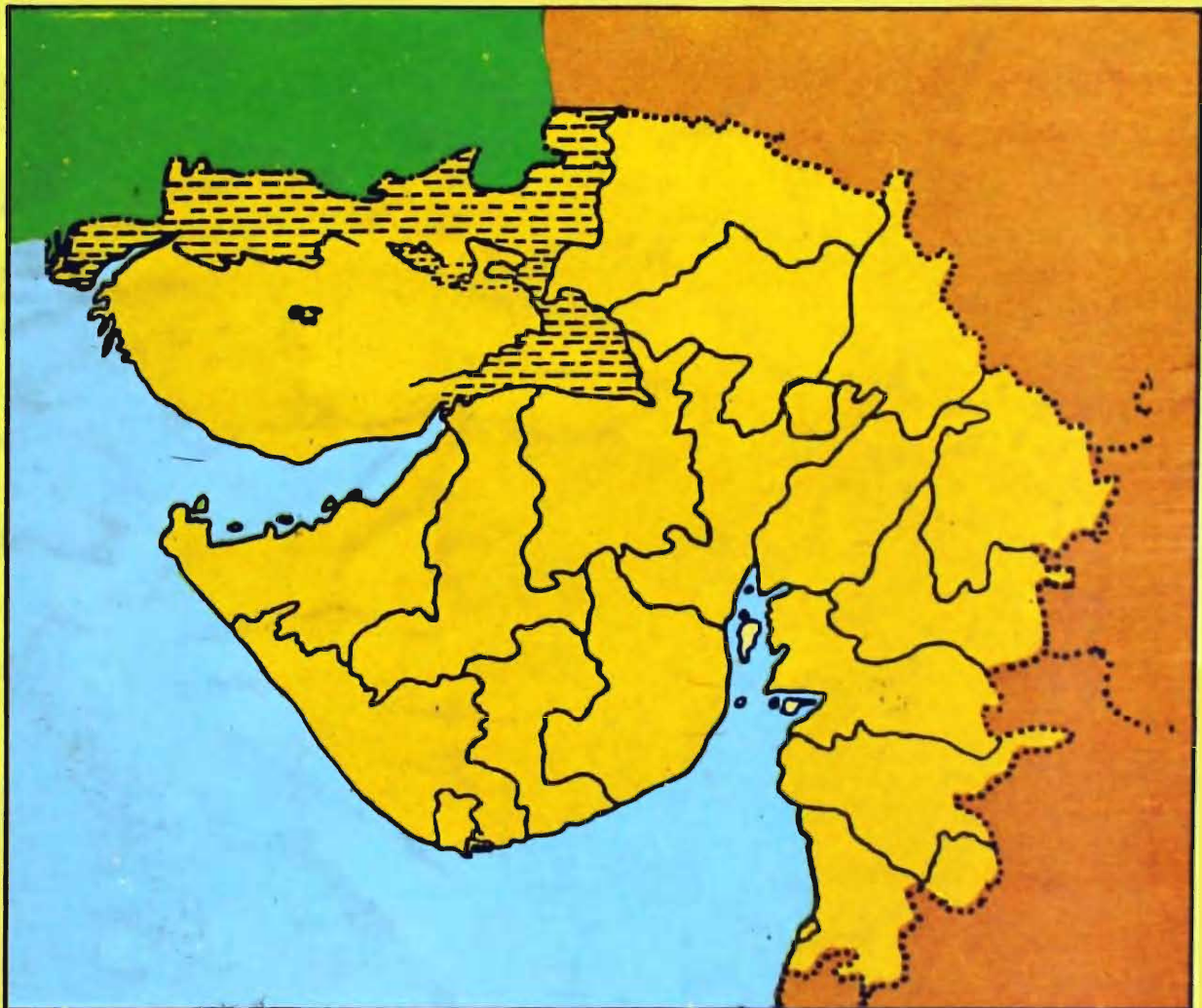


*State fauna series 8*

# FAUNA OF GUJARAT

(Part - 1)

Vertebrates



ZOOLOGICAL SURVEY OF INDIA

*STATE FAUNA SERIES 8*

**FAUNA OF GUJARAT**  
**(PART - I)**  
**VERTEBRATES**

*Edited by*

**THE DIRECTOR**  
**ZOOLOGICAL SURVEY OF INDIA**



**ZOOLOGICAL SURVEY OF INDIA**

**2000**

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Project Co-ordinator  
**Dr. Qaiser H. Baqri**  
Scientist-SF  
*Zoological Survey of India*  
*Jodhpur*

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## PREFACE

The state of Gujarat situated in the north-western region of the Indian subcontinent, is very interesting from the zoological point of view. It has the longest coast line exhibiting a rich mangrove area and a wide variety of corals. The state also has the largest marshy land, the Rann of Kutch which is periodically inundated by marine transgressions. Northern Gujarat is dominated by arid climate and along with the Rajasthan desert, it harbours a number of species showing Saharan affinities. Southern Gujarat falls under sub-humid and humid zone and is mostly inhabited by Peninsular elements. The state also has the distinction of providing the last refuge to two highly threatened mammalian species, the lion in the Gir forest and the wild ass in the little Rann of Kutch. Moreover, the great Rann of Kutch is possibly the only established breeding habitat for the flamingo in India. The state holds a spectacular biodiversity. The Zoological Survey of India has always given prime attention to the fauna of Gujarat. Though much work has been carried out in this connection, yet it was now felt that there was a need to resurvey and compile all data to enable one to get the complete information on the faunal diversity of Gujarat in one place. Hence, under the State Fauna series this is being undertaken for Gujarat.

The present publication is Part I of the *State Fauna Series* of State of Gujarat. This deals with Vertebrates. Part - II will be dealing with the Invertebrate fauna of the State. During the post independence period, the scientists and staff of Zoological Survey of India have carried out a number of surveys to collect all the relevant information from the state. Recently surveys have once again been carried out and the results are presented here. Mammals have been compiled and collated by Dr. S. Chakraborty and Dr. V.C. Agarwal ; Birds by Mr. B.B. Dutta; Reptiles by Dr. R.C. Sharma; Amphibians by Mr. A.K. Sarkar and Mr. S. Ray; Marine and Estuarine Fishes by Dr. R.P. Burman, Mr. P. Mukherjee and Mr. S. Kar; Freshwater Fishes by Mr. T.K. Sen and Mr. P.K. Banerjee. I wish to express my gratitude to all the authors for their hard work. I also wish to express my sincere thanks to the Coordinator of this Volume, Dr. Q.H. Baqri, Joint Director and Officer-in-Charge of Desert Regional Station of ZSI, Jodhpur for the painstaking efforts in compiling all the chapters and to bring them into a unified style.

I hope this volume which forms the baseline data on vertebrate diversity of the State of Gujarat will be very useful for all future workers in the field of Biological Diversity not only from that state but for individual group of fauna.

**Dr. J.R.B. Alfred**  
Director,  
Zoological Survey of India

**FAUNA OF GUJARAT  
PART - I**

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<b>Part 1</b>	<b>2000</b>	<b>1-464</b>
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## INTRODUCTION

KAISER H. BAQRI

*Zoological Survey of India, Desert Regional Station, Jodhpur 342 009*

Naming the organisms and identifying them as friends or enemies must have been the foremost task of the first human on this planet. Since then, the practice of naming the organisms has passed through evolutionary stages and has now formed an independent discipline in life sciences, i.e., taxonomy. According to World Conservation Monitoring Centre (WCMC), about 1,604,000 species of living organisms have been named till date. However, as per estimates of taxonomists, there might be around 10-100 million species on earth. Hence, a majority of species is yet to be discovered and named. Obviously, the organisms of larger size could be sighted and identified first while the smaller organisms, specially having hideous nature, remained unnoticed until efficient magnifying devices were invented. As a result, majority of the unnamed organisms are microorganisms or invertebrates which are very rich in diversity.

In nature, each and every species of plants and animals play an important role in maintaining its ecosystem functional. Unfortunately, rapid depletion of biological resources has been noticed in recent decades mainly due to increased industrialisation, urbanization and demand for food, fodder, wood, clothes, etc. for the increased human and livestock populations. This depletion has led to the destruction or degradation of their natural habitats or ecosystems. This has resulted in the extinction of species, many without being named. Besides, a large number of species are being threatened and are on the verge of extinction. All these factors create an imbalance in the ecosystem. It is now feared that further imbalance will make ecosystems

non-functional and that may lead to the extinction of the human race itself.

In view of the facts mentioned above, a movement of conservation started with a new approach and terminology 'Biodiversity' in 1988. This concept was recommended by the World Commission on Environment and Development (WCED) appointed by General Assembly of the United Nations in 1987 for the conservation of biological resources in the world. This new approach emphasises the conservation of nature for many reasons (ecological, genetic, economic, educational, social, cultural, aesthetic, etc.) instead of conventional approach to protect species by species and protected areas. This is necessary because species do not live in isolation but are dependent on each other. Realising the alarming situation and the importance for maintaining the life sustaining system of each ecosystem, the Global Biodiversity Convention was adopted at the Earth Summit organised by the United Nations on Environment and Development held at Rio de Janeiro in June, 1992.

In order to chalk out any strategy for conservation, the first step is to complete the inventory of species so as to know the richness of species in each biogeographical zone or the administrative unit (district/state). Moreover, for a better planning, we must know what we have lost, what is left and what is to be conserved? Since the plants and animals are now considered as biological resources for which conservation is a must, the information on the distribution of species in each state will also help in the assessment of wealth of these resources. In fact, the database on biodiversity is considered a prerequisite before starting any

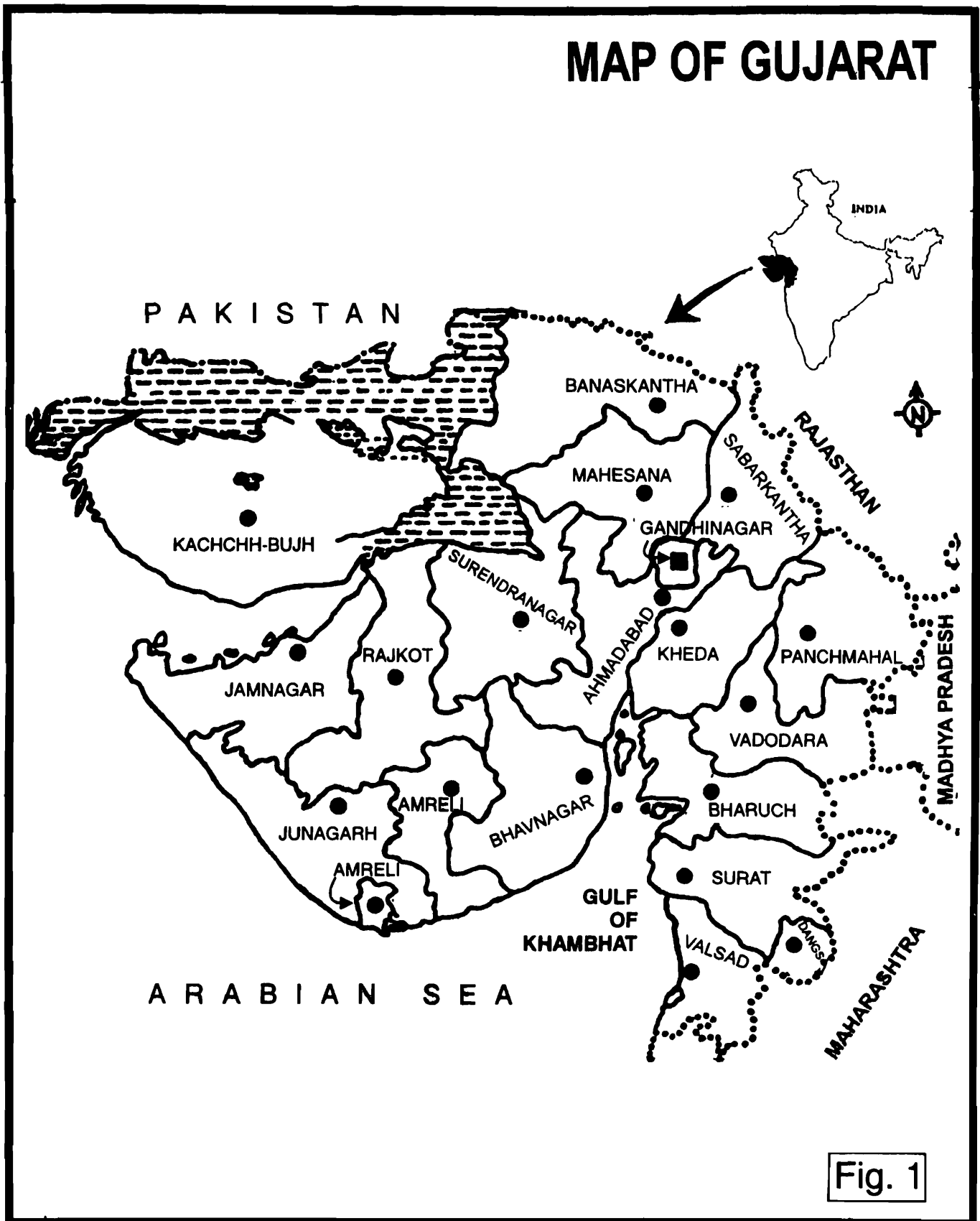


Fig. 1. Map of Gujarat

developmental or industrial project either at district or village level. Such information will also guide us in the sustainable use of any component of biological resource in a way and at a rate that does not lead to the long term decline so that the future generations can also meet their demand, as recommended in the Biological Convention. The tropical countries are generally very rich in biodiversity because of their climatic uniformity. Among these countries, the Indian subcontinent has also exhibited a rich biodiversity. Though India occupies about 2.2% land mass of the world, it represents about 8.4% of the documented biodiversity, i.e., 48000 species of plants and 89451 species of animals.

During the last 52 years (the post independence period), the scientists in Zoological Survey of India (ZSI) and a few other institutes have done significant research work on the identification and distribution of different groups of animals (from Protozoa to Mammalia) in the country. Since a huge wealth of information exists in the Indian Zoological literature, this is the time to collate them and prepare the database of faunal resources. It was therefore, felt necessary that the scattered information in literature on fauna of India should be gathered either state wise or ecosystem wise in separate volumes. In this direction, the ZSI has already undertaken the responsibility to publish '*State Fauna Series*' in order to provide up-to-date information on the faunal resources of each State in the country. Of this *Fauna Series*, No. 8 has been initiated in order to report the known vertebrate and invertebrate species from the State of Gujarat. Though an attempt has also been made by the Gujarat Ecology Commission by publishing the status report on Biological Diversity (plants & animals) of Gujarat in 1996, the present series has been planned to provide detailed information on the systematic position and distribution of animal species, their diagnostic characters, keys for identification, present status, etc. Part-I of the Series deals with the vertebrate species known from Gujarat. Most of the information furnished in the chapters of this volume is based on the observations made by the authors themselves. Before presenting an overview of the fauna of the state, it is important to know about the topography, rivers, biogeography,

physiography, soil, climate, rainfall, vegetation, forests, protected areas, etc. of the State which we are dealing.

## GUJARAT

The State of Gujarat, with 17 administrative districts (now 19), came into existence in May, 1960 (Fig. 1). The state occupies 1,96,024 sq kms area and is situated on the west coast of India between 20° and 25° north latitudes and 68° and 75° east longitude. Gujarat is fringed by the Arabian sea in the west, bordered by Rajasthan in the north-east, Madhya Pradesh in the east and Maharashtra in the south-east and south. The Kutch region of the state in north-west shares the border with Pakistan. The state has administratively been divided into 19 districts and 42 talukas (Fig. 1). As per the 1991 census report, the state of Gujarat is inhabited by more than 41 million people.

**Topography, Biogeography and Physiography** -- The State of Gujarat consists of major and minor peninsulas, gulfs, ranns, creeks, marshes, hills, plateaus and a coastal strip. The two "tongues of water," namely Gulf of Kutch and Gulf of Cambay, enter the landmass to define the peninsula of Kathiawar or Saurashtra. These gulfs have always been very useful from the commercial point of view. The plains in the north are interrupted by Satpura and Vindhya hills while the north-eastern fringe of the state is bordered by Aravalli hills and south-east by the hills of Sahyadri. The Saurashtra peninsula has famous hills of Gir, Girnar, Barda and Shetrunjaya. The Kutch region consists of undulating rocky area with many small hills and the Rann of Kutch lying in the northern part.

Tapti, Narmada, Mahi, Sabarmati and Saraswati form the main draining system into the Arabian Sea. In fact, these rivers are the lifeline for human and animal life in the state. The state also holds a large number of saline and freshwater wetlands (tanks, lakes, dams and reservoirs) ranging from a small area of a few hectares to the large Nalsarovar having an area of 23,582 hectares. Nalsarovar is the largest wetland bird sanctuary in the state and is an important wetland habitat as per Ramsar Convention. It is also included among the 15

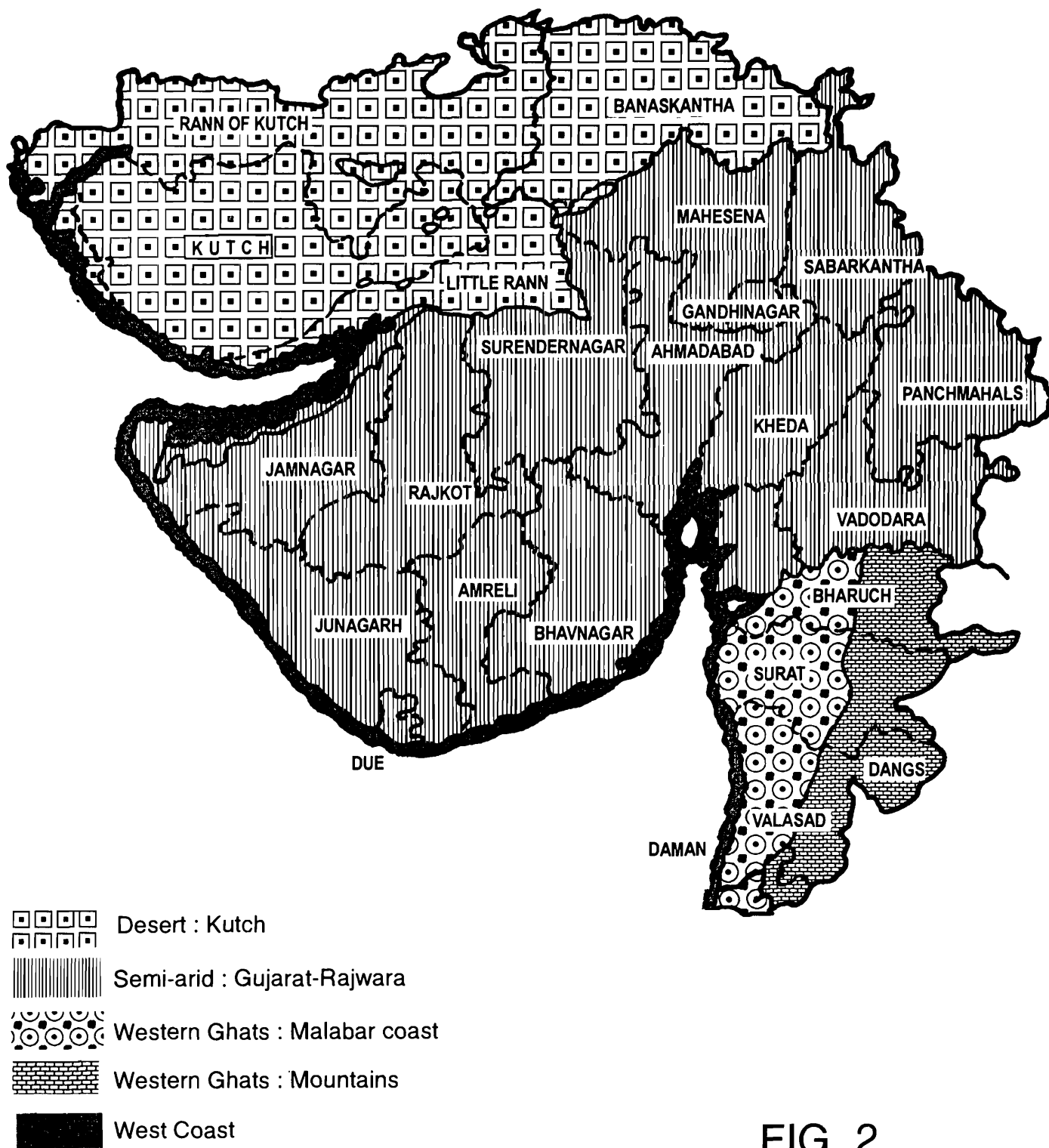


FIG. 2

Fig. 2. The Biogeographical Classification of Gujarat  
(After Biological Diversity of Gujarat, Gujarat Ecology Commission, 1996)

important wetlands of the country identified by the National Wetland, Mangrove and Coral Reef Committee. The water of the rivers and some wetlands is the main source for irrigating the agricultural lands. The construction of Narmada Dam has become a debatable subject at the National level.

Gujarat can also be divided into the following three distinct geomorphological regions : Gujarat Mainland, Saurashtra Peninsula and Kutch Peninsula.

The Gujarat mainland is a rich alluvial terrain between Narmada and Tapti rivers. The region is nearly 120 km wide and extends about 400 kms towards north where it merges with the desert of Rajasthan and Rann of Kutch. Aravalli, Vindhya, Satpura and Sahyadri hills run along the eastern border of this terrain.

The central part of Saurashtra Peninsula forms an elevated table which gradually slopes towards the margins. The sedimentary rocks along the coast form almost a flat land.

The Kutch peninsula falls under the category of Desert Ecosystem which can further be divided into three regions, *viz.*, Kutch, Rann of Kutch and Little Rann. The mainland of Kutch is isolated by Rann of Kutch on the north and east, and by Little Rann on the south-east. The Kutch peninsula is centrally elevated and sloping on all sides. In fact, Kutch has been named because of the typical tortoise-like appearance of this peninsula. According to Geologists, this region was under the ocean during the Pleistocene era as is evident from the highly fossiliferous soil conditions. Interestingly, this peninsula, occupying an area of about 73,600 sq. km. is a micro-zone in itself. Its western periphery can also be classified as coastal desert. Due to its low lying nature, the marine water floods a fairly vast area into a marshy land. As a result, the waters and soils are extremely saline. The important rivers draining into Rann of Kutch are the Luni, the Rakhari, the Bhukhi, the Banas, the Nachhu and the Demi. All these rivers have their origin in the Aravalli. From November to March, the Rann is a barren tract of dry salt-encrusted mud whereas during the other half of the year it is flooded by the water of rivers.

According to the classification of biogeographical zones in India (Rodgers and Panwar, 1988), the state of Gujarat consists of

the following zones (Fig. 2) :

1. The Indian Desert : Kutch
2. The Semi-arid zone : Gujarat Rajwara
3. The Western Ghats : Malabar Coast and Western Ghat Mountains
4. The Coast of India : West Coast

According to Gujarat Ecology Commission (1996), the Western Ghats in Gujarat may further be divided into Malabar coast and the Mountains. Amongst the Indian states, Gujarat has the longest coastline, i.e., more than 1,600 kms.

However, on the basis of climate, rainfall, soils and topography, Gujarat state can also be divided into eight agro-climatic zones (Table-I, Fig. 3).

**Soils** : Soil varies not only from zone to zone but also within the same zone, i.e., medium black to deep black alluvium, red, grey brown alluvium, coastal alluvium, calcareous medium black, sandy, sandy loam, etc. (Table-I).

**Climate** : Nearly 25% in western part is arid, 34% in north is semi-arid and 50% in the middle Gujarat is arid/semi-arid. Nearly 20% of the total area of the state is drought prone. Zone-wise information on climate is seen in Table-I. Three seasons are distinct, *viz.*, winter, summer and monsoon. Generally, winter is severe and the summer is harsh, because the Tropic of Cancer passes through the northern border of Gujarat, except in the coastal tract. The hottest months are April and May while the coldest are December and January. During summer, the central and northern parts are hottest where the maximum temperature may rise up to 44.5°C while in the southern parts the temperature remains lower (38°C). The winter in the northern parts is also severe.

**Rainfall** (Fig. 3, Table-I) : The monsoon season is generally from June to September. The heaviest rainfall is invariably recorded in July. The average rainfall of the state is about 800 mm and varying from 340-1800 mm in the different zones. The Ghat regions of Bhusar and Dang districts receive the maximum rainfall while the minimum is in the Kutch region. In the Bhal region, the soil becomes saline and the land becomes marshy during monsoon, though

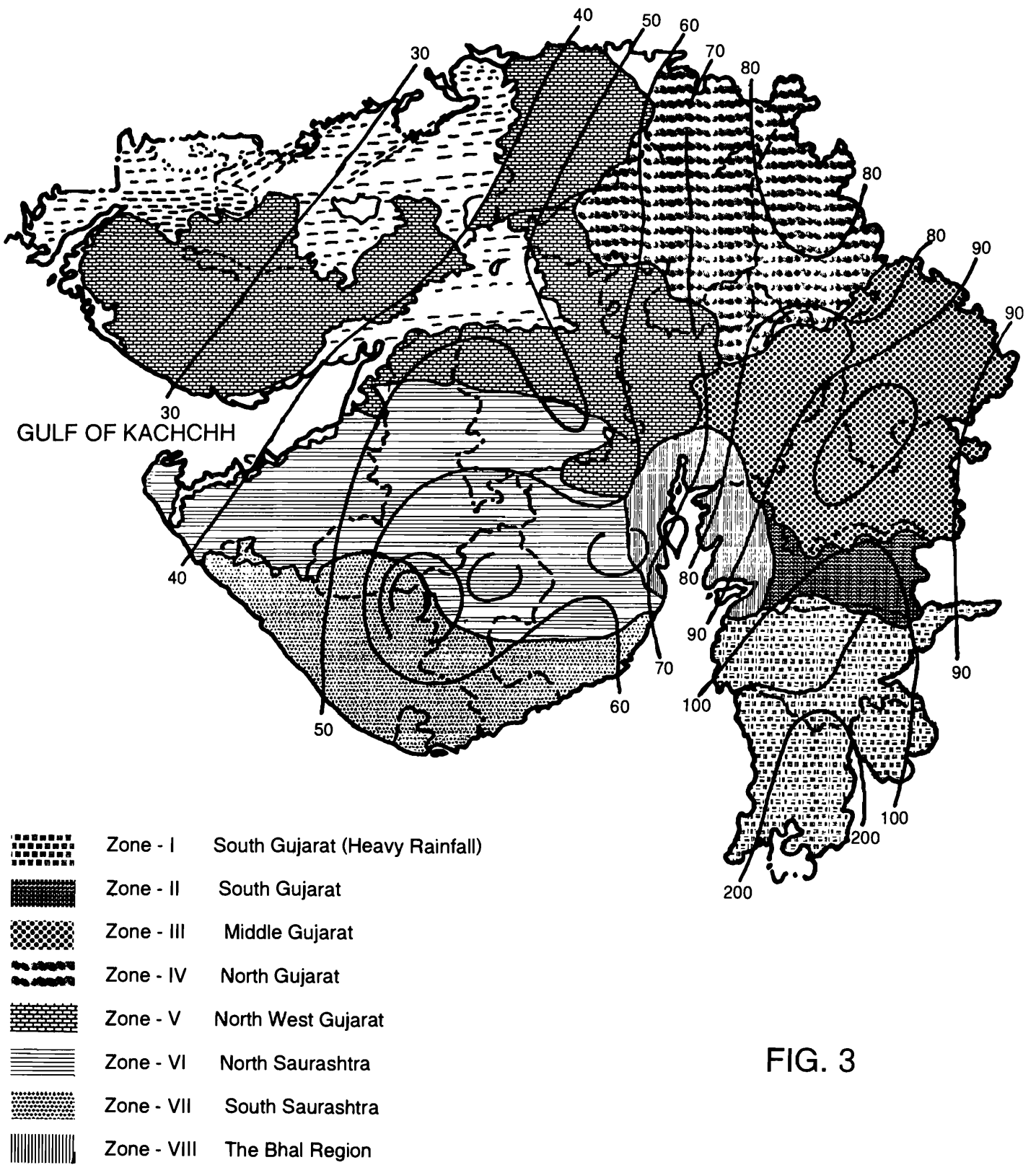


FIG. 3

Fig. 3. Agro Climatic Zones and Rainfall Pattern  
(After Gujarat Ecology Commission, 1996)

Table 1. Agro-climatic Zones of Gujarat

Sl. No.	Zones	Districts	Average Rainfall in mm.	Climate	Soils
1.	Southern hills	Dangs, Bular	1793	Semi-arid dry sub-humid	Deep black, coastal alluvium
2.	Southern Gujarat	Surat, Bharuch	974	-do-	-do-
3.	Middle Gujarat	Baroda, Kheda, Panchmahals	904	Semi-arid	Medium black
4.	North Gujarat	Ahmedabad, Gandhinagar, Mahesana, Sabarkantha, Banaskantha	735	Arid to semi-arid	Gray brown coastal alluvium
5.	North West arid	Kutch	340	Arid	Gray brown Deltaic alluvium
6.	North Saurashtra	Amreli, Bhavnagar, Jamnagar, Rajkot, Surendranagar	537	Semi-arid	Medium black calcareous
7.	South Saurashtra	Junagarh	844	Dry sub humid	Coastal alluvium Medium black
8.	The Bhal Region	Two talukas each in Ahmedabad, Bhavnagar and Bharuch, Khambhat taluka in Kheda district	700	Dry sub humid and marshy during monsoon	Calcareous soil

(After Gujarat Ecology Commission, 1996)

the rainfall is up to 700 mm. The salinity is mainly due to the clayey soil which prevents the percolation of water.

**Vegetation** : The wide fluctuations in climate, soil, topography, etc. have resulted in a great variation in the pattern of vegetation. Out of the total land mass in the state, only about 12% area is under irrigation. About 5.2% of the area is utilised as permanent pasture and grazing land and 5.4% remains under fodder crops. The total area under forests in Gujarat is about 18,707 sq. kms which is about 9.53% of the area of the state. Nearly 30% of the forests in Gujarat are found in Dangs, Surat, Valsad and Bharuch districts which receive high rainfall.

The forests in the state may be grouped into the following categories, viz., Tropical moist deciduous forest, dry deciduous forest (dry teak forest and dry non-teak forest), scrub forest and mangrove forest.

(i) *Tropical moist deciduous forests* -- These are found in areas where the average

rainfall is more than 1250 mm, viz., southern most hilly portion of the state comprising Bular, Dangs and Surat districts. Top layer trees are more than 8 m tall and shed their leaves during March and April while middle and ground layer cover generally remain green. These forests are dominated by *Tectona grandis*, *Acacia chundra*, *Anogeissus latifolia*, *Butea monosperma*, *Dendrocalamus strictus*, *Diospyros melanoxylon*, *Mitragyna parvifolia*, *Terminalia crenulata*, etc. The middle layer trees and shrubs are 2-8 m tall and remain fairly green.

(ii) *Dry deciduous forests* -- All the trees are deciduous during the dry season. These can further be divided into 'dry teak forests' and 'dry non-teak forests' The former type occurs in Rajpipla, Chhotaudepur, Panchmahal, Sabarkantha in north, and Junagadh and Amereli districts in Saurashtra. The 'dry non-teak forests' are found in some parts of Banaskantha district in north Gujarat and Rajkot district in Saurashtra.

(iii) *Scrub forests* -- These forests occur in plains from Bulsar to Saurashtra and Kutch in arid and semi-arid zones where the average rainfall is low. The vegetation is very thin consisting of xerophytic trees and shrubs. The trees are generally 5-11 m in height. The typical trees of the scrub forests are *Acacia nilotica*, *A. senegal*, *Balanites aegyptiaca*, *Capparis sepiaria*, *Dichrostachys cineria*, *Zizyphus nummularia*, etc.

(iv) *Mangrove forests* -- These plants can be seen in the 10-13 km wide zone along the coastline at some parts. This vegetation can also be divided into salt marshy zone and low lying muddy shores and sandy saline areas. The mangroves are dominated by *Avecennia marina*, *A. officinale*, *Acanthus ilicifolius*, *Aegiceras corniculata*, etc. In all, 27 species of mangroves have been recorded from about 1600 km long coastline of Gujarat.

The growth of *Casuarina equisetifolia* and *Prosopis juliflora* has taken the shape like man made forests along the coastal strips and at desert borders of Kutch. Vegetation is also specific along river banks, roads, in ponds, ditches, etc. A large number of grasses are found as natural fodder plants. The scientists of Gujarat Ecology Commission in *Biological Diversity of Gujarat : Current Knowledge* (1996) have listed all the species of economically important cereals, pseudo cereals, pulses, vegetables, fruits, flowers, fodder, spices and condiments, oil yielding, fibre yielding, bidi wrappers, timbers, medicinal, narcotics, and miscellaneous types (grasses, hedges, climbers, creepers, etc.) of plants found or grown in Gujarat. However, the names of the important agricultural crops, vegetables and fruits are listed below :

*Triticum aestivum* (wheat), *Oryza sativa* (rice), *Zea mays* (maize), *Pennisetum americanum* (Bajri), *Pennisetum typhoides* (Pearl millet), *Avena sterilis* (animated oat), *Setaria italica* (fox tail millet), *Hordeum vulgare* (barley), *Sorghum bicolor* (sorghum), *Cajanus cajan* (pigeon pea), *Cicer arietinum* (gram), *Lablab purpureus* (sem), *Lathyrus sativus* (pea), *Pisum sativum* (sweet pea), *Vigna aconitifolia* (moth bean), *V. angularis* (adzuki bean), *V. radiata* var. *radiata* (mung), *Abelmoschus esculentus* (lady's finger), *Brassica oleracea* (cauliflower), *B. oleracea* (cabbage), *Solanum tuberosum* (potato), *Lycopersicon lycopersicum* (tomato), *Beta vulgaris* (beet root), *Cucumis sativum* (cucumber), *Annona reticulata* (custard apple), *Daucus carota* (raddish), *Capsicum annum* (chilli), *Allium sativum* (garlic), *Citrullus lanatus* (water melon), *Arachis hypogaea* (ground nut), *Sesamum indicum* (til), *Gossypium herbaceum* (cotton), *Hibiscus cannabinus* (sun hemp), *Nicotiana tobacum* (tobacco), *Carica papaya* (papaya), *Musa paradisiaca* (banana), *Psidium guajava* (guava), etc.

According to Gujarat Ecology Commission, 53 species of plants are rare/endemic, of which majority is found in Kutch area.

*Protected areas and their important features* (Table-II)

The rapid rate of depletion/extinction of biological resources is a global concern and compels the urgent action for their conservation. As one of the steps in this direction, the Government of Gujarat has

Table II. Protected Areas (PA) of Gujarat (After Ecology Commission of Gujarat, 1996)

Region	Geographical Area sq. km.	Forest Area sq. km.	Forest Cover sq. km.	PA area sq. km	Biogeographical province of PA
Saurashtra	64335	4484.89	2346	2466.37	Gujarat-Rajwara and Western Coast
Kutch	45652	2860.61	1252	12903.92	Indian Desert
North Gujarat	29120	2945.46	1455	729.73	Gujarat-Rajwara
Central Gujarat	33210	3274.83	1645	306.85	Gujarat-Rajwara
South Gujarat	23703	5813.00	5346	792.50	Western Ghats
		(5142.01)		(768.67)	
				17322.27	
				(17199.41)	

declared 21 protected areas (four National Parks and 17 Wildlife Sanctuaries) in all the biogeographical zones. (Table-II).

**National Parks** : Gir National Park (for lion), Marine National Park (for Corals), Velavadar National Park (for black buck), Bansda National Park.

**Sanctuaries** : Gir wildlife sanctuary, Narayan Sarovar Chinkara sanctuary, Nal Sarovar wildlife sanctuary, Khejadiya wildlife sanctuary (for birds), Barda wildlife sanctuary, Hingolgarh wildlife sanctuary (nature & education), Jessore wildlife sanctuary (for sloth bear), Purna wildlife sanctuary, Dhrangadhra wildlife sanctuary, Gaga Great Indian Bustard sanctuary, Velavadar wildlife sanctuary, Rajmahal wildlife sanctuary, Dumkal wildlife sanctuary, Marine sanctuary, Wild Ass sanctuary, Shoolpaneshwar wildlife sanctuary and Ratanmal sloth bear sanctuary.

Gujarat is the first state in India to declare a Marine National Park for the conservation of marine life in the Gulf of Kutch, specially for all the coral species in the park (district Jamnagar). Amongst the protected areas of Gujarat, Wild Ass sanctuary in Little Rann of Kutch and Gir sanctuary and National Park in Junagarh district are of great significance because these are the last abode of two important endangered endemic mammal species, i.e., the Wild Ass and the Asiatic Lion. The Wild Ass sanctuary also inhabits two vulnerable species, viz., the Wolf and the Chinkara. The Gir National Park is the largest compact tract of dry deciduous forests in the semi- arid western part of the country. This rich biodiversity protected area supports several threatened/endangered species, viz., lion, leopard, jungle cat, hyaena, jackal, mongoose, civet cat, desert cat, rusty spotted cat, chital, sambar, four- horned antelope, chinkara, wild boar, pangolin, etc. Crocodiles, star tortoise, monitor lizard and some snakes are also abundantly found in the park. The Gir sanctuary and national park jointly occupy about 1412 sq. km area. Shoolpaneswar wildlife sanctuary, Marine National Park, and Dang Forest are classified as unique and rich biodiversity area. The Gaga Great Indian Bustard sanctuary has specially been declared for the conservation of the Great Indian Bustard, an endangered majestic bird of this region. North arid zone of

Kutch supporting the spiny tailed lizard (*Uromastix hardwickii*) is also considered a unique biodiversity area.

Besides these important animals, the protected areas in Gujarat have significant populations of black buck, dolphins, whales, sloth bear, houbara, lesser florican, and crocodile. In Great Rann of Kutch, between Khadir and Pahchhm belt, is located the flamingo city which is Asia's only long-term breeding site for flamingos.

## FAUNA

The analysis of Indian Zoological literature reveals that the fauna of Gujarat state shows a spectacular biological diversity. Realising the importance of great diversity of the ecosystems in Gujarat (from lush green Western Ghats to arid Thar desert), Zoological Survey of India established its regional station, Desert Regional Station, at Jodhpur in 1960 with the objective to study the fauna of Gujarat and Rajasthan states. During the last 40 years, a number of survey parties, comprising specialists of different groups of animals from the Desert Regional Station as well as the Headquarters, have conducted several faunistic surveys in different ecosystems of Gujarat State. Apart from the scientists of Zoological Survey of India, the diversity of Gujarat fauna has also attracted many scientists from other institutes. However, the contribution of the following is worth mentioning : Stoliczka (1872), Anderson (1877), Murray (1886), Blanford (1888), Hornell (1909), Wroughton (1912), Lyon (1913), McCann (1938a, 1938b), Pocock (1939), Acharya (1949), Kapadia (1951), Ranade (1952), Smith (1953), George (1955), Ali (1956), Dharamkumarsinhji (1956), Day (1958), Soman (1960), Daniell & Shull (1963), Ramachandran (1973), Patel & Chhaya (1979), Soota *et al.* (1981), Rao & Soota (1981), Sharma (1982), Monga & Naoroji (1984), Pillai & Patel (1988), Daniel & Sekar (1991), Dutta (1992), Deesai *et al.* (1993), Naik *et al.* (1993, 1993), Naik & Vinod (1992, 1993, 1994), Pandey & Fursich (1993), Vyas (1995), Bhutani *et al.* (1995), etc.

In 1996, the scientists of Gujarat Ecology Commission in "*Biological Diversity of Gujarat, Current Knowledge*" have compiled

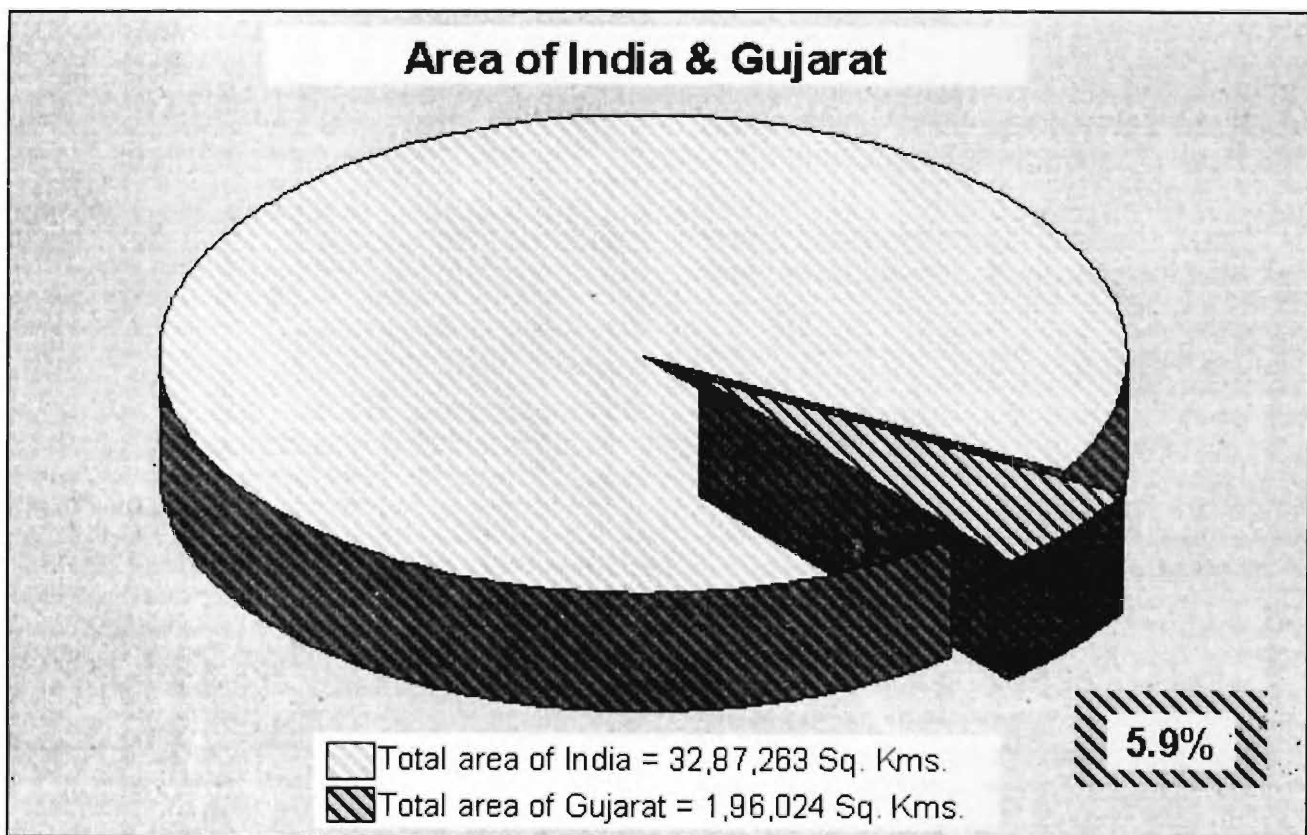
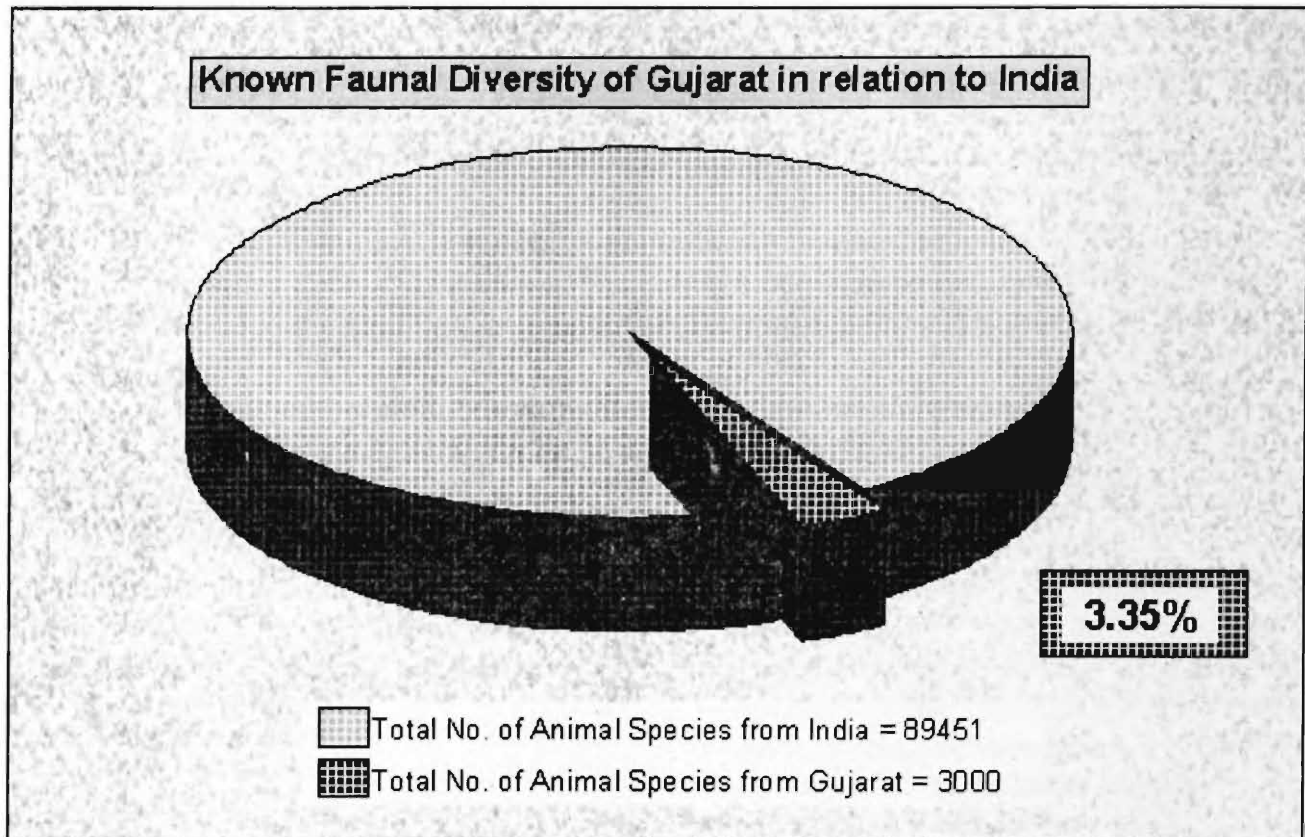


Fig. 4.

information on biological diversity of Gujarat. According to this publication, 2720 species of different groups of animals (from Protozoa to Mammalia) have been reported from Gujarat till 1996 against 77452 known species from India. Like other states of India, the vertebrate fauna is more or less known to us while many groups of invertebrates are either unknown or insignificantly explored in Gujarat. As per report of Gujarat Ecology Commission, out of 2720 species, 985 species are vertebrates and the rest are invertebrates. In other words, the vertebrate species of Gujarat are about 36% of the total state fauna and nearly 20.5% of Indian vertebrates. Amongst the invertebrates, the species of Ctenophora, Platyhelminthes, Nematoda, Kinorhyncha, Gastrotricha, Acanthocephala, Onychophora, Arthropoda, Entoprocta, Chaetognatha and Echinodermata are either unknown or insignificantly explored. Surprisingly, our knowledge of the important phylum Arthropoda is so poor that only 743 species are known against about 68400 species from India, i.e., only about 1.1% of Indian arthropods.

Alfred (1998) has recently estimated about 89450 known species from India and our analysis on Gujarat fauna reveals that the number of reported species from Gujarat is about 3000 species. It means, we know about 3.35% fauna of India in Gujarat whereas the state occupies about 5.9% area of the country (Fig. 4). As per latest information furnished by Alfred (1998) and the estimate in the present publication, the known species of vertebrates from India and Gujarat are 4833 and 1266 respectively, i.e., the state represents about 26.19% diversity of Indian vertebrates (Fig. 5).

Part - I of the *State Fauna Series of Gujarat*, No. 8 reports almost all the known species of vertebrates from the state. Attempts have been made to provide brief description, information

on the distribution, key characters and up-to-date references on each species reported. Gujarat Ecology Commission had reported only 69 species of mammals whereas S. Chakraborty and V.C. Agarwal (the authors of the Chapter on mammals in this volume) have reported 101 species and subspecies, i.e., 26% of Indian mammals. These species/subspecies belong to 68 genera, spread over 33 families under 12 orders. The chapter contributed by B.B. Dutta on birds reports 452 species while Gujarat Ecology Commission has reported 454 species. These 452 known species from Gujarat belong to 228 genera of 59 families under 17 orders. This diversity of birds comes to about 36.6% of the species recorded from India. Gujarat Ecology Commission has reported 78 species of reptiles from the state, out of 428 species from India. However, R.C. Sharma in the present publication reports 89 species of 61 genera under 20 families of 4 orders, i.e., 17.3% of reptilian fauna of India. Out of 2546 known species of fishes from India, only 364 species were mentioned by Gujarat Ecology Commission (1996) from Gujarat. Significant contribution has now been made in the present publication by the ZSI scientists either by adding new records or reporting from literature. The present publication comprises a chapter contributed by A.K. Sarkar and S. Ray on amphibians of Gujarat. Sarkar and Ray have reported only 18 species whereas 19 species have been mentioned in the publication by Gujarat Ecology Commission. These 18 species of amphibia (8.6% of Indian amphibians) belong to 9 genera, 5 families and 2 Orders. The present volume reports 606 species in two chapters on fishes, i.e., freshwater and marine water fishes separately. The former group is represented by 119 species

Table III. Diversity in different groups of vertebrates in Gujarat

Class	Orders	Families	Genera	Species
MAMMALIA	12	33	68	101
AVES	17	59	228	452
REPTILIA	4	20	61	89
AMPHIBIA	2	5	8	18
PISCES	34	136	317	606
i. Freshwater	8	24	60	119
ii. Marine	26	112	257	487

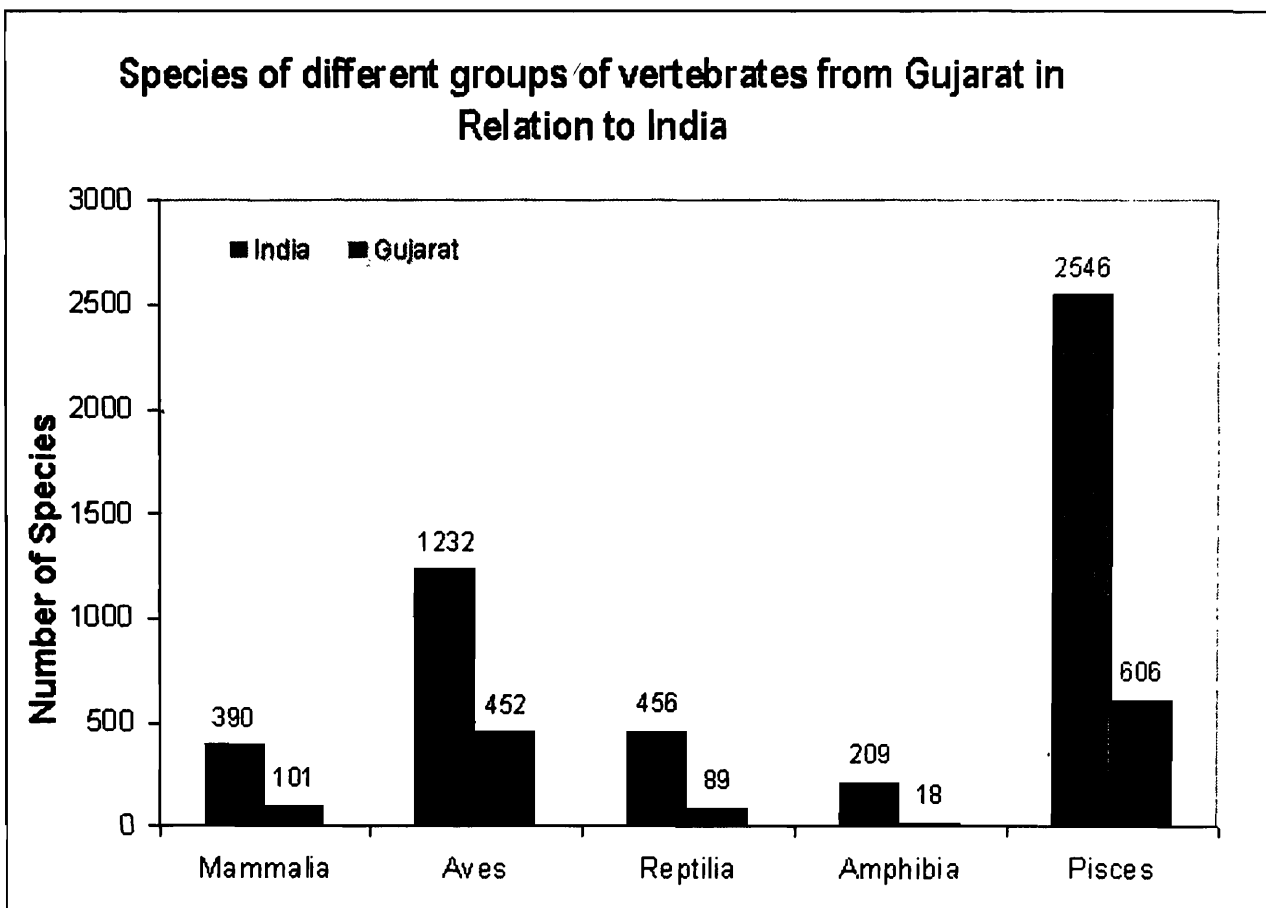
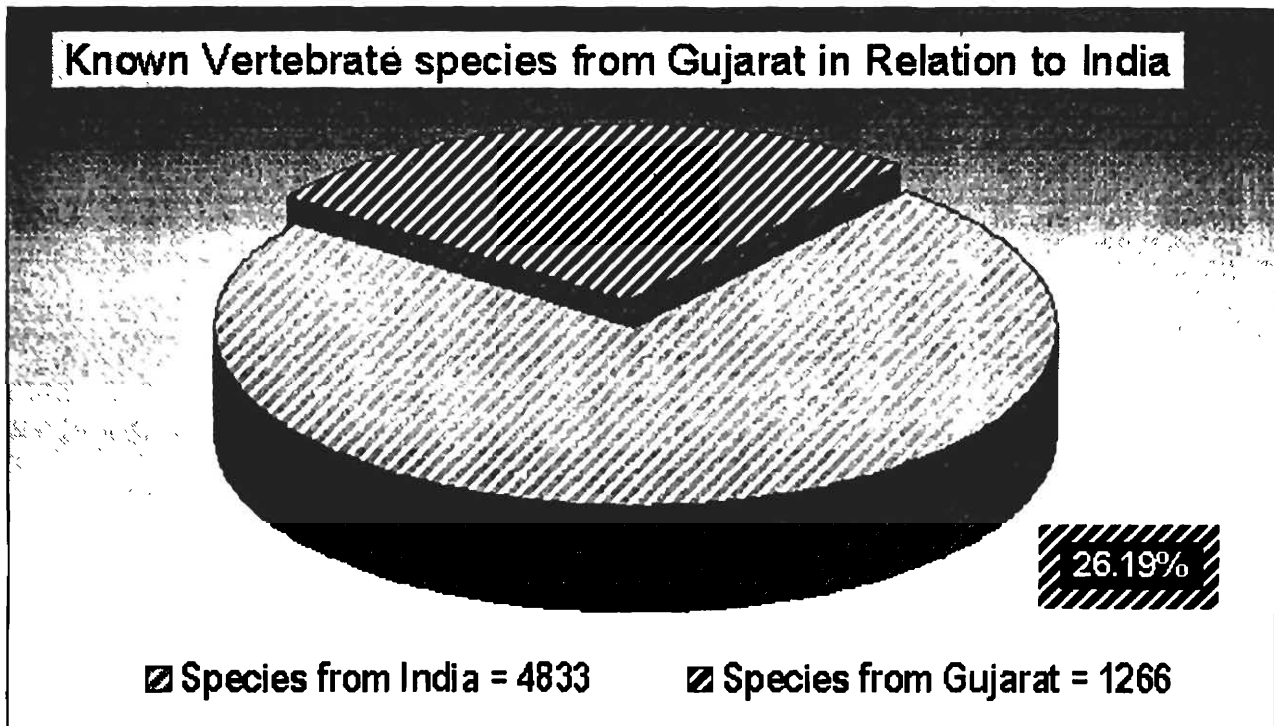


Fig. 5.

belonging to 60 genera and 24 families of 8 Orders. Of these freshwater fishes, 25 species have been recorded by T.K. Sen and P.K. Banerjee for the first time from Gujarat state. The chapter contributed by R.P. Burman, P. Mukherjee and S. Kar on fishes from marine and estuarine ecosystems reports 487 species under 257 genera, spread over 112 families of 26 Orders. This combined diversity of fishes in the state has been assessed to be about 23.8% of the total Indian fishes.

The information on vertebrate diversity in terms of different taxa from Gujarat has been summarised in Table - III. The known diversity under each Class of vertebrates from the state has been compared with the country (Fig. 5). The present volume of State Fauna Series of Gujarat reports 1266 species of vertebrates as against 985 species reported in *Biological Diversity of Gujarat, Current Knowledge* (1996), i.e., 281 more species of vertebrates from Gujarat.

## ACKNOWLEDGEMENTS

I am deeply indebted to Dr. J.R.B. Alfred, Director, Zoological Survey of India for providing valuable suggestions, guidance and all facilities during the publication of the present volume. It is my pleasant duty to acknowledge my sincere thanks to the authors (Dr. S. Chakraborty, Dr. V.C. Agarwal, Mr. B.B. Dutta, Dr. R.C. Sharma, Mr. T.K. Sen, Mr. P.K. Banerjee, Dr. R.P. Burman, Mr. P. Mukherjee, Mr. S. Kar, Mr. A.K. Sarkar and Mr. S. Ray) who have contributed the chapters in this volume. I acknowledge my sincere thanks to Dr. I. Prakash, Professor of Eminence, presently continuing his research at DRS, ZSI, Jodhpur after retirement from CAZRI; Dr. A.G.K. Menon and Dr. R.S. Pillai, Retired Joint Directors, Zoological Survey of India for the comments on the manuscripts contributed by the specialists in this publication. I am also thankful to Mr. V. Muraleedharan, Stenographer and Mr. Himmat Singh, Ex- Senior Research Fellow, DRS, ZSI, Jodhpur for assisting me sincerely during the process of publication.

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## MAMMALIA

S. CHAKRABORTY & V.C. AGRAWAL

*Zoological Survey of India, Calcutta*

### INTRODUCTION

Our knowledge on the mammalian fauna of Gujarat was enriched mainly by the contributions of Stoliczka (1872), Anderson (1877), Blanford (1888-91, 1897), Wroughton (1911, 1912a, 1912b, 1912c, 1918a, 1918b), Lyon (1913), Ryley (1913, 1914a, 1914b, 1914c), Thomas (1916), Winter-Blyth (1955), Ellerman (1961), Silas (1961), Berwick and Jordan (1971), Oza (1974), Rashid (1977), Dharam Kumar Sinhiji (1978), Sinha (1981a), Ranjitsinh (1982, 1985), Himmatsinghji (1978), Chavan (1987), Chakraborty (1993) and Prakash (1994). However, most of the above works dealt with the mammalian fauna of a particular group or region. Moreover, during the last few decades rapid extension of agricultural land due to improved irrigation system has changed the ecological conditions in many parts of the State. This, in turn, affected the earlier composition and distribution of the mammalian fauna of the State. In the present paper, an attempt has been made to provide a complete account of the mammalian fauna of the State along with their district-wise distribution, identification keys, population status and ecological and taxonomic notes.

The present account is based mainly on the collections and observations made during the surveys of the State (1958- Junagadh, 1964 Kachchh, Sabarkantha; 1966 Rajkot, Surendra nagar, Jamnagar; 1975 Mahesana; 1976-Vadodara, Kheda, Bharuch, Surat; 1988 -Bhavnagar; 1990 Amdavad, Surendranagar, Rajkot, Jamnagar, Bharuch, Surat, Dangs, Valsad; 1991 Vadodara, Junagadh, Amreli) by the Zoological Survey of India. Earlier collections made by the Bombay Natural

History Society's Mammal Survey in the State and incorporated in the National Zoological Collection have also been included for the study. Species recorded in literature but not present in the National Zoological Collection, are also dealt with.

Measurements of Insectivora, Chiroptera and Rodentia are taken after Roonwal (1949), Khajuria (1952) and Ellerman (1961) respectively. Those of Carnivora and Primates are taken after Pocock (1939, 1941) and some are self-explanatory. Unless otherwise mentioned all measurements in the text are given in millimetre.

### ABBREVIATIONS

Following abbreviations have been used in the text for different measurements.

*apf* = length of anterior palatal foramen

*b* = length of bulla

*cr* = cranial rostrum

*c<sup>1</sup>-c<sup>1</sup>* = distance between outer surface of upper canines

*cw* = cranial width

*cb* = condylobasal length

*d* = length of diastema

*E* = ear

*Fa* = length of forearm

*F & Cl* = length of foot and claw

*fr* = frontal width

*H & B* = length of head and body

*Hf* = length of hindfoot

*iw* = least interorbital width

*l* = greatest length of skull

*mtr* = length of maxillary toothrow

*m<sup>1</sup>-m<sup>1</sup>* = distance between outer surface of first

upper molars

$m^2-m^2$  = distance between outer surface of second upper molars

$m^3-m^3$  = distance between outer surface of third upper molars

$ml$  = length of mandible

$mw$  = maxillary width

$m_1$  = length of lower first molar

$n$  = nasal length

$onl$  = occipitonasal length

$orb$  = length of orbit

$pow$  = post- orbital width

$pm^4$  = length of 4th upper premolar

$pl$  = length of palate

$Tb$  = length of tibia

$Tl$  = length of tail

$zw$  = zygomatic width

### SYSTEMATIC LIST OF MAMMALS FROM GUJARAT

Order Insectivora

Family Erinaceidae

1. *Paraechinus micropus micropus* (Blyth)

2. *Hemiechinus auritus collaris* (Gray)

Family Soricidae

3. *Suncus murinus sindensis* (Anderson)

4. *Suncus murinus blanfordi* (Anderson)

5. *Suncus stoliczkanus subfulvus* (Anderson)

Order Chiroptera

Family Pteropodidae

6. *Rousettus leschenaulti leschenaulti* (Desmarest)

7. *Pteropus giganteus* (Brunnich)

8. *Cynopterus sphinx sphinx* (Vahl)

Family Rhinopomatidae

9. *Rhinopoma microphyllum kinneari* Wroughton

10. *Rhinopoma hardwickei hardwickei* Gray

Family Emballonuridae

11. *Taphozous perforatus perforatus* Geoffroy

12. *Taphozous longimanus longimanus* Hardwicke

13. *Taphozous nudiventris kachhensis* Dobson

14. *Taphozous melanopogon* Temminck

15. *Saccolaimus saccolaimus crassus* (Blyth)

Family Megadermatidae

16. *Megaderma lyra* Geoffroy

Family Rhinolophidae

17. *Rhinolophus lepidus lepidus* Blyth

18. *Hipposideros speoris speoris* (Schneider)

19. *Hipposideros fulvus pallidus* Anderson

20. *Hipposideros galeritus brachyotus* (Dobson)

Family Molossidae

21. *Tadarida aegyptiaca thomasi* Wroughton

Family Vespertilionidae

22. *Pipistrellus mimus* Wroughton

23. *Pipistrellus ceylonicus indicus* (Dobson)

24. *Pipistrellus coromandra coromandra* (Gray)

25. *Scotozous dormeri* Dobson

26. *Scotophilus kuhli kuhli* Leach

27. *Scotophilus heathi heathi* (Horsfield)

Order Scandentia

Family Tupaiidae

28. *Anathana ellioti* Wroughton

Order Primates

Family Cercopithecidae

29. *Macaca Mulatta mulatta* (Zimmermann)

30. *Presbytis entellus entellus* (Dufresne)

Order Pholidota

Family Manidae

31. *Manis crassicaudata* Gray

Order Carnivora

Family Canidae

32. *Canis lupus pallipes* Sykes

33. *Canis aureus aureus* Linnaeus

34. *Vulpes vulpes pusilla* Blyth

35. *Vulpes bengalensis* (Shaw)

36. *Vulpes cana* Blanford

37. *Cuon alpinus dukhunensis* (Sykes)

Family Ursidae

38. *Melursus ursinus ursinus* (Shaw)

Family Mustelidae

39. *Mellivora capensis indica* (Kerr)

40. *Lutra perspicillata* Geoffroy

Family Viverridae

41. *Viverricula indica indica* (Desmarest)

42. *Paradoxurus hermaphroditus* (Pallas)

Family Herpestidae

43. *Herpestes auropunctatus pallipes* (Blyth)

44. *Herpestes edwardsi nyula* (Hodgson)

45. *Herpestes edwardsi ferrugineus* Blanford

Family Hyaenidae

46. *Hyaena hyaena hyaena* (Linnaeus)

Family Felidae

47. *Felis silvestris ornata* Gray  
 48. *Felis chaus kutas* Pearson  
 49. *Felis caracal schmitzi* Matschie  
 50. *Felis bengalensis bengalensis* Kerr  
 51. *Felis rubiginosa rubiginosa* Geoffroy  
 52. *Panthera pardus fusca* (Meyor)  
 53. *Panthera tigris tigris* (Linnaeus)  
 54. *Panthera leo persica* (Meyor)  
     Order Perissodactyla  
     Family Equidae  
 55. *Equus onager khur* Lesson  
     Order Artiodactyla  
     Family Suidae  
 56. *Sus scrofa cristatus* Wagner  
     Family Cervidae  
 57. *Muntiacus muntjak* (Zimmermann)  
 58. *Axis axis axis* (Erxleben)  
 59. *Cervus unicolor niger* Blainville  
     Family Bovidae  
 60. *Tetracerus quadricornis* (Blainville)  
 61. *Boselaphus tragocamelus* (Pallas)  
 62. *Gazella bennettii* (Sykes)  
 63. *Antilope cervicapra* (Linnaeus)  
     Order Lagomorpha  
     Family Leporidae  
 64. *Lepus nigricollis dayanus* Blanford  
     Order Rodentia  
     Family Sciuridae  
 65. *Petaurista petaurista philippensis* (Elliot)  
 66. *Funambulus pennanti* Wroughton  
 67. *Ratufa indica dealbata* Blanford  
     Family Hystricidae  
 68. *Hystrix indica* Kerr  
     Family Muridae  
 69. *Gerbillus nanus nanus* Blanford  
 70. *Gerbillus gleadowi* Murray  
 71. *Tatera indica indica* (Hardwicke)  
 72. *Meriones hurrianae* (Jerdon)  
 73. *Vandeleuria oleracea oleracea* (Bennett)  
 74. *Millardia meltada pallidior* Ryley  
 75. *Millardia gleadowi* (Murray)  
 76. *Rattus rattus narbadae* Hinton  
 77. *Rattus rattus rufescens* (Gray)  
 78. *Rattus rattus alexandrinus* (Desmarest)  
 79. *Golunda ellioti gujerati* Thomas  
 80. *Cremnomys cutchicus cutchicus* Wroughton  
 81. *Mus musculus tytleri* Blyth  
 82. *Mus saxicola sadhu* (Wroughton)  
 83. *Mus phillipsi* Wroughton  
 84. *Mus booduga booduga* (Gray)  
 85. *Mus dunni* (Wroughton)  
 86. *Bandicota bengalensis bengalensis* (Gray)  
 87. *Bandicota indica indica* (Bechstein)  
 88. *Nesokia indica* (Gray)  
     Order Cetacea  
     Family Balaenidae  
 89. *Eubalaena australis* (Desmoulins)  
     Family Balaenopteridae  
 90. *Balaenoptera musculus* (Linnaeus)  
 91. *Megaptera novaeangliae* (Borowski)  
     Family Delphinidae  
 92. *Delphinus delphis* Linnaeus  
 93. *Globicephala macrorhynchus* Gray  
 94. *Peponocephala electra* (Gray)  
 95. *Orcinus orca* (Linnaeus)  
 96. *Pseudorca crassidens* (Owen)  
 97. *Sousa chinensis* Osbeck  
 98. *Tursiops truncatus* (Montagu)  
     Family Phocaenidae  
 99. *Neophocaena phocaenoides* (Cuvier)  
     Family Physeteridae  
 100. *Kogia breviceps* (Blainville)  
     Order Sirenia  
     Family Dugongidae  
 101. *Dugong dugon* (Muller)

## SYSTEMATIC ACCOUNT

### Order INSECTIVORA

Small-sized; long, pointed snout projecting far beyond the lower jaw; limbs as a rule short, five-toed and their gait almost plantigrade. Orbits open posteriorly; true molars studded with sharp, pointed cusps. Nocturnal and mainly insectivorous.

Order Insectivora is represented in Gujarat by two families.

## Key to the families of order INSECTIVORA

- Back and sides covered with spines; crown of first and second upper molars with a central fifth cusp..... Erinaceidae
- Back and sides covered with soft hairs; central fifth cusp absent..... Soricidae

## Family ERINACEIDAE

Two genera occur in Gujarat.

## Key to the genera of family ERINACEIDAE

- Spines on the forehead divided by a longitudinal naked furrow.....*Paraechinus*
- No distinct parting of the spines on the forehead .....*Hemiechinus*

Genus *Paraechinus* Trouessart, 1879

The genus *Paraechinus* is represented by a single species in Gujarat.

1. *Paraechinus micropus micropus* (Blyth)

1846. *Erinaceus micropus* Blyth, *J. Asiat.Soc. Beng.*, 15 : 170 (Bhawalpur, Punjab).

1970. *Paraechinus intermedius* Biswas and Ghosh, *Mammalia*, 34 : 469 (Jodhpur, Rajasthan).

**Common names** : Indian Hedgehog (Eng.); Kantachua, Kanderna, (Hin.) ; Servo, Sewra (Guj.)

**Material examined** : Banaskantha district : 1F, Deesa, coll. C.A. Crump, 2.i.1913. Kachchh district : 1M, 1F (Holotype and Paratype of *P. intermedius*), Bhuj, coll. C.A. Crump, 23. vii. 1911, 30. viii. 1911; 1M (Paratype of *P. intermedius*), Nanda, coll. C.A. Crump, 13. ix. 1911. Junagarh district : 1F, coll. C.A. Crump, 1.x.1912. Rajkot district; 2F, coll. C.A. Crump, 19. xii. 1912, 2.1.1913.

**Measurements**: External : 2M : H & B 150, 150; Tl 12, 13; Hf 24, 25; E 29. 29. 5F : H & B 158-198 (176); Tl 12-16 (15); Hf 24- 28 (26.5); E 29-33 (30.5). Cranial: 1M : l 38.1; cb 38; pl 21.5; cw 21.8. 5F : l 38.8-44.5 (42.5); cb 38.7-44 (42.1); pl 21.5-22.5 (24); cw 21.8-23.5 (22.8).

**Diagnosis** : Tip of spine creamy white; upper part of face and cheek grayish white, with variable but characteristic masked pattern; limbs, belly, muzzle and areas around eyes clothed with reddish brown hairs.

**Distribution** : India : Gujarat : Banaskantha district (Ryley 1914c), Junagadh district (Ryley 1913), Kachchh district (Wroughton 1912c), Rajkot district (Ryley 1913), Surendranagar district (Ryley 1913), Punjab; Rajasthan. Pakistan.

**Remarks** : Fairly common, but difficult to observe due to strictly nocturnal habit. Burrowing animal (Krishna and Prakash 1955), spends the day in burrows deep inside the bushes or takes shelter under bush (Roberts 1977). Preys upon insects and smaller vertebrates. Foxes and jackals are its main predators. According to local reports, it was once very common, but now the extensive cultivation and use of random pesticides have reduced its population.

Biswas and Ghosh (1970) described *P. intermedius* as new to science occurring partly sympatrically with *P. micropus*. They distinguished it by a combination of characters, such as body size, shape of ears, dorsal and throat coloration, etc. However, on an examination of those characters, nothing specially distinct could be found between *P. micropus* and *P. intermedius*. Biswas and Ghosh (1970) regarded *P. intermedius* as smaller (H & B 2M : 150, 150, 1F : 158) than *P. micropus* (H & B 4M : 159- 171, 4F : 160-195). However, in the population of *P. micropus* from Sind, head and body length ranges from 130 to 195, averaging 155.5 (Roberts 1977) which overlaps with that of *P. intermedius*. Further, Corbet (1978), Honacki *et al.*, (1982) regarded *P. intermedius* as synonym of *P. micropus*. We are also of the same opinion.

Genus *Hemiechinus* Fitzinger, 1866

The genus *Hemiechinus* is represented by one species in Gujarat.

2. *Hemiechinus auritus collaris* (Gray)

1830. *Erinaceus collaris* Gray, *Ill. Indian Zool.* 1, pl. 8.

1878. *Erinaceus blanfordi* Anderson, *J. Asiat Soc. Beng.* 47 : 2 (Rohri, Sukkur, Pakistan).

*Common names* : Long-eared Hedgehog (Eng.) : Kantachua, Kanderna (Hin.); Servo, Sewra (Guj.).

*Material examined* : Banaskantha district : 1M, Deesa, coll. C.A. Crump, 2.v.1913. Kachchh district : 1M, Bhuj, coll. B.N.H.S. , 23. vii. 1911.

*Additional material examined* : Pakistan : Sukkur district : 1 subad M (Syntype of *E. blanfordi*), Rohri, coll. W.T. Blandford, 22.iii. 1877.

*Measurements* : External : 2M : H & B 181, 197; TI 20, 25; Hf 32, 33; E 32,-.

*Diagnosis* : Spines wholly black distally. Ears long, subequal to hindfoot. Tail stumpy. General colour blackish with whitish face and few dark brown or grayish black hairs. Light coloured individual along with white colour also met with.

*Distribution* : India : Gujarat: Amdavad district, Amreli district, Banaskantha district (Ryley 1914c), Bhavnagar district, Junagadh district, Kachchh district (Wroughton 1912c), Mahesana district, Rajkot district and Surendranagar district; Himachal Pradesh; Punjab; Rajasthan. Afghanistan and Pakistan.

*Remarks* : Once fairly common but at present its population has declined to a great extent due to agro-climatic changes. Nocturnal, spends day time in short or long (30 to 150 cm) self dug burrows under deep bush. Its habit of self-anointing is often responsible for the damage of bushes in the desert region.

In many areas, local people reported the occurrence of two types of hedgehogs, one dark and another light coloured in the same ecological zone. Thus, it is obvious that the Long-eared Hedgehog and the Indian Hedgehog occur sympatrically in true sense.

'*Erinaceus blanfordi*' was treated as a subspecies of *Paraechinus hypomeles* (Brandt) by Ellerman and Morrison-Scott (1951). Agrawal (1974) on examination of the syntype of *E. blanfordi* found it to be a species of *Hemiechinus* and put it under *H. auritus collaris*. However, Roberts (1977) followed Ellerman and Morrison-Scott (1951) without referring Agrawal (1974) and considered *P.h.*

*blanfordi* as "small hedgehog equal in size to *H. auritus* but having the parting in the species on the forecrown" In the syntype of *E. blanfordi*, present in the National Zoological collection, no sign of parting in the spines on the forecrown is evident Thus, inclusion of *blanfordi* under the genus *Hemiechinus* by Agrawal (1974) is quite justified. However, present syntypic specimen is not as black as the typical *H.a. collaris* as some of the spines have pale tips. These pale tips of spines may be attributed to the age of the animal, and thus, *blanfordi* is regarded as a synonym of *H.a. collaris*

### Family SORICIDAE

Family Soricidae is represented by only one genus in Gujarat.

### Genus *Suncus* Ehrenberg, 1833

Three species of the genus *Suncus* occur in Gujarat.

#### Key to the species and subspecies of the genus *Suncus*

1. Head and body length 60 to 71.  
.....*S. stoliczkanus subfulvus*
- Head and body length over 93. ....2
2. Dorsum lighter in shade, hairs being basally dark gray, apically Raw umber or Tawny.....*S. murinus sindensis*
- Dorsum darker, hairs being basally Mouse Gray, apically Mummy Brown  
.....*S. murinus blanfordi*

#### 3. *Suncus murinus sindensis* (Anderson)

1877. *Crocidura (Pachyura) sindensis* Anderson, *J. Asiat. Soc. Beng.*, 46 : 266 (Karachi, Pakistan).

*Common names*: House shrew (Eng.); Chuchundar (Hin.); chuchunda, Andhi-chuchunda (Guj.).

*Material examined* : Amdavad district; 2M, 3F, Nandol Dahegam, c 29 km NE Amdavad, coll. S.- Chakraborty, 8/11.iv.1990. Amreli district: 1F, Dhari, c 65 km E. Junagarh, coll. S.

Chakraborty, 4.xi.1991; 1M, 1F, Khodiyar Dam, 12 km NW Dhari, coll. S. Chakraborty, 4. xi. 1991. Banaskantha district : 2F, Danta, coll. C.A. Crump, 5/7. vii 1913. Jaminagar district: 4M, 2F, Okha Port, coll. S. Chakraborty, 26/27. iv. 1990. Junagadh district: 1M, 1F, Jasadhar, c 80 km SE Junagadh, coll. B. Biswas, S. Chakraborty, 8.ii.1958, 31. x.1991; 2M, 2F, Kudia, coll. C.A. Crump, 1/3. xii.1912; 2M, 1F, Sasan, c 56 km S Junagadh, coll. C.A. Crump, 5/6 xi. 1912; 5M, Sasan Gir, c 57 km S Junagadh, coll. S. Chakraborty, 29.x.1991; 1M, Talala, c 11 km E Sasan Gir, coll. C.A. Crump, 28.x.1912. Surendranagar district: 1M, 1F, Dhrangadhra, c 36 km N Surendranagar, coll. S.Chakraborty, 21.iv 1990; 5M, 4F, Limbdi, c 28 km SE Surendranagar, coll. S. Chakraborty, 14-18. iv. 1990. Vadodara district; 2M, 1F, Shankheda, c 66 km SE Vadodara, coll. S.Chakraborty, 23/24.x. 1991.

**Measurements** : External : 24M : H & B 98-135 (114); T1 59- 95(73); Hf 16-25 (19); E 10-13(11.5). 17F : H & B 96-130 (109); T1 65-85(69); HF 13-20(16.5); E 7-12 (10.5). Cranial: 9M : *l* 27.9- 33(33.4); *cb* 26.9-32 (30.5), *pl* 13-15.1 (13.7); *cw* 11.4- 13.1 (12.2); *mtr* 12.8-15.2(13.8). 4F: *l* 28.1-31.9 (29.7); *cb* 27.4-31.3 (28.9); *pl* 12.1-14.3 (13.1); *cw* 11.3-12.9 (11.8); *mtr* 12- 13.8(12.9).

**Diagnosis** : Hairs short, dense, velvety. snout mobile, long, pointed; ears with distinctive folds within the conch; tail much shorter than head and body, thickened at base then gradually tapering, sparsely covered with whitish hairs; eyes very small.

**Distribution** : India : Gujarat: Amdavad district, Amreli district, Banaskantha district, Jamnagar district, Junagadh district (Lindsay 1929), Kachchh district (Lindsay 1929), Rajkot district, Surendranagar district and Vadodara district; Rajasthan. Pakistan.

**Remarks** : Most common in the houses, drains, gardens and also in fields adjacent to the residential areas, but not in forested tracts. Lives in small holes, crevices of rocks and walls, below the garbage, bushes or litters; often makes nest with leaves, papers, feathers, clothes and many other household material. Almost omnivorous in habit and plays an important role in the biological control of

various insects and mice. However, it causes considerable nuisance by its urine, musk and faecal matter. Pregnant females with 3-5 foetuses were caught in April and October.

Dorsal hairs relatively larger than in *S.m. blanfordi*. Snout very long and in most specimens tip of snout bends down at right angle to the nasal. Tail muscular and roundish in male, but in female almost devoid of muscle and squarish in cross section, at least in the basal region. Tail slightly bicolour, particularly in female, being darkish above and pale below. On average, females are smaller than males.

#### 4. *Suncus murinus blanfordi* (Anderson)

1877. *Crocidura (Pachyura) blanfordi* Anderson, *J. Asiat. Soc. Beng.* 46:269 (Khandalla, Maharastra, India).

**Common name** : As in previous subspecies.

**Material examined** : Bharuch district: 2F, Jhagadiya, c 22 km E Bharuch, coll. S. Chakraborty, 3/6.x.1990; 1F Netrang, c 60 km E Bharuch, coll. S.Chakraborty, 7.x.1990. Dangs district: 2M, 2F, Ahwa, coll. S. Chakraborty, 16-19.x.1990; 1F, Waghai, c 30km N.W. Ahwa, coll. S. Chakraborty, 19.x.1990. Surat district; 1F, Mandvi, c 65 km E Surat, coll. S. Chakraborty, 12.x.1990.

**Measurements** : External : 2M : H & B 118, 139; T1 62, 72; Hf 19, 20; E 7, 10, 8. 8F: H & B 96-128 (112); T1 58-92(67); Hf 14-21 (18); E 8-12 (10). Cranial : 2F : *l* 30. 2, 32; *cb* 29.4, 31.6; *pl* 13.6, 13.9; *cw* 12.1, 13.4; *mtr* 13.5, 13.9. 4F : *l* 27.9-30.6 (28.9); *cb* 26.7- 29.8 (28); *pl* 11.1-14.1 (12.5); *cw* 11-12.2 (11.5); *mtr* 11.9-13.3(12.5).

**Diagnosis** : Very similar to *S.m. sindensis* but dorsum distinctly darker and whitish hairs on tail relatively short.

**Distribution** : India: Gujarat: Bharuch district, Dangs district, Surat district and Valsad district; Karnataka and Maharastra.

**Remarks** : Fairly common. Found in and around residential areas as well as in the agricultural fields. Food habit, nest and sexual dimorphism similar to that of previous subspecies. Pregnant females with three

foetuses were found in November. According to Lindsay (1929) and Ellerman and Morrison-Scott (1951), this subspecies occurs in Western Ghats and Deccan areas. Present series extends its range further north to Gujarat. It appears that in Gujarat, *S.m.blanfordi* is restricted to relatively moist south and southeastern region, while *S.m.sindensis* in relatively dry and arid eastern, central, western and northern region.

In most of the cities of Gujarat, specimens of house shrew of much larger size than the above two subspecies had frequently been observed on the roadside at night but could not be trapped. Most likely, those specimens belong to *S.m.caerulescens* (Shaw), and were transported there through human agency.

#### 5. *Suncus stoliczkanus subfulvus* (Anderson)

1877. *Crocidura (Pachyura) subfulva* Anderson, *J. Asiat. Soc. Beng.*, 46 : 278 (Kachchh, Gujarat, India).

*Common name* : Anderson's shrew (Eng.).

*Material examined* : Surendranagar district: 1M, 1F, Dhrangadhra, c 36 km N Surendranagar, coll. C.A. Crump, 24.i.1913.

*Measurements* : External : 1M : H & B 60; T1 38; Hf 9.9; E 8. Crainial: 1M : *l* 16+ ; *cb* 15 + ; *pl* 7.6; *cw* 7.4; *mtr* 7.3.

*Diagnosis* : Small-sized. Length of head and body less than 71. Dorsum light fawn, venter pale grayish. Snout rather short, ears flattened above.

*Distribution* : India: Gujarat: Kachchh district (Anderson 1877) and Surendranagar district (Ryley 1913). Pakistan.

*Remarks* : Not very common. Lives away from human habitation in under stones, logs or litters. Omnivorous. Breeds throughout the year except the coolest two or three months (Roberts 1977).

### Order CHIROPTERA

The second largest and by far the most distinctive Order of mammals, having membranous wings for true flight. Fingers

enormously developed to support wings. Nocturnal.

Two clearly defined suborders, viz., Megachiroptera and Microchiroptera are recognised and both are well represented in Gujarat.

#### Suborder Megachiroptera

Second finger usually bearing a claw; margin of ears forming a complete ring. Angular process of mandible broad and low or almost absent; bony palate continues behind the last molar; molar teeth marked with longitudinal furrow.

Represented by only one family Pteropodidae.

#### Family PTEROPODIDAE

The family is represented by three genera in Gujarat.

#### Key to the genera of family PTEROPODIDAE

1. No tail; neck and shoulder generally paler than back. .... *Pteropus*
- A short tail present; dorsum of one colour throughout..... 2
2. Five teeth in upper molar series and six in lower..... *Rousettus*
- Four teeth in upper molar series and five in lower..... *Cynopterus*

#### Genus *Rousettus* Gray, 1821

The genus *Rousettus* is represented by one species in Gujarat.

#### 6. *Rousettus leschenaulti leschenaulti* (Desmarest)

1820. *Pteropus leschenaulti* Desmarest, *Encycl. Meth. Mammal.*, 1 : 110 (Pondicherry, India).

*Common names* : Indian Fulvous fruit Bat (Eng.); Chamo Chiria (Guj.).

*Material examined* : Bharuch district: 3F, Jhagadiya, c 22 km S Bharuch, coll. S. Chakraborty, 7.x.1990.

*Measurements* : External: 3F : Fa 74.2, 76.5, 79.5; E 17.5, 18.5, 19.5; Tb 32.5, 34.3, 35.7; F & Cl 18.5, 19.5, 22.7. Cranial: 3F : l 35.5, 37.4, 37.5; cr 10.5, 11, 11.2; mtr 13.9, 14, 15.5,  $c^1 c^1$  7, 7.5, 7.5; cw 15, 15.3, 15.7;  $m^2 - m^2$  10.5-11.2; ml 26.3, 28.5, 28.5.

*Diagnosis* : A medium-sized bat, head and body on average 131, with large head and elongated dog-like muzzle; tail vestigial, length averaging 14. Body fur short, dorsally with rufescent tone and ventrally pale brown; a collar of radiating hairs with paler bases present on the lower neck and shoulder region. Second phalanges of third digit less than 40.

*Distribution* : India: Gujarat: Amdavad district (Brosset 1962a) Bharuch district (Sinha 1981a), Surat district and Vadodara district (Brosset 1962a); widely distributed throughout the mainland. Pakistan (Mirza 1965), Sri Lanka (Sinha 1969), Nepal, Bhutan (Chakraborty 1975), Myanmar, Southern China (Wang *et al.* 1962), Tibet (Cai and Zhang 1980), Hongkong, Thailand, Laos (Phillips 1967), possibly Cambodia (Rookmaaker and Bergmans 1981) and Vietnam.

*Remarks* : Common in the relatively moist southeastern part of the State. Old buildings, rock crevices or caves are used as roosting places and often roosts with other microchiropteran species (Mirza 1965, Roberts 1977, Sinha 1981a).

All the specimens of the present series were collected in mist nets placed in front of a banana garden just after the dusk. Teats prominent in all three, but none was pregnant or lactating. A roost was observed in a dry well at Valod, Surat. Owners of the orchards reported that this species could be seen only in the fruiting season.

#### Genus *Pteropus* Brisson, 1962

The genus *Pteropus* is represented by one species in Gujarat.

#### 7. *Pteropus giganteus* (Brunnich)

1782. *Verperilio gigantea* Brunnich, Dyreness Historie, 1 ; 45 (Bengal = West Bengal, India).

*Common Names* : Indian Flying Fox (Eng.); Vagol, Whoewanga (Guj.).

*Material examined* : Rajkot district : 1M, Rajkot, coll. C.A. Crump, 20.xii. 1912; Sabarkantha district: 1F, Kankrol, c 7 km SE Himmatnagar, coll. R.N. Bhargava, 7.xi.1964.

*Measurements* : External : 1F : Fa 173; E 36 : F & Cl 57. Cranial : 1M : l 74.5; cr 25.4; mtr 28.2;  $c^1 c^1$  13.7; cw 25.2;  $m^1 - m^1$  21.5; ml 60.1.

*Diagnosis* : Largest bat of the Indian Subcontinent, head and body length averaging 265. Brightly coloured, rufous brown around the head and neck, orange or honey coloured band across the upper back. Head long with dog like-muzzle; nostrils neither raised nor divided by any internal groove. No tail.

*Distribution* : India : Gujarat: Throughout the State in suitable areas; widely distributed in India including Andamann Islands. Pakistan, Sri Lanka, Nepal, Bangladesh and Myanmar.

*Remarks* : Common, particularly in relatively moist areas. Gregarious; roosts mainly in large trees with thick foliage, particularly near some ponds or lakes. Sinha (1981a) reported colonies of 100 to 500 individuals, but largest colony observed by us was at Nandal Dahegam, Amdavad. About 170 animals were roosting in three tamarind trees around a pond. The smallest colony observed was of 14 animals in a neem tree at Limbdi, Surendranagar. From the local reports, it becomes obvious that some of the colonies are permanent, while others are seasonal. Colonies formed of single sex though reported in Gujarat (Crump in Ryley 1914c) but we could found only mixed colonies. Copulation was observed in October-November, however, young were noticed in summer as well as winter.

This species though causes considerable damage to the orchards yet roosts are well-protected by the local people in all the areas except in some parts of Dangs district

where its flesh is eaten by tribals. Again, a good number of it die by being electricuted in the overhead wires.

So far, *Pteropus giganteus* was recorded from Kachchh, Junagadh, Rajkot, Sabarkantha, Banaskantha, Vadodara and Surat districts of Gujarat (Wroughton 1912c Ryley 1913, 1914c, Sinha 1981a). However, the present species occurs throughout the State.

#### Genus *Cynopterus* Cuvier, 1824

The genus *Cynopterus* is represented in Gujarat by one species.

#### 8. *Cynopterus sphinx sphinx* (Vahl)

1797. *Vespertilio sphinx* Vahl, Skr. Nat. Selsk. Copenhagen, 4 (1) : 123 (Tranquebar, Tanjavar, Tamil nadu).

*Common names* : Short-nosed Fruit Bat (Eng.); Chamo chiria (Guj.).

*Material examined* : Banaskantha district: 1M, Danta, coll. C.A.crump, 6. vii. 1913. Bharuch district: 4M, 5F, 1 juv F, Jhagadiya, c 22 km S Bharuch, coll. S. Chakraborty, 6/7. x. 1990; 1M, Netrang, 60 km E Bharuch, coll. S. Chakraborty, 7.x.1990. Dangs district: 7M, 9F, Ahwa, coll. S. Chakraborty, 17/19. x. 1990; 1M, 1F, Mahal Dangs, coll. S. Chakraborty, 17. x. 1990; 3F, Waghai, c 30 km NW Ahwa, coll. S. Chakraborty, 19.x.1990. Surat district : 1F, Unai, coll. S. Chakraborty, 14.x.1990; 3M, 3F, Valod, 52 km E Surat, coll. S. Chakraborty, 11-13.x.1990. Valsad district: 1F, Vansda National Park, 40 Km SE of Valod, coll. S. Chakraborty, 13.x.1990.

*Measurements* : External : 15M : Fa 68.1-78 (74); E 17.7-21.9 (20); Tb 25.4-31.8 (29); F & Cl 14.5-21 (17). 25F : Fa 66-80 (73); E 17.5-22.5 (20); Tb 24.1-31.5 (29); F & Cl 16-20 (18). Cranial : 5M 1 35-35.7 (35.5); cr 9.1-10.5 (9.6); mtr 11.3-12.5 (12); c c 6.9-7.7 (7.4); cw 14.5-14.7 (14.6); m<sup>l</sup>-m<sup>l</sup> 8.2-12 (9.9); ml 23.8-26 (25.1). 8F : 1 29.6-34 (32.6); cr 7.4-10.5 (9.2); mtr 9.3-12.0 (11.5); c c 5.6-7.0 (6); cw 12-14.6 (13.9); m<sup>l</sup>-m<sup>l</sup> 8.1-12.0 (9.8); ml 22-26.6 (24.1).

*Diagnosis* : Smallest of the three fruit eating bats of Gujarat, head and body length on average 110. Nostril at the tip of slightly

bifurcated fleshy projections; upper lip deeply grooved down the centre. Dorsum gray or grayish brown, venter paler; margin of ears white. Tail vestigial, rod like.

*Distribution* : India: Gujarat: Amdavad district, Banaskantha district (Ryley 1914c), Bhavnagar district, Bharuch district, Dangs district, Kheda district (Brosset 1962a). Panchmahal district, Sabarkantha district, Surat district (Sinha 1981a), Vadodara district and Valsad district; Widely distributed throughout the mainland. Pakistan, Sri Lanka, Nepal, Bangladesh and Myanmar.

*Remarks* : Most common in the eastern part of the State. About 100 individuals were found entangled in a mist net placed in the banana garden at Jhagadiya. Roosts of single as well as cluster of 2-8 individuals were observed in the folds of leaves of banana, coconut and palm trees at Jhagadiya and Ahwa. A roost of one individual was also noticed in a hole of wooden light post at Ahwa. Though occur in small number in the roosts, but in the foraging ground they congregate in large number.

Specimens collected in July are lighter in shade than the October specimens.

In Gujarat, this species is hitherto known from Banaskantha, Kheda and Surat districts (Ryley 1914c, Sinha 1981a). Present observation and collection show that *C.s. sphinx* is much more widely distributed particularly in the eastern part.

This species was found to be the most serious pest of banana crop, along the bank of Narmada river particularly at Bharuch district. Reports of damage of mature fruits were received from other districts also. Farmers, occasionally adopt several indigenous methods, such as netting, drumming, explosion of crackers etc. to protect the crops but with a little success. However, before adopting a more effective method of control, its role in the pollination and dispersal of seeds (McCann 1940) should also be taken into consideration.

#### Suborder *Microchiroptera*

Second finger without a claw; margin of ears not forming a complete ring. Angular process of mandible long and narrow. Crown of

molar teeth with transverse furrow. Bony palate not extending behind the last molars.

All the six families of Microchiroptera occurring in India are well represented in Gujarat.

#### Key to the families of Microchiroptera of India

1. Both nose leaf and tragus present.....Megadermatidae
- Either nose leaf or tragus present but not both.....2
2. A nose leaf present but no tragus.  
.....Rhinolophidae
- A tragus present but no nose leaf.....3
3. Tail entirely enclosed in interfemoral membrane.....Vespertilionidae
- Distal portion of tail free from interfemoral membrane.....4
4. Tail emerging from upper surface of interfemoral membrane.  
..... Emballonuridae
- Tail emerging from the end of the interfemoral membrane.....5
5. Tail very long and slender.  
.....Rhinopomatidae
- Tail comparatively short and stout.  
.....Molossidae

#### Family RHINOPOMATIDAE

Family Rhinopomatidae contains a single genus *Rhinopoma*.

#### Genus *Rhinopoma* Geoffroy, 1818

As regards the number of species and subspecies under the genus *Rhinopoma* and key to their identification a lot of literature have been accumulated (Jerdon 1874, Blanford 1888-91, Wroughton 1912 b, 1918b, Ellerman and Morrison Scott 1951, Aellen 1959, Felton 1962, Brosset 1962a, Prakash 1963, Rosever 1965, Siddique 1970, De Blase *et al.* 1973, Sinha 1980). However, Corbet (1978) and Honacki *et al.* (1982) recognised altogether

three species, viz. *R. microphyllum* (Brunnich) *R. hardwickei* Gray and *R. muscatallum* Thomas under the present genus. Of the three species, first two species are represented in India as well as in Gujarat. On an examination of the material from Gujarat present in the National Zoological Collection it becomes obvious that relatively larger *R. microphyllum kinneari* Wroughton and smaller *R.h. hardwickei* Gray occur sympatrically and have some overlapping characters.

#### Key to the species of genus *Rhinopoma* occurring in India

- Larger, forearm 57.5 to 75; tail relatively shorter being on average 80 percent of forearm length. Rostrum with ill defined narial swelling.  
.....*R. microphyllum kinneari*
- Smaller, forearm 54.5 to 64; tail relatively larger, being on average 85 percent of forearm length. Rostrum with prominent narial swelling  
.....*R. hardwickei hardwickei*

#### 9. *Rhinopoma microphyllum kinneari* Wroughton

1912. *Rhinopoma kinneari* Wroughton *J. Bombay nat. Hist. Soc.* 21 : 767 (Bhuj, Kachchh, Gujarat).

*Common names* : Larger Rat-tailed Bat (Eng.); Chamda (Guj.).

*Material examined* : Junagadh district : 4M, Junagadh, coll. C.A. Crump, 22/25. ix. 1912. Kachchh district : 2M, Kachchh, coll. F. Stoliczka, 1872. Vadodara district : 1M, 2F, Vadodara, coll. R.V. Shah, 1970.

*Measurements* : External : 3M : Fa 67.1, 70.1, 71.5, T1 48; 51.2; 53.9; E 19 19.6, 22.1; Tb 26, 26.5, 28.9, F & CI 16.9; 17, 17.2. 2F : Fa 62, 62; T1 41, 48.2; E 16.9, 20 ; Tb 24.6, -; F & CI 15.6; -. Cranial : 3M : l 21.4, 22.1, 22.9; cb 19.7, 20.5, 20.9; cr 4.1, 4.5, 5.4; mtr 7.7, 8.1, 8.1; c<sup>1</sup>c<sup>1</sup> 4.8, 5.5, 5.8; cw 9.3, 9.5, 10.1; m<sup>3</sup>-m<sup>3</sup> 9.5, 9.9, 10; ml 15.3, 15.7, 16.4.

*Diagnosis* : Medium-sized, head and body 61-84; tail slender and completely free from

interfemoral membrane. Muzzle long, naked; lower jaw apparently shorter than snout. Ear large, rhomboidal in shape. Tip of nose with a small fleshy, triangular projection.

*Distribution* : India : Gujarat : Jamnagar district, Junagadh district (Ryley 1913), Kachchh district (Wroughton 1912b). Kheda district (Brosset 1962a), Surendranagar district and Vadodara district (Sinha 1981a); Bihar; Delhi; Madhya Pradesh; Maharashtra; Orissa; Rajasthan; Uttar Pradesh; West Bengal. Pakistan, Afghanistan, Saudi Arabia, Palestine, Egypt and also probably in Andalus (Corbet 1978)

*Remarks* : Quite common in the semiarid regions but rather locally or erratically distributed. Gregarious, roosting in roofs of poorly lighted and deserted man made structures like buildings, temples, mosques, forts, godown, etc. Sinha (1981a) observed a colony of about 200 animals in a room of an old building at Vadodara, and collected forty specimens from the roost, all of which were males. Roberts (1977) reported that the two sexes occupy separate roosts over entire summer and autumn in Pakistan. Roost of 1000 bats has also been recorded (Brosset 1962a). A large number of individuals were observed emerging from an old, deserted prison (Dhrangadhra) and from a godown of dry fish (Okha port) during April. In both the cases emergence started just at dusk and continued for about an hour. However, no specimen could be collected from either of the spots and the specimen might have been of *R. hardwickei*. Local people at Dhrangadhra reported that the colony is not permanent and in winter no specimen is found roosting inside the prison. Seasonal migration has also been reported by Gaisler (1970) and Roberts (1977) in Afghanistan and Pakistan respectively.

Brosset (1962a) observed sexual activity during April at Fathepur Sikri (Uttar Pradesh), and Prakash (1960) found females carrying young ones during August. However, nothing was observed about the breeding activity of this species at Gujarat.

#### 10. *Rhinopoma hardwickei hardwickei* Gray

1831. *Rhinopoma hardwickei* Gray, *Zool. Misc.*, 37 (India).

*Common names* : Lesser Rat-tailed Bat (Eng.); Chamda (Guj.).

*Material examined* : Amreli district : 5M, 8F, Khodiyar Dam, c 12 km NW Dhari, coll. S. Chakraborty, 4.xi.1991. Banaskantha district : 1M. Palampur, coll. C.A. Crump, 17.iv.1913. Junagadh district : 3M, 14F, Junagadh, coll. C.A. Crump, one of 28.xi. 1912, rest undated. Rajkot district : 3F. Vankaner, coll. C.A. Crump, 4.vi.1913.

*Measurements* : External : 8M : Fa 57.8-63.6 (59.8); T1 50- 60 (55) ; E 18.3-23 (20); Tb 23-33 (28); F & C1 12.8-16 (14). 14F : Fa 56- 63.4(59.4); T1 50.2-62 (56); E 18-20.6 (19); Tb 21.7- 31.7 (27); F & C1 12-16 (14) Cranial : 4M : l 19.5-20 (19.7); *cb* 18-18.4 (18.2); *cr* 3.8-4.2(4); *mtr* 6.6-6.9 (6.7); *c'c'* 4.6-5 (4.8); *cw* 8.5-9.1(8.8);  $m^3-m^3$  8.3-9 (8.5);  $m^1$  13.3-13.9 (13.5). 8F : l 18.6-20.1 (19.5); *cb* 17-18.4 (18); *cr* 4-4.9 (4.3); *mtr* 6.4- 6.9 (6.6);  $c^1c^1$  4.3-4.7 (4.5); *cw* 8.3- 9.1 (8.6);  $m^3m^3$  8.2-9.1 (8.5); *ml* 13.2-13.8 (13.4).

*Diagnosis* : Very similar to the above species and distinguished by the characters already mentioned in the key.

*Distribution* : India : Gujarat : Amdavad district (Brosset 1962a), Amreli district, Banaskantha district (Ryley 1914c), Junagadh district (Ryley 1913), Kachchh district (Wroughton 1912b), Kheda district (Brosset 1962a) and Rajkot district (Ryley 1913); Bihar; Delhi; Jammu and Kashmir; Karnataka; Kerala; Madhya Pradesh; Orissa; Rajasthan; Tamil Nadu; Uttar Pradesh; West Bengal. Afghanistan, Pakistan, Myanmar and Thailand.

*Remarks* : Common. Roosts are found in similar places as that of *R.m.kinneari* and also in caves and tunnels. At Khodiyar, roosts were observed in between the overlapping roof tins of a number of deserted huts near dam; not more than ten animals were found in a roost. Their presence in the roots could be felt by the sound and occasional short flight within the room. Animals of both the sexes were collected from the same roost at Khodiyar. According to local reports those roost are permanent and animals are living there for more than a year. We observed bats emerging from the roosts quite early in the evening and flying over the water of the dam for some time. At night, they were observed foraging round some large trees

(Tamarind, Shisam, Mohua) not far from the roost. Crump (in Ryley 1914c) observed them hovering over lofty trees at Banaskantha. Late emergence (8.00 pm) of this species during February has also been reported (Khajuria and Ghosal 1981).

Except for the specimens collected during April rest have thick deposition of fat at the base of tail and in interfemoral membrane.

Reuben (1963) reported periodicity in the rut, with young ones being born in June. Khajuria (1973) and Khajuria and Ghosal (1981) observed their courtship and mating during winter in Madhya Pradesh. In the present series from Khodiyar, none is young or subadult; all the females have very well developed teats, but without any sign of pregnancy.

#### Family EMBALLONURIDAE

A lot of controversies exist as regard the taxonomic status of the Indian species of the family Emballonuridae. Dobson (1876) mentioned four species of the genus *Taphozous* from the Indian region, viz. *T. melanopogon* Temminck, *T. longimanus* Hardwicke, *T. saccolaimus* Temminck and *T. nudiventris* Cretzschmar, and considered *T. kachhensis* Dobson as a subspecies of *T. nudiventris*. Blanford (1888-91) considered *kachhensis* as a full species with some doubt. Thomas (1915) based on the absence of radio-metacarpal pouch and completeness of bullae, regarded *Saccolaimus* as a distinct genus. He (op.cit.) also recorded two more species, viz. *T. perforatus* Geoffroy and *T. theobaldi* Dobson from the Indian territory and considered *T. kachhensis* as distinct from *T. nudiventris* on the basis of heavier skull (length from occipital crest to base of canine 27 vs. less than 26). Wroughton (1918b) also recognised *Saccolaimus* as a distinct genus and provided key to the identification of the species and subspecies of the genus *Taphozous* occurring in the Indian subcontinent. During the last few decades considerable amount of literature have also accumulated on the status of *kachhensis* and *Saccolaimus*. Felton (1962) Gaisler (1970), Honacki *et al.* (1982), Agrawal *et al.* (1993);

and Koopman (1993) considered *kachhensis* as a subspecies of *T. nudiventris* while Ellerman and Morrison-Scott (1951), Siddique (1970), Sinha (1970, 1980, 1981a, 1986), Roberts (1977), and Khajuria (1979) considered *kachhensis* as a species. Again *Saccolaimus* was regarded as a distinct genus by Baghorn (1977), Honacki *et al.* (1982) and Koopman (1993), but others (Ellerman and Morrison Scott 1951, Siddique 1970, Sinha 1981a, Corbet and Hill 1986, Agrawal *et al.* 1993) kept it as a species under the genus *Taphozous*. Looking into the controversies and having the advantage of a good series of specimens in the National Zoological Collection, it was thought worthwhile to study the species of the family Emballonuridae from the Indian subcontinent afresh. From the study it was found that many of the distinguishing key characters, such as, coloration, nature of fur, black beard, gular sac, ear, fat deposition etc., mentioned by the earlier workers are masked with individual variations or related to age, sex, season and geographical range. It also appeared that *kachhensis* should be treated as a subspecies and *Saccolaimus* may well be regarded as a distinct genus.

#### Key to the genera of family EMBALLONURIDAE occurring within Indian territory

- Radio-metacarpal pouch present; lower lip not or scarcely grooved.  
.....*Taphozous*
- Radio-metacarpal pouch absent; lower lip with a deep median groove.  
.....*Saccolaimus*

#### Genus *Taphozous* Geoffroy, 1918

#### Key to the species of the genus *Taphozous* occurring in India

- No gular sac in either sex.....1
  - Gular sac present at least in males.....2
1. Dorsal fur extends over wing membrane up to one third of the length of humerus and femur and to a part of inter-femoral membrane; tail thickened and laterally

compressed towards the tip; forearm and ear smaller, on average below 65 and 21 respectively. Most of the males have a black bearded. ....*T.melanopogon*

— Upper surface of wing and interfemoral membrane almost devoid of hairs; extremity of tail not thickened; forearm and ear larger, on average over 71 and 24 respectively. Throat seal brown. No black beard in either sex.....*T.theobaldi secatus*

2. Body fur not extending over the wing or interfemoral membrane; forearm large; more than 68.....*T.nudiventris kachhensis*

— Body fur extending over part of the wing and interfemoral membrane; forearm small; less than 65 .....3

3. Wing span 210-280; gular sac moderately developed in males but absent in females; tail tip pointed; distal margin of tragus not wavy; calcar weak; posterior margin of palate inverted u-shaped .....*T.perforatus perforatus*

— Wing span 370-390; gular sac well developed in males, rudimentary in females; distal margin of tragus wavy; calcar well developed. Posterior margin of palate inverted v-shaped.

.....*T.longimanus longimanus*

Except for *T.theobaldi secatus* all other species occur in Gujarat.

### 11. *Taphozous perforatus perforatus*

Geoffroy

1818. *Taphozous perforatus* Geoffroy, *Descr. de L Egypte*, 2 : 126 (Egypt).

*Common names* : Tomb Bat (Eng.); Chamda (Guj.).

*Material examined* : Kachchh district: 4M, 1F, Bhuj, coll. C.A. Crump, 24.viii.1911, 4/5.x.1911, 30.xi.1911. Rajkot district: 7F, Rajkot, coll. B.N.H.S, 11-12.xii.1922.

*Additional material examined* : Rajasthan : 2M, 2 young M, coll. I. Prakash, 10/26.viii.1955.

*Measurements* : (Gujarat specimen) : External : 2M; Fa 55.6, 62.1; E 17, 19; Tb 22,

22.6; F & C1 10.9, 12.8. 2F : Fa 60.3, 62.8; E 18, 19; Tb 23, 24.1; F & C1 10.3, 11.1. Cranial : 2M : l 20, 20.5; cb 18.8, 18.9; cr 4.1, 4.4; mtr 4.5, 4.5; c<sup>1</sup>c<sup>1</sup> 3.7, 3.8; m<sup>3</sup>-m<sup>3</sup> 8.1, 8.4; m<sup>1</sup> 15.1, 15.3, 2F : l 20.6, 21.5; cb 19.1, 19.7; cr 4, 4; mtr 8.6; c<sup>1</sup>c<sup>1</sup> 3.7, 3.9; m<sup>3</sup>-m<sup>3</sup> 8.7, 9; m<sup>1</sup> 14.5, 15.4.

*Diagnosis* : Wing span 210-280; whitish clavicular collar patch; head with a central depression. Radio-metacarpal pouch small. Anterior margin of ear papillate. Distal half of tail emerges about midway from interfemoral membrane.

*Distribution* : India: Gujarat : Amdavad district (Brosset 1962a), Bharuch district (Sinha 1981a), Junagadh district, Kachchh district and Rajkot district; Madhya Pradesh; Rajasthan. Egypt, Pakistan (Siddique 1961.).

*Remarks* : Very common. Gregarious; roosts in natural caves, ruins, deserted wells and godowns. Sinha(1981a) observed colonies of 100-150 individuals roosting in a ruin at Rajpipla, Bharuch district. Local people usually protect this creature and did not allow the survey party to collect them from the roosts. Whenever the party approached near the roost, the animals became restless, emitted sound and tried to enter further deep in the crevices. They are reported to remain active throughout the year and often found in association with other species of bats. Youngs are born in May (Brosset 1962a).

Dorsum drab to broccoli brown but neck region much lighter being almost whitish. Chin and throat similar to back but rest much lighter. Gular sac moderately developed in males, absent in females. Tail thin, with pointed tip. Posterior margin of palate inverted u-shaped.

### 12. *Taphozous longimanus longimanus*

Hardwicke

1825. *Taphozous longimanus* Hardwicke, *Linn. Soc. London*, 14 : 325 (Calcutta, West Bengal, India.).

*Common names* : Long-armed Sheath-tailed Bat (Eng.); Chamda (Guj.).

*Material examined* : Gujarat : Banaskantha district. 3M 2F, Palampur, coll. C.A. crump, undated; 1M, 1F, Lunwa, coll. C.A. Crump, 7/14.vi.1913. Bharuch district : 1M, Jhagadiya,

c 22 km S Bharuch, coll. S. Chakraborty, 3.x.1990. Vadodara district : 1M, 1F, Vadodara, coll. P.V. Nene, 24.iv.1972.

*Measurements* (Gujarat specimens) : External : 3M : Fa 54.2, 58.7, 59.5; E 15.5, 17, 18.5; Tb 24, 24, 24.5; F & C1 12.13, 13.5. 3F : Fa 59.9, 60.61; E 14.5, 16.2, 18; Tb 24.1, 24.5, 25; F & C1 10.5, 12.8, 13.9. Cranial : 2M : *l* 19.8, 21.5; *cb* 19.2, 20.4; *cr* 4.4, 4.6; *mtr* 8.6, 8.9;  $c^1c^1$  4.3, 4.3;  $m^3m^3$  8.3, 8.8; *ml* 16.1, 16.1. 2F : *l* 21.2, 21.4; *cb* 20, 20.2; *cr* 4.4, 5.3; *mtr* 8.7, 9;  $c^1c^1$  4, 4.3;  $m^3m^3$  8.4, 8.9; *ml* 16, 16.3.

*Diagnosis* : Very similar to the previous species, but wing span larger being 370-390; radio-metacarpal pouch moderately developed; gular sac deep, very well developed in males and often presents in females; inner margin of ear smooth.

*Distribution* : India: Gujarat : Amdavad district (Brosset 1962a), Banaskantha district (Ryley 1914c), Bharuch district (Sinha 1981a), Kheda district (Brosset 1962a), Surat district (Wroughton 1918b) and Vadodara district (Sinha 1981a); widely distributed in the Indian peninsula-northwards to Rajasthan (Sinha 1976), and Tripura in the east (Agrawal and Bhattacharya 1977). Sri Lanka, Nepal (Worth and Shah 1969), Bangladesh (Ahmed and Hussain 1982), Myanmar, possibly Thailand (Lekagul and McNeely 1977) and Cambodia (Hill and Thonglonya 1972).

*Remarks* : Fairly common in the eastern part of the State, but probably absent in the drier and more arid western parts. For roosting, a variety of sites are selected such as ruins, between the tiles of roofs, rock crevices, other man made structure and hollows of trees (Khajuria 1979, Sinha 1981a). This species was found to use the same roosting place even after prolonged disturbance by human beings (Khajuria op. cit.). Colony size in Gujarat varies from 6 to 40 individuals (Sinha 1981a). Reported to breed throughout the year (Gopalkrishna 1955).

Dorsal colour variable from fawn to clove brown; in six specimen neck region little paler than rest of dorsum. Tail tip blunt. Gular sac very well developed in all males often with an aperture below that. Among females gular sac present in three, absent in four and rudimentary

in rest. Posterior margin of palate inverted V-shaped.

Thick deposition of fat is marked in the specimens collected from October to February.

### 13. *Taphozous nudiventris kachhensis* Dobson

1872. *Taphozous kachhensis* Dobson, *J.Asiat. Soc. Beng.*, 41 : 221 (Kachchh, Gujarat, India).

*Common names* : Naked-bellied Tomb Bat (Eng.); Chamda (Guj.).

*Material examined* : Gujarat : Kachchh district : 1F, Bhuj, coll. C.A. Crump, 27.ix.1912. Junagadh district : 9M, 3F; Junagadh, coll. C.A. Crump, 17-30. ix. 1912. Surendranagar district : 1M, Dhrangadhra c 36 km N Surendranagar, coll. S. Chakraborty, 22.IV.1990. Vadodara district; 1M, 1F, Shankhada, c 66 km SE Vadodara, coll. S. Chakraborty, 23.x.1991.

*Measurements* : (Gujarat specimens) : External : 4M : Fa 68.6- 79.8 (74.5); E 21.5-24 (22); Tb 25-33.4 (30.5); F & C1 15.5-17.2 (16). 5F : Fa 72.1-75 (73.5); E 21.3-23 (22); Tb 27-32.2(30); F & C1 14.6-18 (16.5). Cranial : 4M : *l* 27-31 (29.4) ; *cb* 24.5-26 (25.4); *cr* 5.1-7 (6); *mtr* 11-11.5 (11.2);  $c^1c^1$  5.5-6.4 (6);  $m^3m^3$  10.8-11.5 (11.2); *ml* 20.9-22.5 (21.4). 4F : *l* 27.5-29 ( 28.3) ; *cb* 24.4-25.5 (24.8); *cr* 5.2-6.4 (5.7); *mtr* 10.8-11.2 (11.1);  $c^1c^1$  5.9-6.1 (6);  $m^3m^3$  11-11.8 (11.3); *ml* 19.9-20.4 (20.2).

*Diagnosis* : Large, wing span 300-423. Body fur not extending over wings or inter-femoral membrane. Radio-metacarpal pouch well developed. Inner surface of ear papillate and posterior margin of tragus with a lobe or slight projection. Parietal and occipital crest forming a distinct helmet at their junction.

*Distribution*: India : Gujarat : Amdavad district (Brosset 1962a), Banaskantha district (Ryley 1914c), Bharuch district (Sinha 1981a), Bhavnagar district, Jamnagar district. Junagadh district (Ryley 1913), Kachchh district (Stoliczka 1872), Kheda district (Brosset 1962a), Mahesana district, Rajkot district (Ryley 1913) and Vadodara district (Sinha 1981a); Bihar (Sinha 1981b); Delhi (Brosset 1962a); Jammu and Kashmir (Sharma and Sharma 1976); Karnataka; Madhya Pradesh; Maharastra; Rajasthan (Prakash

1956); Sikkim; Uttar Pradesh (Brosset 1962a); West Bengal. Afghanistan (Gaisler 1970) and Pakistan (Siddiqui 1961).

*Remarks* : Most common. Small roosts of 2-15 animals were observed on the inner side of the roof of godowns, ruins, temples, mosques and many other old and infrequently visited man-made structure. At Shankheda (Vadodara), about 76 individuals were noticed in different parts of the same ruin. Roosts of 4-6 animals were noticed in three adjacent cotton godowns at Dhrangadhra (Surendranagar). Two specimens were found clinging on the wall of a deserted well at Siddpur (Mahesana) at a depth of about three metres. This species is very wary of human beings and it was observed that with the opening of the door of cotton godown, they began to crawl side wise at a great speed to have shelter in a more secluded part of the wall. While attempting to collect them, bats started flying out of the godown even in the bright sunlight. At Dhrangadhra and Shankheda, people reported that these bats occur in the same roosting place for several years. Khajuria (1979) also reported a permanent roost in a deep fissure of rock in Madhya Pradesh. Testes of the specimens collected in April from Dhrangadhra were more well developed than those of October specimen from Shankheda. None of the female was pregnant or lactating. Brosset (1962a) reported that rut occurs in late March, with parturities taking place during first half of July in Madhya Pradesh. In Pakistan, copulation was reported during September (Roberts 1977). Khajuria (1979) reported pregnant females during February in Madhya Pradesh. Thus, it appears that this species breeds during the greater part of the year, but periodicity depends on the local factors.

In certain parts of Pakistan, these bats are killed for the collection of fat which is reported to have medicinal value (Roberts 1977). In Gujarat, no such record could be obtained. However, owners of the godown conduct indigenous operation to drive them out from time to time.

Fur relatively thick and colour of back varies from mummy brown to mars brown in specimens from India, while in Pakistan specimens fur very fine and short and much lighter in colour being fawn. Tail thick,

gradually tapering towards tip but blunt at tip. posterior margin of palate somewhat inverted 'V'- shaped.

Thick fat deposition was observed in winter specimens, but practically absent in summer ones.

#### 14. *Taphozous melanopogon* Temminck

1841. *Taphozous melanopogon* Temminck, *Mon. Mamm.*, 2 ; 287 (Bantam, Western Java).

*Common name* : Black beard Tomb bat (Eng.).

*Diagnosis*: Medium-sized, forearm 63-68.5. No gular sac; radio-metacarpal pouch large. Most of the males have black beard. Tail somewhat laterally compressed towards the tip.

*Distribution* : India : Gujarat : Dangs district (Sinha 1981a); Andaman Island (Khajuria 1953); Andhra Pradesh; Bihar (Sinha 1981b); Karnataka; Madhya Pradesh; Maharashtra; Orissa; Tamil Nadu; West Bengal (actually recorded as 'Lower Bengal' by Blanford 1888-91). Sri Lanka, Myanmar, Malaysia, Laos, Vietnam, Southern China, Andalas, Java, Kalimantan, Timor, Savu Isl., Kei Isl., and perhaps Lombok.

*Remarks* : Very rare in Gujarat and known by only one specimen from Bansda, Dangs district (Sinha 1981a). However, it was reported that the specimen was collected from a roost of 36 individuals in the wall of a semi-dark room of of an old building.

Wroughton (1912b) and Ryley (1913) reported a series of specimens of *T. melanopogon* from Kachchh and Rajkot respectively. However, all those specimens were later identified as *T.p. perforatus*.

#### *Taphozous theobaldi secatus* Thomas (Extralimital)

1915. *Taphozous theobaldi secatus* Thomas, *J. Bombay nat. Hist. Soc.*, 24: 60 (Asirgarh, Nimar, Madhya Pradesh).

*Material examined* : Madhya Pradesh: Nimar district: 1M, Asirgarh, coll. C.A. Crump, 1.xi.1911.

**Distribution** : India : Madhya Pradesh.

**Remarks** : Dorsum prout's brown, region of neck and base of ears much lighter being smoke gray. Throat seal brown, rest of abdomen slightly lighter than back. Junction of parietal and occipital crests not much prominent.

Genus *Saccolaimus* Temminck, 1838

Only the nominate species occurs in Gujarat.

15. *Saccolaimus saccolaimus crassus* (Blyth)

1844. *Taphozous crassus* Blyth, *J.Asiat. Soc. Beng.*, 13 : 492 (Madras, Tamil Nadu, India).

**Common name** : Pouch bearing Bat (Eng.).

**Material examined** : Nil.

**Additional Material examined** : West Bengal ; 4M, 3F, coll. P.K.Das, 18.ix.1984, 28.iv.1988. Kerala : 1M, coll. D.A. Madhavan, Sept. 1980.

**Diagnosis** : Medium-sized, forearm on average 69.5. Radio-metacarpal pouch absent. Gular sac well developed in both sexes. Tragus hairy posteriorly. Lower lip with a deep transverse median groove.

**Distribution** : India : Gujarat : Kheda district (Brosset 1962a); Karnataka; Maharashtra (Brosset 1962a); Orissa; Tamil Nadu; Uttar Pradesh; West Bengal. Sri Lanka, Bangladesh, Thailand (Lekagul and McNeely 1977), Malaysia, Andalus and Myanmar.

**Remarks** : Very rare in Gujarat, known only by one record from Anand, Kheda district (Brosset 1962a). No specimen could be collected or observed by us or Sinha (1981a) during the surveys of the State. Probably avoids the drier parts.

Small, irregular white spots or blotches present on the dorsum in all the specimen of present series. Tail circular in outline and gradually tapering towards the tip. Posterior margin of palate inverted V-shaped.

Family MEGADERMATIDAE

This family is represented by one genus and one species in the State.

Genus *Megaderma* Geoffroy, 1810

16. *Megaderma lyra lyra* Geoffroy

1810. *Megaderma lyra* Geoffroy, *Ann. Mag. nat. Hist. Paris.*, 15 : 190 (India, possibly Madras, Tamil Nadu, India)

**Common name** : Indian False Vampire (Eng.).

**Material examined** : Banaskantha district : 1M, Deesa, coll. C.A.Crump, 30.iv.1913. Bharuch district : 1M, Jhagadiya, c 22 km. S.Bharuch, coll. S. Chakraborty, 4.x.1990.

**Measurement** : 2M : Fa 64, 65; E 36, 36.5; Tb 31, 32, F & C1 14, 19. Cranial : 2M :  $l$  27, 27.9;  $cb$  24.6, 24.7;  $cr$  6.8, 7;  $mtr$  10.6, 10.7  $c^1 c^1$  5.3-5.5;  $cw$  11.8, 12.5;  $m^3-m^3$  9.3, 9.7;  $iw$  4.6, 4.8;  $m1$  18.3, 19.3.

**Distribution** : India : Gujarat : Amdavad district, Banaskantha district (Ryley 1914c), Dangs district, Junagadh district, Kheda district (Brosset 1962 *b*) and Surat district (Sinha 1981a). Widely distributed throughout the mainland of India. Afghanistan (Aellen 1959), Pakistan, Sri Lanka and Bangladesh.

**Remarks** : Fairly common in village areas. Roosts of 8 and about 20 individuals were observed in a deserted forest hut (Jasadhar, Junagadh) and in a cowshed (Nandal Dahegam, Amdavad) respectively. Sinha (1981b) recorded a colony of about 50 individuals in a semi-dark room of a deserted building at Dumas (Surat). Khajuria and Ghosal (1981) observed them roosting in caves as well as in lighted places of a soapstone mine at Jogakhurd, Madhya Pradesh. However, size of colony may vary widely from 2 to 2000 individuals (Brosset 1962b).

At Ahwa, Indian False Vampires were observed regularly flying through the *Varanda* of the forest rest house in between 22.00 and 24.00 hours and also near the lighted vapour lamps of the compound in search of insect-prey. Droppings collected from the cowshed at Nandol Dahegam (Amdavad) revealed mammalian hairs, and wings of insects.

People of Gujarat regarded the presence of False Vampire Bat in the cowshed as a good sign and, hence, protect it from killing.

### Family RHINOLOPHIDAE

This family is represented by two genera in Gujarat.

#### Key to the genera of RHINOLOPHIDAE occurring in Gujarat

- Digits of the hindfoot with two joints; nose-leaf square in outline, posterior portion takes the shape of a thin flattened disc. Two premolars in lower jaw.  
.....*Hipposideros*
- Except for the first, remaining digits have three joints; nose-leaf circular or horse-shoe shaped, posterior portion narrows into a thin pointed appendage- 'lancet' Three premolars in lower jaw  
.....*Rhinolophus*

#### Genus *Rhinolophus* Lacepede, 1799.

Genus *Rhinolophus* is represented by only one species in Gujarat.

#### 17. *Rhinolophus lepidus lepidus* Blyth

1844. *Rhinolophus lepidus* Blyth, *J. Asiat. Soc. Beng.* 13 : 480 (Calcutta, West Bengal, India).

**Common name** : Little Indian Horse Shoe Bat (Eng.).

**Material examined** : Dangs district : 3M, Ahwa, coll. S. Chakraborty, 19.x.1991.

**Measurements**: External : 2M : Fa 38.3, 40; E 16, 17; Tb 16, 16.5; F & Cl 8, 8.3. Cranial : 2M :  $l_1$ -, 18.5;  $cb$  -, 15.7;  $cr$  4.4, 4.8;  $mtr$  6.3, 6.4;  $c^1-c^1$  4.6, 5.1;  $cw$ -, 8.3;  $m^3-m^3$  -, 6.5,  $ml$ -, 11.3.

**Diagnosis** : Small-sized, wing span 230-250 (Sinha 1980); ears large, only little shorter than head; tail completely covered by interfemoral membrane. Fur thick; dorsal hairs basally pale, apically dark brown; venter light brown. Postorbital process absent.

**Distribution** : India : Gujarat : Dangs

district; Andhra Pradesh; Delhi (Brosset 1962c); Karnataka; Kerala; Madhya Pradesh; Maharashtra; Meghalya; Orissa (Das and Agrawal 1973); Uttar Pradesh; West Bengal. Nepal (Mitchell 1980) and Thailand (Lekagul and McNeely 1977).

**Remarks** : Very rare in the State and no roost could be observed. All the three specimens entangled at about 21.30 hrs in a mist net placed below a vapour lamp in the compound of the forest bungalow. They remained quite in the pockets of mist net and offered no resistance while taking them out except a mild 'chik chik' sound. In one, testes were very prominent, but in the other two the same could not felt from outside.

The present specimens constitute first record of this species from the state.

#### Genus *Hipposideros* Gray, 1831

Three species of the genus *Hipposideros* occur in Gujarat.

#### Key to the species of the genus *Hipposideros* of Gujarat.

1. No supplementary leaflet present on each side of horseshoe  
.....*R. fulvus pallidus*
- Supplementary leaflets present on each side of the horseshoe .....2
2. Three supplementary leaflets on each side; forearm length about 50.  
..... *H. speoris speoris*
- Two supplementary leaflets on each side; forearm length about 45.  
.....*H. galeritus brachyous*

#### 18. *Hipposideros speoris speoris* (Schneider)

1800. *Verpertilio speoris* Schneider, in Schreber's *Saugeth*, pl. 59b (Tranquebar, Tamil Nadu, India).

**Common name**: Schneider's Leaf-nosed Bat (Eng.).

**Material examined** : Dangs district : 1M, Ahwa, coll. S. Chakraborty, 19.x.1991.

**Measurements** : External : 1M : Fa 52; E

15.5; Tb 22; F & Cl 9.2. Cranial : 1M :  $l$  19.8;  $cb$  16.6;  $cr$  4.6;  $mtr$  7;  $c^1-c^1$  5;  $cw$  9.9;  $m^3-m^3$  7.6;  $ml$  13.1.

**Diagnosis** : Forearm length about 50. Hinder margin of interfemoral membrane straight. Ear broad and pointed, concave below the tip, then convex and having a spine-like projection at about one-third distance from base to tip. Dorsum varies from brown to bright golden brown or blackish, but basal part of hairs white. Venter slightly paler than dorsum.

**Distribution** : India : Gujarat : Dangs district and Vadodara district (Sinha, 1975a); Karnataka; Tamil Nadu. Sri Lanka.

**Remarks**: Status not clearly known. Sinha (1975a) recorded this species for the first time from the State on the basis of a specimen collected in 1918. Later, he (1981a) observed a roost of about 100 individuals at Vadodara Rajmahal compound and opined that this species might be occurring in other parts of Gujarat. Present specimen from Ahwa confirms his opinion and makes first authentic record of the species from Dangs district.

The specimen was collected in the same net and almost at the same time with the previous species (*R.l. lepidus*). However, it was very active in the net and tried to cut the net. Testes were very prominent.

### 19. *Hipposiderous fulvus pallidus* Andersen

1918. *Hipposideros fulvus pallidus* Andersen, *Ann. Mag. nat. Hist.*, 2 : 381 (Junagadh, Gujarat, India).

**Common names**: Bicolored Leaf-nosed Bat (Eng.); Cheepa, Kankiria (Guj.).

**Material examined**: Junagadh district: 12M, 12F, 1 unsexed, Junagadh, coll. C.A. Crump, 19.xi.1912 to 10.xii. 1912; 1M, 2F, Sasan Gir, c 57 km S. Junagadh, coll. C.A. Crump, 6.xii.1912, 2/16.i. 1913. Kachchh district : 3M, 1F, coll. F. Stoliczka, 1872. Rajkot district : 1M, 1F, Rajkot, coll. C.A. Crump, 2.i.1913.

**Measurements**: External : 9M : Fa 38.5-40.5 (39); E 18.4 22.7 (22); Tb 17-19 (18); F & Cl 7-8.1 (7.5). 7F : Fa 38.8-41 (40); E 19.3-21.5 (20.5); Tb 17.4-21 (19); F & Cl

7.2-8.4 (7.6). Cranial : 3M :  $l$  17.8, 18, 18.1;  $cb$  16.1, 16.5, 16.8;  $cr$  3.6, 3.8, 3.8;  $mtr$  6.2, 6.5, 6.7;  $c^1-c^1$  3.8, 4, 4.1;  $cw$  8.3, 8.7, 8.7;  $m^3-m^3$  6.1, 6.2, 6.4;  $ml$  11.2, 11.4, 11.4. 3F :  $l$  18.1, 18.2, 18.6;  $cb$  15.9, 16.5, 16.8;  $cr$  4, 4.1, 4.2;  $mtr$  6.4, 6.5, 6.5;  $c^1-c^1$  3.9, 4.2, 4.2;  $cw$  8.3, 8.6, 8.8;  $m^3-m^3$  6.2, 6.5, 6.5;  $ml$  11.3, 11.4, 11.8.

**Diagnosis** : Forearm length about 40. Ears broad, blunt and when laid forward extend up to muzzle; outer margin straight; a low raised band of hairy skin connects bases of ears across the crown. Upper surface of nose-leaf indented into three shallow pits at anterior part. Dorsum golden chestnut to dark reddish brown or black, with bases of hair white or buff; venter pale buff.

**Distribution**: India : Gujarat : Banaskantha district (Ryley 1914c), Junagadh district (Ryley 1913), Kachchh district (Stoliczka 1872), Rajkot and Surendranagar districts (Ryley 1913); Madhya Pradesh; Orissa; Rajasthan (Sinha, 1980). Afghanistan (Gaisler 1970) and Pakistan.

**Remarks** : Crump (in Ryley 1913) stated that this subspecies is very common, often found in porcupine earths, and frequently comes into bungalows. Though a good series of specimens were collected from Gujarat during B.N.H.S. Mammal Survey, but no specimen could be collected or observed during recent surveys.

On an examination of further specimens from Pakistan and India present in the Z.S.I. collection, it was found that Pakistan specimens (from Ghara, Sukkur, Gholam and Rawalpindi) are much lighter than the Indian specimens. However, most of the specimens from Pakistan were collected during summer months, while those from India were obtained during September to January.

### 20. *Hipposideros galeritus brachyotus* (Dobson)

1874. *Phyllorhina brachyota* Dobson, *J. Asiat. Soc. Beng.*, 43 : 237 (Madhya Pradesh, India).

**Common name**: Cantor's leaf-nosed Bat (Eng.).

**Diagnosis** : Forearm length about 45. Ears broad with blunt tip; outer margin below the tip concave; inner margin very convex. Dorsum dark brown, with spinal and shoulder region

darkest; venter a little paler. Second upper premolar distinct from canine.

*Distribution:* India : Gujarat : Banaskantha district (Ryley 1914c); Karnataka; West Bengal (Wroughton 1918a recorded the locality as Bengal). Sri Lanka.

*Remarks:* Very rare. Known from Gujarat by a single specimen collected during the B.N.H.S. Mammal Survey (Ryley 1914c).

Family : MOLOSSIDAE

Represented in Gujarat by a single genera and a single species.

Genus *Tadarida* Rafinesque, 1814.

#### 21. *Tadarida aegyptiaca thomasi* Wroughton

1919. *Tadarida thomasi* Wroughton, *J. Bombay nat. Hist. Soc.*, 26 : 732 (Bhuj, Kachchh, Gujarat, India).

*Common names:* Egyptian Free-tailed Bat, Wrinkle-lipped Bat (Eng.).

*Material examined:* Gujarat : Rajkot district : 1M, Rajkot, coll. C.A. Crump, 11.xii.1912.

*Measurements :* External : 1M : Fa 47.2; E 19; Tb 16.6; F & Cl 8.

*Diagnosis:* Forearm length around 47; ear large, forward projecting, anterior margin converge but do not quite coalesce across the forecrown. Nostrils surrounded by fleshy ridges. Rear margin of hindfoot and distal portion of each digit fringed with short, stiff, whitish hairs. Free part of tail fleshy and finely annulated. Dorsum reddish brown to seal brown, venter a little paler.

*Distribution:* India : Gujarat : Banaskantha district (Wroughton 1918b), Kachchh district (Wroughton 1918b), Kheda district (Brosset 1962c) and Rajkot district (Wroughton 1919); Bihar; Maharashtra; Rajasthan. Sri Lanka.

*Remarks :* Rare and sparsely distributed in the relatively drier regions.

Family : VESPERTILIONIDAE

Vespertilionid bats are represented in

Gujarat by three genera.

Key to the Vespertilionid genera of Gujarat.

1. Upper premolar 1 on each side  
.....*Scotophilus*
- Upper premolar 2 on each side .....2
2. Outer upper incisor not extending beyond the cingulum of inner  
..... *Scotozous*
- Outer upper incisor extending distinctly beyond the cingulum of inner  
..... *Pipistrellus*

Genus *Pipistrellus* Kaup, 1829

Genus *Pipistrellus* is represented by three species in Gujarat.

Key to the species of the genus *Pipistrellus* of Gujarat

1. Size large, forearm length 36 or more  
.....*P. ceylonicus indicus*
- Size small, forearm length less than 36.  
.....2
2. Forearm length less than 30.....*P. mimus*
- Forearm length more than 30.  
.....*P. coromandra coromandra*

#### 22. *Pipistrellus mimus* Wroughton

1899. *Pipistrellus mimus* Wroughton, *J. Bombay nat. Hist. Soc.* 12 : 722 (Mheskatri, Dangs, Gujarat, India).

*Common names:* Indian Pygmy Pispistrelle (Eng.); Chamda, Chamochiria (Guj.).

*Material examined:* Banaskantha district : 2M, Lunwa, coll. C.A. Crump, 5.11.iv.1913. Junagadh district : 1M, Jasadhar, c 80 Km SE Junagadh, coll. S. Chakraborty, 1.xi.1991; 1M, Sasan, c 56 Km S Junagadh, coll. S.Chakraborty, 4.xi.1991; 1F, Bagdu, coll. C.A. Crump, 17.xi.1912. Vadodara district : 1F, Shankheda, c 66 Km SE Vadodara, coll. S. Chakraborty, 25.x.1991.

*Measurements :* External : 2M : Fa 27.7, 29; E 9.6, 10; Tb 10.6, 10.8; F & Cl 5.7, 5.8. 2F :

Fa 26.4, 29; E 8.5, 10; Tb 11, 11.1; F & Cl 4, 5.9. Cranial : 2M : *l* 12, 12.2; *cb* 11.2, 11.4; *cr* 3.3, 3.5; *mtr* 4.3, 4.6;  $c^1-c^1$  3.5, 3.6; *cw* 6.2, 6.4;  $m^3-m^3$  5.2, 5.4; *ml* 8.3, 8.5. 2F : *l* 11, 11.5; *cb* 10.7, 10.8; *cr* 3, 3.1; *mtr* 3.7, 3.9;  $c^1-c^1$  3.3, 3.4; *cw* 6, 6.1;  $m^3-m^3$  5, 5.1; *ml* 7.6, 7.7.

**Diagnosis** : Small-sized, forearm length on average 28. Dorsum dark brown to bistre brown, venter slightly paler; face, ears, wing membrane almost black. Ear widely spaced, scarcely triangular, with tragus about half the height of the ear.

**Distribution** : India : Amdavad district, Amreli district, Banaskantha district (Ryley 1914c), Bhavnagar district, Bharuch district, Dangs district (Wroughton 1899), Jamnagar district, Junagadh district (Ryley 1913), Kachchh district (Wroughton 1918a), Kheda district (Brosset 1962c), Mahesana district, Rajkot district, Surat district (Wroughton 1918a) and Vadodara district; widely distributed throughout the mainland of the Indian Union. Afghanistan (Meyer-Oehme 1965), Pakistan, Sri Lanka, Nepal (Mitchell 1980), Myanmar, Thailand (Lekagul and McNeely 1977) and Vietnam.

**Remarks** : Common; observed in all the districts visited particularly in congested areas of towns and villages. Roosts in any dark, covered place, such as, holes, crevices, cracks of trees or buildings, between roof tiles or tin shades, within bamboos used for various purposes, ventilator, rain-water pipes, behind sign-boards, etc. They come out from the roosts one after another just at dusk, and fly irregularly for some time near the roosting place, particularly over some waterbodies. At night, they hunt around lamp posts or trees adjacent to lamp post.

This species exercises biological control over several species of dipteran and lepidopteran insects (Khajuria, 1980).

### 23. *Pipistrellus ceylonicus indicus* (Dobson)

1878. *Vesperugo indicus* Dobson, *Cat. Chiroptera. Brit. Mus.*, 222 (Mangalore, Karnataka, India).

**Common names**: Kelaart's Pipistrelle (Eng.); Chamda, Chamochiria (Guj.).

**Material examined**: Amdavad district : 2M, Nandol Dahegam, c 29 km NE Amdavad, coll. S. Chakraborty, 9/11.iv.1990. Bharuch district; 1M, 5F : Jhagadiya, c 22 Km S Bharuch, coll. S. Chakraborty, 4-7.x.1990. Jamnagar district : 1F, Okha Port, coll. S. Chakraborty, 27.iv.1990. Junagadh district : 2M, 2F, Jamwala, c 50 Km E Sasan, coll. B. Biswas, J.K. Sen, 25/26.i.1958, 13-17.xii. 1962; 1F, Junagadh, coll. C.A.Crump, 6.x.1912; 1M, Kesod, coll. C.A. Crump, 5.x.1912; 2M, 1F, Sasan Gir, c 57 Km S Junagadh, coll. S. Chakraborty, 28.x.1991; 1M, Sirwan, c 70 Km SE Junagadh, coll. B. Biswas, 3.xii.1962. Vadodara district : 1F, Shankheda, c 66 Km SE Vadodara, coll. S. Chakraborty, 23.x.1991.

**Measurements**: External : 7M : Fa 34.5-37.8 (36.2); E 9-12 (10); Tb 12.5-16 (14); F & Cl 6-8.5 (7.5). 9F : Fa 36-39.5 (37.5); E 9-10.7 (10); Tb 12.4-15.5 (14); F & Cl 7-10 (8). Cranial : 5M : *l* 14-15.2 (14.7); *cb* 13.5-14.3 (13.9); *cr* 4.3-4.6 (4.4); *mtr* 5.3-5.5 (5.4);  $c^1-c^1$  4.8-5 (4.9); *cw* 7-7.5 (7.3);  $m^3-m^3$  6.4-6.7 (6.5); *ml* 10.5-11 (10.6). 7F : *l* 12.8-15.1 (14.3); *cb* 12.6- 14.5 (13.8); *cr* 3.9-4.6 (4.2); *mtr* 5-5.6 (5.3);  $c^1-c^1$  4.6-5.2 (4.9); *cw* 7.1-7.9 (7.4);  $m^3-m^3$  6.4-7.1 (6.8); *ml* 9.8-10.7 (10.4).

**Diagnosis**: Largest of all the species of Pipistrelle occurring in Gujarat, forearm length being on average 36. Dorsum brown to grayish brown, venter pale brown. Ear subtriangular, extending two-thirds the distance from eye to nostril when laid forward; tragus with straight inner margin and a triangular lobe at base. Glandular swellings between eye and nostril often present.

**Distribution**: India : Gujarat : Amdavad district (Brosset 1962c), Amreli district, Banaskantha district, Bhavnagar district, Bharuch district, Dangs districts (Wroughton 1918a), Jamnagar district, Junagadh district (Ryley 1913), Kachchh district (Wroughton 1912b), Kheda district (Brosset 1962c); Andhra Pradesh (Lal 1984); Bihar; Karnataka; Kerala; Madhya Pradesh (Brosset 1962c); Maharashtra, Orissa (Das and Agrwal 1973); Rajasthan; Tamil Nadu; Uttar Pradesh (Lal 1984). Pakistan and Bangladesh (Siddique 1961, Khan 1982).

**Remarks**: Most common and observed in all the districts visited. Roosts singly or in group

at places similar to that of the previous species. A specimen collected from Nandol Dehégam (Amdavad) was roosting singly in a hole of wooden door frame. It used to come out of the roost even before dusk and return to the roost after every two or three hours, till morning.

Sinha (1981a) recorded *P.c. chrysothrix* Wroughton and *P.c. subcanus* Thomas from Gujarat. Lal (1984) synonymised both the above subspecies with *P.c. indicus*.

#### 24. *Pipistrellus coromandra coromandra* (Gray)

1838. *Pipistrellus coromandra* Gray, *Mag. Zool. Bot.* 2 : 298 (Pondicherry India).

*Common names:* Indian Pipistrelle (Eng.), Chamda, Chamochiria (Guj.).

*Material examined:* Nil.

*Measurements :* Nil.

*Diagnosis:* Small-sized, forearm length on average 31. Dorsal fur blackish brown, with tips slightly rufescent; venter a little paler. Tragus curving forward and bluntly rounded. A small lobe present below the calcar.

*Distribution:* India : Gujarat : Surat district (Wroughton 1918a); widely distributed in Peninsular India, north to Jammu and Kashmir (Sharma and Sharma 1976), east to northeastern states including Tripura (Agrawal and Bhattacharyya 1977). Afghanistan (Meyer-Oehme 1965), Pakistan (Walton 1974), Sri Lanka and Nepal.

*Remarks:* Rare in Gujarat. So far, there is only one record from Surat. No specimen could be observed by us.

Genus : *Scotozous* Dobson, 1875

Genus *Scotozous* is represented by a single species.

#### 25. *Scotozous dormeri* Dobson

1875. *Scotozous dormeri* Dobson, *Proc. zool. Soc. Lond.* 373 (Bellary Hills, Karnataka, India).

*Common names:* Dormer's Bat (Eng.); Chamda, Chamochiria (Guj.).

*Material examined:* Gujarat : Amdavad district : 2M, Nandol Dahegam, c 29 Km NE Amdavad, coll. S. Chakraborty, 9/10.iv.1990. Banaskantha district : 1M, Palanpur, coll. C.A. Crump, 3.iv.1913. Bharuch district : 1M, 5F, Jhagadiya, c 22 Km S. Bharuch, coll. S. Chakraborty, 3/6.x.1990.

*Measurements:* External : 2M : Fa 32.4, 33.6; E 9.8, 9.8; Tb 11, 12.2; F & Cl 6.5, 7.5. 5F : Fa 33.4-35.5 (34); E 9.2-11.8 (10); Tb 11.5-13.5 (12.5); F & Cl 6.6-8.5 (7.5). Cranial: 2M : l : 13.3, 13.9 *cb* 13, 13.3; *cr* 3.6, 3.9; *mtr* 5.4, 5.4; *c*<sup>1</sup>-*c*<sup>1</sup> 3.6, 4.7; *cw* 7, 7.5; *m*<sup>3</sup>-*m*<sup>3</sup> 6.7, -; *ml* 9.5, 10.7. 5F : l, 13.5-14.4 (14); *cb* 13-13.7 (13.2); *cr* 3.5-4.1 (3.8); *mtr* 5.1-5.5 (5.3); *c*<sup>1</sup>-*c*<sup>1</sup> 4.5-4.8 (4.6); *cw* 6.9-7.5 (7.2); *m*<sup>3</sup>-*m*<sup>3</sup> 6.5-6.8 (6.6); *ml* 10.2-10.7 (10.4).

*Diagnosis :* Medium-sized, forearm length on average 34. Ears subtriangular, tip rounded, margin below the tip nearly straight; tragus straight, pointed, with a small lobe at the base of outer margin. Dorsal fur dark brown with ashy tip, venter whitish or lemon yellow.

*Distribution:* India : Gujarat : Amdavad district, Banaskantha district (Ryley 1914c), Bharuch district, Dangs district (Sinha 1981a), Junagadh district (Ryley 1913), Kachchh district (Wroughton 1912c), Kheda district, Surat district (Sinha 1981a); widely distributed in the Indian mainland from Jammu and Kashmir in the north to at least Karnataka in the south and West Bengal in the east. Pakistan (Roberts 1977) and possibly Taiwan.

*Remarks:* Fairly common. Roosts in similar places as in *P. mimus*. Emerges a little later than other two species. Colony-size varies from 2-24 individuals (Sinha, 1981a). At Jhagadiya, specimens were collected in mist-nets placed between trees near a neon lamp of Bus stand, between 21.00 and 23.30 hours. Three females collected during October were lactating.

Genus *Scotophilus* Leach, 1821

Two species of the genus *Scotophilus* occur in Gujarat.

Key to the identification of species of the  
genus *Scotophilus*

- Smaller in size, forearm length 42-45; belly buff or pinkish brown, with a few scattered rufous hairs  
.....*S. kuhli kuhli*
- Larger in size, forearm length 56-60; belly oily yellow in colour  
.....*S. heathi heathi*

26. *Scotophilus kuhli kuhli* Leach

1822. *Scotophilus kuhli* Leach, *Trans. Linn. Soc. Lond.*, 13 : 72 (According to Hill and Thonglongya 1972, type- locality is India).

**Common names:** Lesser Yellow Bat (Eng.); Chamda (Guj.).

**Material examined:** Junagadh district : 3M, 1F, 1 unsexed, Talala, c 11 Km E Sasan Gir, coll. C.A. Crump, 20- 25.x.1912.

**Measurements:** External : 3M : Fa 46.5, 47.3, 48.2; E 13, 13, 14; Tb 18, 18, 18.4; F & Cl 8, 8, 9. 1F: Fa 50; E 14; Tb 20; F & Cl 8. Cranial : 3M : l 19.2, 19.2, 19.3; cb 17.1, 17.3, 17.4; cr 4, 4.2, 4.5; mtr 6.3, 6.3, 6.5;  $c^1-c^1$  6, 6.4, 6.5; cw 8.8, 9, 9.2;  $m^3-m^3$  8.1, 8.1, 8.5; ml 13.1, 13.1, 13.1.

**Diagnosis:** Forearm length 42-55; fur short, close and sleek. Ear small, rounded at tip; tragus semilunar and markedly convex on posterior border, concave anteriorly. Dorsum reddish or olive brown. Muzale with glandular swellings behind eyes.

**Distribution:** India : Gujarat : Banaskantha district (Ryley 1914c), Junagadh district (Ryley 1913), Kachchh district (Wroughton 1912c) and Surat (Thomas 1897); widely distributed throughout India including Nicobar Island (Hill 1967). Pakistan (Walton 1974), Sri Lanka, Bangladesh and Myanmar.

**Remarks:** Crump (in Ryley 1914c) reported this species as numerous in Gujarat. However, during the recent surveys, it was found to be less numerous than the other species of the genus. Sinha (1981a) also could not obtain any specimen of this species from Gujarat. Crump (in Ryley 1913) observed Lesser Yellow Bats roosting in the dead leaves of Palmyra palms at

Talala (Junagadh). Present authors also observed them roosting in the palm leaves in Orissa, West Bengal and Gujarat. However, Crump (in Ryley 1914c) and Roberts (1977) stated that ceilings and crevices in roof are its favourite roosting places. Roosts may have specimens of one sex only or of both sexes (Crump in Ryley 1913, Gopalkrishna 1949, Agrawal *et al.* 1992).

27. *Scotophilus heathi heathi* (Horsfield)

1831. *Nycticejus heathi* Horsfield, *Proc. zool. Soc. Lond.*, 113 (Madras, Tamil Nadu, India).

**Common names:** Greater yellow Bat (Eng.); Chamda (Guj.).

**Material examined:** Amdavad district : 2M, 1F, Nandol Dahegam, c 29 Km NE Amdavad, coll. S. Chakraborty, 10. iv.1990. Banaskantha district : 1M, 1F, Palanpur, coll. C. A. Crump, 28/30. iii. 1913. Bharuch district : 1M, Jhagadiya c 22 Km S Bharuch, coll. S. Chakraborty, 6.x.1990. Vadodara district : 4M, 1F, Shankhedā, c 66 Km SE Vadodara, coll. S. Chakraborty, 24.x.1991.

**Measurements:** External : 4M : 56.2-58.5 (57.5); E 13-16.2 (14.5); Tb 21.5-24 (23); F & cl 9.8-12.3 (11). 3F : Fa 56, 58.3, 61.5; E 14, 15.5, 16; Tb 23, 24, 24.5; F & Cl 10.5, 11, 12. Cranial : 3M : l 20.6, 21.5, 21.9; cb 18.4, 19.19; cr 4.7, 4.9, 5.1; mtr 7.3, 7.3, 7.5;  $c^1-c^1$  7.4, 7.4, 7.6; cw 10, 10, 10.2;  $m^3-m^3$  8.9, 9.5, 9.8; ml 14.7, 14.9, 15.6. 2F : l 21, 22.6; cb 19, 19.6; cr 5, 5.1; mtr 7.4, 7.4;  $c^1-c^1$  7, 8; cw 10.3, 10.4;  $m^3-m^3$  9.4, 9.4; ml 15.6, 15.7.

**Diagnosis:** Forearm length more than 56. Fur short and sleek; dorsum olive to gray brown, venter lemon yellow to orange yellow and clearly demarcated from dorsum. Muzzle sparsely haired, with swollen glandular pads between the eyes and nostrils.

**Distribution:** India : Gujarat : Throughout the state; widely distributed all over India. Afghanistan (Meyor- Oehme 1965), Pakistan, Sri Lanka, Nepal (Agrawal and Chakraborty 1971), Bangladesh and Myanmar.

**Remarks:** Very common, observed in all the districts. Lives in close association with human beings. Roosts mainly in between roof and false ceiling or in the cracks of wall. Roosts of 5 to 22 individuals have been observed.

A female with a clinging young (about 24 mm length) was caught during April.

### Order SCANDENTIA

Squirrel-like in appearance, but with a long snout and without long whiskers. Post orbital process present; orbital ring encircled by bone. Teeth 44.

Contains one family Tupaiidae. Family Tupaiidae is represented in Gujarat by a single genus and one species.

#### Genus *Anathana* Lyon, 1913

Lower lobe of ear greater than upper half; inner side of ear well-haired. Reticulation on naked area of nose coarser.

#### 28. *Anathana ellioti wroughtoni* Lyon

1913. *Anathana wroughtoni* Lyon, *Proc. U.S. nat. Mus.*, 45 : 123 (Mandvi, Surat, Gujarat, India).

*Common name*: Madras Tree Shrew (Eng.).

*Diagnosis*: Head and body length 170-180. Body grizzled dull brownish; tail slightly darker; hands and feet grizzled grayish; under-surface almost white.

*Distribution*: India : Gujarat : Kheda (Rajyagor 1977), Surat district (Lyon 1913), Surendranagar district and probably Junagadh district (Rajyagor 1975); Maharashtra.

*Remarks*: Very rare; only a pair has been observed in a scrub jungle of *Acacia* by the side of highway at Limbdi (Surendranagar) in the morning of 15.iv.1990. Traps were set at the spot for two consecutive days with coconut and dry fish as bait, but without any success.

### Order PRIMATES

Arboreal. Limbs plantigrade with five digits. Hands and feet prehensile. Thumbs of hindfoot opposable (except human beings). Clavicles well-developed. Facial region relatively small. Brain complex, with great development of braincase.

Represented in Gujarat by only one family Cercopithecidae.

### Family CERCOPITHECIDAE

Orbit completely closed by bone behind. Pollex short or wanting. Upper incisors not divided by a vacant space in the middle. Tail present. Arm not longer than leg.

#### Key to genera of family CERCOPITHECIDAE occurring in Gujarat

- Face red, cheek pouches present; tail length variable but generally smaller than head and body .....*Macaca*
- Face black, cheek pouches absent; tail always longer than head and body .....*Presbytis*

#### Genus *Macaca* Lacepede, 1779

Only one species occurs in Gujarat.

#### ~ 29. *Macaca mulatta mulatta* (Zimmermann)

1780. *Cercopithecus mulatta* Zimmermann, *Geogr. Gesch. Mensch.*, 2 : 195 (India).

*Common names*: Rhesus Macque (Eng.); Kalyan (Guj.).

*Diagnosis*: Medium-sized, head and body length around 540; tail short. two fifths to one-half of head and body. Hairs straight; crown hairs not radiating from centre. Face light pink, hind-quarter of body brighter with orange-red hue, while upper back olive brown.

*Distribution*: India : Gujarat : Bharuch district, Dangs district (Fooden *et al.* 1981), Surat district and Valsad district (Fooden *et al.* 1981); Andhra Pradesh; Arunachal Pradesh; Assam; Bihar; Delhi; Himachal Pradesh; Jammu and Kashmir; Madhya Pradesh; Meghalaya; Orissa; Punjab; Rajasthan; Sikkim; Tripura (Agrawal and Bhattacharyya 1977); Uttar Pradesh; West Bengal. Bhutan, Bangladesh, Myanmar, China, Thailand and Vietnam.

**Remarks:** Fairly common in the forested tracts of southern Gujarat, but almost absent from other regions of the State. Blanford (1888-91) regarded Rhesus Macaque as common throughout Gujarat, but in the beginning of the present century Mammal Survey parties could not find or observe them in the northern or western part of Gujarat (Wroughton 1912c, Ryley, 1913, 1914 c). Tiwari (1982) also could not find them during census work in Junagadh and Vadodara. It is included only in the district gazetteer of Surat (Govt. of India 1961). During recent surveys, altogether three troops of 5, 28 and 24 animals were observed at Zajhpur (c 16 Km E Jhagadiya), Waghai (c 30 km N.W. Ahwa), and c 10 Km. W Ahwa respectively. Troop at Zajhpur was reported to be a casual visitor and could be seen only after rainy season up to beginning of winter. Fooden *et al.* (1981) estimated as many as 40, 70 and 50 troops in Suart, Dangs and Valsad district respectively, which appear to be on a much higher side.

Rhesus Macaques are regarded as most sacred, hence, there is no hunting pressure. However, they were found to be very shy and confined themselves in the forested tracts.

#### Genus *Presbytis* Eschscholtz, 1821

The genus *Presbytis* is represented by one species in the State.

#### 30. *Presbytis entellus entellus* (Dufresne)

1797. *Simia entellus* Dufresne, *Bull. Soc. Philom Paris* 1, 7 : 49 (Bengal).

**Common names:** Hanuman Langur (Eng.); Vandra (Guj.).

**Diagnosis:** Large-sized, head and body length around 580; tail longer than head and body. Upper side dark or light sepia brown, paler on the shoulder, nape and crown; hands and feet black or deep brown and colour sharply contrasted with that of arms and legs. Whiskers short, partly covering the ears; crown hairs radiating from a frontal whorl.

**Distribution:** India : Gujarat : Throughout the State; Bihar; Delhi; Haryana; Madhya Pradesh; Orissa; Punjab; Rajasthan, Uttar Pradesh; West Bengal. Bangladesh.

**Remarks:** Plentiful, found in towns, villages as well as forests. During census. Tiwari (1982) estimated 843 animals in 18 troops and 53 animals in two troops in Junagadh and Vadodara districts respectively. However, 1985 census (Rashid 1986) revealed 6912 langurs in Gir Forest (Junagadh) alone. Some troops are permanent residents of the area, while others move from one place to another depending on the availability of water and food. A large troop of about 200 animals was observed near Sasan Gir Railway Station during the present survey and was reported to be permanent resident of adjacent trees. At Dhrangadhra (Surendranagar) and Nandol Dahegam (Amdavad) they were reported to be migratory, leaving the area during winter.

In Gujarat, langurs are very much associated with the human beings and regularly accept food from them.

Langurs are reported to be responsible for the serious damage of crops, plantation and *Kachha* houses in Gujarat; still they are regarded as sacred and enjoy full protection.

Youngs and subadults were observed in good number both during the summer as well as winter.

#### Order PHOLIDOTA

Upper part of body covered with large, overlapping scales; undersurface clothed with coarse, bristle-like hairs. Head long, narrow. No teeth.

Pholidota represented by one family MANIDAE and only one species occurs in Gujarat.

#### Family MANIDAE

#### Genus *Manis* Linnaeus, 1758

#### 31 *Manis crassicaudata* Gray

1827. *Manis crassicaudata* Gray, in *Griffith's Cuvier Anim. Kingd.*, 5 : 282 (India).

**Common names:** Indian Pangolin (Eng.); Chhalo, Bhimagaroo, Pingaroo (Guj.).

*Diagnosis:* Head and body reaches 660, female a little smaller (Robers 1977). Hump-backed body; tapering tail without glandular naked area at tip. Muzzle tapers to a narrow, down-curving, trunk-like snout. External pinna like a shallow, creseent-shaped, vertical fold on the naked skin. Body covered with 11-13 rows of overlapping light yellowish brown, pointed, horny scales.

*Distribution:* India : Gujarat : Amreli district, Bharuch district, Bhavnagar district, Dangs district, Junagadh district (Rajyagor 1975), Kachchh district, Kheda district (Rajyagor 1977), Surat district (Govt. of India 1962) and Vadodara district (Govt. of India 1979); Andhra Pradesh; Bihar; Delhi; Karnataka; Kerala; Madhya Pradesh; Maharashtra; Orissa; Punjab; Rajasthan; Uttar Pradesh; West Bengal. Pakistan, Sri Lanka and China.

*Remarks:* Indian Pangolin, though recorded from a number of districts of Gujarat, is now not very common in the State. No specimen could be seen during the recent surveys, however, the signs of excavation of termite mounds were observed at Velavador (Bhavnagar), Goralia (Bharuch), Khodiyar (Amreli) and Shirwan (Junagadh). At Ahwa and Shankheda, at least three tribal ladies were noticed using ornaments made out of its scales. Himmatsinhji (1984) reported a specimen from Bhuj (Kachchh) and opined that it is very difficult to notice pangolins, but they are not so rare as it is thought. However, in all the areas visited by us, it was reported as becoming rare day by day. Main reason of the depletion of its population is the steady increase in the agrarian economy combined with improved irrigation and random use of pesticides for more production. Unusual apathy of the villagers towards this poor creature has also been reported. For the effective conservation of this unique creature, people should be educated about its food habit and beneficial role in minimising the economic damage done by termites both to agricultural crops and buildings.

#### Order CARNIVORA

Large conical canine and six small, roughly

equal sized incisors in both jaws; upper premolar and first lower molar especially enlarged, with sharp-edged lobes for shearing the flash.

Species belonging to seven families of order Carnivora occur in Gujarat.

#### Key to families of CARNIVORA occurring in Gujarat

1. Ethno-turbinals very large, covering the greater part of nasal chambers and extending anteriorly to the anterior orifice; auditory bulla composed of two bones; Cowper's gland absent.....2
- Ethno-turbinals excluded from the anterior orifice of nasal chamber by large maxillo-turbinal; auditory bulla composed of a single tympanic bone; Cowper's gland present .....5
2. Face flat, muzzle not slender; posterior palatal foramina set far back on the maxillo-palatine suture; teeth highly sectorial and reduced in number, dental formula 3/3, 1/1, 3 or 2/3, 1/1; inter-ramal tuft of vibrissae absent .....Felidae
- Face pointed, muzzle slender; posterior palatal foramina located in front of the maxillo-palatine suture; teeth not so specialised or reduced in number, dental formula 3/3, 1/1, 4/2 or 4/4, 2/2 or 1/1; inter-ramal tuft of vibrissae present .....3
3. Dog-like in appearance; hindfoot with four digits; auditory bulla without oblique groove; massive jaws and teeth. ....Hyaenidae
- Not dog-like in appearance; hindfoot with five digits; auditory bulla with distinct groove; jaws and teeth less massive.
4. Ear moderate in size, with well-developed bursa and simple supratragus, but devoid of valvular flap over it; feet compact, with short claws; anus not enclosed in a glandular sac. No bony tube to auditory orifice .....Viverridae
- Ear small and rounded, with vestigial bursa, valvular supratragus and a valvular flap over it; foot with free digits and

fossorial claws; anus in centre of a glandular pouch. A well-developed bony tube to the auditory bulla

.....Herpestidae

5. Legs long, slender and digitigrade; small first digit of forefoot raised above the planter pad; hindfoot with four toes; baculum deeply channelled below. ....Canidae

— Legs relatively short and thick; plantigrade or semiplantigrade; first digit in both feet present close to the second and not raised above the planter pad; baculum not deeply channelled below .....6

6. Large-sized, with relatively short tail; pads of digits forming weak curved line; planter pads very wide; three lower molars on each side .....Ursidae

— Small-sized, with moderately long tail; pads of digits forming a sharply curved line; two lower molars in each side .....Mustelidae

### Family CANIDAE

Family CANIDAE is represented by three genera in Gujarat.

#### Key to the genera of family CANIDAE occurring in Gujarat

1. Tail at least three-quarters of head and body length; no frontal sinus; post-orbital processes concave above; forehead between the post orbital processes flat. ....*Vulpes*
- Tail less than two thirds of head and body length; a frontal sinus present; post-orbital processes convex above; forehead between post orbital processes elevated .....2
2. Ear almost rounded at tip; two molar teeth in lower jaw; nasal noticeably expanded at the posterior half.....*Cuon*
- Ear almost pointed at tip; three molar teeth in lower jaw; nasal not noticeably expanded at the posterior half. ....*Canis*

Genus *Canis* Linnaeus, 1758

Two species of genus *Canis* occur in

Gujarat.

#### Key to the species of genus *Canis* occurring in Gujarat

— Large-sized, male 650-750 high at shoulder; greatest length of skull 180-240; first upper molar with indistinct outer cingulum

.....*Canis lupus pallipes*

— Medium sized; measuring 380-430 high at shoulder; greatest length of skull 130-164; first upper molar with a prominent outer cingulum

.....*Canis aureus aureus*

### 32. *Canis lupus pallipes* Sykes

1831. *Canis pallipes* Sykes, *Proc. zool. Soc. Lond.*, 101 (Decan, India).

**Common names :** Wolf (Eng.); Nowr, Nar, Bhagat, Varoo (Guj.).

**Diagnosis :** About the size of an Alsatian dog, measuring 900-1050 in head and body length. Tail bushy, black tipped and less than half of head and body. Forehead elevated, brows arched, ear pointed and upstanding. A crest of long hairs on neck and shoulder. Dorsum grizzled with fulvus to rufous and black; Venter creamy buff; back of ears black; legs ochraceous, paler on outside.

**Distribution** India : Gujarat : Amdavad district, Amreli district (Patel 1972), Bhavnagar district (Govt. of India 1969) Bharuch district (Govt. of India 1961), Jamnagar district (Govt. of India 1970), Junagadh district (Shahi 1982), Kachchh district (Wroughton 1912c), Kheda district (Rajyagor 1977), Mahesana district (Rajyagor 1975), Rajkot district (Govt. of India 1965), Surat (Govt. of India 1962), Surendranagar district (Ryley 1913) and Vadodara district (Govt. of India 1979); Andhra Pradesh; Arunachal Pradesh; Assam; Bihar; Karnataka; Madhya Pradesh; Maharastra; Orissa; Rajasthan; Uttar Pradesh; West Bengal. Arabian Peninsula, Iran and Pakistan.

**Remarks :** Though found in most parts of Gujarat, but its population has declined to a great extent in recent time mainly due to habitat

destruction, and now could be seen only occasionally in open areas. People reported that wolf was a nuisance for domestic livestock as well as children even in 1960's. At present, problem is negligible as wolves are either totally wiped out from many areas as in Sabarkantha district (Rajygor 1974) or represented by a small number. Ketan Bhai of Nandol Dahegam (Amdavad) reported that his two pet dogs were taken away by wolves during winter of 1988, but no other recent report about lifting of domestic stocks or children was obtained. During the present survey we could see three animals in between Varvala and Bhimrana (about 18 km W of Okha) and five animals at Velavadar, Bhavnagar.

Wolves do not prefer true forest, but take shelter in grassy plains or scrub or thorn jungle, having some rocks and sand hills. Most of their habitats are now brought under cultivation. Moreover due to its alleged habit of child lifting, it is persecuted by villagers. Both the factors attributed to the decline of wolf population in Gujarat. Latest census made in little Rann of Kutch revealed its population around five dozen (Shahi 1982).

Prakash (1960) reported a litter of five young in February at Kathiawar.

### 33. *Canis aureus aureus* Linnaeus

1758. *Canis aurus* Linnaeus, *Syst. Nat.*, 10th ed, 1 : 40 (Province of Lar, Persia).

*Common names* : Asiatic Jackal (Eng.); Siyad, Shial (Guj.).

*Material examined* : Kachchh district : 1F, Rhoda Motha, c 16 km N Bhuj, coll. C.A.Crump, 12.vii.1911. Junagadh district : 1F, 4 km N Jamwala, Gir Forest, coll. J. K. Sen, 2.ii.1958.

*Measurement* : External : 2F : H & B 660, 686; T1 210, 229; Hf 138; 145; E 67, 68. Cranial : 2F : *l* 146, 148; *cb* 138.8, 142; *zw* 70, 80.5; *mw* 24.2, 25.3; *pow* 26.3, 27.7; *iw* 23.5, 24.9; *pm*<sup>4</sup> 15.5, 16; *m*<sub>1</sub> 17.8, 18.6; *ml* 117.8, 118.

*Diagnosis* : Very similar to wolf but smaller in size and without arching brows and elevated forehead. Dorsal fur coarse, wiry with sandy buff appearance, but mid dorsum predominantly black; back of ear brownish, face and

lower flank grayish and tail-tip black; belly, chest and inside of legs creamy white.

*Distribution* : India : Gujarat : Throughout the State; Bihar; Haryana; Himachal Pradesh; Punjab; Rajasthan; Uttar Pradesh. Saudi Arabia, Iraq, and European part of earlier U.S.S.R. to the extreme south.

*Remarks* : Found throughout the State but its population is dwindling at a very fast rate due to extension of agricultural field, random use of pesticides and also killing by the tribal people for coat and supposed medicinal value. Asiatic Jackal is not primarily a forest dweller and mainly lives near human habitation. Though it is thought to be a carrier of rabies and causes certain damage to sugarcane and orchard, but all available evidences of its food habit indicate that Asiatic Jackal is beneficial in controlling rodent population in crop fields (Roberts 1977).

### Genus *Vulpes* Oken, 1816

Two species viz., *V. vulpes* and *V. bengalensis* had been recorded from Gujarat. Probable occurrence of another species, viz., *V. cana* has also been reported by Himmatsinhji (1984) and Ranjitsinh (1985). A key to the identification of these three species is given below.

1. Back of ear black or dark brown, contrasting strongly with colour of head and nape; tail-tip white.  
.....*V.vulpes pusilla*  
— Back of ear almost of same colour as the head and neck; tail tip blackish  
.....2
2. Larger in size, head and body length with few exception, not less than 460; hindfoot 110-120; back of ear sandy brown  
.....*V. bengalensis*  
— Smaller species, head and body length usually does not exceed 420; hindfoot 95-110; back of ear buff .....*V.cana*

### 34. *Vulpes vulpes pusilla* Blyth

1854. *Vulpes pusilla* Blyth, *J. Asiat. Soc. Beng.*, 23: 729 (Salt Range, Pakistan).

*Common names* : Desert Fox, White-footed Fox (Eng.); Lonkdo (Guj.).

**Diagnosis:** Bushy tail, with very long hairs at the proximal region; hairs around pectoral region slaty gray to black; a patch of black hairs on the muzzle in between eye and nose; pelage grayish when viewed from distance, with faint speckling of rusty brown hairs.

**Distribution :** India : Gujarat : Banaskantha district (Crump in Ryley 1914c) and Kachchh district; Madhya Pradesh; Punjab; Rajasthan. Iraq, Iran and Pakistan.

**Remarks :** Rare. Avoids dense forest and lives in open country. From the food habit (Prakash 1959, Roberts 1977), it appears that the desert Fox plays an important role in the control of various pest-species and also contributes in the dispersal of seeds.

Prakash (1960) observed a litter of four cubs during January, which were estimated to be about five weeks old.

### 35. *Vulpes bengalensis* (Shaw)

1800. *Canis bengalensis* Shaw, *Gen. Zool.*, 1, 2 : 330 (Bengal).

**Common names :** Common Indian Fox, Bengal Fox (Eng.). Lokdi, Lokri, Lonkdo, Khekhli, Fao, Lonkadi (Guj.).

**Material examined :** Banaskantha district: 1 subad M, Palanpur, coll, C.A. Crump, 8.iii.1913.

**Measurements :** External : 1 subad M : H & B 420; T1 248; Hf 111; E 69. Cranial : 1 subad M : *l* 92.1; *cb* 90; *zw* 48.8; *mw* 15.3; *pow* 21.5; *iw* 15; *Pm*<sup>4</sup> 6; *m*<sub>1</sub> 11; *m*<sub>1</sub> 79.8.

**Diagnosis:** Smaller and grayer than the Desert Fox, with black tail tip. Back of ear sandy brown or dark brown, with black margin. A smudge of black hairs around the upper part of the muzzle in front of eyes.

**Distribution :** India : Gujarat : Throughout the State; almost all over India. Pakistan, Nepal, Bangladesh.

**Remarks :** Though still common but population is declining due to same factors as mentioned for *C. aureus*. In many places which reported to have good population of Bengal Fox only a decade ago, such as, Shankheda (Vadodara), Anand (Kheda), Amreli, Limbdi (Surendranagar) and others, now one can hardly hear its familiar chattering bark in the

evening. Lives in scrubs or bushes particularly adjacent to the cultivated fields and villages. We could receive only one record of its attack on poultry at Nandol Dahegam (Amdavad). It also helps in the biological control of several agricultural pest species.

### 36. *Vulpes cana* Blanford

1877. *Vulpes canus* Blanford, *J. Asiat. Soc. Beng.*, 46 (2) : 321 (Gwadar, Baluchistan, Pakistan).

**Common names :** Blanford's Fox (Eng.).

**Diagnosis :** Small-sized with dense luxuriant fur. Tail-tip generally black, with some black tipped hairs throughout its length; occasionally extreme tip may be whitish. Inside of ear thickly fringed with white hairs. Back of ear grayish brown, with pale buff margin. Mask grizzled silvery gray with a conspicuous black band across the upper part of the muzzle and below the eyes.

**Distribution :** India : Gujarat: Kachchh district (Himmatsinhji 1984, Ranjitsinh 1985). Afghanistan, N.E. Iran, Pakistan, S.W. Russia including Ujbekistan, Bokhara and Turkestan (Bobrinskii *et al.* 1965).

**Remarks :** Could not be observed or heard about its occurrence in Gujarat during recent surveys. However, Himmatsinhji (1984) reported a species of *Vulpes* from Great Rann of Kachchh with dark gray ring or band just above the black tip of bushy tail. Similarly, Ranjitsinh (1985) while flying in a helicopter over a small Island, south of Khadar Island in Great Rann of Kachchh, observed a pair of foxes with dark tail tip. He regarded those specimens either belong to *V. cana* or a distinct subspecies of *V. bengalensis*. He also regarded them as larger than *V. bengalensis*. Specific survey is required in the area to confirm the taxonomic status of the said population.

### Genus *Cuon* Hodgson, 1830

It is a monotypic genus.

### 37. *Cuon alpinus dukhunensis* (Sykes)

1831. *Canis dukhunensis* Sykes, *Proc. zool. Soc.*, 100 (Decan, Peninsular India).

**Common names :** Dhole, Red Dog, Indian Wild Dog (Eng.); Rani-kutra, Kohl-kutra,

Rani-huno (Guj.).

**Diagnosis** : Head and body length over 910, hindfoot over 170. Dog-like in appearance with bushy tail and almost rounded ear. Hairs long, with woolly under fur. Body colour ferruginous red to tawny.

**Distribution**: India : Gujarat : Bharuch district (Govt. of India 1961), Dangs district and Surat district (Govt. of India 1962); Forested parts of Peninsular India, south of the Ganges up to an elevation of 2240 m, excepting the western desert.

**Remarks** : Rare: Found only in the well-wooded region. Its number has considerably decreased in Dediapara, Gora and Sagabara ranges of Bharuch district (Govt. of India 1961).

#### Family URSIDAE

Represented in Gujarat by a monotypic genus *Melursus*.

Genus *Melursus* Meyer, 1793

#### 38. *Melursus ursinus ursinus* (Shaw)

1791. *Bradypus ursinus* Shaw, *Nat. Misc.*, 2 (unpaged), pls.58-59 (Patna, Bihar, India).

**Common names** : Sloth Bear (Eng.); Rinchh (Guj.).

**Diagnosis** : Large-sized, head and body length 140-170 cm. Coat long, rough, shaggy, black, with or without a V-Shaped breast patch. Face triangular with long muzzle. Claws on forefeet ivory white.

**Distribution** : India : Gujarat ; Banaskantha district (Ryley 1914c), Bharuch district (Tikader 1983), Panch Mahal district (Guj. Forest Dept. 1985) and probably Sabarkantha district (Rajyagor 1974); forested tracts all over India from Himalayan foot hills to the extreme southernmost parts.

**Remarks** : Very rare, almost restricted to the sanctuaries of Dhumkhal (Bharuch), Jessore (Banaskantha) and Ratanmal (Panch Mahal). In all these areas it takes up its abode in remote rocks or bamboo clumps and cactus bushes on hills during day time. Often it travels great distances coming down to plains in search of fruits. Villagers are very much afraid of this

animal, as it often attacks without provocation and causes severe wounds.

#### Family MUSTELIDAE

Two genera belonging to family Mustelidae occur in Gujarat.

Key to the genera of the family Mustelidae occurring in Gujarat.

- Adapted for semi aquatic life; tail thick and muscular; hindfoot wider than forefoot. Vibrissae thick .....*Lutra*
- Adapted for terrestrial life, without the above mentioned modifications .....*Mellivora*

Genus *Mellivora* Storr, 1780

Genus *Mellivora* is monotypic.

#### 39. *Mellivora capensis indica* (Kerr)

1792. *Ursus indicus* Kerr, *Anim. Kingd.*, 188 (India).

**Common names** : Ratel, Honey Badger (Eng.); Ghurmar, Bastora, Ghor-khodla, Kabar- Bijjo (Guj.).

**Diagnosis** : Body squat and bear like; stumpy legs and small tail, snout not projecting. Pinna reduced to a thickened rim. Coat grey above and black below.

**Distribution** : India : Gujarat : Amdavad district, Bhavnagar district, Bharuch district (Govt. of India 1961), Jamnagar district, Junagadh district (Crump in Ryley 1913), Kachchh district (Wroughton 1912c), Rajkot district (Govt. of India 1965), Surat district (Govt. of India 1962), Surendranagar district (Patel 1977) and Vadodara district (Govt. of India 1979); Bihar; Madhya Pradesh; Orissa; Punjab; Uttar Pradesh; West Bengal and Peninsular India except Malabar Coast. Iran, Afghanistan and Pakistan.

**Remarks**: Though Ratel is reported as widely distributed in Gujarat particularly in areas adjacent to graveyard, but it is hardly met with. During the surveys we moved for several hours of day and night in and around burial grounds of Amreli, Amdavad and Junagadh districts and could observe species of

*Herpestes*, *Canis*, *Tatera* and *Rattus* but not a single specimen of Ratel. Crump (in Ryley 1913) also sat during moonlight at Hindu burning ground of Girna (Junagadh) but could not notice this creature. Thus, its alleged habit of digging out buried dead bodies needs further verification. According to Roberts (1977), Ratel preys upon snakes and rodents.

#### Genus *Lutra* Brisson, 1762

The genus is represented by a single species in Gujarat.

#### 40. *Lutra perspicillata* Geoffroy

1826. *Lutra perspicillata* Geoffroy, *Dict. Class H.N.*, 9 : 519 (Andalas).

*Common names* : Smooth-coated Indian Otter (Eng.); Jal-manas, Jal-ood, Panini biladi (Guj.).

*Diagnosis* : Thick fusiform body, broad paddle shaped tail with distal portion more or less triangular in outline. Web of skin present between all the digits of fore and hindfoot. Upper border of naked rhinarium smooth and convex in outline. Dorsum brown to olive brown, venter lighter in shade.

*Distribution* : India : Gujarat : Amdavad district (Bhargava and Prasad 1975), Bharuch district, Junagadh district (Rajyagor 1975), Kheda district (Rajyagor 1977), Sabarkantha district, Surat district and Vadodara district (Govt. of India 1979); Andhra Pradesh; Arunachal Pradesh; Assam; Orissa; Bihar; Karnataka; Kerala; Madhya Pradesh; Meghalaya; Nagaland; Pondicherry, Rajasthan; Tamil Nadu; Uttar Pradesh; West Bengal. Pakistan, Bangladesh, Myanmar, China, Vietnam, Malaysia and Indonesia.

*Remarks* : Moderately common particularly in and around marshy areas of villages and even towns and also in the islands of Narmada river. Though this otter causes certain amount of damage to fish crop, people usually do not disturb it. Bhargava and Prasad (1975) observed a specimen in a pond at Viramgam (Amdavad) during daytime. We have also observed a troop of three individuals at Nandol Dahegam in and around a large tank amidst a thickly populated area. However, we could not

find any record of taming of otters by the fishermen for driving fish towards the net.

In the district gazetteers (Govt. of India 1961, 1962, Rajyagor 1974), *Lutra vulgaris* (= *Lutra lutra*) had been recorded from Bharuch, Surat and Sabarkantha districts, which we think is due to wrong identification of the species.

Being unable to examine the specimen from Gujarat, it was not possible for us to determine the subspecific status of Gujarat population. However, from the observed size, it appears that the population of Gujarat belongs to *L.p. sindica* Pocock.

#### Family VIVERRIDAE

Two genera of the family Viverridae occur in Gujarat.

#### Key to the genera of the family VIVERRIDAE occurring in Gujarat.

- Feet terrestrial and digitigrade; carpal pad single; metatarsal pad absent. Scent glands opening into highly specialised pouches ..... *Viverricula*
- Feet scansorial and semiplantigrade; carpal and metacarpal pad double; glandular pouches less specialised. .... *Paradoxurus*

#### Genus *Viverricula* Hodgson, 1838

It is a monotypic genus.

#### 41. *Viverricula indica indica* (Desmarest)

1817. *Viverra indica* Desmarest, *Nouv. Dict. Hist. Nat., Paris*, 7 : 170 (India)

*Common names* : Small Indian Civet (Eng.). Noll, Jubat, Mushk-billa (Guj.).

*Diagnosis* : Small-sized, head and body length 500-620, with tail a little smaller. Muzzle slender and pointed; ears broad and rounded. Small black spots on fore quarters; large spots tending to run into longitudinal lines on the flank and form 6-8 stripes down the back. Naked rhinarium reddish brown.

*Distribution* : India : Gujarat : Almost throughout the State; whole of India. Sri Lanka,

Pakistan, Bhutan, and Bangladesh.

*Remarks* : Fairly common. Found in various habitats, such as such jungle, grass jungle, forests, rocks and even in barren lands and cultivated fields. Lives singly in self made burrow. Often attacks poultry and other domestic stocks. A good climber, could be seen moving considerable distance through branches.

Genus *Paradoxurus* Cuvier, 1821

Represented in Gujarat by a single species.

42. *Paradoxurus hermaphroditus* (Pallas)

1777. *Viverra hermaphroditus* Pallas, in Schreber, *Die sauget.*, 3 ; 426 (India).

*Common names* : Common Palm Civet, Toddy Cat (Eng.); Vaniar (Guj.).

*Diagnosis* : Head and body length about 600; tail almost equal to head and body. Coat black or blackish brown but new coat with a pattern of longitudinal stripes on back; blackish spots on flank, thigh and shoulder usually with white patch or spots around eyes and nose.

*Distribution* : India : Gujarat : Amdavad district, Banaskantha district (Ryley 1914c), Bhavnagar district, Bharuch district (Govt. of India 1961), Dangs district, Kheda district (Rajyagor 1977), Jamnagar district, Junagadh district (Rajyagor 1975), Rajkot district (Ryley 1913), Surat district, Surendranagar district, Vadodara district (Govt. of India 1979) and Valsad district; almost throughout India. Bangladesh, Myanmar, Nepal, Sri Lanka, China, Hainan Island, Malaysia, Philippine, and Indonesia.

*Remarks* : Common in the wooded areas as well as in the cities and villages. Usually lives singly in branches of tree, but often takes shelter in old buildings particularly in those having false ceiling. This animal was observed within the compound of forest Rest House at Jashadar (Junagadh) and Ahwa (Dangs). A specimen was observed in a green verge of Amdavad city at about 00.30 hrs., which at the notice of the party ran very fast for a short distance and then climbed up a shisome tree.

Based on the size, coloration, cranial and

dental features, a good number of subspecies have been recognised from India (Ellerman and Morrison-Scott 1951). However, Agrawal *et al.* (1992), opined that most of these differences are individual or seasonal variations.

Family HERPESTIDAE

Family Herpestidae is represented in India by one genus.

Genus *Herpestes* Illiger, 1881:

Two species occur in Gujarat.

Key to the species of the genus *Herpestes* occurring in Gujarat

- Contour hairs long and multibanded when fully grown. Legs darker than body. Larger, head and body length over 360  
..... *H.edwardsi*
- Contour hairs short with few bands. Legs not darker than body. Size smaller, head and body length less than 350  
..... *H.auropunctatus*

43. *Herpestes auropunctatus pallipes* (Blyth)

1845. *Mangusta pallipes* Blyth, *J.Asiat. Soc. Beng.*, 14 : 346 (Kandahar, Afghanistan).

*Common names* : Small Indian Mongoose (Eng.); Noila, Nolioon, Noriya (Guj.).

*Material examined*: Banaskantha district : 1M, Palanpur, coll. C.A. Crump, 5.v.1913.

*Measurements* : External: 1M : H & B 245; T1 333; Hf 48; E 22.

*Diagnosis* : Gray grizzled body; short sturdy legs; sharp pointed coical face; ear small and lies partially concealed in the body fur; naked rhinarium blackish. Paler than nominate subspecies.

*Distribution*: India : Gujarat : Banaskantha district (Ryley 1914c), Jamnagar district, (Govt. of India 1970), Junagadh district Kachchh district (Crump in Ryley 1914c), Rajkot district and Surat district; Punjab. Pakistan, Afghanistan, Iraq and Iran.

*Remarks* : Fairly common in the vicinity of villages. Lives in burrows inside the bushes particularly near drains, canals, ponds,

etc. Primarily diurnal but occasionally haunts by night. Responsible for the considerable damage of the poultry; still it enjoys protection due to its supposed role in the control of snakes.

***Herpestes edwardsi* Geoffroy**

Two subspecies of *H. edwardsi* occur in Gujarat, with some amount of overlapping distribution.

Key to the subspecies of *H. edwardsi* occurring in Gujarat.

- General colour darker, with minimum tendency of erythrism ..... *H. e.nyula*
- General colour lighter, with predominant tendency of erythrism  
..... *H. e.ferrugineus*

**44. *Herpestes edwardsi nyula* (Hodgson)**

1836. *Mangusta (Herpestes) nyula* Hodgson, *J.Asiat. Soc. Beng.*, 5 ; 236 (Nepal).

**Common names** : Indian Gray Mongoose (Eng.); Nolia, Nolioom, Noriya (Guj.).

**Material examined** : Junagadh district : 1F, Baradia, coll. C.A. Crump, 21.xi.1912; 1M, Kashod, coll. C.A. Crump, 6.x.1914; 1F, Junagadh, coll. C.A. Crump, 1.xii.1912; 1F, c 18 km E Jamwala, Gir Forest, coll. J.K. Sen, 4.ii.1958. Surendranagar district : 1F, Dhrangadhra, c 36 km N Surendranagar, coll. C.A. Crump, 23.i.1913.

**Measurements** : External : 1M: H & B 405; T1 360; Hf 74; E 25. 4F : H & B 290-412 (358); T1 249-373 (329); Hf 59-77 (69); E 22.5-31 (26). Cranial : 3F : *l* 62.1, 72.8, 75.5; *cb* 61.6, 72, 75.4; *zw* 29.6, 34.8, 39; *iw* 11.7, 13.1, 14.7; *pow* 12.4, 15.1, 16.1; *mw* 10.6, 13.5, 13.6; *pm*<sup>4</sup> 6.3, -, 7; *mj* 5.7, -, 6.1; *ml* 41, 48.3, 49.3.

**Diagnosis** : Very similar to *H. auropunctatus* but considerably larger, with longer contour hairs which form almost a cape over hindquarter of body and flank.

**Distribution** : India : Gujarat : Amreli district (Patel 1972), Kachchh district (Wroughton 1912c), Kheda district (Rajyagor 1977), Bharuch district (Govt of India 1961), Junagadh district (Ryley 1913), Surat district and Surendranagar district (Govt. of India 1979); Assam; Bihar; Madhya Pradesh; Orissa; Sikkim; Uttar Pradesh; West Bengal. Nepal and

Bangladesh.

**Remarks** : Common. Observed in cities, villages as well as in the forests. Lives in burrows within the bushes. Somewhat colonial, 8-12 animals live together occupying a particular territory. Follows a particular route from burrows to foraging ground and preys upon animals whatever it can capture. It has also been observed to catch fish from a patch of shallow water at Limbdi. (Surendranagar). There are authentic records about its role in controlling snakes (Jerdon 1874, Sterndale 1884, Stockley 1931, Walker *et al.* 1964). It also enjoys protection from the local people.

Crump (in Ryley 1914c) reported black tail tipped species *Herpestes smithi*. Gray from Danta (Banaskantha). Patel (1972) also considered that along with *H. e.nyula*, *H. smithi* occurs in Amreli district. However, we could not find any evidence of the occurrence of *H. smithi* in Gujarat.

**45. *Herpestes edwardsi ferrugineus* Blanford**

1874. *Herpestes ferrugineus* Blanford, *Proc. zool. Soc. Lond.*, pp. 661. (Larkhana, Sind, Pakistan)

**Common names** : same as in previous subspecies.

**Material examined** : Banaskantha district: 2M, 1F, Palanpur, coll. C.A. Crump, 28.iii.1913, 2.iv.1913, 1.vi.1913; 1F, Danta, coll. C.A. Crump, 20.vi.1913. Rajkot district: 1M, Vankaneer, coll. C.A. Crump, 8.i.1913.

**Measurements**: External : 2M : H & B 360, 365; T1 350, 378; Hf 67, 68. 2F : H & B 365, 385; T1 363, 387; Hf 72, 77.

**Diagnosis**: Very similar to previous subspecies but a little paler with well evident reddish brown speckling; hindfoot distinctly reddish.

**Distribution** : India : Gujarat : Amdavad district, Banaskantha district (Pocock 1941), Mahesana district and Sabarkantha district; Rajasthan; Himachal Pradesh. Pakistan, Iraq and Iran.

**Remarks** : Moderately common. Lives in scrub jungle adjacent to localities. Often attacks poultry.

A specimen from Palanpur have gray-grizzled hindfoot instead of reddish.

## Family HYAENIDAE

Represented by one species only.

46. *Hyaena hyaena hyaena* (Linnaeus)

1758. *Canis hyaena* Linnaeus, *Syst. Nat.* 10th ed., 1 : 40 (Benna mountains, Laristen, Iran).

*Common names* : Striped Hyaena (Eng.); Zarakh, Chitra(Guj.).

*Diagnosis* : Head body length about 104 cm and height at shoulder 68-76 cm. Dog-like with a conspicuous crest of longer hairs extending like a mane from crown of head to pelvis. Legs relatively long; hind quarters of body weak; high sloping shoulder. Body colour tawny yellow, having indistinct broad vertical stripes along the flank.

*Distribution* : India : Gujarat: Amreli district (Patel 1972), Banaskantha district (Crump in Ryley 1914c), Bharuch district (Govt. of India 1961), Bhavnagar district (Govt. of India 1969), Dangs district (Patel 1971), Kachchh district (Stoliczka 1872), Kheda district (Rajyagor 1977), Jamnagar district (Govt. of India 1970), Junagadh district (Rajyagor 1975), Panch Mahal district (Patel 1972), Rajkot district (Govt. of India 1965), Sabarkantha district (Rajyagor 1974), Surat district (Govt. of India 1962), Surendranagar district (Patel 1977) and Vadodara district (Govt. of India 1979); throughout India in forested tracks. Pakistan, Sri Lanka, Bangladesh, Myanmar and China.

*Remarks* ; Hyaena, though recorded from many areas of the State but except for some conservation areas like Gir Sanctuary it is very rare everywhere. In fact it was not very common even in the beginning of the present century (Crump in Ryley 1914c). There is no hunting pressure, but revolutionary progress in agriculture has resulted substantial loss of its habitat and decline in population.

Hyaena lives mainly in forests among bushes, but can also be found in plain country taking its abode in abandoned burrows of porcupines, foxes or jackals. Some beaches of Kathiawar are protected as temples and in such areas it lives in caves which are full of bats (Dharmkumarsinhji 1978).

Census of 1985 reported 192 Hyaenas from

Gir Forests which showed a steady increase as compared to 1974 and 1979 census (Sinha 1987).

## Family FELIDAE

Two genera of the family Felidae occur in Gujarat.

## Key to the genera of family FELIDAE occurring in Gujarat

- Large-sized; hyoidean apparatus modified by the conversion of medium part of suspense into a long elevated tendon ..... *Panthera*
- Small to medium-sized; hyoidean apparatus of normal mammalin type, suspense or consisting of chain of bones jointed end to end..... *Felis*

Genus *Felis* Linnaeus, 1758

Five species of genus *Felis* occur in Gujarat.

Key to the species of the genus *Felis* occurring in Gujarat

1. Pelage spotted all over ..... 2
  - pelage unspotted .....4
2. No distinct longitudinal bands on crown; ears pointed; back of ears sandy buff .....*F.silvestris ornata*
  - Distinct longitudinal bands on crown; ears rounded; back of ears not sandy-buff .....3
3. Tail unspotted; back of ears brown with a large pale spot in the centre; upper molar series 3 on each side .....*F.rubiginosa rubiginosa*
  - Tail spotted above; back of ears black with a pale or whitish spot in the centre; upper molar series 4 on each side .....*F. bengalensis bengalensis*
4. On average larger, head and body length 700-760; tail one fourth of total length and uniformly coloured. Ears entirely black or with frosting of white hairs; inside of forelegs without any black stripe. ....*F.caracal schmitzi*

— On average smaller, head and body length 640-740; tail more than one fourth of total length; tail-tip black and preceded by 2 or 3 black rings. Back of ears reddish chestnut. Inside of forelegs with black horizontal stripes .....*F. chaus kutas*

#### 47. *Felis silvestris ornata* Gray

1831. *Felis ornata* Gray, Ill. Ind. Zool., 1, pl. 2 (India).

*Common names* : Indian Desert Cat (Eng.); Thang-meno (Guj.).

*Material examined* : Bhavnagar district : 1 unsexed, Bhavnagar, coll. R.S. Dharmkumar-sinhji, 27.i.1931. Rajkot district: 1M, Rajkot, coll. C.A.Crump, 19.xii.1912.

*Measurements* : External : 1M : H & B 270 ; T1 268; Hf 115; E 54. Cranial : 1 unsexed : *l* 95; *cb* 90; *pow* 33, *iw* 19; *mw* 25; *zw* 68; *pm*<sup>4</sup> 10; *m<sub>l</sub>* 7.

*Diagnosis* : Body pale sandy yellow with rather small but clearly separated grayish black spots; tail spotted in proximal part and with four or five black rings in distal half. Scattered spots on forehead and lower surface of paws.

*Distribution* : India : Gujarat : Banaskantha district (Crump in Ryley 1914c). Bhavnagar district, Junagadh district (Rajyagor 1975); Kachchh district (Wroughton 1912c) and Rajkot district (Ryley 1913); Madhya Pradesh; Rajasthan. Afghanistan and Pakistan.

*Remarks* : Very rare and extremely local in distribution. Prefers semiarid regions and low hills.

Gujarat Forest Department (1985) reported 30 Desert Cats from Narayan Sarovar Chinkara Sanctuary of Kachchh. Except a probable sighting in Gir Forest, no other specimen could be observed during present surveys. Specimen from Rajkot was shot in a patch of grass jungle near a tank and its stomach contained a rat and some vegetable matter (Crump in Ryley 1913).

Much variations as regard colour pattern and nature of fur have been reported (Pocock 1939). Present specimen though collected in winter, have short (20-23) dorsal fur; pattern much diffused and cheek stripes not prominent, however, rings at distal end of tail complete.

This species is considered as *Felis libyca ornata* by many authors (Ellerman and Morrison-Scott 1951, Roberts 1977).

#### 48. *Felis chaus kutas* Pearson

1832. *Felis kutas* Pearson, *J.Asiat.Soc.Beng.*, 1 : 75 (Medinipur, West Bengal, India).

*Common names* : Jungle cat (Eng.); Munra, Jungle Billa, Jungle Billai, Raani Bilado (Guj.).

*Material examined* : Banaskantha district : 1 Unsexed, Deesa, coll. C.A. Crump, 9.v.1913. Junagadh district : 1F, Junagadh, coll. C.A. Crump, 1.x.1972. 1 unsexed, Gir Forest, coll. B. Biswas, 1962. Kachchh district : 1M, 1 unsexed, Charwa, coll. C.A. Crump, 11/13.viii.1911.

*Measurements* : External : 1M : H & B 620; T1 292; Hf 165; E 70. 1F : H & B 540; T1 223; Hf 133; E 64. Cranial : 1M : *l* 114; *cb* 105; *pow* 36; *iw* 27; *zw* 76; *pm*<sup>4</sup> 11; *m<sub>l</sub>* 9. 2 unsexed: *l* 101, 106; *cb* 92; 96; *pow* 34, 36; *iw* 18,19; *mw* 24,25; *zw* 69, 69; *pm*<sup>4</sup> 11,13; *m<sub>l</sub>* 8,11.

*Diagnosis*: Dorsal pelage unspotted, but occasionally speckled buff gray or rusty; black horizontal stripes present on the inner side of fore legs; underside reddish buff with fore throat, axillae and groin white.

*Distribution* : India : Gujarat : Amreli district, Banaskantha district (Ryley 1914c), Bharuch district (Govt. of India 1961), Dangs district, Jamnagar district (Govt. of India 1970), Junagadh district (Ryley 1913), Kheda district (Rajyagor 1977), Kachchh district (Wroughton 1912c), Panch Mahal district (Patel 1972), Rajkot district (Ryley 1913), Surat district (Govt. of India 1962), Vadodara district and Valsad district; Bihar; Madhya Pradesh; Orissa; Rajasthan; Uttar Pradesh; West Bengal.

*Remarks*: Jungle cat, though reported to be widely distributed but in reality it is mainly concentrated in Junagadh, Jamnagar, Bharuch, Kachchh, and Dangs districts. It was found to be very common in Gir Forest during recent survey. Census by Gujarat Forest Department (1985) also revealed Jungle cat as fairly common in Hingolghadh Nature Education Sanctuary (20 Nos.), Barda Sanctuary (156 Nos.), Narayan Sarovar Chinkara Sanctuary (70 Nos.) and Kachchh East (60 Nos).

However, extension of agricultural fields and random use of pesticides worstly affected the population of Jungle Cat outside conservation areas.

Jungle Cat plays an important role in the control of wild rodent populations (Prakash 1959, Niethammer 1966).

Variations in colour, nature and pattern of pelage are well evident in this species. Melanism is somewhat common as it is evident from the series of specimens present in the Bombay Natural History Society.

In the Mammal Survey Reports (Nos. 3,10,12), *Felis affinis* (= *F. chaus affinis*) has been recorded from Gujarat. However, Pocock (1939) considered the population of Jungle Cat from Gujarat as *F.c. kutas* on the basis of smaller size.

#### 49. *Felis caracal schmitzi* Matschie

1912. *Felis (caracal) schmitzi* Matschie, *S.B.Ges. Nat.Fr.Berlin*, 64 (The Dead Sea Region, Palestine).

*Common names*: Caracal Lynx (Eng.), Hayantra (Guj.).

*Diagnosis*: Long legs; short tail (230-320). Uniformly reddish sandy gray above, fading to buff or white below; a dark spot present on each side of upper lip and two short vertical bars above eyes; Ears triangular, pointed, with a long erect tuft of black hairs at tip.

*Distribution* : India : Gujarat : Kachchh district (Wroughton 1918c); Rajasthan; Uttar Pradesh. Pakistan, Afghanistan, Iraq, Iran and Palestine.

*Remarks*: Crump (in Wroughton' 1912c) reported that in Gujarat it is "fairly common in the N. and N.W. Hills" However, rarity of this species in the subcontinent, was mentioned even by earlier naturalists (Murray 1884, Sterndale 1884). In the district gazetteer of Kachchh (Patel 1974) this species was not recorded from there. However, Forest Department of Gujarat (1985) reported 10 individuals from Narayan Sarovar Chinkara Sanctuary. Thus, it is obvious Caracal Lynx is found in a limited area of Gujarat, that too in very small number.

Honacki *et al.* (1982) treated this species under the genus *Lynx* Kerr, and Wozencraft (1993) under the genus *Caracal* Gray.

#### 50. *Felis bengalensis bengalensis* Kerr

1792. *Felis bengalensis* Kerr, *Anim. Kingd.*, 151 (Southern Bengal).

*Common names* : Leopard Cat (Eng.); Morchita (Guj.).

*Diagnosis* : Dorsal pelage pale fulvous, varying from ochraceous to grayish, ornamented throughout with numerous elongated black or rusty spots; undersurface white but spotted; two narrow black stripes over the head from inner corner of eyes; transverse stripes on forelegs.

*Distribution* : India : Gujarat : Bharuch district (Govt. of India 1961) and Surat district (Govt. of India 1962); Andhra Pradesh; Assam; Maharashtra; Manipur; Orissa; Karnataka; Kerala; Tamil Nadu; Tripura; West Bengal. Bangladesh, Myanmar, Thailand, China, Vietnam, Kalimantan, Indonesia and Philippines.

*Remarks* : In the district Gazetteers, Leopard Cat has been recorded from Bharuch and Surat district. However, during the present surveys we could not obtain any evidence of its occurrence in the State. Thus, Leopard Cat is listed here with a benefit of doubt.

Wozencraft (1993) treated this species under the genus *Prionailurus* Severtzov.

#### 51. *Felis rubiginosa rubiginosa* Geoffroy

1831. *Felis rubiginosa* Geoffroy, *Belanger, Voy. Ind. Orient. Zool.*, 140 (Pondicherry, India).

*Common names* : Rusty-spotted Cat (Eng.).

*Diagnosis* : Smaller than domestic cat, head and body length 350-480, tail about half of head and body length. Dorsal pelage rufescent gray, patterned with brown bars and spots. A pair of cheek stripe and four dark lines present over the head. Tail uniformly coloured or most indistinctly patterned. Belly and inner side of legs white with large dark spots.

*Distribution*: India : Gujarat : Dangs, Surat

and Valsad districts (Digveerendrasinhji 1964, 1987) and Junagadh district (Tikader Pers. Comm.); Andhra Pradesh; Jammu and Kashmir; Maharashtra; Pondicherry; Tamil Nadu.

**Remarks :** Very rare, there are only few sighting records from the State. Digveerendrasinhji (1964) collected two specimens, one from Dangs district and the other from adjoining forest of Vansda Taluka (Surat district). Later, he (1987) could notice a specimen on the road going through the Vansda National Park at the turn of Ghat Road, known as 'Vis- Gholiani Bari, in 1986. Chavan *et al.* (1991) observed it in Shoolpaneshwar Sanctuary.

Rusty-spotted Cat, though very rare, has a wide range of distribution. Specific survey is required to reveal the exact status of this minic-cat in our country.

Wozencraft (1993) considered this species under the genus *Prionailurus* Severtzov.

#### Genus *Panthera* Oken, 1816

Three species of the genus *Panthera* occur in Gujarat.

#### Key to the identification of the species of genus *Panthera* occurring in Gujarat.

1. Pattern of stripes or spots almost absent in the adult; a black tuft on the tip of tail .....*P. leo persica*
- Pattern of stripes or spots present in the adult; no black tuft on tail tip.....2
2. Size larger, including tail usually over 260 cm. Pattern consisting of vertical black stripes; tail relatively thick. ....*P.tigris tigris*
3. Size smaller, including tail usually less than 215 cm. Pattern consisting of black spots irregularly arranged in rosettes; tail relatively slim. ....*P.pardus fusca*

#### 52. *Panthera pardus fusca* (Meyer)

1794. *Felis fusca* Meyer, *Zool. Ann.*, 1 : 394 (Bengal).

**Common names :** Leopard (Eng.); Dipra, Nana Wagh (Guj.).

**Diagnosis :** Total length 170 to 215 cm; height at shoulder 60 cm. Ground colour variable-pale yellow, warm gray, rich tawny to rufous fawn, with dark spots arranged in rosettes all over the sides of the body.

**Distribution :** India : Gujarat : Amdavad district, Amreli district, Bhavnagar district (Govt. of India 1969), Bharuch district (Govt. of India 1961), Banaskantha district (Crump in Ryley 1914c), Junagadh district (Crump in Ryley 1913), Kachchh district (Stoliczka 1872), Kheda district (Rajyagor 1977), Dangs district (Patel 1971), Jamnagar district (Govt. of India 1970), Sabarkantha district (Govt. of India 1962), Surendranagar district (Patel 1977) and Vadodara district (Govt. of India 1979); throughout India in suitable habitats. Pakistan, Bangladesh, Myanmar, China and Sri Lanka.

**Remarks :** Once Leopard was plenty in Gujarat, but now it is rare in many areas of its range (Govt. of India 1965, Dharmkumarsinhji 1978). It lives among rocks cultivated fields with deep nullahs and scrub as well as in forests. It has been reported that some populations of Leopard living in Jungle depend on deer, cattle and occasionally pick up dogs or other domestic animals from adjoining villages (Govt. of India 1961). These leopards have a larger sphere of activity. Some other leopards live permanently around villages and cause constant nuisance and harassment to villagers. Cases of mauling do occur almost every year, particularly in monsoon. But no man-eater has been reported in recent years.

Some population data on leopards of Gujarat are given below (Gujarat Forest Department 1985).

Surat Circle 103; Vadodara Circle 82; Gandhinagar Circle 7; Kachchh Circle 3; Junagadh Circle (excluding Gir Lion Sanctuary) 24; Wildlife Circle including Gir Lion Sanctuary 201. However, 1989 census reported 212 animals from Gir.

#### 53. *Panthera tigris tigris* (Linnaeus)

1758. *Felis tigris* Linnaeus, *Syst.Nat.*, 10th ed., 1 : 41 (Bengal).

**Common names :** Tiger (Eng.), Palawala Wagh, Pattial Wagh (Guj.).

**Diagnosis:** Large sized. Total length 260 cm to 290 cm; height at shoulder about 80cm. Rich reddish, yellow to orange rufous coat with black stripes; tail black ringed; venter white.

**Distribution :** India : Gujarat : Bharuch district (Govt. of India 1961), Dangs district (Patel 1971), Kheda district (Rajyagor 1977) and Surat district (Govt. of India 1962); found almost throughout India in suitable habitats where three essentials of its well being viz., plenty of game, water and shelter from sun are available. Nepal, Bangladesh, and Myanmar.

**Remarks :** Endangered. In the beginning of the present century tigers were fairly common in Panch Mahal, Sabarkanth, Banaskantha and Vadodara districts. But now totally wiped out from these areas (Crump in Ryley 1914c, Pocock 1934, Patel 1972, Rajyagor 1974, Govt. of India 1979). Principal reasons for extinction of tigers from these areas are indiscriminate shooting by the former rulers and 'shikaris', predominant agrarian economy combined with depletion of forest vegetation.

According to Gujarat Forest Department (1985), all the tigers are now restricted to Surat Circle and their number is around nine.

Pocock (1939) provided the description of a skin collected from Danta (Banaskantha) as follows :

"has a rougher coat, with a little wool, about 25 mm long, and on the nape about 40 mm"

#### 54. *Panthera leo persica* (Meyer)

1826. *Felis leo persica* Meyer, *Dissert Inaug.de Genera Felium*, 6 (N.V.), 1826, *Beytr. Anat. des. Tiegern*, 6 (Persia).

**Common names :** Lion (Eng.); Sabaj, Sawach howach, Sinh, Untio Wagh (Guj.).

**Diagnosis :** Large-sized, total length of adult males 270 cm to 300 cm, females a little smaller. Coat yellowish brown to sandy gray and devoid of any marking. Tail with a long tuft of hairs at tip. Light or dark coloured mane in males; cubs marked with stripes and spots. A

pair of infraorbital foramen present below eye socket in 50 percent animals (Joslin 1984).

**Distribution :** India : Gujarat : Gir Forest of Junagadh district; occasionally strays into Girnar hills (at least till 1963) and Kodinar and Dhari Talukas of Amreli District.

**Remarks:** Most endangered and only viable population occurs in Gir Forest. In the beginning of 19th century lions were fairly well distributed in India, still Blanford (1888-91) remarked "In India the lion is verging on extinction" According to Bedi and Bedi (1984) probable years of region-wise extermination of lion appears to be : Delhi 1834; Bihar 1814; Saharanpur and Ludhiana-1822; Bhawalpur - 1842; Eastern Vindhya and Bundelkhand - 1865; Rajasthan- 1870; Western Aravalli-1880. Blanford (quoted by Rashid 1986) recorded the presence of lions in different places of Gujarat during last century as follows : Palanpur 1880; Deesa 1878; Amdavad-1836; Vadodara- 1832; Rajasthan border -1872. Extinction of lion from a vast area was due to random hunting by the rulers of princely States, drastic habitat destruction and acute competition with domestic stocks. At the turn of the present century, by the request of Lord Curzon, rulers of Junagadh State took steps for survival of lions in Gir Forest. After independence, by the combined efforts of the Govt. of India and Gujarat forest Department, lions of Gir Forest have escaped from the immediate threat of extinction. Since 1968, a steady increase of lion population could be observed. Census based on direct visual count in the years 1968, 1974, 1979, 1985, 1990 revealed the number of lions as 177, 180, 205, 239 and 284 respectively (Dalvi 1969, Rashid 1986, Chellam and Johnsingh 1993).

Estimated carrying capacity of Gir forest for lion is 250 (Chavan 1993). Thus, identification of new suitable areas for translocation of lions from Gir is the most urgent requirement to minimise the risk of this animal.

In recent years, incidence of mauling has increased substantially. From May 1988-March 1991, lions have mauled 120 people, resulting 20 deaths (Saberwal *et al.* 1990 in Chellam and Johnsingh, 1993).

## Order PERISSODACTYLA

Order Perissodactyla is characterised by well-developed third or middle digit and number of toes in foot being usually odd; molars and premolars are in unbroken series.

The order is represented by one family Equidae in Gujarat.

## Family EQUIDAE

It is a monotypic family (Honacki *et al.* 1982).

Genus *Equus* Linnaeus, 1766

Represented by one species in Gujarat.

55. *Equus onager khur* Lesson

1827. *Equus khur* Lesson, Mammalogia, 337 (The Little Rann of Kachchh, Gujarat, India).

*Common names* : Indian Wild Ass (Eng.); Gorkhur (Guj.).

*Diagnosis* : Horse like; head and body length 200cm to 220 cm, height at shoulder 110cm to 120cm. Short erect mane continues as a dark brown stripe on the back. Ears long; tail moderately long and tufted. Coat colour varies from reddish gray to pale chestnut. lighter on nose, belly and flanks. Each foot has single complete toe encased in a large solid hoof.

*Distribution* : India : Gujarat : Surendranagar district.

*Remarks* : Endangered. The Indian Wild Ass once ranged from south west Iran through Pakistan to north west India. At present, it is restricted to a small area in the Little Rann of Kachchh. Ali (1986) observed this species thriving well in Radhanagar, Santalpur, Jhinjhuva, Kharaghoda, Bajana and many other parts of the Little Rann of Kachchh. It lives in hards, which may be a small family group of 3-10 animals to as big as of 48 individuals.

Number of the Indian Wild Ass in the Little Rann of Kachchh was estimated about 5000 in 1946, 4000 in 1956, 870 in 1962, and 368 in 1969 (Wynter-Blyth 1956, Gee 1964, Schaller

and Simon 1970, Ali 1986). Such catastrophic decline during sixtees was suspected to be due to Surra disease particularly during 1958, 1960 and 1961 (Mukherjee 1982). In 1970, an aerial count put the number at about 400 (Roberts 1977). Recently population of the Wild Ass shows an increasing tendency, which according to the census reports of Gujarat Forest Department is about 1989 individuals in 1985.

In addition to the *Surra* disease, hybridization with domestic donkeys brought for salt work in the area is another threat to the population of Wild Ass.

Taxonomy of the Indian Wild Ass is a debatable subject. Groves and Mazak (1967) and Robert (1977) included *onager* under *hemionus* but Bennett (1980) and Honacki *et al.* (1982) considered *onager* as a distinct species.

## Order ARTIODACTYLA

Even toed, axis of the foot passes between third and fourth toes. Toes enclosed in a horny hooves of roughly equal size and giving the appearance of a single hoof, split down in the middle.

Order Artiodactyla is represented in Gujarat by three families.

## Key to families of ARTIODACTYLA occurring in Gujarat.

1. Upper incisors present. Devoid of horns or antlers. ....Suidae
- Upper incisor absent, horns or antlers present at least in males.....2
2. Horns unbranched, permanent and consists of a hollow outer sheath and an inner bony core .....Bovidae
- Antlers solid, branched, ornamented with knots and ridges, and periodically shed .....Cervidae

## Family SUIDAE

Represented by one genus in Gujarat.

Genus *Sus* Linnaeus, 1758

Only one species occurs in Gujarat.

56. *Sus scrofa cristatus* Wagner

1839. *Sus cristatus* Wagner, *Munch. Gelehrt. Anz.*, 9 : 435 (probably Malabar Coast, India).

*Common names* : Indian Wild Boar (Eng.); Dukkur, Bhund, Suvvar, Huar (Guj.).

*Diagnosis* : Head and body length range from 115 cm to 160 cm in adult males, females smaller. Deep body with short thick neck and slender legs. Head with sloping muzzle terminating in a special flattened disk. Ears large; eyes small. Body dark gray to pinkish brown, covered with coarse black and brown bristles which form a crest over neck. Canine in adult males developed into tusk.

*Distribution* : India : Gujarat : Almost throughout the State; forested or semiforested tracts of whole of India. Pakistan, Sri Lanka, Nepal, Bangladesh, Myanmar, Indonesia, Malaysia and Vietnam.

*Remarks*: Moderately common. Found in grass or scanty bush jungle as well as in the forest particularly near cultivated fields or muddy and swampy areas. Dharmkumarsinhji (1978) reported that in the first part of the present century there were 2000-4000 wild boars in the coconut-cum-mango plantation area of Ranbag, Mahuva, and Bhavnagar alone; occasionally military personal were called for gunning them to protect crop. From a road sampling in 1970, population of wild boar was found to be 6242 in Gir Forest (Berwick and Jordon 1971). Later, Chavan (1993) reported 2212 wild boar in Gir Lion Sanctuary. However, except in conservation areas, its number has reduced considerably due to indiscriminate shooting and use of pesticides.

## Family CERVIDAE

Three genera occur in Gujarat.

Key to the genera of family CERVIDAE occurring in Gujarat.

1. Antlers short, consisting of a short brow tine and an unbranched beam; no phalanges to lateral digits; tusk like canine in males .....*Muntiacus*

— Antlers long and branched, bony phalanges to lateral digits; upper canine when present not tusk like.....2

2. Body distinctly spotted in adult animals; browline sets almost at a right angle to the beam of antler .....*Axis*

— Body unspotted; brow tine forms an acute angle with the beam of antler .....*Cervus*

Genus *Muntiacus* Rafinesque, 1815

The genus is represented in India by one species only.

57. *Muntiacus muntjak* (Zimmermann)

1780. *Cervus muntjak* Zimmermann, *Geogr. Gesch.*, 2 : 131 (Java).

*Common names* : Indian Muntjac, Barking Deer (Eng.); Fokdi, Panfokdi (Guj.).

*Diagnosis* : Head and body length varies from 80 cm to 100 cm., height at shoulder from 41 cm. to 60 cm. Heavy-bodied with short dainty legs. Body fur soft, short and glossy; dorsum reddish chestnut; under surface whitish. Male with a pair of short antlers, developing from two skin covered pedicels.

*Distribution* : India : Gujarat : Bharuch district (Govt. of India 1961), Dangs district (Patel 1971) and Surat district (Govt. of India 1962); throughout India in thickly wooded hill tracts up to 1828 meter. Pakistan, Bangladesh, China, Myanmar, Vietnam, Sri Lanka, Bhutan, Nepal and Thailand.

*Remarks* : Very rare in Gujarat. Though it is reported to occur in some of the southern districts, but during our survey we could not notice any of them. However, there is authentic record of its wide spread occurrence during first quarter of the present century in Junagadh, Banaskantha and Vadodara (Crump in Ryley 1913, 1914c).

No specimen from Gujarat is available for examination. There is also no authentic description of Gujarat specimen in literature. Thus, we are not in a position to comment on the subspecific status of the Gujarat population of Barking deer.

Genus *Axis* H. Smith, 1827

One species of the genus is represented in Gujarat.

58. *Axis axis axis* (Erxleben)

1777. *Cervus axis* Erxleben, *Syst. Regn. Anim.*, 312 (Bank of Ganges, India).

*Common names* : Chital, Axis Deer, Spotted Deer (Eng.); Chital, Haran, Passu (Guj.).

*Diagnosis* : Head and body length varies from 137 cm. to 152 cm.; height at shoulder from 91 cm. to 97 cm. in males; females slightly smaller. Colour rufous fawn with white spots throughout; a dark dorsal stripe from nape to end of tail, bordered by one or two rows of spots. Horns usually with three tines, brow tine forming almost a right angle to the beam.

*Distribution* : India : Gujarat : Amreli district (Patel 1972), Bhavnagar district (Govt. of India 1969), Bharuch district (Govt. of India 1961), Dangs district (Patel 1971), Jamnagar district (Govt. of India 1970), Junagadh district (Crump in Ryley 1913), Panch Mahal district (Patel 1972), Rajkot district (Govt. of India 1965), Sabarkantha district (Rajyagor 1974), Surat district (Govt. of India 1962) and Valsad district; Peninsular India, northwards to Kumaon in Uttar Pradesh and Sikkim, eastwards to Assam and Meghalaya. Nepal, Bangladesh and Sri Lanka.

*Remarks* : Fairly common in conservation areas, but is under great pressure outside the protected areas particularly in tribal belts. In Gir Lion Sanctuary there is a steep increase in its population from 4517 in 1974 to 27600 in 1990 (Chavan 1990).

Genus *Cervus* Linnaeus, 1758

One species of the genus *Cervus* occurs in Gujarat.

59. *Cervus unicolor niger* Blainville

1816. *Cervus niger* Blainville, *Bull. Soc. Philom.*

*Paris.*, pp. 76 (Probably somewhere in India, Ellerman and Morrison-Scott 1951).

*Common name* : Sambar (Eng.)

*Diagnosis*: Largest Indian deer; head and body length 183 cm. to 213 cm., height at shoulder 122 cm. to 150 cm. in males, females a little smaller. Coat coarse and shaggy. Stag with a mane around neck and throat. General colour brown with yellowish or grayish tinge, females lighter in tone. Antlers normally with three tines, brow-tine joins the beam at an acute angle.

*Distribution* : India : Gujarat : Amreli district (Patel 1972), Banaskantha district (Crump in Ryley 1914c), Bhavnagar district (Govt. of India 1969), Bharuch district (Govt. of India 1961), Dangs district, Junagadh district (Crump in Ryley 1913), Panch Mahal district (Patel 1972), Sabarkantha district (Rajyagor 1974), Surat district (Govt. of India 1962), Vadodara district (Govt. of India 1979) and Valsad district; Andhra Pradesh; Bihar; Goa; Himachal Pradesh; Karnataka; Kerala; Madhya Pradesh; Maharashtra; Orissa; Rajasthan; Tamil Nadu; Uttar Pradesh; West Bengal. Nepal and Bangladesh.

*Remarks* : Fairly common in conservation areas, but almost wiped out from other areas. Hunting and destruction of forests in the undulating and hilly countries are the main factors for decline of sambar population. We have found piece of skins and mounted heads in many of the houses. However, at present common people have also come forward for the protection of sambar. From 278 in 1970, its number has gone up to 1764 in 1989 in Gir Lion Sanctuary (Berwick and Jordan 1971; Chavan 1993).

## Family BOVIDAE

Family Bovidae is represented by four genera in Gujarat.

Key to the identification of the genera of family BOVIDAE occurring in Gujarat.

1. Horns smooth or closely, irregularly and transversely wrinkled.....2
- Horns with prominent rings at subequal intervals.....3

2. Large-sized, height at shoulder about 120 cm; tail over 45 cm; males with two short horns .....*Boselaphus*  
 — Small-sized, height at shoulder about 65 cm; tail about 13 cm; males with four small horns .....*Tetracerus*
3. Males with horns much longer than head; females without horns .....*Antelope*  
 — Horns scarcely longer than head; females sometimes with horns .....*Gazella*

Genus *Tetracerus* Leach, 1825

It is a monotypic genus.

60. *Tetracerus quadricornis* (Blainville)

1816. *Cerophorus (Cervicapra) quadricornis*  
 Blainville, *Bull. Soc. Philom. Paris*, 75 and 78  
 (Plains of Peninsular India).

*Common names* : Four horned Antelope (Eng.); Bhekhu, Chousingha (Guj.).

*Diagnosis* : Two pairs of horns, posterior pair 80-100, anterior pair 20-30 in length. Female hornless. Fur thin, short and harsh. Colour varies from brown to rufous brown above and white below; a dark stripe down the front of each leg.

*Distribution* : India: Gujarat : Banaskantha district (Crump in Ryley 1914c), Bharuch district (Govt. of India 1961), Junagadh district (Ryley 1913) and Panch Mahal district (Patel 1972); Peninsular India except Malabar coast, north to Rajasthan and northeast to Bihar and Orissa.

*Remarks* : Endangered. Prefers wooded and hilly country near water. Decline in its population is mainly due to hunting and habitat shrinkage. In Gir Lion Sanctuary its number increased from 256 in 1970 to 1063 in 1984, but dropped to 427 in 1989 (Berwick and Jordan 1971, Chavan 1993).

Genus *Boselaphus* Pallas, 1766

Monotypic genus.

61. *Boselaphus tragocamelus* (Pallas)

1766. *Antelope tragocamelus* Pallas, *Misc. Zool.*, 5

(Plains of Peninsular India).

*Common names* : Nilgai, Blue Bull (Eng.); Nilgai, Roz (Guj.).

*Diagnosis* : Horse-like in appearance with stout legs, long and narrow head, a coarse mane of black gray and white hairs running down the hindneck and over the wither. Males blue gray in colour with small, smooth and cylindrical horns; females reddish tan.

*Distribution* : India : Gujarat : Almost throughout the State; from base of Himalayas to Karnataka, including Maharastra. Occasionally cross Pakistan border.

*Remarks* : Once it was plentiful in Gujarat (Lydekker 1907), but now number has gone down considerably. Shrinkage of habitat by tremendous increase in agricultural activities and grazing of the managed domestic livestock forced Nilgai to become a menace to crops in many areas. Again, horn rubbing behaviour of this animal results in the secondary infection and death of many of the valuable trees (Prasad and Verghese 1991). Still due to cow like appearance Nilgai is regarded as sacred animal and farmers sentiment is involved for this creature.

In the Wild Ass Sanctuary, its number was counted as 659 (Gujarat Forest Dept. 1985), while in Gir Lion Sanctuary its number has declined from 2081 in 1984 to 1524 in 1989 (Chavan 1993).

Genus *Gazella* Blainville, 1816

Represented in Gujarat by one species.

62. *Gazella bennetti* (Sykes)

1831. *Antelope bennetti* Sykes, *Proc. zool. Soc. Lond.*, 1830-31 : 104 (Deccan, India).

*Common names* : Indian Gazelle (Eng.); Ratadio, Chinkara, Kalpuch, Chink (Guj.).

*Diagnosis* : Slender bodied; medium sized, height at shoulder about 66 cm. Short tail. Horns present in both sexes but in females much smaller; number of rings in horns, 15-16 but may go up to 25 (Blanford 1888-91). Tuft of long hairs on each knee. Above light

chestnut; underside, white; tail nearly black; knee tuft usually dark brown; a whitish streak down each side of face.

**Distribution** : India : Gujarat : Banaskantha district (Crump in Ryley 1914c), Bhavnagar district (Govt. of India 1969), Bharuch district (Govt. of India 1961), Jamnagar district (Govt. of India 1970), Junagadh district (Ryley 1913), Kachchh district (Stoliczka 1872), Panch Mahal district (Patel 1972), Rajkot district (Govt. of India 1965), Surendranagar district (Patel 1977), and Vadodara district (Govt. of India 1979); Rajasthan. Pakistan.

**Remarks** : Moderately common in undulating sandy areas, especially in interdunal valleys or sandy to loamy agriculturally single cropped areas, having some shrubs and bushes. Occasionally it causes some amount of damage to crops, still it enjoys active protection from the people. From various census reports it appears that Chinkara is thriving well in the different conservation areas. In Gir Wildlife Sanctuary its number has gone up from 311 in 1984 to 972 in 1989 (Chavan 1993), while in Wild Ass Sanctuary its number has gone up from 191 in 1976 to 906 in 1984 (Bedi and Bedi 1984).

Ellerman and Morrison-Scott (1951) treated *bennetti* as a subspecies of nominate species. Groves (1969) regarded *bennetti* as a subspecies of *G. dorcas* (Linnaeus). However, Grubb (1993) considered *bennetti* as a distinct species.

### Genus *Antilope* Pallas, 1766

*Antilope* is a monotypic genus.

#### 63. *Antilope cervicapra* (Linnaeus)

1758. *Capra cervicapra* Linnaeus, *Syst. Nat.*, 10th ed., 1 : 69 (Inland of Trivandrum, Kerala, India).

**Common names** : Black buck (Eng.); Bekri, Khalia, Kodial, Harni (Guj.).

**Diagnosis** : Medium-sized, 70-80 cm at shoulder and 120-130 cm in head and body length. Horns long, slender, twisted spirally and bearing rounded transverse ridges. With

some bare exceptions (Chauhan 1985), females hornless. Males black dorsally, white on throat and venter; females reddish fawn dorsally.

**Distribution** : India : Gujarat : Amdavad district, Amreli district (Patel 1972), Bhavnagar district, Bharuch district (Govt. of India 1961), Jamnagar district (Govt. of India 1970), Junagadh district (Ryley 1913), Kachchh district (Stoliczka 1872), Mahesana district (Rajyagor 1975), Panch Mahal district (Patel 1972), Rajkot district (Govt. of India 1965), Surat district (Govt. of India 1972), Surendranagar district (Patel 1977) and Vadodara district (Govt. of India 1979); from Rajasthan and Punjab in the north to Assam in the east and south to Kannyakumari (Tamil Nadu). Pakistan and Nepal; also introduced in Texas (U.S.A.).

**Remarks** : Fairly common and mostly found in scattered groups in the 'Bhal' or coastal plains of Saurashtra region. Population size in areas away from 'Bhal' is very small. Detail studies on its population, sex ratio, herd composition, seasonal variations, breeding, etc., in Gujarat have already been made (Rashid 1977, 1978, Dharmkumarsinhji 1978, Ranjitsinh 1982, Prasad 1983). Highest concentration of Black buck observed in Valavadar National Park of Bhavnagar where population is showing a steady increase from 400 in 1969 to 3123 in 1984 (Rashid 1977, 1978, Gujarat Forest Dept. 1985). Rashid (1978) also counted as many as 500 individuals in five different districts of Gujarat.

Ellerman and Morrison-Scott (1951) recognised four subspecies of *A. cervicapra*. However, Groves (1982) recognised only two, viz. *A.c. cervicapra* and *A.c. rajputanae* and both of them occur in Gujarat. Being unable to have close examination of Gujarat specimens, we reserve our comments as regard the range of two subspecies in Gujarat.

### Order LAGOMORPHA

Two pairs of upper incisors placed one behind the other. Cheek-teeth adopted for grinding and separated by a wide diastema from

incisors. Three pairs of upper and two pairs of lower premolars. Tail very short, tufted or totally absent.

Represented in Gujarat by a single family Leporidae.

#### Family LEPORIDAE

Hindlimbs very long; soles including digital pads completely covered with hairs. Ears very long and narrow. A short tail present.

Only one genus and one species occur in Gujarat.

#### Genus *Lepus* Linnaeus, 1758

##### 64. *Lepus nigricollis dayanus* Blanford

1874. *Lepus dayanus* Blanford, *Proc. zool. Soc.*, 663 (Sukkur, Sind, Pakistan).

*Common names* : Indian Hare, Blacknaped Hare, Desert Hare (Eng.); Sao, Sasalo, Sasala (Guj.).

*Material examined* : Banaskantha district: 1M, Deesa, coll. C.A. Crump, 24.iv.1913; 1F, Lunwa, coll. C.A. Crump, 9.iv.1913; 2M, 1F, Palanpur, coll. C.A. Crump, 23.iii.1913, 5.vi.1913. Junagadh district : 1F, Baradia, coll., C.A. Crump, 19.xi.1912; 1M, 1F, 5 and 10 km N Jamwala, coll. J.K. Sen, 22.i.1958. Kachchh district ; 1F, Bhuj, coll. C.A. Crump, 7.vii.1911. Rajkot district; 1M, Rajkot, coll. C.A. Crump, 11.xii.1912; 1M, Vankaneer, coll. C.A. Crump, 7.i.1913. Surendranagar district : 1M, Moti Mojiti, Bajana, coll. C.A. Crump, 17.i.1913.

*Measurements* : External : 6M : H & B 433-450 (439); T1 69- 98 (84); Hf 101-110 (106); E 93-103. 5F : H & B 435-482 (449); T1 69-109 (81); Hf 102-110.5 (106.5); E 96-100 (98). Cranial : 3M : *on* 76.4, 77.8, 86.8; *cb* 71.3, 73.3, 82; *n* 36.8, 37.6, 37.8; *b* 9.5, 11, 11.5; *mtr* 13.5, 15.7, 16; *zw* 37,37.9; 2F; *on* 85.4; 86; *cb* 76.2, 78.9 *n* 34.4, 36.5; *b* 11, 11.2; *mtr* 14, 14.4; *zw* 39.6, 41.1.

*Diagnosis* : Dorsal fur short, harsh. Dorsum pale sandy brown, nape of neck warm buff; lower limbs ochraceous; chest and throat creamy yellow, lower belly and inguinal region whiter. No trace of collar of black hairs in the lower neck.

*Distribution* : India : Gujarat : Throughout the State; Punjab; Rajasthan. Pakistan.

*Remarks* : Fairly common in areas where there is no hunting pressure. Large tracts of bush and jungle alternating with cultivated plains provide ideal living condition to this hare. However, it is also found in small bushes and grassland adjacent to cultivated fields and often can be seen foraging in the day time.

Crump (in Wroughton 1912c) reported that in Gujarat. it breeds in June and July and again in September, having one or two youngs at a birth. Taber (1967, quoted from Roberts 1977) found pregnant females between October and February around Lyallpur, Pakistan. Prakash (1997) found it breeding all the year round, litter size varying from 1 to 4. In the present series, two females, one of July and other of November, were found pregnant, each carrying two foetuses. During the recent survey, quite a large number of youngs along with their mothers have been observed in Gir Wildlife Sanctuary. Thus, it appears that *L.n. dayanus* breeds almost round the year.

Much variations in the length and shade of coat, irrespective of sex and season, have been reported in the specimens of Kathiawar (Ryley 1914c). Similar variations have also been noticed in the present series which may be attributed to the age and moulting of the animal.

#### Order RODENTIA

A pair of chisel-shaped, continuously growing incisors in each jaw; distinct diastema between cheekteeth and incisors.

##### Key to families of RODENTIA occurring in Gujarat

1. Fur modified into quills or stiff hairs; cheekteeth 4/4 in number  
.....Hystricidae
- Fur not modified into quills, cheekteeth except in genus *Ratufa* never 4/4 in number  
.....2
2. Infraorbital foramen not or scarcely opens for muscular transmission; cheekteeth except in genus *Ratufa* 5/4 in number; skull with postorbital process.  
.....Sciuridae

— Infraorbital foramen clearly opens for muscle transmission; cheekteeth 3/3 in number; skull without postorbital process .....Muridae

Honacki *et al.* (1982) considered subfamilies Cricetinae and Gerbillinae under a separate family Cricetidae. However, Ellerman (1961), Carleton and Musser (1984), Corbett and Hill (1986) considered Cricetinae and Gerbillinae as separate subfamilies under Muridae.

### Family SCIURIDAE

Three genera of the family SCIURIDAE occur in Gujarat.

Key to the genera of family SCIURIDAE of Gujarat.

1. Flying membrane present on both sides of the body. ....*Petaurista*
- Flying membrane absent .....2
2. Large-sized, head and body length over 280; dorsum without any stripe; maxillary teeth four in number .....*Ratufa*
- Small-sized, head and body length never exceeding 200; dorsal surface of body striped; maxillary teeth five in number .....*Funambulus*

#### Genus *Petaurista* Link, 1795

Only one species of the genus occurs in Gujarat.

#### 65. *Petaurista petaurista philippensis* (Elliot)

1839. *Pteromys philippensis* Elliot, *Madras J. Litt. and Sci.*, 10 : 217 (South Maharatta Country, Maharashtra.).

*Common names* : Large Brown Flying Squirrel (Eng.); Udli Buledi, Pkharoo (Guj.).

*Material examined* : Dangs district ; 1M, Pandwa, coll. Salim Ali, 5.iii.1948.

*Measurements* : External : 1M : H & B 425; T1 512; Hf 94; E 62.

*Diagnosis* : Dorsum grizzled brown and

gray; parachute and forelimb usually brown; underpart whitish to drab gray; tail usually black.

*Distribution* : India : Gujarat : Bharuch district (Govt. of India 1961), Dangs district (Wroughton 1911) and Surat district (Govt. of India 1962); Bihar; Karnataka; Kerala; Maharashtra; Orissa; Tamil Nadu.

*Remarks* : Rare. Confined to the patches of moist thick forest. Often hunted by the tribal people for meat and pelt.

On the basis of size difference, Wroughton (1911) regarded the population of Dangs as a distinct species viz. *P. cindrella*. Ellerman (1947) synonymised *P. cindrella* with *P.p. philippensis* and opined that no difference could be found between the two when a large number of skins were examined. However, in the present specimen from Dangs, basal part of tail is pale grayish against black in specimen of *P.p. philippensis* from southern and eastern parts of the range.

#### Genus *Funambulus* Lesson, 1835

One species occurs in Gujarat.

#### 66. *Funambulus pennanti* Wroughton

1905. *Funambulus pennanti* Wroughton, *J. Bombay nat. Hist. Soc.*, 16 : 411 (Mandvi Taluka, Surat, Gujarat, India).

*Common names* : Northern Palm Squirrel, Five-striped Palm Squirrel (Eng.); Buti, Khilodi, Kilkuri (Guj.).

*Material examined* : Amdavad district: 1F, Nandol Dahegam, c 29 km NE Amdavad, coll. S. Chakraborty, 5.vii.1990. Banaskantha district : 1F, Balaram river, Palanpur, coll. K.S. Pradhan, 16.iii.1948; 1M, 1F, Danta, coll. C.A. Crump, 4/5.vii.1913; 1M, 1F, Deesa, coll. K.S. Pradhan, 14.iii.1940; 1M, Lunwa, coll. C.A. Crump, 9.iv.1913; Bharuch district : 1M, 1F, Jhagadiya, c 22 km S Bharuch, coll. S. Chakraborty, 5/6.x.1990. Jamnagar district : 1M, Okha Port, coll. S.Chakraborty, 27.iv.1990. Junagadh district; 1M, 1F, Jasadhar, 80 km S.Sasan, coll. S.Chakraborty, 1.xi.1980; 1M. Junagadh, coll. C.A. Crump, 19.x.1912; 2M, Sirwan, c 70 km SE Junagadh, coll. B.

Biswas, 29.xi.1962; 1F, Talala, c 11 km E Sasan Gir, coll. C.A. Crump, 21.x.1912. Kachchh district : 1M, Bhuj, 1.viii.1911. Rajkot district : 1F, Rajkot, coll. C.A. Crump, 10.xii.1912. Surat district : 1F, Valod, c 52 km E Surat, coll. S. Chakraborty, 13.x.1990. Surendranagar district : 1M, Dhrangadhra, c 36 km N Surendranagar, coll. C.A. Crump. 2.ii.1913; 1M, Halvad, c 3 km W Dhrangadhra, coll. S. Chakraborty, 22.iv.1990; 2M, Limbdi, c 22 km SE Surendranagar, coll. S. Chakraborty, 14.iv.1990. Vadodara district : 1F, Shankheda, c 66 km SE Vadodara district, coll. S. Chakraborty, 23.x.1991.

*Measurements* : External: 12M : H & B 133-159 (145); T1 115-171 (144.5); Hf 35-40 (37); E 13-18 (15.5). 10F : H & B 133-156 (146); T1 138-180 (159.5); Hf 34-39 (36.5); E 11-17 (15.5). Cranial : 6M : *on* 35.3-39 (37.1); *pl* 17.4-19.7 (18.3); *n* 10.1-11.7 (11.1); *d* 7.6-9.4 (8.5); *fr* 10-11.5 (11); *orb* 11.3-13.3 (12.3); *mtr* 7.1-8.2 (7.4); *zw* 20.1-20.4 (20.3). 4F : *on* 34.7-38.4 (36.7); *pl* 17.4-19.5 (18.7); *n* 10.3-11.8 (11.5); *d* 7.4-8.8 (8.6); *fr* 10-11.1 (10.6); *orb* 11.3-12.6 (11.9); *mtr* 7.2-8 (7.5); *b* 7.8-8.7 (8.2); *zw* 20.3-20.6 (20.4).

*Diagnosis* : Small-sized, ear rounded, muzzle pointed. Dorsum olive gray, divided by three conspicuous cream coloured stripes; belly and flanks creamy gray and separated from the dorsum by indistinct creamy buff longitudinal stripe. Bushy tail, creamy or whitish at tip.

*Distribution*: India : Gujarat : All districts; Andaman Island; Assam; Bihar; Delhi; Haryana; Jammu and Kashmir; Madhya Pradesh; Maharashtra; Meghalaya; Orissa; Punjab; Rajasthan; Sikkim; Uttar Pradesh; West Bengal. Iran, Pakistan, Nepal and Bangladesh.

*Remarks* : Most common, lives in close association with human beings in cities and villages. Makes nest in houses, trees, electrical posts and many other places. Causes considerable damage to the orchard but not to crop fields. Details of its feeding and breeding behaviour was studied by Banerji (1955), Prakash (1959) and Agrawal (1965).

Much variations in colour, irrespective of sex, season and locality could be marked. Details of these variations have been discussed by Ellerman (1961) and Agrawal and Chakraborty (1979).

Another species of the genus, viz., *F. palmarum* (Linnaeus) has been reported from Bharuch district (Govt. of India 1961). However, during the survey of Bharuch district only *F. pennanti* could be observed. Hence, The record of *F. palmarum* from Bharuch district may be due to wrong identification.

#### Genus *Ratufa* Gray, 1867

One species of the genus *Ratufa* occurs in Gujarat.

#### 67. *Ratufa indica dealbata* (Blanford)

1897. *Sciurus indicus* var. *dealbatus* Blanford, *J. Bombay nat. Hist. Soc.*, 11 : 299 (Mahal Dangs, Gujarat).

*Common names* : Large Indian Squirrel (Eng.).

*Diagnosis* : Large-sized, head and body length over 300, tail a little longer. Ear tufted. Almost whole of back, tail and feet whitish.

*Distribution*: India : Gujarat: Dangs district (Blanford 1897), Surat district.

*Remarks*: Rare. Denizen of forest. Ellerman (1961) regarded it as an albinistic form of the nominate subspecies. However, Bombay Natural History Society collection have at least seven specimens with white dorsum collected during different periods. Hence, Moore and Tate (1965) maintained it as a distinct subspecies.

#### Family HYSTRICIDAE

Represented in Gujarat by one genus and one species.

#### Genus *Hystrix* Linnaeus, 1755

#### 68. *Hystrix indica* Kerr

1792. *Hystrix cristata* var. *Indica* Kerr. *Anim. Kingd.*, 218 (India).

*Common names* : Indian Crested Porcupine (Eng.); Shaudi, Serdai (Guj.).

*Material examined* : Junagadh district: 1M, Baradia, coll. C.A. Crump, 20.xi.1912; 1M,

Talala, 11 km E Sasan Gir, coll. C.A. Crump, 22.x.1912.

*Measurements* : External : 2M : H & B 730, 765; T1 100, 112; Hf 95, 104; E 43, 45.

*Diagnosis* : Body covered with well-developed spines; distinct crest of long black quills on crown and neck; quills of tail whitish, short and hollow.

*Distribution*: India : Gujarat: Amdavad district, Amreli district (Patel 1972), Banaskantha district (Ryley 1914c), Bhavnagar district (Govt. of India 1961), Dangs district (Patel 1971), Jamnagar district (Govt. of India 1970), Junagadh district (Ryley 1913), Kheda district, Kachchh district (Wroughton 1912c), Panch Mahal district (Patel 1972), Rajkot district (Ryley 1913), Sabarkantha district (Rajyagor 1974) and Vadodara district (Govt. of India 1979); almost throughout India, except north eastern states. Syria, Iraq, S.Arabia, Iran, Russian Turkestan, Pakistan, Sri Lanka and China.

*Remarks* : Moderately common but very difficult to notice due to its strictly nocturnal and burrowing habit. However, their presence is indicated by peculiar, elongated, pointed faecal matter. Though it has been wiped out from many areas due to transformation of wasteland into agricultural and industrial land, but it has also established in many new habitats such as irrigated crop-fields and forest plantations (Roberts 1977). It takes bark, roots, bulbs and succulent tubers, resulting serious damage to forest and agricultural crops (Prakash 1976, Roberts 1977).

Tribals regularly hunt porcupines for flesh and quills.

### Family MURIDAE

Largest family of class mammalia and represented by two sub families in Gujarat.

#### Key to the subfamilies of MURIDAE occurring in Gujarat

- Skull and general appearance almost without extreme specialisation; cusps of maxillary teeth arranged in three longitudinal rows; upper incisor except in *Golunda* not grooved. ....Murinae

- Skull and general appearance specialised for saltatorial life; cusps of maxillary teeth arranged in two longitudinal rows; upper incisor always grooved in front  
.....Gerbillinae

### Subfamily GERBILLINAE

Three genera occur in Gujarat.

#### Key to the genera of *Gerbillinae* occurring in Gujarat

1. Upper molars strictly simple prismatic with no sign of cusps; laminae of molars always joined and nearly meet in the middle  
.....*Meriones*
- Upper molars not strictly simple prismatic type, with clear sign of cusps; laminae of molars not always joined. ....2
2. Zygomatic plate unusually strongly thrown forward and angular. Nasal and palate more than 40% and 50% of occipitonasal length respectively .....*Tatera*
- Zygomatic plate less exaggerated. Nasal and palate less than 40% and 50% of occipitonasal length respectively  
.....*Gerbillus*

### Genus *Gerbillus* Desmarest, 1804

Two species of the genus *Gerbillus* occur in Gujarat.

#### Key to the species of *Gerbillus* found in Gujarat

- Soles entirely naked. Dorsum sandy buff with some black hairs .....*G.nanus*
- Soles at least partly haired. Dorsum reddish tan or gingery buff without any black hair.  
.....*G. gleadowi*

### 69. *Gerbillus nanus nanus* Blanford

1875. *Gerbillus nanus* Blanford, *Ann. Mag. nat. Hist. Soc.*, 16 : 312 (Gedresia, West Gwador, Baluchistan).

*Common names* : Baluchistan Gerbil, Little Gerbil (Eng.).

*Material examined* : Banaskantha district: 1JuvM, Lunwa, coll. C.A. Crump, 18.iv.1913.

*Diagnosis* : Small-sized, head and body length on average 74; slender hindfoot on average 23 in length. Tail well-clothed throughout with a tuft of longer hairs at tip. Ear rounded, naked and pinkish brown; a white crescentic area present behind each ear; undersurface pure white.

*Distribution* : India : Gujarat : Banaskantha district (Ryley 1914c), Junagadh district, Surendranagar district (Ryley 1913); Rajasthan. Pakistan, Afghanistan, Iran, and east Arabia.

*Remarks* : Common. Lives in self-excavated simple burrows preferably on soft sand of river banks in Gujarat (Ryley 1913, 1914c). However, in Pakistan burrows are mainly associated with rocky or stony region with patches of tropical thorn scrub or around the edges of cultivated fields (Roberts 1977).

Thomas (1920) and Ellerman (1961) considered the populations of naked sole gerbils from Pakistan and India as *G. dasyrus indus* (Thomas). However, Petter (1961) and Harrison (1972) considered that *G. dasyrus* does not extend beyond east of Syria and Indian population of naked sole gerbil belong to *G. nanus*.

It is preyed upon by owls and small carnivores (Niethammer 1965).

#### 70. *Gerbillus gleadowi* Murry

1886. *Gerbillus gleadowi* Murry, *Ann. Mag. nat. Hist.*, 17 : 246 (Berula, 24 km SW of Rohri, Rohti district, Sind, Pakistan).

*Common names* : Little Hairy-footed Gerbil (Eng.).

*Diagnosis* : Small-sized, head and body, tail and hindfoot on average 91, 132 and 29 respectively. Whitish spots behind eye and ear. Tail dorsally clothed with long hairs, particularly at tip. Under surface pure white.

*Distribution* : India : Gujarat : Banaskantha district (Ryley 1914c), Surendranagar district (Ryley 1913), Rajkot district (Ryley 1913); Punjab; Rajasthan. Pakistan.

*Remarks* : Apparently not common. Nocturnal, lives almost in similar habitat as the previous species.

#### Genus *Tatera* Lataste, 1882

Represented by a single species.

#### 71. *Tatera indica indica* (Hardwicke)

1807. *Dipus indicus* Hardwicke, *Trans. Linn. Soc. Lond.*, 8 : 279 (Between Benaras and Hardwar, Uttar Pradesh, India).

*Common names* ; Indian Gerbil, Antelope Rat (Eng.).

*Material examined* : Amdavad district : 1M, 2F, Nandol Dahegam, c 29 km NE Amdavad, coll. S. Chakraborty, 8/9.iv.1990. Banaskantha district: 1M, Danta, coll. C.A. Crump, 18.iv.1913; 1M, Palanpur, Coll. C.A. Crump, 19.iii.1913; Jamnagar district: 1M, 1F, Okha, coll. S. Chakraborty, 25/27.iv.1990. Junagadh district: 1F, Verawal, coll. C.A. Crump, 16.x.1912; 2F, Sirwan, c 70 km SE Junagadh, coll. B.Biswas, 1/2.xi.1962. Rajkot district : 1M, Rajkot, coll. C.A. Crump, 28.xii.1912; 1F, Vankaneer, coll. C.A. Crump, 8.xi.1913. Surendranagar district : 1M, Dhrangadhra, c 36 km N Surendranagar, coll. C.A. Crump, 22.i.1913; 2M, 2F, Limbdi, c 28 km SE Surendranagar, coll. S. Chakraborty, 13/15.iv.1990; 2M, 1F, Motimojiti, coll. C.A.Crump, 13.ii.1913.

*Measurements* : External : 10M : H & B 140-166 (155); T1 149-210 (176); Hf 35-42 (38); E 20-25 (23); 8F : H & B 138-172 (156); T1 152-200 (176.5); Hf 35-40 (38); E 20-25 (23). Cranial : 5M : *on* 39.2-45 (42.7); *pl* 20.3-24 (22.4); *apf* 7.5-10 (8.4); *n* 15.3-20.1 (18.6); *d* 11.3-12.5 (11.9); *mtr* 5.6-7 (6.4); *b* 10.7-12 (11.4); *zw* 21-23 (22.1). 4F: *on* 41-43.1 (42.2); *pl* 21.3-22.6 (22); *apf* 7.9-8.5 (8.2); *n* 17-18.3 (17.5); *d* 11.8-12.2 (12); *mtr* 6.1-6.6 (6.4); *b* 10.4-10.6 (10.5); *zw* 21.2-22.8 (22.2).

*Diagnosis* : Size of a common house rat, tail longer than head and body. Tail well-furred and distal one-third bears a dorsal crest of longer, blackish hairs terminating in a tuft; dorsal and ventral surface of tail dark brown, sides paler. Dorsum pale biscuit to reddish, venter pure

white. Upper incisors longitudinally grooved.

*Distribution* : India : Gujarat : Throughout the State; Andhra Pradesh; Bihar; Delhi; Haryana; Himachal Pradesh; Jammu and Kashmir; Madhya Pradesh; Maharashtra; Orissa; Punjab; Rajasthan; Uttar Pradesh; West Bengal. Iran, Afghanistan, Pakistan and Nepal.

*Remarks* : Most common, found in crop fields, wastelands, as well as in the residential areas. Makes extensive tunnels with a number of exits inside thorny bushes. Definite tracts of their movement from burrows to the field could easily be noticed. It is mainly a ground feeder, but individuals have been observed moving along the branches of *Acacia* tree at Nandol Dahegam (Amdavad) and Limbdi (Surendranagar). It is considered as the most serious pest of field crops as well as poultry. Details of its intraspecific variations and ecology have been worked out (Prasad 1954a, 1954b, Jain 1970, Prakash *et al.* 1971, Agrawal and Chakraborty 1981).

Indian Gerbil is considered as the most important food source of many of the smaller carnivores (Prakash 1959, Roberts 1977).

### Genus *Meriones* Illiger, 1811

*Meriones* is represented by one species in Gujarat.

#### 72. *Meriones hurrianae* (Jerdon)

1867. *Gerbillus hurrianae* Jerdon, *Mamm. India*, 186 (Hissar, Haryana, India).

*Common names* : Indian Desert Gerbil, Indian Desert Jird (Eng.); Khelrau-undur (Guj.).

*Material examined* : Banaskantha district : 2M, 1F, Danta, coll. C.A. Crump, 21/26.vi.1913; 1M, 1F, Deesa, coll. C.A. Crump, 10.v.1913; 1M, Lunwa, coll. C.A. Crump, 16.iv.1913; 2M, 2F, Palanpur, coll. C.A. Crump, 21.iii.1913, 1.iv.1913. Kachchh district : 1M, Nokania, coll. C.A. Crump, 15.vii.1911. Surendranagar district : 2F, Dhrangadhra, coll. C.A. Crump, 22/24.i.1913; 1M, 1F, Motimojiti, coll. C.A. Crump, 15.ii.1913, 15.iii.1913; 1M, Sadla, coll. C.A. Crump, 20.ii.1913.

*Measurements* : External : 5M: H & B 102-120 (112); T1 109-120 (114); Hf 27-29 (28); E 9-10 (9.5). 4F: H & B 112-122 (118.5); T1 110-120 (115); Hf 26-29 (27); E 10-11 (10.3). Cranial : 3M: *on* 31.2, 31.3, 33.5; *pl* 16.3, 16.7, 17.2; *apf* 4.8, 5.1, 5.5; *n* 11.6, 11.7, 12; *d* 7.9, 7.9, 8.1; *mtr* 4.7, 4.7, 4.8; *b* 9.2, 10, 10; *zw* 18.3, 19.1, 19.7. 3F : *on* 30.9, 33.4, 33.6; *pl* 15.7, 16.7, 17.5; *apf* 4.8, 5.6, 5.9; *n* 10.7, 12.2, 12.9; *d* 7.4, 8.4, 8.6; *mtr* 4.8, 5.3, 5.4; *b* 9, 10, 11.6; *zw* 18.8, 18.8, 19.3.

*Diagnosis* : Smaller than the Indian Gerbil, tail almost subequal to the head and body. Dorsum sandy gray or buff with a few black tipped hairs; venter dirty white to pale yellowish. Distal one-third of tail with a dorsal crest of long black hairs terminating in a tuft. Soles of hind foot hairy.

*Distribution* : India : Gujarat : Amdavad district Banaskantha district (Ryley 1913), Bhavnagar district, Jamnagar district, Junagadh district, Kachchh district (Wroughton 1912c), Surendranagar district (Ryley 1913); Delhi; Haryana; Punjab; Rajasthan. Afghanistan, Pakistan and Iran.

*Remarks* : Common, particularly along the sandy plains and also adjacent to cultivated fields. This species was so far recorded from Kachchh, Surendranagar and Banaskantha districts (Wroughton 1912c, Ryley 1913, 1914c). However, during the present surveys, specimens as well as burrows have been observed in the sandy tracts of other districts mentioned above. Hence, it appears that this gerbil is widely distributed in the State.

There are certain controversies as regard the economic importance of the Indian Desert Gerbil. Wagle (1927) and Roberts (1977) opined that *M. hurrianae* is quite harmless. However, Prakash (1981) showed that in addition to certain amount of damage inflicted to agricultural crops, they are responsible for the serious damage to forage production and thereby affecting livestock industry. In Gujarat, we could not get any report about the damage of agricultural crops by this species.

Taxonomy, ecology, population biology and economic aspects of *M. hurrianae* have already been studied in detail (Ellerman 1961, Agrawal 1967, Fitzwater and Prakash 1969, Prakash 1981).

## Subfamily MURINAE

Genus *Vandeleuria* Gray, 1942

It is a monotypic genus.

Seven genera of MURINAE occur in Gujarat.

A key to those genera is given below.

1. Hallux clawless and apparently fully opposable .....*Vandeleuria*  
— Hallux clawed and not fully opposable .....2
2. Upper incisors clearly and prominently grooved. Molars exceptionally heavily cuspidate .....*Golunda*  
— Upper incisors normally not grooved. Molars not heavily cuspidate.....3
3. Incisors proodont, or base of skull so lengthened that condylobasal length normally equals or exceeds occipitonasal length except in few specimens of *Bandicota indica*. Root of lower incisor forms a prominent process on the outside of lower jaw .....4  
— Condylobasal length normally less than occipitonasal. Root of lower incisor forms less prominent process on the outside of lower jaw.....5
4. Palatal foramen exceeds 7 and, most often exceeding 18 percent of occipitonasal length. Tail usually more than three quarters of head and body length .....*Bandicota*  
— Palatal foramen shortened not reaching 7 and under 14 percent of occipitonasal length. Tail usually less than three quarters of head and body length .....*Nesokia*
5. Palatal foramen shortened, not reaching 20 percent of occipitonasal length .....*Rattus*  
— Palatal foramen long; normally 20 percent or more of the occipitonasal length .....6
6. Palate long, exceeds half the occipitonasal length; fifth hind toe shortened .....*Millardia*  
— Palate short, less than half of occipitonasal length; hind toe noticeably longer .....*Cremnomys*

73. *Vandeleuria oleracea oleracea* (Bennett)

1832. *Mus oleraceus* Bennett, *Proc. zool. Soc.*, 121 (Deccan, India).

1914. *Vandeleuria oleracea spadicea* Ryley, *J. Bombay nat. Hist. Soc.*, 22 : 659 (Lu. wa. Palanpur, Banaskantha district, Gujarat).

*Common names* : Indian Long-tailed Tree Mouse, Palm Mouse (Eng.).

*Material examined* : Banaskantha district; 1M, 1F, Lunwa, coll. C.A. Crump, 8/13.iv. 1913. Surendranagar district : 1M, 1F, 1 juv, Ukai Dam site, Sonagarh, coll. A.K. Sarkar, 15.iii.1992.

*Measurements* : External : 2M : H & B 78, 95; T1 102, 111; Hf 18, 18; E 15, 16. 2F : H & B 78, 83; T1 100, 111; Hf 16, 19; E 15, 16. Cranial : 2M : *on* 22.6, 23.5; *pl* 10.6, 11.2; *apf* 3.7, 3.8; *n* 7, 8.5; *mtr* 3.3, 3.5; *b* 4.3, 4.5. 2F : *on* 23.2, 23.5; *pl* 11.1, 11.2; *apf* 3.6, 3.8; *n* 7.7, -; *mtr* 3.4, 3.4; *b* 4.5.

*Diagnosis* : Small-sized, head and body usually less than 100. Tail poorly white and much longer than head and body. Outer finger short, stumpy and clawless. Dorsum pale tawny brown to reddish, underside white to dirty white.

*Distribution* : India : Gujarat: Amdavad district, Banaskantha district (Ryley 1914a), Jamnagar district, Junagadh district (Ellerman 1961), Rajkot district, Surat district (Ryley 1914 a), Surendranagar district (Ryley 1913) and Vadodara district (Govt. of India 1979); Bihar; Karnataka; Madhya Pradesh; Maharashtra.

*Remarks* : Fairly common, but due to small size and arboreal habit it is very difficult to collect them. Small cup-shaped nests are made in a variety of locations such as trees, hedges, thatch of houses, guttering of bungalows, and even on electric posts (Ellerman 1961, Ryley 1913, Pradhan *pers. comm.*). However, present specimens from Surat were collected by excavating a termite mound at the base of dead 'Babul' tree. Network of tunnels was found in the mound. Female specimen was pregnant with four fetuses in medium stage of

development. From the sex and age composition of the specimens collected from the mound it appears that Indian Long-tailed Mouse lives in family and young accompany the parent up to a certain stage.

Agrawal and Chakraborty (1980) after a study of a series of specimens opined that there is practically no difference between the nominate subspecies and *V. o. spadicea* so far coloration and external measurements are concerned. However, they maintained *V. o. spadicea* on the basis of the larger occipitonasal length (more than 22.4 vs less than 22.4). Present series indicates that difference in the occipitonasal length between *V. o. oleracea* and *V. o. spadicea* also does not hold good. Thus, *V. o. spadicea* is considered here as a synonym of the nominate subspecies.

#### Genus *Millardia* Thomas, 1911

Taxonomic status of the genus *Millardia* was discussed by Agrawal (1970). The genus is represented by two species in Gujarat. Key to these species is given below.

Small-sized, head and body usually less than 115. Females with three pairs of mammae. Plantar pads four... *M. gleadowi*

Larger, head and body mostly over 115 mm. Females with four pairs of mammae. Plantar pads five..... *M. meltada pallidior*

#### 74. *Millardia meltada pallidior* Ryley

1914. *Millardia meltada pallidior* Ryley, *J. Bombay nat. Hist. Soc.*, 22 : 659 (Lunwa, Palanpur, Banaskantha, Gujarat, India).

*Common names* : Meted, Northern Soft-furred Field Rat (Eng.); Unda (Guj.).

*Material examined* : Banaskantha district: 2F, Lunwa, coll. C.A. Crump. 9/10/iv.1913. Rajkot district: 1 juv M, 1 juvF, Rajkot, coll. C.A. Crump, 26/27.xii.1912. Surendranagar district : 1M, 1F, Satapur, Dhrangadhra, 36 km N Surendranagar, coll. C.A. Crump, 30.i.1913; 1M, Muli, coll. C.A. Crump, 8.ii.1913.

*Measurements* : External : 2M : H & B 110, 133; T1 -, 128; Hf 24; 28; E 20, 22. 2F : H & B 115-123; T1 -, 118; Hf 23, 24; E 19, 19. Cranial: 1M : *on* 30.4; *pl* 16.3; *apf* 7.4; *n* 12.3; *mtr* 5.7;

*b* 5.9. 2F ; *on* 31.2; 31.9; *pl* 15.1, 16.8; *apf* 7.2, 7.7; *n* 11.5, 12.2; *mtr* 5.3, 6; *b* 5.8, 6.1.

*Diagnosis* : Rat-like, with large, rounded ear and short bicoloured tail: Hind foot without posterior pad of sole. Fifth toe noticeably short, being roughly equal to hallux. Dorsum pale grayish fawn, venter grayish white.

*Distribution*: India : Gujarat: Banaskantha district (Ryley 1914b), Bharuch district, Junagadh district, Kachchh district (Wroughton 1912c). Rajkot district (Ryley 1913) and Surendranagar district (Ryley 1913); Himachal Pradesh; Punjab; Uttar Pradesh. Pakistan and Nepal.

*Remarks* : Fairly common in the agricultural fields. According to Roberts (1977) this subspecies prefers to make use of natural crannies in loose stone walls and embankments or even natural cracks in the soil. However, extensive but not deep tunnels of metads have been observed in the groundnut and paddy fields of Junagadh and Bharuch districts respectively during harvesting period. Metads are considered to be serious pest of agricultural crops in the field.

#### 75. *Millardia gleadowi* (Muray)

1885. *Mus gleadowi* Muray, *Proc. zool. Soc. Lond.*, 809 (Clifton, Plain, Karachi, Pakistan).

*Common names* : Sand-coloured Rat (Eng.).

*Material examined* : Banaskantha district : 1 juvM, 2F, Lunwa, coll. C.A. Crump, 20/21.vi.1913; Rajkot district : 3M, 3F, Rajkot, coll. C.A. Crump, 12 to 14.xii.1912. Surendranagar district: 1M, Dhrangadhra, 36 km N. Surendranagar, coll. C.A. Crump, 25.i.1913; 1M, 1F, Muli, coll. C.A. Crump, 7/8.ii.1913.

*Measurements* : External : 5M : H & B 72-86 (79.5); T1 71- 83 (79); Hf 18-19.5 (18.5); E 17.5-20 (18.5). 4F : H & B 78- 88 (82); T1 70-80 (76); Hf 18-19 (18.5); E 17.5-20 (18.5). Cranial : 2M : *on* 24.8, 26.3; *pl* 13.3, 14.3; *apf* 5.5, 5.6; *n* 9.6, 10.7; *mtr* 4.2, 4.3; *b* 5.4, 5.4. 6F : *on* 24.2-26.4 (24.5); *pl* 12.7- 13.6 (13.1); *apf* 4.4-6 (5.5); *n* 8.6-10.8 (9.4); *mtr* 4.2- 4.5 (4.3); *b* 5.4-6 (5.6).

*Diagnosis* : Small-sized, mouse-like, soft-

furred. Ear remarkably enlarged being often more than one-fifth of the head and body length. Dorsum sandy brown, undersurface white. Tail dark above, pale below.

**Distribution:** India : Gujarat : Banas-kantha district (Ryley 1914 c), Rajkot district and Surendranagar district (Ryley 1913); Rajasthan. Pakistan and Afghanistan.

**Remarks :** Fairly common in semi desert, sandy or rocky areas having scattered growth of grasses. Burrows are simple and not organised in colonies.

Taxonomy of this species was dealt in detail by Agrawal (1970).

#### Genus *Rattus* Fischer, 1803

One species of the genus *Rattus* occurs in Gujarat.

#### *Rattus rattus* (Linnaeus)

The House Rat or Black Rat, *Rattus rattus* is represented in Gujarat by at least three subspecies with some amount of over-lapping distribution and intergradation. More than one subspecies are often found in the same ecological zone mainly due to human activities.

#### Key to the subspecies of *Rattus rattus* occurring in Gujarat.

1. Underparts white .....*R.r. narbadae*  
— Underparts not white.....2
2. Underparts with a distinct rusty or rufous tings .....*R.r. rufescens*  
— Underparts without rusty tinge .....*R.r. alexandrinus*

#### 76. *Rattus rattus narbadae* Hinton

1918. *Rattus rattus narbadae* Hinton, *J. Bombay nat. Hist. Soc.*, 26 : 77 (Sakot, Hoshangabad, Madhya Pradesh, India).

1919. *Rattus rattus wroughtoni* Hinton, *J. Bombay nat. Hist. Soc.*, 26 :384 (Coonoor, Nilgiri Hills, Tamil Nadu, India).

**Common names :** House Rat, Black Rat

(Eng.); Undur (Guj.).

**Material examined:** Junagadh district: 2M, 3F, Sasan Gir, c 57 km S Junagadh, coll. S. Chakraborty, 28/29.x. 1990; 1F, Sasan c 56 km S Junagadh, coll. S. Chakraborty, 2.xi.1990. Rajkot district: 1 subad M, Morvi, c 78 km S Dhrangadhra, coll. S. Chakraborty, 21. iv. 1990.

**Measurements :** External : 2M : H & B 134, 162; T1 181, 206; Hf 30, 32; E 20, 22. 3F : H & B 135, 163, 163; T1 158, 207, 211; Hf 27, 32, 35; E 20, 20, 23. Cranial : 2M : on 38.9, 39.8; pl 19.2, 20.7; apf 7.2, 7.3; n 14, 14.2; mtr 6.4, 6.7; b 7, 7.2. 2F: on 39.2, 40.5; pl 20.4, 21.4; apf 7.2, 7.6; n 14, 14.1; mtr 6.1, 6.2; b 7.2, 7.3.

**Diagnosis :** White-bellied, tail much longer than head and body. Upper molar tooth row less than 6.6 or less than 16 percent of occipitonasal length.

**Distributioon:** India : Gujarat : Junagadh district and Rajkot district; Maharashtra; Madhya Pradesh; Karnataka; Kerala; Tamil Nadu.

**Remarks :** Well-established populations have been observed in the grocer's shops, godowns and neighbouring fields of Junagadh. In spite of heavy damage inflicted to the stored articles, this species gets protection from many people on ritual ground.

Populations of *Rattus rattus* from Kerala, Tamil Nadu and Karnataka were described by Hinton (1919) as '*R r wroughtoni*' on the basis of relatively larger head and body and shorter tail than *R.r.narbadae*. Ellerman (1961) considered both as valid on the basis of relatively larger tail in *narbadae* than in '*wroughtoni*' (More than 130 percent of head and body vs. less than 130 percent of head and body) and number of mammae 10 in the former as against 12 in the latter. Recently, Chakraborty (1992) extended the range of '*wroughtoni*' further north to the west of 80 E latitude in Madhya Pradesh. In the present series from Gujarat, length of tail varies from 117 to 135 percent and does not fit either with *narbadae* or '*wroughtoni*'. Thus, an analysis of external and cranial measurements of the white-bellied, short-toothed specimens of *R. rattus* from southern, central and western India

present in the National Zoological Collection and those recorded in Ellerman (1961) was made. It was revealed that head and body length ranges from 134-187, percentage of tail in relation to head and body varies from 105 to 149, irrespectively of localities. Again, in one specimen from Sasan (Junagadh), 12 Nos. of mammae have been observed. Thus, in the present paper. 'wroughtoni' has been synonymised with *narbadae*.

#### 77. *Rattus rattus rufescens* (Gray)

1822. *Mus indicus* Desmarest, *Mamm.*, 2 : 229, not of Bechstein 1800.

1827. *Mus rufescens* Gray, *Ann. Mag. nat. Hist.*, 1 : 585 (Dharwaar, Karnataka).

*Common names* : Same as previous subspecies.

*Material examined* : Banaskantha district: 1M, Deesa, coll. C.A. Crump, 9.iv.1913. 1M, Lunwa, coll. C.A. Crump, 9.iv.1913. 2M, 1F, Palanpur, coll. C.A. Crump, 25 to 31.iii.1913. Junagadh district : 1M, Junagadh, coll. C.A. Crump, 16.vi.1912; 1F, Jasadhar, c 80 km S.E. Junagadh, coll. B. Biswas, 9.ii.1958; 1F, Kishod, coll. C.A. Crump, 12.x.1912; 1F, Sasan, c 56 km S Junagadh, coll. C.A. Crump. 14.ii.1912; Kachchh district : 1M, Adesor, coll. C.A. Crump. 14.ix.1911; 2M, 1F, Bhuj, coll. C.A. Crump, 22 to 27.viii.1911. Rajkot district : 1F, coll. C.A. Crump, 26.xii.1912.

*Measurements* : External : 7M : H & B 139-165 (155); T1 184-208 (199); Hf 30-33 (31); E 20-22 (21). 5F, H & B 136-149 (144); T1 171-210 (189); Hf 27.5-31 (30); E 20-22 (21). Cranial : 4M, *on* 37-41 (38.8); *pl* 19.1-21.5 (20.2); *apf* 6.5-7.2 (6.8); *n* 12.9-14.5 (13.7); *mtr* 6.3-6.7 (6.8). 2F, *on* 38.2, 42; *pl* 19.8, 23.2; *apf* 7, 7.8; *n* 13.8, 14.2; *mtr* 6.1, 6.1; *b* 6.6, 7.

*Diagnosis*: Dark-bellied Rat with tail longer than head and body. Rusty or rufous tinge on the belly and dorsum. Upper tooth row less than 6.6.

*Distribution* : India: Gujarat : Banaskantha district (Ryley 1914c), Junagadh district (Ryley 1913), Kachchh district (Wroughton 1912c), and Rajkot district (Ryley 1913);

almost throughout India. Pakistan, Thailand, and Malaysia.

*Remarks* : In all Probability introduced by human agency. Mainly found in residential areas.

Dorsal hairs in all the specimens of present series spiny.

#### 78. *Rattus rattus alexandrinus* (Desmarest)

1803. *Mus alexandrinus* Geoffroy, *Cat. Mamm.* H.N. Paris, 192 (Unavailable, as the work was never published).

1817. *Mus alexandrinus* Desmarest, *Nouv. Dict. Hist. Nat.* (2nd ed.), 29 : 47 (Alexandria, Egypt).

*Common names* : Same as *R.r.narbadae*.

*Material examined* : Amdavad district: 1M, 1 juv M, Nandol Dahegam, c 29 km NE Amdavad, coll. S. Chakraborty, 10/11.iv.1990. Amreli district : 1F, Dhari, c 65 E Junagadh, coll. S. Chakraborty, 5.xi.1991. Bharuch district : 1F, Jhagadiya, c 22 km S Bharuch, coll. S. Chakraborty, 4.x.1990. Banaskantha district : 1F, coll. C.A. Crump. 31.iii.1913. Dangs district: 1M, 1 young unsexed, AHWA, coll. S. Chakraborty, 19.x.1990. Junagadh district: 1M, Sasan Gir, c 57 km S Junagadh, coll. S. Chakraborty, 29.x.1991. Rajkot district : 1M, Morvi, c 70 km W.Dhrangadhra, coll. S. Chakraborty, 21.vi.1990. 1M, 1F, Rajkot, coll. C.A. Crump, 27/31.xii.1912. Surat district : 3 subad. M, 1 subad F, Valod, c 52 km E Surat, coll. S. Chakraborty, 13/14.x.1990. Surendranagar district : 3M 3 subad M, 1F, Dhrangadhra, c 36 km N Surendranagar, coll. S. Chakraborty, 20 to 23.iv.1990. Vadodara district : 1M, 2F, Shankheda, c 66 km SE Vadodara, coll. S. Chakraborty, 25.x.1991.

*Measurements* : External : 5M : H & B 123-190 (155); T1 160-218 (184); Hf 27-35 (31); E 20-24 (21.5). 7F : H & B 130-167 (148); T1 177-205 (200); Hf 26-35 (31) ; E 20-23 (21.5). Cranial : 4M: *on* 33.4-43.8 (38.5); *pl* 17.2-23 (19.7); *apf* 6-7.9 (6.8); *n* 10.9-16 (13.5); *mtr* 6-7.8 (6.6); *b* 6.3-8.1 (7.0). 4F: *on* 36.9-40.7 (38.6); *pl* 19.5-21.2 (20.3); *apf* 6.8-8.1 (7.1); *n* 13.7-15.5 (14.6); *mtr* 6-6.3 (6.1); *b* 6.8-7.5 (7.0).

*Diagnosis* : Very similar to the previous subspecies, but much black, lacking any rusty

or rufous tinge on the belly or back.

**Distribution** : India : Gujarat: Amdavad district, Amreli district, Banaskantha district, Bhavnagar district, Bharuch district, Dangs district, Junagadh district, Mahesana district, Rajkot district, Panch Mahal district, Surat district, Surendranagar district, and Vadodara district. Pakistan, Persian Gulf countries and UAR.

**Remarks** : Most common particularly in urban areas; found in the houses, shops, godowns and occasionally in the neighbouring fields along with white-bellied *narbadae*. Its nests are often found in the fig., mango and other trees adjacent to the houses. Responsible for the huge loss of articles of merchandise and poultry, but it still enjoys protection from certain communities. In many public places, such as, railway stations, city bus stands, markets, dumping grounds, well-established colonies of this subspecies could be observed.

In one female specimen from Dhrangadhra, upper incisors unusually developed, being very long, recurved and reaching almost half of the palatal foramen, while lower incisors only poorly developed. Another female, collected on 25th October at Shankheda, gave birth of six healthy young in the trap within a span of 56 minutes. However, mother did not pay any attention to the newly born young in the trap.

#### Genus *Golunda* Gray, 1837

It is a monotypic genus.

#### 79. *Golunda ellioti gujerati* Thomas

1923. *Golunda ellioti gujerati* Thomas, *J. Bombay nat. Hist. Soc.*, 29 : 374 (Lunwa, Palanpur, Gujarat, India).

**Common names** : Indian Bush Rat (Eng.).

**Material examined** : Banaskantha district: 8M, 6F, Lunwa, coll. C.A. Crump, 9 to 19.iv.1913; 5M, 1F, Danta, coll. C.A. Crump, 19 to 28.vi.1913. Rajkot district : 1F, Rajkot, coll. C.A. Crump, 11.xii.1912. Surendranagar district : 4M, 3F, Dhrangadhra, c 36 km N Surendranagar, coll. C.A. Crump, 24.i.1913 to 3.ii.1913; 1F, Bajana, coll. C.A. Crump,

19.ii.1913; 1F, Muli, coll. C.A. Crump, 9.ii.1913.

**Measurements** : External : 16M : H & B 100-130 (121); Tl 94- 126 (111); Hf 21-24 (23); E 14-16 (15). 13F : H & B 106-128 (118); Tl 92-113 (104); Hf 21.8-25 (23); E 15-17 (15.5). Cranial : 9M : *on* 29.5-32.2 (30.8); *pl* 15.1-16.2 (15.5); *apf* 4.8-5.6 (5.2); *n* 9.7-12.1 (10.8); *mtr* 5.2-6.5 (6.2); *b* 5.2-5.8 (5.4); 3F : *on* 29.6, 31, 31; *pl* 14.9, 15.5, 15.8; *apf* 4.7, 4.8, 5.2; *n* 10.3, 10.6, 11; *mtr* 6.3, 6.3, 6.4; *b* 5.3, 5.4, 5.5.

**Diagnosis** : Apparently similar to house rat, but much smaller and tail almost always shorter than head and body, well-covered with short hairs. Ear almost circular in outline and pinna well-covered on both sides with short buff hairs. Tail dorsally dark brown, ventrally yellowish gray. Upper incisors prominently grooved.

**Distribution** : India : Gujarat : Almost throughout the State; Rajasthan.

**Remarks** : Though widely distributed, but wiped out from many areas due to extensive land use for agriculture and industry. Bush rat mainly depends upon wild seeds and roots and not reported to cause damage to agriculture.

In the present series, belly is white in all except two specimens. Fur spiny particularly in winter specimens. Details of intraspecific variations were dealt by Agrawal and Chakraborty (1982).

#### Genus *Cremnomys* Wroughton, 1912

Represented by one species in Gujarat.

#### 80. *Cremnomys cutchicus cutchicus* Wroughton

1912. *Cremnomys cutchicus* Wroughton, *J. Bombay nat. Hist. Soc.*, 21 : 340 (Dhonsa, Kachchh, Gujarat, India).

1916. *Cremnomys medius* Thomas, *J. Bombay nat. Hist. Soc.*, 24 : 240 (Kudia, Junagadh, India).

**Common names**: Cutch Rat (Eng.).

**Material examined** : Banaskantha district : 6M, 1F, Danta, coll. C.A. Crump, 3.ii.1913, 3.iv.1913, 24/26.vi.1913. Kachchh district :

4M, 2F, Charwa, coll. C.A. Crump, 7 to 13.viii.1911; 1 juvM; Dhonsa, coll. C.A. Crump, 16.vii.1911; 1M, 1F, Padampur, coll. C.A. Crump, 16.ix.1911; 1F, 1 juv, Pirwadi, 7/15.viii. 1918; 1M, 1 juv F; Rhoda-motha, coll. C.A. Crump, 12.vii.1911. Junagadh district : 1M, 8F, coll. C.A. Crump, 26.xi.1912 to 3.xii.1912.

**Diagnosis** : Medium-sized rat, head and body length below 130 and tail longer than head and body. Fur soft. Fifth toe though shorter than central three, but relatively longer than that of *Rattus* sp. Dorsum drab gray to grayish, venter dull gray.

**Distribution** : India : Gujarat : Amdavad district, Amreli district, Banaskantha district, Bharuch district, Junagadh district, Kachchh district (Wroughton 1912a), Panch Mahal district, Rajkot district and Surendranagar district; Bihar; Orissa.

**Remarks** : Fairly common among rocks and hedges around cultivation. Though usually takes wild seeds and fruits, but it has been observed to cause considerable damage to groundnut in Junagadh and cotton in Amdavad and Surendranagar district.

Thomas (1916) described '*C. medius*' from Kudia, Junagadh on the basis of blue gray undersurface and lack of nuchal patch. Ellerman (1961) considered '*medius*' as a subspecies and distinguished it from the nominate subspecies by shorter tail. On detail examination of the present series it was found that tail length of the specimens from the range of '*medius*' varies from 111 to 146 percent against 120 to 145 percent of H&B in *cutchicus* specimens. Examination of the specimens from different parts of India revealed that buffy patch on neck is neither a specific nor a subspecific character, but an individual character, probably related to age and breeding of the animal. Thus, '*medius*' is treated here as a synonym of the nominate subspecies.

### Genus *Mus* Linnaeus, 1758

Classification of the genus *Mus* is marked with much controversies. Present classification is followed after Marshall (1977).

### Key to the species of the genus *Mus* occurring in Gujarat.

1. Supraorbital ridge present .....2
- Supraorbital ridge absent .....3
2. Mammae 4 + 2; anterior border of zygomatic plate arched forward convexly; incisors without a notch; palatal foramina cut deep between anterior molars; an anterior accessory cusp present on elongated anterior cusp of first upper molar .....*M.saxicola*
- Mammae 3 + 2; anterior border of zygomatic plate raised vertically then swept back in an arc of a quarter circle at the zygomatic notch; palatal foramina usually reaching only to a level of anterior cusp of first molar; no anterior accessory cusp present on first upper molar .....*M.phillipsi*
3. Rostrum short and deep, its least depth two-thirds of rostral length; tail bicoloured or unicoloured .....*M.musculus*
- Rostrum long and shallow, its least depth only one-half of rostral length; tail bicoloured..... 4
4. Back brown to light brown, underparts white to the bases; upper incisors short and markedly recurved. X-chromosome telocentric as are autosomes ...*M.booduga*
- Back brown to grayish brown; under parts dull, when white then bases of hairs gray. Upper incisors longer and straight. X-chromosome a huge metacentric ..... *M.dunni*

### 81. *Mus musculus tytleri* Blyth

1859. *Mus tytleri* Blyth, *J.Asiat. Soc. Beng.*, 28 : 296 (Dehra Dun, Uttar Pradesh, India).

**Common names** : House Mouse (Eng.); Undri (Guj.).

**Material examined**: Banaskantha district : 1F, Palanpur, coll. C.A. Crump, 19.iii.1913; Junagadh district : 1M, 1F, Sasan, c 56 km S Junagadh, coll. C.A. Crump, 2/3.xi.1912. Rajkot district : 2M, 2F, Rajkot, coll. C.A. Crump, 12.xii.1912 to 1.i.1913. Surendra-

nagar district : 2M, Dhrangadhra, c 36 km N Surendranagar, coll. S. Chakraborty, 23/29.iv.1990; 1 unsexed, Limbdi, c 28 km SE Surendranagar coll. S. Chakraborty, 16.iv.1990.

*Measurements*: External : 6M : H & B 65-81 (74.5); T1 76-95 (86); Hf 15-18 (16.5); E 8-12 (11). 3F : H & B 68, 73, 73; T1 82, 83, 88; Hf 17, 17, 13; E 11, 12, 12. Cranial : 3M : *on* 19.4, 20, 22.6; *pl* 9.6, 10.1, 11.8; *apf* 4.5, 4.5, 4.9; *n* 7.1, 7.4, 8.6; *d* 4.8, 5, 6.4; *mtr* 3.4, 3.6, 3.6 *b* 3.7, 3.8, 4.3; 2F : *on* 20, 21.3; *pl* 10.1, 11.2; *apf* 4.8, 4.9; *n* 7.2, 7.6; *d* 5.4, 6; *mtr* 3.3, 3.5; *b* 3.6, 4.

*Diagnosis* : Back tawny, grizzled with black; belly ochraceous, with slaty under fur; tail poorly bicoloured and longer than head and body. Ear rounded and seminaked; muzzle sharp and pointed.

*Distribution* : India : Gujarat : Throughout the State; widely distributed almost all over India. Nepal, Myanmar and Sri Lanka.

*Remarks* : Most common in the shops, godowns, houses as well as in the adjacent fields. Nests were observed under the ground, in the garbage, ventilator, roof tiles, as well as in the trees. It causes huge damage to household goods and articles of merchandise.

This mouse is often found in close association with other species of the genus. In all probability the wide spread distribution of the species is due to human agency.

Ryley (1914c) and Ellerman (1961), based on the Mammal Survey material, recorded *Mus musculus castaneus* Waterhouse (= *Mus manei*) from Banaskantha, Junagadh and Rajkot region. However, on examination it appears that those specimens fit very well with the present subspecies.

## 82. *Mus saxicola sadhu* (Wroughton)

1911. *Leggada platythrix sadhu* Wroughton, *J. Bombay nat. Hist. Soc.*, 20 : 1001 (Virawah, Sind, Pakistan).

*Common names* : Brown Spiny Mouse (Eng.); Undei (Guj).

*Material examined* : Banaskantha district: 1M, Danta, coll. C.A. Crump, 24.iv.1913; 1M,

undated. Junagadh district : 1M, Jashadhar, c 80 km SE Junagadh, coll. S. Chakraborty, 31.x.1991; 1M, 3F, Kudia, coll. C.A. Crump, 27 to 29.xi.1912. Kachchh district: 1M, Charwar, coll. C.A. Crump, 12.viii.1911. 1M, Pirwadi, coll. C.A. Crump, 15.viii.1911. Rajkot district : 1F, Vankaner, coll. C.A. Crump, 13.i.1913. Surendranagar district : 2M, 3F, Satapur, Dhrangadhra, 36 km N Surendranagar, coll. C.A. Crump, 30.i.1913 to 11.ii.1913.

*Measurements* : External : 7M : H & B 81-106 (90.5); T1 68- 90 (75); Hf 16-19 (17); E 11-14 (12). 7F : H & B 69-100 (85); T1 59-78 (70); Hf 16-18 (16.7); E 13-17 (14). Cranial : 4M : *on* 23.9-26 (25); *pl* 12.8-14.6 (13.6); *apf* 5.8-6.3 (6); *n* 9.7-10.5 (10); *d* 6.6-7.5 (7); *mtr* 4.2-4.3 (4.27); *b* 4.2-5.2 (4.6). 3F : *on* 23, 25, 26.1; *pl* 12.5, 13.5, 14; *apf* 5.5, 6.3, 6.3; *n* 8.8, 10.3, 10.4; *d* 6.2, 7.1, 8; *mtr* 4, 4.1, 4.3; *b* 4, 4.1, 4.4.

*Diagnosis* : Relatively large-sized mouse, head and body length on average over 85, with much shorter tail. Dorsum gray to brownish gray, with bristle like hair at least in the region of pelvis; ventral surface pale creamy white. Palatal foramina exceeds 23 percent of occipitonasal length.

*Distribution* : India : Gujarat : Amdavad district, Amreli district, Bhavnagar district, Bharuch district, Banaskantha district (Ryley 1914c), Junagadh district (Ellerman 1961), Kachchh district (Wroughton 1912 c), Rajkot district (Ryley 1913), Surendranagar district (Ryley 1913) and Surat district; Punjab; Rajasthan. Pakistan.

*Remarks* : Appears to be the most common field mouse of the State. Burrows were observed in the dry agricultural fields, bunds, under stones and in bushes. Nests of this species were noticed also in the trees. Crump (in Wroughton 1912c) noticed them more plentiful near water. However, we observed them plentiful in the dry areas. At Jasadhar (Junagadh), a large colony was found in a just harvested paddy field. Owner of the land though admitted that the certain loss is caused by this species, but did not allow us to collect any specimen.

Winter specimens were found more spiny

83. *Mus phillipsi* Wroughton

1912. *Mus phillipsi* Wroughton, *J. Bombay nat. Hist. Soc.*, 21 : 772 (Asirgarh, Madhya Pradesh, India).

*Common names* : Phillips Spiny Mouse (Eng.); Undei (Guj.).

*Material examined* : Banaskantha district: 1M (no Skull), Danta, coll. C.A.Crump, 30.vi.1913.

*Measurements* : External : 1M : H & B 65; T1 55; Hf 13.5; E 11.

*Diagnosis* : Medium-sized mouse, head and body length on average 72 (Ellerman 1961), with tail a little shorter. Dorsum yellowish gray to light brown or even darkish. Venter whitish; tail slightly bicoloured. Dorsal fur spiny. Skull well-ridged.

*Distribution*: India : Gujarat : Banaskantha district (Ryley 1914c); Andhra Pradesh; Karnataka; Madhya Pradesh; Rajasthan; Tamil Nadu.

*Remarks* : Not common. According to Crump (in Ryley 1914c), it is found under rocks invariably in close association with *Cremnomys cutchicus*.

84. *Mus booduga booduga* (Gray)

1837. *Leggada booduga* Gray, *Charlesworths Mag. nat. Hist.*, 1 : 586 (South Maharatta Country, Maharashtra, India).

*Common names* : Common Indian Field Mouse (Eng.); Undei (Guj.).

*Material examined* : Amdavad district : 2M, Nandol Dahegam, c 29 km NE Amdavad, coll. S.Chakraborty, 6/8.iv.1990. Amreli district : 1F, Dhari, c 65 km E Junagadh, coll. S. Chakraborty, 3.ix.1991. Banaskantha district: 1M, 1F, Danta, coll. C.A.Crump, 23.vi.1913; 3.vii.1913, 1M,1F, Deesa, coll. C.A. Crump, 30.iv.1913. 1.v.1913; 2M, 1F, Lunwa, coll. C.A. Crump, 15/19.iv.1913; 1M, 1F, Palanpur, coll. C.A. Crump, 19.iii.1913, 6.iv.1913. Bhavnagar district : 1O, Sirhor, coll. C.A. Crump, 26.ii.1913. Dangs district : 2M, Ahwa, coll. S. Chakraborty, 16/19.x. 1990. Junagadh district: 1M, Jasadhar, c 80 km SE Junagadh, coll. B.Biswas, 6.ii.1958; 1M,1F, Sasan, c 56 km S Junagadh, coll. C.A. Crump, 7/8.xi.1912. Rajkot district : 2M, 2F, Rajkot, coll.

C.A.Crump, 14-30. xii.1912; 1M, Vankaneer, coll. C.A. Crump. 8.i.1913. Surendranagar district : 1F, Dhrangadhra, c 36 km N Surendranagar, coll. C.A. Crump, 16.ii.1913; 1M, Muli, Coll. C.A. Crump, 8.ii.1913; 1M, Sadla, Bajana, coll. C.A. Crump, 17.ii.1913.

*Measurements* : External : 11M : H & B 52-73 (62); T1 53-75 (62.5); Hf 13.5-15 (14.5); E 10-13 (11). 9F : H & B 53-63 (60); T1 55-61 (58); Hf 13-15 (13.5); E 10-12 (10.5). Cranial: 2M : *on* 18.7, 20; *pl* 9.9, 10.6; *apf* 3.8, 4.5; *n* 6.9, 7.8; *d* 5, 5.4; *mtr* 3.3, 3.3; *b* 3.5, 3.8. 2F: *on* 18.1, 18.5; *pl* 9.4, 9.7; *apf* 3.5, 4.3; *n* 7, 7.5; *d* 4.8, 4.9; *mtr* 3.1, 3.2; *b* 3.5, 3.9.

*Diagnosis* : Very small; head and body length on average 60, tail usually subequal to head and body. Dorsum brown to light brown, venter perfectly white; tail bicoloured.

*Distribution* : India : Gujarat : Throughout the State; all over rest of India. Pakistan (Roberts 1977) and Bangladesh (Posamentier 1989).

*Remarks* : Most common in dry crop fields and adjacent hedges; in all probability avoids dry sandy areas. Though partly dependent on agricultural crops, but it is not regarded as an economically serious pest.

At Dhari (Amreli), a very good population was observed in the huge stacks of dry grasses in the open godown of the Forest department. Long, branching tunnels up to 10 m in length were found within the stacks.

Wroughton (1912c) included the white-bellied mouse from Kachchh under *Mus dunni* which in all probability belong to this species.

85. *Mus dunni* (Wroughton)

1912. *Leggada dunni* Wroughton, *J. Bombay nat. Hist. Soc.*, 21 : 339 (Ambala, Punjab, India).

*Common names* : Northern field Mouse (Eng.); Undri(Guj.).

*Material examined* : Dangs district : 2M, Ahwa, coll. S. Chakraborty, 16/19.x.1990. Surat district: 1F, Valod, c 52 km E Surat, coll. S. Chakraborty, 14.x.1990.

*Measurements* : External : 1M : H & B 76; T1 58; Hf 15; E 10. 1F : H & B 79; T1 60; Hf 15; E 9. Cranial : 1M; *on* 13.9; *pl* 10.5; *apf* 3.6; *n* 7.3; *d* 5.5; *mtr* 3.2; *b* 3.3.

*Diagnosis* : Very similar to *M. booduga* but dorsum a little darker and venter dull gray at least at the bases of hairs.

*Distribution* : India : Gujarat : Bhavnagar district (Ryley 1913), Dangs district, Rajkot district (Ryley 1913), Surat district and Surendranagar district; Bihar; Karnataka; Maharashtra; Madhya Pradesh; Orissa; Tamil Nadu; Uttar Pradesh; West Bengal.

*Remarks* : Fairly common in the hedge, bush or grass jungle adjacent to crop field as well as in the harvested field.

#### Genus *Bandicota* Gray, 1873

Two species are found in Gujarat.

#### Key to the species of the genus *Bandicota* occurring in Gujarat.

- Bullae relatively small, normally less than one-fifth of the occipitonasal length; nasal more than 33% and palate less than 60% of occipitonasal length  
.....*B. indica indica*
- Bullae relatively large, usually more than one-fifth of occipitonasal length; nasal less than 33% and palate normally more than 60% of occipitonasal length  
.....*B. bengalensis bengalensis*

#### 86. *Bandicota bengalensis bengalensis* (Gray)

1835. *Arvicola bengalensis* Gray, *Illustr. Ind. Zool.*, 2. pl. 21 (Bengal).

*Common names* : Indian Mole Rat, Lesser Bandicoot Rat (Eng.); Ghus (Guj.).

*Material examined* : Junagadh district : 1F, Sasan, c 56 km S Junagadh, coll. C.A. Crump, 5.xi.1914; 1M, Sasan Gir, c 57 km S Junagadh, coll. S. Chakraborty, 29.xi.1991. Rajkot district: 1M, 3F : Rajkot, coll. C.A. Crump, 30.xii.1912, 2.i.1913.

*Measurements* : External : 2M : H & B 140, 150; T1 135, 139; Hf 33,34; E 14,22. 4F : H & B 120-151 (138); T1 108-137 (125); Hf 29-31 (30); E 14-20 (18). Cranial : 1M, *cb* 35.1; *on* 34.7; *pl* 19.6; *apf* 7.1; *n* 10; *mtr* 7; *b* 7.9. 1F : *cb* 35.5; *on* 33.6; *pl* 20.5; *apf* 7.1; *n* 10.2; *mtr* 7.4;

*b* 7.8.

*Diagnosis* : Rat-like, but snout relatively less pointed. Fur coarse, with long black-tipped piles throughout the back. Tail distinctly shorter than head and body. Venter gray to dark gray; ear and tail naked and blackish gray. Mammae 12-20, not always in pairs.

*Distribution* : India : Gujarat: Amdavad district, Amreli district, Bharuch district (Govt. of India 1961), Dangs district, Jamnagar district, Junagadh district (Ryley 1913), Kheda district, Rajkot district (Ryley 1913), Surat district, Surendranagar district and Vadodara district (Govt. of India 1979); throughout India. Pakistan, Sri Lanka, Nepal, Bhutan, Bangladesh and Myanmar.

*Remarks*: Fairly common in fields, godowns, shops and even in busy areas of cities. According to farmers, improved irrigation system and co-operative cultivation have substantially reduced the loss due to Lesser Bandicoot Rat in the field. However, its infestation was very much evident in the railway lines and godowns adjacent to main railway stations like Amdavad, Vadodara, Surendranagar, Jamnagar, etc.

All the specimens from Gujarat appear to be smaller and slightly paler than the specimens from the other parts of the country. Details of intraspecific geographical variations and taxonomy of this species have been worked out by Agrawal and Chakraborty (1976).

#### 87. *Bandicota indica indica* (Bechstein)

1800. *Mus indicus* Bechstein, *Uber Vierf Thiere.* 2: 497 (Pondicherry, India).

*Common names* : Large Bandicoot Rat (Eng.); Ghus (Guj.).

*Material examined* : Banaskantha district: 1M (skull damaged), Danta, coll. C.A. Crump, 2.vii.1913. Junagadh district : 1F (Skull damaged), Sasan, c 56 km S Junagadh, coll. C.A. Crump, 1.xi. 1912.

*Measurements* : External : 1M : H & B 335; T1 338; Hf 61; E 39; 1F : H & B 290; T1 303; Hf 54; E 39.

*Diagnosis* : Similar to the previous species, but larger and tail almost subequal to the head and body length. Fur coarse, with long

black-tipped piles; dorsum blackish brown with little pale yellowish or whitish grizzling; venter grayish brown. Mammæ 12.

**Distribution** : India : Gujarat : Amdavad district, Amreli district, Banaskantha district (Ryley 1914c), Bharuch district, Dangs district, Junagadh district (Ellerman 1961), Kheda district, Surat district, Surendranagar district and Vadodara district; Andhra Pradesh; Bihar; Delhi; Haryana; Karnataka; Kerala; Madhya Pradesh; Maharashtra; Orissa; Rajasthan; Tamil Nadu. Sri Lanka.

**Remarks** : Fairly common in the food grain shops and godowns and also along the sewerage canals and other marshy areas. Causes considerable loss to all the stored articles, but damage is not evident in the crop field.

Taxonomy and intraspecific variations in *Bandicota indica* has recently been discussed by Chakraborty and Chakraborty (1992).

#### Genus *Nesokia* Gray, 1842

It is a monotypic genus.

#### 88. *Nesokia indica* (Gray)

1830. *Arvicola indica* Gray, *Illustr. Ind. Zool.*, 1, pl. XI (India).

**Common names** : Short-tailed 'Mole Rat' Bandicoot Rat (Eng.).

**Diagnosis** : Medium-sized rat, with tail always less than 66 percent of head and body length. Ear small, inconspicuous. Mammæ 8.

**Distribution** : India : Gujarat: Junagadh district and Dangs district; Bihar; Delhi; Haryana; Himachal Pradesh; Punjab; Rajasthan; Uttar Pradesh; West Bengal. Iran, Afghanistan, Pakistan, Bangladesh (Posamentier 1989) and Nepal.

**Remarks** : Not very common. Burrows have been observed in the harvested field of Junagadh and on forested hill slopes near Ahwa (Dangs) and Tulshi Shyam (Junagadh). No report about the damage to agricultural crops by this species was received from the farmers of the State.

#### Order CETACEA

Specialised for aquatic mode of life.

Smooth, hairless, spindle-shaped body with forelimbs flattened into paddle-shaped flippers. Hindlimb absent.

Very little knowledge is available about the Cetacean fauna of Gujarat. During the present survey also very little observations could be made. Thus, based on the existing literature and reports obtained from the fishermen, a list of Cetacean species of Gujarat coast is appended below according to the classification of Mead and Brownwell (1993).

#### Key to the identification of CETACEA species of Gujarat coasts (After De Silva 1987).

1. Whalebone or baleen present.....2
  - Only calcified teeth present.....4
2. With very long baleen plates. No throat furrows .....*Eubalaena australis*
  - Shorter baleen plate with throat furrows .....3
3. Extremely long, often white pectoral fins, with knobs; and jaws with tubercles .....*Megaptera novaeangliae*
  - Much shorter pectoral fins, smooth. Chin and jaws without tubercles .....*Balaenoptera musculus*
4. Skull with high occipital crest. Functional teeth present on lower jaw only .....*Kogia breviceps*
  - Skull without high occipital crest. Teeth present in both upper and lower jaw .....5
5. No dorsal fin. Teeth spade-like, laterally compressed....*Neophocaena phocaenoides*
  - Dorsal fin present. Teeth generally conical .....6
6. Mandibular symphysis greater than 30% of the length of ramus. Atlas and axis vertebræ united, remainder free .....*Sousa chinensis*
  - Mandibular symphysis less than 20% of length of ramus. Anterior 2 to 6 cervical vertebrae united.....7
7. Beak well defined, sharply set off from the forehead by crease.....8
  - Beak very short or absent.....9

8. 19-26 large teeth on each side of upper and lower jaws .....*Tursiops truncatus*  
 — 30 or more small conical teeth on each side of both jaw .....*Delphinus delphis*
9. Bulbous forehead  
 .....*Globicephala microrhynchus*  
 — Forehead not bulbous.....10
10. Striking black and white colour pattern on body .....*Orcinus orca*  
 — Body colour uniform black or dark gray to black.....11
11. Body uniformly black. Flippers with distinct hump on leading edge of fin .....*Pseudorca crassidens*  
 — Body black or dark gray, light grey underneath. Flippers without hump .....*Peponocephala electra*

## Family BALAENIDAE

Genus *Eubalaena* Gray, 186489. *Eubalaena australis* (Desmoulins)

1822. *Balaena australis* Desmoulins, *Dict. Class. Hist. Nat. Paris*, 2 : 161 (Algoa Bay, South Africa).

*Common names* : Southern Right Whale (Eng.).

*Remarks* : Mosses (1947) recorded this species from Gajana, Vadodara.

## Family BALAENOPTERIDAE

Genus *Balaenoptera* Lacepede, 180490. *Balaenoptera musculus* (Linnaeus)

1758. *Balaena musculus* Linnaeus, *Syst. Nat.*, 10th ed., 1 : 76 (Scotland).

*Common names* : Blue whale (Eng.).

*Remarks* : The species was reported from Port Surat (Daniel 1963).

Genus *Megaptera* Gray, 184691. *Megaptera novaeangliae* (Borowski)

1781. *Balaena novaeangliae* Borowski, *Naturgesch. des. Thierreichs*, Berlin, 2, 1 : 21 (New England Coast).

*Common names* : Hump-back Whale (Eng.).

*Remarks* : Though no stranding record is available, but Prater (1965) opined that this species may occur in Indian Water. There is also a record of a stranded specimen on the coast of Baluchistan (Roberts 1977).

## Family DELPHINIDAE

Genus *Delphinus* Linnaeus, 175892. *Delphinus delphis* Linnaeus

1758. *Delphinus delphis* Linnaeus, *Syst. Nat.*, 10th ed., 1 : 77 (European Seas).

*Common names* : The Common Dolphin (Eng.).

*Remarks* : There is much controversy as regard the taxonomy of different species of the genus. Roberts (1977) recorded *D. capensis* Gray from Pakistan coast. However, *D. capensis* was treated as a synonym of *D. delphis* by Mead and Brownwell (1993).

Genus *Globicephala* Lesson, 182893. *Globicephala macrorhynchus* Gray

1846. *Globicephala macrorhynchus* Gray, *Zool. Voy. H.M.S. "Erebus" and "Terror"* 1 : 33 (South seas).

*Common names* : Short-finned Pilot Whale (Eng.).

Genus *Peponocephala* Nishiwaki and Norris, 196694. *Peponocephala electra* (Gray)

1846. *Lagenorhynchus electra* Gray, *Zool. Voy.*

*H.M.S. "Erebus" and "Terror" 1 ; 35.* (Type locality not known).

**Common name:** Melon-headed Whale (Eng.).

**Remarks :** Prater (1965) reported this species from Indian waters. However, no specific locality record is available. It has also been reported to be seen regularly off the Mekran coast of Pakistan (Roberts 1977).

Genus *Orcinus* Fitzinger, 1860

95. *Orcinus orca* (Linnaeus)

1758. *Delphinus orca* Linnaeus, *Syst. Nat.*, 10th ed., 1 : 77 (European Seas).

**Common name:** Killer Whale (Eng.).

**Remarks :** Stranding of specimen at Armada, Vadodara in 1943 was reported by Moses (1947).

Genus *Pseudorca* Reinhardt, 1862

96. *Pseudorca crassidens* (Owen)

1846. *Phocaena crassidens* Owen, *Brit. Fossil Mamm. and Birds*. 515 (Stamford England).

**Common name :** False Killer Whale (Eng.).

**Remarks:** A specimen was reported from Gulf of Cambay in 1978 (De Silva 1987). Also recorded from Pakistan (Pilleri & Gahr 1976).

Genus *Sousa* Gray, 1866

97. *Sousa chinensis* (Osbeck)

1765. *Delphinus chinensis* Osbeck, *Reise nach Ostind. China Rostock*, 1 : 7 (China).

**Common name :** Indo-Pacific Hump backed Dolphin (Eng.).

**Remarks :** Usually found in coastal waters including estuaries.

Genus *Tursiops* Gervais, 1855

98. *Tursiops truncatus* (Montagu)

1821. *Delphinus truncatus* Montagu, *Mem. Wernerian N. H. Soc. Edinburgh*, 3 : 75 (Devonshire,

England).

**Common name:** Bottle-nosed Dolphin (Eng.).

**Remarks :** Appears to be fairly common in Gujarat coast.

Family PHOCAENIDAE

Genus *Neophocaena* Palmer, 1899

99. *Neophocaena phocaenoides* (Cuvier).

1829. *Delphinus phocaenoides* Cuvier, *Regne Anim.* 1 : 291 (Perhaps from Malabar Coast-Allen, 1938).

**Common name:** Finless Porpoise (Eng.).

**Remarks:** Appears to be moderately common in Gujarat coast. Found in coast water and estuaries.

Family PHYSETERIDAE

Genus *Kogia* Gray, 1846

100. *Kogia breviceps* (Blainville)

1838. *Physeter breviceps* Blainville, *Ann. Eranc. Etr. Anat. Phys.*, 2 : 337 (Cape of Good Hope, South Africa).

**Common name:** Pygmy Sperm Whale (Eng.).

**Remarks :** Moderately common in Gujarat coast.

Order SIRENIA

Marine, extremely adapted to aquatic mode of life. Massive head, somewhat truncated anteriorly. Neck absent. Tail fluke horizontally placed and forelimbs modified into flippers.

Family DUGONGIDAE

Genus *Dugong* Lacepede, 1799

101. *Dugong dugon* (Muller)

1766. *Trichecus (sic) dugon* Muller, *Linnes Vollstandigen Natursyst. Suppl.*, 21 (Cape of Good Hope to the Philippines).

*Common names* : Dugong (Eng.); Bai Manas, Suwar, Machi, Lulli (Guj.).

*Distribution*: India : Gujarat : Gulf of Kachchh; Tamil Nadu: Gulf of Mannar, Palk Bay. Tropical coastal waters of Indian and West Pacific Ocean.

*Remarks* : Gulf of Kachchh is often omitted in discussions on dugong. According to Jones (1959) and Nair *et al.* (1975) dugongs are only stray visitors to the Gulf.

Recently, Frazier and Mundkur (1990) review the records of dugongs from the Gulf of Kachchh and found reports of their occurrence, since 1877 to 1987, in the coastal waters of Sachana, Mandvi, Bedi Bundar, Piroton Island, Bet Dwarka, Poshitra, etc. However, Silas (1961) suspects them to be seasonal visitors to the Gulf of Kachchh.

Both Hindu and Muslim fishermen of Gulf of Kachchh claim that they release the dugongs whenever caught in their nets. However, Frazier and Mundkar (1990) stated that oil of dugong is valued as preserver and conditioner of wooden boats in the Gulf, and it is likely that fishermen in Gujarat use it when available.

### SUMMARY

Based mainly on the recent surveys and collection present in the Zoological Survey of India as well as those recorded in literature, an account of the mammalian fauna of Gujarat is given. Altogether, 101 species and sub species belonging to 68 genera, 33 families and 12 orders have been reported from the State.

Diagnostic features and keys to the identification of each species have been given. Detailed district-wise distribution of each species in Gujarat along with range in India and outside have been appended. *Rhinolophus lepidus fulvus* and *Suncus murinus blanfordi* are recorded for the first time from the State.

Sexual variations and intraspecific

variations in different species have been noted. Taxonomic status of the different species have been discussed. Four species, viz., *Paraechinus intermedius*, *Vandeleuria oleracea spadicea*, *Rattus rattus wroughtoni* and *Cremnomys cutchicus medius* have been synonymised with *Paraechinus micropus micropus*, *Vandeleuria oleracea oleracea*, *Rattus rattus narbadae* and *Cremnomys cutchicus cutchicus* respectively. Taxonomic review of the genus *Taphozous* has been made.

Ecological and economic aspects of different species particularly those belonging to orders Insectivora, Chiroptera and Rodentia have been enumerated. Population and conservation status of different species specially of the orders Carnivora, Primates, Artiodactyla and Perissodactyla have also been furnished.

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## AVES

BARID BARAN DUTTA

Zoological Survey of India, Calcutta

### INTRODUCTION

The long coastal line, vast inland water bodies and the geographical location of Gujarat offer splendid landing and foraging grounds for the migratory birds both aquatic and terrestrial species. In fact, Gujarat is well within the migratory route for those elements and may be termed one of the gateways of India particularly for those who come from west and north western directions. Inference of Gujarat is revealed by the Rann of Kutch being the largest breeding ground of Lesser Flamingos, desert tracts as the last abode of the Wild Ass, Gir Forest as the relictual home of the Asiatic Lion, and Nalsarovar a prominent Ramser Site. Gujarat thus offer a variety of habitats ranging from desert to tropical forest, sea coast to mountains of the Western Ghats through mud flats, plains and plateau section.

Incidentally, avifauna of Gujarat has been well studied by luminaries of the Indian ornithology. Salim Ali had the accounts of Birds of Kutch and Birds of Gujarat; Dharmakumarsinghi had Birds of Saurashtra; very important texts. Besides, smaller accounts sporadically came out in the literature; particularly from Baroda, Jasdan, Kutch, Cambay and many other places. Yet many records have been added to the avifaunal account since after those important texts.

The present account has been prepared with due consideration to those available texts and additionally, incorporating the data accumulated in the Zoological Survey of India obtained through the material collected and reports from the regular faunistic surveys undertaken by various teams from the ZSI, together with the

help of the large number of specimens present in the National Zoological Collection of India housed in ZSI.

### SYSTEMATIC LIST OF BIRDS FROM GUJARAT (As reported in this paper)

Order PODICIPEDIFORMES

Family PODICIPEDIDAE

1. *Podiceps C. cristatus* (Linnaeus)
2. *Podiceps ruficollis capensis* Salvadori

Order PELECANIFORMES

Family PHAETHONTIDAE

3. *Phaethon aethereus inidcus* Hume

Family PELECANIDAE

4. *Pelecanus onocrotalus* Linnaeus
5. *Pelecanus p. philippensis* Gmelin
6. *Pelecanus philippensis crispus* Bruch

Family PHALACROCORACIDAE

8. *Phalacrocorax carbo sinensis* (Shaw)
9. *Phalacrocorax fuscicollis* Stephens
10. *Phalacrocorax niger* (Vieillot)
11. *Anhinga rufa melanogaster* Pennant

Order CICONIIFORMES

Family ARDEIDAE

12. *Ardea c. cinerea* Linnaeus
13. *Ardea cinerea rectirostris* Gould
14. *Ardea purpurea manilensis* Meyen
15. *Butorides striatus javanicus* (Horsfield)
16. *Ardeola grayii* (Sykes)
17. *Bubulcus ibis coromandus* (Boddaert)
18. *Egretta alba modesta* (J.E. Gray)
19. *Egretta i. intermedia* (Wagler)
20. *Egretta g. garzetta* (Linnaeus)

21. *Egretta gularis schistacea* (Hemprich & Ehrenberg)

22. *Nycticorax n. nycticorax* (Linnaeus)

23. *Ixobrychus cinnamomeus* (Gmelin)

24. *Ixobrychus sinensis* (Gmelin)

25. *Botaurus s. stellaris* (Linnaeus)

Family CICONIIDAE

26. *Ibis leucocephalus* (Pennant)

27. *Anastomus oscitans* (Boddaert)

28. *Ciconia e. episcopus* (Boddaert)

29. *Ciconia c. ciconia* (Linnaeus)

30. *Ciconia nigra* (Linnaeus)

31. *Xenorhynchus a. asiaticus* (Latham)

32. *Leptoptilos dubius* (Gmelin)

33. *Leptoptilos javanicus* (Horsfield)

Family THRESKIORNITHIDAE

34. *Threskiornis melanocephala* (Latham)

35. *Pseudibis p. papillosa* (Temminck)

36. *Plegadis f. falcinellus* (Linnaeus)

37. *Platalea leucorodia major* Temminck & Schlegel

Family PHOENICOPTERIDAE

38. *Phoenicopterus roseus* Pallas

39. *Phoenicopterus minor* (Geoffroy)

Order ANSERIFORMES

Family ANATIDAE

40. *Anser a. albifrons* (Scopoli)

41. *Anser anser rubrirostris* Swinhoe

42. *Anser indicus* (Latham)

43. *Cygnus columbianus jankowskii* Alpheraky

44. *Dendrocygna javanica* (Horsfield)

45. *Dendrocygna bicolor* (Vieillot)

46. *Tadorna ferruginea* (Pallas)

47. *Tadorna tadorna* (Linnaeus)

48. *Anas angustirostris* Menetries

49. *Anas acuta* Linnaeus

50. *Anas c. crecca* Linnaeus

51. *Anas formosa* Georgi

52. *Anas p. poecilorhyncha* Forster

53. *Anas platyrhynchos* Linnaeus

54. *Anas s. strepera* Linnaeus

55. *Anas falcata* Georgi

56. *Anas penelope* Linnaeus

57. *Anas querquedula* Linnaeus

58. *Netta rufina* (Pallos)

59. *Aythya ferina* (Linnaeus)

60. *Aythya nyroca* (Guldenstadt)

61. *Aythya fuligula* (Linnaeus)

62. *Aythya m. marila* (Linnaeus)

63. *Nettapus c. coromandelianus* (Gmelin)

64. *Sarkidiornis m. melanotos* (Pennant)

65. *Mergus albellus* Linnaeus

66. *Oxyura leucocephala* (Scopoli)

Order FALCONIFORMES

Family ACCIPITRIDAE

67. *Elanus caeruleus vociferus* (Latham)

68. *Pernis ptilorhynchus ruficollis* Lesson

69. *Milvus m. milvus* (Linnaeus)

70. *Milvus m. migrans* (Boddaert)

71. *Milvus migrans govinda* Sykes

72. *Milvus migrans lineatus* (Grey)

73. *Haliastur i. indus* (Boddaert)

74. *Accipiter gentilis schvedowi* (Menzbier)

75. *Accipiter badius dussumieri* (Temminck)

76. *Accipiter nisus nisosimilis* (Tickell)

77. *Accipiter virgatus besra* Jerdon

78. *Buteo r. rufinus* (Cretzschmar)

79. *Buteo buteo burmanicus* Hume

80. *Butastur teesa* (Franklin)

81. *Spizaetus c. cirrhatus* (Gmelin)

82. *Nisaetus f. fasciatus* (Vieillot)

83. *Hieraetus pennatus* (Gmelin)

84. *Aquila h. heliaca* Savigny

85. *Aquila rapax vindhiana* Franklin

86. *Aquila n. nipalensis* (Hodgson)

87. *Aquila clanga* Pallas

88. *Aquila pomarina hastata* (Lesson)

89. *Ictinaetus malayensis perniger* (Hodgson)

90. *Haliaeetus leucogaster* (Gmelin)

91. *Haliaeetus leucoryphus* (Pallas)

92. *Ichthyophaga i. ichthyaeus* (Horsfield)

93. *Torgos calvus* (Scopoli)

94. *Aegyptius monachus* (Linnaeus)

95. *Gyps fulvos fulvescens* Hume

96. *Gyps indicus jonesi* Whistler

97. *Gyps bengalensis* (Gmelin)

98. *Neophron p. percnopterus* (Linnaeus)

99. *Neophron percnopterus ginginianus* (Latham)

100. *Circus macrourus* (S.G. Gmelin)

101. *Circus pygargus* (Linnaeus)

102. *Circus a. aeruginosus* (Linnaeus)

103. *Circaetus g. gallicus* (Gmelin)  
 104. *Spilornis cheela melanotis* (Jerdon)  
 105. *Pandion h. haliaetus* (Linnaeus)  
 Family FALCONIDAE  
 106. *Falco biarmicus jugger* J.E. Gray  
 107. *Falco peregrinus japonensis* Gmelin  
 108. *Falco peregrinus babylonicus* P.L. Sclater  
 109. *Falco s. subbuteo* Linnaeus  
 110. *Falco c. chicquera* Daudin  
 Order GALLIFORMES  
 Family PHASIANIDAE  
 111. *Francolinus francolinus henrici* Bonaparte  
 112. *Francolinus francolinus asiae* Bonaparte  
 113. *Francolinus pictus pallidus* (J.E. Gray)  
 114. *Francolinus pondicerianus interpositus* Hartert  
 115. *Coturnix c. coturnix* (Linnaeus)  
 116. *Coturnix coromandelica* (Gmelin)  
 117. *Perdicula a. asiatica* (Latham)  
 118. *Perdicula argoondah meinertzhageni* Whistler  
 119. *Galloperdix s. spadicea* (Gmelin)  
 120. *Gallus sonneratii* Temminck  
 121. *Pavo cristatus* Linnaeus  
 Order GRUIFORMES  
 Family TURNICIDAE  
 122. *Turnix sylvatica dussumier* (Timminck)  
 123. *Turnix t. tanki* Blyth  
 124. *Turnix suscitator taigoor* (Sykes)  
 Family GRUIDAE  
 125. *Grus grus lilfordi* Sharpe  
 126. *Grus a. antigone* (Linnaeus)  
 127. *Anthropoides virgo* (Linnaeus)  
 Family RALLIDAE  
 128. *Rallus striatus albiventer* Swainson  
 129. *Porzana p. pusilla* (Pallas)  
 130. *Porzana porzana* (Linnaeus)  
 131. *Amaurornis a. akool* (Sykes)  
 132. *Amaurornis phoenicurus chinensis* (Boddaert)  
 133. *Gallixrex c. cinerea* (Gmelin)  
 134. *Gallinula chloropus indica* Blyth  
 135. *Porphyrio poliocephalus* (Latham)  
 136. *Fulica a. atra* Linnaeus  
 Family OTIDIDAE  
 137. *Choriotis nigriceps* (Vigors)  
 138. *Chlamydotis undulata macqueenii* (J.E. Gray)  
 139. *Sypheotides indica* (J.E. Miller)  
 Order CHARADRIIFORMES  
 Family JACANIDAE  
 140. *Hydrophasianus chirurgus* (Scopoli)  
 141. *Metopidius indicus* (Latham)  
 Family CHARADRIIDAE  
 142. *Vanellus leucurus* (Lichtenstein)  
 143. *Vanellus gregarius* (Pallas)  
 144. *Vanellus i. indicus* (Boddaert)  
 145. *Vanellus malabaricus* (Boddaert)  
 146. *Pluvialis squatarola* (Linnaeus)  
 147. *Pluvialis dominica fulva* (Gmelin)  
 148. *Charadrius l. leschenaultii* Lesson  
 149. *Charadrius dubius curonicus* Gmelin  
 150. *Charadrius dubius n. jerdoni* (Legge)  
 151. *Charadrius mongolus atrifrons* Wagler  
 152. *Numenius p. phaeopus* (Linnaeus)  
 153. *Numenius arquata orientalis* C.L. Brehm  
 154. *Limosa l. limosa* (Linnaeus)  
 155. *Limosa l. lapponica* (Linnaeus)  
 156. *Tringa erythropus* (Pallas)  
 157. *Tringa totanus eurhinus* (Oberholser)  
 158. *Tringa stagnatilis* (Bechstein)  
 159. *Tringa nebularia* (Gunnerus)  
 160. *Tringa ochropus* (Linnaeus)  
 161. *Tringa glareola* Linnaeus  
 162. *Tringa terek* (Latham)  
 163. *Tringa h. hypoleucos* Linnaeus  
 164. *Arénaria i. interpretes* (Linnaeus)  
 165. *Gallinago stenura* (Bonaparte)  
 166. *Gallinago g. gallinago* (Linnaeus)  
 167. *Gallinago minima* (Brunnich)  
 168. *Scolopax r. rusticola* Linnaeus  
 169. *Calidris albus* (Pallas)  
 170. *Calidris minutus* (Leisler)  
 171. *Calidris temminckii* (Leisler)  
 172. *Calidris a. alpinus* (Linnaeus)  
 173. *Calidris testaceus* (Pallas)  
 174. *Limicola f. falcinellus* (Pontoppidan)  
 175. *Philomachus pugnax* (Linnaeus)  
 176. *Pahlaropus lobatus* (Linnaeus)  
 Family ROSTRATULIDAE  
 177. *Rostratula b. benghalensis* (Linnaeus)  
 Family RECURVIROSTRIDAE

178. *Himantopus h himantopus* (Linnaeus)  
 179. *Recurvirostra avosetta* Linnaeus  
 Family BURHINIDAE  
 180. *Burhinus oedicephalus saharae* (Reichenow)  
 181. *Burhinus oedicephalus indicus* (Salvadori)  
 182. *Esacus magnirostris recurvirostris* (Cuvier)  
 Family GLAREOLIDAE  
 183. *Cursorius c. cursor* (Latham)  
 184. *Cursorius coromandelicus* (Gmelin)  
 185. *Glareola pratincola maldivarum* J.R. Forster  
 186. *Glareola lactea* Temminck  
 Family LARIDAE  
 187. *Larus argentatus heuglini* Bree  
 188. *Larus f. fuscus* Linnaeus  
 189. *Larus ichthyaetus* Pallas  
 190. *Larus brunnicapillus* Jerdon  
 191. *Larus r. ridibundus* Linnaeus  
 192. *Larus genei* Breme  
 193. *Chlidonias hybrida indica* (Stephens)  
 194. *Chlidonias leucoptera* (Temminck)  
 195. *Gelochelidon n. nilotica* (Gmelin)  
 196. *Hydroprogne c. caspia* (Pallas)  
 197. *Sterna aurantia* J.E. Gray  
 198. *Sterna acuticauda* J.E. Gray  
 199. *Sterna a. albifrons* Pallas  
 200. *Sterna a. saundersi* Hume  
 201. *Sterna b. bengalensis* Lesson  
 202. *Sterna s. sandvicensis* Latham  
 203. *Rynchops albicollis* Swainson  
 Order COLUMBIFORMES  
 Family PTEROCLIDIDAE  
 204. *Pterocles alchata caudacutus* (S.G. Gmelin)  
 205. *Pterocles exustus erlangeri* (Neumann)  
 206. *Pterocles senegallus* (Linnaeus)  
 207. *Pterocles O. orientalis* (Linnaeus)  
 208. *Pterocles i. indicus* (Gmelin)  
 Family COLUMBIDAE  
 209. *Treron phoenicoptera chlorigaster* (Blyth)  
 210. *Columba livia intermedia* Strickland  
 211. *Streptopelia orientalis meena* (Sykes)  
 212. *Streptopelia d. decaocto* (Frisch)  
 213. *Streptopelia t. tranquebarica* (Hermann)  
 214. *Streptopelia chinensis suratensis* (Gmelin)  
 215. *Streptopelia senegalensis cambayensis* (Gmelin)  
 216. *Chalcophaps i. indica* (Linnaeus)  
 Order PSITTACIFORMES  
 Family PSITTACIDAE  
 217. *Psittacula eupatria nipalensis* (Hodgson)  
 218. *Psittacula krameri borealis* (Neumann)  
 219. *Psittacula cyanocephala bengalensis* (Forster)  
 Order CUCULIFORMES  
 Family CUCULIDAE  
 220. *Clamator jacobinus serratus* (Sparrman)  
 221. *Cuculus v. varius* Vahl  
 222. *Cuculus m. micropterus* Gould  
 223. *Cuculus c. canorus* Linnaeus  
 224. *Cuculus p. poliocephalus* Latham  
 225. *Cacomantis s. sonneratii* (Latham)  
 226. *Cacomantis merulinus passerinus* (Vahl)  
 227. *Eudynamis s. scolopacea* (Linnaeus)  
 228. *Rhopodytes viridirostris* (Jerdon)  
 229. *Taccocua leschenaultii* (J.E. Gray)  
 230. *Centropus sinensis parroti* Stresemann  
 Order STRIGIFORMES  
 Family STRIGIDAE  
 231. *Tyto alba stertens* Hartert  
 232. *Otus bakkamoena deserticolor* Ticehurst  
 233. *Otus bakkamoena marathae* Ticehurst  
 234. *Bubo bubo bengalensis* (Franklin)  
 235. *Bubo c. coromandus* (Latham)  
 236. *Bubo zeylonensis leschenault* (Temminck)  
 237. *Glaucidium r. radiatum* (Tickell)  
 238. *Ninox scutulata lugubris* (Tickell)  
 239. *Athene brama indica* (Franklin)  
 240. *Athene blewitii* (Hume)  
 241. *Strix ocellata grandis* Koelz  
 242. *Strix o. ocellata* (Lesson)  
 243. *Asio o. otus* (Linnaeus)  
 244. *Asio f. flammeus* (Pontoppidan)  
 Order CAPRIMUGIFORMES  
 Family CAPRIMUGIDAE  
 245. *Caprimulgus i. indicus* Latham  
 246. *Caprimulgus europaeus unwini* Hume  
 247. *Caprimulgus mahrattensis* Sykes  
 248. *Caprimulgus macrurus albonotatus* Tickell  
 249. *Caprimulgus a. asiaticus* Latham  
 250. *Caprimulgus affinis monticolus* Franklin  
 Order APODIFORMES  
 Family APODIDAE

251. *Apus m. melba* (Linnaeus)  
 252. *Apus melba nubifuga* Koelz  
 253. *Apus apus pekinensis* (Swinhoe)  
 254. *Apus pacificus leuconyx* (Blyth)  
 255. *Apus a. affinis* (J.E.Gray)  
 256. *Cypsiurus parvus batasiensis* (J.E. Gray)  
 257. *Hemiprocne longipennis coronata* (Tickell)  
 Order TROGONIFORMES  
 Family TROGONIDAE  
 258. *Harpactes fasciatus legerli* Koelz  
 Order CORACIIFORMES  
 Family ALCEDINIDAE  
 259. *Ceryle rudis leucomelanura* Reichenbach  
 260. *Alcedo atthis pallasii* Reichenbach  
 261. *Pelargopsis c. capensis* (Linnaeus)  
 262. *Halcyon s. smyrnensis* (Linnaeus)  
 263. *Halcyon pileata* (Boddaert)  
 Family MEROPIDAE  
 264. *Merops superciliosus persicus* Pallas  
 265. *Merops o. orientalis* Latham  
 266. *Nyctornis a. athertoni* (Jardine & Selby)  
 Family CORACIIDAE  
 267. *Coracias garrulus semenowi* Loudon & Tschudi  
 268. *Coracias b. benghalensis* Linnaeus  
 Family UPUPIDAE  
 269. *Upupa e. epops* Linnaeus  
 Family BUCEROTIDAE  
 270. *Tockus birostris* (Scopoli)  
 Order PICIFORMES  
 Family CAPITONIDAE  
 271. *Megalaima zeylanica caniceps* (Franklin)  
 272. *Megalaima viridis* (Boddaert)  
 273. *Megalaima haemacephala indica* (Latham)  
 Family PICIDAE  
 274. *Jynx t. torquilla* Linnaeus  
 275. *Micropternus brachyryus jerdonii* (Malherbe)  
 276. *Picus chlorolophus chlorigaster* Jerdon  
 277. *Dinopium benghalense dilutum* (Blyth)  
 278. *Dryocopus javensis hodgsonii* (Jerdon)  
 279. *Dendrocopos m. mahrattensis* (Latham)  
 280. *Dendrocopos nanus hardwickii* (Jerdon)  
 281. *Hemicircus c. canente* (Lesson)  
 282. *Chrysocolaptes f. festivus* (Boddaert)  
 283. *Chrysocolaptes lucidus chersonesus* Kloss

## Order PASSERIFORMES

## Family PITTIDAE

- 284.
- Pitta b. brachyura*
- (Linnaeus)

## Family ALAUDIDAE

285. *Mirafra javanica cantillans* Blyth  
 286. *Mirafa erythroptera sindiana* Ticehurst  
 287. *Mirafa erythroptera furva* Koelz  
 288. *Mirafa erythroptera erythroptera* Blyth  
 289. *Eremopterix grisea* (Scopoli)  
 290. *Eremopterix nigriceps affinis* (Blyth)  
 291. *Ammomanes p. phoenicurus* (Franklin)  
 292. *Alaemon alaudipes doriae* (Salvadori)  
 293. *Calandrella cinerea longipennis* (Eversmann)  
 294. *Calandrella raytal adamsi* (Hume)  
 295. *Calandrella raytal krishnakumarsinghi* Vauri & Dharmakumarsinghi  
 296. *Melanocorypha bimaculata torquata* Blyth  
 297. *Galerida cristata chendoola* Franklin  
 298. *Galerida malabarica* (Scopoli)  
 299. *Galerida deva* (Sykes)  
 300. *Alauda gulgula inconspicua* Severtzov  
 301. *Alauda gulgula gulgula* Franklin  
 Family HIRUNDINIDAE  
 302. *Riparia paludicola chinensis* (J.E. Gray)  
 303. *Hirundo rupestris scopoli*  
 304. *Hirundo c. concolor* sykes  
 305. *Hirundo obsoleta pallida* (Hume)  
 306. *Hirundo r. rustica* Linnaeus  
 307. *Hirundo smithii filifera* Stephens  
 308. *Hirundo fluvicola* Blyth  
 309. *Hirundo daurica nipalensis* Hodgson  
 310. *Hirundo daurica japonica* Temminck & Schlegel  
 311. *Hirundo daurica erythropygia* Sykes  
 312. *Delichon u. urbana* (Linnaeus)  
 Family LANIIDAE  
 313. *Lanius excubitor lahtora* (Sykes)  
 314. *Lanius v. vittatus* Valenciennes  
 315. *Lanius c. collurio* Linnaeus  
 316. *Lanius collurio phoenicuroides* (Schalow)  
 317. *Lanius collurio isabellinus* Hemprich & Ehrenberg  
 318. *Lanius schach erythronotus* (Vigors)  
 319. *Lanius schach caniceps* Blyth  
 320. *Lanius c. cristatus* Linnaeus  
 Family ORIOLIDAE

321. *Oriolus oriolus kundoo* Sykes  
 322. *Oriolus xanthornus maderaspatanus* Franklin  
 Family DICRURIDAE  
 323. *Dicrurus adsimilis macrocerus* Vieillot  
 324. *Dicrurus leucophaeus longicaudatus* Hay  
 325. *Dicrurus c. cerulescens* (Linnaeus)  
 326. *Dicrurus paradiseus grandis* (Gould)  
 Family ARTAMIDAE  
 327. *Artamus fuscus* Vieillot  
 Family STURNIDAE  
 328. *Sturnus m. malabaricus* (Gmelin)  
 329. *Sturnus m. blythii* (Jerdon)  
 330. *Sturnus pagodarum* (Gmelin)  
 331. *Sturnus roseus* (Linnaeus)  
 332. *Sturnus vulgaris poltaratskyi* Finsch  
 333. *Acridotheres t. tristis* (Linnaeus)  
 334. *Acridotheres ginginianus* (Latham)  
 335. *Acridotheres fuscus mahrattensis* (Sykes)  
 Family CORVIDAE  
 336. *Dendrocitta vagabunda pallida* (Blyth)  
 337. *Corvus s. splendens* Vieillot  
 338. *Corvus macrorhynchos culminatus* Sykes  
 339. *Corvus corax subcorax* Severtzov  
 340. *Hypocolius ampelinus* Bonaparte  
 Family CAMPEPHAGIDAE  
 341. *Hemipus p. picatus* (Sykes)  
 342. *Tephrodornis virgatus sylvicola* Jerdon  
 343. *Tephrodornis pondicerianus pallidus* Ticehurst  
 344. *Tephrodornis pondicerianus pondicerianus* (Gmelin)  
 345. *Coracina novaehollandiae macei* (Lesson)  
 346. *Coracina melanoptera sykesi* (Strickland)  
 347. *Pericrocotus f. flammeus* (Forster)  
 348. *Pericrocotus cinnamomeus pallidus* Baker  
 349. *Pericrocotus c. cinnamomens* (Linnaeus)  
 350. *Pericrocotus e. erythropygus* (Jerdon)  
 Family IRENIDAE  
 351. *Aegithina tiphia humei* Baker  
 352. *Aegithina nigrolutea* (Marshall)  
 353. *Chloropsis aurifrons frontalis* (Pelzeln)  
 354. *Chloropsis cochinchinensis jerdoni* (Blyth)  
 Family PYCNONOTIDAE  
 355. *Pycnonotus jocosus abuenis* (Whistler)  
 356. *Pycnonotus jocosus fuscicaudatus* (Gould)  
 357. *Pycnonotus leucogenys leucotis* (Gould)  
 358. *Pycnonotus cafer humayuni* Deignan  
 359. *Pycnonotus l. luteolus* (Lesson)  
 Family MUSCICAPIDAE  
 360. *Pellorneum r. ruficeps* Swainson  
 361. *Pomatorhinus schisticeps obscurus* Hume  
 362. *Pomatorhinus schisticeps horsfieldii* Sykes  
 363. *Dumetia hyperythra abuenis* Harington  
 364. *Dumetia hyperythra navarroii* Abdulali  
 365. *Chrysomma sinensis hypoleuca* (Franklin)  
 366. *Turdoides c. caudatus* (Dumont)  
 367. *Turdoides malcolmi* (Sykes)  
 368. *Turdoides striatus sindianus* (Ticehurst)  
 369. *Turdoides striatus orientalis* (Jerdon)  
 370. *Turdoides striatus somervillei* (Sykes)  
 371. *Alcippe poioicephala brucei* Hume  
 372. *Muscicapa striata neumanni* Poche  
 373. *Muscicapa striata sarudnyi* Snigirewski  
 374. *Muscicapa latirostris* Raffles  
 375. *Muscicapa p. parva* Bechstein  
 376. *Muscicapa t. tickelliae* (Blyth)  
 377. *Muscicapa t. thalassina* Swainson  
 378. *Culicicapa ceylonensis calochrysea* Oberholser  
 379. *Rhipidura a. aureola* Lesson  
 380. *Rhipidura a. albogularis* (Lesson)  
 381. *Terpsiphone paradisi leucogaster* (Swainson)  
 382. *Terpsiphone p. paradisi* (Linnaeus)  
 383. *Monarcha azurea styani* (Hartlaub)  
 384. *Lusciniola melanopogon mimica* Madarasz  
 385. *Cisticola juncidis cursitans* (Franklin)  
 386. *Prinia h. hodsonii* Blyth  
 387. *Prinia buchanani* Blyth  
 388. *Prinia gracilis lepida* Blyth  
 389. *Prinia subflava terricolor* (Hume)  
 390. *Prinia socialis stewarti* Blyth  
 391. *Prinia sylvatica insignis* (Hume)  
 392. *Orthotomus sutorius guzurata* (Latham)  
 393. *Locustella naevia streaminea* Seebohm  
 394. *Chaetornis striatus* (Jerdon)  
 395. *Phragamaticola a. aedon* (Pallas)  
 396. *Acrocephalus stentoreus brunnescens* (Jerdon)  
 397. *Acrocephalus dumetorum* Blyth  
 398. *Acrocephalus a. agricola* (Jerdon)  
 399. *Hippolais c. caligata* (Lichtenstein)  
 400. *Hippolais caligata rama* (Sykes)  
 401. *Sylvia hortensis jerdoni* (Blyth)  
 402. *Sylvia communis icterops* Menetries

403. *Sylvia curruca blythi* Ticehurst & Whistler  
 404. *Sylvia m. minula* Hume  
 405. *Sylvia a. althaea* Hume  
 406. *Sylvia n. nana* (Hemprich & Ehrenberg)  
 407. *Phylloscopus trochilus acredula* (Linnaeus)  
 408. *Phylloscopus collybita tristis* Blyth  
 409. *Phylloscopus tytleri* Brooks  
 410. *Phylloscopus griseolus* Blyth  
 411. *Phylloscopus inornatus humei* (Brooks)  
 412. *Phylloscopus trochiloides viridanus* Blyth  
 413. *Phylloscopus nitidus* Blyth  
 414. *Phylloscopus o. occipitalis* (Blyth)  
 415. *Erythropygia galactotes familiaris* (Menetries)  
 416. *Erithacus svecicus pallidogularis* (Zarudny)  
 417. *Erithacus svecicus abbotti* (Richmond)  
 418. *Copsychus s. saularis* (Linnaeus)  
 419. *Copsychus m. malabaricus* (Scopoli)  
 420. *Phoenicurus ochruros phoenicuroides* (Moore)  
 421. *Phoenicurus ochruros rufiventris* (Vieillot)  
 422. *Cercomela fusca* (Blyth)  
 423. *Saxicola macrorhyncha* (Stoliczka)  
 424. *Saxicola torquata maura* (Pallas)  
 425. *Saxicola torquata indica* (Blyth)  
 426. *Saxicola caprata bicolor* (Sykes)  
 427. *Saxicola caprata burmanica* Baker  
 428. *Oenanthe isabellina* (Temminck)  
 429. *Oenanthe xanthoprymna kingi* (Hume)  
 430. *Oenanthe d. deserti* (Temminck)  
 431. *Oenanthe picata* (Blyth)  
 432. *Saxicoloides fulicata cambaiensis* (Latham)  
 433. *Monticola cinclorhynchus* (Vigors)  
 434. *Monticola solitarius pandoo* (sykes)  
 435. *Myiophoneus h. horsfieldii* (Vigors)  
 436. *Zoothera citrina cyanotus* (Jardine & Selby)  
 437. *Turdus merula nigropileus* (Lafresnaye)  
 Family PARIDAE  
 438. *Parus major stupae* Koelz  
 439. *Parus nuchalis* Jerdon  
 440. *Parus xanthogenys aplanotus* Blyth  
 Family SITTIDAE  
 441. *Sitta c. castanea* Lesson  
 442. *Sitta f. frontalis* Swainson  
 443. *Salpornis s. spilonotus* (Franklin)  
 Family MOTACILLIDAE  
 444. *Anthus h. hodgsoni* Richmond  
 445. *Anthus t. trivialis* (Linnaeus)  
 446. *Anthus novaeseelandiae waitei* Whistler  
 447. *Anthus novaeseelandiae rufulus* Vieillot  
 448. *Anthus c. campestris* (Linnaeus)  
 449. *Anthus godlewskii* (Taczanowski)  
 450. *Anthus cervinus* (Pallas)  
 451. *Anthus pelopus* J.E.Gray  
 452. *Anthus similis decaptus* Meinertzhagen  
 453. *Anthus similis jerdoni* Finsch  
 454. *Motacilla indica* Gmelin  
 455. *Motacilla flava thunbergi* Billberg  
 456. *Motacilla flava beema* (Sykes)  
 457. *Motacilla citreola calcarata* Hodgson  
 458. *Motacilla c. caspica* (Gmelin)  
 459. *Motacilla alba dukhunensis* Sykes  
 460. *Motacilla maderaspatensis* Gmelin  
 Family DICAETIDAE  
 461. *Dicaeum a. agile* (Tickell)  
 462. *Dicaeum e. erythrorhynchos* (Latham)  
 Family NECTARINIIDAE  
 463. *Nectarinia zeylonica sola* (Vieillot)  
 464. *Nectarinia asiatica brevisrostris* Blandford  
 465. *Nectarinia a. asiatica* (Latham)  
 466. *Aethopyga siparaja vigorsii* (Sykes)  
 Family ZOSTEROPIDAE  
 467. *Zosterops p. palpebrosa* (Temminck)  
 468. *Passer domesticus indicus* Jardine & Selby  
 469. *Petronia xanthocollis transfuga* (Hartert)  
 470. *Petronia x. xanthocollis* (Burton)  
 Family PLOCEIDAE  
 471. *Ploceus p. philippinus* (Linnaeus)  
 472. *Ploceus benghalensis* (Linnaeus)  
 473. *Ploceus manyar flaviceps* Lesson  
 474. *Estrilda a. amandava* (Linnaeus)  
 475. *Estrilda formosa* (Latham)  
 476. *Lonchura m. malabarica* (Linnaeus)  
 477. *Lonchura s. striata* (Linnaeus)  
 478. *Lonchura p. punctulata* (Linnaeus)  
 Family FRINGILLIDAE  
 479. *Carpodacus erythrinus roseatus* (Blyth)  
 Family EMBERIZIDAE  
 480. *Emberiza melanocephala* Scopoli  
 481. *Emberiza bruniceps* Brandt  
 482. *Emberiza stewarti* (Blyth)  
 483. *Emberiza b. buehanani* Blyth  
 484. *Emberiza s. striolata* (Lichtenstein)  
 485. *Melophus lathami subcristatus* (Sykes)

## SYSTEMATIC ACCOUNT

### Order PROCELIARIFORMES

#### Family PROCELLARIDAE

Oceanic birds of divers size and structure; tubular nostrils; stout horny bill hooked at tip; long, pointed wings for strong fly; short rounded tail; feet webbed like ducks, sexes alike.

Persian Shearwater : *Procellaria tharminieri persica* (Hume) *Puffinus persicus* Hume, 1873, *Stray Feathers* 1 : 5. (Sea between Gwader and Muscat)

Size smaller than a pigeon (C.30 cm). Colouring sooty black above with greyish neck and sides of breast, below white with black or black and white under tail coverts; a narrow white ring round eye and white streak behind it.

Pelagic bird near the Arabian sea coasts, common in Persian Gulf to Mekran coast. Storm blown Specimens have been recorded from Koncan and Malabar coasts. Likely to occur in Gujarat coast also.

Wing 185-209 Tail 87-103 Bill 38 Tarsus 31-33.

### Order PODICIPEDIFORMES

#### Family PODICIPEDIDAE

Small, aquatic birds with slim neck and short bill, legs placed far back, toes with broad lateral vane like lobes, small wings and rudimentary tail. Plumage dense and silky. Sexes alike. Especially adapted for swimming and diving. World over distribution. Of twenty species, three species occur in Indian territory and two of them have been recorded from Gujarat.

#### 1. *Podiceps cristatus cristatus* (Linnaeus)

Great crested Grebe. (*Colymbus cristatus* Linnaeus, 1758, *Syst. Nat.*, ed. 10, 1 : 35 (Sweden); Baker, FBI. No. 2290, vol. 6 : 477; Ali & Ripley, HB No.3, Vol. 1 : 3)

Size smaller than domestic duck (C. 50cm).

Dark greyish brown above and silky white below, two upstanding blackish ear tufts directed backwardly and a frill of chestnut and black elongated feathers below head are diagnostic. Sexes similar but overall size and the ear tuft is smaller in females.

Winter visitor in small numbers to N. India to NE India; South through Rajasthan, Gujarat and Orissa on the east.

Extralimital : A palaeartic breeding species. Locally winter in suitable water bodies in Kutch, Porbander, Jasdon, Viramgam and Bhavnagar.

#### 2. Little Grebe : *Podiceps ruficollis capensis* Salvadori

(*Podiceps capensis* Salvadori, 1884, *Ann. Mus. Civ. Genova* (2), I : 252 (Shoa, Africa); Baker, FBI No. 2292, Vol. 6. 481; Ali & Ripley, HB No. 5, Vol. 1 : 6)

A small dark brown squat tailless bird with short pointed bill. Brown above and silky smoky white below. Throat and neck chestnut sexes alike.

Resident but shifting locally depending upon water condition. common throughout in Indian union except islands in all type of inland water.

Extralimital : As in earlier race.

Tropic birds : Phaethontidae.

Three species inhabit tropical seas. All three may winter in the Indian subregion. One recorded in the Gujarat coast. Large white birds with long tail. Head large; short neck, longish stout decurved pointed bill, Middle pair of tail feathers in adults narrow, ribbon like, like as paradise flycatcher (*Terpsiphone*).

#### 3. Short-tailed Tropic-bird : *Phaethon aetherus indicus* Hume

(*Phaethon indicus* Hume, 1876, SF, 4 : 481, 483 (Marakan coast); Baker, FBI No. 2188, Vol. 6 : 291; Ali & Ripley, HB, No. 17, Vol. 1 : 22).

Local names : Not recorded.

Size : (16in.) + tail ribbons (12in.).

White bird with finley barred with black

above, and two greatly elongated ribbons in the wedge-shaped tail.

Recorded in the northern parts of Indian Ocean.

Recorded from Gulf of Kutch (March), Bombay (February, May and July- Navarro, Rauf Ali, JBNHS 59 : 649 ; 63 : 437). Laccadive Islands from our Indian limit.

Extralimital : recorded from Marakan coast (February), Esp. Sri Lanka ( $7^{\circ} 52'N$ ,  $77^{\circ} 26'E$ ).

Pelicans : *Pelecanidae*.

Three species found in the Indian Subregion and all of them found in Gujarat. Large clumsy-looking birds. Bill long, heavy, the upper mandible flattened and hooked at the tip, the lower consisting of two narrow flexible arches, underhung throughout its length by a capacious gular pouch of loose naked skin.

#### 4. White or Rosy Pelican : *Pelecanus onocrotalus* Linnaeus

*Pelecanus onocrotalus* linnaeus, 1758, Syst. Nat., ed. 10, (1 : 132. (Africa, Asia); Baker, FBI No. 2176, Vol. 6 : 270; Ali & Ripley, HB No. 20, vol. 1 : 27).

Local names : Hindi-Hawasil, Gujarat-Pen.

Very large (72 in.), white plumage tinged with rose colour, with a tuft of yellowish feathers on the breast, sexes alike.

A. Resident, at least in part; mainly winter visitor in N. India, from the Punjab to Assam (U.P., Rajasthan, A.P.). Single or in pair, often vast congregation on large jheels and lagoons (Great Rann of Kutch, Gujarat).

B. Breeding in the Great Rann of Kutch (Ali, JBNHS 57 : 414) winter visitor to Gujarat, but sight record at Nalsarover (Gandhi Nagar dist.) by the Z.S.I. Party, and also in the salt pans in fairly good numbers near Khijidia Bird Sanctuary (Jam nagar dist.).

Extralimital : Southerneastern Europe south to central Africa, S. Asia.

#### 5. Spotted billed or Gray Pelican : *Pelecanus p. philippensis* Gmelin.

(*Pelecanus philippensis* Gmelin, 1789,

Syst. Nat. 1 (2) : 571 Philippines = Manila, vide stresemann 1952, Ibis 94 : 514; Baker, FBI No 2179, Vol. 6 : 274; Ali & Ripley, HB No. 21, Vol. 1 : 29)

Similar to earlier race, but without black in wings.

Resident and local migratory, Great and Little Rann of Kutch and other well watered tracts in the Indian Union. Breeds in Tamil Nadu -Tirunelveli and Chingleput dists.), A.P. (W. Godavari dist.), Assam (Kagiranga Wildlife Sanctuary), Nicobar Is. (accidental. Abdulali, JBNHS 61 : 500).

Extralimital : Pakistan and Sri Lanka.

It is commonly found in well watered tracts (coastal mudflats, lagoons, creeks etc.) in Gujarat.

Butlor (S.F., iv : 30) recorded this bird in very good numbers in some tanks in N. Gujarat.

#### 6. Dalmatian Pelican : *Pelecanus philippensis crispus* Bruch.

(*Pelecanus crispus*, Bruch, 1832, Isis, col. 1109 (Dalmatis); Baker FBI No. 2178, Vol. 6 : 273; Ali & Ripley, H.B.No. 22 Vol. 1 : 30).

Very similar to White Pelican, and difficult to distinguish it from White Pelican from distance. Colour of legs and feet dark grey instead of pink, and forehead feathers ending in a concave crescentic line instead of a pointed wedge, best diagnostic clues.

Winter visitor. Sparsely recorded in our Indian limit in Kutch, Saurashtra (Both in Gujarat), Oudh (U.P.), Bihar, Orissa (?), W. Bengal, Assam and Rajasthan (?). Affects large jheels and caostal lagoons by large flocks.

Ali, noted it from Pung Bet (Little Rann) at the mouth of the Banas River; Mithapur, Navlakhi, Kharaghoda, Gujarat.

Ali, further noted that the birds observed by him during Gujarat Survey, in a large mixed flocks, was containing all the three races of Pelicans found in Gujarat, of which Rosy Pelican took the lion share.

Hume observed this birds in the Rann of Kutch and on the western coast of Kathiawar Peninsula.

Cormorants and Darter : *Phalacrocoracidae*

Some thirty one species world wide; five in the Indian subregion and four represent in Gujarat. Freshwater birds. Long neck, black plumage and slender, pointed and hooked bill. Tail long and stiff, feet large with toes adopted for swimming. Colonial- nesting bird.

No oil gland in the plumage, so non resistant to water. Drying out of wings and body by spreading in the sunshine is the common feature. Mostly indistinguishable in non-breeding plumage except in size.

7. Large Cormorant : *Phalacrocorax carbo sinensis* (Shaw)

(*Pelecanus sinensis* shaw, 1801, Nat. Misc. 13 : PL. 529, text (China); Baker, FBI No. 2180, Vol. 6 : 277; Ali & Ripley, HB No.26, Vol. 1 : 37)

Size : Large duck. Length (C. 32 in).

Local names : Hindi-Ghogur, Pan- Kowwa. Gujarat-Jal kagdo.)

Duck like black bird (32 in). Broad white patch on posterior flanks. Head crest and neck mixed silky white feather. Throat white, gular pouch bright yellow (breeding). Sexes alike.

Practically found in the entire Indian Union in the large inland water, lakes, jheels, tidal lagoons, salt pans etc.

Extralimital : Pakistan, Nepal, Europe to Central Asia, Burma, Thailand, Indo- China and Malaysia.

Resident and local migratory. In Gujarat it is found in large river, jheels, tidal lagoons and salt pans.

Ali noted in Chobari (Bhachau dist.), Kandla (kutch), Baduchi (Cambay town environs), Kanewal (Cambay), Radhanpur, Gujarat. Sight record by the Z.S.I. party at Khijidia Bird Sanctuary (Jam Nagar dist.) Nov. 1993.

8. Indian Shag : *Phalacrocorax fuscilis* Stephens.

(*Phalacrocorax fuscilis* Stephens, 1826, in Shaw's Gen. Zool. 13 (1) : 91 (Bengal); Baker,

FBI No. 2181, Vol. 6 : 279; Ali & Ripley, HB No. 27, Vol. 1 : 39)

Size. Duck + Length C. (25 in.).

Slightly smaller than large cormorant (25 in). White tuft of feathers behind ear-coverts, few white specks on head (breeding). Sexes alike.

Resident, moving locally with the condition of habit and habitat. Practically found in the entire Indian Union excluding islands, in all types of inland water sources and also in tidal estuaries etc.

Extralimital : Pakistan, Bangladesh, Sri Lanka, also Burma south to Tenasserim.

Ali noted it from Kanewal (Cambay).

9. Little Cormorant : *Phalacrocorax niger* (Vieillot)

(*Hydrocorax niger*. Vieillot, 1817, Nouv. Dist. Hist. 8 : 88 (East Indies= Bengal); Baker, FBI No. 2182, Vol. 6: 280; Ali & Ripley, HB. No. 28, Vol. 1 : 41).

Local names : Hindi-Pan Kowwa, Jograbi.

Gujarat- Nano Jab kagdo

Size : Jungle Crow. Length c. (20 in.).

A overall black bird (20 in) with greenish sheen, upper back and wing-coverts dark silvery grey, scalloped with black, shouter bill and longer tail (breeding). Sexes alike.

Resident. Commonly found in the entire Indian Union excluding Himalayan tracts and island.

Extralimital : Pakistan, Bangladesh, Sri Lanka. Also Burma, Thailand, Indo-China, Malaysia, Indonesia east to the greater Sunda Islands.

Ali noted it in Bhuj environs, Mandvi (Both in Kutch) Dhari (Amreli dist), Ghatwad (Kodinar), Baroda environs and dist., Cambay and environs, Balaram (Palanpur), Viramgam.

Z.S.I. party noted this bird in the vicinity of Nalsarobar (Gandhinagar dist.), in a fairly good number.

Ali, noted this bird breeding in Kutch in August.

10. Darter or Snake-bird : *Anhinga rufa melanogaster* Pennant.

(*Anhinga melanogaster* Pennant, 1769, Indian Zool. : 13, p. 12 (Ceylon and Java); Baker FBI No. 2183, Vol. 6 : 282; Ali & Ripley, HB No. 29, Vol. 1 : 43).

Local names : Hindi Pan dubi

Gujarat- Sarpagreeva

Size : Duck; Length c. (36 in.).

Resembles with cormorant but larger (36 in), long, slender snake like neck. Straight, pointed bill. Sexes alike.

Resident, Fairly common in the entire Indian Union excluding islands in suitable well-watered biotope.

Extralimital : Pakistan, Bangladesh, Sri Lanka and also Burma, Thailand, Indo-China, Malaysia.

Order CICONIIFORMES

Family ARDEIDAE

Key to the genera of family ARDEIDAE

1. Large sized, above 97 cm .....*Ardea*  
Medium or small-sized, below 63 cm .....2
2. Plumage mainly varied coloured.....3  
Plumage mainly dark slaty blue above .....*Ixobrychus*
3. Plumage mainly greenish or bluish black, with white and grey.....4  
Plumage generally white and grey .....*Nycticorax*
4. Plumage generally greenish or bluish black .....*Butorides*  
Plumage mainly white coloured .....5
5. Head and neck brown or yellowish brown .....*Ardeola*  
Head and neck white throughout .....6
6. Bill yellow .....*Bubulcus*  
Bill black .....*Egretta*

Sixty-two species world-wide. Some twenty six-found in the Indian Subregion and sixteen species are distributed in Gujarat. Largely confined to lower altitude in nearby swamps, marshes, jheels and all types of inland water. Small to huge (30-102 cm), long-legged, broad wing, wading birds with long pointed bills. Several species have nuptial plumage, some have bare facial skin often colour during breeding. In sustained flight neck is typically tucked into an 'S' shape. Most feed in open space except Bittern which shulk inside vegetation. Herons are large long-necked, usually black or grey. Egrets are typically white, others being purple or brown sometimes speckled, barred or streaked. Many species have filamentous ornamental plumes during breeding season.

11. European Gray Heron : *Ardea c. cinerea* Linnaeus

(*Ardea cinerea* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 143 (Europe, restricted to Sweden); Baker, FBI No. 2217, Vol. 6, 339; Ali & Ripley, HB No. 35, Vol. 1 : 54.

Local name : Hindi Nari, Sain, Anjan.

Size : Length C. (39 in.).

Large, lanky grey bird, indistinguishable from the Eastern Grey Heron. Sexes alike.

Casual winter visitor. Sparsely recorded in our Indian Limit from Kutch and Karnataka (JBNHS 59 : 650).

Extralimital : Breeds in the Palaearctic and Ethiopian regions.

12. Eastern Gray Heron : *Aardea cinerea rectirostris* Gould.

(*Ardea rectirostris* Gould 1843, Proc. Zool. Soc. London : 22 (new south Webes = India, restricted by Ripley 1961 to India); Baker, FBI No. 2218, Vol. 6 : 340; Ali & Ripley, H.B. No. 36, Vol. 1 : 55)

Large (39 in.) long necked, long legged bird, Ashy grey above with white crown and neck, long black occipital crest, Sexes alike.

Resident, Practically found in the entire Indian Union including islands. in all types of inland water sources, mangrove swamps, tidal creeks, estuaries etc.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh also to the Middle East, Burma, Thailand, Indochina, Malaysia, E. Siberia, E. China, Japan, Formosa, Hainan.

Ali noted it from Kandla, Bhuj environs (Kutch), Mithapur, Kodinar, Ghatwad, Baroda and environs, Cambay and environs, Palanpur, Viramgam etc., Gujarat.

Ali also noted its breeding in Kutch during August.

Ardeidae : Herons, Egrets, Bitterns.

13. Eastern Purple Heron : *Ardea purpurea manilensis* Meyen.

(*Ardea purpurea* Var. *manilensis* Meyen, 1834, Nova Acta acad. Cacs. Leop. Carol. 16, suppl. : 102-103 (Philippines); Baker, FBI No. 2216, Vol. 6 : 337; Ali & Ripley, H.B. No. 37, Vol. 1 : 57.)

Local names : Hindi-nari, Lal sain.

Size : Gray Heron. Length c. (38 in.).

Smaller than last (38 in.), purplish slaty above, blackish wing and tail, head and neck ferruginous boldly striped with black. Underparts slaty black and chestnut except chin and throat which are white. Sexes alike.'

Resident and local migrant. Uncommonly found in the plains of India east to Assam and Manipur, Andamans and Nicobar Islands. Sparsely found in jheels with rebeds, tidal swamps in Gujarat, Not easily recognised due to freezy and suspicious habit. Breeding in Kutch with others (Ali).

Extralimital : Pakistan, Nepal, Sri Lanka, Burma, Thailand, Indochinese countries, China, Philippines, Greater Sunda Islands and Celebes.

14. Little Green Heron : *Butorides striatus javanicus* (Horsfield)

(*Ardea Javanica* Horsfield, 1821, Trans, Linn. Soc. London 13 (1) : 190 (Western java); Baker, FBI No. 2231, Vol. 6 : 357; Ali & Ripley, HB No. 38, Vol. 1 : 59)

Local name : Hindi – Kancha bagla

Size : Pond heron. Length c. (18 in.).

Smaller (18 in) than pond Heron. Above grey glossed with dark to bronze green, chin white, lower parts ashy grey, long glossy greenish black occipital crest diagnostic.

Resident mainly solitary, shy and nocturnal in habit. Thinly distributed to shady nullah, jungle streams and secluded overgrown reedbeds and marshes. Practically found in the entire India Union except Andaman and Nicobar Island but in Laccadive Islands.

Extralimital : As in earlier race.

15. Indian Pond Heron or Paddybird : *Ardeola g. grayii* (Sykes)

(*Ardeola grayii* Sykes, 1832, Proc. Zool. Soc. London : 158 (Dukhun) ; Baker FBI No. 2229, Vol. 6 : 354; Ali & Ripley, H.B. No. 42, Vol. 1 : 63)

Local name : Hindi-Bagla

Size : Country hen. Length C. (18 in.).

Medium (18 in.), white while in flight, earthy brown at rest (non-breeding). Head and neck yellowish brown, long white to buff occipital crest, back deep maroon with long feathers extending over the tail (breeding). Sexes alike.

Resident; shifting locally with draught and flood condition, vary commonly found in all types of inland water sources, marshes, inundated puddy field, Practically found in the entire Indian Union including Islands.

Extralimital : Pakistan, Nepal, Bhutan, Bangladesh, Sri Lanka, Persian Gulf, Burma and Malaysia.

Ali collected 3 examples from Bodeli (Baroda), and Nadiad (Kaira dist.), Gujarat.

Sight record elsewhere from Gujarat by the Z.S.I. Party, Oct.- Nov. 1993.

16. Cattle Egret : *Bubulcus ibis coromandus* (Boddaert)

(*Cancroma coromanda* Boddaert, 1783, Table Pl. enlum : 54 (Coromandel); Baker, FBI No. 2226, Vol. 6 : 349; Ali & Ripley, H.B. No. 44, Vol. 1 : 66).

Local names : Hindi-Doria / Gai Bagla

Size : Village hen. Length C (20 in.).

A lanky snow-white bird (20 in.), similar to little egret but distinguished from little egret by yellow bill contra black (non-breeding). Golden buff on head neck and back (breeding). Sexes alike.

Resident in the high altitude, wintering in the plains mostly in the cultivated field and gazzing ground of cattles. Throughout the Indian Union including Islands.

Extralimital : Whole of Asia.

Ali collected one example from Bodeli (Baroda dist.), Gujarat.

Z.S.I. party noted it elsewhere in Gujarat during their survey in October-November. 1993.

17. Eastern Large Egret : *Ardea alba modesta* J.E. Gray.

(*Ardea modesta* J.E.Gray, 1831, Zool. Misc. : 19 (india); Baker, FBI No. 2223, Vol. 6 : 346; Ali & Ripley, HB No. 46, Vol. 1 : 69)

Local name : Hindi-Bada Bagla

Gujarati-not recorded.

Size : Gray heron. Length c (36 in.)

Large (36 in.). Lanky snow-white heron like bird with bare blackish legs. Pointed black to yellow bill. Sexes alike.

Resident and nomadic. Normally solitary or two feeding nearby field or marshes, sparsely and patchily distributed in the entire Indian Union including Maldiv Island (winter) but not recorded in Andamans and Laccadive Islands.

Extralimital : Whole of Asia and Australia.

Sight record by the Z.S.I. Party in Khijidia Bird Sanctuary (Jam nagar dist.), Nov. 1993.

Ali, collected specimens from Tuna (Anjar Dist.), Baroda town environs, Dabka (Baroda dist.), Nadiad environs.

This bird is easily confused with the Median Egret (*Egretta i. intermedia*) in the field. The colouration of bill (Breeding) and the plumage thereof needs careful consideration as it regularly varies from specimen to

specimen.

18. Small or Median Egret : *Egretta i. intermedia* (Wagler)

(*Ardea intermedia* Wagler, 1829, Iris von Oken, Col. 659 (Java); Baker, FBI No. 2224, Vol. 6 : 347; Ali & Ripley, HB No. 47, 48, Vol. 1 : 71)

Local names : Hindi-Patokha/ Karchia Bagla.

Size : Length c. (26 in.).

Like Eastern Large Egret but being smaller (26 in.), indistinguishable from the former race in non-breeding plumage. Decomposed filamentous plumage on back and breast diagnostic. Sexes alike.

Resident and nomadic due to water condition. It is distributed throughout India including islands.

Extralimital : Whole of Asia.

Ali noted it in Kutch and Saurashtra region.

Z.S.I. party noted (?) at Dwarka mixed with other, Nov. 1993.

19. Little Egret : *Egretta g. garzetta* (Linnaeus)

(*Ardea Garzetta* Linnaeus, 1766, Syst. Nat., ed. 12. 1: 237 (Oriente = northeast Italy); Baker, FBI. No. 2225, Vol. 6 : 348; Ali & Ripley, HB No. 49, Vol. 1 : 72)

Local name : Hindi-Karchia bagla

Size : Village hen +. Length c. (25in.).

Smaller replica of Large and Median Egrets (25 in), black bill diagnostic. Long narrow nuchal crest (breeding). Sexes alike.

Resident. Practically found in all over India including islands in well-watered biotope.

Distributed all over Gujarat in Marshes, nearby cultivation and cattle gazzing field.

Extralimital : Asia, S. and E. Europe, N. and E. Africa.

All collected 2 examples from Bodeli (Baroda) and Dediapada (Rajpipla).

Z.S.I. party noted it elsewhere from Gujarat (Nalsarobar, Gandhinagar dist; Jamnagar, Dwarka, Verabal etc.)

20. Indian Reef Heron : *Egretta gularis schistacea* (Hemprich & Ehranberg).

(*Ardea (Leptorodas schistacea* Hemprich & Ehrenberg, 1832, Symb. Phys. Aves, (P. 12), Pl. 6 (Red Sea); Baker, FBI No. 2228, Vol. 6 : 353; Ali & Ripley, HB No. 50, Vol. 1: 74)

Local names : Hindi- Kala bagla.

Size : Same as earlier race.

Like Little Egret (25 in), but dimorphic-pure white and slaty grey. Upper foreneck and throat white (non-breeding), indistinguishable from Egret both in breeding and non-breeding plumes. Sexes alike.

Resident, nomadic and local migratory. It ranges from shores of W. India south to Kanya Kumari, rare in eastern coast. Shy and solitary habit in more or less isolated habitat is diagnostic.

Extralimital : Pakistan, Coast of Red Sea, Gulf of Aden and Persian Gulf.

All collected 2 examples from Bhuj and Okha. Common along the sea-coast and tidal creeks. Breeding at Kandla creek, Kutch (Ali).

21. Night Heron : *Nycticorax n. nycticorax* (Linnaeus),

(*Ardea Nycticorax* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 142 (Southern Europe); Baker, FBI No. 2233, Vol. 6 : 659; Ali & Ripley, HB No. 52, Vol. 1 : 78)

Local name: Hindi-Tar bagla

Gujarati-Awaak Waak.

Size : Pond heron. Length c. (23 in).

Like Pond Heron (23 in) but much stouter bill. Above grey with metallic greenish black back, below white. Sexes alike.

Resident. Patchily distributed throughout the Indian Union including Islands in suitable biotope like shaded inland water sources, coastal lagoons and backwaters etc.

Nocturnal. Rarely or sparsely found in Gujarat.

Extralimital: The America and Europe east to Japan, South to Africa and the Sunda Islands.

All collected one example and noted from Kutch (Bhuj, kandla, Tuna, Lakhpat etc.). Baroda City environs, Kanewal (Cambay), Viramgam, Breeds in Kutch in August.

22. Chestnut Bittern : *Ixobrychus cinnamomeus* (Gmelin)

(*Ardea cinnamomea* Gmelin, 1789, Syst. Nat., 1 (2) : 643 (China); Baker, FBI No. 2238, Vol. 6 : 367; Ali & Ripley, HB No. 56, Vol. 1: 84)

Local names : Hindi. Lal bagla

Size : Pond heron -. Length c. (15 in.).

Smaller than pond Heron (15 in), above chestnut-cinnamon below pale cinnamon with chin and throat white with a dark median stripe (Male); crown blackish, heavy brown streak down the middle of fore neck and breast (Female).

Resident. Possibly also migratory to some extent depending upon water condition and suitable habitat. Sparsely found in the entire Indian Union including islands in reed beds in inland wheels and swamps in Gujarat. No record so far from Gujarat.

Extralimital : Whole of Asia.

(Ali), did not mention it in the list of the Birds from Gujarat.

23. Yellow Bittern : *Ixobrychus sinensis* (Gmelin)

(*Ardea Sinensis* Gmelin, 1789, Syst. Nat. 1 (2) : 642 (China); Baker, FBI No. 2237, vol. 6 : 365; Ali & Ripley, HB No. 57, Vol. 1 : 86).

Local name : Hindi -Jun Bagla

Size : Same as earlier race.

Like Chestnut Bittern (15 in), indistinguishable from Chestnut Bittern in the Field, bushy crest diagnostic (Male); similar with male except a buff mesial line down the throat and foreneck (Female).

Resident, Practically in the entire Indian Union. Possibly also migratory to some extent. This race has been maintaining same distributed range and isolated habitat with that

of earlier race. Sparsely and also rarely dotted in the overgrown reed beds, swamps, Mangrove swamps, backwaters etc. It is very hard to identify which race actually noted in the field from a far distance.

Extralimital : Same as earlier race.

Butler (S.F., V : 216) found two or three pairs breeding in small tank at Milana near Dessa during August, 1876. No further record till then in Gujarat.

24. Bittern : *Botaurus s. stellaris*  
(Linnaeus)

(*Ardea stellaris* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 144 (Europe restricted to Sweden) : Baker, FBI No. 2240, Vol. 6 : 370; Ali & Ripley, HB No. 59, Vol. 1 : 89)

Local Names : Hindi-Nir goug, Baz.

Size : Pond heron+. Length c. (28 in.)

Larger than Pond Heron (28 in.). Above black with bushy crest edged with buff, rump and tail yellowish, below yellowish buff streaked brown. Chin and throat white with a conspicuous buff and black median line. Sexes alike.

Winter visitor, found in small numbers in dense reed-beds and inland jheels and swamps. It distributed in India from Rajasthan and the Gangetic Plain to Assam, straggling south through Gujarat, M.P., Orissa, A.P., Maharashtra, Tamil Nadu, Karnataka.

Extralimital : Pakistan, breeds in the temperate Palaearctic region.

Butler (S.F., iv : 24, 1876) records it as occasionally seen and shot at some reedy tanks at Milana c. 18 m. NE of Dessa, Gujarat.

Family : CICONIIDAE

Key to the genera of the family CICONIIDAE

1. Mandibles leaving open space near middle of bill .....*Anastomus*  
Mandibles not leaving any space .....2
2. Bill straight .....*Leptoptilos*  
Bill down curved or slightly up-curved .....3

3. Bill down curved .....*Mycteria*  
Bill slightly up-curved .....*Ciconia*

Storks : **Ciconiidae**

Seventeen species worldwide, distributed in temperate and tropical regions. Nine species occur in the Indian subregion of which eight are supposed to be distributed in Gujarat. Large, long-legged, diurnal marsh-hunting birds with massive ungrooved strong bills. Mainly black and white with sometimes metallic sheen, undertail coverts lax and greatly developed in some species. Wings long and broad; tail short.

25. Painted Stork : *Mycteria leucocephala*  
(Pennant)

(*Tantalus leucocephalus* Pennant, 1769, Indian Zool. : 11, pl. 10 (Ceylon); Baker, FBI No. 2214, Vol. 6 : 331; Ali & Ripley, HB. No. 60, Vol. 1 : 930)

Local names : Hindi-Janghill, Dhok.

Gujarati- Chitroda.

Size : Vulture ± Length c. (3.5 ft. Standing)

Large (3.5 ft.), white above barred with metallic greenish black. A black band across the breast. Wing and tail quills black. Heavy yellow bill and rose-pink near the tail diagnostic. Sexes alike.

Resident, shifting locally with water conditions. Sparsely and solitarily found in inland marshes, jheels, inundated fields. It is found in the entire Indian excluding islands.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Burma, Thailand, Indochina, SW. China.

Commonest stork in Gujarat, also breeds in Gujarat (Ali)

(Ali), did not collect any specimen but noted that it is commonest stork in the area (Gujarat).

26. Openbill Stork : *Anastomus oscitans*  
(Boddaert)

(*Ardea oscitans* Boddaert, 1783, Table Pl. enlum : 55 (Pondicherry); Baker FBI No. 2215,

Vol. 6 : 333; Ali & Ripley, HB No. 61, vol. 1 : 95)

Local name : Hindi Gungla

Size : (2.5 ft. standing).

Smaller than Painted Stork (2.5 ft.), chiefly white with purplish greenish black mantle, bills with narrow open gap in between is diagnostic. Sexes alike.

Resident with some local migration. It distributed throughout India excluding island in large jheels and marshes.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Burma, Thailand east through Indochinese subregion.

Not uncommon, throughout Gujarat but not abundant, and subject to considerable local movements depending on the monsoon, seen in twos and threes or small flocks at jheels and marshes (Ali).

27. Whitenecked Stork : *Ciconia e. episcopus* (Boddaert)

(*Ardea episcopus* Boddaert, 1783, Table Pl. enlum : 54 (Coromandel coast); Baker, FBI No. 2210, Vol. 6 : 342; Ali & Ripley, HB No. 62, Vol. 1 : 98).

Local names : Hindi -Laglag

Gujarati- kali tui

Size : Goose  $\pm$  standing c. (3.5 ft.)

Large (3.5 ft.) red-legged black and white stork with white neck and black crown. Sexes alike.

Resident. Sparsely distributed throughout the well watered parts of India.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh and Burma.

Ali, collected specimens from Chinchli (Surat Dangs). Vaghjipur (Mehsana dist.), Gujarat.

Ali, also noted it from Bodeli (Baroda dist.), Dediapada (Rajpipla), Mahal, Galkund, Mehaskatri (all in surat dangs).

Lester recorded it during cold season and rains.

28. White stork : *Ciconia c. ciconia* (Linnaeus)

(*Ardea Ciconia* Linnaeus, 1758, Syst. Nat., ed. 10. 1 : 142 (Sweden); Baker, FBI No. 2207, Vol. 6 : 321; Ali & Ripely, HB No. 63, Vol. 1 : 99)

Local names : Hindi-Ujli, Dhak, Gybar,

Size : Same as earlier race.

Large (3.5 ft.) and white bird except black scapulars and wing quills. Legs and heavy pointed bill red. Sexes alike.

Winter visitor on marshy grassland and moist cultivated field. Common in NW India. In small numbers east and south in the Gangetic Plain (U.P., Bihar, W. Bengal, Orissa), Assam, M.P., Gujarat, Rajasthan, Sparsely found in the southern peninsula.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh. Breeds in Europe, N. Africa.

Observed only on three occasions in Gujarat (January and March) at Deesa (Palanpur) and in the Surat Dangs at Pimpri and Mehaskatri, Solos and pasties of 3 or 4. Apparently an uncommon winter visitor (Ali).

29. Black Stork : *Ciconia nigra* (Linnaeus)

(*Ardea nigra* Linnaeus, 1758, Syst. Nat. ed., 10, 1 : 142 (Sweden); Baker FBI, No. 2209, Vol. 6 : 323; Ali & Ripley, HB No. 65, Vol. 1 : 102)

Local name : Hindi-Surmali

Size : Same as earlier race.

Large (3.5 ft.), glossy black above and white under parts. Sexes alike.

Winter visitor. Rarely winter in northern India. Gangetic Plains and east to Assam. South through Rajasthan and upto Kutch (Gujarat). Rare in the Deccan, south to c. 18°N lat. (Sholapur dist.). Recorded as spring passage in Kashmir (Ward, JBNHS 17 : 947).

Extralimital : Asia, Europe and Africa.

Rare winter visitor to Gujarat, habit and habitat are alike with other storks.

Lester recorded it in kutch during cold weather. Butler (S.F., iv : 22-1876) noted one to a tank between Ahmedabad and Deesa, and it

may occur in other parts of the area also in winter season (Ali).

30. Blacknecked Stork : *Ephippiorhynchus a. asiaticus* (Latham)

(*Mycteria asiatica* Latham. 1790, Index Orn., 2 ; 670 (India); Baker, FBI No. 2211, vol. 6 : 326; Ali & Ripley, HB No. 66, Vol. 1 ; 104)

Local names : Hindi-Loharjang, Loha sarang.

Size : Painted stock +; standing c. (4.5 ft.).

Larger than painted stork (4.5 ft.), black and white stork with massive black bill. A broad black diagonal band across the wings diagnostic.

Resident. Widespread but sporadically distributed throughout India (rare in the south) excluding islands in low land marshes, mangrove swamps and large inundated field.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Burma, Malaysia, Thailand, Indochinese countries.

(Ali) noted it at Kutch (Kandla), Bhuj (Anjan), Dwarka (Okhamandal), Dabka (Baroda) and Saiat (Kaira dist.).

31. Adjutant stork : *Leptoptilos dubius* (Gmelin)

(*Ardea dubia* Gmelin, 1789, Syst, Nat., 1 (2) ; 624 (India); Baker, FBI No. 2212, Vol. 6: 327; Ali & Ripley, HB No. 67, Vol. 1 : 105).

Local names; Hindi-Garur, Peda dhauk

Size : Vulture +; standing (4.5 ft.).

Largest (4.5 ft.), black, grey and dirty white with necked reddish and yellow head, huge wedge-shaped bill and pinkish gular pouch diagnostic, sexes alike.

Breeding sporadically in Assam, Orissa, and the Sunderbans. Chiefly found during rain in India from Kutch, (Gujarat), Rajasthan, Gangetic Plain to Assam. Rare in the Deccan.

Extralimital : As in earlier race.

Uncertain status with nomadic habit, moving with the advent of monsoon.

Sir Peter Clusterbuck reported it from Bhuj during winter in 1944-45 (Ali).

Butler (S.F. iv ; 21-1876) considered it rare in W. Gujarat but noted elsewhere in N. Gujarat (Ali).

32. Lesser or Haircrested Adjutant : *Laptoptilos javanicus* (Horsfield)

(*Ciconia Javanica* Horsfield, 1821, Trans. Linn. Soc. London, 13 (1): 188 (Java); Baker, FBI No. 2213, Vol. 6 ; 329; Ali & Ripley, H.B. No. 68, Vol. 1 ; 107).

Local names; Hindi-Bang gor, Chhota garur

Size : Same as earlier race

Smaller than Adjutant Stork (3.5 to 4 ft.), glossy black above and white below, yellowish wedged shaped bill, sparse hair like feathers on the head is diagnostic.

Resident, nomadic with the rain and also local migratory. Record spordically in India from Assam. Bengal, Bihar, Orissa, Kerala, Recorded also from A.P., U.P. (Lucknow), Delhi, Kutch (Gujarat), Rajasthan in well water tracts, lake, swamps, jheels, flooded land etc.

Extralimital : Bangladesh, Burma, Malaysia, Borneo, Java, Sumatra, S. China.

Ali, did not collect any specimen from Gujarat.

Sir Peter Clutterbuck reported it from Mandvi, Gujarat during the winter in 1944/45 (Ali).

Family THRESKIORNITHIDAE

Key to the genera of the family THRESKIORNITHIDAE

1. Bill slender, slightly down curved, neck bare .....2
  - Bill greatly flattened, becoming broader and spoonshaped at the tip, face and throat naked ..... *Platalea*
  2. Plumage principally black ..... *Pseudibis*
  - Ibises and spoonbills..... *Threskiornis*
- Some twenty-nine species worldwide. Four

species found in the Indian subregion and all of them are distributed in Gujarat.

Long and bare-legged marsh birds. Plumage chiefly white, or black or chestnut with metallic gloss. Ibises have long, slim, down-curved bills and spoonbills have spatulashaped bills. Most of them are social feeders and breeders. Wings long and tail short. Affects large rivers, jheels, marshes, inundated cultivated fields, sometimes in tidal mudflats and brackish waters etc.

### 33. White Ibis : *Threskionis aethiopica melanocephala* (Latham)

(*Tantalus melanocephalus* latham, 1790, Index Orn., 2; 709 (India); Baker, FBI No. 2203, vol. 6 : 314; Ali & Ripley, HB No. 69, Vol. 1 ; 110).

Local names : Hindi-Munda, Safad baza, Didhar.

Size : Large domestic hen  $\pm$  Length c. (30 in.).

Large (30 in), white bird with naked black head and neck. Long black decurved bill. Long ornamental plumes overhanging base of neck (breeding). Sexes alike.

Resident. Nomadic, depending upon water sources. Thinly distributed in suitable biotope in the entire Indian Union excluding islands. Singly or occasionally in a small Party.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Burma, sporadically to China and Japan.

Ali, collected one example from Saiat (Kaira dist.) and also noted from Mandvi, Bhuj, Kandla, Khavda, Dholovira, (Khadi Is.), Mithapur, Baroda, Cambay, Vaghjipur (Mehsana dist.). Viramgam, Gujarat, Breeds in Kutch in August/September.

### 34. Indian Black Ibis : *Pseudibis p. papilosa* (Temminck)

(*Ibis papilosa* Temminck., 1824, pl. Col. livr. 51, pl. 304 (India); Baker, FBI No. 2204, Vol. 6 : 316, Ali & Ripley, HB No. 70, Vol. 1 : 112).

Local names : Hindi Kala baza

Size : Same as earlier race.

Smaller than white Ibis (27 in.). Glossy black plumage with white shoulder patch, slim decurved bill, red legs and naked black head with brilliant red warts on the top of the head diagnostic. Sexes alike.

Resident. Habit and habitat is similar to earlier race. It distributed in India from Gujarat, Rajasthan and throughout the Gangetic Plain and peninsula south to Karnataka.

Extralimital : Pakistan, Nepal, Bangladesh, Burma, Thailand.

Ali, collected two examples from Mahal and Meheskatri both in Surat Dangs. Gujarat, also noted elsewhere from Kutch, Bhuj, Verabal (Junagadh dist.), Viramgam Bodeli (Baroda dist.), Vaghjipur (Mehsana dist.). Small party of 4 nos. was also noted in the Nalsarobar by the Z.S.I. party in Nov. 1993.

### 35. Glossy Ibis : *Plegadis f. falcinellus* (Linnaeus)

(*Tantalus falcinellus* Linnaeus, 1766, Syst. Nat., ed. 12 : 241 (Austria & Italy); Baker, FBI No. 2206, Vol. 6 : 318; Ali & Ripley, HB No. 71, Vol. 1 : 114)

Local names : Hindi-Chhota buza

Size : Same as earlier race.

small (25 in). Black plumage with feathered head (Non-breeding). Dark chestnut above tinged with glossy green and purple on head, neck, throat etc. tail glossy greenish black (breeding).

Partly resident and nomadic, partly winter visito to our Indian limit.

Recorded from U.P., Gangetic plain, M.P., Deccan, Rajasthan, Gujarat, Orissa, east through Bengal to Assam and Manipur and in Maldive islands.

Extralimital : America, S. Europe and Asia to Africa and Australia.

Uncommopn or rare visitor in Gujarat. Noted at Kutch, Bhuj (March-April, 1944-45), Viramgam and Kharaghoda, Gujarat (Ali).

### 36. Spoonbill : *Platalea leucorodia major* Temminck & Schlegel

(*Platalea major* Tamminck Schlegel, 1849,

in Siebold, Fauna Jap., Aves : 119, Pl. 73 (Japan); Baker FBI No. 2202, Vol. 6. : 311; Ali & Ripley, HB No. 72, Vol. 1 : 116).

Local names : Hindi-Chamach Buza

Size : Domestic duck +. Length c. (24 in.).

Medium (24 in.) size white bird with distinctive flat, black and yellow spatula-shaped bills. Naked yellow throat and bare long black legs. A long white bushy nuchal crest during breeding time. Sexes alike.

Partly resident & Partly winter visitor. Patchily and thinly distributed in all over India.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh and also in Central Asia and south to Syria and Egypt.

Resident in Gujarat, Breeding at kutch in August-September (Ali).

Noted at Bhuj; Mandvi, Khandla, Chobari (Bhachu dist.), Dawarka, Mithapur (Okha), Dabka (Baroda), Sairat (Kaira), Deesa (Palanpur), Kharaghoda etc (Ali).

Noted also in Ahmedabad city environment by the Z.S.I. party in October, 1993.

#### Flamingos : *Phoenicopteridae*

Large birds with excessive long legs and necks. Thick decurved lamellated bills. Plumage pinkish white sometimes tinged with crimson. Sexes alike. Normally found in large lakes and lagoons, salt pans, estuaries and on the sea-coast.

#### 37. Flamingo : *Phoenicopterus roseus* Pallas

(*Phoenicopterus roseus* Pallas 1811, Zooger, Russo-Asiat., 2 : 207 (Mouth of Volga river, South Russia); Baker, FBI No. 2241, Vol. 6 : 373; Ali Riply, H.B. No. 73, Vol. 1 : 118)

Local names : Hindi Bog/Rag hans.

Gujarati-Hanj Pakkhi

Size : Vulture +. Standing c. (4.5 ft.).

Tall stoke like bird (4.5 ft. standing). Plumage rosy white with scarlet and black wings and massive pink bill decurved or broken from about half of its length. Sexes alike.

Resident, nomadic and also extralimital migrant in part. Capriciously and sporadically

distributed in the entire Indian union (rare in NE India) in large Jheels, lakes, tidal mudflats, lagoons, salt pans etc.

Extralimital : Pakistan, Sri Lanka, Bangladesh, S. France, S. Spain, N. & E. Africa, Middle East, Caspian region to W. Siberia, south through Afghanistan.

Ali Collected 4 examples from Khandla (Kutch) and Mithapur (Okha) also noted from Nir (Great Rann.) Pang Bet (Little Rann), Breeding at Pachham Island, Nir, (Great Rann), (Ali).

#### 38. Lesser Flamingo : *Phoeniconaias minor* (Geoffrey)

(*Phoenicopterus minor* Geoffrey, 1798, Bull. Soc. Phil. Paris, 1 : 98 (East Africa); Baker, FBI No. 2242, Vol. 6 : 375; Ali & Ripley, HB No. 74, Vol. 1 : 121)

Local name : Hindi-Chhota rajhans

Size : Large duck; Standing c. (3-3.5 ft.).

lesser than flamingo (3-3.5 ft.) but indistinguishable from it in the field. Deeper rose pink plumage and dark coloured bill with crimson feathers around its base is diagnostic. Sexes alike.

Recorded in our Indian limit from Sambhar Lake (Rajasthan) and little Rann (Gujarat), where vast concentration of ten thousands occur irregularly. Stray record from Bombay (JBNHS 40 ; 649), A.P. (SF 9 : 436) and Chilka (Orissa).

Status uncertain, but presumably resident in Gujarat (Ali); Between February-March in 1946, enormous concentrations of hundred thousands birds were observed on the flat muddy expanse of the shallow Banas River near its mouth (Opposite Dhutari Bet) in the Little Rann of Kutch (Ali).

#### Order ANSERIFORMES

#### Family ANATIDAE

Key to the genera of the family ANATIDAE

1. Hind toe not lobed .....*Sarkidornis*

- Hind toe narrowly or broadly lobed .....2
2. Hind toe narrowly lobed.....3  
Hind toe broadly lobed .....6
3. Bill short and goose like .....*Nettapus*  
Bill rather flat and broad .....4
4. Primaries equal to secondaries in length  
.....*Dendrocygna*  
Primaries longer than secondaries .....5
5. Entire outer web of inner secondaries  
chestnut .....*Tadorna*  
Outer web of inner secondaries not chestnut  
.....*Anas*
6. Width of culmen becoming narrower  
towards tip .....*Netta*  
Width of culmen becoming broader  
towards tip .....*Aythya*

#### Ducks, Geese and Swans : **Anatidae**

Some 147 species world wide. of which 48 species recorded from the Indian sub region. some 28 species are resident or wintering in Gujarat. Small (Pigeon size) to vary large (+ vulture) water birds, variously coloured and patterned. Most are long necked with short webbed feet. Sociable gathering into large feeding congregations in all types of inland water. Partly migratory, partly resident. Bill typically broad, flat, rounded at tip, and with a comb. like fringe or lamellae. Very hard to distinguish one from another unless otherwise it differ in size from sp. to species and some other diagnostic features.

#### 39. Whitefronted Goose : *Anser a. albifrons* (Scopoli)

(*Branta albifrons* Scopoli, 1789, Annus I, Hist. Nat. : 69 (North of Italy), Baker FBI No. 2253, Vol. 6 : 399; Ali & Ripley, HB No. 79, Vol.1 : 126).

Local names : Unrecorded.

Size : C. (27 in.)

Medium (27 in.), size dark coloured bird with pinkish bill and a diagnostic white patch on the fore head. Sexes alike.

Sporadic records from kutch (Gujarat) and ranges across the Gangetic Plain (U.P.) to

Assam and Manipur. Southern most record from Chilka (Orissa-JBNHS 48; 365-6)

Extralimital : Breeds on the Arctic coasts of Europe and Asia. Winters in W. Europe, Black and Caspian Seas to China and Japan.

Sparse and rare winter visitor. no specimen collected so far from Gujarat.

Evidently a rare winter straggler. Lester shot 3 birds in February 1892 on a dirty village tank near Anjar (Kutch) (Ali).

#### 40. Eastern Greylag Goose : *Anser anser rubrirostris* Swinhoe

(*Anser cinereus* var. *rubrirostris* Swinhoe, 1871, P.Z.S. : 416 : (Sanghai); Baker FBI No. 2252, Vol. 6 : 398; Ali & Ripley, HB No. 81, Vol. 1 : 129)

Local names : Hindi-Raj hans

Gujarati- Gaj

size : Domestic Goose ±. Length c. (32 in.).

Very like normal ashy brown phase of the domestic goose, diagnostic pink bill.

Winter visitor. It winters in India from Kashmir, Punjab, Rajasthan, Gujarat through the Gangetic Plain east to Assam, Manipur (Plenty in Logtak lake), south upto Orissa (Chilka)

Extralimital : Whole of Asia. Caspian and Black Seas, Seistan and China.

According to the late shri vijayarajii (JBNHS, 21 : 678-9) this bird was a regular winter visitor to Chhari Dhandh (36 miles NW of Bhuj)- (Ali).

Butler (S.F., IV : 26-1876) recorded it as rare in N. Gujarat. In the neighbourhood of Ahmedabad. 'Very scarce' seldom more than 1 or 2 shot in a season. (R.M. Simmons c 1932). Observed by Dr. H.C. Aldrich in december and january 1931/32 and 1939 at Parej and Chitesumba (Kaira dist.)-(Ali).

#### 41. Barheaded Goose : *Anser indicus* (Latham)

(*Anas indicus* Latham, 1790, Index Orn., 2 : 839 (Taimyr = India); Baker, FBI No. 2258, Vol. 6 : 405, Ali & Ripley, HB No. 82, Vol. 1 : 131.)

Local names : As in earlier race.

Size : As in earlier race.

Slender (30 in), pale grey, brown and white goose with a stripe down each side of brown neck. A black bar from eye to eye and a shorter second one across the nape diagnostic. Bill and legs yellow. Sexes alike.

Breeds in Ladakh, winter visitor to our Indian limit from Kashmir east through Punjab, Rajasthan and Gangetic Plains east to Assam and south upto Orissa. Also disjunctly recorded from Karnataka.

Extralimital : Winters in Pakistan, Nepal, Bangladesh and Burma. Breeds in Central Asia from the Tian Shan to Kokonor.

Rare winter visitor to Kutch (JBNHS, 21 : 678). No specimen collected so far from Gujarat. (Ali).

#### 42. Jankowski's or Eastern Whistling Swan : *Cygnus columbianus jankowskii* Alpheraky

(*Cygnus bewickii jankowskii* Alpheraky 1904, Priroda : Okhota, sep. : 10 (Ussuriland); Baker, FBI No. 2245, Vol. 6 : 382; Ali & Ripley, HB No. 85, Vol. 1 : 135).

Size : Vulture +. Length c. (48 in.)

Large (48 in), all white and a yellow patch on base of bill. Bill (terminal end) black. Sexes alike.

Very rare straggler in severe winter.

One unsexed example collected from Bhuj (Kutch). So far from our Indian limit.

Extramiltal : Pakistan (Staggler- two records in Baluchistan and NWFP). Breeds from the delta of the Lena to the delta of the Kolyma. Winter also to China and Japan.

One of a pair reported to have frequented Hamisar tank in Bhuj. A unique record (JBNHS, 47(3) : 167).

In 1870 or thereabout Stoliczka calimed to have seen some swans while crossing the Great Rann from Kutch to Pachham Island (JASB., Xli, 1872). Later Hume (S.F. iv., 33, 1876) suspected that Stoliczka mis recorded it.

#### 43. Lesser Whistling Teal : *Dendrocygna javanica* (Horsfield)

(*Anas javanica* Horsfield, 1821, Trans, Linn. Soc. London, 13 : 199, pl. 1 (Java) ; Baker, FBI No. 2260, Vol. 6 : 411; Ali & Ripley, H.B. No. 88, Vol. 1 ; 138)

Local names : Hindi Seelhi, Seelkahi

Gujarati- Nani Sisoti, Chayi

Size : Domestic duck -. Length C. (17 in.).

Small (17 in), pale brown and maroon chestnut coloured bird, indistinguishable from large-whistling Teel in the field. Upper tail-coverts chestnut is diagnostic. Sexes alike.

Resident and local migratory to water sources. Commonly distributed in the entire Indian Union including islands.

Extralimital : Pakistan, Nepal, Sri lanka, Bangladesh, Burma, Malaysia, Thailand, S. China, S. Vietnam, SW Borneo, Java, Sumatra.

Fairly common but not abundant. Breeding in Kutch during August (1943). Dr. H.C. Aldrich also noted breeding in Sandhna (Kaira dist.) on Sept. 1945. (JBNHS, 45 : 610).

Z.S.I. partly noted in Oct. 1993, Fairly common in Nalsarobar (Gandhi nagar dist.) and also in Khijidia Bird Sanctuary (Jamnagar dist.).

#### 44. Large whistling Teal : *Dendrocygna bicolor* (Vieillot)

(*Anas bicolor* Vieillot, 1816, Nouv. Dict. Nat. Hist., 5 : 136 (Paraguay); Baker, FBI No. 2261, Vol. 6 : 413, Ali & Ripley, HB No. 89, Vol. 1 : 139).

Local names : As in earlier race.

Size : Slightly larger than the earlier race.

Similar to but slightly larger (20 in) than Lesser Whistling Teal. Upper tail-coverts white and a broad diffuse rusty white collar round the neck diagnostic. Sexes alike.

Resident: Population is very much thinner and going scarce day by day. This race has similar distributional range. habit and habitat to that of earlier race.

Extralimital : N. and S. America, E. Africa, Madagascar, S. Asia.

Suppose to be distributed in Gujarat. so far no authenticated record from Gujarat except Ticehurst (Ibis 1923 : 457) who presumably noted in kutch area.

45. Ruddy Shelduck or Brahminy Duck :  
*Tadorna ferruginea* (Pallas)

(*Anas ferruginea* Pallas, 1764 in Vroeg, Cat. d' Ois., Adumbr : 5 (Tartary); Baker, FBI No. 2263, Vol. 6 : 416; Ali & Ripley, HB No. 90, Vol. 1 : 141)

Local names : Hindi- Chakwa, Chakuri.

Size : Large domestic duck. Length c. (26 in).

Midium (26 in), Plumage cinnamon- brown with black wing and tail. White wing patch and metallic green speculum on wing. Sexes alike.

Winter visitor (breeds only in Ladakh in our locality), sparsely found in all over India (rare in south) excluding Islands. Affects large jheels, inundated cultivated field etc.

Extralimital : Asia, SE Europe, Nile valley and Caspian Sea.

A rare and erratic winter visitor to Kutch; less uncommon in Gujarat, though never abundant. Usually in twos and threes; once a loose flock of about 20 (Mahi River, Dabka, Baroda dist.) (Ali).

46. Common Shelduck : *Tadorna tadorna*  
(Linnaeus)

(*Anas tadorna* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 122 (Sweden); Baker, FBI No. 2262, Vol. 6 : 414; Ali & Ripley, HB No. 91, Vol. 1 : 144).

Local names : Hindi-Shah Chakwa,

Size : Smaller than earlier race, c. (24 in.)

Size, domestic duck (24 in). White above with gilsterning greenish black head, two black band on either side of upper back, below white, upper breast chestnut and a broad black band from breast to vant. Red upturned bill and pinkish legs. (Male). Female being duller in colouration.

Casual and uncommon winter visitor. Recorded in our Indian limit in Kashmir, Delhi,

U.P., W. Bengal (Murshidabad dist., Salt lake, Calcutta), Assam (Brahmaputra river), Manipur (Logtak lake), Bihar, Orissa (Chilka lake), Gujarat (Kutch), M.P. (Neemuch) south to Deccan (Poona). Very rarely observed in Gujarat.

Extralimital : A palaeartic breeding sp., wintering south to N. Africa, Arabia, S. China, Japan, S. Asia (Part).

Ali, noted as very rare winter visitor, or vagrant. Col. C.B. O'brian shot one near Bhachau(Kutch) in 1921, and it has also been obtained in Saurashtra (JBNHS, 26 : 674)"

47. Marbled Teal : *Marmaronetta angustirostris* (Menetries)

(*Anas angustirostris* Menetries, 1832, Cat. Rais. Obj. Zool. Caucase : 58 (Lenkoran, Transcapia); Baker, FBI No. 2277, Vol. : 445; Ali & Ripley, HB No. 92, Vol. 1 : 147).

Size : Domestic duck -; length c. (19 in.).

Size, domestic duck - (19 in.), above greyish brown, spotted with buff and black, large brown patch from eye to nape, below dirty white barred with brown. Sexes alike.

Rare winter visitor, winter records of our Indian limit are erratic, straggling records from U.P., M.P., Rajasthan, Gujarat (Kutch, Bhavnagar, Ahemdabad and Baroda dist.), W. Bengal (Calcutta), Assam (Sibsagar dist.), Maharashtra (Ahmednagar, Poona) may rarely winters in Gujarat.

Extralimital : Pakistan (rare-winter), resident (breeding) in Mediterranean Basin from S. Spain to near East, Persia.

M.K.S. Fatehsinhjii shot one in Kutch in 1940, and it has also been obtained in Saurashtra (JBNHS, 38 : 195). Butler (S.F. IV: 30 1876) also noted in N. Gujarat (Ali).

48. Pintail : *Anas acuta* Linnaeus

(*Anas acuta* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 126 (Sweden); Baker, FBI No. 2274, Vol. 6 : 437; Ali & Ripley, HB No. 93, Vol. 1 ; 149).

Local names : Hindi-Sand, Seenkh par

Size : Domestic duck-. length c. (22. 29 in.).

Medium (22–29 in.). Plumage largely grey with head and throat chocolate and black hind neck. A white band either side of the neck, long pointed pin-like central tail feathers diagnostic (Male-breeding). Female mottled brown and buff but pin less tail.

Winter visitor. Common, and widespread. Winter in all type of inland water in the entire Indian Union including islands (?).

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Burma, S. China, Siam, Persian Gulf, Ethiopia, N. Africa (Nile Valley), N. Europe, N. America.

Z.S.I. party noted abundant of it in Nalsarobar (Gandhinagar dist.) and in good numbers in Khijidia Bird Sanctuary and its environment in Jam nagar dist, Oct.-Nov. 1993.

#### 49. Common teal : *Anas c. crecca* Linnaeus

(*Anas crecca* Linnaeus, 1758, Syst. Nat., Ed. 10, 1 : 126 (Sweden); Baker, FBI No. 2271, Vol. 6 : 431; Ali & Ripley, HB No. 94, Vol. 1 : 151).

Local name : Hindi- Choti murghabi

size : Juv. domestic duck  $\pm$ . Length c. (15 in.).

Small (15 in.). Plumage white and grey, head chestnut with a broad green band from eye to nape. Tricoloured wing speculum (Black, green and buff) visualised during flight (Male-breeding). Brown above, with black and green wing speculum (Female).

Widely spread all over India including Islands in all types of inland water.

Extralimital : An Holarctic sp., wintering in Southern, N. America, Africa and Asia.

Winter visitor. Very common and widely distributed in all inland water of Gujarat specially in winter.

Ali collected and noted elsewhere in Gujarat.

Z.S.I. party noted it in vast numbers in Nalsarobar (Gandhinagar dist.), in October' 1993.

#### 50. Baikal, Clucking or 'Formosa' Teal : *Anas formosa* Georgi

(*Anas formosa* Georgi, 1775, Bermerk. Reise Russ. Reich, 1 : 168 (Lake Baikal, Siberia); Baker, FBI No. 2272, Vol. 6 : 433; Ali & Ripley, HB No. 95, Vol. 1 : 154).

Size : Common Teal  $\pm$ . Length c. (15- in.).

Small (15 in.). A remarkably beautiful teal with beautiful colour pattern running from the head down to the wing speculum with black, buff and metallic green, (male), female similar to common Teal with distinctive head pattern with black and brown.

Very rare and sporadic winter visitor in our Indian limit. Has been recorded at intervals of 70 years in Rajasthan, Gujarat, U.P., Bihar, W. Bengal, Assam, Manipur and latest record at Delhi (1947- R.S. Symons).

Extralimital : Breeds in Siberia. Winters in China and Japan.

Ali, did not mention this birds in his list. of Birds from Gujarat.

#### 51. Spotbill Duck : *Anas p. poecilorhyncha* J.R. Forster.

(*Anas poecilorhyncha* J.R. Forster, 1781, Indian Zool. : 23, pl. 13, p. 1 (Ceylon); Baker, FBI No. 2265, Vol. 6 : 421, Ali & Ripley, HB No. 97, Vol. 1 : 157).

Local names : Hindi Garm pai, Gugral

Size : Domestic duck. Length c. (24 in.)

Medium (24 in). Scaly-patterned grey and brown plumage with metallic green speculum, legs red and yellow-tipped dark bill and swollen orange-red spot on either side of fore-head diagnostic (Male), female duller.

Resident, nomadic, and occasionally migratory. More or less common in suitable well watered biotope in whole of India.

Extralimital : Pakistan, Nepal, Sri Lanka (rare), Bangladesh.

Ali, collected one specimen from Anjar (Kutch) and also noted from Mandvi (Bhuj), Timbi (Baroda), Dakor & saiat (Kaira dist.) and Kharaghoda, Gujarat.

Z.S.I. party noted in Khijidia Bird Sanctuary (Jamnagar) and road-side jheel in between Dwarka and Okha, Nov. 1993.

52. Mallard : *Anas platyrhynchos* Linnaeus

(*Anas platyrhynchos* Linnaeus, 1758, Syst. Nat. ed. 10, 1 : 125 (Sweden); Baker, FBI No. 2264, Vol. 6 : 419; Ali & Ripley, HB No. 100, Vol. 1 : 160)

Local name : Hindi- Nilsir

Gujarati-But, Raje

Size : Same as earlier race.

Medium (24 in), grey above and below vermiculated with black, Metallic dark green head neck separated by white collar from chestnut breast, yellowish green bill and orange legs. (Male- breeding). Male and female in eclipse plumage are brown spotted with black.

Breeds in kashmir and winters in the plains of our Indian Limit. From the Himalayas through U.P., Bihar, W. Bengal to Assam, south to about 19°N. in Orissa, M.P., Gujarat and N. Maharashtra.

Extralimital : Holarctic breeding species wintering in south temperate and subtropical latitudes around the world.

Uncommon winter visitor to Gujarat.

(Ali) noted, "An uncommon but regular winter visitor in cold winters; confined to the reedier jheels (R.M. Simmons)"

53. Gadwall : *Anas s. strepera* Linnaeus

(*Anas strepera* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 125 (Sweden); Baker, FBI No. 2269, Vol. 6 : 426; Ali & Ripley, HB No. 101, Vol. 1 : 163).

Local names : Hindi-Myla, Bhuar

Size : Domestic duck -. Length c. (20 in.).

Small (20 in); dark brown and grey bird with whitish belly and black tail. Chestnut patch with black and white speculum at rest is diagnostic. (Male-breeding) Male in eclipse and female rather duller.

Winter visitor. one of our commonest wintering ducks. It is found all over India but

rare in south and not in islands.

Extralimital : Holarctic breeding species wintering around the world in temperate, subtropical, and tropical latitudes.

Ali, noted, "Specimens shot. Winter visitor common"

Z.S.I. party made sight record in the Khijidia Bird Sanctuary (Jamnagar) in Oct. 1993.

54. Falcated or Bronzeced Teal : *Anas falcata* Georgi

(*Anas falcata* Georgi, 1775, Bemerk, Reise Russ. Reich, 1 : 167 (Asiatic Russia); Baker, FBI No. 2268, Vol. 6 : 424; Ali & Ripley; H.B. No. 102, Vol. 1 : 165).

Size : Same as earlier race.

Domestic duck (20 in). Head metallic green and chestnut purplish with a mane-like nuchal crest. General plumage grey (male-breeding). Female very like female Gadwall.

Rare winter visitor, but not infrequent winter straggler to Assam and Manipur. Vagrant record in Bihar (Tirhoot), U.P. (Lucknow), Delhi, Punjab, Gujarat (Kutch) in our Indian limit.

Extralimital : Records from Pakistan (West), Nepal (Kosi river), Breeds in N. Asia; winters in Japan, Korea, E. and S. China to upper Burma.

Possibly vagrant in Gujarat.

A specimen collected by Vijayaraj ji in kutch on 7 February, 1932 (JBNHS, 35 : 899). Till then no record so far from Gujarat.

55. Wigeon : *Anas penelope* Linnaeus

(*Anas penelope* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 126 (Sweden); Baker, FBI No. 2270, Vol. 6 : 429; Ali & Ripley, HB No. 103, Vol. 1 : 167)

Local names : Hindi-Passan, Chhotalsir  
Gujarati- Pharao

Size : Domestic duck -: Length c. (19 in.).

Size like Gadwall (19 in.), Head and neck chestnut with creamy patch on fore crown, vinous breast, small narrow blue grey bill is diagnostic (male-breeding). Male in eclipse

and female duller incolouration.

Winter visitor. Rather common in northern India and less common in peninsula and eastern India.

Extralimital : Breeds in the palaeartic region and winters in Europe, Africa, and Asia.

More or less abundantly winter in the large jheels and marshes in Gujarat.

Ali, noted "specimens shot; fairly common and plentiful" According to Lester it arrives in kutch much latter than others.

56. Garganey or Bluewinged teal : *Anas querquedula* Linnaeus.

(*Anas querquedula* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 126 (Sweden); Baker, FBI No. 2275, Vol. 6 : 439; Ali & Ripley, HB No. 104, Vol. 1 : 159).

Local names : Hindi-Chaita, Khira, Patari Gujarati- Kardio.

Size : Domestic duck —. Length c. (16 in.).

A small (16 in) blackish brown bird with head and neck pinkish brown and conspicuous broad white eyebrows diagnostic. (Male-breeding). Male in eclipse and female much more duller.

Most commonest and widespread migratory duck, earliest to come and last to leave. Most frequently found all over India including islands in all types of waters.

Extralimital : Winters in Pakistan, Nepal, Sri Lanka, Bangladesh, Burma, Thailand and Indochinese countries. Breeds in Palaeartic Region.

Commonly found all over Gujarat. In much watery part and well watered jheels. Sometimes this bird has been observed throughout the year.

Ali, noted this bird elsewhere in Gujarat.

Lester recorded it in kutch at least up to may (JBNHS 11 : 168)

Z.S.I. party noted it plenty in Nalsarobar, Gandhinagar dist. in Oct.'1993.

57. Shoveller : *Anas clypeata* Linnaeus

(*Anas clypeata* Linnaeus, 1758, Syst. Nat.,

ed. 10, 1 : 124 (Sweden); Baker, FBI No. 2276, Vol. 6 : 442; Ali & Ripley, HB No. 105, Vol. 1 : 172).

Local names : Hindi-Tiddari, Ghirah

Gujarati- Gaino

Size : Domestic duck : Length c. (20 in).

Size like domestic duck (20 in.), head and neck glossy metallic green, breast white, abdomen chestnut with two large white patches on flanks (Male-breeding); Male in eclipse and female are mottled dark brown and buff with bluish shoulder patch and greyish white below. Broad, shovel-shaped bill is diagnostic.

Winter visitor. More or less common all over India in well- watered tracts.

Extralimital : Breeds in the Holarctic Region, wintering in the temperate and tropical zones.

More or less common in all types of inland water in Gujarat.

Ali collected one specimen in Kharaghoda. Common and abundant. Also amongst the last ducks to leave, seen till 24th April (Ali).

Lester records 20 on a tank in Kutch as late as May 6 (1897- JBNHS 11 : 168).

Z.S.I. party noted 2-3 birds in Nalsarobar (Gandhinagar dist.) in October' 1993 and 10-15 birds in Khijidia Bird Sanctuary (Jamnagar dist.) in early november, 1993.

58. Redcrested Pochard : *Netta rufina* (Pallas)

(*Anas rufina* Pallas, 1773, Reise, Russ. Reichs, 2 : 713 (Caspian Sea); Baker, FBI No. 2278, Vol. 6 : 448; Ali & Ripley, HB No. 107, Vol. : 177).

Local names : Hindi Nat chonch

Gujarati Ratubari

Size : Same as earlier race.

Size similar to domestic duck (21 in.), light brown birds white wing patch and below black. Head and silky moplike crest chestnut and golden orange, with bright crimson bill are diagnostic (Male-breeding).

Winter visitor. Common in NW India decreasingly so eastward, south to about the 20th parallel. Less common in the Peninsula.

Extralimital : Winter visitor to Pakistan (W), Nepal Valley, Burma, Shan state to China. Breeds to Europe, Holland, Siberia.

"Noted in Gujarat at Patan (Mehsana dist.). Only a couple, so presumably an uncommon winter visitor. Butler (S.F., iv : 30 - 1876) writes of it as not very common in northern Gujarat, but occurring on most large tanks" (Ali).

Z.S.I. party during October - November, 1993 not met with any bird in Gujarat.

59. Common Pochard : *Aythya ferina*  
(Linnaeus)

(*Anas ferina* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 126 (Sweden); Baker, FBI No. 2279, Vol. 6 : 450; Ali & Ripley, HB No. 108, Vol. 1 : 180).

Local names : Hindi-Burur nar, Lalsir

Gujarati Tarandio, Dhusanda

Size : Domestic duck. Length c. (18-19 in.).

Smaller than domestic duck (18.5 in), a black bird with greyish white below and head and neck chestnut (male-breeding); Male in eclipse duller; Female overall brown to rufous brown with a pale blue subterminal band on bill.

Winter visitor, rather common in NW India, and across, More sparsely to Assam, Manipur, decreasingly southward in the Peninsula.

Extralimital : A palaeartic breeding sp., wintering in S. Europe, Africa and S. Asia.

"Seen in small numbers in Kutch and Gujarat. Fairly common" (Ali);

Z.S.I. party noted 3-4 birds in Khijidia Bird Sanctuary (Jamnagar dist.) during November, 1993.

60. White-eyed Pochard : *Aythya nyroca*  
(Guldenstadt)

(*Anas nyroca* Guldenstadt, 1770, Nov; Comm. Sci. Petropol., 14 : 403 (S. Russia); Baker FBI No. 2280, Vol. 6 : 453; Ali & Ripley, HB No. 109, Vol. 1 : 182).

Local names : Hindi-Kurchiya, Burar mada Gujarati-Tamni

Size:- Domestic duck. Length c. (16 in.).

Smaller than domestic duck (16 in); A rich rufous brown bird with a large oval patch on belly (Male-breeding), male in eclipse and female duller in colouration.

Breeds in Ladakh (Kashmir), winter visitor in the plains of entire Indian Union, less common or sparse in the Peninsula.

Extralimital : Breeds in Palaeartic Region, wintering in Southern Europe, N. Africa, and W. Asia.

"Specimen shot. Winter visitor; common" (Ali).

Z.S.I. party not met with this bird during Oct.-Nov., 1993.

61. Tufted Duck : *Aythya fuligula*. (Linnaeus)

(*Anas fuligula* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 128 (Sweden); Baker, FBI No. 2283, Vol. 6 : 458; Ali & Ripley, HB No. 111, Vol. 1 : 185)

Local names : Hindi Ablak, Rahwara

Gujarati Kalwelio

Size : Same as earlier race.

Size domestic duck (17 in.), black head, neck breast, back tail and vent, rest white with a occipital tuft (Male-breeding). Male in eclipse duller, Female dark brown and tuft rudimentary.

Winter visitor. Common in N. India and east to Assam and Manipur, south to about the 20th parallel. (M.P., & Orissa) gradually sparse in the Peninsula.

Extralimital : Palaeartic breeding species wintering in Southern Europe and Asia.

Sparsely seen in Gujarat during winter.

"Specimen shot. Winter visitor; Fairly common, but its abundant varying from year to year" - (Ali).

Z.S.I. party not met with this bird in Gujarat during Oct.-Nov., 1993.

62. Scaup Duck : *Aythya m. marila*  
(Linnaeus)

(*Anas marila* Linnaeus, 1761, Fn. Svec., ed. 2 : 39 (Lapland); Baker, FBI No. 2282, Vol. 6 : 456, Ali & Ripley, HB No. 112, Vol. 1 : 187).

Local names : same as earlier race.

Size like domestic duck (18 in), similar to Tufted Duck but lacking occipital tuft (Male-breeding), male in eclipse like female but lacking pure white facial band, female dark brown with white band at forehead.

Rare vagrant in winter. Has recorded from Kashmir, Kutch, Punjab, Delhi, U.P., Bihar (Monghyr), W. Bengal (Calcutta), Assam, Manipur, Gujarat (Bhavnagar), Maharashtra of our Indian limit but not beyond of 19°N lat.

Extralimital : Winters in Pakistan, Bangladesh and W. Europe, Black Sea, Persian Gulf. Breeds in N. Europe and Asia.

"A rare vagrant. One shot by Dharmakumarsinhji near Bhavnagar (Saurashtra) on 22nd February, 1935 (JBNHS, 38 : 195)" -(Ali).

63. Cotton Teal or Quacky-duck : *Nettapus c. coromandelianus* (Gmelin).

(*Anas coromandelianus* Gmelin, 1789, Syst. Nat., 1 (2) : 522 (Coromandel, India); Baker, FBI No. 2250, Vol. 6 : 392; Ali & Ripley, HB No. 114, Vol. 1 : 190).

Local names : Hindi Girri, Girja

Smallest duck (13 in.) in Indian limit, blackish brown bird with purple green gloss on the back, face, neck and underpart dirty white (Male-breeding); male in eclipse and female much duller and less white in plumage.

Resident. Abundantly found in the entire Indian Union including islands in all types of water sources.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Burma, East to S. China to Malay and NW East Indies.

Ali, collected and noted from different part of Gujarat. 2 female examples from Bhimesar Tank (Anjar dist.) collected by Fatehsinhji & Sir G. Archer.

Ali, noted it from Harni (Baroda environs), Sairat (Kaira dist.) and also from Bhuj (Kutch-H.A.).

Hume (S.F., iv, 27) noted it from Kathiawar region, resident in small numbers. Breeds July to September.

Z.S.I. party noted elsewhere, viz., Nalsarobar. (Gandhinagar dist.); Sasan Gir (Amreli dist.), Khijidia Bird Sanctuary (Jamnagar dist.) etc., in fairly good numbers during Oct.-Nov., 1993.

64. Nakhta or Comb Duck : *Sarkidiornis m. melanotos* (Pennant)

(*Anas melanotos* Pennant, 1769, Ind. Zool. : 12, pl. 11 (Ceylon); Baker, FBI No. 2247, Vol. 6 : 385; Ali & Ripley, HB No. 115, Vol. 1 : 192).

Local name : Hindi Nakta

Larger than domestic duck (30 in), similarly colour pattern with cotton teal with fleshy knob or comb on the base of the bill, becoming greatly swollen in breeding season (Male); female is like male but duller and with out comb.

Resident and local migratory due to water condition. Practically sparsely found all over India, more common in the northern part and east to Assam, gradually decreases in the Peninsula.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Burma, S. China, as far as Africa.

Sparsely found in Gujarat.

Ali, noted from Mandavi (Kutch) and Bhuj environs; Pariej (Kaira dist.), Vaghjipur (Mehsana dist.) and Champaner (Dodhra dist.)

"According to Hume (S.F., iv : 27) 'common in Kathiawar' Lester recorded it breeding in Kutch during the rain in holes in cliffs" -(Ali).

65. Smew : *Mergus albellus* Linnaeus

(*Mergus albellus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 129 (Mediterranean Sea near Smyrna); Baker, FBI No. 2286, Vol. 6 : 416, Ali & Ripley, HB No. 119, Vol. 1 : 201).

Local name : Hindi Nikenne

Size like domestic duck (18 in), predominantly white, with a large black patch on face, a black band behind eye and drooping nuchal crest. Black back and white breast (Male-breeding), Male in eclipse and female forehead crown, nape and short nuchal crest chestnut, breast greyish brown and under part white.

Uncommon and sparse winter visitor. Recorded from Punjab, Delhi, NE Assam, N. Gujarat, Bihar (Hazaribagh), Orissa (Cuttack), W. Bengal (Raniganj).

Extralimital : Pakistan, China, Japan, Great Britain, Breeds in Europe and Asia.

"Butler (S.F., iv : 31-1876) saw it occasionally on some tanks in northern Gujarat. He described it as very uncommon and excessively shy. It has not been recorded from Kutch or Saurashtra".-(Ali).

#### Hawks, Vultures, etc : *Accipitridae*

A widespread and diverse group of some 217 species of diurnal birds of prey with a worldwide distribution, 83 species inhabit forest interior edge, scrub, and open grassland, from sea level to alpine grasslands of the Indian sub-region of which thirty seven are found in the state of Gujarat. Some are resident and others seasonal migrant depending upon habit and habitats. Plumages are largely brown, black and grey with some white and chestnut. Bill short with upper mandible longer than lower, curved and strongly hooked at tip. Feet strong, furnished with powerful hooked claws. Hallux present. Sexes more or less alike but female usually larger. Eagles and Hawks are very indistinguishable in the field due to polymorphism. These are perhaps largest polymorphic group with several species having black phase/brown phase or sometimes all white phase. They can be better identified far more easily by their flight silhouettes or by their motions than by their colour patterns.

#### Order FALCONIFORMES

#### Family ACCIPITRIDAE

#### Key to the genera of the family ACCIPITRIDAE

1. Head and neck bare .....*Gyps*

- Head and neck feathered .....2
2. Upper mandible with two sharply pointed conical "teeth"..... *Aviceda*  
Upper mandible without teeth .....3
3. Lores feathered .....*Pernis*  
Lores unfeathered.....4
4. Tarsus long, two or more times length of bill from tip to gape .....5  
Tarsus short, less than two times length of bill from tip to gape .....7
5. Feathers across throat and each side of neck forming conspicuous ruff .....*Circus*
6. Nuchal crest absent or pointed Nuchal Crest broad covering whole nape .....*Spilornis*
7. Front of tarsus covered with small hexagonal scales .....8  
Front of tarsus scutellate .....9
8. Size small, second primary longest .....*Elanus*  
Size larger, third and fourth primary longest .....*Pandion*
9. Tail forked .....*Milvus*  
Tail not forked .....10
10. Third primary longest .....*Haliaeetus*  
Fourth primary longest .....*Haliastur*

Flight behaviour : Eagle : Soar with the tips of the flight feathers spread like the fingers of an open hand.

Goshawk : Flap the wings quickly a number of times.

Heron : Holds the wings above the horizontal producing a V-shaped flight silhouette

Osprey : Fly like a large gull.

This group (size) ranges from 25 to 100 cm., and all are predaceous or scavengers, taking birds, mammals, fishes and carrion. Hawks and Eagles except those of Himalayan species are normally found soaring in the city and suburb near slaughter House, Fish markets etc.

Vultures differ from others of this group in having head and neck bare except lammergeier.

Tursus completely feathered in front and behind in case of Black Eagle and Hawk Eagles and Tursus naked or partially feathered for the rest.

Hawks and Eagles normally soar singly or perch on the tree top singly, occasionally remain in group of 2-3.

Vulture are always soaring in a groups of 10-50 nos., and also scavenging on the caracases in groups.

66. Blackwinged Kite : *Elanus caeruleus vociferus* (Latham)

(*Falco vociferus* Latham, 1790, Index Orn., 1 ; 46 (India); Baker, FBI No. 1789, Vol. 5 : 125; Ali & Ripley, HB No. 124, Vol. 1 : 212).

Local name : Hindi Kapassi

Size, House crow (13 in), small dainty ashy grey and white bird, black shoulder patch and a black line from lores to eyes is diagnostic. Sexes alike.

Resident, widely distributed in the entire Indian Union. Affects deciduous biotope and edges of the forest. [(Ali), collected specimens from Ajwa (Baroda dist.), Sairat (Kaira dist.), Vaghjipur (Mehsan dist.), Radhanpur.]

Ali, also noted it from Mandvi, Jakhan, Bhuj environs, Bela Islands (Great Rann), Anjar, Gagodar (all in Kutch), Ghatwad (Kodinar dist.), Kharaghoda, Galkund (Surat Dangs).

"Fairly common, but sparse and local. Affects dry scrub and grass country in open cultivation and waste land" -(Ali).

Z.S.I. party noted one specimen in the Lion Safari Park, Sansan Gir (Amreli dist.), Nov. 1993.

67. Crested Honey Buzzard : *Pernis ptilorhynchus ruficollis* Lesson.

(*Pernis ruficollis* Lesson, 1830, Traite d'Orn., Livr. 1 : 77 (Bengal); Baker, FBI No. 1819, Vol. 5 : 167; Ali & Ripley, HB No. 130, Vol. 1 : 222).

Local names : Hindi Shahutela, Madkare  
Larger than jungle Crow (27 in.), highly

polymorphic, greyish brown to dark brown above and below duller narrowly cross-banded with white. A short black nuchal crest.

Resident, with local migration depending on food. Normally observed in forest biotope and large agricultural firm. It is distributed in the entire Indian Union.

Extralimital : Pakistan, Sri Lanka, Bangladesh, east to Tonkin and Laos.

Ali, collected 8 examples from Kutch, Bhuj, Radhanpur, and Deesa (Palanpur) and also noted from Mahal (Surat Dangs).

Due to high degree of polymorphism, this race is hardly distinguishable from allied races. For further details about this bird collected from Gujarat observation of (Ali), may be noted.

68. European or Red Kite : *Milvus m. milvus* (Linnaeus)

(*Falco milvus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 89 (S. Sweden); Ali & Ripley, HB No. 131, Vol. 1 : 225).

Local name : As in Pariah Kite.

Size similar to Pariah Kite (24 in), Differs from Pariah kite is being rusty brown overall and bright rufous deeply forked tail is diagnostic. Sexes alike.

The status of this bird is uncertain, Vagrant and very irregular winter visitor to Indian limit.

Extralimital : Breeds in England, Scandanevia, east to Russia, South to NW Africa, Asia Minor and Palestine.

Over 50 of these birds noted at Pung Bet, Little Rann of Kutch, c. 23°N, 70°E, March 1945 (Ali); further noted by Shibraj Kumar of Jasdan, Gujarat, in March, 1984 (JBNHS 61(2) : 446).

This bird so far recorded twice from Gujarat and once from Chilka Lake, Orissa, January' 1963 (JBNHS, 62 : 301) from Indian limit.

69. Black Kite : *Milvus m. migrans* (Boddaert)

(*Falco migrans* Boddaert, 1783, Table Pl. enlum : 28 (France); Baker, FBI No. 1786, Vol.

5 : 121; Ali & Ripley, HB No. 132, Vol. 1 : 226).

Local name : Hindi Cheel

Size like Pariah Kite (24 in), differs from Pariah Kite in having head and neck whitish instead of fulvous brown with black shaft streaks. Sexes alike.

Resident (Breeding) in W. Pakistan and probably wintering further in southern region and also lower elevation and may winter as far as in Kutch, Gujarat in the Indian limit.

Extralimital : As in earlier race and also breeds in the Palaearctic Region.

No authentic record so far from Gujarat.

70. Pariah Kite : *Milvus migrans govinda*  
Sykes

(*Milvus Govinda* Sykes, 1832, Proc. Zool. Soc. Lond. : 81 (Dukhun); Baker, FBI No. 1787, Vol. 5 : 122, Ali & Ripley, HB No. 133, Vol. 1 : 227).

Local names : As in earlier race.

Size (24 in), dark fulvous-brown hawk distinguishable from all birds of prey by its deeply forked tail. Sexes alike.

Resident, Very common in the entire Indian Union, chiefly found in urban localities near slaughter house or fish market, also near any type of inland water preferably nearby village.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Burma, Malaysia (Occasional).

(Ali), collected specimens from Bodeli (Baroda dist.) Deesa (Palanpur) and Kharaghoda, Gujarat.

Z.S.I. party noted it from Nalsarobar (Gandhinagar dist.), Verabal, Dwarka and Okha in Nov., 1993.

71. Blackeared or large Indian Kite : *Milvus*  
(*migrans*) *lineatus* (Gray)

(*Haliaetus lineatus* J.E. Gray, 1831, Ind. Zool., 1 (8) : 1 Pl. 18 (China); Baker FBI No. 1788, Vol. 5 : 124; Ali & Ripley, HB No. 134, Vol. 1 : 229).

Local names : Same as earlier race.

Size slightly larger than Pariah Kite (26 in.), plumage like that of Pariah Kite but differ

in having a conspicuous white buzzard-like underwing patch and underpart without rufous tinge. Sexes alike.

Breeds in Ladakh and also possibly throughout the Himalayas and wintering in the plains of the Indian Subregion and extended to about 18°N through Peninsular India.

Extralimital : Pakistan, Nepal (Biswas), also breeds in N. Siberia, east to Japan, Turkastan, N. China. Winters in Burma, Indo-china, Hainan.

No authentic record so far from Gujarat but possibly overlooked as it may occur in Gujarat as straggler or passage migrant in the sub-mountain/hilly terrain intersepted by human inhabitation.

72. Brahminy Lite : *Haliastur i. indus*  
(Boddaert)

(*Falco indus* Boddaert, 1783, Table pl. enlum : 25 (pondicherry); Baker, FBI No. 1784, Vol. 5 : 118; Ali & Ripley, HB No. 135, Vol. 1 : 230)

Local name : Hindi sankacheel

Size, smaller than Pariah Kite (19 in), plumage rusty red with head, neck upper back and breast white, abdomen brown, wings tipped with black. Sexes alike.

Resident, with seasonal migration depending on habitats. It ranges in the entire Indian Union including Andaman Is.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Burma east to S. China, south to Tenasserim, N. Thailand, Central Vietnam.

Ali collected specimen from Dabka (Baroda dist.), and also noted from Kutch, Bhuj, Ajwa, Bodeli (Baroda dist.),

Balaram (Palanpur), Dediapada (Rajpipla), Mahal (Surat Dangs) etc.

Z.S.I. party noted this bird from Nalsarobar (Gandhinagar dist.), Khijidia Bird Sanctuary (Jamnagar dist.), Okha in Nov. 1993.

73. Eastern Goshawk : *Accipiter gentilis*  
*schvedowi* (Menzbier)

(*Astur palumbarius schvedowi* Menzbier, 1882, Orn. Geogr. Eur. Russl. 439

(Transbaikalia); Baker, FBI No. 1801, Vol. 5 : 146, Ali & Ripley, HB No. 136, vol. 1 : 233).

Local names : Hindi : Jarra, Baaz,

Size similar to Pariah Kite, dark gray above with darker head and nape, below white cross barred with black extending upto tail. During flight, the cross barred body, rounded wings and longish fan tail with 3/4 black bands are diagnostic. Sexes alike.

Breeds in the N.W. Himalayas, otherwise a sparse winter visitor to N. India and the lower Himalayas, from Kashmir to Sikkim and Assam, Vagrant in Gujarat (Saurashtra).

Extralimital : Pakistan (Vagrant), Central Asia, South to the Tien Shan and Altai mountain and the Amur river.

Ali did not listed this bird in the 'Birds of Gujarat'

Z.S.I. party not met with this bird during their survey in 1993.

#### 74. Indian Shikra : *Accipiter badius dussumieri* (Temminck)

(*Falco dussumieri* Temminck, 1824, pl. Col. Livr. 52, text to pl. 308 (Bengal); Baker, FBI No. 1803, Vol 5 : 149; Ali & Ripley, HB No. 138, Vol. 1 : 235).

Local names : As in earlier race.

Ashy blue-gray above and below white barred with rusty brown. A diagnostic median grey stripe on throat. Sexes alike.

Resident, All India excepting Kerala and Assam in wooded biotope and village environment.

Extralimital : Pakistan, Nepal.

Ali collected as much as 16 examples from several parts of Gujarat, and according to him the commonest of the smaller hawks.

Lester reported to breed in Kutch during March/April.

Z.S.I. party noted it from Sasan Gir (Amreli dist.) and Jamnagar Municipality area during Oct.-Nov. 93.

#### 75. Asiatic Sparrow-Hawk : *Accipiter nisus nisosimilis* (Tickell)

(*Falco nisosimilis* Tickell, 1833, Jour. Asiat. Soc. Bengal, 2 : 571 (Marcha, Borabhum, India); Baker, FBI No. 1811, Vol. 5 : 156; Ali & Ripley, HB No. 147, Vol. 1 : 243).

Local names : Hindi-Basha (Female), Bashin (Male)

Size, like House Krow (12-14 in.), very similar to Indian Shikara but differs from it being short wings, blackish head, white supercilium and without black mesial line. Sexes alike.

Sparse winter visitor to the Indian limit from Kashmir to Kerala, sporadically found in well wooded biotope and edges of the forest in Gujarat.

Extralimital : Pakistan, Nepal, Bangladesh, Burma and S. China, Breeds in N. and C. Asia.

(Ali), collected 3 examples from Cambay town environs, Dediapada (Rajpipla) and Galkund (Surat Dangs), Gujarat.

Butler (S.F., iii : 445) found it sparingly in the plains and hills of N. Gujarat.

Stoliczka collected one specimen in Kutch.

Hume reported it is very rare in Kathiawar.

#### 76. Besra sparrow-Hawk : *Accipiter vigrgatus* sp? (Temminck).

(Baker, FBI Vol. 5 : 159-161 Ali & Ripley, Vol. 1 : 246-249)

Size smaller than house crow (11-13 in.), a medium sized short-winged shikara like hawk easily confused with both Indian sikara and sparrow Hawk but a bold black masial stripe on throat diagnostic. Sexes alike.

Altogether three species are found in the Indian limit, the West Himalayan, the East Himalayan and Southern. The first two are resident in West and East Himalayas respectively whereas the Southern is resident in Ceylon.

Ali & Riply (HB) recorded southern species once in Gujarat (Saurashtra).

Hume mentions that Stoliczka obtained a couple of young birds in Kutch (S.F., iii : 445-1875).

77. Longlegged Buzzard : *Buteo r. rufinus*  
(Cretzschmar)

(*Falco rufinus* Cretzschmar, 1826, in Ruppell's Atlas Vog. 40, pl. 27 (Upper Nubia, Schendi and Sennar, and Ethiopia) Baker, FBI No. 1796, Vol. 5 : 137; Ali & Ripley, HB No. 153, Vol. 1 : 252)

Local name : Hindi Chuhamar

Size, like Pariah Kite (24 in.), apparently looks like immature Brahminy Kite, highly polymorphic, ranging brown through fulvous, rusty and pale sandy plumage with paler or white head, neck and breast. During flight, "Sprayed finger" wings, creamy rufous tail with obsolete brown bars and unfeathered legs are suggestive for buzzard but species to species identification in the field is impossible.

Breeds in Ladakh (?), Kashmir and Garhwal, between c. 1500 and 3700mt. Winters in the Eastern Himalayas east to Assam (Lakhimpur dist.), south to the Deccan and possibly further in our Indian limit.

Extralimital : Asia and south to N. Africa.

Ali did not procure any specimen, but noted in Kutch : Anjar ; Thoriari (Wagad dist.), and reported, "A sparse winter visitor to Kutch, much commoner in some years than in others"

"Butler (S.F., iii : 447) says it arrives in Northern Gujarat about 12th September, and is not very common"

78. White-eyed Buzzard-Eagle : *Batastur teesa* (Franklin)

(*Circus teesa* Franklin, 1832 (1831), Proc. Zool. Soc. Lond., pt. 1 : 115 (Further India = Ganges)

Baker, FBI No. 1774, Vol. 5 : 104; Ali & Ripley, HB No. 157, Vol. 1 : 257)

Local name : Hindi -Tisa

Size. Jungle Crow, (17 in), above greyish

brown with white throat, below brown and whitish, more rufous on tail. A dark brown central nasal line together with two cheek-stripe on the either side are diagnostic.

Resident, normally from the Himalayas (c. 1200 mt.) down to the plains of entire Indian limit preferably in dry deciduous forest and nearby cultivated field on the edges of the forest, sluggish, practically keeps single.

Extralimital : Pakistan, Nepal, Bangladesh, Burma, South to Tenassarim.

Ali collected specimens from Ajwa, Bodeli, Dabka (all Baroda dist.), Golana (Cambay), Nadiad (Kaira dist.), Patan (Mehsana), Pandwa (Surat Dangs) and also noted from Mandvi (Kutch), Jakhan (Bhuj), Phari (Amreli dist.), Kodinar, Ghatwad & Dalkhanja (Saurashtra).

According to Ali this is commonest hawk in Gujarat. Affects dry, open, cultivated and sparse scrub and bush country.

Z.S.I. party noted it from the Gir National Park, Sasan Gir., in Nov.'93.

79. Indian Crested Hawk-Eagle : *Spizaetus c. cirrhatus* (Gmelin)

(*Falco cirrhatus* Gmelin, 1788, Syst. Nat., 1 (1) : 275 (Ceylon), Baker, FBI No. 1756, Vol. 5 : 85; Ali & Ripley, HB No. 161, Vol. 1 : 262).

Local name : Hindi-Shah baz.

Gujarati- Mor baaz.

Size kite + (29 in), brown above and white below, black longitudinal streaks on throat and broad chocolate streaks on breast. Long black crest and feathered legs, are diagnostic. Sexes alike.

Resident, Predominantly in well wooded parts of Southern Peninsula but its northern limit down from Mt. Abu (Rajasthan) through Bihar to Calcutta (Hume, S.F., 3 : 446)

Extralimital : Sri Lanka, Burma, SE Thailand (Straggler).

Ali collected specimens from Juna Rajpipla and Didiapada (Rajpipla) and also noted from Galkund (Surat Dangs).

Ali further noted that this bird not

uncommon in forested country. Usually solos perched on branches, hidden in the canopy foliage of tall trees.

80. Bonelli's or Slender Hawk-Eagle :  
*Hieraetus f. fasciatus* (Vieillot)

(*Aquila fasciata* Vieillot, 1822, Mem. Soc. Linn. Paris 2 (2) : 152 (Montpellier, France. Baker, FBI No. 1752, Vol. 5 : 77, Ali & Ripley, HB No. 163, Vol. 1 : 266)

Local name : Hindi-Morangi

Size, larger than kite (27-29 in), relatively slender than other eagles with much longer tail and uncrested head, above dark umber brown and rufous to whitish under parts heavily streaked with black. Broad black subterminal band on tail is diagnostic. Sexes alike.

Resident, sparsely found in well wooded country, hilly terrain of Indian limit ranging c. 2400m in the Himalayas south to Kanyakumari.

Extralimital : Pakistan, Nepal, Sri Lanka (Vagrant), Bangladesh, S. Europe to N. Africa. China.

Ali collected specimens from Kutch, Bhuj, Patan (Mehsana dist.), Deesa (Palanpur) and Dabka (Baroda dist.) and also noted from Chaduva (Bhuj) and Vaghjipur (Mehsana), Gujarat.

Ali also noted a pair breeding on the topmost ramparts of Bhujia Fort (Kutch).

Ali also noted, "Kirke Swann ('A Monograph of the Birds of Prey, Part xi : 73) recognises a large Indian breeding race, *H.f. grandis* (Hodgson)"

81. Booted Hawk-Eagle : *Hieraetus pennatus* (Gmelin)

(*Falco pennatus* Gmelin, 1788, Syst. Nat., 1 (1) : 272 (no type locality); Baker, FBI No. 1753, Vol. 5 : 79, Ali & Ripley, HB No. 164, Vol. 1 : 268).

Local names : Hindi-Baghati, Gileri mar

Size, smaller than kite (20-22 in.), superficially a smaller edition of Bonelli's Hawk Eagle with two distinctive colour phase. Hard to distinguish in the field. Identification is strictly on skin in hand.

Partly resident, chiefly winter visitor to the entire Indian Union.

Extralimital : S. Asia, S. Europe, N. Africa.

Fairly common in Gujarat, affects well-wooded biotope and hilly semiarid zone.

Ali collected specimens from Patan (Mehsana dist.) and Radhanpur and also noted Cambay town and Deesa (Palanpur).

One specimen collected by Maharao in 1896 and two more by Sir Geoffery Archer in 1939/40 in Kutch, Gujarat.

Ali collected specimens from Pung Bet (Little Rann.) and Pariej (Kaira dist.) and Ali further noted several large eagles sparse dotted about on the bare ground in the Little Rann but not definitely identified.

Z.S.I. party noted one large eagle, probably this species on the way to Okha from Dwarka in Nov. '1993.

82. Twany Eagle : *Aquila rapax vindhiana* Franklin.

(*Aquila vindhiana* Franklin, 1831, Proc. Zool. Soc. Lond. Pt. 1 : 114 (Vindhya Hills, Central India); Baker, FBI No. 1749, Vol. 5 : 72 ; Ali & Ripley, HB No. 168, Vol. 1 : 276).

Local names : Hindi-Okaab, Ragar

Gujarati-Deshi Jummas.

Size, slightly larger than Pariah Kite (25-28 in.), highly polymorphic ranging from dirty buff to brownish black, rounded tail and feathered legs down to toes, long wing reaching upto tail tips, but indistinguishable from other relatives in the field. Sexes alike.

Resident. Widely distributed eagles in semi-arid and dry deciduous biotope of the entire Indian Union. Normally perched singly on tree top or sometimes soaring in association with vulture.

Extralimital : Pakistan, Nepal (terai), Bangladesh, NC. Burma.

Ali collected specimens from Dalkhania (Amreli dist.), Dabka (Baroda dist.), Cambay town, Vaghjipur (Mehsana dist.), Radhanpur, Dedipada (Rajpipla) and Galkund (Surat Dangs), Gujarat.

Ali further noted, "A common resident

species over the entire area. Breeding was in progress between November and March"

83. Eastern Steppe Eagle : *Aquila rapax nipalensis* Hodgson.

(*Aquila nipalensis* Hodgson 1833, Asiat. Res. 18 (2) : 13, Pl. 1 (Nepal); Baker, FBI No. 1748, Vol. 5 : 70, Ali & Ripley, HB No. 169, Vol. 1 : 278).

Local names : Hindi-Jumis

Size, larger than Pariah Kite (30-32 in.), plumage similar to Twany Eagle as well as polymorphism, indistinguishable from the earlier race in the field. Two diagnostic pale bars on upper as well as underside of wings formed by whitish tips of secondaries and coverts. Sexes alike.

Winter visitor, From N. India, wandering south upto c. 22°N. Lat, in semi-desert and dry-deciduous forest.

Extralimital : Pakistan, Nepal, Bangladesh (?), S. China (Winter). Breeds in Altai to Mongolia to SE Siberia.

Ali collected specimens from Pung Bet (Little Rann), Gujarat and elsewhere noted but not definitely identified.

Ali further noted that Twany Eagle and Eastern-Steppe Eagle have much points of similarity rather than dissimilarity so far plumages and measurements are concerned, and concluded, as "I can see no overwhelming reason for not considering *rapax* and *nipalensis* as conspecific"

84. Greater spotted Eagle : *Aquila clanga* Pallas

(*Aquila Clanga* Pallas, 1811, Zoogr. Rosso-Asiat., 1 : 351 (Russia and Siberia); Baker, FBI No. 1750, Vol. 5 : 74; Ali & Ripley, Hb No. 170, Vol. 1 : 279).

Local names : Hindi Kaljanga

Size, same as kite (25-28 in), a dark blackish brown bird throughout, underside paler, head whitish.

Resident and breeding in N. India. Usually ranges from N. India, east to Manipur and south

to about 22°N lat., wandering to the Peninsula in winter. Prefers jheels, marshes and perched singly on tree top.

Extralimital : Pakistan, Bangladesh, S. China, as far as N.E. Africa (winter). Breeds Europe and Russia upto Siberia, Amurland.

Ali collected specimen from Pareij (Kaira dist.) and Hathidhara (Palanpur). (Ali) further collected specimen (Palanpur) had enlarged ovaries and breeding evidence in this region.

Z.S.I. party noted two birds on two occasion in the vicinity of Nalsarobar (Gandhinagar dist.), Gujarat, Oct, 1993.

85. Lesser Spotted Eagle : *Aquila pomarina hastata* (Lesson)

(*Morphnus hastata* Lesson, 1834, in Belanger, Voy. Ind. Orient., Zool. : 217 (Bengal); Baker, FBI No. 1751, Vol. 5 : 75; Ali & Ripley, HB No. 171, Vol. 1 : 281).

Size, like kite (24-26 in), slightly smaller than Greater Spotted Eagle but indistinguishable in the field, upper tail coverts dingy white is diagnostic as pure white in the earlier race. Sexes alike.

Resident, but thinly distributed in the entire Indian Union, south upto Tamil Nadu.

Rare resident in saurashtra, Gujarat (H.B.); This bird mainly prefers wooded country. edges of the forest and cultivation contra the Greater spotted Eagle is restricted to jheels and marshes.

Ali did not collect and mention this bird in the 'Birds of Gujarat'

86. Black Eagle : *Ictinaetus malayensis perniger* (Hodgson)

(*Aquila Pernigra* Hodgson, 1836, Jour. Asiat. Soc. Bengal, 5 : 227 (Nepal); Baker, FBI No. 1755, Vol. 5 : 83, Ali & Ripley, HB No. 172, Vol. 1 : 283).

Size, like kite (27-32 in.), plumage entirely black with long wings reaching to the tip of the tail at rest. Bright yellow cere and feathered legs in front and behind are diagnostic. Sexes alike.

Resident. Widely but patchily distributed in evergreen and moist deciduous forest biotope, ranging from c. 2700 m. in the Himalayas through H.P., east to Assam and sporadically south to Kanyakumari of the Indian limit.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Burma, Thailand, Malay Peninsula.

Ali noted, "Definitely observed only once—a single bird beating over mixed deciduous forest at Jamughoda (Gujarat), 11-11-1945"

87. White-tailed Sea Eagle : *Haliaeetus albicilla* (Linnaeus)

(*Falco albicilla* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 89 (Sweden); Baker, FBI No. 1777, Vol. 5 : 110; Ali & Ripley, HB No. 172a, Vol. 1 : 286).

Size, larger (27-34 in.), "Huge dark brown eagle with whitish head, neck and upper breast and shortish distinctive white wedge-shaped tail. Sexes alike" (H.B.).

Casual winter visitor in the Indian sub-region.

Specific record in H.P. (Kulu, Doland),

Rajasthan (Bharatpur, Duke) and in Kutch (Mundra, Himmatsinghji), Gujarat.

Extralimital : Pakistan, N. Africa, S. China, (Winter). Breeds in Greenland, Europe, Asia.

88. White-bellied sea Eagle : *Haliaeetus leucogaster* (Gmelin)

(*Falco leucogaster* Gmelin, 1788, Syst. Nat., 1 (1) : 257 (Prince's Island, Indonesia), Baker, FBI No. 1778, Vol. 5 : 111; Ali & Ripley, HB No. 173, Vol. 1 : 287).

Local name : Hindi- Kohasra

Size, larger than kite (26-28 in.), "ashy brown above with pure white head, neck, underparts, and terminal third of tail, Sexes alike" (H.B.).

Resident, seaboard and off shore Island from c. 19°N. West Peninsula (Bombay) south as far as Andaman and Nicobar group of Islands, in the Indian limit.

Extralimital : Coast of Burma, Malay Peninsula, and Archipelago east to Australia, Tasmania, W. Polynesia and E. Pakistan.

A rare vagrant in Gujarat.

"One recorded near Ahmedabad c. 80 km. in land from sea coast, and another at the mouth of Shatrunjri river, Saurashtra" (H.B.).

89. Ring-tailed or Pallas's Fishing Eagle : *Haliaeetus leucoryphus* (Pallas)

(*Aquila leucorypha* Pallas, 1771, Reise versch. Prov. Russ. Reichs, 1 : 454 (Lower Ural river); Baker, FBI No. 1779, Vol. 5 : 112, Ali & Ripley, HB No. 174, Vol. 1 : 289).

Local name : Hindi- Machharang

Size, large (c. 30-33 in), a dark brown bird with head and neck pale golden brown. Tail rounded with a white sub-terminal band is diagnostic.

Resident and also partially migratory, from the Himalayas down to 19°20'N lat. from Kashmir, H.P. through Gangetic plains, and east to Assam in the Indian limit.

Sparsely found in rivers, inland lakes and tidal creeks in Gujarat.

Extralimital : Pakistan, Nepal, Bangladesh, N. Burma, S. Russia to C. Asia and south to Persian Gulf.

Ali noted, "Occasional, so long were observed on the Mahi river at Golana (Cambay), and on the Banas River (Palanpur). According to Butler, Occurs springly throughout the plains in the well watered districts of northern Gujarat, to which Hume adds Kutch and Saurashtra as well"

90. Gre-headed Fishing Eagle : *Ichthyophaga ichthyaetus* (Horsfield)

(*Falco ichthyaetus* Horsfield, 1821, Trans. Linn. Soc. London, 13(1) : 136 (Java); Baker, FBI No. 1780, Vol. 5 : 114; Ali & Ripley, HB No. 175, Vol. 1 : 292).

Local name : Hindi- Madhuya

Size (29 in), above brown and duller below, head and neck grey, abdomen and tail white with a blackish terminal band. Sexes alike.

Resident, Widely though sparsely distributed from the Himalayan foothills (NW Delhi) east to Assam and sporadically south to Kerala of the Indian limit.

Extralimital : Bangladesh, Nepal, Burma, Malay Peninsula, Philippines, Greater Sunda Islands and Celebes.

Sparsely observed in well wooded and well watered parts of Gujarat. May be observed in well forested tract of Surat Dangs.

Ali noted at Balaram (Palanpur), a pair on a perennial rocky forest stream.

91. Black or king Vulture : *Sarcogyps calvus*  
(Scopoli)

(*Vultur calvus* Scopoli, 1786, Del. Faun. et. Flor, Insubr., 2 : 85 (Pondicherry); Baker, FBI No. 1706, Vol. 5 : 9, Ali & Ripley, HB No. 178, Vol. 1 : 296).

Local name : Hindi Rajgidh

Size, large (33 in), a huge black vulture. Deep yellowish red naked head and neck diagnostic. Sexes alike.

Extralimital : Pakistan, Nepal, Bangladesh, Burma, Thailand, Malay Peninsula, S. Vietnam.

Resident. Throughout the Indian Union.

Everywhere in Gujarat.

92. Cinereous Vulture : *Aegyptius monachus*  
(Linnaeus)

(*Vultur Monachus* Linnaeus, 1766, Syst. Nat., ed. 12, 1 : 122 (Arabia) Baker, FBI No. 1705, Vol. 5 : 7; Ali & Ripley, HB No. 179, Vol. 1 : 298).

Local names : Hindi-Kala gidh.

Size (40-42 in), black plumage with naked pinkish neck with blackish ruff. Crown, occiput, lora covered with black fur like feathers. Sexes alike.

Breeds in Lahul (H.P.) and N. Cachar (Assam) in Indian limit.

Rare and sparse winter visitor NW and N. India, Kutch, N. Gujarat and Central India, South to about 21°N lat. in Khandesh (M.P.).

Extralimital : Pakistan (Baluchistan, Gilgit breeding), Nepal, NE Tibet, E. China, South to N. Morocco, Asia Minor. Also breeds in Europe.

Rarely straggling in the semidesert country of Gujarat.

Ali noted, "An example was picked up dead by Mr. harinarayan Acharya near Ahmedabad on 25-12-1949 (JBNHS, 49 : 307".)

A.E. Butler recorded one from Gujarat in the winter of 1870 (S.F., iii : 441).

Ali further observed four birds *c. Sandher* (Radhanpur) of Little Rann on 3-1-1946.

93. Indian Griffon Vulture : *Gyps fulvus*  
*fulvescens* Hume

(*Gyps fulvescens* Hume, 1869, Rough Notes 1 ; 15, 19 (Punjab); Baker, FBI No. 1707, Vol. 5 : 11; Ali & Ripley, HB No. 180, 183, Vol. 1 : 301).

Size, (40-48 in), An enormous cinnamon-brown vulture with naked neck. Underparts duller. Prominent whitish ruff of lanceolate downy feathers at the base of the neck. Sexes alike.

Resident. Sparsely distributed in arid tract in N. India and N. Gujarat, straggling east to W. Assam, south to c. lat. 20°N. upto Bombay (Kurla).

Extralimital : Pakistan.

Sparsely found in semi-arid to arid region of Northern Gujarat.

Ali noted a few example (ssp?) in the Kutch area during 1943 to March 1944. Only Noted in Deesa (Palanpur).

94. Indian longbilled Vulture : *Gyps i.*  
*indicus* (Scopoli)

(*Vultur indicus* Scopoli, 1786, Del Faun. ed. Flor. Insubr., 2 : 85 (India); Baker, FBI No. 1710, Vol. 5 : 15, Ali & Ripley, HB No. 182, Vol. 1 : 304).

Local name : Hindi Gidh

Size (38 in), dark brown with scalloped plumage above. Head, neck patchily feathered. Underparts sandy with further paler shaft stripes. Sexes alike.

Resident, Rajasthan, Gujarat and Peninsular India south of the Gangetic Plain (HB). Not in extreme SW India.

(Ali), noted in Mandvi (Kutch), Ajwa & Dabka (Baroda dist.), Cambay, Vaghjipur (Mehsana), Deesa (Palanpur) and Songadh (Navsari dist.).

Z.S.I. party noted in Verabal and in Okha, Nov. 1993.

95. Indian Whitebacked Vulture : *Gyps bengalensis* (Gmelin)

(*Vultur bengalensis* Gmelin, 1789, Syst. Nat., 1 (1) : 245 (Bengal); Baker, FBI No. 1713, Vol. 5 : 19; Ali & Ripley, HB No. 185, Vol. 1 : 307).

Local name : Hindi- as in earlier race.

Size (c. 35 in), Heavy brownish black with naked scrawny neck and head sunk into shoulders at rest, whitish tuft round the base of neck.

Resident. Commonest vulture in the Indian limit. Practically all India.

Found everywhere in Gujarat.

96. Egyptian Vulture : *Neophron percnopterus* (Linnaeus)

(*Vultur percnopterus* (Sic) Linnaeus, 1758, Syst. nat., ed. 10, 1 : 87 (Egypt); Baker, FBI No. 1714, 5 : 22; Ali & Ripley, HB No. 186, Vol. 1 : 310)

Local name : Hindi Safed gidh

Size, medium (26 in), dirty white kite like vulture with naked head but without long scrawny neck, bill dark horny is diagnostic.

Resident, mainly at high altitude of the Himalayas, (c. 2500 mt) and NW India (Kashmir, Punjab, H.P.) straggling further down in the winter to U.P., H.P., and further west to Rajasthan and Gujarat (Kutch).

Extralimital : Pakistan, Arabia, Persia, Morocco, Egypt, Afghanistan, Turkestan, S. Russia to S. Europe.

Ali noted it fairly common in Gujarat. Nesting in Kutch in August.

97. Indian Scavenger Vulture : *Neophron percnopterus ginginianus* (Latham)

(*Vultur ginginianus* Latham, 1790, Index Orn., 1 : 7 (Gingee, Coromandel); Baker, FBI No. 1715, Vol. 5 : 23; Ali & Ripley, HB No. 187, Vol. 1 : 312).

Local name : same as earlier race.

Size, (24 in), similar to but smaller than Egyptian Vulture, and yellow bill is diagnostic.

Resident. All India (Except the portion of NW occupied by nominate *percnopterus* (H.B.)).

Extralimital : Same as earlier race.

Ali noted "Fairly common over the whole area. Nesting in Kutch during August"

Presence of both the races of *Neophron percnopterus* in Gujarat specially in the northern part is somewhat a point to be discussed. Both the races are indistinguishable in the field and also with the skin in hand due to overlapping colouration and measurements. Needs further clarification on the identify of the both the races either collected or observed in Gujarat.

98. Pale Harrier : *Circus macrourus* (S.G. Gmelin)

(*Falco macrourus* S.G. Gmelin, 1770, Reise d. Russl. th. 1 : 48 (Voronoezh, Southern Russia); Baker, FBI No. 1790, Vol. 5 : 129; Ali & Ripley, H.B. No. 190, Vol. 1 : 319).

Local names : Hindi Dastmal, Girgitmar

Size, small (18-20 in), pale ashy grey above, pure white below, with black tips to the long narrow pointed wings.

Winter visitor. Practically common in the entire Union from plains to c. 3000 mt. in the Himalayas in the hill side terai. semi-arid scrub and edges of the cultivation including Islands.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Burma (Winter). Breeds in Europe and Russia.

Ali collected specimens from Ratnal (between Bhuj & Kandla), Dodeli (Baroda dist.), Cambay town, Nadiad (Kaira dist.), Radhanpur (Rajpipla) and Pandwa (Surat Dangs).

Ali further noted common winter visitor in

Gujrat., Earliest seen 24th August (Mandvi, Kutch), latest 29th march (Rajpipla).

Butler (S.F., iii : 447) recorded in northern Gujarat (Deesa) about 2 August.

Z.S.I. party noted in Sasan Gir (Amreli Dist.) and in Dwarka in Nov. 1993.

99. Montagu's Harrier : *Circus pygargus*  
(Linnaeus).

(*Falco pygargus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 89 (Europe = England); Baker, FBI No. 1791, Vol. 5 : 130, Ali & Ripley, HB No. 191, Vol. 1 : 321).

Size, similar to Pale Harrier (18-19 in), plumage like the earlier race but darker ashy tinged with brown, throat and breast grey and rest white underparts stripes chestnut. Sexes alike.

winter visitor to entire Indian Union but less common than Pale Harrier and also affects identical biotope.

Extralimital : same as earlier race.

Ali neither collected nor identified any specimen in the field.

Lester ('Birds of Cutch' 2nd. ed.) considered it equally common with the Pale Harrier in Kutch during winter.

Z.S.I. party noted one specimen with brown on the vent in the surrounding salt pan of Khijidia Bird Sanctuary (Jamnagar dist.) during November '93, but not definitely identified as this species.

100. Marsh Harrier : *Circus a. aeruginosus*  
(Linnaeus)

(*Falco aeruginosus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 91 (Sweden); Baker, FBI No. 1794, Vol. 5 : 134; Ali & Ripley, HB No. 193, Vol. 1 : 324).

Local names : Hindi Kutar, Safed sira

Size, larger than Pale Harrier (21-23 in), a dark brown bird with more darker underparts, but paler on head, neck and breast. Tail and wing grey, latter tipped black, Sexes alike.

Winter visitor, predominantly remain in the marshes, inland water and inundated

cultivated field of the entire Indian Union including Islands upto the elevation of c. 2000 mt. in the Himalayas.

Extralimital : A palaeartic breeding sp., wintering to S. Asia, Africa, China and the Philippines.

Ali collected specimens from Kharaghoda, Gujarat and further noted from Kandla; Mandvi (Kutch); Mithapur (Okhamandal), Ajwa (Baroda dist.), Golana (Cambay), Vaghjipur (Mehsana dist.) Balaram (Palanpur) and Laochali (Surat Dangs).

Butler (S.F., iii : 448) noted it from Deesa (Palanpur).

Z.S.I. party noted it from the environs of Nalsarobar (Gandhinagar dist.) during Oct. '1993.

101. Short-toed Eagle : *Circaetus g. gallicus*  
(Gmelin)

(*Falco gallicus* Gmelin, 1788, Syst. Nat., 1 (1) : 259 (France); Baker, FBI No. 1764, Vol. 5 : 93; Ali & Ripley, HB No. 195, Vol. 1 : 327)

Local name : Hindi Saampmaar

Size, larger than kite. (25-27 in), a earthy brown bird with paler chin, throat and upper breast, rest of the under parts white, barred with brown. Tail banded, large greyish owl like head is diagnostic. Sexes alike.

Resident, Practically entire Indian Union barring Assam, upto the altitude of 2300mt. in the Himalayas (Dharamsala - Donald.). Affects deciduous scrub, semi arid to himalayan terai and edges of the cultivated field.

Extralimital : Pakistan, Nepal, and NE Africa (Winter). Breeds in c. Europe, N. Africa, Persia and N. China.

Ali collected specimens from Bodeli, Dabka (Baroda dist.), Vaghjipur (Mehsana dist.), Radhanpur, Deesa (palanpur), and further noted from Nakhtrana, Khari Rohar Nir (Pachham Island- Kutch), Mandi (Okha), Champaner, Golana (Cambay), Nadiad (Kaira dist.) Songadh (Navsari dist.), Gujarat.

Ali observed that this birds is fairly common in dry sand-dune and open country cultivation and sparse scrub, and dotted with babul trees, and further noted breeding between

November and February in Gujarat.

102. Lesser or Peninsular Crested Serpent  
Eagle :

*Spilornis cheela melanotis* (Jerdon)

(*Buteo melanotis* Jerdon, 1844, Madras Jour. Lit. Sci., 13 : 166 (Nilgiris); Baker, FBI No. 1766, Vol. 5 : 98, Ali & Ripley, HB No. 197, Vol. 1 : 331).

Local names : Hindi- Juxj baj, Dagra cheel  
Gujarati-Chotaliyo sapmar.

Size, large (29 in), a large brown bird with prominent nuchal crest, unfeathered yellow legs and a yellow patch at the base of the bill diagnostic. Paler underparts ocelated and barred with black and white. Sexes alike.

Resident, Peninsular India, from Gujarat eastward to Bengal, south upto the lat. 25°N. Affects mainly well-watered wooded plains.

Ali collected specimens from Balaram (Palanpur) and Dediapada (Rajpipla) and noted from Mahal and Laochali (Surat Dangs), Dalkania (Amreli dist.).

(DKS), collected it from Bhavnagar. (Barred breast, chin & throat black typical of *S.C. Cheela*). "This may either be a migrant from N. India or an aberrant throwback to the typical race as suggested by Whistler (Mysore survey, JBNHS, 44 : 21").

Z.S.I. party noted two birds *ca.* Kamleswar Dam area of Gir National park, during Nov. 1993.

Family : FALCONIDAE  
(FLACONS)

Some fifty-eight species of falcons show a world wide distribution. Twenty one species have been recorded from the Indian sub-region, five as breeding residents, two breeding and wintering and from remaining fourteen, nine are wintering and rest five are resident. Four have been recorded from Gujarat. All the falcons are generally brown, often stripes black or chestnut. Wings are pointed, tail narrow and flight swift. All Falconidae moult the primaries starting with the fourth (descending) whether they have pointed or rounded wings. This

distinguishes them from all Accipitridae.

Two genus, viz., *Microhierax* and *Falco* comprise the Indian falconidae, of which the former Genus is generally resident in the Himalayan Foot Hill and the Genus *Falco* is nearly cosmopolitan. The falcons are categorically distinguished by their stout and strongly toothed bill and very powerful strong decurved claw. All the falcons generally affect outskirts of the forest, open cultivation, terai, and semi-arid biotope.

103. Osprey : *Pandian h. haliaetus*  
(Linnaeus)

(*Falco Haliaetus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 91 (Sweden); Baker, FBI No. 1704, Vol. 5 : 3; Ali & Ripley, HB No. 203, Vol. 1 : 336)

Local name : Hindi Machhlimar

Size, (22 in), a water-frequenting fish-eating dark brown hawk. Upper parts streaking white with tufted head. Below white with a broad brown necklace like band on upper breast is diagnostic. Sexes alike.

Breeds in the Himalayas from west to east between c. 2000 mt. and 3300 mt. altitude and wintering sparsely through the Indian Union in well watered tracts including Islands.

Extralimital : A species of continental world-wide distribution in tropical, temperate and boreal latitudes.

Ali collected one specimen from Radhanpur and also noted from Ajwa (Baroda dist.); Golana, Cambay, and Vaghjipur (Mehsana dist.), Gujarat.

Z.S.I. party noted this bird on two occasions in the environs of Nalsarobar, (Gandhinagar dist)., during October, 1993.

104. Lanner Falcon : *Falco biarmicus jugger*  
J.E. Gray.

(*Falco Jugger* J.E. Gray, 1834, Ind. Zool. 2: pl. 26 (India); Baker, FBI No. 172, Vol. 5: 37; Ali & Ripley, HB No. 208, Vol. 1 : 344).

Local names : Hindi laggar (Female), Jaggar (Male)

Size, (17-18 in.), underparts dark to ashy brown with crown and nape whitish, below whitish with light brown drops. A distinct moustachial stipe running down in front and below eyes is diagnostic. Sexes alike.

Resident with partial local migration depending upon suitable biotope. Practically all India ranging from the Himalayan foothills (c. 1000 mt.) to the plains in dry open country and edges of the forest.

Extralimital : Pakistan, Nepal, Bagladesh, Breeds also in Afghanistan to Turkestan and S. Turkmenia.

Ali collected specimens from Rapar (Kutch), Bela Island (Great Rann.), Dabka (Baroda dist.), Radhanpur, Deesa (Palanpur), Dalkhania (Amreli dist.) and further noted from Chobar (Bharuch dist.), Dholavira (Khadir Island), Bhuj, Kharda Pachham Island, Dwarka, Gujarat.

105. Eastern Peregrine Falcon : *Falco peregrinus japonensis* Gmelin.

(*Falco japonensis* Gmelin, 1788, Syst. Nat., 1 (1) : 257 (Japan); Baker, FBI No. 1778, Vol. 5 : 32; Ali & Ripley, HB No. 209, Vol. 1 : 347).

Local names : Hindi-Bhujri (Female), Bhuri bacha (Male).

Size, similar like Jungle Crow, (15-18 in.), upperparts ashy gray cross-barred with blackish, chin, throat whitish and rest of underpart rufous. Chestnut crown and narrow black cheek-stripe diagnostic. Sexes alike.

Winter visitor, sparsely found in the entire Indian Union including islands.

Extralimital : Pakistan, Nepal, Breeds in N. Asia. Wintering in Japan, Sunda Islands, New Guinea and N. Africa (Occasional).

Ali observed but was not definite upto sub-specific level. He mentioned as *Falco peregrinus* ssp.? He noted it from Nakhatrana (2 sept.) and Rapar (19 sept.) both in Kutch. Pung Bet (Little Rann, March), Kharaghoda (19 March).

Dr. H.C. Aldrich observed from Kaira dist., in Dec. 1944 & Nov. 1945.

Stoliczka shot one in Kutch and Hume obtained it at Dwarka (S.F., iii : 443 1875).

106. Redcapped or Peregrine Falcon : *Falco peregrinus babylonicus* P.S. Sclater.

(*Falco babylonicus* P.S. Sclater, 1861, Ibis : 218, Pl. 7. (Oudh, India) Baker, FBI No. 1720, Vol. 5 : 36; Ali & Ripley, HB No. 210, Vol. 1 : 349).

Local Name : Hindi Safed Shaheen

Size, similar like jungle Crow (15-18 in.), upper parts ashy gray cross barred with blackish, chin, throat whitish and rest of underparts rufous. Chestnut crown and narrow black cheek stripe diagnostic. Sexes alike.

Winter visitor, chiefly but sparsely visited NW India, from Kashmir, Punjab, U.P., Rajasthan and N. Gujarat, rare in M.P.

Extralimital : Pakistan (Breeding) and also in W. and C. Asia.

Ali collected specimens from Radhanpur (Kutch) and Deesa (Palampur).

Lester recorded from Kutch, and by Sir Geoffrey Archer.

107. Hobby : *Falco s. subbuteo* Linnaeus.

(*Falco Subbuteo* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 89 (Sweden); Baker, FBI No. 1724, Vol. 5 : 42; Ali & Ripley, HB No. 212, Vol. 1 : 352).

Size, like pigeon (12-13 in.), a small, pointed winged streamlined falcon with grey above and moustachial streaks. Rusty white below broadly streaked with black. Sexes alike.

Winter visitor, entire India up to Belgaum (Karnataka). Affects edges of the forest and semi-desert country.

Extralimital : A Palaearctic and N. African species wintering S. Asia and China.

Ali observed the bird at Nir (Great Rann) and Mandvi (Kutch) in October and March. But he could not differentiate this race from allied sub species, viz. *Centralasiense*. It is very difficult to go upto sub-specific level in the field.

108. Radheaded Marlin : *Falco c. chicquera*  
Daudin,

(*Falco chicquera* Daudin, 1800, *Traite d'Orn.*, 2 : 121 (Bengal); Baker, FBI No. 1730, Vol. 5 : 47; Ali & Ripley, Hb No. 219, Vol. 1 : 359).

Local name : Hindi Turumti (Female)

Size, (12-14 in.), upper parts bluish grey, below white sparsely streaked blackish, tail grey and banded, wings tipped black and a diagnostic chestnut head. Sexes alike.

Resident and breeding but sparsely distributed in the entire Union from Himalayan terai to Gangetic Plains, east to Assam and south to Peninsula.

Extralimital : Pakistan, Nepal, Bangladesh.

Ali collected specimens from Kutch, chaduva (Bhuj), Mandvi, Ajwa (Baroda dist.), Cambay and Radhanpur, and also noted from Great and Little Rann.

109. European kestrel : *Falco t. tinnunculus*  
Linnaeus

(*Falco Tinnunculus* Linnaeus, 1758, *Syst. Nat.*, ed. 10, 190 (Sweden); Baker, FBI No. 1740, Vol. 5 : 61; Ali & Ripley, HB No. 222, Vol. 1 : 365).

Local names : Hindi Nazi nak (Male), Narzi (Female)

Size, like pigeon (14 in); crown ashy grey with black cheek-stripe. Mantle brick red with black spot, grey tail with broad subterminal bar. Below buff streaked on breast with black. Sexes alike.

Breeds in Ladakh and H.P. of the Indian limit and winters all India from an alt. of 5500 mt. in the Himalayas to open grassland and semi-desert in the plains.

Extralimital : Pakistan, Nepal, Bangladesh (Winter). Breeds in Palaearctic Region.

Ali collected specimens from Dwarka, Ajwa (Baroda dist.), Jambughoda and Dabka, Baroda, Cambay, Vaghjipur, Patan both Mehsana and Kharaghoda, also noted

elsewhere from Gujarat.

Order GALLIFORMES

Family PHASIANIDAE  
(Pheasants, Partridges and Quails)

Some 175 species world wide. Indian subregion represents 86 species and subspecies, of which only 10 varieties found in Gujarat.

Popularly called as 'Game Birds' The males have brilliant and lusturous colour and females are duller almost brown, mottled buff.

This family is characterised by its terrestrial habit with stout unfeathered legs. Tarsus usually furnished with one or more spike like spurs. This family ranges from unaccessable hilly terrain in the high Himalayas down to the grassland of the plains and from dry deciduous forest to moist evergreen biotope. They usually keep pair or in small parties and extremely shy in nature and hide themselves quickly with slightest disturbances.

Key to the genera of the family  
PHASIANIDAE  
(Based on Adult males)

1. Large metallic ocelli on tail feathers .....*Pavo*  
No ocellation on tail or tail coverts.....2
2. Wing over 200 mm. ....3  
Wing under 200 mm. ....4
3. A flesh erect comb on the crown .....*Gallus*  
No flesh comb on the crown .....*Lophura*
4. Tail longer than wing, tail feathers numbering 14 .....*Ithaginis*  
Tail shorter than wing .....5
5. Size moderate, wing over 120 mm. ....6  
Size small, wing under 120 mm.....7
6. Tail less than 1/2 length of wing .....*Arborophila*  
Tail more than 1/2 length of wing .....*Francolinus*
7. 1st primary longer than 4th .....*Coturnix*

1st primary between 7 th and 10th  
.....*Perdicula*

110. Indian Black Partridge : *Fracolinus  
francolinus asiae* Bonaparte.

(*Fracolinus asiae* Bonaparte, 1856, Compt. Rend. Acad. Sci. Paris 42 : 882 (Gurgaon); Baker, FBI No. 1976, Vol. 5 : 408; Ali & Ripley, HB No. 238, Vol. 2 : 22).

Local name : Hindi Teetar

Size, Pigeon (13 in.), Jet black above, scalloped white and fulvous, white cheek-patches, chestnut collar and belly (Male). Female brown without cheek patch and collar.

Resident, from Kashmir, U.P., Punjab and east to Bihar, W. Bengal and south to a line from Deesa (Gujarat) to Orissa (lat. c. 20°N. (Sambalpur to Chilka lake).

Extralimital : Nepal and Bangladesh.

Ali collected specimens, although mentioned as *Fracolinus francolinus* ssp., from Chaduva (Bhuj dist.), and Jakhan (Kutch) and also noted from Mandvi. According to (Ali), his specimens resembles with allied south persian race *henrici*. He further commented that Black Partridge have been introduced into kutch from time to time without particular regard to their place of region; therefore, a certain amount of racial confusion is inevitable.

Breeds in Kutch during August (Ali).

"According to Hume, Deesa where Butler recorded a specimen, is about the line of junction of the Black Partridge and the painted partridge which is the common species of Gujarat (S.F., iv : 6).

Z.S.I. party noted a small group of 5-6 birds by the side of Hiron river, Saran Gir and also a pair in the Gir National park in Oct.-Nov. 1993.

111. Northern Painted Partridge :  
*Fracolinus pictus pallidus* (J.E. Gray).

(*Perdix pallida*, J.E. Gray, 1831, III. Ind. Zool. 1 (8) : Pl. 55 (Udaipur); Baker, FBI No. 1980, Vol. 5 : 414, Ali & Ripley, HB No. 240, Vol. 2 : 25).

Local name : Hindi Teetar

Size. (12 in.), Above, brownish black spotted and barred with white, face pale chestnut. Below black heavily spotted with white, abdomen rufous. Sexes more or less alike. The painted partridge looks very similar with female black partridge in the field.

Resident, spreading out widely in the Monsoon with allied race, viz., Black Partridge. South range of Black Partridge in Gujarat (Except kutch), Southern U.P. and Northern N.P. Believed to hybridize with black Partridge where their ranges meet with.

Ali collected specimens from Dalkhania (Amreli dist.), Dediapada (Rajpipla), Galkund and Pandwa both in Surat Dangs, Gujarat, also noted from Ajwa (Baroda dist.), Dakor (Kaira dist.), Ganga Sagar (Palanpur), Dohad, Ratlam etc.

Z.S.I. party noted a small group of 3-4 birds in the vicinity of Khijidia Bird Sanctuary (Jamnagar dist.) during Nov. 1993.

Ali noted this birds in small numbers in grassland along streams, in fallow and stubble fields overgrown with weeds.

As regard specific identification of this bird upto sub-specific level and comparison with allied black partridge, co-existence of both the forms specially in the intergradingzone needs carefull examination.

112. North Indian Grey Partridge :  
*Fracolinus pondicerianus interpositus*  
Hartert.

(*Fracolinus pondicerianus interpositus* Hartert, 1917, Novit. Zool. 24 : 288 (Oudh); Baker, FBI No. 1948, Vol. 5 : 421; Ali & Ripley, HB No. 245, Vol. 2 : 30).

Local names : Hindi Safed / Gora teetar

Size (13 in.); a squat, stub-tailed bird largely greyish brown and rufous above and vermiculated with buff and black. Below duller, tail chestnut, centre of throat creamy white. Sexes alike.

Resident from E. Punjab, Rajasthan and N. India to W. Bengal and south upto the range of southern race. Affects dry open thron scrub and bush country in Gujarat.

Extralimital : Pakistan (Sind), Nepal (?), Bangladesh (?).

Ali collected specimens elsewhere from Gujarat.

113. Grey quail : *Coturnix c. coturnix*  
(Linnaeus)

(*Tetrao Coturnix* Linnaeus, Syst. Nat., ed. 10, 1 : 161 (Sweden); Baker, FBI No. 1950, Vol. 5 : 372; Ali & Ripley, HB No. 250, Vol. 2 : 37).

Local name : Hindi Bater

Size, small (8 in.), a partridge like bird with conspicuous buff spear-shaped streaks and irregular molting and barring of redish brown and black in both sexes. Underparts creamy white.

Party resident and party winter visitor. Practically all India south to the Nilgiri Hills except the range of allied race *Coturnix c. japonica* But intergrades with it during winter to a greater extent.

Extralimital : Pakistan (breeding), Nepal, Bangladesh.

Ali collected specimens from Nakhatrana (Kutch), Tuna (Anjar dist.), Dhari (Amreli dist.), Ajwa (Baroda dist.), Cambay, Palanpur, Dediapada (Rajpipla) and Pandwa (Surat Dangs).

Common winter visitor to entire Gujarat, affecting standing crops, viz. Bajri, Jowar, Cotton etc.

"In Butler's time about 1875, it used to be so abundant in winter about Deesa and Ahmedabad that two guns, or even one good gun, might without difficulty shoot 100 birds in a day' - (S.F., iv : 6)"

Z.S.I. party noted a large groups of at least 50 birds in the standing bajra field around Nalsarobar (Gandhinagar dist.) in Oct. 1993.

114. Black breasted or Rain Quail : *Coturnix coromandelica* (Gmelin)

(*Tetrao coromandelicus* Gmelin, 1789, Syst. Nat. 1 (2) : 764 (Coromandel Coast); Baker, FBI No. 1952, Vol. 5 : 375; Ali & Ripley, HB No. 252, Vol. 2 : 41).

Local name : Hindi China bater

Gujarati Chinaga bater

Size, small (7 in.), very similar to Grey Quail but smaller. Male with dark marks on face and throat and more jet-black contrasting strongly with white cheek. Upper breast black. Sexes alike.

Resident and nomadic, shifted during SW Monsoon. Practically all India, from Himalayas (Upto c. 2000 mt.) to the plains in grass and scrub jungle, edges of the cultivated field.

Extralimital : Pakistan, Nepal (?), Bangladesh.

Ali collected specimens from Golana (Cambay), Sairat (Kaira dist.), Hathidhara (Palanpur) and Kodinar (Saurashtra), Gujarat.

Butler noted (S.F., IV : 7) breeding in northern Gujarat in August September.

115. Jungle Bush Quail : *Perdicula a. asiatica* (Latham).

(*Perdix asiatica* Latham, 1790, Index Orn. 2 : 649 (Mahratha region, India); Baker, FBI No. 1953, Vol. 5 : 377; Ali & Ripley, HB No. 255, Vol. 2 : 45).

Local name : Hindi Lowwa

Gujarati Vana lavari

Size, like Grey Quail, (6-7 in.), upperparts fulvous-brown, Streaked and mottled with black and buff. Buff and chestnut supercilium. Chin & Throat chestnut and rest of the underparts white, barred with black. Sexes more or less alike.

Resident, Gujarat (excepting Kutch), Maharashtra (excepting S. Kankan), M.P. Bihar, Orissa, A.P. and Mysore, from plains upto c. 1250 m. in the hills.

Ali collected specimens from Dediapada (Rajpipla), Pandwa, Babulghat, Laochali (Surat Dangs).

116. Rajasthan Rock Bush Quail : *Perdicula argoondah meinertzhageni* Whistler.

(*Perdicula argoondah meinertzhageni* Whistler, 1937, Bull. Brit. Orn. Cl. 58 : 19 (Nasriabad, Rajputona); Baker, FBI No. 1954, Vol. 5 : 379; Ali & Ripley, HB No. 259, Vol. 2 : 49).

Local name : As in earlier race.

Size, like Gray Quail (6.7 in.), very similar to Jungle Bush Quail except for absence of buff superciliary stripe and dull brick red throat patch. The female lacks throat patch and chin whitish.

Resident. From Haryana and U.P. across Rajasthan and N. Gujarat to Kutch and Saurashtra and east to western and northern M.P. Affects stony, sparsely thorn-scrubbed country in semi-desert facies.

(Ali), collected specimens from Chaduva (Bhuj dist.), Mata-no-Madh, Dabka (Baroda dist.), Deesa (Palanpur), and Dalkhanja (Amreli dist.), Gujarat.

117. Red Spurfowl : *Galloperdix s. spadicea* (Gmelin)

(*Tetrao spadiceus* Gmelin, 1789, Syst. Nat. 1 (2) : 759 (India); Baker, FBI No. 1940, Vol. 5 : 358; Ali & Ripley, HB No. 275, Vol. 2 : 67).

Local names : Hindi Chhoti jangli murgi  
Gujari Chokhara.

Size, Village hen (14-15 in.), upperparts rufous-chestnut with black and rufous vermiculations, below chestnut. A naked red patch round eye. 2 to 4 pointed spurs on each leg. Female duller. Greyish to brown, breast spotted with black. One or twospurs on each leg.

Resident, U.P., peninsular India south of the Gangetic Plains in Gujarat (North to c. Palanpur), M.P. Southern Bihar, Orissa, Maharashtra, A.P., Madras, Mysore and northern Kerala (Wynaad). Affects stony, scrubbed foothills and bamboo jungle and densely covered bushes.

Extralimital : Nepal.

Ali collected specimens from Hathidhara (Palanpur), Dediapada (Rajpipla), Songadh (Navsari dist.), Waghai, Galkund, Pandwa all (Surat Dangs), Chaduva and Mata-no-Madh., Gujarat.

Butler (S.F., IV : 5) noted breeding in N. Gujarat in the hot weather.

Northern Gujarat, specially in the region of Mt. Abu and nearby state boundaries of Gujarat

and Rajasthan, this nominate race has always been intergrading with allied race. viz. *Galloperdix s. caurina* and that of southern race, viz. *Galloperdix s. stewati* in the southern peninsula. The sub-specific difference mainly depends on saturation of plumage colouration via-a-vis gradual paleness from extreme south to north west.

118. Grey Junglefowl : *Gallus sonneratii* Temminck.

(*Gallus sonneratii* Temminck, 1813, Pig. et. Gall. 2 : 246 (Madras); Baker, FBI No. 1905, Vol. 5 : 298; Ali & Ripley, HB No. 301, Vol. 2 : 106).

Local names : Hindi-Jungli murgi  
Gujarati-Komri

Size, (18 in.), A white-streaked dark grey with glossy purple black wing quills and long arching, sickle-snapped tail (Male).

Resident. India, south of Line, c. 24°30'N., 73°E (Mt. Abu), in the west to Panchmari (M.P.), in A.P. near the mouth of Godavari River and southern Rajasthan, M.P., A.P., Gujarat, Maharashtra, Tamil Nadu, Karnataka and Kerala.

Ali collected and noted specimens from different parts of Gujarat.

Jerdon, vide Blanford, recorded the nominated race *Gallus g. murghi* in the Rajpipla Hills (Western extremity of the Satpura Range in Gujarat) about a hundred years ago.

119. Indian Peafowl: *Pavo cristatus* Linnaeus.

(*Pavo cristatus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 156 (India); Baker, FBI No. 1897, vol. 5 : 282, Ali & Ripley, HB No. 311, Vol. 2 : 123).

Local names : Hindi Mor, Mayura  
Gujarati Mor-Male; Dhel Female.

Size, Male (40-41 in.), colouration familiar and universally known.

Resident. All over India, from the Himalayas upto c. 1800 mt. down to the plains, vary common and abundant in Rajasthan and Gujarat.

Extralimital : Pakistan (Indus River), Sind, Nepal (?), Sri Lanka, Bangladesh.

Ali collected and noted elsewhere from Gujarat.

Z.S.I. party noted plenty of this bird on the bothside jungle of Hiron River in Sasan Gir (Amreli dist.), Gujarat, in Oct.- Nov. 1993.

Family TURNICIDAE  
(Button or Bustard - Quail)

Fifteen species ranging from Spain, through Africa, India, SA Asia, China, Japan, Philippines, to Solomons and Australia.

Seven species and subspecies in the Indian sub. region. Only three races are found in Gujarat. Superficially Quail like, but liking a hindtoe, so called Hemipodes, and sex roles reversed, i.e., female brighter, male tends nest.

Normally met with singly; occasionally pairs, rarely small parties. Sedentary; haunting in the same spot day after day. Affects grassland and scrub jungle bordering villages and cultivation, and open light deciduous forest. They are small, secretive, grassland birds.

120. Little Bustard-Quail : *Turnix sylvatica dussumier* (Temminck)

(*Hemipodius Dussumier* Temminck, 1828, Pl. Col., livr. 76, Pl. 454, f. 2 (Bengale); Baker, FBI No. 2003, Vol. 5 : 450; Ali & Ripley, HB No. 313, Vol. 2 : 128).

Local names : Hindi Ginwa/Chhota lowwa, Dabki.

Size, smaller than Bush Quail (5.5 in.), An unmistakable Quail and one of our tiniest game birds. Upperparts irregularly barred rufous and black, below white with buff breast with black and chestnut spot. Blackish brown with whitish median line and short pointed tail are diagnostic.

Resident but nomadic with SW monsoon, from the Himalayas upto c. 2400 mt. alt. south through Peninsula, and east through Assam to entire NE India. Distribution in Gujarat needs verification.

Extralimital : Pakistan (Sind), Nepal,

Bangladesh, Burma.

Ali commented as, "No specimen obtained. Both Lester and Captain Newnham record it in Kutch from Devisar (Bhuj)"

Butler (S.F., iv : 9) noted it common in N. Gujarat and collected a juvenile (?) near Deesa.

121. Indian Yellowlegged Button Quail :  
*Turnix t. tanki* Blyth.

(*Turnix tanki* Blyth, 1843, Jour. Asiat. Soc. Bengal, 12 : 180 (Bengal); Baker, FBI No. 2005, Vol. 5 : 454; Ali & Ripley, HB No. 314, Vol. 2 : 129).

Size. (6 in.), Upper parts greyish brown, irregularly crossbarred with black. Chin and throat whitish, abdomen pale buff. Blackish crown mixed with buff with a paler median line diagnostic (Male). Female larger and a broad orange-rufous half collar on back.

Resident (?) Practically in the entire Indian Union in grassland and low scrub, from other Himalayas upto c. 1200mt. alt. down to the plains including Andamans & Nicobar Is.

Extralimital : Pakistan (Sind, Kohat), Nepal, Bangladesh.

Ali collected specimens from Kutch, Chaduva (Bhuj dist.), Vaghjipur (Mehsana dist.) and noted from Dabka (Baroda dist.).

Ali reported that this birds were collected together with Indian Bustard Quail (*Turnix suscitator taigoor*) from the same spot in Kutch.

Butler noted of this bird near Deesa on 15-7-1875. (S.F., iv : 8).

122. Indian Bustard-Quail : *Turnix suscitator taigoor* (Sykes)

(*Hemipodius Taigoor* Sykes, 1832, Proc. Zool. Soc. London : 155 (Dukhun); Baker, FBI No. 1998, Vol. 5 : 447 ; Ali & Ripley, HB No. 318, Vol. 2 : 133).

Local names : Hindi Gulu, gundra

Size (6 in.), colouration of the plumage apparently more or less allied with other two races found in Gujarat. Breast barred across with black or white or quite black in the centre,

wing coverts boldly spotted with black and buff. very indistinguishable in the field from other two races of Bustard quails in Gujarat.

Resident, from Punjab in the West, the whole continental and Peninsular India up to roughly south of 23°N lat.

Extralimital : Pakistan (Sind ?).

Ali collected specimens from Kutch, Nakhatrana, Dabka (Baroda dist.), Cambay, Vaghjipur & Patan both (Mehsana dist.) and also noted from Bhuj, Rapar, Ajwa (Baroda dist.), Gujarat.

Butler noted a nest with 4 eggs at Deesa on 9th August 1875 (S.F., iv : 7).

#### Family GRUIDAE (CRANES)

Fifteen species worldwide, except for south America, New Zealand, Oceanic islands. Two Genera, viz., *Anthropoides* (Head and neck feathered) and *Grus* (Head and neck feathered) and Seven species and sub-species are found in the India sub-region, three of which found in Gujarat. A very large, long-naked and long-legged bird of grassland and swamps. Call is loud trumpeting; the birds fly in formation and have spectacular dancing display. They never perch.

#### 123. Eastern Common Crane : *Grus grus lilfordi* Sharpe.

(*Grus lilfordi* Sharpe, 1894, Cat. Bds. Brit. Mus. 23 : 250 (Jhelum River near Jelapur, Punjab); Baker, FBI No. 2034, Vol. 6 : 50; Ali & Ripley, HB No. 320, Vol. 2 : 136).

Local names : Hindi-Kurunch, Kurch

size (c. 4.5 ft.), standing to top of head, a large lanky grey bird with black flight feathers. A dull red naked patch on nape. A white band from behind eye to upper neck is diagnostic. Sexes alike.

Winter visitor, commonest and most abundant crane is NW India, from Rajasthan, Gujarat, Punjab, U.P., east to Bihar, Orissa and W. Bengal and South to A.P. and M.P.

Extralimital : A Palearctic breeding species wintering to the Mediterranean,

N.Africa, and China.

On migration it is noted that this bird on northward migration flying at tremendous height across the Great Rann of Kutch from the 2nd week of March, chiefly after forenoon.

Ali not collected any specimen but noted in Khari Ropar (Kutch).

#### 124. Indian Sarus Crane : *Grus a antigone* (Linnaeus)

(*Ardea Antigone* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 142 (Asia = Farther India); Baker, FBI No. 2038, Vol. 6 : 55; Ali & Ripley, HB No. 323 Vol. 2 : 141).

Local name : Hindi-Sarus

Size (5 ft.), standing to top of head. The largest of Indian cranes. A huge longnecked grey bird with naked red head and upper neck. Sexes alike.

Resident, moving locally with the condition of water, entire India from the Himalayas, Kashmir Valley, c. 1700 mt. (AE Ward, 1907, JBNHS 17 : 945), south throughout the Peninsula northern M.P. to a line c. 21°N (Surat) to the West (c. 16°30'N), Common in Gujarat.

Extralimital : Pakistan (Sind), Nepal (Terai), Bangladesh.

Ali not collected any specimens but noted elsewhere in Gujarat. Not common in Kutch.

Z.S.I. party noted a flock of six birds in the cultivated field near the vicinity of Khijidia Bird Sanctuary (Jamnagar dist.), in November 1993.

#### 125. Demoiselle Crane : *Anthropoides virgo* (Linnaeus)

(*Ardea virgo* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 141 (India); Baker, FBI No. 2040, Vol. 6 : 57; Ali & Ripley, HB No. 326, Vol. 2 : 146).

Local name : Hindi Karkara

Gujarati Karkara

Size (2.5 ft.), standing to top of head. A dainty little grey crane with black head and

neck and white ear-tufts behind eyes. Elongated sickle-shaped brownish grey secondaries drooping over tail. Sexes alike.

Winter visitor, common in NW and WC portion of India extending eastward to Assam and south to Mysore (c. 16°N).

Extralimital : S. Asia, SE. Europe to Mongolia to N. and NE Africa.

An abundant winter visitor and passage migrant in Gujarat. It was noted on migration through Khandla, Kutch and Nir, Pachham Island (Great Rann.)-(Ali),

**Family RALLIDAE  
(Rails, Moorhens and Coots)**

Some 140 species worldwide, 24 sp. and sub-species are found in the Indian sub-region, of which nine races are distributed in Gujarat. Secretive swamp birds, long legs and very long toes, wings are usually weak, some have 'frontal shield, an elongation of the upper bill.

Marsehes, rice field, or the thick stand of reeds along the edges of water body are the favourite habitat. Generally rusty brown, olive, or sooty, often with barring and spotting.

**Family RALLIDAE**

**Key to the genera of the family RALLIDAE**

1. Bill from gape sub-equal or longer than the tarsus ..... *Rallus*  
 Bill from gape much shorter than tarsus .....2
2. Frontal shield absent to slightly developed .....3  
 Frontal shield well developed.....4
3. Quail second longest; first between fifth and seventh .....*Porzana*  
 Quail three to six longest, first shorter than eight .....*Amaurornis*
4. Toes with membranous fringes divided into convex lobes. Plumage black or blackish .....*Fulica*
5. Plumage blue; frontal shield truncate behind .....*Porphyrio*

- Plumage not blue; frontal shield not truncate behind .....6
6. Toes with a narrow straight edges lateral fringes. Sexes alike..... *Gallinula*  
 Toes with fringes. Sexes not alike .....*Gallicrex*

**126. Indian Bluebreasted Banded Rail :  
*Rallus striatus albiventer* Swainson.**

(*Rallus albiventer* Swainson, 1838, *Animals in Menageries* : 337 (India); Baker, FBI No. 2008, Vol. 6 : 7; Ali & Ripley, HB No. 329, Vol. 2 : 152).

Size. Grey Partridge (10-11 in.), upperparts dark brown with irregular white bands and spots. Chin and throat white, foreneck and breast ashy blue. Abdomen blackish barred white (Male). Female duller above and white on belly.

Resident and local migrant depending on water condition. Sparsely found in all India except Punjab, Kashmir, Rajasthan, N. Gujarat and Sikkim. in reedy swamps, mangroves, inundated puddy field.

Extralimital : Pakistan (?), Bangladesh, Sri Lanka.

No specimen obtained so far from Gujarat except Lester and Capt. Newnham both recorded it from Devisar tank (Bhuj) in 1892.

**127. Eastern Baillon's Crake : *Prozana p. pusilla* (Pallas)**

(*Rallus pusilla* Pallas, 1776, *Reise, Russ. Reichs* 3 : 700 (Dauria); Baker, FBI No. 2013, Vol. 6 : 14; Ali & Ripley, HB No. 337, Vol. 2 : 160).

Size, small (7-8 in.), our smallest rail. Upperparts rufescent olive brown with ashy grey supercillium and brownish streak through eye over ear-coverts. Below, neck, breast and upper abdomen grey and rest barred brown and white. Sexes alike.

Breeds in Kashmir (c. 1800 m.), and spread out in entire Indian Union including Is. in winter in suitable reedy marshes and dense watery busy country.

Extralimital : A Palaearctic sp., breeding also in Africa, Australia and New Zealand, Winters S. Asia.

Ali noted at Ajwa (Baroda dist.), on 28-10-1945, and Balaram (Palanpur) on 18-1-1946.

Butler noted it common in Ahmedabad and Deesa in September or later and also possibly breeding. (S.F., V : 215-1877).

128. Spotted Crakes : *Porzana porzana*  
(Linnaeus).

*Rallus Porzana* Linnaeus, 1766, Syst. Nat., ed. 12, 262 (France); Baker, FBI No. 2011, Vol. 6 : 11; Ali & Ripley, HB No. 338, Vol. 2 : 162).

Size. (9 in.), upperparts olive brown broadly streaked with black. Chin, throat and abdomen white. Breast brownish grey speckled with white. Sexes alike.

Winter visitor. Practically all over India, southern limit at least upto Karnataka (Belgaum), sparsely found in Moist and well-developed swamps and reeds in Gujarat.

Extralimital : Pakistan, Nepal, Bangladesh, also S. Europe, Africa (Sahara), W. Asia, north to Norway.

Lester collected one specimen from Devisar tank (Bhuj) in 1892.

Butler commented that it occurred in the swampy country between Ahmedabad and Deesa during winter (S.F., v. 215-1877).

The vicinity of Nalsarobar with tall reeds is the ideal habitat of this bird. But Z.S.I. party did not find it during Oct. -Nov. 1993.

129. Brown Crake : *Amaurornis a akool*  
(Sykes)

(*Rallus Akool* Sykes, 1832, Proc. Zool. Soc. London : 164 (Dukhun); Baker, FBI No. 2024, Vol. 6 : 25; Ali & Ripley, HB No. 342, Vol. 2 : 167).

Size, Grey Partridge (C. 11 in.), A stub-tailed brown and ashy swamp bird with indistinct supercillia. Wings and tail dark olive brown. Sexes alike.

Resident and local migratory according to water condition, from Kashmir east to Assam,

south through Punjab and Gujarat plain, and south as far as Karnataka except eastern Peninsula (S. of Orissa) where the status is unknown.

Extralimital : Nepal (Lowlands, duns), Bangladesh.

Butler (S.F., iv :21) noted it from N. Gujarat where it frequents in rocky Nallah beds of river, and marshy grounds, he further added it very common in Milana (18 m. SE of Deesa) (S.F., v : 224-1877).

Z.S.I. Party spotted one likely to be the same race. in the dense bush of the Hiron river tract in Sasan Gir (Amreli Dist.) in October, 1993.

130. Indian whitebreasted Waterhen :  
*Amaurornis phoenicurus chinensis*  
(Boddaert)

(*Fulica chinensis* Boddaert, 1783, Table Pl. enlum : 54 (Hongkong); Baker, FBI No. 2022, Vol. 6 : 24; Ali & Ripley, HB No. 343, Vol. 2 : 168).

Local names : Hindi Dahak, Dauk.

Gujarati- Davak.

Size- (11-12 in.). A familiar dark slaty grey stub-tailed swamp bird with prominent white facial mask and underparts, vent and undertail coverts rufous. Sexes alike.

Resident. Practically found in North of an arbitrary boundary along lat. 20°N. in nullah, narrow water tract covered by bushes and reed-bed swamp.

Extralimital : Indo Chinese and Malaysian Subregions and Indonesian Islands.

Ali, did not collect any specimens but noted from Ajwa (Baroda dist), Cambay town environs, Nadiad (Kaira dist.), Radhanpur, Dediapada (Rajpipla), Mahal, Ambika, Waghai (All in Surat Dangs).

Hume collected it from Kutch and Kathiawar (S.F., IV : 21).

Butler recorded it from Milana near Deesa, and nesting in August (S.F., V : 224-1877).

Z.S.I. party recorded it from Kamleswar Dam area, Gir National park; by the side of Hiron River, Sasan Gir (Amreli dist.) and in

Khijidia Bird Sanctuary (Jamnagar dist.), Gujarat, Oct.- Nov. '1993.

131. Kora or Watercock : *Gallicrex c. cinerea* (Gmelin)

(*Fulica cinerea* Gmelin, 1789, Syst. Nat. 1 (2) : 702 (China); Baker, FBI No. 2027, Vol. 6 : 29; Ali & Ripley, HB No. 346, Vol. 2 : 172).

Local name : Hindi -Kora

Size. (14 in.), a rail like swamp bird, above dark brown, broadly scalloped with fulvous, below, pale buff with darker bars. A small triangular yellowish horny shield on forehead diagnostic. In breeding dress, overall black with bright red fleshy horn projecting above the crown (Male).

Resident in well watered areas and dispersing widely during monsoon in all over India, from the Himalayas (S), east to Assam south through the Peninsula including Is and Maldiva Is.

Extralimital : Pakistan, Indochinese and Malaysian subregion to Japan, S. & E. China, Philippines and Celebes.

Lester records a pair shot in Kutch by H.H. Rao Saheb on 4-7- 1897. He also recorded eggs from Kutch (?), (JBNHS, 11 : 321).

132. Indian Moorhen : *Gallinula chloropus indica* Blyth

(*Gallinula chloropus?* var. *Indicus* Blyth, 1842, Jour. Asiat. Soc. Bengal 11 : 887 (Calcutta); Baker, FBI No. 2026, Vol. 6 : 28; Ali & Ripley, HB No. 347, Vol. 2 : 175).

Local names : Hindi Jal murgi

Gujarati Jal Kukadi.

Size, like white bread water hen (12-13 in.), above black, sooty grey and brown with a diagnostic white border to the closed wings, below grey, whitish on abdomen, bright red frontal shield on forehead. Sexes alike.

Resident and partly winter visitor. Practically found all over India in suitable biotope. Breeds in outer Himalayas and Peninsular hills (c. 2400 mt. Kashmir, c. 2000 in the Nilgiris).

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, S. Tibet, E. China, Japan, Burma, Thailand, Malay Peninsula (C), Cambodia, Formosa.

Ali noted it from Chaduva (Bhuj dist.), Dhari (Amreli dist.), Balaram (Palanpur) Kharaghoda and Baroda town environment, Gujarat.

Lester collected eggs of this bird from Devisar tank (Bhuj) in July 1893.

Butler (S.F., v : 224) recorded it plentiful in the tank at Milana, 18 miles SE of Deesa, breeding during the rains in the large reed beds.

133. Indian Purple Moorhen : *Porphyrio porphyrio poliocephalus* (Latham)

*Gallinula poliocephala* Latham, 1800, Index Orn., Suppl. : 68 (India); Baker, FBI No. 2028, Vol. 6 : 32; Ali & Ripley, HB No. 349, Vol. 2 : 178).

Local names : Hindi Kaim, Khima,

Gujarati Neel Kukadi.

Size,- Village hen (17 in.), a clumsy purplish blue rail with long legs and enormous toes. The bold red forehead runs back from the short heavy red bill. Sexes alike.

Resident. More or less in the entire Indian Union in the dense reed-beds around large swamps and jheels.

Extralimital : Pakistan (Sind, Baluchistan), Nepal, Sri Lanka, Bangladesh.

Ali noted it from Chaduva (Bhuj dist.), Bhimasar tank (Anjar dist.), Gujarat.

Lester found it plentiful and breeding on the Dhonsa Jheel in Kutch.

Butler noted in some tanks many birds in N. Gujarat.

Hume noted it as common in Kathiawar, Gujarat (S.F., iv 20).

134. Coot : *Fulica a atra* Linnaeus.

(*Fulica atra* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 152 (Sweden); Baker, FBI No. 2029, Vol. 6 : 34; Ali & Ripley, HB No. 350, Vol. 2 : 180).

Local names : Hindi Darari, Thekari

Guajrati- Aad, Dasadi.

Size, village hen (16 in), a slaty black, dumpy and almost tail less water bird with stout pointed white bill and flat, rounded, horny shield on forehead. Sexes alike.

Resident and as well as common and abundant winter visitor in the entire Indian Union in all types of inland waters.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Java, Celebes, as far as Sudan, Arabia, breeds in Europe, Asia and N. Africa.

Ali noted it from Bhuj, Anjar (Kutch), Cambay town, Dakor (Kaira dist.), Patan (Mehsana dist.), Balaram (Palanpur) and Kharaghoda, Gujarat.

DKS recorded its breeding in Bhavnagar and in Saurashtra (JBNHS, 46 : 724).

Z.S.I. party noted hundred and thousands in the Nalsarobasr (Gandhinagar dist.) and plentiful in the Khijidia Bird Sanctuary (Jamnagar dist.), Gujarat, Oct. 1993.

#### Family OTIDIDAE (Bustard)

Twenty four species, restricted to temperate and tropical regions of the Old World. Indian Sub-Region shares only six species and sub-species, of which the state of Gujarat has taken three species and subspecies. Practically all the races are threatened and endangered and the Great Indian Bustard and Bengal Florican are on the way of extinction.

An impressive, very large bird of open plains and light woodland. Flight is strong and steady, on huge, rounded wings.

#### 135. Great Indian Bustard : *Choriotes nigriceps* (Vigors)

(*Otis nigriceps* Vigors, 1831, Proc. Zool. Soc. London : 35 (Himalayas = Foothills of NW India).

Baker, FBI No. 2043, Vol. 6 : 64; Ali & Ripley, HB No. 354, Vol. 2 : 188).

Local names : Hindi Hukna.

Gujarati Godad, Ghorar.

Size (37 in), standing to top of head, a huge ground bird reminiscent of a small ostrich with

deep sandy buff above vermiculated with black, crested head black and a black band across whitish lower breast. (Male). Female smaller and paler, Pectoral band absent.

Resident, and nomadic, dispersing widely in monsoon with creation of grassland.

It was once distributed in the entire Indian Union in suitable biotope, but now restricted or supposed to be occurred in the remote area of Rajasthan, Gujarat (Kutch, Saurashtra) and Decan (Ahmednagar dist.).

Ali noted this bird from Rapar (Waghad dist.), Nir (Pachham Island) and Chobari (Bhachau dist.), Gujarat.

Ali further reported, "A female specimen shot by H.H. Maharao Madansinji on 3-3-1946" He further stated that it was not common in Kutch, but small numbers were seen in the sandy, grassy country along the edge of the Great Rann at least till 1946. Its status since then unknown.

A pure white albino has been recorded in Kutch (JBNHS, 31 : 526).

(DKS), reported the presence of it in the Bhavnagar area.

Hume reported very common in Kathiawar (S.F., iv : 9).

Baker (Game Birds, II : 172) recorded a single egg in Kutch in January.

Maharao Vijayraji noted a chick in October (JBNHS, 43 : 660).

#### 136. Houbars Bustard : *Chlamydotis undulata* Macqueenii (J.E. Gray).

(*Otis macqueenii* J.E. Gray, 1832, Indian Zool. 2 (12) : Pl. 47 (Himalayas). Baker, FBI No. 2044, Vol. 6 : 67; Ali & Ripley, HB No. 355, Vol. 2 : 191)

Local name : Hindi Tiloor

Gujarati Siara tiloor.

Size, larger than domestic hen (26 in.), Sandy buff above, vermiculated with blackish, short black and white crest, a tuft of greyish plumes from lower throat overlapping the breast (Male). Female smaller with ruff and neck-plumes less developed.

Winter visitor, straggling east to Delhi, south through Rajasthan, N. Gujarat in sandy undulating grassland along the edge of the Rann (Kutch) and among the coastal sand dunes.

Extralimital : Breeds in Marakan (Pakistan).

Ali collected one specimen near Khavda (Pechham Island, Kutch), 4-10-1943.

H.H. Maharao Madansinji in December, 1943 collected 16-17 birds in the bushy sand-dunes near Mandvi.

137. Leekh or Lesser Florican : *Sypheotides indica* (J.F. Miller)

(*Otis indica* J.F. Miller, 1782, Icon. Anim., Pl. 33 (India); Baker, FBI No. 2045, Vol. 6 : 69; Ali & Ripley, HB No. 357, Vol. 2: 196)

Local names : Hindi Leekh

Gujarati Khar mor, Tiloor

Size, like domestic hen (20 in.). Male (breeding). Chiefly black and white with a tuft of narrow spatulate ended upcurving black plumes projecting behind the head, three on either side.

Male (winter) and female, overall sandy buff, mottled with black. Two Parallel blackish stripes on throat and fore neck.

Resident, irregular local migrant and also nomadic in the rainy season, from Punjab, Rajasthan, Gujarat, south through Peninsula and east to U.P., Bihar, Orissa and W. Bengal in the Indian limit.

Extralimital : Pakistan (Marakan coast), Nepal, Bangladesh.

(Ali) reported it common in Kutch and Saurashtra.

(DKS) recorded its breeding in Gujarat (JBNHS, 49 : 201-216).

R.M. Simmons noted its breeding in grass land of West of Sanand (Ahmedabad dist.), Gujarat.

Migration (local) : "Of about 500 males in breeding plumage ringed by DKS in the Bhavnagar in seven successive seasons (1943-

49), 18 have so far been recorded. Ten of these in the same area, the others mostly well within a radius of 50 km." (Ali Ripley H.B.).

Family JACANDAE (**Jacanas**)

This pantropical family comprises eight species, two of which species and sub-species are distributed in Indian sub-region as well as Gujarat. This birds frequent open lagoons and lowland swamps. It is a specialized wader with long toes, adopted for walking on floating vegetation.

138. Pheasant-tailed Jacana :  
*Hydrophasianus chirugus* (Scopoli)

(*Tringa chirugus* Scopoli, 1786, Del. Flor. et. Faun. Insubr., Fasc. 2 : 92 (Luzon);

Baker, FBI No. 2032, Vol. 6 : 42; Ali & Ripley, HB No. 358, Vol. 2 : 199).

Local names : Hindi Piho, Pihuya

Gujarati-

Size (12 in.). In breeding plumage a striking white and chocolate-brown marsh bird with slender spidery toes and pointed sickle shaped pheasant tail. In Non breeding dress, brown and white with a black band on upper breast. Sexes alike.

Resident, moving locally with water condition. All India, from Kashmir (c. 1500 mt.) down to the plains, in marshes, floating vegetation covered jheels etc.

Extralimital : Indochinese and Malaysian subregion and the Philippines.

Ali collected specimens from Hathidhura (Palanpur), Gujarat, and also noted from Bhuj, Ajwa (Baroda dist.) Pariej (Kaira dist.), Kanewal jheel (Cambay) and Balam (Palanpur).

Butler noted it as winter visitor to Deesa (S.F., iv : 20).

Humayan Abdulali found it common on Hamisar tank (Bhuj), in June 1937 (JBNHS, 40 : 122).

Z.S.I. party noted it in the dense reed-beds of Nalsarobar (Gandhinagar dist.), Oct. 1993.

139. Bronzewinged Jacana : *Metopidius indicus* (Latham)

(*Parra indica* Latham, 1790, Index Orn. 2 : 765 (India); Baker, FBI No. 2031, Vol. 6 : 40; Ali & Ripley, HB No. 359, Vol. 2 : 201).

Local names : Hindi- Kundai

Gujarati Kalo jal manjar

Size. (12 in.). Head, neck and breast glossy black. Back and wings metallic greenish bronze. Stub tail chestnut. A broad white stripe from eye to nape. Sexes alike.

Resident. Practically all India except W. Punjab and W. Rajasthan) in large jheels, marshes mostly in plains.

Extralimital : Pakistan (?), Nepal, Bangladesh, Burma, Thailand, Vietnam Cambodia, Malay Peninsula, Java, Sumatra.

Ali noted at Bhuj and also Humayun Abdulali in June (JBNHS, 40 : 122) and elsewhere in Gujarat.

Z.S.I. party noted it by the side of Hiron River, Sasan Gir (Amreli Dist.), Gujarat in Oct.- 1993.

Family HAEMATOPODIDAE  
(Oystercatchers)

140. Oystercatcher or Sea-Pie : *Haematopus ostralegus* Linnaeus

(*Haematopus ostralegus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 152 (Oland); Baker, FBI No. 2110, Vol. 6 ; 165; Ali & Ripley, HB No. 360, Vol. 2 ; 203).

Local name : Hindi Darya gajpaon

Size (10 in.), A striking black and white black and white shore bird with stoutish bare red legs and long straight laterally compressed orange-red bill. Sexes alike.

Winter visitor. Chiefly found to the western sea-coast and off- shore island in our Indian limit.

Once recorded at Wular Lake, Kashmir (Ward, JBNHS 17 : 946), sporadically straglling on the western coasts, India.

Extralimital : Pakistan (Makran), also to Africa (Winter). Breeds in the coast of Europe.

(Ali), did not collect any specimen but noted it at Mandvi (kutch) in March.

Family CHARADRIIDAE  
(Plovers, Sandpipers, Snipe)

67 species and sub-species are resident or winters in the Indian sub-region. 33 species and sub-species are found in Gujarat. Out of 67 races found in the Indian sub-region, 48 are winter visitor (9 are rare vagrant and one straggler); one accidental visitor; 11 are resident and rest 7 are breeding. Generally black, grey and white, with a small bill, longish legs, and distinctive gait : running quickly a few paces, then halting abruptly. Usually inhabit mudglats, beaches, and other favoured water haunts.

Key to the subfamilies of Family  
CHARADRIDAE

Bill straight, like that pigeon- Upper mandible- middle portion constricted, tip swollen ..... *Charadriinae*  
Bill straight or decurved or recurved. Upper mandible-tip occasionally flatened and pitted ..... *Scolopacinae*

Key to the subfamily **Charadriinae**

1. Tail feathers grey or brown, outer tail feathers white or white-tipped ..... *Charadrius*  
Tail feathers white with a broad black band on the distal half or with narrowly barred with dusky spot on marging of outer tail feathers ..... 2
2. Tail with narrowly barred. Black spotted ..... *Pluvialis*  
Tail with a broad black band and often with a narrow white terminal band ..... *Vanellus*

Key to the genera of subfamily  
**Scolopacinae**

1. Tibia featherd ..... 2

- Tibia un - feathered .....3
2. Tibia entirely feathered .....*Scolopax*  
Tibia partially feathered..... *Gallinago*
3. Toes partially webbed .....4  
Toes divided .....7
4. Bill long, over 65mm. ....5  
Bill under 65mm .....6
5. Bill curved downwards .....*Numenius*  
Bill slightly curved up .....*Limosa*
6. No white on secondary coverts or upper tail  
coverts .....*Philomachus*  
White on upper tail coverts and tip of  
secondary coverts .....*Tringa*
7. Bill spoon-shaped .....*Eurynorhynchus*  
Bill not spoon-shaped .....8
8. Bill sharply pointed .....*Arenaria*  
Bill not sharply pointed .....9
9. Tip of bill slightly decurved .....*Limicola*  
Tip of bill slightly expended .....*Calidris*

141. Whitetailed Lapwing : *Vanellus leucurus* (Lichtenstein)

(*Charadrius laucurus* Lichtenstein, 1823, in Eversmen's Reise von Orenburg nach Buchara : 137 (Turkestan).

Baker, FBI No. 2123, Vol. 6 : 183; Ali & Ripley, HB No. 362, Vol. 2 : 206).

Size, like common myna (11 in.), a light brown and white plover like yellow-wattled Lapwing but devoid of black cap. Sexes alike.

Winter visitor, mainly in NW India diffusing thinly through U.P., northern M.P. N. Bihar and W. Bengal.

Extralimital : Pakistan, Nepal (terai), Bangladesh (Winter), Breeds on the Kirghiz Steppes, Transcaspia, Syria (Part), Iraq and Iran.

Ali collected specimens from Pariej and sairat both (Kaira dist), Gujarat, and also noted from Kandla (Kutch) and Kanewal (Cambay).

142. Sociable Lapwing : *Venellus gregarius* (Pallas)

(*Charadius gregarius* Pallas, 1871, Reise, Russ. Reichs. 1 : 456 (Volga); Baker, FBI No. 2122, Vol. 6 : 182; Ali & Ripley, HB No. 363, Vol. 2 : 208).

Size, common Myna + (13 in.), a grey and white bird, crown brown, a buffy white supercillia upto hind neck. Tail white banded black. Underparts white to smoky white. Large white patch on wings and subterminal tail bands are diagnostic. Sexes alike.

Winter visitor, NW India (rare in Kashmir) and U.P., east to Bihar and W. Bengal, South through Rajasthan and Gujarat and erratically to whole Peninsula upto Kerala (Straggler).

Extralimital : Pakistan, Nepal, Sri Lanka and NE Africa to Sudan. Breeds in middle and S. Russia, Kirghiz Steppes, W. Siberia.

Lester noted it common in Kutch.

Butler (S.F., IV : 12) noted common in Deesa (N. Gujarat).

143. Redwattled Lapwing : *Venellus i. indicus* (Boddaert)

(*Triga indica* Boddaert, 1783, Table Pl. enlum : 150 (Goa); Baker, FBI No. 2125, 2126, Vol. 6 : 189; Ali & Ripley, HB No. 366, Vol. 2 : 212).

Local names : Hindi Titeeri, Tetai,

Size, common Myna (13 in.), bronza-brown above and white below, with black breast, head and neck, and a crimson fleshy wattle. Sexes alike.

Resident. All India as far east as Assam and through the Peninsula from c. 2000 mt to plains in all types of inland waters.

Extralimital : Pakistan, Nepal (Valley), Bangladesh.

Ali collected specimens from Khasi Rohar, Ajwa (Baroda dist.), Bodeli (Baroda), Dabka (Baroda), Nadiad environs (Kaira dist.), Dediapada (Rajpipla).

Ali further noted its breeding at Kutch in March-October.

Z.S.I. party noted this bird in Nalsarobar (Gandhinagar dist.); Kamleswar Dam area, Gir National Park, Khijidia Bird Sanctuary (Jamnagar dist.), Gujarat, Oct.- Nov.' 1993.

144. Yellow-wattled Lapwing : *Venellus malabaricus* (Boddaert)

(*Charadius malabaricus* Boddaert, 1783, Table Pl. enlum : 53 (Malabar Coast);

Baker, FBI No. 2128, Vol. 6 : 190; Ali & Ripley, HB No. 370, Vol. 2 : 218).

*Local name* : Hindi Zirdi

Size, (10.5 in.). A sandy brown bird with white belly, black cap, bright yellow wattle and bare yellow legs are diagnostic. Sexes alike.

Resident, chiefly found in N. India, east to W. Bengal and south through whole of Peninsula scarcely found in NW India in drier biotope.

Extralimital : Pakistan, Nepal (Valley), Bangladesh, Sri Lanka.

Ali collected specimens from Jambughoda, Gujarat and Cambay town, also noted from Bhuj, Mandvi, Khari, Rohan, Anjar, Jakhan, Mata-no-Madh all from Kutch; Kodinar, Dalkhania, Bodeli (Baroda dist.), and Kahraghoda., Gujarat.

Z.S.I. party noted it in Dwarka and Okha during Nov. Dec. 1993.

145. Blackbellied or Grey Plover : *Pluvialis squatarola* (Linnaeus)

(*Tringa Squatarola* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 149 (Sweden);

Baker, FBI No. 2102, Vol. 6 : 156; Ali & Ripley, HB No. 371, Vol. 2 : 220).

*Local name* : Hindi Bada Batan

Size, common Myna, (12 in.), upperparts scalloped dark brown except white tail, forehead white specked with black and sides of the head and neck streaked brown. Below, breast and flanks streaked and spotted brown rest white. Sexes alike.

It is very indistinguishable with other allied plover in the field due to marginal colour difference.

Winter visitor to India including islands. Chiefly to the sea board, erratically or as a straggler mostly on migration passage in autumn and spring. Recorded thus in the foothills and the plains.

Extralimital : Pakistan (Makran coast), Nepal, Sri Lanka, Burma, Thailand, Malaya (Passage migrant). Breeds in Arctic Tundra of Europe and Asia.

Ali noted this bird at Mandvi (Kutch).

Hume collected it from N. Gujarat on the shores of the Rann and also noted along the coast of Kutch and Kathiawar, Gujarat. (S.F., iv : 11).

146. Eastern Golden Plover : *Pluvialis dominica* fulva (Gmelin).

(*Charadius fulvus* Gmelin, 1789, Syst. Nat. 1 (2) : 687 (Tahiti); Baker, FBI No. 2120, Vol. 6 : 178; Ali & Ripley, HB No.373, Vol. 2 : 222).

*Local name* : Hindi Chhota Batan.

Size (9-9.5 in.), a typical plover with rounded head and short pigeon-like bill, swollen at base, above brown, white and golden yellow. Below, whitish, the breast mottled with brown, grey, and yellow. Fanned out tail at flight and narrow pointed wings are diagnostic. Sexes alike. Usually keeps in flocks of atleast 15-20 numbers.

Winter visitor, practically all India, but more chiefly found in NE & E. India than N. & NW India in suitable biotope, including all islands.

Extralimital : S. and E. Asia, N. America, S. America and Oceania.

Ali collected one specimen in Mandvi (Kutch) and also noted from Mithapur (ca. Dwarka).

147. Large Sand Plover : *Charadius leschenaultii* Lerson.

(*Charadius Leschenaultii* Lerson, 1826, Dict. Sci. Nat., ed. Levrault, 42 : 36 (Pondicherry, India);

Baker, FBI No. 2118, Vol. 6 : 175; Ali & Ripley, HB No. 374, Vol. 2 : 226).

Size. (8-9 in.), forehead and supercillia fulvous-white, with a broad brown band from lores under eye to ear coverts. Rest of upperparts ashy brown. Below white, with a pale brown band across breast (Ali & Ripley). (Winter).

Winter visitor to the entire seaboard of India and islands. Sparsely winters in the Gujarat sea-shore.

Extralimital : S.Asia, S. Africa, Australia etc.

Ali noted it from Mandvi, Khandla, Lakhpat all in Kutch and Kodinar (Saurashtra), Gujarat.

148. European Little Ringed Plover :  
*Charadrius dubius curonicus* (Gmelin)

(*Charadrius curonicus* Gmelin, 1789, Syst. Nat. 1 (2) ; 692 (Kurland); Baker, FBI No. 2114, Vol. 6 : 171; Ali & Ripley, HB No. 379, Vol. 2 : 231).

*Local names* : Hindi Zirra, Merwa

Size. Lesser Sand Plover (6-7 in.), a typical Little Plover with round black and white head, yellowish legs and short pigeon-like bill. A double collar on hindneck (the upper white and lower black) and black nuchal collar across upper breast are diagnostic.

Almost all the Plovers of same sizes are inseparable in the field. This race also indistinguishable from many other allied races in the field.

Status uncertain, since its separation from the allied Indian race, viz. *Jerdoni* rests solely on marginal wing length.

Breeds in Ladakh and Kashmir in our Indian limit and winters or passage migrant and sporadically recorded in our Indian limit.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Africa, Arabia, S. China, Malay (Winter). Breeds in the Palearctic Region.

Ali collected specimens from Nakhatrana and Khavda (Pechham Island) both in Kutch, Gujarat.

149. Indian Little Ringed Plover :  
*Charadrius dubius jerdoni* (Legge)

(*Aegialitis jerdoni* Legge, 1880, Proc. Zool. Soc. London : 39 (Ceylon and Middle India);

Baker, FBI No. 2115, Vol. 6 : 171; Ali & Ripley, HB No. 380, Vol. 2 : 231).

*Local names* : As in earlier race.

Size, same as earlier race and also same plumage colour except slightly larger wing from earlier race.

Resident, throughout the entire Indian Union from the Himalayas to Kanyakumari, east to Assam in suitable well watered biotope.

Extralimital : Palearctic (Breeding), S.Asia, N. Guinea and Africa.

Ali collected specimens from Dabka (Baroda dist.) and Vaghjipur (Mehsana dist.), Gujarat.

150. Kentish Plover : *Charadrius a.*  
*alexandrinus* Linnaeus

(*Charadrius alexandrinus* Linnaeus, 1758, Syst. Nat., ed., 10 ; 1 : 150 (Egypt) ;

Baker, FBI No. 2106, Vol. 6 : 161 ; Ali & Ripley, HB No. 381, Vol. 2 : 235).

Size. Grey Quail (6-7 in.), similar to juvenile Little Ringed Plover but blackish v. yellowish legs, and a small dark patch on each side of upper breast, a complete pectoral band, are leading pointers. (winter). Male (Breeding) crown bright rufous, and white collar on hindneck not separated from back by a black band. Female more or less as in winter.

Breeds in N. Bihar (Darbhanga), Gujarat (Bhavnagar, Porbunder, Kharaghoda) and also winters to the rest of India including Maldives and Laccadive Islands. Status of this race is uncertain due to certain sporadic breeding records in our Indian limit.

Extralimital : Holarctic breeding sp., found also in Africa, Australia and S. America.

Ali collected specimens from Bodeli (Baroda dist.) and elsewhere noted.

Ali further commented as "The Kentish Plover is a resident in Saurashtra, and possibly

also in Kutch, has only lately been proved by the discovery of its breeding in Bhavnagar and Porbunder by DKS in June 1946 and subsequent years (JBNHS, 46 : 728/29 ; 48 : 809 10)"

151. Pamir Lesser Sand Plover : *Charadrius mongolus atrifrons* Wagler

(*Charadrius atrifrons* Wagler, 1829, Isis von Oken, Col. 650 (Bengal); Baker, FBI No. 2117, Vol. 6 : 174; Ali & Ripley, HB No. 384, Vol. 2 : 238).

Size. (6-7 in.), forehead twany, upperparts sandy brown and white below. A dark patch behind eye on white sides of head (Winter).

Forehead and sides of the head black; crown and hind neck rusty. Rest of upper parts sandy brown. Below, upper breast pale chestnut, seperated from white throat by a blackish half collar. (Summer). Sexes alike.

Breeds in Ladakh, Lahul and Sikkim (c. 3900-5500 mt.), of our limit and abundant winter visitor to the seabound to entire Peninsula to W. Bengal and passage migrant in N. Bihar, Assam, Manipur, Rajasthan of the Indian limit, including isalnds.

Extralimital : S. and N. Asia, E. Africa, New Guinea and Australia.

Ali noted it in Mandvi, Khandla (Kutch) and Kodinar (Saurashtra), Gujarat.

152. Whimbrel : *Numenius p. phaeopus* (Linnaeus)

(*Scolopax Phaeopus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 146 (sweden); Baker, FBI No. 2135, Vol. 6 : 203; Ali & Ripley, HB No. 385, Vol. 2 : 242).

Local name : Hindi Chhota goungh.

Size. Domestic hen (17 in.), a smaller edition of Curlew with decurved bill. Blackish crown with white supercillium on either side. Upper parts sandy brown with whitish spots, below white or whitish faintly streaked blackish on foreneck and breast. Sexes alike.

Winter visitor. Chiefly in W. India (Gujarat) and sparingly along the entire sea-coast south upto Kerala and all Islands of

the Indian limit. Also east of coastal Bengal. Also recorded in Kashmir (Hokarsar), U.P. (Lucknow), Bihar (Darbhanga), M.P. (Shehore). All are passage migrant recorded in the inland jheels.

Extralimital : An Holarctic breeding sp., wintering in tropical and southern latitudes in America, Africa, Asia, and Australia.

Ali noted this bird at Mandvi, Kandla (Both Kutch), Navlakhi (Morvi), Mithapur (Okhamandal) all in Saurashtra.

Plentiful on the muddy shores of Gulf of Kutch, between Navlakhi and Kandla, in June/ July and also rest of the year (Ali).

153. Eastern Curlew : *Numenius arquata orientalis* C.L. Brehm.

(*Numenius orientalis* C.L. Brehm, 1831, Handb. Naturg. Vog, Deutschl : 610 (East India)

Baker, FBI No. 2134, Vol. 6 : 202, Ali & Ripley, HB No. 388, Vol. 2 : 246).

Local names : Hindi Goar, Goungh  
Gujarati Khalili.

Size. Large domestic hen (23 in), large darkish sandy brown wader with long, slender decurved bill. Scalloped with fulvous above, streaked with balck on the whitish underparts. Sexes alike.

Winter visitor to the entire seaboard of Indian Union including all Islands. Also recorded springly throughout India in inland water during cold season.

Extralimital : A Palaearctic breeding sp., wintering in S. Europe, Africa and S. Asia.

Ali collected specimens from Mandvi (Kutch) and Dabka (Baroda dist.), also noted from Kandla (Kutch), Bhuj, Khavda (Kutch), Bedi Bunder, Dwarka, Mithapur (all Saurashtra), Cambay town and Kanewal (Cambay) Radhanpur (Viramgram), Kharaghoda, Gujarat.

Butler noted it in N. Gujarat, immense flocks often 200-300 birds (S.F., iv : 16 - 1876).

Ali further noted that this bird seen in the Gulf of Kutch throughout the year.

Z.S.I. party noted 1-3 birds in the

Nalsarobar (Gandhinagar dist.), Gujarat during October' 1993.

154. Balcktailed Godwit : *Limosa l. limosa*  
(Linnaeus)

(*Scolopax Limosa* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 147 (Sweden); Baker, FBI No. 2137, Vol. 6 : 205; Ali & Ripley, HB No. 389, Vol. 2 : 249).

*Local names* : Hindi Gudera, Khag

Size, domestic hen. (16-19 in), dark sandy brown above and whitish below, slender, straight bill. White tail tipped broad black and black wing with white sub-terminal band is diagnostic clue. Sexes alike.

Winter visitor. N. India, rare in Kashmir, east to Bihar, Orissa and W. Bengal, gradually thin to southern Peninsula in inland jheels, tridal creeks, estuaries and brakish water.

Extralimital : A Palaeartic breeding sp., wintering in Europe, Asia, Africa and Australia.

Ali collected specimens from Kharaghoda, Gujarat and noted from Mandvi (Kutch) and Rudra Mata (Bhuj).

Z.S.I. party noted it from Khijidia Bird Sanctuary (Jamnagar dist.), Gujarat in Nov. 1993.

155. Bartailed Godwit : *Limosa l. lapponica*  
(Linnaeus)

(*Scolopax lapponica* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 147 (Lapland); Baker, FBI No. 2139, Vol. 6 : 208; Ali & Ripley, HB No. 391, Vol. 2 : 252).

*Local names* : As in earlier race.

Size. (14-15 in.). Similar to Blacktailed Godwit but differ from the earlier race by the absence of white wing bar and presence of particoloured black and white tail. Sexes alike.

Winter visitor, chiefly to the seaboard of W. India (Kutch, Saurashtra) and decreasingly south to about Bombay, Vagrant to further south, straggling in Bihar and Punjab Salt Range.

Ali collected specimen from Kandla (Kutch) and noted from Bhuj, Gujarat.

156. Spotted or Dusky Redshank : *Tringa erythropus* (Pallas)

(*Scolopax erythropus* Pallas, 1764, in Vroeg's Cat., Abumbr. : 6 (Holland); Baker, FBI No. 2149, Vol. 6 : 223; Ali & Ripley, HB No. 392, Vol. 2 : 255).

*Local names* : Hindi Batan, Gatni

Size : Common Myna (13 in.), greyish brown and white wader with longish orange-red and slender straight bill. Plumage profusely spotted and barred with white. Tail ashy brown, barred with white on edges. Sexes alike.

Winter visitor, practically all India from Kashmir Valley down to the plains in suitable habitat. More common in the coastal region and less in N.E. India.

Extralimital : A Palaeartic breeding sp., wintering in Africa and s. Asia.

Butler noted it as not uncommon in N. Gujarat in the cold weather (S.F., iv : 18 1876).

157. Eastern Redshank : *Tringa totanus eurhinus* (Oberholser).

*Totanus totanus eurhinus* Oberholser, 1900, Proc. U.S. Nat. Mus. 22 : 207 (Tso Moriri lake, 15000 ft., Ladakh);

Baker, FBI No. 2147, 2148, Vol. 6 : 221, 222; Ali & Ripley, HB No. 393, 394, Vol. 2 : 257).

*Local name* : Hindi Chhota Batan

Size. (11 in.). Greyish brown above and white below. Tail white, barred with brown. Slender orange-red legs and slender orange-red and black bill. Sexes alike.

Breeds in Kashmir and Ladakh, between c. 3300-5200 mt. in our limit and winter throughout the Indian Union in all kinds of water sources, including all islands.

Extralimital : A Palaeartic breeding sp., wintering in S. Europe, Asia, and Indonesia.

Migration "Vast concentration of Redshanks together with thousand upon thousand of Ruff and Reeve and assorted small waders assemble on the squenlchy mud and shallow at the mouth of Banas river, Little Rann

of Kutch (Gujarat), prior to emigration presenting a truly astonishing spectacle" (Ali & Ripley H.B.).

Ali collected specimens from Kandla and Mandvi (Kutch), Gujarat and also noted many at the mouth of Banas River opposite Dhutari Mata in the Little Rann in March.

Z.S.I. party noted a good population both in Nalsarobar (Gandhinagar dist.) and Khijidia Bird Sanctuary (Jamnagar dist.), Gujarat during Oct. Nov. 1993.

158. Marsh Sandpiper or Little Greenshank:  
*Tringa stagnatilis* (Bechstein).

*Totanus stagnatilis* Bechstein, 1803, Orn. Taschenb, Deutschl. 2 : 292, Pl. 29 (Germany); Baker, FBI No. 2144, Vol. 6 : 216; Ali & Ripley, HB No. 395, Vol. 2 : 259).

Length c. (9 in.). Daintiest and most beautiful of our sandpiper and a miniature of Greenshank. Greyish brown with forehead, supercillium, sides of the head, lower back and rump and underparts pure white, slender, straight black bill and slender greenish legs. Sexes alike. (Winter).

Winter visitor, practically in the entire Indian Union in all types of inland waters and inundated paddyfield.

Extralimital : SE Europe, Africa, S. Asia and Australia.

Ali collected specimens from Kandla (Kutch) and Bhuj and also noted from Nakhatrana, Khavda, Mandvi, Khadir, all in Kutch, Radhanpur and Rajpipla.

Z.S.I. party noted a good numbers of this birds in Nalsarobar (Gandhinagar dist.); Gujarat during October, 1993.

159. Greenshank : *Tringa nebularia*  
(Gunnerus).

(*Scolopax nebularia* Gunnerus, 1767, in Leem, Beskr. Finm. Lapper : 251 (Norway); Baker, FBI No. 2150, Vol. 6 : 225; Ali & Ripley, Hb No. 396, Vol. 2 : 261).

Local name : Hindi- Tantana

Length (14 in). The largest of our sandpipers. Plumage colouration is almost same with earlier race but with larger tarsus (over 50 mm.) and larger bill (Over 48 mm.). Sexes alike (Winter).

Winter visitor, common in suitable biotope with other sandpiper in the entire. Indian Union including all Islands.

Extralimital : A Palaearctic breeding sp., wintering to Africam, S. Asia, Australia and New Zealand.

Ali collected specimens from Bodeli (Baroda dist.) and Vaghjipur (Mehsana dist.), Gujarat.

Z.S.I. party noted it in mixed flocks with others in Nalsarobar (Gandhinagar dist.), Kamaleswar Dam, Gir national Park and Khijidia Bird Sanctuary (Jamnagar dist.), Gujarat during Oct. Nov. ' 1993.

160. Green Sandpiper : *Tringa ochropus*  
Linnaeus

(*Tringa Ochropus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 149 (Sweden); Baker, FBI No. 2143, Vol. 6 : 215; Ali & Ripley, HB No. 397, Vol. 2 : 263).

Local names : Hindi As in earlier race  
Gujarati Leeli tutvari.

Length (9-10 in.). Head and neck ashy brown; rest of upperparts dark brown glossed with bronze-green. Rump and tail more or less pure white, the latter faintly barred with blackish. Below, white, finely streaked with brown on throat, breast and flanks. (Ali & Ripley). Sexes alike.

Winter visitor to the entire Indian Union including islands in all types of inland water tracts.

Extralimital : A Palaearctic breeding sp., wintering in the Mediterranean Africa, S. Asia and the Philippines.

Ali collected specimens from Bodeli (Baroda dist.), Vaghjipur (Mehsana dist.), Galkund (Surat Dangs) and Dalkhania (Amreli dist.) and also noted elsewhere from Gujarat.

Z.S.I. party noted it in Verabal, Dwarka and Okha, Gujarat, during Oct. Nov. ' 1993.

161. Wood or Spotted Sandpiper : *Tringa glareola* Linnaeus.

(*Tringa Glareola* Linnaeus, 1758, Syst. Nat. ed. 10, 1 : 149 (Sweden); Baker, FBI No. 2146, Vol. 6 : 219; Ali & Ripley, HB No. 398, Vol. 2 : 265).

*Local name* : Hindi Chupka, Titvari

Length (8-9 in); above, greyish brown and sepia brown indistinctly spotted and marked with white. A whitish supercilium. Lower back, rump, and tail white, the last barred with blackish. Below, breast pale dusky, rest of the underparts white. Sexes alike. (Winter Ali & Ripley).

Winter visitor, common and widespread in all over India including islands in suitable well-watered biotope.

Extralimital : As in earlier race.

Ali collected specimen from Bodeli (Baroda dist.), Gujarat.

162. Tarek Sandpiper : *Tringa terek* (Latham)

(*Scolopax terek* Latham, 1790, Index Orn. 2 : 724 (Terek river); Baker, FBI No. 2141, Vol. 6 : 212; Ali & Ripley, HB No. 400, Vol. 2 : 269).

Length (8-9 in.). Greyish brown above with forehead and supercellium and underparts white. Slender upcurved bill and short orange-yellow legs diagnostic. Sexes alike.

Winter visitor to the entire Indian Union including island in seashore, swamps, tidal creeks and mudflats.

Extralimital : A Palaearctic breeding sp., wintering in E. Africa, S. Asia, and Australia.

163. Common Sandpiper : *Tringa hypoleucos* Linnaeus.

(*Tringa hypoleucos* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 149 (Sweden); Baker, FBI No. 2145, Vol. 6 : 217; Ali & Ripley, HB No. 401, Vol. 2 : 271).

*Local names* : Hindi- Chupka, Titvari

Gujarati Samanya tutvari

Length (7-8 in.). upper parts olive brown.

Below white with broad diffuse dusky band across breast. A vertical white stripe between wing shoulder and dusky breast band diagnostic. Sexes alike.

Breeds in Kashmir, Ladakh and Garhwal upto c. 3200 m. alt in our Indian limit. Winters all over India including inlands, in large numbers in all types of water sources.

Extralimital : A Palaearctic breeding sp., wintering in S. Europe, Africa, S. Asia, Philippines and Australia.

Ali collected specimens from Anjar (Kutch) and Bodeli (Baroda dist.), Gujarat.

Sparsely found with others in the marshes and jheels along the coast line of Gujarat.

Butler noted it not very common in N. Gujarat (S.F., v : 212 1877)

164. Turnstone : *Arenaria i. interpres* (Linnaeus).

(*Tringa Interpres* Linnaeus, 1758, Syst. Nat., ed. 10, 1 ; 148 (Sweden); Baker, FBI No. 2101, Vol. 6 : 154; Ali & Ripley, HB No. 402, Vol. 2 : 274).

Size, Grey Quail +. length (8-9 in.). A dark brown and white wader with diagnostic glistening white chin and throat, straight conical black bill and orange-red legs. Sexes alike. (Winter).

Winter visitor to the entire seaboard of the Indian Union including islands. Chiefly found in a small party among with other allied winter migrant.

Extralimital : Winters similar to earlier race. Breeds on Arctic coast and Tundras.

Commonly found in the entire coast line of Gujarat with other waders.

Ali noted one solo bird in a freshwater village tank near the Great Rann.

Z.S.I. party noted it from Verabal, Nalsarobar (Gandhinagar dist.), Dwarka and Okha, Gujarat, during Oct.- Nov. 1993.

166. Pintail Snipe: *Capella stenura* (Bonaparte).

(*Scolopax stenura* Bonaparte, 1830, Ann. Ster. Nat. Bologna 4 : 335 (Sunda Islands);

Baker, FBI No. 2173, Vol. 6 : 263; Ali & Ripley, HB No. 406, Vol. 2 : 282).

*Local name* : Same as Common / Fantail snipe.

*Size* : Grey Quail; Length (10 - 11 in.). Very similar to very commonly observed Fantail Snipe but under wing coverts and axillaries much more heavily and darkly barred than in Fantail Snipe. Bill horny brown and legs greyish green. Sexes alike.

Winter visitor to the entire Indian Union including islands in all kinds of inland waters more particularly in marshes and large jheels.

Extralimital : Winters similar to earlier race. Breeds in E. Siberia, N. Tibet, Amurland.

166. Common or Fantail Snipe : *Capella g. gallinago* (Linnaeus)

(*Scolopax Gallinago* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 147 (Sweden); Baker, FBI No. 2170, Vol. 6 : 259; Ali & Ripley, HB No. 409, Vol. 2 : 287).

*Local names* : Hindi Chaha  
Gujarati Garhod.

*Size*. Grey Quail. Length (10 - 11 in.). Very similar to Pintail Snipe and very indistinguishable in the field from Pintail Snipe. A brown obliteratively patterned marsh-hunting bird with straight slender bill. Dark brown above heavily streaked with black, rufous and buff. Three outer pairs of tail feathers marked with dusky spots and bars. Sexes alike.

Partly resident in Kashmir & Garhwal etc. (Himalayas); Chiefly a common and abundant winter visitor to the entire Indian Union including islands in all suitable habitats.

Extralimital : S. Asia, Europe, Mediterranean, E. Africa.

Ali collected specimens from Dhari (Amreli dist.) and also noted from Anjar (Kutch sept. 16).

Z.S.I. party noted a flock of 15-20 birds in the muddy salt pans opposite to Khijidia Bird Sanctuary (Jamnagar dist.), Gujarat in Nov. 1993.

167. Jack Snipe : *Capella minima* (Brunnich).

(*Scolopax Minima* Brunnich, 1764, Orn. Boreal : 49 (Denmark); Baker, FBI No. 2175, Vol. 6 : 265; Ali & Ripley, HB No. 410, Vol. 2 : 290).

*Local name* : Hindi Chhota Chaha

*Size*. Common Myna : Length (8-9 in.). Smaller edition of Fantail Snipe but with relatively shorter and stouter bill and much metallic green and sheen in the streaked dark brown upper plumage. Tail short and wedge-shaped, uniformly dark. Sexes alike.

Winter visitor in smaller numbers and irregular visitor to the entire Indian Union in and around jheels, marshes and muddy cultivated fields.

Extralimital : A Palearctic sp., wintering in S. Europe, S. Asia, Middle East.

Ali collected specimens from Chaduva (Bhuj dist.).

168. Woodcock : *Scolopax r. rusticola* Linnaeus.

(*Scolopax Rusticola* Linnaeus, 1758, Syst. Nat. ed. 10, 1 : 146 (Sweden); Baker, FBI No. 2167, Vol. 6 : 252; Ali & Ripley, HB No. 411, Vol. 2 : 292).

*Local names* : Hindi Simteetar, Tuteetar

*Size*. Domestic Pigeon. Length (14 in.). An outsized snipe, above, brownish grey blotched and barred with black, rufous and buff, nape cross barred black and rufous. Whitish chin and underparts brownish white barred with darkish brown. Long slender straight bill swollen at tip is diagnostic. Sexes alike.

Breeds in the Himalayas between c. 2000 - 3800 mt. and descends in winter to the lower elevation and sparsely dispersed in the entire India in swampy glades with dense undergrowth, dark ravines in sholas and evergreen forest etc.

Extralimital : A Palearctic breeding sp., N. Burma, E. China, Japan and S. Asia.

Maharao Madansinhji noted and collected one specimen ca. Chakar (Bhuj dist.) on 19-11-1942 (JBNHS, 43 : 661). Sir Peter

Culterback noted one example at Hamisar Tank, Bhuj city in Jan. 1945 (Ali JBNHS, 52 : 420), (Ali), further noted this bird at Mt. Abu on 2nd July 1949 (JBNHS, 48 : 585).

169. Sanderling : *Calidris albus* (Pallas).

(*Trynga (alba)* Pallas, 1764, in Vroeg's Cat. Abumbr. 7 (Coast of the North Sea); Baker, FBI No. 2153, Vol. 6 : 231, Ali & Ripley, HB No. 414, Vol. 2 : 298).

Size, Grey Quail : Length. (7-8 in.). A plump little shore bird with slender bill whitish and blackish shoulder patch and conspicuous white bar during flight. Hind toe absent. Sexes alike.

Sparse winter visitor to the sea board of Indian limit. This bird may springly be observed in the coastline of Gujarat.

Extralimital : An Holarctic sp., wintering, in S. Asia, Europe, Madagascar, Australia, America.

170. Little Stint : *Calidris minutus* (Leisler).

(*Tringa minuta* Leisler, 1812, Nachtrage ZU Bechstein's Naturg. Deutschl. : 74 (Germany); Baker, FBI No. 2155, Vol. 6 : 234; Ali & Ripley, HB No. 416, Vol. 2 : 301).

*Local names* : Hindi - Chhota Panlowwa

Size. Grey Quail. length (6 in.). Our smallest wader, slightly larger than House sparrow. Dusky above and white below, straight bill and blackish legs. Sexes alike.

Winter visitor, main on the coastline of the entire Indian Union including islands, commonly found in large flocks on tidal mudflats, larger jheels and other water sources in Gujarat.

Extralimital : Pakistan, Nepal (?), Sri Lanka, Bangladesh, Africa, Breeds in Arctic Tundra.

Ali collected specimens from Kandla and Khari Rohar both from Kutch and Bodeli (Baroda dist.), Gujarat.

Z.S.I. party noted a large flocks in the Khijidia Bird Sanctuary (Jamnagar dist.), Gujarat in Nov. '1993.

171. Temminck's Stint : *Calidris temminckii* (Leisler)

(*Tringa Temminckii* Leisler, 1812, Nachtrage ZU Bechstein's Naturg. Deutchl : 64 (Germany); Baker, FBI No. 2158, Vol. 6 : 237; Ali & Ripley, HB No. 417, Vol. 2 : 303).

*Local name* : Hindi Chhota Panlowwa

Size. House sparrow, length (6 in.). Similar to Little stint but greyer brown and less mottled above; less purely white below, with the breast light brownish grey. Sexes alike.

Winter visitor to the entire Indian Union including islands in freshwater marshes. tidal mudflats and large jheels.

Extralimital : Same as earlier race.

Ali collected specimens from Mandvi (Kutch); Bodeli (Baroda dist.) and Vaghjipur (Mehsana dist.), Gujarat.

172. Dunlin : *Calidris a. alpinus* (Linnaeus).

(*Tringa alpina* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 149 (Lapland); Baker, FBI No. 2161, Vol. 6 : 241; Ali & Ripley, Hb No. 420, 421, Vol. 2 : 308).

Size, Redvented Bulbul. Length (7-8 in.). Above greyish brown with fine dark mottling; below, white, with a diffuse greyish- streaked band across breast. Blackish upper tail coverts. Sexes alike.

Winter visitor. Common and more abundantly found along the coast line of W. India and Sparsely winters from Kashmir to Kerala and east to Assam of the Indian limit.

Extralimital : Same as earlier race.

Ali collected specimen from Kandla, Kutch, Gujarat.

Z.S.I. party noted this bird in verabal and Okha, Gujarat during Oct. Nov. 1993.

173. Curlew Sandpiper : *Calidris testaceus* (Pallas).

(*Scolopax testacea* Pallas, 1764, in Vroeg's Cat. Adumbr. : 5 (Holland); Baker, FBI No. 2160, Vol. 6 : 240; Ali & Ripley, HB No. 422, Vol. 2 : 310).

Size. Bulbull. Length (8 in.). Above greyish brown with fine dark mottling; below, white, with the breast streaked and washed with brown and white upper tail coverts. Sexes alike.

Common winter visitor to the entire seaboard of the Indian Union including islands. Commonly found in muddy saltpans and tidal creeks in Gujarat.

Extralimital : Winter same as earlier race. Breeds in N. Asia.

Ali collected specimens from Kandla, Kutch, Gujarat.

Z.S.I. party noted a large flocks mixed with others in the saltpans opposite to the Khijidia Bird sanctuary. (Jamnagar dist.) Gujarat during Nov.' 1993.

174. Broadbilled Sandpiper : *Limicola f. falcinellus* (Pontoppidan).

(*Scolopax Falcinellus* Pontoppidan, 1763, Dansk. Atlas 1 : 623, pl. 25 (Denmark); Baker, FBI No. 2163, Vol. 6 : 245 ; Ali & Ripley, HB No. 424, Vol. 2 : 315).

Size. Grey Quail +. Length. (6-7 in.). Very similar to Dunlin and Curlew-Sandpiper but more slightly downcurved bill. Above dark-mottled greyishbrown and white below. Long whitish supercilium and blackish wing-shoulder patch are diagnostic. Sexes alike.

Winter visitor to the seaboard of India and its islands. Very rarely winters in the tidal mudflats, muddy creeks of Gujarat. Not yet recorded from Gujarat till date.

Extralimital : Pakistan, Sri Lanka, Bangladesh, Mediterranean and Black, Caspian, and Red seas, Persian Gulf (Winter). Breeds in the Palaearctic Region.

175. Ruff : *Philomachus pygnaeus* (Linnaeus)

(*Tringa Pugnax* Linnaeus, 1758, Syst. Nat. ed. 10, 1 : 148 (southern Sweden); Baker, FBI No. 2152, Vol. 6 : 228; Ali & Ripley, HB No. 426, Vol. 2 : 318).

Local names : Hindi Gehwala, Bagbad.

Gujarati

Size, Grey Partridge (Ruff-male); Grey

Quail (Reeve -female); Length (- 12 in & 10 in.). A dumpy greyish brown wader with bold blackish scaly-patterned upperparts relatively short bill. Narrow white wing bar and a white patch on dark tail on either side are diagnostic. (- winter).

Sparse winter visitor to all India excluding islands, in estuaries, tidal creeks, muddy saltpans in Gujarat.

Ali noted it from Anjar, Khavda, Bhuj (Kutch). Pung Bet (Little Rann.), Mithapur (Okhamandal), Baduchi and Kanewal (Cambay), Gujarat.

Ali further noted thousands of birds with other waders on the mudflats near Pung Bet ca. Banas River debouches into the Little Rann of Kutch.

176. Rednecked Phalarope : *Phalaropus lobatus* (Linnaeus).

(*Tringa tobata* (Sic) Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 148 (Hudson Bay); Baker, FBI No. 2166 m Vol. 6 : 249; Ali & Ripley, HB No. 428, Vol. 2 : 323).

Size, Grey Quail. Length (7-8 in.). Grey above and white below, with a blackish eye-patch. Sexes alike, male smaller.

Sporadic winter visitor along the coastline of India recorded also as passage migrant (spring/autumn) in Delhi, Bihar, Kutch (ca. Bhuj) of our Indian limit.

Extralimital : A Holarctic breeding sp., wintering off the S. America coast, Indian Ocean, Moluccan and Banda seas.

Family ROSTRATULIDAE  
(Painted snipe)

Bill slender and long; tip slightly swollen and bent down; both mandibles grooved at the base. Wings short, broad, rather rax. Female large and brighter coloured than male. Affects marshes, soft muddy patches and thick shrubby vegetation. Represent by one resident species in our Indian limit.

177. Painted snipe : *Rostrallula b. benghalensis* (Linnaeus)

(*Rallus benghalensis* linnaeus, 1758, Syst.

Nat., ed. 10, 1 : 153 (Asia); Baker, FBI No. 2033, Vol. 6 : 45; Ali & Ripley, Hb No. 429, Vol. 2 : 325).

*Local names* : Hindi - Rajchada  
Gujarati - Pan Lauva.

*Size*. Grey Quail +. Length (10 in.). Above bronze - green with buff and blackish streaks and markings. White shoulder and breast patch. Chin, throat and upper breast chestnut diffusing to blackish. Rest of the underparts white. Whitish 'spectacles' with a white patch behind eye is diagnostic (Female). Male duller lacking chestnut and neck and breast.

Resident, throughout the Indian Union excluding islands in suitable biotope.

Extralimital : Africa, Madagascar, S. Asia, Indochina, Malaysia, Formosa, Philippines and Australia.

Ali noted it kutch in grassy marsland bordering jheels.

Butler shot one female example near Deesa (Palanpur), on 16th Sept. (S.F., iv : 16).

#### Family RECURVIROSTRIDAE (Stilts, Avocets and Ibisbill)

Thirteen species distributed in warmer parts of the world. Only three Genera supported by four species and sub-species found in the Indian sub-region and two races found in Gujarat. Ibisbill does not occur in Gujarat. Normally found in small parties or large roosting flock, foraging in shallow open water in lagoons and marshes.

#### 178. Indian Blackwinged Stilt : *Himantopus h. himantopus* (Linnaeus)

(*Charadrius Himantopus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 151 (Southern Europe); Baker, FBI No. 2130, Vol. 6 : 193; Ali & Ripley, HB No. 430, Vol. 2 : 329).

*Local names* : Hindi - Gaz paon, Tinghur

*Size*. Grey Partridge ±. length (10 in.). A lanky pied black and white marsh bird with straight slender bill, pointed black wings, and enormously long, thin reddish legs which trail behind in flight, making unique diagnostic character. (Male). Female has black portions of male replaced by brown.

Resident, thinly found in the entire Indian Union excluding islands from C. 1500 m. alt. down to the plains in the suitable habitat.

Extralimital : Pakistan, Nepal, Bangladesh, Breeds in the Mediterranean Regions and Malay, Egypt, Africa (S. of Sahara), Madagascar.

Ali collected specimens from Mandvi (Kutch) and Dabka (Baroda dist) and also noted from Bhuj, Lakhpat, Chobari, Khadir, Anjar etc. all from Kutch, Cambay, Dalcot (Kaira dist.), Vaghjipur (Mehsana dist.) Radhanpur and Viramgram etc. Gujarat.

Ali further noted that this bird is one of commonest waders on inland waters in Gujarat.

Z.S.I. party noted it from Nalsarobar (Gandhinagar dist.) Gujarat in October' 1993.

#### 179. Avocet : *Recurvirostra avosetta* Linnaeus.

*Recurvirostra avosetta* Linnaeus, 1758, Syst. nat., ed. 10, 1 : 151 (Italy); Baker, FBI No. 2131, Vol. 6 : 195; Ali & Ripley, HB No. 432, Vol. 2 : 332.)

*Local name* : Hindi - Kusya Chaha

*Size*. Grey Partridge +. Length (18 in.).

An elegant black and snowy white (Pied) marsh bird unmistakable with any other by its unique slender black upcurved bill and longish bare blue legs. Sexes alike (Ali & Ripley).

Breeds in kutch, Gujarat, mainly winter visitor in NW India and less common in the otherparts of the Indian Union including islands.

Extralimital : W.Europe, S. and W. Asia, Middle East and Africa (part).

Lester recorded it as very common in Kutch in winter (1895-6).

Ali recorded a breeding colony in the Great Rann. of Kutch, off Nir on Pechham Island (JBNHS, 45 (3) : 420).

Z.S.I. party noted this bird in good numbers in Khijidia Bird Sanctuary (Jamnagar dist.), Gujarat, in Nov. 1993.

#### Family DROMADIDAE (Crab Plovers)

Bill longer than head, strong, smooth and compressed. Wings long and pointed; toes long,

the 3rd and 4th joined by a broad web, the 2nd and 3rd by a small one. Affects tidal mudflats and estuaries, lagoon shores etc.

180. Crab Plover : *Dromas ardeola* Paykull.

(*Domus Ardeola* Paykull, 1805, kongl. Vet.-Acad. Nya. Nandl. 26 : 182, 188, pl. 8 (India); Baker, FBI No. 2057, Vol. 6 : 94; Ali & Ripley, HB No. 434, Vol. 2 : 337).

Size. Grey Partridge +. Length (16 in.).

A rather dumpy maritime wader. In flight the overall white plumage with black and wing quills, a smaller but striking black patch around eye, and particularly the rather heavy black tern-like bill simplify its differentiation from other pied waders, e.g. Avocet, Stilt etc. Sexes alike (Ali & Ripley).

Winter visitor in small numbers, locally and sporadically, to the sea coasts of Peninsular India and all Indian Islands in tidal mudflats, estuaries, lagoon shores, coral reefs etc.

Extralimital : Pakistan (Makran, sind), Sri Lanka (Resident ?), Bangladesh (?), N & E shores of Indian Ocean, Red Sea, Persian Gulf.

Family BURHINIDAE  
(Stone-Curlews, Thick-Kness)

Nine species of all tropical and temperate regions except North America. Two genus and four species and sub-species are represented in the Indian sub-region, and three of these are distributed in Gujarat. Largish waders with cryptic plumage of brown, black and white. Crepuscular or nocturnal, confined to beaches, islands, lagoons and large marshes.

181. Persian Stone Curlew : *Burhinus oedicnemus saharae* (Reichenow)

(*Oedicnemus oedicnemus saharae* Reichenow, 1894, Jour. F. Orn. 42 : 102 (Tunis); Baker, FBI No. 2048, Vol. 6 : 79; Ali & Ripley, HB No. 435, Vol. 3 : 1).

Local names : Hindi Karwanak, Barsiri

Size. Grey Partridge +. Length c. (16 in.).

A dark-streaked sandy brown plover-like

cursorial bird with thick head, long bare yellowish 'thick-kneed' legs, and huge yellow 'goggle' eye. A conspicuous white patch in the dark wings diagnostic. Sexes alike.

Resident. Sporadically distributed in NW India south through Rajasthan and N. Gujarat in open semidesert and stony scrub country. Largely crepuscular and nocturnal in habit.

Extralimital : Pakistan, Afghanistan, Persian Gulf, N. Africa, Crete, Cyprus, S. Palestine, Kara Korum desert.

Ali recorded stone - Curlews in Gujarat but upto specific level.

Ali collected specimens from Kutch, Bhuj, Nadiad (Kaira dist.) and Kharaghoda, Gujarat, and also noted from Mandvi, Nakhatrana, Anjar, Rapar, all in Kutch; Dwarka, Dalkhania (Amreli dist.), Ajwa (Baroda dist.), Cambay, Deesa (Palanpur), and Galkund (Surat Dangs), Gujarat.

Ali further noted that the specimens collected by him are intermediate in between Indian race *Indicus* and the paler and larger desert form *Saharae*.

182. Indian Stone Curlew : *Burhinus oedicnemus indicus* (Salvadori)

(*Oedicnemus indicus* Salvadori, 1865, Atti Soc. Ital. Sci. Nat. Milano 8 : 381 (India); Baker, FBI No. 2047, Vol. 6 : 77; Ali & Ripley, HB No. 436, Vol. 3 : 2).

Local name : Hindi Karwanak, Barsiri,

Size. Grey Partridge +. Length c. (16 in.).

Similar to earlier race but being smaller and darker.

Resident. All India excepting the range of earlier race from the plains upto the Himalayas (c. 1000 mt.) and with the same habit and habitat of the earlier race.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Burma, Thailand, Cambodia.

Gujarat, specially arid part offers a good asylum for this bird.

183. Great Stone Plover : *Esacus magnirostris recurvirostris* (Cuvier).

(*Oedicnemus recurvirostris* Cuvier, 1829,

Regme Anim, ed. 2, 1 : 500, note 2 (Nepal); Baker, FBI No. 2049, Vol. 6 : 90; Ali & Ripley, HB No. 437, Vol.3 : 5).

*Local name* : Hindi- Bada Karwanak

*Size*. Domestic hen. Length c. (20 in.).

A larger edition of Stone curlew, uniformly sandy above and white below. Massive slightly upturned black and yellow bill enormous yellowish 'goggle' eye with white spectacle around them and two blackish band above and below are diagnostic. Sexes alike.

Mainly resident with some local migration in the entire India excluding islands. Riverain in habit, thus affecting rocky beds of rivers and also in deciduous biotope.

*Extralimital* : Same as earlier race.

Ali collect specimen from Mandvi (Kutch) and also noted from Kandla, Dabka (Baroda dist.), Golana Cambay on the Mahi and Sabarmati Rivers.

(DKS) noted it from Porbunder (JBNHS, 48 : 809-10).

#### Family GLAREOLIDAE (Coursers and Pratincoles)

Some sixteen species, inhabiting in the warmer region except for the world. Two Genus and six species and sub-species are found in the Indian Sub-region, out of which the State of Gujarat shares four races.

Handsome, demurely coloured in buffy tans with black and white markings. They run well over their favoured habitat-sandy wasteland or short grass. Bill short, slightly decurved. Tail short and almost even.

#### 184. Creamcoloured or Desert Courser : *Cursorius c. cursor* (Latham)

(*Charadrius Cursor* Latham, 1787, Gen. Syn. Bds., Suppl. 1 : 293 (Kent); Baker, FBI No. 2051, Vol. 6 : 85; Ali & Ripley, HB No. 439, Vol. 3 : 8)

*Local names* : Hindi Not recorded.

Gujarati Chhena bori

*Size*. Grey Partridge -. Length c. (9 in.).

A sandy buff cursorial bird with bare slender legs and black arching bill. Ashy-grey

and rufous crown with black and white stripe behind eye to nape and wing primaries edged black are diagnostic characters. Sexes alike.

Winter visitor. Sporadically found in NW India in Rajasthan (SE to ca. Ajmer) and Gujarat (Northern arid part) in semi- desert and desert country.

*Extralimital* : Pakistan (W), Somaliland (Winter). Breeds in N. Africa east through Iraq to Persia.

Ali collected specimens from Khavda (Pechham Island Kutch), Patan (Mehsana dist.), Radhanpur and Palanpur, Gujarat.

Butler suggested that it is winter visitor to N. Gujarat. (S.F., IV : 11).

#### 185. Indian Courser : *Cursorius coromandelicus* (Gmelin).

(*Charadrius coromandelicus* Gmelin, 1789, Syst. Nat., 1(2) : 692 (Coromandel Coast); Baker, FBI No. 2052, Vol. 6 : 86; Ali & Ripley, HB No. 440, Vol. 3 : 9).

*Local names* : Hindi Nuksi

*Size*. Grey Partridge -. Length c. (10 in.).

Like earlier race but crown chestnut with black nuchal spot. Undedpart black and bare white legs. Double black and white stripe from eye to nape is diagnostic. Sexes alike.

Resident, but partly nomadic; patchily and very thinly distributed all over Indian mainland excepting Assam and Manipur in waste and fallow land with scattered scrub and dry village grazing ground.

*Extralimital* : Pakistan (West), Nepal, Sri Lanka, Bangladesh.

Ali collected specimens from Kutch, Bhuj, Kodinar, Dabka (Baroda dist.), Deesa (Palanpur), Kharaghoda, Gujarat, and also noted from Anjar, Rapar, Mundra, Mandvi, Jakhan, Chobari (Bhachan dist.) all in Kutch; Dwarka, Mithapur, Amreli, Patan (Mehsana dist.) and Nadiad (Kaira dist.), Gujarat.

#### 186. Collared Pratincole or Swallow-Plover: *Glareola p. pranticola* (Linnaeus)

(*Hirundo pranticola* Linnaeus, 1766, Syst. Nat., ed. 12, 1 : 345 (Austria); Baker, FBI No. 2054, Vol. 6 : 89; Ali & Ripley, HB No. 442, Vol. 3 : 12).

Size. Myna +. Length c. (9 in.).

A short-legged plover, shaped like tern, with long narrow, pointed wings and deeply forked tail. Head and back olive-brown, tail black with white base. Chin and throat rufous buff bounded by black loop, rest of underparts brown to rufous brown. Sexes alike.

Straggler. Rarely winter in India, sporadically recorded from different parts of India and also recorded in Ahmedabad, Gujarat. Affects tidal creeks, estuaries and large jheels etc.

Extralimital : Pakistan (West-breeding, Sri Lanka (Winter). Breeds in the Mediterranean Countries and Black Seas east to Iraq and S. Persia.

187. Small Indian Pratincola : *Glareola lactea* Temminck.

(*Glareola lactea* Temminck, 1820, Man, D'orn., ed. 2, 2 : 503 (Bengal); Baker, FBI No. 2051, Vol. 6 : 92; Ali & Ripley, Hb No. 444, Vol. 3 : 15).

Size. Sparrow ± Length c. (6-7 in.).

A sandy grey fluviatile bird with pointed, swallow-like wings and slightly forked tail. Black band from eye to bill. Tail white tipped black. Sexes alike.

Resident, also nomadic and local migrant, sparsely distributed in all India in large placid streams and sandbars.

Extralimital : Pakistan (West), Nepal (Terai), Bangladesh, Sri Lanka.

No report so far been made about the presence of this bird in Gujarat till date.

Family LARIDAE  
(Gulls and Terns)

Of the roughly 90 species of gulls and terns Worldwide, 10 gulls and 26 terns are known from the Indian sub-region and out of which 16 gulls and terns are found or distributed in Gujarat.

Nearly exclusively coastal, except along larger water courses. Terns are also salt-water habitat. Generally white with grey or black on back, head, or wings. Bills and legs are brightly

coloured.

Terns differ from gulls in being much more lighter and with longer narrow wings. Gulls always settle on water, the tern donot. Bill straight, slender with pointed tips. Tail long and deeply forked or so. Legs and feet small.

Key to the Genera of the family LARIDAE

1. Bill stout; compressed, uppermandible longer than the lower; the tip of upper mandible curved .....*Larus*  
Bill slender, straight with pointed tip .....2
2. Tail short, generally half length of wing .....*Chlidonias*  
Tail long, generally longer than half length of wing .....3
3. Bill stout, culmen somewhat curved .....*Gelochelidon*  
Bill slender, culmen straight or nearly so .....*Sterna*

188. Yellowlegged Herring Gull : *Larus argentatus heuglini* Bree.

(*Larus Heulini* Bree, 1876, Bds. Eur., ed. 2, 5 : 58 (Zeyla, Somali land); Baker, FBI No. 2065, Vol. 6 : 107; Ali & Ripley, HB No. 450, Vol. 3 : 26)

Size. Domestic duck+. Length c. (23 in.).

A large heavy, snow white gull with mantle slaty grey. Wing - quills chiefly black. Legs and feet yellow; A bright red patch near tip of lower mandible is diagnostic. (Winter). Sexes alike.

Winter visitor along the coast of W. India to Bombay, rarely to Kerala.

Extralimital : Pakistan (Makran), Nepal, Sri Lanka, Persian Gulf, Red sea, Breeds in N. Siberia.

Ali noted it around Kandla (Kutch), Navlakhi and Kodinar (N. Gujarat) along the sea-coast.

189. Lesser Blackbacked Gull: *Larus f. fuscus* Linnaeus.

(*Larus fuscus* Linnaeus, 1758, Syst. Nat.

ed. 10, 1 : 136 (Sweden); Baker, FBI No. 2065, Vol. 6 : 107; Ali & Ripley, HB No. 452, Vol. 3 : 28).

Size. Same as earlier race.

Plumage pure white with blackish mantle and dark wings tipped white on primaries. Sexes alike.

Winter visitor, along the coast of W. India south to Kerala.

Extralimital : Breeds in W. and N. Europe, wintering from Africa to the Persian Gulf.

190. Great Blackheaded Gull : *Larus ichthyaetus* Pallas.

(*Larus ichthyaetus* Pallas, 1773, Reise, Russ. Reich. 2 : 713 (Caspian Sea); Baker, FBI No. 2060, Vol. 6 : 101; Ali & Ripley, HB No. 453, Vol. 3 : 29).

Local name : Hindi Dhomra

Size : Domestic duck +. Length c. (26 -28 in.).

Largest gull of our limit. Head and neck black with two small crescentic white patch above and below the eye. Mantle grey, rest pure white. Bill yellow. Sexes alike.

Winter visitor to the coast of India, not recorded from islands. No record so far from Gujarat but very well in the distributional range.

Extralimital : Breeds in S. Russia east to Mongolia, Wintering to the E. Mediterranean, Red Sea, Burma.

191. Brownheaded Gull : *Larus brunnicephalus* Jerdon.

(*Larus brunnicephalus* Jerdon, 1840, Madras Jour. Lit. & Sci. 12 : 225 (West coast of Indian Peninsula); Baker, FBI No. 2062, Vol. 6 : 103; Ali & Ripley, HB No. 454, Vol. 3 : 31).

Local name : Hindi Dhomra

Size : Jungle Crow ± Length c. (18 in).

Grey above and white below with a dark brown head and presence of a large white patch at the tip of black primaries is diagnostic (Summer).

Head greyish white with a vertical black crescent mark behind the ear (Winter). Sexes alike.

Breeds in Ladakh in our Indian limit. Winters to the entire sea-coast of India excluding Islands.

Extralimital : Pakistan, Nepal (Vagrant), Sri Lanka, Bangladesh, also Southern Asia (Winter). Breeds on the lakes of the high plateau of C. Asia.

Ali collected specimens from Okha and also noted it from Kodinar, Nir-Pachham Island (Great Rann.), Gujarat.

Z.S.I. party noted plenty on the sea in between Dwarka and Vet Dwarka in Nov. 1993.

192. Blackheaded Gull : *Larus r. ridibundus* Linnaeus.

*Larus ridibundus* Linnaeus, 1766, Syst. Nat., ed. 12, 1 : 225 (England); Baker, FBI No. 2061, Vol. 6 : 102; Ali & Ripley, HB No. 455, Vol. 3 : 33).

Local name : Hindi Dhomra

Size. House crow +. Length (17 in.).

A grey and white gull with blackish brown head. Very similar to brown headed gull in the field but smaller in size, in flight, white wing not display no white mirror near tip of primaries (Summer). Sexes alike.

Winter visitor to the entire sea coast of India excluding islands. Recorded on passage in different parts of mainland in India and on the mouth of the Hooghly River (Biswas).

Extralimital : Winter similar to earlier race except Sri Lanka. Breeds in the whole of the Palaearctic Region.

Ali collected specimens from Mandvi (Kutch) and also noted from Kandla, Meta-no-Madh, Nakhatrana (All in Kutch), Bhuj, Khadir Island, Nir (Pachham Island) in Rann. And Kodinar, Saurashtra, Gujarat.

Z.S.I. Party noted a very good numbers in Nalsarobar (Gandhinagar dist.), Dwarka and Okha, Gujarat, in Oct. Nov. 1993.

193. Slenderbilled Gull : *Larus genei* Breme

(*Larus Genei* Breme, 1839, Rev. Zool. : 321

(Sardinia); Baker, FBI No. 2064, Vol. 6 : 106, Ali & Ripley, HB No. 456, Vol. 3 : 35).

*Local name* : Hindi Dhomra

*Size*. House Crow +. Length c. (17 in.)

Similar to Blackheaded Gull but a complete pure white bird with mantle grey and bright red legs and bill. (Winter). Sexes alike.

Sparse winter visitor.

Possibly occur more commonly on the Kutch- Saurashtra Coast (Ali & Ripley).

Several specimen collected from Bombay (Navasro, 1967, JBNHS, 65 : 218).

Extralimital : Pakistan (Makran, Las Bela), N.W. Africa, Red Sea. Breeds on the Black and Caspian Seas, Persian Gulf, S. Spain.

194. Indian Whiskered Tern : *Chlidonias hybrida indica* (Stephens).

(*Viralva indica* Stephens, 1826, in Shaw's Gen. Zool. 13 (1) : 169 (Cawnpore, India); Baker, FBI No.2067, Vol. 6 : 111; Ali & Ripley, HB No. 458, Vol. 3 : 39).

*Local names* : Hindi - Tehari, Ganga Cheel, Machh louka, Koorari.

*Size*. Pigeon : Length c. (10 in.).

Slender silvery grey and white bird with long narrow pointed wings and forked tail. Very short red legs and red bill. Sexes alike.

Resident and / or breeding visitor in Kashmir and N. India (Gangetic Plains), east to Assam of our Indian limit. Winters over the Indian Union in estuaries, coastal lagoons, tidal mudflats, large inland water etc.

Extralimital : Pakistan, Nepal (low land), Sri Lanka, Bangladesh, Persian Baluchistan.

Ali collected specimens from Kandla (Kutch) and Dabka (Baroda dist.) and also noted from Anjar, Khadva, Nir (Pechham Island) all in Bhuj environs, Dwarka, Mithapur (Saurashtra region), Ajwa (Baroda dist.), and Kharaghoda, Gujarat.

Z.S.I. party noted this bird in Nalsarobar (Gandhinagar dist.), in October 1993.

195. Whitewinged Black Tern : *Chlidonias leucoptera* (Temminck).

(*Sterna leucoptera* Temminck, 1815, Man. d'Orn. : 483 (Coast of Mediterranean.); Baker, FBI No. 2070, Vol. 6 : 114; Ali & Ripley, HB No. 459, Vol. 3 : 41)

*Local name* : As earlier race.

*Size*. Pigeon : Length (9 -10 in.).

Similar to earlier race but smaller in size and duller in colouration (dull grey mantle).

Rare. winter visitor. Scattered records in our Indian limit. Recorded from Assam (Cacher), Bengal (Calcutta), M.P. (Raipur), Bombay, Gujarat, Andaman Islands.

Twice recorded Saurashtra (Jasdan, June, 1949 and 12. v. 1955, Y.S.Shivraj Kumar) JBNHS 49 : 310; 53 : 13).

Extralimital : Breeds in S. Europe, C. Asia, Wintering in Africa, Malaysia to Australia.

196. Gullbilled Tern : *Gelochelidon n. nilotica* (Gmelin).

(*Sterna nilotica* Gmelin, 1789, Syst. Nat. 1 (2) : 606 (Egypt); Baker, FBI No. 2072, Vol. 6 : 117; Ali & Ripley, HB No. 460, Vol. 3 : 42).

*Local name* : As earlier race.

*Size*. House Crow -. Length c. (15 in.).

A common pale grey and white tern with deep forked white tail and stout black bill. Head white streaked with black. Sexes alike.

Breeds in and winters widespread but locally / patchily in the entire Indian Union in the coastal mudflats, salt pans and back waters etc. from Rajasthan and the Gangetic Plains to Bihar south through Peninsula upto Kanyakumari and Maldiva Is.

Extralimital : Pakistan (Las Bela, Punjab, breeding), Sri Lanka (Winter).

Breeds in Europe and western three quarters of Asia. Winters in N. and E. tropical Africa, Persian Gulf.

Ali collected specimens from Mandvi (Kutch) and Dabka (Baroda dist.) and also noted from Kandla, Khadva, Lakhpat, Chobari

all in Kutch; Navlakhi (Morvi), Mithapur (Saurashtra), on Mahi Sabarmati rivers, Gujarat.

Z.S.I. party noted it in Veraual, Dwarka and Okha, Gujarat, in Oct. - Nov. 1993.

197. Caspian Tern : *Hydroprogne c. caspia*  
(Pallas)

(*Sterna caspia* Pallas, 1770, Comm. Acad. Sci. Petropol. 14 (1) : 582, Pl. 22 (Caspian Sea); Baker, FBI No. 2071, Vol. 6 : 115; Ali & Ripley, HB No. 462, Vol. 3 : 45)

*Local names* : Hindi - As earlier race.

*Size*. Jungle Crow +. Length c. (20 in.).

Largest tern in the Indian limit. Above, pearl-grey with white head and neck, streaked on crown with black, below pure white. Stout soral red bill and black legs and feet. Sexes alike.

Winter visitor. Sparingly found in the entire Indian Union excluding islands, except Maldives.

Extralimital : Pakistan, Sri Lanka also breeds in Europe and Asia and Africa, N. America. Winters in Africa and Sunda Is.

Ali noted it in Mandvi (Kutch), Nir (Pachham Island Great Rann.) and Mithapur (Okhamandal), Gujarat.

198. Indian River Tern : *Sterna aurantia* J.E.  
Gray.

(*Sterna aurantia* J.E. Gray, 1831, in Hardwicke's Ill. Ind. Zool. 1 (5) : pl. 69. f. 2. (India); Baker, FBI No. 2080, Vol. 6 : 125; Ali & Ripley, HB No. 463, Vol. 3 : 48)

*Local name* : Hindi as earlier race.

*Size*. House Crow +. Length c. (15-18 in.).

A slender, graceful fluviatile bird, pale grey above white below, with long narrow pointed wings, deeply forked tail, very short red legs, and pointed yellow bill. Sexes alike.

Resident and breeding widely on sandy islets in rivers, practically throughout the entire Indian Union excluding islands.

Extralimital : Pakistan, Nepal (Low

lands), Sri Lanka, Bangladesh, Burma, Malay east to Mekong River.

Ali collected specimens from Bodeli (Baroda dist.) and Sairat (Kaira dist.) and noted from Mithapur (Okhamandal), Radhanpur on Banas River and Mahi, Sabarati River, Gujarat.

199. Blackbellied Tern. *Sterna acuticauda*  
J.E. Gray.

(*Sterna acuticauda* J.E. Gray, 1831? (1830-1832), in Hardwicke's Ill. Ind. Zoo. 1(6): pl. 70, f. 3 (Cawnpore, India); Baker, FBI No. 2081, Vol. 6 : 127; Ali & Ripley, HB No. 470, Vol. 3 : 57).

*Local names* : Hindi as earlier race.

*Size*. House Crow. Length c. (13 in.)

Ashy grey above and black below. Forehead, crown, nape and crest glossy black, throat white, deeply forked tail (summer). Head white streaked with black, a black patch behind eye. Below white tinged with grey on fore neck and breast (winter). Sexes alike.

Resident, practically in the entire Indian Union excluding islands.

It is an essentially inland and freshwater tern.

Extralimital : Pakistan, Nepal, Bangladesh, Burma, Thailand and W. Indochina.

Ali collected specimen from Sairat (Kaira dist.) and noted from Bodeli (Baroda dist.) on Orsang River.

Z.S.I. party noted this bird in Nalsarobar (Gandhinagar dist.), Gujarat in October, 1993.

200. Little Tern or Ternlet : *Sterna a.*  
*albifrons* Pallas.

(*Sterna albifrons* Pallas, 1764, in Vroeg's Cat., Adumbr : 6 (Holland); Baker, FBI No. 2087, 2090, Vol. 6 : 135, 138; Ali & Ripley, HB No. 475, Vol. 3 : 64)

*Size*. Myna +. Length c. (9 in.).

Distinguish from all other grey and white terns by its diminutive size. Velvety black cap, white forehead, head orange yellow bill and feet (summer). Black cap mixed with white in winter. Sexes alike.

Resident and breeding in NW India, Gujarat (Bhavnagar), Occurs widely in N. India east to Assam, Peninsular India south to Kerala and Rameswaram Islands.

Extralimital : Pakistan, Nepal, Sri Lanka, Bangladesh, Somali Coast of Africa, (Winter). Breeds in Europe and Western Asia.

Ali collected specimens from Kandla and noted from Mandvi (Kutch), Nir (Pachham Island Gt. Rann.).

Ali further noted that, "It is impossible to distinguish between the typical race and *Saundersi* both of which wander freely into each others range"

201. Blackshafted Ternlet: *Sterna albifrons saundersi* Hume

(*Sterna saundersi* Hume, S.F. 5 : 324, note 325 (Karachi, Sind); Baker, FBI No. 2091, Vol. 6 : 138; Ali & Ripley, HB No. 476, Vol. 3 : 65).

Size. Same as earlier race.

Plumage same as earlier race but black on top of head does not taper to a point but has straight edge across forehead, legs and feet dusky yellowish olive and shafts of first three primaries black. Sexes alike.

Little definitely known. Sporadically recorded from Different partsof India.

Non- breeding specimens have been collected in Gujarat (Kandla, May; Pirotan Island, July)- (Ali & Ripley), Bombay Dharamtar Creek, April), Madras, Laccadive (Hume), Maldive Is.

Extralimital : Pakistan, Sri Lanka. Also southern coast of the Persian Gulf, Red Sea, Somali Coast of Africa.

202. Indian Lesser Crested Tern : *Sterna b. bengalensis* Lerson.

(*Sterna bengalensis* Lerson, 1831, Traite d'Orn., livr. 8 : 621 (Coast of India); Baker, FBI No. 2079, Vol. 6 : 124; Ali & Ripley, HB No. 479, Vol. 3 : 69)

Size. House Crow +. Length c. (16 -17 in.).

A large sea tern with black crown and nuchal crest down to the eyes in summer, lacking white lores and forehead. Underparts

white, mantle grey with lilac tinge. Tail greyish white. Lemon yellow bills and black legs. Sexes alike.

Resident : Occurs commonly along the western and eastern coast of India and its islands, but no direct evidence as yet.

Extralimital : Pakistan (Karachi), Sri Lanka, and Coast of S. Asia from the Persian Gulf to the Straits of Malacca, Sumatra, Java, Celebes.

203. Sandwich Tern : *Sterna s. sandvicensis* Latham.

(*Sterna sandvicensis* Latham, 1787, Gen. Sym. Suppl. 1 : 296 (Sandwich Kent, England); Baker, FBI No. 2074, Vol. 6 : 119; Ali & Ripley, HB No. 480, Vol. 3 : 70)

Size. House Crow +. Length c. (17 in.).

Similar to Gullbilled Tern but larger. Black bill longer and slender, tipped with yellow. A more pronounced nuchal tuft than in Gullbilled. Sexes alike.

Winter visitor. In India, sight recorded only in Saurashtra, Gujarat (DKS, 1958, JBNHS, 55 : 357) where possibly frequent in winter but overlooked amongst Gullbilled Tern. Essentially a maritime species (Ali & Ripley).

Extralimital: Pakistan, Europe, N. Africa, N. America, Red Sea, S. America.

Family PTEROCLIDIDAE  
(Sandgrouse)

Two genera, viz. *Syrrhapetes* and *Pterocles* are comprised of Indian sandgrouse. Eight species and sub-species are distributed in the Indian sub-region of which the share of Gujarat is only 4 races.

Sandgrouse are terrestrial pigeon-like bird with sandy brown colouration exquisitely patterned with disruptive black spots and vermiculation. Mostly they live in semi desert country.

This small game birds are now patchily/thinly or sparingly found in small numbers and always found in small parties

early in the morning or at dusk. very shy in nature, when disturbed, keep away a long distance by their strong flight.

204. Large Pintail Sandgrouse : *Pteroaes alchata caudacutus* (S.G. Gmelin).

(*Tetrao caudacutus* S.G.Gmelin, 1774, Reise Russl. 3 : 93, Pl. 18 (Northern Persia); Baker, FBI No. 1892, Vol. 5 : 268; Ali & Ripley, HB No. 486, Vol. 3 : 80)

*Local name* : None recorded.

*Size*. Pегion +. Length c. (15 in.).

An overall sandy coloured bird with a long-pointed tail and distinctive white belly.

Winter visitor. Abundant or passage migrant. Springly found in Punjab and vagrant east to Ludhiana and Delhi, south to Bikaner and Jodhpur (Rajasthan) and Deesa (N. Gujarat, c. 24° 15'N.) in barred sandy and semidesert biotope.

Extralimital : Pakistan (West -winter), Afghanistan, SE Europe and Africa.

Ali did not collect any specimen from Gujarat.

205. Indian Sandgrouse : *Pterocles exustus erlangeri* (Neumann).

(*Pteroclorus exustus erlangeri* Neumann, 1909, Orn. Monatsb. 17 : 154 (El.Hota, Lahej, Southern Arabia); Baker, FBI No. 1893, Vol. 5 : 271; Ali & Ripley, HB No. 487, Vol. 3 : 82)

*Local names* : Hindi Bhat teetar, Kuhar

*Size*. Pегion. Length c. (12-13 in.).

Upperparts sandy grey and buff with dark narrow crescentic marks and cross yellowish speckles. Chin and throat dull yellow; belly chocolate black. (Male). In female upperparts paler, breast spotted black and buff, abdomen and flanks rufous barred blackish.

Resident, also nomadic or local migrant, sporadically distributed in Peninsular India east to Bengal, south to Madurai and Tirunelveli (Tamil Nadu). Once recorded in Jammu, absent in Assam. Affects barren, dry stubbles, scrubbed stony semi-desert land.

Extralimital : Pakistan, SW Arabia, S. Palestine, Syria.

Ali recorded as *Pterocles exustus elloti* Bogdarov. and collected specimens from Mandvi (Kutch), Golana (Cambay), Patan (Mehsana dist.), Radhanpur, Kharaghoda, and also noted from Bhuj, Nakhatrana, Anjar, Bhachau, Bela Island (Great Rann.), Dwarka, Okha (both in Saurashtra), Amreli, Nadiad (Kaira dist.), Gujarat.

Dr. H.C. Aldrich found it nesting between Feb. to May in Kaira dist., (JBNHS, 44 : 124).

206. Spotted sandgrouse : *Pterocles senegallus* (Linnaeus)

(*Tetrao senegallus* Linnaeus, 1771, Mantissa : 526 (Algeria); Baker, FBI No. 1894, Vol. 5 : 273; Ali & Ripley, HB No. 488, Vol. 3 : 84)

*Local name* : Gujarati Waku.

*Size*. Pigeon +. Length c. (14 in.).

Above pale sandy buff, a pale ashy band from forehead encircling crown and running back over eyes. An orange throat patch. Tailpin black. Chin, throat deep orangy yellow, vent blackish brown (Male). Crown and upper back spotted, lower back barred with black (Female).

Winter visitor mainly to NW India (Punjab, W. Rajasthan, N. Gujarat in arid stony and sandy waste and in scrubby semi-desert country.

Extralimital : Pakistan (West), N. Africa, Palestine, Iraq, Arabia, Iran, Afghanistan.

Ali, collected specimens from Khadva (Pechham Island), Kutch and also noted from Nanda (SE Of Aderar, on edge of Little Rann.).

Also occurs springly in Gujarat and Kathiawar, but only in the neighbourhood of the Rann. (Hume, S.F., iv : 4).

207. Imperial or Blackbellied Sandgrouse : *Pterocles o. orientalis* (Linnaeus).

(*Tetrao orientalis* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 161 (Anatolia); Baker, FBI No. 1888, Vol. 5 : 262; Ali & Ripley, HB No. 489, Vol. 3 : 86)

*Local name:* Hindi Bada bhatta

*Size.* Pigeon +. Length c. (15 in.).

Above, sandy grey, mottled yellow and black. Below, throat chestnut succeeded by black and grey on breast. A black pectoral black gorget followed by a buff border and black belly. (Male).

Above paler with irregular black cross bar on back. Chin and throat yellowish, belly black (Female).

Winter visitor to our Indian limit. but somewhat nomadic, patchy and erratically occurs in NW India (Punjab, Rajasthan, Thar desert, N. Gujarat and Kutch (Little Rann.).

Old vagrant have strayed as far as lucknow, Allahabad, south of Bhopal and Mysore.

*Extralimital :* E. Canary Is., Iberian Peninsula, NW Africa, Cyprus, Asia minor, Pelestine, S. Russia, Turkestan, Transcapia, Iran, Afghanistan.

Ali noted in Kutch but only to the eastern district (Wagad);

(Butler noted it at Deesa (*ca.* 1876, S.F., iv : 4) and further noted that it was very abundant between Babra village (80 miles SW of Deesa) and Mandvi in Kutch (S.F., v. 222).

Hume also noted this bird in winter in N. Kathiawar along the shores of Rann.

#### 208. Painted Sandgrouse : *Pterocles i. indicus* (Gmelin)

(*Tetrao indicus* Gmelin, 1789, Syst. Nat. 1 (2) : 755 (Coromandel, India) Baker, FBI No. 1889, Vol. 5 : 264 ; Ali & Ripley, HB No. 492, Vol 3 : 92)

*Local names :* Hindi - Pahari bhat teetar, Bhat ban

*Size.* Pigeon. Length c. (11 in.).

White forecrown cut across by a straight black bands, broad tricoloured gorget chestnut, buff and black. (Male).

Female fawn overall, closely barred with black, lacking head marking and breast band.

Resident and locally nomadic, distributed in Peninsular India from Rajasthan (Aravali Hills, etc.) and Gujarat east to Bihar and Orissa, south to Karnataka and Tamil Nadu in stony

sparsely scrubbed foothills, and plateau country.

*Extralimital :* West Pakistan.

Ali collected specimens from Meta-no-Madh (Kutch), Chaduva (Bhuj dist.), Vaghjipur (Mehsana dist.) and also noted from Nakhatrana (Kutch) and Bhujia Fort.

Lester recorded it breeding at Kutch.

### Order COLUMBIFORMES

#### Family COLUMBIDAE (Pigeons and Doves)

A large, worldwide family of some 299 species, the pigeon and doves attain their greatest diversity of size, form and ecology. 53 species and sub-species are found in the Indian sub-Region but curiously only 7 are found in the mostly arid state of Gujarat. Pigeons and doves are plumb birds with small head and short, thin bills. All are strong and swift fliers. Colouration reflects habitat preferences, ranges green in the evergreen biotope, emerald in dense forest, pale grey in open area. The pigeons are generally frugivorous and doves are normally seed eaters. Pigeons always found in small or large party and doves normally feed singly and occasionally in small party.

#### Key to the genera of the family COLUMBIDAE

1. Plumage greenish .....2  
Plumage not greenish .....3
2. Plumage with much yellow-green above and below .....*Treron*  
Plumage vanaceous with metallic green in upper parts .....*Chalcophaps*
3. Tail with 14 feathers, head entirely whitish.....*Ducula*  
Tail with 12 feathers, head not white .....4
4. Plumage distinctly barred with black .....*Macropygia*  
Plumage not barred .....5
5. Wing above 200 mm; outer tail feathers blackish at tips .....*Columba*

Wing below 180 mm.; outer tail feathers white or grey at tips .....*Streptopelia*

209. Southern Green Pigeon : *Treron phoenicoptera chlorigaster* (Blyth)

(*Vinago chlorigaster* Blyth, 1843, Jour. Asiat. Soc. Bengal 12 (1) : 167 (Indian Peninsula); Baker, FBI No. 1828, Vol. 5 : 184; Ali & Ripley, HB No. 504, Vol. 3 : 108)

Local name : Hindi Harial

Size. Pigeon. Length c. (13 in.).

Olive-green and ashy grey above, below bright-yellow, with a lilac patch on shoulder and a yellow band on black wing. Yellow legs. Sexes alike but female much duller.

Resident, wandering locally with fruit-ripening. All Peninsular India, including southern Rajasthan and Gujarat, roughly arbitarily south of Gangetic Plain wherein it intergrades with nominated race. Affects forest and edges of the forest.

Ali collected it from different parts of Gujarat, viz., Vaghjipur (Mehsana dist.), Palanpur, Galkund, Pandwa all in Deesa environs., and Surat Dangs.

Not recorded in Kutch, though Hume suggests that it occurs (S.F., IV : 2).

Z.S.I. party noted it plenty in Gir national Park area ca. Kamleswar Damm, in Nov. 1993.

210. Indian Blue Rock Pigeon : *Columba livia intermedia* Strickland.

(*Columba intermedia* Strickland, 1844, Ann. and Mag. Nat. Hist. 13 : 39 (India = Calcutta); Baker, FBI No. 1856, Vol. 5 : 221; Ali & Ripley, HB No. 517, Vol. 3 : 125).

Local name : Hindi Kabutar

Gujarati Parevun.

Size. Length c. (13 in.).

A familiar bluish grey pigeon with glistening metallic green, purple, and magenta sheen on upper breast and round the neck. Sexes alike, but female has paler sheen.

Resident. and locally abundant throughout the Indian Union.

Extralimital : Nepal, Bhutan, Bangladesh,

Sri Lanka, Burma, Thailand.

Ali collected this bird from elsewhere from Gujarat but keep it as *Columba livia* ssp, because he did not find any difference in between sub-species, viz., *neglecta* and *intermedia* either in plumage colour or in distributional isolation. For details see Ali, 1954, JBNHS 52 : 428-9.

We also subscribe more or less same view but not with certainty due to lack of sufficient specimens from everywhere.

211. Western Turtle-Dove : *Streptopelia orientalis meena* (Sykes).

(*Columba Meena* Sykes, 1833 (1832), Proc. Zool. Soc. London, pt. 2 : 149 (Dukhun); Baker, FBI No. 1871, vol. 5 : 239; Ali & Ripley, HB No. 531, Vol. 3 : 143)

Local names : Hindi Kala fakhta, Barko fakhta

Size. Pigeon; Sleemer, length c. (13 in.).

Reddish brown dove, black 'chessboard' on sides of the neck, and broad white terminal band on rounded tail. Sexes alike.

Resident and breeds in the W. Himalayas upto c. 4000 mt. in Kashmir, Ladakh, Leh, Gerhwal and Kumaon in our Indian limit. Spreads widely over northern and peninsular India, chiefly on the western side, south to Karnataka. Affects deciduous forest and edges of the cultivation.

Extralimital : Pakistan, Nepal, Sri Lanka (Vagrant), Also Breeds in W. Siberia east to W. Altai, Turkestan, Persia, Afghanistan.

Ali collected specimens Sakalpatal (Surat Dangs), Malegaon, Chikhli, Gujarat.

Z.S.I. party noted it in Gir National Park area, in November 1993.

212. Indian Ring Dove : *Streptopelia d. decaocto* (Frivaldszky).

(*Columba risoria* L. Var. *decaocto* Frivaldszky, 1838 (1834-6); K. Magyar Tudos Tarsasag Evkonyvi, 3 : 183, pl. 8 (Turkey); Baker, FBI No. 1879, Vol. 5 : 248; Ali & Ripley, HB No. 534, Vol. 3 : 147).

Local names : Hindi Dhor Fakhta

Gujarati Dhol.

Size. Pigeon. Length c. (11-12 in.).

Pale grey and brown with diagnostic prominent black half-collar on hind neck. Broad white terminal edge on blackish tail. Sexes alike.

Resident. Practically found in the entire Indian Union excluding Sikkim and islands from c. 2400 mt. alt. down to the plains in open cultivated field on edge of the forest.

Extralimital : Breeds in NC and E Europe east to Japan, S. Asia, Burma, Middle East.

Ali collected specimens from Dabka (Baroda dist.) and Deesa (Palanpur) and also noted almost everywhere from Gujarat.

Z.S.I. party also noted more abundant in the Saurashtra area than in the moist part in Gujarat.

13. Indian Red Turtledove : *Streptopelia t. tranquebarica* (Hermann).

(*Columba tranquebarica* Harmann, 1804, Obs. Zool. : 200 (Tranquebarica, India); Baker, FBI No. 1881, Vol. 5 : 250; Ali & Ripley, HB No. 535, Vol. 3 : 149)

Local name : Hindi Seroti fakhta

A small, daintly, brightly coloured grey and pinkish brick red dove with a black collar round hindneck, mantle vinous red. Sexes alike.

Resident. Widely but rather capriciously / sparingly distributed in the drier parts from U.P. to Bihar, south through Peninsular India to Tamil Nadu and Karnataka in our Indian limit.

Extralimital : Pakistan (Sind, Baluchistan, Punjab), Nepal (West), Sri Lanka (rare vagrant Jaffna 1800 mt once).

Ali collected specimens from Ajwa (Baroda dist.) and also noted from Kutch & Bhuj environs, Amreli, Kaira, Cambay, Mehsana and other dists of Gujarat.

Z.S.I. party noted it in the cultivated fields on either side of Nalsarobar (Gandhinagar dist.), Gujarat, Oct. '1993.

214. Indian Spotted Dove : *Streptopelia chinensis suratensis* (Gmelin).

(*Columba suratensis* Gmelin, 1789, Syst. Nat. 1 (2) : 778 (Surat, Gulf of Cambay, India);

Baker, FBI No. 1873, Vol. 5 : 242; Ali & Ripley, HB No. 537, Vol. 3 : 152)

Local name : Hindi Chitroka fakhta

Gujarati Vana holi.

Size. Pigeon. Slender. Length c. (12 in.).

A pinkish brown and grey dove spotted with white and a diagnostic 'chessboard' on hindneck. White on belly, vent, and under tail coverts. Sexes alike.

Resident. Common in the entire Indian Union excluding islands.

Extralimital : West Pakistan, Nepal, Bangladesh.

Type locality is in Gujarat (Surat, Gulf of Cambay).

Ali collected specimens from Cambay town environs, Nadiad town environs, Pandwa, Laochali, Mahal (all in Surat Dangs), Dalkhanja (Amreli dist.), Gujarat.

Ali further reported it as absent in Kutch.

Z.S.I. party noted it common in the Nalsarobar environment, (Gandhinagar dist.), Gujarat, Oct. '1993.

215. Indian Little Brown or Senegal Dove : *Streptopelia senegalensis cambayensis* (Gmelin).

(*Columba cambayensis* Gmelin, 1789, Syst. Nat. 1(2) : 779 ('Cambaya' i.e. Gulf of Cambay, NW India); Baker, FBI No. 1877, Vol. 5 : 246; Ali & Ripley, HB No. 541, Vol. 3 : 155).

Local name: Hindi-Same as earlier race.

Size. Myna + Length c. (10-11 in.).

Slim pinkish brown and grey dove with head and neck pink and miniature 'chessboard' on either side of the neck. Breast pinkish brown and vent, belly white. Sexes alike.

Mainly resident, hitherto believed more or less sedentary. Evidently also migratory to an unsuspected extent, but movement as yet very unclear. Restricted to dry deciduous biotope, and largely coincident with Ring Dove (Ali & Ripley). Practically found all over India as in earlier race.

Type locality is in Gujarat (Gulf of Cambay).

Extralimital : Pakistan (West), Bangladesh.

Ali collected specimens from Kutch, Bhuj environs and Cambay town environs.

Z.S.I. party noted it in Dwarka and Okha, Gujarat in November, 1993.

216. Indian Emerald Dove : *Chalcophaps i. indica* (Linnaeus).

(*Columba indica* Linnaeus, 1758, Syst. Nat. ed. 10, 1 : 164 (Amboina); Baker, FBI No. 1852, Vol. 5 : 215; Ali & Ripley, HB No. 542, Vol. 3 : 157)

Local names : Hindi Not recorded.

Size. Myna +. Length c. (10-11 in.).

A small brownish pink forest dove with brilliant bronzed emerald green upperparts. White forehead. Rump grey, tail brown and grey, Sexes alike.

Resident (and sedentary as far as known) in evergreen and moist deciduous biotope, patchily throughout India upto c. 1800mt. in the lower Himalayas, from Jammu east to Arunachal. South through entire Peninsula and all islands.

Extralimital : Nepal, Bhutan, Bangladesh, Burma, Malay Peninsula, Indochina, Philippines, Indonesia.

Ali collected specimens from Mahal, Waghai (Surat Dangs), and also noted from Songadh (Navsari dist.), Piplaidevi, Pimpri, Laochali etc. (Surat Dangs), Gujarat.

Family PSITTACIDAE  
(Parrots)

This family is represented by two genera and twenty four species and sub-species in the Indian sub-Region of which only 3 found in Gujarat. All are arboreal fruit and grain-eating birds with brightly coloured plumage. All the Indian representatives are chiefly green. Bill short, stout, strongly hooked. Feet zygodactylous 2 toes in front, 2 behind adopted for clambering among branches. Affects dry and moist deciduous biotope forest and well-wooded country, cultivated field, horticulture etc. Some of them are destructive bird pests of agriculture in India.

217. Large Indian Parakeet : *Psittacula eupatria nipalensis* (Hodgson).

(*Palaeornis Nipalensis* Hodgson, 1836, Asiat. Res. 19 (1): 177 (Nepal); Baker, FBI No. 1497, 1498, Vol. 4 : 199, 200 ; Ali & Ripely, HB No. 545, Vol. 3 : 164).

Local name : Hindi Hiranman tota

Size. Pigeon +. Slender. Length c. (21 in.) including pointed tail.

A large grass green parakeet with deeply hooked red bill and red patch on wing shoulder. A diagnostic rose-pink collour (Male); Female lack rose pink collar and the black mandibular stripe.

Resident. Nomadic and local migratory depending on ripening of fruit and seeds, found in all India from Himalayan foothills down to the plain as far s south roughly to about 18<sup>0</sup>N lat. Affects forest and edges of the forest and cultivated field in a small to a very large flocks consisting of hundreds of birds at a time.

Extralimital : Pakistan (Sind), Nepal, Bhutan, Bangladesh.

Ali collected specimens from Waghai, Mahal (Surat Dangs), Chikhli, Pandwa, Mheskatri, Sarwar (All in Surat Dangs) and also noted elsewhere in Gujarat except in Kutch and Saurashtra region.

Z.S.I. party noted a good numbers in Gir national Park, Saran Gir, Gujarat in November '1993.

218. Northern Roseringed Parakeet :  
*Psittacula Krameri borealis* (Neumann).

(*Palaeornis krameri boreallis* Neumann, 1915, Orn. Monatrb. 23 : 178 (Assam); Baker, FBI No. 1501, Vol. 2 : 204; Ali & Ripley, HB No. 549, Vol. 3 : 169)

Local names : Hindi Lybar tota

Gujarati Popat, Sudo.

Size. Myna +. Length. c. (16-17 in. including tail).

A slim grass-green parakeet with typical deeply hooked red bill. A diagnostic rose-pink and black collar. No red shoulder patch (Male);

Female without collar but indistinct emerald green ring round neck.

Resident and local migratory depending on food, distributed all N. India, eastward along the Himalayan terai, entire Gangetic Plain through Assam, south to the arbitrarily fixed boundary of 20°N lat., Keeping to light secondary jungle, gardens, orchards, and cultivation in small to large flocks.

Extralimital : Pakistan, Nepal, Bangladesh, Burma, SE China, Vietnam.

Ali collected specimens from Kutch, Bhuj environs, Ajwa (Baroda dist.), Dabka (Baroda), Kharaghoda, Pandwa, Laochali (Surat Dangs).

Z.S.I. party noted this birds in plenty in Jamnagar environs and Dwarka region in November, 1993.

219. Northern Blossomheaded Parakeet :  
*Psittacula cyanocephala bengalensis*  
(Forster).

(*Psittacus bengalensis* Forster, 1781, in Pennant's Indian Zool. : 40 (Calcutta); Baker, FBI No. 1503, Vol. 4 : 206; Ali & Ripley, HB No. 557, Vol. 3 : 178).

Local name : Hindi not recorded.

Size. Myna. Length. c. (14 in. including tail).

A slim grass-green or yellowish green parakeet with bluish red head and a diagnostic black and verdigris collar (Male); Female duller grey head surrounded by a yellow collar.

Resident and local migratory dependig on food supply. Distributed along the lower Himalayas through Jammu and Kashmir, U.P., east to W. Bengal, South in the Gangetic Plain and through Saurashtra in Gujarat and M.P. Upto a arbitrary boundary to 20°N. lat.

Extralimital : Pakistan, Nepal, Bangladesh.

Ali collected specimens from Dabka (Baroda dist.), Vaghjipur (Mehsana dist.), Deesa (Palanpur), Balaram; Mheskatri, Chikhli (Surat Dangs).

Z.S.I. party noted it from Nalsarobar environs, Gandhinagar dist., Gujarat in October, 1993.

Order CUCULIFORMIS

Family CUCULIDAE  
(Cuckoos, Koels, and Coucals)

One hundred thirty species Worldwide, but its members are most numerous in the tropics. 37 species and sub-species are resident/migratory in the Indian sub-region. only ten races are found in Gujarat.

These birds are best known for their habit of broad parasitism. Feet zygodactyle, the first and fourth toes directed backwards. Plumage ranges from ashy grey to brown and black. They prefers to live in evergreen and moist deciduous biotopes foothill forest, and scrub-bush jungle. Very shy in nature. Always keep themselves within the foliage. All of them are insect eater.

Key to the genera of the family CUCULIDAE

1. Tarsus more or less feathered anteriorly .....4  
Tarsus naked .....2
2. Plumage of head and shoulder spiny .....3  
Plumage of head and shoulder not spiny .....*Eudynamis*
3. Claw of hind toe much lengthen .....*Centropus*  
Claw of hind toe not as above .....6
4. Head crested, tarsus feathered top only .....*Clamator*  
Head not crested, tarsus feathered throughout in front .....5
5. Larger; wing 150 mm. or above .....*Cuculus*  
Smaller; wing below 150 mm .....*Cacomantis*
6. Naked sides of head not united .....*Rhopodytes*  
Sides head not naked .....*Taccocua*

220. Pied Crested Cuckoo : *Clamator jacobinus serratus* (Sparman).

(*Cuculus serratus* Sparman, 1786, Mus. Carls., Fasc. 1 no. 3 and pl. (Cape Peninsula,

Cape Province, S. Africa); Baker, FBI No. 1472 Vol. 4 : 167; Ali & Ripley, HB No. 570, Vol. 3: 194).

*Local names* : Hindi Kala paptya, Chatak

*Size*. Myna + -. Length c. (13 in.).

A slender longtailed crested bird, black above and white below, white patch on wings, black graduated tail tipped white. Sexes alike.

SW monsoon (breeding) visitor to our Indian limit, from northern India Kashmir, U.P. east to Assam, Manipur, south in Peninsula upto c. 18°N. lat. Sporadically record upto Karnataka. Normally in the well-wooded country and occasionally on the edges of the forest.

*Extralimital* : Africa south and east of the Sahara, E. Iran, Afghanistan, Pakistan, Burma, Sri Lanka.

Ali collected specimens from Kutch, Bhujia Fort, Nir (Pachham Island), Ajwa (Baroda dist.) and Bodeli (Baroda).

221. Common Hawk-Cuckoo or Brain Fever Bird : *Cuculus v. varius* Vahl.

(*Cuculus varius* Vahl, 1797, Skriv. Naturhis-Selsk., Kjobenhavn 4 (1) : 60 (Tranquebar); Baker, FBI No. 1458, Vol. 4 : 148; Ali & Ripley, HB No. 573, Vol. 3 : 200).

*Local names* : Hindi - Papiya

Gujarati Bappaiyo

*Size*. Pigeon +. Length c. (13-14 in.).

Above ashy grey, tail tipped rufescent with 4 or 5 whitish and black bars. Below, white suffused with rufous. Ashy abdomen barred brownish. Sexes alike.

Resident, but nomadic during rainy season. Wide spread, thinly in the entire Indian Union excluding islands in deciduous and semi-evergreen biotope.

A rain straggler in arid parts of Gujarat.

*Extralimital* : Pakistan, Nepal, Bhutan, Sri Lanka and Bangladesh.

Ali collected specimen from Bodeli

(Baroda dist.), Waghai, Galkund, Mahal (Surat Dangs), Gujarat.

222. Cuckoo : *Cuculus c. canorus* Linnaeus.

(*Cuculus canorus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 110 (Sweden); Baker, FBI No. 1451, Vol. 4 : 135; Ali & Ripley, HB No. 578, Vol. 3 : 208).

*Size*. Pigeon +. Length c. (13 in.).

Dark grey above, tail blackish brown, spotted and tipped with white. Chin and breast ashy, rest of underparts white, narrowly cross-barred with blackish (Male); Female a rufous tinge on upper breast.

Entire upperparts barred chestnut and blackish brown (Hepatic phase).

Resident, nomadic, and seasonal migrant -Possibly also translimital as in the Palaearctic Region.

Common in the Himalayas (Summer). Dispersed practically throughout the Peninsula south to Kerala rare vagrant in Andamans Is. and Maldives Is.

*Extralimital* : Afghanistan, Pakistan (Gilgit), Nepal, Sri Lanka, Bangladesh. Breeds in Asia and Europe. Winters in Africa, Malaysia to New-Guinea.

Ali recorded this bird as *Cuculus canorus* ssp. and collected specimens from Kutch, Bhuj Fort, Chaduva (Bhuj), Dhari (Amreli dist.).

Ali further noted that "Status over the area as a whole uncertain" due to its hepatic phase.

Butler noted it common in Deesa in rain and winter (S.F., iii, 460).

223. Small Cuckoo : *Cuculus p. poliocephalus* Latham.

(*Cuculus poliocephalus* Latham, 1790, Index Orn. 1 : 214 (India); Baker, FBI No. 1455, Vol. 4 : 142; Ali & Ripley, HB No. 581, Vol. 3 : 213).

*Size*. Myna + Length c. (10 in.).

Staty grey above, black barred white below, the underparts suffused with buff. Sexes alike. Female has hepatic phase.

Breeds in the Himalayas between c. 1500 to 3200 mt.alt. winters in the Peninsula south to Kerala with sporadic records, Gujarat (Surat Dangs) and elsewhere etc. and Andaman Island in the Indian limit.

Extralimal : Afghanistan, Pakistan, Nepal, Bhutan, Bangladesh, Sri Lanka, W & C. China, Japan, Burma.

224. Indian Bordered Bay Cuckoo :  
*Cacomantis s. sonneratii* (Latham)

(*Cuculus Sonneratii* Latham, 1790, Index Orn. 1 : 215 (India); Baker, FBI No. 1464, Vol. 4 : 157; Ali & Ripley, HB No. 5 82, Vol. 3 : 215).

Local name : Gujarati Pattavali lal koyal.

Size. Myna +. Slenderer. Length c. (9-10 in.).

A slim rufous, crossbarred with brown and whitish below. Tail rufous and tipped white. Sexes alike.

Status uncertain due to its silent nature but believed to be resident and nomadic during monsoon. Widely but sparsely distributed throughout India from lower Himalayas down to the plains in heavy forest as well as deciduous biotope.

Extralimal : Nepal, Bhutan, Bangladesh, Burma, Thailand and Vietnam.

Ali collected specimens from Galkund and

Pandwa (both in Surat Dangs) and also noted from Juna Rajpipla; Waghai; Mheskati, Gujarat.

225. Indian Plaintive Cuckoo : *Cacomantis merulinus passerinus* (Vahl).

(*Cuculus passerinus* Vahl, 1797, Skriv. Naturhist. Selsk., Kjobenhavn, 4 (1) : 57 (Trequebar); Baker, FBI No. 1462, Vol. 4 : 154; Ali & Ripley, HB No. 584, Vol. 3 : 218).

Local names : Gujarati Nani rakhodi koyal.

Size. Myna +-. Length c. (9 in.).

Grey and brown above. Chin, throat and breast grey, paling to whitish on abdomen. Blackish tail tipped white. Sexes alike but Female dimorphic.

Status variable (?). Nomadic, widely dispersed during monsoon and very much vocal but remain entirely silent in non-breeding season.

More or less scattarly and thinly distributed throughout the Indian Union including Maldivie Is. in well wooded country.

Less possiblity to occur in the drier parts of N. Gujarat and Kutch, but possibly may occur in the well wooded part of Surat Dangs, Gujarat.

Extralimal : Nepal, Bhutan.

Ali didn't collect any specimen from Gujarat or no authentic record so far be made from Gujarat but there is every possiblity of occurence of this bird in the well- wooded part of Surat Dangs.

226. Indian Koel : *Eudynamys s. scolopacea*  
(Linnaeus)

(*Cuculus scolopaceus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 111 (Malabar); Baker, FBI No. 1475, Vol. 4 : 172; Ali & Ripley, HB No. 590, Vol. 3 : 227)

*Local name* : Hindi - Koel

*Size*. House Crow. Length c. (16-17 in.).

A glistening metallic black bird with yellowish green bill and red eyes (Male). Female dark brown with white spotted and barred, below dirty white barred with blackish. Distinguished by its universally sweet note. (Male).

Resident, nomadic and local migrant throughout the Indian Union including Laccadive and Maldiva Is. but excluding Assam and Andaman Is.

*Extralimital* : Nepal, Bhutan, Sri Lanka.

Ali collected specimens from Kutch, Bhuj environs, Chaduva (Bhuj), Dabka (Baroda dist.), Deesa (Palanpur), Kodinar, Dalkhania (Amreli dist), Gujarat.

Z.S.I. Party noted it by the side of Hiron River, Sasan Gir, Gujarat in Nov. '1993.

227. Small Greenbilled Malkoha :  
*Rhopodytes viridirostris* (Jerdon).

(*Zanclotomus viridirostris* Jerdon, 1840, Madras Jour. Lit. Sci. 11 : 223 (Bottom of the Coonoor pass); Baker, FBI No. 1478, Vol. 4 : 177; Ali & Ripley, HB No. 595, Vol. 3 : 233).

*Local names* : Hindi Kappra, Popiya.

*Size*. House Crow. Length c. (14-15 in.).

An untidy greenish grey bird suffused with rufous on underparts. Green bill, naked blue patch round eye and long graduated white tail are diagnostic characters. Sexes alike.

Resident, thinly distributed in the Peninsula roughly north 20° N. lat. in the forest and edges of the forest. Northern most record on the Western side of Baroda (Gujarat)- c. 22°20' N.

*Extralimital* : Sri Lanka.

Mr Joseph Gabriel made a sight record of this bird at Ajwa, Gujarat (Ali, JBNHS, 52 : 435).

228. Western Sirkeer Cuckoo : *Taccocua leschenaultii sirkee* (J.E. Gray).

(*Centropus sirkee* J.E. Gray, 1831, in Hardwicke's Ill. Ind. Zool. 1 (6), pl. 28 (No locality Cawnpore); Baker, FBI No. 1487, Vol. 4 : 187, Ali & Ripley, HB No. 596, Vol. 3 : 234)

*Local names* : Hindi Jangli tota

*Size*. House Crow +. Length c. (16-18 in.).

A heavy-tailed brown and rufous cuckoo with fine glistening black shaft-streaks to head and breast. Red and yellow bill. Sexes alike.

An obvious cousin of most common crow-pheasant and rather earthy brown edition of the latter.

Resident in NW India from H.P. southern U.P., Garhwal Western M.P., Eastern Maharashtra, Rajasthan and Gujarat, south to about Cambay, c. 22°20' N. Lat. in dry scrub country and secondary jungle.

*Extralimital* : Pakistan (Sind, Punjab)

Ali recorded it as southern race, i.e., *Taccocua l. leschenaultii* (Lesson) and collected specimens from Dabka (Baroda dist.), Nadiad environs, Vaghjipur (Mehsana dist.) Palanpur, Laochili (Surat Dangs).

Ali further noted that his specimen are somewhat intermedia between *sirkee* and *leschenaultii* (Ali., JBNHS, 52 : 435).

229. Southern Crow-Pheasant : *Centropus sinensis parroti* Stresemann.

(*Centropus sinensis parroti* Stresemann, 1913, Nov. Zool. 20 : 323 (Ceylon); Baker, FBI No. 1492, Vol. 4 : 192; Ali & Ripley, HB No. 602, Vol. 3 : 243)

*Local names* : Hindi Mahoka

Gujarati Hokko, Ghoyaro

*Size*. Jungle Crow +. Length c. (19 in.).

A clumsy glossy black bird with diagnostic chestnut wings and long graduated black tail. Iris bright crimson. Underparts blue or blue green. Interscapulars black. Sexes alike.

Resident. Peninsula India From N. Gujarat, Kutch and Saurashtra east through M.P., A.P. and Orissa, South through Maharashtra, Karnataka, Tamil Nadu and Kerala in light

forest and bush jungle.

Extralimital : Sri Lanka.

Ali collected specimens from Kutch, Chaduva (Bhuj), Ajwa (Baroda dist.), Cambay town environs, Patan (Mehsana dist.), Laochali, Pimpri (Surat Dangs).

Z.S.I. party noted it in the bushy jungle by the side of Hiron River, Saran Gir, Gujarat in November '1993.

More abundant in the southern Gujarat rather than dry area of N. Gujarat.

Order STRIGIFORMES

Family STRIGIDAE  
(Barn Owls)

Of the eleven species world wide, only 5 species and sub species inhabited in the Indian sub-Region of which only one distributed in Gujarat.

They are recognised by their heart-headed facial disc surrounded by a ruff of stiff-feathers, and also dark eyes, unstreaked and unbarred plumage, and long legs. Colouration ranges from pale yellow-brown and white to sooty grey. The tursus is covered with feathers on the above which pass into bristles on the lower tursus. Middle toe scarcely longer than inner, with the claw expanded and pectinate on the inner side.

They forage mostly on small mammals and reptiles in twilight or at night, usually in forest openings or in grassland or occasionally in true forest. The birds occurs singly or in pairs.

Key to the subfamilies of family STRIGIDAE

- Facial disc and ruff well marked ear-orifice smaller than eye, middle claw pectinate .....*Tytoninae*
- Facial disc and ruff ill marked; ear-orifice, larger than eye, middle claw simple ..... *Striginae*

Key to the genera of the family STRIGIDAE

- 1. Middle claw pectinate on inner side ..*Tyto*
- Middle claw not pectinate .....2

- 2. Ear-tufts present .....3
- Ear-tufts absent .....5
- 3. Wings exceeding 250 mm .....4
- Wing under 250 .....*Otus*
- 4. Wing exceeding 350 mm .....*Bubo*
- Wing 280-330 mm .....*Asio*
- 5. Wing 250 mm. and above..... *Strix*
- Wing 250 mm. and below .....6
- 6. Plumage uniform above .....*Ninox*
- Plumage barred or spotted above .....7
- 7. Plumage barred above..... *Glaucidium*
- Plumage spotted above .....*Athene*

230. Indian Barn Owl : *Tyto alba stertens*  
Hartert.

(*Tyto alba stertens* Hartert, 1929, Nov. Zool. 35 : 98 (Cachar); Baker, FBI No. 1636, Vol. 4 : 385; Ali & Ripley, HB No. 606, Vol. 3 : 250)

Local names : Hindi Kuraya, Karail, Buri churi.

Gujarati Revi devi.

Size. House Crwo Length c. (14 in.).

Large round head with diagnostic heart-shaped facial disc sarrounded by a ruff of shiff feathers. Golden buff and grey above, silky white below usually spotted brown. Sexes alike.

Resident. Thinly distributed all over India from Jammu east to Gangetic Plain to NE India, south throughout the Peninsula to Kanya Kumari. Chiefly inhabited in the old/ruin buildings/fort etc.

Extralimital : Pakistan (West), Nepal, Bhutan, Sri Lanka (Restricted to Jaffna and Aripo dist.), Bangladesh, Burma.

Ali collected specimen from Radhanpur and noted another specimen from Nadiad (Kaira dist.), (Coll. H.C. Aldrich), And also noted from Dediapada (Rajpipla), Deesa (Palanpur, Butler, S.F., iii : 449).

Lester recorded it from Kutch.

Capt. A. Newnham recorded it also from Kutch (JBNHS, 2 : 55 1837).

(DKS) noted it breeding in Bhavnagar in October (JBNHS, 41 : 174 1938).

Z.S.I. party noted it in the Circuit House of Jamnagar dist. in November, 1993.

Family STRIGIDAE  
(Typical Owls)

Of the 132 species of typical Owls are known world wide, only 55 species and sub-species are found in the Indian sub-Region of which the share of Gujarat is only 15. They are nocturnal, predatory birds with slow flight and deep wing beats. Most of them are brown or grey above with underparts streaked or barred.

They prefer to live in the forest and normally come out on the edges of the forest at dusk.

231. West Pakistan Collared Scops Owl: *Otus bakkamoena deserticolor* Ticehurst.

(*Otus bakkamoena deserticolor* Ticehurst, 1922, Bull. Brit Orn. CL 42 : 57 (Hyderabad dist., Sind Province India); Baker, FBI No. 1670, Vol. 4 : 426, Ali & Ripley, HB No, 620, Vol. 3 : 267).

*Local names* None recorded.

Size. Myna +. Length c. (9-10 in.)

A rufous brown bird, vermiculated with whitish on above, below buffy white streaked with black. A prominent yellow buff collar at base of hindneck is diagnostic. Tarsus feathered only to the base of toes. Sexes alike.

Resident in west Pakistan. This possibly also occurs in N. Gujarat (Ali & Ripley).

The sub-specific status of *Otus bakkamoena* is a point to be discussed. All the six sub-species are largely made on the measurements of wings, plumage colouration which are very variable from specimen to specimen.

The Gangetic Collared Scops Owl, i.e. *Otus bakkamoena gangeticus* may also be extended from Mt. Abu and eastern Rajasthan to N. Gujarat. So a large series of specimens in hand may exactly tell the real status of particular race of *Otus bakkamoena* in the northern part of Gujarat.

Extralimital : There are specimens in the BNHS collection from Persian Gulf and Muscat (S. Arabia).

232. Central Indian Collared Scops Owl :  
*Otus bakkamoena marathae* Ticehurst.

(*Otus bakkamoena marathae* Ticehurst, 1922, Bull. Brit. Orn. Cl. 42 : 122 (Raipur, Central Provinces); Baker, FBI No. 1667, Vol. 4 : 424; Ali & Ripley, HB No. 622, Vol. 3 : 268)

*Local name* : Hindi Tharkari Choghad

Size. Myna +. Length c. (9-10 in.).

Same as earlier race, slightly smaller than earlier race and paler overall. Sexes alike.

Resident, Approximately between lat. 20<sup>0</sup> and 24<sup>0</sup>N from the Surat Dangs (Gujarat) eastward through Khandesh (Maharashtra) and M.P. to Orissa and Gangetic W. Bengal. Precise limit not worked out.

Ali recorded it as *Otus bakkamoena ssp.* but didn't collect any specimen. He further commented that it is fairly commonly in moist deciduous forest in Gujarat. He noted its call notes at Songadh (Navsari dist.), Mahal, Galkund, Pandwa, Laochali (all in Surat Dangs), Gujarat.

233. Indian Great Horned or Eagle Owl :  
*Bubo bubo bengalensis* (Franklin).

(*Otus bengalensis* Franklin, 1831 (1830-31), Proc. Zool. Soc. London : 115 (The Ganges between Calcutta and Banaras and in the Vindhyan Hills between latter place and Gurra Mundela); Baker, FBI No. 1660, Vol. : 414; Ali & Ripley, HB No. 627, Vol. 3 : 273)

*Local names* : Hindi Ghughu

Gujarati Ghuvad.

Size. Pariah Kite +. Length c. (22 in.).

A large dark brown owl, streaked and mottled with tawny buff and black, with two prominent upstanding blackish 'horns' or ear-tufts above the head, large round forwardly directed orange eyes, and fully feathered legs. Sexes alike. (Ali & Ripley).

Resident, Practically throughout the entire Indian Union excluding island and Sikkim (not

recorded) from the Himalayas c. 1500 m. down to the plains in forested rocky hills, well wooded country edge of the forest near cultivated field.

Extralimital : Pakistan (Kohat, Peshawar, Rawalpindi), Nepal (West Central).

Ali collected specimens from Rapar (Kutch), Dabka (Baroda dist.), Pariej (Kaira dist.), Deesa (Palanpur) also noted from Anjar (Kutch), Shedi River and Viridi (Kaira dist.).

H.C. Aldrich also collected specimens from Patan (Mehsana dist.), Dediapada (Rajpipla) and Mahal (Surat Dangs).

(DKS), records a nest with 4 eggs in Bhavnagar in Dec. (1938 - JBNHS, 41 : 174).

#### 234. Dusky Horned Owl : *Bubo c. coromandus* (Latham)

(*Strix coromanda* Latham, 1790, Index Orn. 1 : 52 (Coromandel Coast); Baker, FBI No. 1661, Vol. 4 : 416; Ali & Ripley, HB No. 630, Vol. 3 : 278).

*Local names* : Hindi Jangli ghughu

Gujarati Rodiyo ghurad.

Size. Pariah Kite +. Length c. (23 in.).

A large stout built Owl, similar to earlier race but more grey or sooty-washed rather than twany, and with paler yellow eyes. Sexes alike.

Resident. Widespread but thinly distributed in well wooded and well water tract of the entire Indian Union excluding islands. Ideal habitat of this bird is any very old and large fruit trees, viz. mango, tamarind etc.

Extralimital : Pakistan, Nepal, Bhutan (?), Bangladesh.

Ali collected specimens from Cambay town environs, Patan (Mehsana dist.), Radhanpur, Kharaghoda, and also noted from Kanewal (Cambay), Viridi (Kaira dist, specimen : H.C. Aldrich).

This bird avoid arid, treeless country like Kutch, N. Gujarat, where Ali reported absent.

#### 235. Brown Fish Owl : *Bubo zeylonensis leschenaulti* (Temminck).

(*Strix leschenaulti* Temminck, 1820, Pl. Col. Livr. 4, Pl. 20 (Eastern provinces of India = Chandernagore); Baker, FBI No. 1653, 1654, Vol. 4 : 408, 409; Ali & Ripley, HB No. 631, Vol. 3 : 280)

*Local name* : Hindi Amrai ka ghughu, Ullu.

Gujarati Machhimar ghuvad.

Size. Pariah kite +. Length c. (22 in.).

A large rufous brown eared Owl, heavily streaked above with black. Below, pale fulvous white with fine wavy brown cross bars and bold blackish streaks. A diagnostic large white patch on throat and foreneck. Golden yellow eyes and naked legs. Sexes alike.

Resident. Thinly and patchily found in the submontane Himalayas and down to the entire Indian Union in well wood country and deciduous forest with large trees. Avoids treeless barren country.

Extralimital : Pakistan, Nepal, Bhutan, Bangladesh.

Ali collected specimens from Pariej (Kaira dist.), Vaghjipur (Mehsana dist.) also noted from Dabka (Baroda dist.), Patan (Mehsana dist.), Nadiad (Kaira dist. specimen H.C. Aldrich).

This bird is absent in Kutch and may be more plentiful in Surat Dangs areas of Gujarat.

#### 236. Barred Jungle Owlet : *Glaucidium r. radiatum* (Tickell)

(*Strix radiata* Tickell, 1833, Jour. Asiat. Soc. Bengal 2 : 572 (Jungles of Borabhum and Dholbhum); Baker, FBI No. 1694, Vol. 4 : 448; Ali & Ripley, HB No. 636, Vol. 3 : 286).

*Local name* : Hindi Jungli choghad

Size. Myna +. Length c. (8 in.).

A small squat, round headed Owlet without ear tufts. Above, dark brown beared paler fous. Below, Chin upto middle of the breast dirty white, rest barred brown. Sexes alike.

Resident. from submontane Himalayas to H.P. eastward through Garhwal, Kumaon as far as Sikkim. South throughout Peninsula,

roughly east and south of a line from Almorah to Baroda (Gujarat), with a western extension to Aravalli Range, arbitrarily replaced by allied race *Malabaricum* from 16°N. lat.

Extralimital : Nepal, Bhutan.

Ali collected specimens from Dediapada (Rajpipla), Songadh (Navasari dist.), Waghai, Mahal, Galkund, Pandwa, Laochali, Mheskatri (all in Surat Dangs).

Z.S.I. party noted it in the compound of Gir National Park F.R.H., Sasan Gir, Gujarat, in October '1993.

237. Indian Brown Hawk-Owl. *Ninox scutulata lugubris* (Tickell).

(*Strix lugubris* Tickell, 1833, Jour. Asiat. Soc. Bengal 2 : 572 (Dampara, Dholbhum, Bengal); Baker, FBI No. 1698, Vol. 4 : 454; Ali & Ripely, HB No. 642, Vol. 3 : 292)

Local name : Hindi Choghad basra

Size. Pigeon : Length c. (12-13 in.).

Dark greyish brown above with darkish forehead, white patch on shoulders. Throat, foreneck fulvous streaked with brown, rest of the underpart whitish spotted brown. Tail barred with black and tipped white. Sexes alike.

Resident. Thinly distributed from the outer Himalayas eastward to Arunachal, southward through Gangetic Plains except the drier parts of Rajasthan and N. Gujarat upto an arbitrary boundary of 19°N. lat.

Extralimital : Pakistan (Muree), Nepal, Bhutan, Bangladesh.

Ali recorded this birds as *Ninox scutulata* ssp. and noted at Songadh (Navsari dist.), and at Waghai, Mahal, Galkund, Pandwa, Laochali, Mheskatri etc. all in Surat Dangs, Gujarat.

This bird prefers forest and well wooded country and edge of the forest, and avoid arid zone. So it is possibly uncommon in N. Gujarat and absent in Kutch.

238. Northern Spotted Owllet : *Athene brama indica* (Franklin).

(*Noctu indica* Franklin, 1831, Proc. zool. Soc. London. : 115 (U.P.); Baker, FBI No. 1684, Vol. 4 : 440; Ali & Ripley, HB No. 650, Vol. 3 : 299)

Local names : Hindi Dolloo, Khakusat, size. Myna +. Length c. (8 in.).

A squat, white-spotted greyish brown owl with large round head and yellowish eyes. Sexes alike.

Resident. Common and widely distributed from W. Himalayas (Submontane tract) Jammu, eastward through Sikkim to whole of NE India, south through Gangetic Plains including NW India, upto arbitrarily boundary of 20°N. lat.

Affects, thin forest, edges of the forest, and also semi-arid country.

Extralimital : Pakistan (West), Nepal, Bhutan, Bangladesh and SE Iran.

Ali collected specimens from Kutch, Bhujia fort, Bhuj Town environs, Ajwa & Bodeli (Both in Baroda dist.), Patan (Mehsana dist.), Dalkhania (Amreli dist.), Kharaghoda, Gujarat, also noted from Chaduva, Mandvi, Khari Rohar, Tuna (Kutch), Amreli Town, Bhavnagar (DKS specimen), Cambay, Nadiad (Specimen Aldrich), Vaghjipur, Gujarat.

Z.S.I. Party noted it in the Jamnagar Town environs in November, 1993.

239. Forest Spotted Owllet : *Athene blewitti* (Hume).

(*Heteroglaux Blewitti* Anonymous = Hume, 1873, S.F. 1 : 468 (Busnah, Phodjan state, India) (=Phuljhar, c. 21°N, 83°E., M.P.);

Baker, FBI No. 1686, Vol. 4 : 441; Ali & Ripley, HB No. 653, Vol. 3 : 302).

Local names : None recorded

Size. Myna +. Length c. (8 in.).

Above, whole head, back sides of neck, scapulars unspotted earthy brown; hind collar of white spots ill defined. Below, a strongly marked dark bar across throat; underparts more brown less white; breast brown with merely white fringes to the feathers. Sexes alike. (Ali & Ripley).

Status uncertain. Rare but apparently extending all along the satpura mountain trend, from Surat Dangs and W, Khandesh to eastern M.P. and Orissa (Sambalpur). Since first described in 1873 less than a dozen specimens have been collected, the latest in october 1914

at Mandvi on Tapti River (21°16'N., 73°22'E.), c. 220km. north of Bombay, by Meinertzhagen. Affects heavy moist deciduous jungle and groove of wild mango; partial to the neighbourhood of stream. (Ali & Ripley).

240. Saurashtra Mottled Wood Owl : *Strix ocellata grandis* Koelz.

(*Strix ocellata grandis* Koelz, 1950, Amer. Mus. Novit., No. 1452 : 4 (Sasan, Junagadh, Kathiawar, W. India);

Baker, FBI No. 1649 (Part), Vol. 4 : 402; Ali & Ripley, HB No. 655, Vol. 3 : 304).

Gujarati Girnari ghuvad.

Size. Pariah kite +. Length c. (19 in.).

Large Owl, without ear-tuft, mottled and vermiculated above with brown, black and white, facial disc white mixed with buff, throat chestnut and black striped white, rest underparts golden buff barred blackish. Sexes alike.

Resident, restricted to Saurashtra Peninsula, Gujarat. Affects forest with large and old deeply foliated trees.

The type locally of this race is Gujarat (Sasan, Junagadh, Kathiawar, W. India).

241. Southern Mottled Wood Owl : *Strix o. ocellata* (Lesson).

(*Syrnium ocellatum* Lesson, 1839, Rev. Zool. : 289 (Pondicherry); Baker, FBI No. 1649 (Part), Vol. 4 : 402; Ali & Ripley, HB No. 657, Vol. 3 : 305)

Local names : Not recorded.

Size. Pariah Kite +. Length c. (19 in.).

Similar to earlier race but being smaller and a diagnostic dark brown patch running back from eye on either side of the neck.

Resident. Widespread but thinly distributed throughout Peninsula from Kerala, Tamil Nadu, north through Karnataka, A.P. Maharashtra, Gujarat, M.P. and Orissa.

Ali collected specimens from Deesa (Palanpur), Dediapada (Rajpipla), Laochali (Surat Dangs) and also noted from Dabka (Baroda dist.), Patan (Mehsana dist.). Gulkund and Mheskati (Surat Dangs). He further noted that it is absent in Kutch.

The geographical distribution of the three races of *Strix ocellata* (Lesson) and that to specially geographical isolation of the race from the type locality, Sasan, Junagadh, i.e. *S.o.grandis* Koelz. is much needed debate. The geographical position of the state of Gujarat is such that all the three races may either occur and also overlap to each other specially on N. Gujarat and Saurashtra region. It is therefore, vary difficult to say a particular specimen, without a series collection, to which race it belongs.

242. Longeared Owl : *Asio o. otus* (Linnaeus).

(*Strix Otus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 192 (Sweden); Baker, FBI No. 1642, Vol. 4 : 393; Ali & Ripley, HB No. 663, Vol. 3 : 313)

Local names : None recorded.

Size. Pigeon +. Length c. (14-15 in.).

Mottled grey-brown above, buff below, boldly streaked and barred with blackish. Two upstand black and buff ear-tufts. Transverse as well as longitudinal markings on abdomen. Sexes alike.

Breeding in our Indian limit, recorded once in Kashmir (Shelley, 1895, JBNHS, 10 : 149). Mainly seasonal visitor, as vagrant, rare and locally common, sparsely in Kashmir, H.P. (Chamba, Lahul), Delhi, Gujarat (Kutch) in the Indian limit in semi-desert country and waste land.

Extralimital : Pakistan, Also more or less throughout Europe and Palaearctic. Asia north to between c. 58° and 66° N. lat. and NW Africa.

"Hume (S.F., iii : 450) recorded *Asio otus* the Longeared Owl, from Kutch on the authority of Stoliczka" (Ali, JBNHS, 52 : 440).

243. Shorteared Owl : *Asio f. flammeus* (Pontoppidan).

(*Strix Flammea* Pontoppidan, 1763, Dansk. Atlas 1 : 617, pl. 25 (Sweden); Baker, FBI No. 1643, Vol. 4 : 394; Ali & Ripley, HB No. 664, Vol. 3 : 314)

Local names : Hindi Not recorded.

Size. Pigeon +. Length c. (15 in.).

Plumage overall buff, heavily streaked with dark brown. Head Grey, Facial disc white surrounding by brown ruff. Two short blackish brown upstanding ear tufts. Breast with longitudinal brown streak but abdomen is without transverse marking. Sexes alike.

Winter visitor, and/or passage migrant, practically in the entire Indian Union excluding Andamans and Nicobar Islands.

Extralimital : Pakistan, Nepal, Bhutan (?), Sri Lanka, Bangladesh.

Ali collected specimens from Dabka (Baroda dist.), Radhanpur, Galkund (Surat Dangs), Gujarat and also noted from Mandvi (Specimen : Fatehsinhji), Kaira dist (Specimen : H.C. Aldrich), Dwarka, Dalkhanja (Amreli dist.), Gujarat.

#### Family CAPRIMULGIDAE (Nightjars)

The nightjars include 76 species through the tropical and temperate areas of the World. 13 species and sub-species have been recorded from the Indian Sub-region and only five races are distributed in Gujarat.

Nightjars are cryptic, nocturnal birds with long wings and tail, short weak legs. They are most often encountered resting in leaves on ground or on dust on ground, with the body held in a characteristic horizontal position. Plumage colouration mimics dried barn or leaves, being mottled white, grey, brown and black. Bill short, weak, flexible and with an enormous gape. Largely solitary or in pairs and mostly remain silent. Nightjars prefer to leave in open scrub, and dry and moist deciduous forest, normally come out of the forest with the advent of darkness.

#### 244. Indian Jungle Nightjar : *Caprimulgus i. indicus* Latham.

(*Caprimulgus indicus* Latham, 1790, Index Orn. 2 : 588 (India); Baker, FBI No. 1625, Vol. 4 : 366; Ali & Ripley, HB No. 671, Vol. 4 : 10)

*Local names* : Hindi Chhippak, Chhappa, Dabank.

Size. Pigeon +. Length c. (11-12 in.).

Plumage overall mottled, vermiculated, barred and streaked with brown, rufous, black and white, blended in a remarkably obliterative or camouflaging pattern. Tarsus feathered, back with black streaks and spots.

Four outer pairs of tail feathers with sub-terminal white spots. (Male).

Species differentiation are difficult in the field except by their calls chiefly heard in the breeding season, which are distinctive and specifically diagnostic.

Long runs of quickly repeated loud Chuck-Chuck-Chuck or Chuckoo- Chuckoo- Chuckoo etc.; Off-repeated Chuk'm Chuk'm Chuk'm like exhaust-note of small gas-engine (Ali & Ripley). Resident and partial local migrant. Practically all India excluding W. Rajasthan and Kutch (Gujarat).

Ali collected specimens from Sairat (Kaira dist.), Galkund and Pandwa (Surat Dangs) and also noted from Dediapada (Raj Pipla), Waghai, Malegaon, Mheskatri (Surat Dangs), Gujarat.

#### 245. Hume's European Night Jar : *Caprimulgus europaeus unwini* Hume.

(*Caprimulgus unwini* Hume, 1871, Ibis : 406 (Agrore valley); Baker, FBI No. 1619, Vol. 4 : 359; Ali & Ripley, HB No. 673, Vol. 4 : 12).

*Local names* : Hindi As in earlier race.

Size. Myna +. Length c. (10 in.).

Plumage as in earlier race. Two outer pairs of tail-feathers tipped white, a white spot on first three primaries (Male); tarsi three-fourth feathered. Female with no white on tail wings patch rufous.

Call-note :- Steady whirring notes, and quick-repeated subdued Chuk-Chuk as of House Gecko (Ali & Ripley).

Summer visitor and passage migrant. Common and abundant as a transient or autumn passage in Kutch (Gujarat), Stragglers records in Jodhpur (Rajasthan), Bombay city, Gorakhpur (U.P.) in the Indian limit.

Extralimital : Pakistan. Winters in eastern Africa from Sudan south to Natal.

(Ali), collected specimens from Bhachau, Rapar (both in Kutch), Gujarat - Fairly common

and abundant autumn passage migrant through Kutch by the Arabian routs to its winter quarters in Africa.

246. Sykes's or Sind Nightjar : *Caprimulgus mahrattensis* Sykes.

(*Caprimulgus Mahrattensis* Sykes, 1832, Proc. Zool. Soc. London : 83 (Mahrattas (?); Baker, FBI No. 1628, Vol. 4 : 369; Ali & Ripley, HB No. 674, Vol. 4 : 14).

*Local name* : Hindi - As in earlier race.

*Size*. Myna +. Length c. (9 in.)

A small sandy grey semidesert nightjar, finely verniculated above with wavy bars of light brown. Tarsus almost naked, outer tail feathers tipped white in male and buff in female. Soft, long- continued prrrrr like Bustard - Quail's drumming (Call note - Ali & Ripley).

Winter visitor, widely but sparsely dispersed and straggling to Rajasthan, Kutch, Saurashtra, W. Khandesh, Deccan. Konkan, south to Belgaum (Karnataka); also recorded from Simla and Delhi, arbitarily not further east than c. 77°E. in semi-desert cultivation, stony waste land.

Extralimital : Pakistan (breeding), Afghanistan, SE Iran.

Ali collected one specimen from Dabka (Baroda dist.).

Hume obtained one specimen in N. Gujarat between Deesa and Suigam (S.F., iii : 455).

247. Indian Little Nightjar : *Caprimulgus a. asiaticus* Latham.

(*Caprimulgus asiaticus* Latham, 1790, Index Orn. 2 : 588 (India-Bombay); Baker, FBI No. 1630, Vol. 4 : 372; Ali & Ripley, HB No. 680, Vol. 4 : 21)

*Local names* : Hindi - As earlier race.

Gujarati Deshi Chhapo

*Size*. Myna +: Length c. (9-10 in.).

A small nightjar, narrowly black streaked above. Plumage as in Indian Jungle Nightjar. Tarsus almost naked. Atleast three distinct colour phases- pale sandy, brown and grey

(Whistler - JBNHS 38 : 38).

Call note :- Chuck-Chuck-Chuck-r-r-r, like pelted stone skidding over ice (Ali & Ripley).

Resident, most abundant and widely diffused nightjar in our Indian limit. practically in the entire Indian Union excluding islands.

Extralimital : Pakistan, Nepal, Bangladesh, Tibet, Burma, S. Thailand, S. Indo - China.

Ali collected specimens from Kutch, Bhuj environs, Bhujia Fort and also noted Khari Ropar, Meta-no-Madh, Khadir, Bela and Pacchem Island (all in Kutch); Dwarka, Golana (Baroda), Cambay, Gujarat etc.

248. Franklin's or Allied Nightjar : *Caprimulgus affinis monticola* Franklin.

(*caprimulgus monticolus* Franklin, 1831, Proc. Zool. Soc. London : 116 (Ganges between Calcutta and Benaras); Baker, FBI No. 1629, Vol. 4 : 370; Ali & Ripley, HB No. 682, Vol. 4 : 23)

*Local name* : Hindi - As in earlier race.

*Size*. Myna +. Length c. (10 in.).

Plumage as in earlier race. Tarsus almost naked, outer tail feathers all white except at tip.

Single, sharp, penetrating Sweesh (or Chos-ae-or Chewees) like sound of whiplash cutting air (call note - Ali & Ripley).

Resident. Common and widely diffused, but rather local from Punjab eastward to Assam, Sikkim and N.E. India, south through Rajasthan, Gujarat, eastward and southward throughout the Peninsula to Bengal and Kerala. Affects bare, sparsely scrubbed hillside, thorn scrub and stunted trees etc.

Order APODIFORMES

Family APODIDAE  
(Swifts and Swiftlets)

These are the most specialized aerial birds, have cigar-shaped bodies and long rather straight wings. The birds spend most time in the air and only are seen at rest, usually only at the roosting or nesting site. Flight is fast, with stiff and rapid wing beats.

## Key to the genera of the family APODIDAE

Four toes directed forward though 1st reversible ..... *Apus*

Toes arranged in pairs, 3rd & 4th outward, 1st & 2nd inward ..... *Cypsiurus*

249. Alpine Swift : *Apus m. melba* (Linnaeus)

(*Hirundo Melba* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 192 (Gibraltar); Baker, FBI No. 1589 (part), Vol. 4 : 324; Ali & Ripley, HB No. 693, Vol. 4 : 39)

*Local names* : Hindi- Badi ababeal

Gujarati Pahadi ababeelo

*Size*. Bulbut +. Length c. (8-9 in.).

A large sooty brown swift with white underparts and a brown pectoral band across breast. Long pointed wings, slightly forked tail. Sexes alike.

Passage migrant to our Indian limit, only recorded from Saurashtra (Gujarat) and Mt. Abu (Rajasthan) in winter.

Extralimital : Pakistan (Passage). Winter in Arabia, Asia Minor, and Africa.

Ali recorded this bird as *Apus melba ssp.* and noted it from Nakhatrana, Bhachau (Kutch), Bhuj, Patan, Waghai and Fort Salher, Gujarat.

Ali further noted that, loose parties appearing suddenly mostly in cloudly overcast weather from nowhere and disappearing just as suddenly.

Allied race of this bird, i.e. Indian Alpine swift, *Apus melba ubifuga* Koelz have also geo-graphical distribution in Gujarat. But so far no authentic data is available about the presence of both sub-species.

250. Eastern Swift : *Apus apus pekinensis* (Swinhoe)

(*Cypselus pekinensis* Swinhoe, 1870, Proc. Zool. Soc. London : 435 (Pekin, China); Baker, FBI No. 1590, Vol. 4 : 326; Ali & Ripley, HB No. 696, Vol. 4 : 43)

*Local names* : None recorded.

*Size*. Bulbul +. Length c. (6-7 in.).

A uniformly sooty black swift, with whitish chin and throat and sometimes a few pale crescentic marks on belly. Sexes alike.

Straggler. Once recorded from Saurashtra (Lavkumar, subspecies?), otherwise casual winter visitor in N. India, recorded also from N. Cachar (Assam).

Extralimital : Pakistan. Breeds in winters in E. Africa.

251. Blyth's or Himalayan Whiterumped Swift : *Apus pacificus leuconyx* (Blyth).

(*Cypselus leuconyx* Blyth, 1845, Jour. Asiat. Soc. Bengal 14 (1) : 212 (Calcutta); Baker, FBI No. 1595, Vol. 4 : 331; Ali & Ripley, HB No. 700, Vol. 4 : 49)

*Local names* : None recorded.

*Size*. Sparrow +. Length c. (6 in.).

Apparently it looks like Indian House swift, but the tail deeply forked. Sexes alike.

Status uncertain. Possibly breeds in the Himalayas from Kashmir to Arunachal including northern U.P., H.P. and Sikkim in our Indian limit.

Movement in non-breeding season capricious and unpredictable and also due to non-identification in the field as it is very close to Indian House Swift in plumage.

Wanders far and wide in the Peninsula, recorded from A.P. (Mulug), Bombay city, Konkan & Karwar (Karnataka) and also Saurashtra (Gujarat).

Extralimital : Pakistan, Nepal, Bhutan, Bangladesh.

252. Indian House Swift : *Apus a. affinis* (J.E. Grey).

(*Cypselus affinis* J.E. Grey, 1830, in Gray and Hardwicke's I11 Ind. Zool. 1 (2), pl. 35, f. 2 (No locality = Ganges); Baker, FBI No. 1596, Vol. 4 : 332; Ali & Ripley HB No. 703, Vol. 4 : 51)

*Local name* : Hindi Ababeel, Babeela

Gujarati Ababeelo.

Size. Sparrow; Length c. (6 in.).

A small smoky black swift with conspicuous white rump, white throat, short square tail, and long narrow sickle-shaped wings. Sexes alike. (Ali & Ripely).

Extralimital : Sri Lanka, Nepal, Bangladesh.

Thinly distributed in Gujarat.

Ali noted it at Ajwa and Bodeli (Baroda dist.), Cambay town environs, Rajpipla, Gujarat.

(DKS) found nests in Bhavnagar, Saurashtra in May-June, 1946 (JBNHS, 46 : 724).

253. Indian Palm Swift : *Cypsiurus parvus batesiensis* (J.E.Gray).

(*Cyp (selus) Batesiensis* (Sic) J.E. Gray, 1829, in Griff. th's Amin. Kingdom 7 : 60 (Calcutta); Baker, FBI No. 1600, Vol. 4 : 336, 338; Ali & Ripley, HB No. 707 Vol. 4 : 56).

Local names : Hindi Taki ababeel, Talchatha, Patta deuli

Gujarati Tad ababeelo.

Size. Sparrow +. Length c. (5 in.).

A plain sooty grey swift with deeply forked tail. Sexes alike.

Resident. Common but patchily found all over the India excluding islands, in human inhabitation near cultivation dotted with Palm trees.

Extralimital : Nepal, Sri Lanka, Bangladesh, Burma to Central Tenasserim, Thailand and Indo-China.

Ali collected specimens from Juna, Rajpipla and also noted from Songadh (Navsari dist.), Galkund, Pimpri etc. (Surat Dangs). Absent in Kutch.

254. Crested Tree Swift : *Hemiprocne longipennis coronata* (Tickell).

(*Horundo Coronata* Tickell, 1833, Jour. Asiat. Soc. Bengal 2 : 580 (Jungles of Borabhum and Dholbhum); Baker, FBI No. 1616, Vol. 4 : 354; Ali & Ripley, HB No. 709, Vol. 4 : 58)

Local names : Hindi Jagdar ababeel

Gujarati Chotaliyo ababeelo

Size. Bulbul +. Length c. (9 in.).

A bluish grey swift with a prominent backward curving frontal crest. Chin, throat and sides of the face chestnut, breast ashy grey and abdomen white (Male); female similar but lacking chestnut on face and throat.

Resident. rather patchily distributed throughout the Indian Union except arid tree less part of Punjab, Rajasthan and Gujarat.

Resident. Most common of our swift. Practically found in the entire Indian Union excluding islands.

Ali collected specimens from Kutch and Bhuj Fort. and also noted everywhere from Gujarat.

Z.S.I. party noted this bird as plenty in the Jamnagar Town environs, in Nov. '1993.

Family TROGONIDAE  
(Trogon)

Brilliant coloured birds. Bill short, strong and wide. Base of bill well covered with bristles. Tail long, the rectrices broad and squarely truncated. They prefer to live in moist-deciduous and evergreen forest.

255. Central Indian Trogon : *Harpactes fasciatus legerli* Koelz.

(*Harpactes fasciatus legerli* Koelz, 1939, Proc. Biol. Soc. Washington 52 : 79 (Foot of Mahendragiri, Orissa); Baker, FBI No. 1585 (Part), Vol. 4 : 317, Ali & Ripley, HB No. 710, Vol. 4 : 61)

Local name : Hindi Kufni chiri

Size. Myna +. Length c. (12 in.).

Plumage of head, neck and breast sooty black. Back pale brown. Underparts brilliant crimson-pink divided from black breast by a white gorget (Male); female duller and underparts orange-brown.

Resident, but thinly distributed in isolated biotope and restricted to a geographical boundary from Southern Gujarat (Surat Dangs)

and Northern Maharashtra (Khandesh) south to c. lat. 20<sup>0</sup>N, eastward, presumably over the Satpura trend, through M.P. (Bastar dist.) to Chota Nagpur to Orissa (Mahendra Giri).

Ali collected specimens from Waghai, Galkund, Pandwa, Ajwa, Mahal, Mheskatri, Sarwar (all in Surat Dangs), and further noted that this bird is absent in Kutch, and possibly may occur in Rajpipla and Gir Forest area in suitable habitat.

### Order CORACIFORMES

#### Family ALCEDINIDAE (Kingfishers)

#### Key to the genera of the family ALCEDINIDAE

1. Plumage black and white .....*Ceryla*  
Plumage not black and white .....2
2. Tail shorter than bill .....*Alcedo*  
Tail longer than bill .....3
3. Bill compressed, culman flattened and grooved on either side .....*Palargopsis*  
Bill not compressed, culmen rounded and not grooved .....*Halcyon*

Eighty-seven species worldwide; twenty seven species and sub- species are found in the Indian Sub-Region, of which five races are found in Gujarat.

Most are small to medium-sized. With large head, long bill, short legs and tiny feet. Most are predominately blue, with brown or white underparts. Most search for prey from an exposed perch and swoop down on their quarry. Solitary, in pairs, rarely as family groups.

Though the birds by name Kingfisher, but some are not associated with water and do not eat fish but forest dwellers and prey on insects.

#### 256. Indian Pied Kingfisher : *Ceryle rudis leucomelanura* Reichenbach.

(*Ceryle leucomelanura* Reichenbach, 1851, Handb. Spec. Orn.: 21, Pl. ccix b, f. 3488

(Ceylon); Baker, FBI No. 1531, Vol. 4 : 246; Ali & Ripley, HB No. 719, Vol. 4 : 71)

*Local name* : Hindi Koryala, Kilkila

Gujarati Kal Kaliyo; Kirkiria (Kutch).

Size. Myna +. Length c. (12 in.).

A speckled and barred Black and White Kingfisher with the typical stout dagger-shaped black bill. readily identified by its spectacular habit of 'standing on its tail' in mid air, hovering over water (Ali & Ripley).

Resident and rather sedentary. Common, practically throughout the Indian Union except Kerala and Sikkim.

Extralimital : Pakistan, Nepal, Bhutan, Sri Lanka, Afganistan, Burma, Thailand etc.

Ali collected specimens from Sairat (Kaira dist.), Vaghjipur (Mehsana dist.) and also noted from Chaduva, Bhuj, Anjar (all in Kutch); Kodinar (Saurashtra); Baroda environs, Golana (Cambay), Radhanpur, Kharaghoda, Juna Rajpipla, Gujarat.

Lester noted its breeding in Kutch in Feb. & March.

Z.S.I. party noted it at Khijidia Bird Sanctuary (Jamnagar dist.), Nov. '1993.

#### 257. Indian Small Blue Kingfisher : *Alcedo atthis bengalensis* Gmelin.

(*Alcedo bengalensis* Gmelin, 1788, Syst. Nat. 1 (1) : 450 : (Bengal); Baker, FBI No. 1533, Vol. 4 : 250; Ali & Ripley, HB No. 723, Vol. 4 : 76)

*Local name* : Hindi Chhota Kilkila

Gujarati Lagothi

Size. Sparrow +. Length c. (7 in.).

A little blue-green kingfisher with brilliant blue back and rump and deep rust underparts, long straight and pointed black bills. Sexes alike.

Resident, from the Himalayan terai east to Sikkim, Assam, Manipur and through the Gangetic Plain south to a arbitrary line C. 20<sup>0</sup>N.

Extralimital : Pakistan, Nepal, Bhutan, Bangladesh, Burma, Thailand, Indo-China, Malay; Philippines.

Ali collected specimens from Dhari (Amreli dist), Ajwa (Baroda dist.), Sairat (Kaira dist.), Vaghjipur (Mehsana dist), Balaram (Palanpur dist.), Juna Rajpipla and also noted from Kutch, Bhuj environs, Mandvi, Dwarka, Cambay, Radhanpur, Kharaghoda etc. Gujarat.

Z.S.I. party also noted from Nalsarobar (Gandhinagar dist.); Gir National park; Verabal, and Khijidia Bird Sanctuary (Jamnagar dist.), Oct. Nov.'1993.

258. Brown-headed Storkbilled Kingfisher :  
*Pelargopsis c. capensis* (Linnaeus)

(*Alcedo capensis* Linnaeus, 1766, Syst. Nat., ed. 12, 1 : 180 (Cape of good hope = Chandernagar); Baker, FBI No. 1548, Vol. 4 : 265; Ali & Ripley, HB No. 730, Vol. 4 : 84)

Local name : Hindi Bada kilkila

Size. Pigeon +. Length c. (15 in.).

Plumage, above, head greyish brown, upperparts pale greenish blue, a yellow collar on hind neck. Chin and throat whitish and rest ochraceous buff. A diagnostic blood-red dagger-shaped bill. Sexes alike.

Resident. Thinly distributed in all India, Affects large shaded forest stream and other inland water source.

Extralimital : Nepal, Bangladesh, Sri Lanka.

Ali collected specimens from Balaram (Palanpur), Juna Rajpipla, Dediapada (Rajpipla), Waghai (Surat Dangs), Kalibel and Sakapatal (Both in Surat Dangs). Absent in Kutch.

Z.S.I. party noted it by the side of the Hiron River, Saran Gir, Gujarat, Nov.'1993.

259. Whitebreasted Kingfisher : *Halcyon s. smyrnensis* (Linnaeus).

(*Alcedo smyrnensis* Linnaeus, 1758, Syst. Nat. ed. 10, 1 : 116 (Africa and asia = Smyrna, ex Albin); Baker, FBI No. 1550, Vol. 4 : 268; Ali & Ripley HB No. 735, Vol. 4 : 89).

Local name : Hindi Kilkila

Gujarati Kalkaliyo

Size. Myna +; length c. (11 in.).

A brilliant turquoise-blue kingfisher with chocolate brown head, neck and underpart, chin, throat and centre of breast white. Long, pointed coral-red bill and legs. Sexes alike.

Distribution: Resident. Most common and wide spread NW India (Kashmir), from the Sub-Himalayan tracts south throughout the Peninsula. Rajasthan and N. Gujarat (Kutch) and Gulf of cambay.

Extralimital : Pakistan, west through Iran and Iraq to Asia minor, south to Arabia.

Ali collected specimens from Ajwa, Bodeli, Dabka (all in Baroda dist.), Golana (Cambay), Cambay town environs, Vaghjipur (Mehsana dist.), Dediapada (Rajpipla) also noted from Chaduva (Kutch), Mandvi Lakhpat (Saurashtra), Amreli, Kodinar, Radhanpur, Palanpur, Kharaghoda, Gujarat.

Z.S.I. party noted it in Nalsarobar environs (Gandhinagar dist.), Dwarka and Gir National park environs, Oct. - Nov. '1993.

Ali further commented that the NW race, *Smyrnensis* excepting a slight increase in size as one more northward, in keeping with Bargmann's Rule.

260. Balckcappad kingfisher : *Halcyon pileata* (Boddaert).

(*Alcedo pileata* Boddaert, 1783, Table pl. enlum : 41 (China); Baker, FBI No. 1554, Vol. 4 : 271; Ali & Ripley, HB No. 739, Vol. 4 : 94)

Local name : Hindi Kaurila

Size. Myna +: Length c. (12 in.).

Plumage purple blue back on upperparts and rusty under parts. Prominent white collar on hind neck, whitish wing patch and coral red bill. Sexes alike.

Resident. A maritime Kingfisher, patchily distributed on the western sea board through eastern Peninsula, and also Andaman and Nicobar Islands. Sporadically recorded also from Gonda (U.P.), Monghyr, Madhubani, Trihut (Bihar), Damagudiem. (A.P.), Bharatpur (Rajasthan), N. Lakhimpur (Assam) and Naga Hills N. of Manipur (S.F. 11 : 45).

Extralimital : Sri Lanka, Bangladesh,

Burma, Thailand, Malay Peninsula, Indo-China, China, Korea, Hainan, Philippines, Borneo, Sumatra.

Ali collected specimen from Sakalpatal (Surat Dangs) and noted elsewhere.

Family MEROPIDAE  
(Bee-Eaters)

Twenty-four species of bee-eaters are distributed throughout the tropical and sub-tropical Old world. Ten species and sub-species are found in the Indian sub-Region and only three found in the Gujarat.

Bee-eaters are green birds with some amount of blue and black in their plumage. They have long pointed bill and tail. Gregarious and vocal, choose open perch like canopy of trees or telephone wires, from which they sail out to catch flying insects. Legs and feet feeble, syndactyle.

261. Bluecheeked Bee-eater : *Merops superciliosus persicus* Pallas

(*Merops persica* Pallas, 1773, Reise, Russ. Reich 2 : 708 (Shores of the Caspian Sea); Baker, FBI No. 1527, Vol. 4 : 239; Ali & Ripley, HB No. 747, Vol. 4 : 104)

Local name : Hindi Bada patringa

Gujarati Moto patrangiyō

Size. Bulbul +. Length c. (12 in.).

A bright green bird with slender decurved black bill and projecting pin feathers in the tail. Throat patch pale chestnut, a black band through eyes. Sexes alike.

Resident. Probably extralimital breeding visitor in small numbers in NW India Rajasthan, Gujarat (Saurashtra), Delhi, NW Punjab, in the neighbourhood of jheels, edge of the forest.

Extralimital : Pakistan. Migrates over Arabia and the Nile Valley wintering in tropical and southern Africa.

Ali collected specimens from Kutch, Chaduva (Bhuj dist.), Ajwa (Baroda dist.) and also noted from Ropar (Kutch), Khadva (Bhuj), Mithapur and Amreli, Gujarat.

Z.S.I. party noted a large flocks comprising more than hundred in an island in the Nalsarobar environs (Gandhinagar dist.) in October '1993.

262. Indian Small Green Bee-eater : *Merops o. orientalis* Latham.

(*Merops orientalis* Latham, Index Orn., Suppl. : xxxiii (Pondichery); Baker, FBI No. 1523, Vol. 4 : 234; Ali & Ripley, HB No. 750, Vol. 4 : 109).

Local names : Hindi Patringa

Gujarati Nano patrangiyō

Size. Sparrow +. Length c. (8 in.).

A slender grass green bee-eater with slightly decurved black bill, brown head and fore neck and projecting blue pin central pair tail feathers. Chin and throat verditer blue follows black gorget. Sexes alike.

Resident with seasonal movement. Practically common in the entire Indian Union excluding islands and Assam.

Extralimital : Nepal, Bhutan, Bangladesh.

Ali collected specimens from Kutch, Bhuj environs, Nir (Pachham Island), Bodeli (Baroda dist.), Cambay town, Dalkhania (Amreli dist.), Kharaghoda, Gujarat.

Z.S.I. party noted it from Khijidia Bird Sanctuary environs, Jamnagar, Gujarat, Nov. '1993.

Northern Gujarat, perhaps, is the intergrading zone with allied race, i.e., *Beludschicus* which is frequently noted here.

Ali further noted that, "The Great Rann evidently acts as a barrier between *orientalis* and the paler race *beludschicus* of sind, though individuals from Kutch and N. Gujarat may pass with either"

263. Blue Beared Bee-eater : *Nyctornis a. athertoni* (Jard. & Selby).

(*Merops athertoni* Jard. & Selby, 1830, I11. Orn. 2, pl. 58-and text. (Bangalore); Baker, FBI No. 1529, Vol. 4 : 242; Ali & Ripley, HB No. 753, Vol. 4 : 112)

Local names : Not recorded.

Size. Pigeon +. Length c. (14 in.).

A large grass green bee-eater with long-decurved black bill. Greenish blue forehead, throat, upperbreast verditer blue, abdomen buff streaked green shaft stripes. tail square. Sexes alike.

Resident. Scattered and thinly distributed all over main land of Indian limit, from the lower Himalayas. down to the plains in evergreen and deciduous forest.

Extralimital : Nepal, Bhutan, Bangladesh, Burma, Thailand, Indo- China.

Ali recorded call note at Medha, *ca.* Songadh (Navsari dist.), Gujarat.

#### Family CORACIDAE (Rollers)

Eleven species of rollers inhabits in the Old World tropics and subtropics, of which eight species and sub-species are found in Indian Sub-region and two races reaching Gujarat as passage migrant and resident.

It spends much time atop open perches at forest edge to catch the insects.

Plumage predominantly blue and green with some brown.

#### 264. Kashmir Rollar : *Coracias garrulus semenowi* Loudon & Tschudi.

(*Coracias garrulus semenowi* Loudon & Tschudi; 1902, Orn. Jahrb. 13 : 148 (Transcaspia); Baker, FBI No. 1516, Vol. 4 : 222; Ali & Ripley, HB No. 754, Vol. 4 : 114)

*Local name* : Gujarati Kashmiri Nilkant.

*Size. Pigeon* : Length c. (12 in.).

Plumage, above, blue and brown, blue black flight feathers and underparts uniformly light blue. Sexes alike.

Breeds in Kashmir in our Indian limit. Passage migrant (autumn) in Rajasthan and N. Gujarat. Occasionally straggling as far as M.P. (Seoni dist.), Maharashtra (Dhulia, Khandela) to Karnataka (Karwar).

Extralimital : Pakistan, Arabia and Africa

(Autumn migration), Breeds also in Transcaspia, Turkestan, W. Iran Shan to Iran.

Ali collected specimens from Kutch, Chaduva (Bhuj Dist.), Ajwa (Baroda dist.) and also noted from Anjar, Rapar, Bhachau, Khavda (All in Kutch), Dwarka, Okha, Amreli, Dhari, Gujarat.

Z.S.I. party noted this bird in the Gir National Park area in November 1993.

#### 265. Northern Rollar or Blue Jay : *Coracias b. bengalensis* (Linnaeus).

(*Corvus bengalensis* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 106 (Tulin, Purulia, W. Bengal); Baker, FBI No. 1517, Vol. 4 : 224; Ali & Ripley, HB No. 755, Vol. 4 : 176)

*Local names* : Hindi Nikant, Sabzak  
Gujarati Deshi Nilkant.

*Size. Pigeon. Length c.* (12 in.).

A blue rollar with rufous brown coloured breast, pale blue abdomen and vent and an obsolete brown collar on hind neck. Sexes alike.

Resident. Commonly found all over India except islands. The southern limit of distribution is fixed arbitrary boundary at 20°N. lat.

Extralimital : Pakistan, Nepal, Bhutan, Bangladesh. Also in E. Arabia, S. Iran, Iraq.

Ali collected specimens from Nakhatrana (Kutch), Bodeli (Baroda dist.), Golana (Cambay), Nadiad town (Kaira dist.), Patan (Mehsana dist.), Kharaghoda, Songadh (Navsari dist.).

Z.S.I. party noted in Nalsarobar environs, Gandhinagar dist. Gujarat, Oct. 1993.

#### Family UPUPIDAE (Hoopes)

This family is represented by one genus, one species and four sub-species of which two races are found in Gujarat. Easily recognised by its erectile fan-shaped crest. Affects open country, cultivation, light forest, and the neighbourhood of villages.

266. European Hoopes : *Upupa e. epops*  
Linnaeus.

(*Upuoa epops* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 117 (Sweden); Baker, FBI No. 1579, Vol. 4 : 308; Ali & Ripley, HB No. 763, Vol. 4 : 124).

*Local name* : Hindi Hudhud

Size. Myna. Length c. (12 in.).

A fawn coloured bird with black and white zebra marking on back. wing and tail. A diagnostic black and white tipped fan-shaped crest. Long, slender decurved bill. Sexes alike.

Breeds in Kashmir, Ladakh, H.P., Garhwal, Kumaon from foothills upto 4000 mt. in our Indian locality and winters south through Rajasthan, Gujarat, M.P., U.P. and Bihar. Possibly further south in the Peninsula.

Extralimital : Pakistan. Breeds in also in Europe and Asia. Winters in N. Africa and Arabia.

Ali collected specimens from Kutch, Chaduva (Bhuj dist.), Bhuj environs, Chobari (Bhachau dist.), Amreli, Ajwa (Baroda dist.), Bodeli (Baroda dist.), Dabka (Baroda dist.), Nadiad (Kaira dist.), Patan (Mehsana dist.), Kharaghoda, and also noted from Nakhatrana, Anjar, Khavd (Pachham Is.), Nir (all in Kutch), Kodinar, Dalkhania, Radhanpur, Deesa, Palanpur, Gujarat.

Z.S.I. party noted this bird in Nalsarobar environs, (Gandhinagar dist.) Verabal and Sasan Gir area during Oct. Nov. '1993.

267. Ceylon Hoopes : *Upupa epops*  
*ceylonensis* Reichenbach.

(*Upupa ceylonensis* Reichenbach, 1853, Handb. Spec. Orn., Seansoriae. 320, Pl. DXCV, f. 4036 (Ceylon); Baker, FBI Nos. 1581. 1582, Vol. 4 : 311; Ali & Ripley, HB No. 765, Vol. 4 : 128).

*Local names* : Hindi Hudhud.

Gujarati Ghanti tankno.

Size. Same as earlier race.

Plumage, same as earlier race but smaller, darker and more rufous. Breast with hardly any tint of vinous; rufous of head and crest deep; white spot on crest absent or obsolete. Sexes alike.

Resident and breeds in lower Himalayas from Bihar, N. West Bengal, South through Western U.P., Central India, Western M.P., Gujarat, Maharashtra and all southern Peninsula of our Indian limit.

Extralimital : Nepal, Bhutan, Sri Lanka.

The distributional ranges of this race and the earlier are not worked out. Presumably the earlier race occur in N. Gujarat. This race extended from other adjoining area to south Gujarat. But no arbitrary line has so far been fixed.

Ali further reported on the basis of collection of earlier race that there is a greater extent of variation in colour variation/diffusion/richness and presence/absence of white spot on crest.

Family BUCEROTIDAE  
(Hornbills)

Hornbills are typical old World family of 44 species, 10 of which inhabit in the Indian Sub-region and only one is found in Gujarat.

268. Grey Hornbill : *Tockūs birostris*  
(Scopoli).

(*Buceros birostris* Scopoli, 1786, Del. Flor. et. Faun. Insubr., fasc. 2 : 87 (Coromandel, India); Baker, FBI No. 1575, vol. 4 : 301, Ali & Ripley, HB No. 767, Vol. 4 : 130).

*Local names* : Hindi Dhanesh

Gujarati Chilotro/Chalotra

Size. Kite +. Length c. (24 in.).

A clumsy brownish grey bird with heavy decurved blackish bill surmounted by casque and long black and white edged graduated tail. Sexes alike but casque smaller.

Resident but moving locally subject to fruiting seasons, it ranges from the base of the Himalayas east to northern W. Bengal southward throughout the Peninsula of our Indian limit. Affects well-wooded country singly or occasionally small party of four to five.

Extralimital : Pakistan, Nepal.

Ali collected specimens from Juna Rajpipla

and also noted from Ajwa (Baroda dist.), Hatiadhara (Palanpur), Songadh (Navsari dist.), Galkund, Malegaon (Surat Dangs), Gujarat.

Family CAPITONIDAE  
(Barbets)

Prevailing colour green. Bill stout; base of bill completely surrounded by rictal bristles. A naked orbital patch usually present. Tail square and graduated sixteen species and subspecies are found in the Indian sub-Region and only two are found in Gujarat.

269. Northern Green Barbet : *Megalaima zeylanica caniceps* (Franklin).

(*Bucco caniceps* Franklin, 1831 (1830-31), Proc. Zool. Soc. London (1) : 121 (On the Ganges between Calcutta and Benaras, and the vindhyan hills between the latter place and Gurrah Mundela on the Nerbudda); Baker, FBI No. 1430, Vol. 4 : 110; Ali & Ripley, HB No. 780, Vol. 4 : 150).

Local name : Hindi Bada Basanta

Size. Myna+. Length c. (10-11 in.).

A grass green arboreal bird with head, neck, upper back and breast brown streaked whitish. Abdomen pale green, Naked orange colour patch round the eye is diagnostic. Sexes alike.

Resident, from W. Himalayas, Kangra (H.P.) to Kumaon (U.P.), west to Mt. Abu and Gujarat, east through M.P., northern Maharashtra to Bihar and W. Bengal and Orissa south of Godavari River in our Indian limit. Affects forest, edges of the forest and village side, even in well-wooded urban localities.

Extralimital : Nepal, Bangladesh (?).

Ali reported this green barbet as Western race, i.e. *M.z. inornata* Walden which is stipulated in Western India from about the Godavari River in Maharashtra south through Goa and Mysore to Coorg dist. (Ali & Ripley) and collected specimens Hathidhara (Palanpur), Juna Rajpipla, Songadh (Navsari dist.) Malegaon, Galkund, Laochali, Mheskatri, Sarwar (all in Surat Dangs) and also noted from Pavagadh (Panchmahals dist.), Gujarat.

Ali further commented that this race is more browner and streaks on breast finer or obsolete. The brown of head and breast silky and buffy.

270. Small Green Barbet : *Megalaima viridis* (Boddaert).

(*Bucco viridis* Boddaert, 1783, Table Pl. enlum : 53 (Mahe, India); Baker, FBI No. 1434, Vol. 4 : 113; Ali & Ripley, HB No. 785, Vol. 4 : 155).

Local name : Hindi Chhota Basantha

Size. Myna+. Length c. (8 in.).

Plumage similar to earlier race but presence of diagnostic white cheek-stripe. Sexes alike.

Resident. Common. The Sahyadri or W. Ghat complex from Kerala northward to about Narbada River in moist deciduous forest.

Ali collected specimens from Melagaon (Surat Dangs) and further noted that it was only found in Surat Dangs, and absent in Suarashtra and Kutch.

271. Crimsonbreasted Barbet or Coppersmith : *Megalaima haemacephala indica* (Latham)

*Bucco indicus* latham, 1788, Index Orn. 1 (1) : 205 (India); Baker, FBI No. 1446, 1447, Vol. 4 : 127, 128; Ali & Ripley, HB No. 792, Vol. 4 : 163)

Local names : Hindi Kathphora, Tambayat, Chhota Basantha

Gujarati Tuktukiyo

Size. sparrow+. Length (6-7 in.).

A small grass green barbet with yellow throat. Crimson breast and forehead and green-streaked yellowish underparts.

Resident. Very common and widely distributed in the entire Indian Union excluding islands in light wooded country side, gardens, and urban localities.

Extralimital : Pakistan, Nepal, Bhutan, Sri Lanka, Bangladesh, S. Yunan, N. Malaya, Thailand & Indo-China.

Ali collected specimens from Amreli;

Ajwa, Bodeli, Dabka (All in Baroda dist.), Cambay town environs, Deesa (Palanpur), Dediapada (Rajpipla), Melagaon, Sarwar (Surat Dangs) and also noted that it is rare in Kutch.

### Family PICIDAE

#### Key to the sub-families of family PICIDAE

Shafts of tail feathers stout and rigid  
.....*Picinae*  
shafts of tail feathers soft and flexible  
.....*Jyncinae*

#### Key to the genera of the sub-Family Picinae

1. Nostril concealed by feathers .....2  
   Nostril exposed .....3
2. Mantle wholly or partly green .....*Picus*  
   Mantle Black and White .....*Picoides*

#### 272. European Wryneck : *Jynx t. torquilla* Linnaeus

(*Jynx Torquilla* Linnaeus, 1758. Syst. Nat., ed. 10, 1 : 112 (Sweden); Baker, FBI No. 1423, Vol. 4 : 99; Ali & Ripley, HB No. 796, Vol. 4 : 168)

*Local name* : Hindi Gardan eyengtha

*Size*. BulBul +. Length c. (7 in.).

A silvery grey-brown bird, streaked, speckled, and vermiculated with black and fulvous above. Below, whitish with finely cross barred. Sexes alike.

Winter visitor, it ranges through U.P., Rajasthan, Gujarat, Maharashtra and Western Central India south to Kerala in our Indian limit. Affects some-desert, thorn jungle and deciduous forest.

Extralimital : Pakistan, Nepal, Breeds in Europe and W. Asia. Winters in the Mediterranean region, Africa south to the Equator.

Ali collected specimens from Kutch, Jakhan, Bhuj, Chaduva (Bhuj), Ajwa, Dabka (Both in Baroda dist.); Vaghjipur (Mehsana dist.), Patan (Mehsana dist.), Deesa (Palanpur), Rajpipla and Amreli, Gujarat.

#### 273. Southern Rufous Woodpecker : *Micropternus brachyurus jerdonii* (Malherbe).

*Phaiopicus jerdonii* Malherbe, 1849, Rev. et. Mag. Zool. 1 (2): 535 (Travancore); Baker, FBI No. 1392, Vol. 4 : 65 (= Gularis); Ali & Ripley, HB No. 804, Vol. 4 : 179)

*Local name* : Hindi None recorded.

*Size*. Myna +. Length c. (10 in.).

A chestnut-rufous woodpecker, narrowly cross-banded with black on underparts, wings and tail. Male differs from female by a crescent shaped crimson patch under the eye.

Resident and ranges from about Tapti River in Gujarat south through W. Maharashtra, Karnataka, W. Tamil Nadu and Kerala.

Ali collected specimen from Pimpri (Surat Dangs).

#### 274. South Indian Small Yellownaped Woodpecker : *Picus chlorolophus chlorigaster* Jerdon.

(*Picus chlorigaster* Jerdon, 1844, Madras Jour. Lit. Sci. 13 (2): 139 (Southern India); Baker, FBI No. 1349, Vol. 4 : 19; Ali & Ripley, HB No. 816, Vol. 4 : 194)

*Local name* : Hindi None recorded.

*Size*. Myna +. Length c. (10-11 in.).

A bright yellowish green woodpecker with forehead, supercilia and moustacial streak crimson, nuchal crest golden yellow. Tail brownish black, underparts brown barred whitish (Male). Female has no head or malar stripe.

Resident. Western Ghats complex from the Narbada River (W. Khandesh, Surat Dangs) south to Kerala thence in the Eastern Ghats to Northern A.P. to Orissa in forest and deciduous biotope.

Ali collected specimens from Songadh (Navsari dist.), Malegaon, Galkund, Pimpri (Surat Dangs), Gujarat.

275. Northern Goldenbacked Woodpecker :  
*Dinopium b. benghalense* (Linnaeus).

(*Picus bengalensis* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 113 (Chandernagor); Baker, FBI No. 1394, Vol. 4 : 67; Ali & Ripley, HB No. 819, Vol. 4 : 197)

*Local name* : Hindi Katphora (For all woodpeckers)

*Size*. Myna +. Length c. (10-11 in.).

*Plumage*, upper golden yellow and black, below, white, streaked with black. Crown and occipital crest crimson (Male); Female, forecrown black and only occipital crest crimson.

*Resident*. Most widely distributed from Punjab, U.P., Bihar, W. Bengal, Assam, Manipur (?). Orissa, Northern A.P., M.P., Rajasthan, Gujarat, Northern Maharashtra in forest and edge of the forest.

*Extralimital* : Nepal, Bangladesh.

Ali collected specimens from Bodeli (Baroda dist.), Cambay town environs, Patan (Mehsana), Radhanpur, Deesa, Balaram (Both in Palanpur), Juna Rajpipla, Dediapada (Rajpipla), Galkund, Pandwa, Laochali, Mheskatri (All in Surat Dangs) and also noted from Bhavnagar (Specimen DKS), absent in Kutch, though Hume (S.F., 3 : 459) noted it here.

Z.S.I. party noted it from Sasan Gir environs, in November, 1993.

276. Indian Great Black Woodpecker :  
*Dryocopus javensis hodgsonii* (Jerdon).

(*Malacolophus (Hemilophus) Hodgsonii* Jerdon, 1840, Madras Jour Lit. Sci. 11 (1) : 215, Pl. 2 (Telicherry); Baker, FBI No. 1414, Vol. 4 : 90; Ali & Ripley, HB No. 830, Vol. 4 : 208).

*Local names* : Hindi As in earlier race.

*Size*. House Crow +. Length c. (19 in.).

A large black woodpecker with white rump and abdomen. Male with crimson forehead, crown, nuchal crest and cheeks : female with the crimson confined to nape only.

*Resident*. It occur in humid forest and range from Western Ghats complex from Kerala north to Tapti River (C. 21°N.), through Tamil Nadu, W. Karnataka, W. Maharashtra (Khandesh), and S. Gujarat (Surat Dangs); also in Goa and recorded as far as from Bastar dist (M.P.) and Eastern M.P. and extended along the Satpura Hills.

Ali collected specimens from Songadh (Navsari dist.), Galkund, Pipalaidevi, Ajwa, Laochali, Mheskatri (All in Surat Dangs). Absent in Saurashtra or Kutch.

277. Yellowfronted Pied or Mahratta  
Woodpecker :

*Pecoides m. mahrattensis* (Latham).

(*Picus mahrattensis* Latham, 1801, Index Orn. Suppl. xxxi (Mahvatta); Baker, FBI No. 1374, Vol. 4 : 46; Ali & Ripley, HB No. 847, Vol. 4 : 226).

*Local name* : Hindi- As in earlier race.

*Size*. Bulbul -. Length c. (7 in.).

A small pied woodpecker, brownish black above irregularly spotted with white. Forehead and Crown yellow with scarlet occipital crest. Chin and throat white and rest of the underparts fulvous streaked brown with a scarlet patch on abdomen (Male); female similar to male but crown golden brown without any scarlet.

*Resident*. Common and most widely distributed more or less in the entire Indian Union except islands, upper Himalayas and rare in N.E. India in all types of wooded country.

*Extralimital* : Pakistan, Nepal, Bangladesh, Sri Lanka.

Ali collected specimens from Kutch, Bhuj, Cambay town environs, Dabka (Baroda dist.), Vaghjipur (Mehsana dist.), Radhanpur, Balaram, Deesa (All in Palanpur), Dediapada (Rajpipla), Galkund, Laochali (Both in Surat Dangs), also noted in Kodinar, Dalkhania (Amreli dist.).

Z.S.I. party noted this bird in Sasan Gir environs, Gujarat.

278. Southern Browncrowned Pygmy  
Woodpecker :  
*Pecoides nanus hardwickii* (Jerdon).

(*Picus (Dendrocopos) Hardwickii* Jerdon. 1844, Madras Jour. Lit. Lsi. 13 (2) : 138 (South India = Goomsoor, Ganjam); Baker, FBI No. 1380, Vol. 4 : 52; Ali & Ripley, HB No. 852, Vol. 4 : 231).

*Local names* : None recorded.

Size. Sparrow +. Length c. (5 in.).

A diminutive barred dark brown and white bird crown umber brown with a scarlet streak on either side together with a broad white stripe from above eye. Below, brownish white streaked blackish (Male). Female similar but lacking scarlet streak.

Resident. Common and distributed in the Peninsula except Coorg dist. (Karnataka) and Kerala, northward to Gujarat through M.P. and east to Orissa.

Saurashtra (Gujarat) is the intergrading zone of nominated race, *Nanus*;

Ali collected specimens from Jambughoda, Dediapada (Rajpipla), Galkund, Melagaon, Laochali, Mheskatri, Sarwar, Chikhli (All in Surat Dangs).

Also in Bhavnaagar (Specimen -DKS.).

Absent in Kutch.

Z.S.I. party noted this bird in the forest of Sasan Gir, (Amreli dist.), Gujarat, Nov.' 1993.

279. Heartspotted Woodpecker : *Hemicircus canente* (Lesson).

(*Picus canente* Lesson, 1830, Cent. Zool. : 215. : Pl. 73 (Pegu); Baker, FBI No. 5. 1409, 1410, Vol. 4 : 84, 85; Ali & Ripley, HB No. 856, Vol. 4 : 236).

*Local name* : Hindi none recorded.

Size. Sparrow +. Length c. (6-7 in.).

A small black and buff woodpecker with very slender neck, large crested head and strikingly short rounded tail. Forehead, crown and crest black in male and buffy white in female. Wing-coverts and tertiaries marked with diagnostic heart-shaped black spot.

Resident. Thinly and sparsely distributed in Western Ghats complex from Kerala north to Karnataka, Goa, Maharashtra to the Tapti River (c. 21°N lat., S. Gujarat) and Khandesh, then east to M.P., the Satpura trend, through Chanda, Bastar to Orissa, W. Bengal, Assam, south of Brahmaputra River, Manipur.

Extralimital : Bangladesh, Burma, Malay, Peninsula, Thailand, S. Indo-China.

Ali collected specimens from Songadh (Navsari dist.), Waghai, Sarwar (Both in Surat Dangs). Not recorded in Suarashtra and absent in Kutch.

280. Indian Blackbacked Woodpecker :  
*Chrysocolaptes f. festivus* (Boddaert).

(*Picus festivus* Boddaert, 1783, Table pl. enlum : 43 (Goa); Baker, FBI No. 1403, Vol. 4 : 77; Ali & Ripley, HB No. 858, Vol. 4 : 239).

*Local names* : None recorded.

Size. Pigeon., c. (11-12 in.).

Plumage, above, golden olive, crown and crest crimson, sides of hindneck white running down to form a white 'V' on neck. Underparts buffy white. chin and Throat fulvous white with five black longitudinal stripe (Male). Female similar but crown and crest yellow.

resident, widely but sparsely distributed in all Peninsular India except the following limit, drier zone of NW India, Assam in the east.

Ali collected specimens from Dediapada (Rajpipla), Galkund, Laochali, Mheskatri, Pimpri (All in Surat Dangs). Absent in Saurashtra and Kutch).

281. Southern Larger Golden backed  
Woodpecker :  
*Chrysocolaptes lucidus chersonesus* Kloss.

(*Chrysocolaptes strictus chersonesus* Kloss, 1918, Ibis : 113 (Johore, Malaya); Baker, FBI No. 1406, Vol. 4 : 80; Ali & Ripley, HB No. 862, Vol. 4 : 244).

*Local name* : None recorded.

Size. Pigeon +. Length c. (11-12 in.).

Plumage, above, crown and crest crimson, nape white, back golden olive, rumpcrims on

and tail black. Below buffy white with scaly pattern with black (Male). Female similar but crown and crest black.

Resident, sparsely distributed from Kerala along the Western Ghats through Karnataka, Goa, Maharashtra and Gujarat to the Tapti River and Khandesh in moist deciduous biotope.

Extralimital : Malay Peninsula, Singapore, Riau Archipelego, Sumatra, W. & C. Java.

This is one more example (cf. Great Pied Hornbill) of the fact that birds of the same species at the extremities of the 'Indo-Malayan horseshoe', i.e. Ceylon - India - Burma - Malaya, are Closely alike (Ali & Ripley).

Ali collected specimens from Mahal, Malegaon, Pimpri (all in Surat Dangs).

282. Indian Pitta : *Pitta b. bracyura*  
(Linnaeus)

(*Corvus brachyura* Linnaeus, 1766, Syst. Nat., ed. 12, 1 : 158 (Ceylon); Baker, FBI No. 1323, Vol. 3 : 453; Ali & Ripley, HB No. 867, Vol. 4 : 252)

Local name : Hindi Naorang

Size. Quail + - : Length c. (6-7 in.).

A multi coloured stub-tailed terrestrial bird-green, blue, black, white and fulvous with crimson-pink abdomen, vent and under tail coverts. Sexes alike.

Resident. Practically found in the entire Indian Union in scrub-jungle and light deciduous forest.

Extralimital : Nepal (?), Bhutan(?), Bangladesh, Sri Lanka.

Sparsely found in Gujarat with the advent of monsoon.

Ali not recorded it.

(DKS) noted its call in Gir forest (JBNHS, 48 : 189).

Family ALAUDIDAE

Key to the genera of the family ALAUDIDAE

1. 1st primary exceeding primary coverts in length .....2

1st primary not exceeding primary coverts in length .....3

2. Nostrils not covered by plumelets .....*Mirafra*

Nostrils covered by plumelets .....*Ammomanes*

3. Crest absent or short and covering whole crown .....*Eeramopterix*

A crest formed of a few long feathers springing from centre of crown .....*Galerida*

283. Singing Bush lark : *Mirafra javanica cantillans* Blyth.

(*Mirafra cantillans* Blyth, 1844-5, Jour. Asiat. Soc. Bengal 13 : 960 (Bengal); Baker, FBI No. 1229, Vol. 3 : 334; Ali & Ripley, HB No. 872, Vol. 5 : 2).

Local name : Hindi Agan, Agin,

Size. Sparrow : length c. (6 in.).

Similar to house sparrow (Female) with much chestnut in the wings. Underparts fulvous, breast marked with triangular brown spots. Sexes alike.

But indistinguishable from Skylark and Crested Lark in the field.

Resident. Common in Punjab, Kashmir, H.P., U.P., M.P., Bihar and W. Bengal; South throughout Peninsula except in Kerala also absent in NE. India. Affects arid to semiarid field cultivation and grass land.

Extralimital : Pakistan, Bangladesh (?).

Ali collected specimens from Chaduva (Bhuj dist.), Nakhatrana (Kutch), Nadiad (Kaira dist.).

Ali further noted breeding in Kutch during August.

284. Sind Redwinged Bush lark : *Mirafra erythroptera sindiana* Ticehurst.

(*Mirafra erythroptera sindiana* Ticehurst, 1920, Bull. Brit. Orn. Cl. 41 : 56 (Karachi, Sind); Baker, FBI No. 1236, Vol. 3 : 342, Ali & Ripley, HB No. 875, 876, Vol. 5 : 7).

Local name : Gujarati Agiya agan

Size. Sparrow : Length. c. (5-6 in.).

Above, pale brown, streaked with blackish, wings rufous. Below, chin and throat whitish, breast spotted with black and rest of the underparts pale fulvous, sexes alike.

Resident, thinly restricted/distributed in W. Rajasthan and N. Gujarat in our Indian limit.

Extralimital : Pakistan.

Ali collected specimens from Bhujia Fort, Chaduva (Bhuj dist.), Bhuj environs, Mata-no-Madh, Bela Island (Great Rann.), Ajwa (Baroda dist.), Dabka dist.), Vaghjipur, Patan (Both in Mehsana dist.), Radhanpur, Deesa (Palanpur), Khania (Amreli dist.).

Ali further commented that specimens from Baroda would pass for typical *Erythroptera*, From Saurashtra are true race, while Kutch and N. Baroda nearer to *sindiana*. Most birds are, therefore, intermediate.

285. Redwinged Bush Lark : *Mirafra e. erythroptera* Blyth.

(*Mirafra erythroptera* Blyth, 1845, Jour. Asiat. Soc. Bengal 13 : 958 (northern Deccan); Baker, FBI No. 1235, Vol. 3 : 341; Ali & Ripley, HB No. 877, Vol. 5 : 7).

Local name : Hindi Aggia

Size. Sparrow : Length c. (5-6 in.).

Plumage same as earlier race but overall darker and more tinged with rufous above. Sexes alike.

Resident. but sparsely distributed in U.P., Bihar, W. Bengal, S. Gujarat and eastward through M.P. to Orissa, South through Maharashtra, A.P., Tamil Nadu and Karnataka of our Indian limit.

Intergrades with earlier race *M.e. sindiana* in Saurashtra region and Kutch of Gujarat.

Ali collected a series of examples and listed as *M.e. sindiana* Ticehurst, and to his mind, most of specimens are intermediate.

286. Ashycrowned Finch-Lark : *Eremopterix grisea* (Scopoli).

(*Aluda grisea* Scopoli, 1786, Del. Flor. et.

Faun. Insubr. 2 : 95 (Ginges, S. Arcot. Dist., India); Baker, FBI No. 1245, Vol. 3 : 353; Ali & Ripley, HB No. 878, Vol. 5 : 9).

Local names : Hindi Diyora, Duri, Jhothauli

Gujarati Bhon Chakli

Size. Sparrow : Length c. (5 in.).

A small, thickbilled, crested lark, above, sandy crown with ashy crown, whitish cheeks, and a black streak from chin to eye. below, brownish black. Female sandy brown hen-sparrowlike.

Resident, Subject to local seasonal withdrawals in monsoon from heavy rainfall area. Practically all India in scrubbed waste land, cultivation grazing grounds and arid country.

Extralimital : Pakistan, Nepal, Bangladesh, Sri Lanka.

Ali collected specimens from Ajwa, Dabka (both in Baroda dist.), Patan (Mehsana), Radhanpur, Kharaghoda, Chaduva (Bhuj dist.).

Z.S.I. party noted this bird in a cultivated field, near Nalsarobar environs, Gandhi nagar dist., in October '1994.

287. Blackcrowned Finch-Lark : *Eremopterix nigreiceps* affinis (Blyth).

(*Pyrrhulauda affinis* Blyth, Ibis : 185 (Madras, amended to Karachi, Ticehurst, 1921, Jour. BNHS. 28 : 235); Baker, FBI No. 1246, Vol. 3 : 355; Ali & Ripley, HB No. 879, Vol. 5 : 10).

Local names : Hindi Duri, Dabak Chiri

Size. Sparrow -. Length c. (5 in.).

Similar to earlier race but paler, with white forehead and chocolate-black crown and nape (Male); Female below whiter distinctly streaked with brown.

Resident. Restricted to NW India in Punjab, Haryana, W. Rajasthan. Once straggling to Delhi, two Specimens from Northern Kutch (Kuar Bet, 1960 - Ali). Affects sandy waste and neighbourhood canal-fed desert cultivation.

Possibly also breeds in N. Gujarat, including Saurashtra and Kutch (Shivaraj-kumar, JBNHS 66 : 625).

Extralimital : Pakistan, Persian Baluchistan, S. Iraq, Arabia, Somalia, Ethiopia, W. Egypt, Sudan.

Ali commented that this race is inseparable from the earlier race on the basis of collected specimen from different parts of Gujarat.

288. Indian Rufoustailed Finch-Lark :  
*Ammomanes p. Phoenicurus* (Franklin).

(*Mirafra phoenicura* Franklin, 1831, Proc. Zool. Soc. London : 119 (Between Calcutta and Banaras); Baker, FBI No. 1242 (Part), Vol. 3 : 350; Ali & Ripley, HB No. 882, Vol. 3 : 14).

Local name : Hindi Aggia Retal

Gujarati- Khetariyo

Size. Sparrow, length c. (6 in.).

A rufous brown, stout-billed uncrested lark, with rufous tail ending in a black diagnostic band. Sexes alike.

Resident, common with the advent of monsoon in Gujarat, Rajasthan, Delhi, Haryana, U.P., Bihar, Orissa, W. Bengal, Maharashtra, M.P. and Northern A.P. in open stony scrub and bush, edge of the cultivated field.

Extralimital : Pakistan (Jhelum & Shahpur dists., Waits, JBNHS 59 : 961).

Ali collected specimens from Padhar, Chaduva (Both in Bhuj Dist.), Bodeli (Baroda dist.), Radhanpur, Laochali (Surat Dangs), Dalkhanja (Amreli dist.).

Ali further noted it breeding in Gujarat.

289. Large Desert Lark : *Alaemon alaudipes doriae* (Salvadori).

(*Certhilauda doriae* Salvadori, 1868, Atti R. Accad. Torino 3 : 292 (Iran); Baker, FBI No. 1205, Vol. 3 : 304; Ali & Ripley, HB No. 884, Vol. 3 : 16).

Local name : Gujarati Rann Chandul.

Size. Myna Length c. (9 in.).

A large sandy grey lark with whitish underparts, black-streaked on breast. Long slightly curved black bill and china-white legs. Sexes alike.

Resident, but local and thinly scattered in NW India in and around the Great and Little Ranns of Kutch in desert area.

Extralimital : Pakistan, E. Arabia, Iraq, S. Iran and Afghanistan.

Ali collected specimens from Khadva (Pachhem Is. Kutch), Nir, (Great Rann.), Chobari (Bhachau dist.) and also noted between kakindia bet and Gangli Bet; between Dholovira and Bela (Great Rann.), Pung Bet (Little Rann.).

This birds were observed in salt-encrusted barren sandy 'pan' in the Rann, devoid of any boulder/stone or grass. Breeding noted in early October Ali

290. Yarkand Short-toed lark :  
*Calandrella cinerea longipennis*  
(Eversmann).

(*Alauda longipennis* Eversmann, 1848, Bull. Soc. Imp. Sci. Nat. Moscow 21 : 219 (Sangara, ozungaria); Baker, FBI No. 1221, Vol. 3 : 325; Ali & Ripley, HB No. 885, Vol. 5 : 19).

Local name : Hindi Pullak, Bagheri

Size. Sparrow : Length c. (6 in.).

A sparrow like bird in open semi-desert country, above greyish brown streaked with blackish, a pale supercilium. Below dull white, the breast washed and finely striated with brown. Sexes alike.

Winter visitor, common and abundantly found in Haryana, Delhi, Western U.P., Rajasthan, N. Gujarat, Northern M.P. in our Indian limit.

Extralimital : Pakistan, Afghanistan. Breeds from S. Russia Altai east to N. Mongolia, And NE Manchuria.

Ali collected specimens from Kutch, Bhuj environs, Kharda (Pechhem Is.), Mandvi, Dwarka, Cambay town, Vaghipur, Patan (Both in Mehsana dist.), Radhanpur, Deesa (Palanpur), Kharaghoda, Gujarat.

291. Indus Sand Lark : *Calandrella raytal adamsi* (Hume).

(*Alauda adamsi* Hume, 1871, Ibis 13 : 405 (Agore valley, Hazara); Baker, FBI No. 1226, Vol. 3 : 331; Ali & Ripley, HB No. 889, vol. 5 : 26).

*Local name* : Hindi Retal

*Size*. Sparrow -. Length c. (5 in.).

*Plumage* - above, greyish sandy, streaked dark brown. Below, white, sparsely dark-streaked on sides of breast. a white supercilium short black and white tail. Bill slender and longer. Sexes alike.

Resident. Thinly distributed and restricted to Punjab, Haryana east to the Jumna River, and Kutch in our Indian limit in the salt pans, saltry mudflats etc.

*Extralimal* : Pakistan, Persian Baluchistan.

Ali collected specimes from Kandla, Jakhan (Both in Kutch).

292. Saurashtra Sand Lark :  
*Calandrella raytal krishnakumar sinhji*  
Vaurie & Dharamkumarsinhji.

(*Calandrella raytal krishnakumar sinhji* Vaurie and Dharmakumarsinhji, 1954, JBNHS., 52 : 8 (Bhavnagar Saurashtra); Ali & Ripley, HB No. 890, Vol. 5 : 27).

*Local name* : Hindi Retal

Same as earlier race but more heavily streaked, much darker and greyer.

Resident. So far known only from type locality Bhavnagar in Saurashtra (Gujarat) in tidal mudflats along the coast (Gulf of Cambay) with scanty growth of rank grasses and saline plants.

Breeds in Bhavnagar between june and July (DKS.).

293. Eastern Calandra Lark :  
*Melanocorypha bimaculata torquata* Blyth.

(*Melanocorypha torquata* Blyth, 1847, Jour. Asiat. Soc. Bengal 16 : 476 (Afghanistan); Baker, FBI No. 1210, Vol. 3 : 312; Ali & Ripley, HB No. 892, Vol. 5 : 29).

*Local name* : None recorded.

*Size*. Sparrow +; Length c. (6-7 in.).

Dark brown above with broad white supercilium. Tail blackish brown, except central pair white tipped. Chin, throat white, a

large black spot on either sides of breast which in lower region fulvous. Abdomen white. Sexes alike.

Winter visitor, fairly common and ranges from Kashmir, Punjab, Haryana, Rajasthan, U.P. Vagrant in N. Gujarat. A specimen collected in Kutch (Himmatsinhji, JBNHS 5 : 408); and another by Ali Affects semi-desert country and sparse cultivation.

*Extralimal* : Pakistan, Transcaspia, E. Iran, N & NE Afghanistan, E. Russian Turkekstan and Kirghiz steppes.

Not mentioned by Ali in Birds of Gujarat.

294. Indian Crested Lark : *Galerida cristata chendoola* (Franklin).

(*Alauda chendoola* Franklin, 1831, Proc. Zool. Soc. London : 119 (Between calcutta and Benares); Baker, FBI No. 1237, Vol. 3 : 343; Ali & Ripley, HB No. 899, Vol. 5 : 37).

*Local names* : Hindi Chandul

Gujarati Ghaghas Chandul

*Size*. Sparrow +; Length c. (7 in.).

A sandy brown streaked blackish lark with a jaunty, upstanding pointed crest. Below, white, fulvous and boldly streaked with dark brown on breast. Sexes alike.

Resident, with some local movement (Seasonal), from Kashmir foothills, Punjab, Haryana, Delhi, U.P., Bihar and Northern M.P., south in Rajasthan, Northern Gujarat in open sandy or salt- encrusted semi-desert country.

*Extralimal* : Pakistan, Iran, Transcaspia, Afghanistan, Russian and Chinese Turkestan, Kansu, Mongolia.

Ali collected specimens from Mandvi, Kandla (Both in Kutch), Dwarka, Radhanpur, Kharaghoda, Gujarat.

Ali further noted it breeding in Kutch during August.

295. Malabar Crested lark : *Galarida malabarica* (Scopoli).

(*Alauda malabarica* Scopoli, 1786, Del. Flor. et. Faun. Insubr. 2 : 94 (Malabar); Baker, FBI No. 1241, Vol. 3 : 348; Ali & Ripley, HB No. 901, Vol. 5 : 39).

*Local name* : Hindi None recorded.

Similar to earlier race but the upperparts rufous brown instead of grey brown. Sexes alike.

Resident. Thinly distributed. Gujarat (Ahmedabad 3 specimens, Hume coll. in British Museum), southward through Western Maharashtra, Western Karnataka, Western Tamil Nadu and Kerala of Indian limit.

Ali collected specimens from Fort Salher, 5000 ft. (Navsari dist.), elsewhere not noted and also in Saurashtra or Kutch.

296. Deccan or Sykes Crested Lark: *Galerida deva* (Sykes).

(*Alauda deva* Sykes, 1832, Proc. Zool. Soc. London : 92 (Dukhun); Baker, FBI No. 1240, Vol. 3 : 347; Ali & Ripley, HB No. 902, Vol. 5 : 40).

*Local name* : Hindi not recorded.

Size. Sparrow +-. Length c. (5 in.).

Similar to earlier race but smaller in size with the underparts darker and more rufous, without the whitish abdomen. Streaking on breast sparser and narrower.

Resident. Sparsely distributed from E. Rajasthan, N. Gujarat, east through the Gangetic Plain and south through the Peninsula to Southern Karnataka in scrubbed ghat, plateau country and dry cultivation.

Ali collected specimens from Kutch, Bhuj environs, Chaduva (Bhuj dist.), Mandvi, Dwarka, Amreli, Pariej, Sairat (Both in Kaira dist.), Kodinar, Dalkhania (Amreli dist.), Kharaghoda, Gujarat.

This race are almost identical in the field, with *Alauda gulgula* and *M.j. cantillans* so far courtship, pattern of song and other behaviours are concerned.

297. Turkestan Small Skylark : *Aluda gulgula inconspicua* Severtzov.

(*Alauda inconspicua* Severtzov, 1873, Vertik. Turkest. Zhivotn. : 142 (Turkestan); Baker, FBI No. 1219, vol. 3 : 332; Ali & Ripely, HB No. 904, Vol. 5; 44).

*Local name* : Hindi Chandul

Size. Sparrow +; Length c. (6-7 in.).

Plumage, above crown, each feather centered blackish and edged tawny, an indistinct tuft on crown; below, fulvous buff, darker on breast, faintly streaked and spotted with blackish. Sexes alike.

Resident, migrate locally with rainy season, distributed and restricted to Gujarat, Rajasthan, Haryana and eastward through southern U.P. and Bihar to about long. 85°E. in open grassy and cultivated area.

Extralimital : Pakistan, Iran, Afghanistan, Transcaspia, Russian, Turkestan.

Ali collected specimens from Mandvi (Kutch, Sairat (Kaira dist.)).

298. Indian Greythroated Sand Martin : *Riparia paludicola chinensis* (J.E. Grey).

(*Hirundo chinensis* J.E. Gray, 1830, I11. Indian Zool. 1 (2), Pl. 35, Fig. 3 (China); Baker, FBI No. 1148, Vol. 3 : 235; Ali & Ripley, HB No. 912, Vol. 5 : 51).

*Local names* : Hindi Abali, Ababil

Size. Sparrow -. Length c. (4-5 in.).

A small swallow, greyish brown above, darker on crown and paler on rump. Wing-quills and tail darker brown. Chin to lower breast grey, rest of the underparts white. Sexes alike.

Resident, but sparsely and patchily in northern India from the Himalayan foothills east to Assam; south through Rajasthan, Gujarat, upto c. 18°N. lat; east through M.P., Orissa Affects. Riverain tracts with sandy banks and alluvial cliffs.

Extralimital : S. Asia, S. Africa, Madagasker, Indochina, Philippines. Bhutan.

Ali collected specimens from Vaghjipur (Mehsana dist.) and also noted from Dabka (Baroda dist.). He further noted that a colony at about 50 scattered nest tunnels in the steep vertical bank of vastak River.

299. Crag Martin : *Hirundo rupestris* Scopoli.

(*Hirundo rupestris* Scopoli, 1796, Annus I, Hist. Nat. : 167 (Tyrol); Baker, FBI No. 1149,

Vol. 3 : 236; Ali & Ripley, HB No. 913, Vol. 5 : 53).

*Local name* : Not recorded.

*Size*. Sparrow ; c. (5-6 in.).

Similar to Dusky Crag Martin but larger and paler above with almost whitish underparts and blackish undertail coverts. Sexes alike.

A montane form, breeding in the Himalayas in Ladakh, Kashmir, H.P. Garhwal, Kumaon, Sikkim of our Indian limit. Winters throughout the hilly portions of India. Affects grassy hills.

Extralimital : Pakistan, Nepal, Bhutan. Also S. Europe, NW Africa through c. Asia to Manchuria.

Ali collected specimens from Pandwa (Surat Dangs) and also noted from Bodeli (Baroda dist.), Fort Salher, ca. 500' (Navsari Dist.), Gujarat.

300. Dusky Crag Martin : *Hirundo c. concolor* Sykes.

(*Hirundo concolor* Sykes, 1833, Proc. Zool. Soc. London : 83 (Dukhun); Baker, FBI No. 1150, Vol. 3 : 237; Ali & Ripley, HB No. 914, Vol. 5 : 55).

*Local name* : Hindi Chatan Ababil

*Size*. Sparrow Length c. (5 in.).

A sooty brown swallow with short square-cut tail. Underparts pale rufous finely streaked with blackish. A roundish white spot on tail feathers is diagnostic during flight. Sexes alike.

Resident. Widely but patchily distributed in the entire Indian Union from 1800 mt. alt. down to the plains in rocky hills, ancient buildings and deserted fort etc.

Ali collected specimens from Kutch, Bhuj, Pandwa (Surat Dangs).

Several nests in occupation were observed in Kutch during August september Ali

301. Pale Crag Martin : *Hirundo obsoleta pallida* (Hume).

(*Ptinoproгна Pallida* Hume, 1872, S.F. 1 : 1 (Sind); Baker, FBI No. 1151, Vol. 3 : 238; Ali & Ripley, HB No. 915, vol. 5 : 56).

*Local name* : None recorded.

*Size*. Sparrow -. Length c. (5 in.).

A sandy replica of the earlier race with below rusty cream colour. Sexes alike.

Residet. Recorded only once in Kutch (Gujarat breeding Stoliczka) in our Indian limit, however, not recently reported.

Extralimital : Pakistan, S. Afghanistan, SE Iran.

302. Western Swallow : *Hirundo r. rustica* Linnaeus.

(*Hirundo ristica* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 191 (Sweden); Baker, FBI No. 1152, Vol. 3 : 240; Ali & Ripley, HB No. 916, Vol. 5 : 57).

*Local name* : Hindi Ababil

*Size*. Sparrow Length c. (7 in.).

Plumage, above, glossy steel blue, pinkish white below and typical deeply forked tail. Forehead, chin, throat chestnut, the last bordered below by a blue -black band. Sexes alike.

Breeds in the Western Himalayas, winters in the entire Indian Union in the neighbourhood of rivers, jheels of human habitation.

Extralimital : Pakistan, Nepal, Bangladesh, Sri Lanka. Also Europe north to between 60 and 70°N and W. Asia, Asia Minor, E. Arabia, Iran, Afghanistan, Russian Turkestan.

Ali listed this birds as *H.r. gutturalis* Scopoli (Eastern Swallow) and collected specimens from Bhimasar (Anjar dist Kutch), Ajwa (Baroda dist.), Kharaghoda, Gujarat.

The difference in between western and eastern forms of *Hirundo rustica* Linnaeus is based on richness of colouration of abdomen and formation of pectoral band.

Indistinguishable from each other in the field and wornout plumage.

303. Indian Wiretailed Swallow: *Hirundo smithii filifera* Stephens.

(*H. ? (irundo) filifera stephens* 1825, in Shaw's Gen. Zool. 13 : 78 (India); Baker, FBI

No. 1157, Vol. 3 : 245; Ali & Ripley, HB No. 921, Vol. 5 : 63).

*Local name* : Hindi Leishra

*Size*. Sparrow ± : Length c. (5-6 in in excluding tailwires).

*Plumage*, above, glossy steel-blue, with a chestnut cap. Underparts white and two long fine 'wire' projecting from tail (diagnostic). Sexes alike but tail wire shorter in female.

Summer (Breeding) visitor to Punjab, Kashmir, H.P., Sikkim, Arunachal (?) in our Indian limit.

Resident, elsewhere in the Peninsula subject to local movement, east to Assam, breeding south to N. Kerala (Cannanore dist.) in open country/cultivation nearby water sources.

Extralimital : South and Central Asia and Central and south Central Africa.

Ali collected specimens from Ajwa (Baroda dist.), and also noted in Kutch and Saurashtra region of Gujarat.

### 304. Indian Cliff Swallow : *Herundo fluvicola* Blyth.

(*Hirundo fluvicola* Blyth, 1855, Jour. Asiat. Soc. Bengal 24 : 470 (Bundelkund ex Jerdon); Baker, FBI No. 1158, Vol. 3 : 246; Ali & Ripley, HB No. 922, Vol. 5 : 64).

*Local name* : Hindi Nahar Ababil.

Gujarati -Bhekhad Ababil.

*Size*. Sparrow : Length c. (4-5 in.).

Same as earlier race but smaller and slightly forked tail, below fulvous white, profusely streaked with blackish on sides of head, chin, throat and breast. Sexes alike.

Status unclear, apparently a summer (breeding) visitor in NW India. Elsewhere resident, common in the Gangetic Plain, east through Sambhar Lake (Rajasthan) to the Gulf of Cambay (Gujarat), with a western extension into Saurashtra (Jamnagar- breeding) and Kutch. Eastward along the lower Himalayas from S. Kashmir to Gonda and Mirzapur dist. (U.P.) and southward through Peninsula to c. 11°N (Coimbatore), not recorded beyond east of c. 84°E.

Extralimital : Pakistan, Sri Lanka (Phillips, JBNHS 47 : 740), E. Afghanistan.

Ali collected specimens from Ajwa (Baroda dist.), Gujarat, also noted rare in Kutch and saurashtra region of Gujarat.

### 305. Himalayan Striped or Redrumped Swallow :

*Hirundo daurica nipalensis* Hodgson.

(*Hirundo Nipalensis* Hodgson, 1836, Jour. Asiat. Soc. Bengal 5 : 780 (Nepal); Baker, FBI No. 1161, Vol. 3 : 250; Ali & Ripley, HB No. 925, Vol. 5 : 68)

*Local names* : None recorded.

*Size*. Sparrow +: Length c. (7-8 in.).

*Plumage*, above, glistening steel blue-black, a supercillium, sides of head, rump chestnut and chestnut half collar on hind neck. Below fulvous white streaked brown. Sexes alike.

Resident, largely sedentary with some local movement, evenly distributed in the entire Indian Union.

Extralimital : Nepal, SW Sikang. Burma.

Ali collected specimens from Dhari (Amreli dist.), Radhanpur, Ghatwad (Kodinar).

Z.S.I. Party further noted several thousand bird in the Jamnagar town environs in November. '1993.

### 306. Japanese Striated or Redrumped Swallow :

*Hirundo daurica japonica* Temminck and Schlegel.

(*Hirundo alpestris japonica* Temminck & Schlegel, 1847, in Siebold's Fauna Jap., Aves, Pl. 11 : 33 (Japan); Ali & Ripley, HB No. 926, Vol. 5 : 70).

*Local name* : None recorded.

*Size*. Sparrow + : Length c. (7-8 in.).

Similar as earlier race. Wings smaller, lower parts more heavily streaked, rump with faint streaks.

Winter migrant to U.P., M.P., Gujarat (Saurashtra), Karnataka (Londa), Tamil Nadu, A.P., W. Bengal, Assam.

Extralimital : Bangladesh, Nepal, China, Japan, Thailand and Burma.

Not mentioned in the 'Birds of Gujarat' by Ali

307. Indian Striated or Redrumped Swallow:  
*Hirundo daurica erythropgia* Sykes.

(*Hirundo erythropgia* Sykes, 1832, Proc. Zool. Soc. London : 83 (Dukhun, Poona); Baker, FBI No. 1162, Vol. 3 : 251; Ali & Ripley, HB No. 927, vol. 5 : 70)

Local name : Hindi Masjid ababil

Gujarati Kenchi Abobil.

Size. Sparrow + : Length c. (7-8 in.).

Similar to earlier race. Striation on lower plumage hardly broader than the shafts. Rump uniform dark chestnut without blackish shaft streaks. Sexes alike.

Resident. More or less throughout the Indian Union.

The distribution of the three races, viz. *Japonica*, *nipalensis* and *erythropgia* of *Hirundo daurica* Linnaeus is to a greater extent overlapping in Gujarat. All the three races are very ill differentiated in the field, more precisely due to their flight nature to a considerable high level. So apparently it is rather impossible to note in the field which race is actually flying in a particular area of Gujarat.

Ali collected specimens from Rudra Mata (Bhuj dist.), Bhuj Fort, Kesari (Cambay), Dabka (Baroda dist.), and Pandwa (Surat Dangs), Gujarat.

Ali noted this bird in pair or in small parties, but not in a large flock like *mipalensis*. Breeding freely in Kutch in August/September.

308. European House Martin : *Delichon u.*  
*urbica* (Linnaeus)

(*Hirundo urbica* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 192 (Sweden); Baker, FBI No. 1141, Vol. 3 : 226; Ali & Ripley, HB No. 930, Vol. 5 : 74)

Size. Sparrow ; length c. (6 in.).

A small black and white swallow with short

forked tail, above, glossy blue-black with glistening white rumps; below, pure white including feathered legs and feet. Sexes alike (Ali & Ripley).

Status unclear owing to difficulty of distinguishing in the field from Kashmir Martin. Apparently breeds in the W. Himalayas. Sporadic in winter/or on migration in Peninsular India. Recorded from Gujarat (Saurashtra), Maharashtra, M.P., Mysore, Nilgiri Hills and Kerala and also in Laccadive and Maldiva Is.

Family CAMPEPHAGIDAE

Key to the genera of the family  
CANPEPHAGIDAE

1. Tail square .....*Tephrodornis*
- Tail more or less graduated .....2
2. Shafts of rump-feathers soft .....*Hemipus*  
Shafts of rump-feathers spiny .....3
3. Outer rectrices more than half length of tail  
.....*Peicrocotus*  
Outer rectrices more than three quarters  
length of tail .....*Coracina*

309. Indian Grey shrike : *Lanius excubitor*  
*lahtora* (SYkes).

(*Collurio lahtora* Sykes, 1832, Proc. Zool. Soc. London. 86 : (Dukhun); Baker, FBI No. 706, Vol. 2 : 285; Ali & Ripley, HB No. 933, Vol. 5 : 79).

Local names : Hindi Dudiya latora, Safed latora.

Gujarati Dudhio or Moto latoro

Size. Myna + : Length c. (9-10 in.).

A silvery grey bird with graduated black and white tail, black wings with white mirror. A broad diagnostic black band on either sides of the neck passing through eyes. Heavy hooked bill. Sexes alike.

Resident. Common and evenly distributed in our Indian limit from Punjab, Rajasthan, Gujarat south to Karnataka, east through M.P.

Maharashtra to Bihar and S. West Bengal, Affect sparse scrub jungle, edges of arid cultivation zone and dry-deciduous forest.

Extralimital : Pakistan, Bangladesh, Sri Lanka.

Ali collected specimens from Chaduva (Bhuj dist.), Mandvi, Jakhan (Both in Kutch), Dabka (Baroda dist.), Golana (Cambay), Pariej (Kaira dist.), Patan (Mehsana dist.), Radhanpur, Deesa (Palanpur), Dalkhania (Amreli Dist.) and also noted from Anjar, Ratnal, Rudra Mata, Rapar, Gedi, Desalpur, Khadva, Mata-no-Madh Lakhpat, Dholovira, Chhaparia, Pung Bet, Adesar (All in Kutch), Palanpur), Kharaghoda, Ahmedabad environs.

Ali further noted it breeding in March/April.

Butler records its breeding in N. Gujarat in June and July. (S.F., iii : 462 1875).

Z.S.I. party noted this bird in the Khijidia Bird Sanctuary environs (Jamnagar) in November '1993.

### 310. Indian Baybacked shrike : *Lanius v. vittatus* Valenciennes.

(*Lanius vittatus* Valenciennes, 1826, Diet. Sci. Nat., ed. (Levrault) 40 : 227 (Pondichery); Baker, FBI No. 710, Vol. 2 : 289; Ali & Ripley, HB No. 940, Vol. 5 : 85).

Local name : Hindi Pachanak.

Gujarati pachanak Latoro.

Size. Bulbul : Length c. (7 in.).

Plumage, above, head white and grey with a broad black band across forehead encircling eye; back chestnut maroon, rump white, below, white, fulvous on breast and rusty of flanks. Sexes alike.

Resident, with marked seasonal movement. Practically distributed in the entire Indian Union excluding islands.

Extralimital : Pakistan, Nepal.

Ali collected specimens from Bhuj environs, Nakhatrana, Khari Rohar, Nir (Kala Dongar, Pachham), Ajwa, Bodeli (Both in Baroda dist), Baroda city environs, Cambay, Golana (cambay), Vaghjipur, Patan (Both in Mehnsana dist.), Radhanpur, Kharaghoda,

Amreli, Gujarat, and also noted from Anjar, Ratnal, Rapar, Kandla, Mandvi, Dholovia (All in Kutch), Deesa, Palanpur, Rajpipla, Viramgam, Gujarat.

Z.S.I. party noted this bird in Sasan Gir Environs, Amreli, Gujarat in November '1993.

### 311. Redbacked Shrike : *Lanius c. collurio* Linnaeus.

(*Lanius collurio* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 94 (Sweden); Baker, FBI No. 717, Vol. 2 : 298; Ali & Ripley, HB No. 941, Vol. 5 : 87).

Size. Bulbul: Length c. (7 in.).

Similar to earlier race but differ from earlier by absence of white wing-speculum and greater amount of white in tail. (Male). Female duller and without black and through eye.

Regular autumn passage migrant in Western Rajasthan, and N. Gujarat via Arabia and east Africa to its winter quaters in Africa. Reduced in N. Gujarat (Banaskantha, Kutch, Saurashtra). Affects open scrubjungle and outskirts of cultivation.

Extralimital : Pakistan (West), Arabia and E. Africa (Autumn passage route). Most of Europe, Asia Minor, Iran and tropical and S. Africa.

Ali collected specimens from Bhuj, Anjar (Kutch), Rapar (Wagad dist.) and also noted Dholovira (Khadir Islands Kutch) and not noted elsewhere in Gujarat.

Ali commented that Kutch, Gujarat, is the extreme eastern fringe of its route south and west.

Butler recorded a specimens in the neighbourhood of Deesa (Palanpur) on 1st September, being the earliest passage migrant record since 1943. (S.F., iii : 463 1875).

Ali mentioned this birds as *Lanius collurio* Linnaeus and listed above mentioned specimens upto species level. But fortunately all the three races of *Lanius collurio* linnaeus pass through Gujarat as autumn migrant, and that too, Saurashtra and Kutch region are the overlapping zones of the three races. The sub-specific differentiation is being made on

the basis of contrasting colouration of upperparts and colouration of the tail which are not at all constant characters for all specimens of the three races irrespective of biota, season and age of a particular bird of a particular race.

So it is rather impossible to identify one bird in the field specially where all the three races are frequently overlapping.

312. Rufous Shrike : *Lanius collurio phoenicuroides* (Schalow).

(*Otomala phoenicuroides* Schalow, 1875, Jour. f. Orn. 23 : 148 (Tschimkent); Baker, FBI No. 722, Vol. 2 : 303; Ali & Ripley, HB No. 942, Vol. 5 : 88).

Size. Bulbul : Length c. (7 in.).

Plumage, pale sady brown above, buffy whitish below, with rusty red rump and tail. Crown rufous brown and white distinct supercillium (Male). Female duller with fine brown squamations on underparts.

Regular autumn passage migrant in S. Punjab, Rajasthan (Mt. abu); Small numbers overwintering in N. Gujarat in our Indian limit. Affects sparselyscrubbed semi-desert.

Extralimital : Pakistan, Turkestan, Tien Shan, Pamirs, Transcaspia, Dzungaria, N. Afghanistan, Iran, Arabia to NE Africa (Winter).

313. Pale Brown Shrike : *Lanius collurio isabellinus* Hemprich & Ehrenberg.

(*Lanius isabellinus* Hemprich & Ehrenberg, 1833, Symb. Phys. Arium Fol. e. (Kunfuda, Arabia); Baker, FBI No. 721, Vol. 2 : 302; Ali & Ripley, HB No. 943, Vol. 5 : 89).

Size. Bulbul Length c. (7 in.).

Similar to earlier race but crown and back concolour (Male); Female duller and wing-speculum absent, under parts sometime finely streaked.

Winter visitor, and passage migrant in NW India from Rajasthan, Gujarat, south through Maharashtra to Bombay, West and North a line from Khandesh through Sehore (M.P.) to Gorakhpur (U.P.). Stragglers recorded from Darjeeling (W. Bengal), Darbhanga (Bihar),

Raipur (M.P.), Rare in Ladakh (Osmastson, JBNHS 31 : 988) in our Indian limit.

Extralimital : Pakistan, Nepal, Turkestan to Kirghiz steppes. Winters largely in Arabia and NE Africa.

314. Rufousbacked Shrike : *Lanius schach erythronotus* (Vigors).

(*Collurio erythronotus* (Vigors), 1831, Proc. Zool. Soc. London : 42 (Simla - Almora); Baker, FBI No. 714, Vol. 2 : 295; Ali & Ripley, HB No. 946, Vol. 5 : 93).

Local names : Hindi Mattiya/Kajala (latora)

Size. Bulbul +; length c. (10 in.).

Plumage, above, forehead and a broad band through eye black; crown, nape, sides of hind neck, upperback grey diffusing to rufous on rest of upperparts. Tail black and rufous. Below, chin, throat, upper breast white, rest pale rufous. Wings black with white mirror. Sexes alike.

Partly resident (breeding) and partly winter visitor mainly to the plains. More or less in the entire Indian union excluding NE India.

Extralimital : Pakistan, Russian, Turkestan, East to Ferghana, south to transcaspia, WE Iran, Afghanistan.

Ali collected specimens from Bhuj environs, Ajwa, Dabka, (both in Baroda dist.), Golana (Cambay), Nadiad (Kaira dist.), Kharaghoda, Malegaon, Pandwa (Both in Surat Dangs).

Z.S.I., party noted this bird in Nalsarobar environs, ca. a cultivated field, but not definite about the sub-specific status.

315. South Indian Greybacked Shrike : *Lanius schach caniceps* Blyth.

(*Lanius caniceps* Blyth, 1846, Jour. Asiat. Soc. Bengal 15 : 302 (Madras); Baker, FBI No. 715, Vol. 4 : 296; Ali & Ripley, HB No. 947, Vol. 5 : 96).

Local names : As in earlier race.

Size. Bulbul +; length c. (10 in.).

Plumage, same as earlier race, but grey of head and mantle extend down to rump. Upperback with no tinge of rufous.

Resident. Peninsular India from Kutch (Gujarat), east through M.P. and A.P. in deciduous open wooded country.

Intergrades with earlier race, i.e., *erythronotus* in Kutch (Breeding).

Extralimital : Sri Lanka.

Ali collected specimens from Rudra Mata (Kutch), Chaduva (Bhuj dist.), Kharaghoda, Gujarat and also noted in Chobari (Bhachau dist. Kutch), Patan (Mehsana), Rajpipla environs Dediapada, Ghatoli (Rajpipla) but sub-specific status doubtful.

Ali further commented that the race, *erythronotus* is a winter visitor, where as *caniceps* resides and breeds in Gujarat (Kutch), but colouration of plumage could not regular cline specially during winter a great factor to confuse both the races in the field.

### 316. *Lanius phoenicuroides isabellinus*.

Specimen collected : Anjar, Khadva (Pachham Island), (Both in Kutch), Bhuj environs, Dabka (Baroda dist.), Golana (Cambay), Cambay, Pariej, Nadiad, Sairat, (All in Kaira dist.), Vaghjipur (Mehsana dist.), Radhanpur and also noted from Khari Ropar (Kutch), Pung Bet (Little Rann.).

Total specimens collected 8 Male and 5 Female.

Ali commented as follows, "Col. R. Meinerzhagen who kindly examined the above series, remarked as follows : 'None of your specimens are typical of either *Phoenicuroides* or of *isabellinus*. They are all intermediates and agree with the form described as *Lanius collurio bogdanowi* (Bianchi) based on a bird from North Persia; it is not a good form but an intermediate or hybrid between *Collurio* and *isabellinus* sometimes with a dash of *Phoenicuroides*, and it is not constant within its reported breeding area. All your birds seem to be nearer *Phoenicuroides* than to *isabellinus*. The form breeds in Tarbagatai"

### 317. Brown Shrike : *Lanius c. cristatus* Linnaeus.

(*Lanius cristatus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 93 (Benghala); Baker, FBI No. 719, Vol. 2 : 300; Ali & Ripley, HB No. 949, Vol. 5 : 98).

Local name : Hindi Karkheta.

Size. Bulbul : Length c. (7-8 in.).

A reddish brown shrike with forehead and supercillium white and a black line through eyes to ear coverts. Chin, throat white. Sexes alike.

Winter visitor. Practically common all over India preferably edge of the forest, scrub jungle, grassy hill side.

Extralimital : Nepal, Bhutan, Bangladesh, Sri Lanka, Burma, Thailand, Malay Peninsula, Indo-China.

Ali collected specimens from Galkund and Chikkli (Surat Dangs), and not noted elsewhere in Gujarat.

### 318. Indian Golden Oriole : *Oriolus kundoo* Sykes.

(*Oriolus kundoo* sykes, 1832, Proc. Zool. Soc. London : 87 (Dukhun); Baker, FBI No. 953, Vol. 3 : 6; Ali & Ripley, HB No. 953, Vol. 5 : 103).

Local name : Hindi Peelak.

Size. Myna; length c. (10 in.).

A bright golden yellow bird with black wings and tail and a diagnostic black streak from lores through eye (Male); Female duller and greener yellow.

Breeds in Ladakh, Kashmir in our Indian locality and winters in the entire Peninsula upto Kerala east to W. Bengal. Staggler in Assam. Affects well-wooded country. deciduous forest, edge of the forest near gardens.

Extralimital : Breeds in Pakistan and Nepal, winter in N. Sri Lanka (Sparse). Also in Afghanistan, Pamir, Tien Shan, Turkestan.

Ali collected specimens from Tuna (Anjar dist., Kutch), Ajwa, Bodeli, Dabka (All in Baroda dist.), Patan (Mehsana dist.), Radhanpur, Meheskatri (Surat Dangs), and also noted in Amreli town and Dhari, Gujarat.

Ali further noted that it is uncommon in Kutch.

319. South Indian Blackheaded Oriole :  
*Oriolus xanthornus maderaspatanus*  
Franklin

(*Oriolus maderaspatanus* Franklin, 1831, Proc. Zool. Soc. London : 118 (Jubbulpore); Baker, FBI No. 958 (Part), Vol. 3 : 11; Ali & Ripley, HB No. 959, Vol. 5 : 110).

*Local name* : Hindi Peelak

*Size*. Myna; length c. (10 in.).

A golden yellow bird with black head, throat and upper breast, and some black on wings and tail. Underparts of female tinged with olive.

Resident. Peninsular India south of the Gangetic Plains, from Gujarat and M.P. east to southern Bihar, Orissa and A.P. in all kinds of forest and village side forest.

Not found in N. Gujarat (Saurashtra and Kutch), though one recorded from Mandvi (Kutch, JBNHS 66 : 376).

Ali collected specimens from Juna Rajpipla, Dediapada, Galkund, Laochali, Mahal, Mheskatri (All in Surat Dangs), also noted from Songadh (Navsari dist.), Waghai (Surat Dangs).

Z.S.I. party noted this bird in Sasan Gir environs. Amreli dist., Gujarat, Nov. '1993.

320. South Indian Black Orango or  
King Crow :  
*Dicrurus adsimilis macrocercus* Vieillot.

(*Dicrurus macrocercus* vieillot, 1817, Nouv. Diet. d'Hist. Nouv. ed. 9 : 588 (Madras City); Baker, FBI No. 766, Vol. 2 : 356; Ali & Ripley, HB No. 963, Vol. 5 : 117).

*Local names* : Hindi Kotwal, Kalkalachi.

Gujarati Kosita, Kalo Koshi

*Size*. Bulbul +; Length c. (12 in with tail).

A slim, glossy jet black bird with long deeply forked tail. Presence of white rictal spot. Sexes alike.

Resident. Very common throughout

Peninsular India south of a line roughly from Kutch and Saurashtra east through M.P., Orissa and southern W. Bengal in forest and edge of the forest near human habitation.

Ali collected specimens from Chaduva (Bhuj dist.), Mandvi, Bela Islands (Great Rann.), Bodeli (Baroda dist.), Jambughoda, Patan (Mehsana dist.), Dalkhania (Amreli dist.), and also noted from Khari Ropar, Anjar, Khadva, Chobari, Khadir Island (Great Rann.), Pung Bet (Little Rann.), Baroda, Dabka, Cambay, Radhanpur, Deesa, Palanpur, Amreli, Okha, Ghatwad (Kodinar), Rajkot, Jamnagar.

321. Indian Grey Drongo : *Dicrurus leucophaeus longicaudatus* Hay.

(*Dicrurus longicaudatus* A. Hay, in Horsfield & Moore, 1854, Cat. Bds. Mus. E.I.Co. 1 : 152 (Segour pass, Neilgherries); Baker, FBI No. 775, Vol. 2 : 362; Ali & Ripley, HB No. 965, Vol. 5 : 119).

*Size*. Bulbul +; length c. (12 in.).

A slaty black drongo with long deeply forked tail and diagnostic crimson eyes. Underparts duller grey. Sexes alike.

Resident. Breeds in the Himalayas. winters throughout the Peninsula including arid zone of NW India, east to W. Bengal. Affect all kinds of thin forest and edge of the forest near cultivation.

Extralimital : Pakistan, Nepal, Bhutan, Afghanistan.

Ali collected specimens from Cambay, Malegaon, Laochali, Mheskatri, Sarwar (All in Surat Dangs), and also noted in Songadh (Navsari dist.).

Ali further not met with in Kutch, but recorded one specimens, shot by K.S. Fatehsinhji, in Bhuj (Vijaya Vilas Palace).

322. Indian Whitebellied Drongo : *Dicrus c. caerulescens* (Linnaeus).

(*Lanius caerulescens* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 95 (Banghala); Baker, FBI No. 777 (Part), Vol. 2 : 365; Ali & Ripley, HB No. 967, Vol. 5 : 122).

*Local names* : Hindi Pahari buchanga, Dhapri

Size. Bulbul +; length c. (9-10 in.).

A typical drongo with long, deeply forked tail. Glossy indigo colour above, brownish grey below with white belly and under tail coverts. Sexes alike (Ali & Ripley).

Resident. All India south and east of a line roughly from Kutch (Bhuj, Mandvi) to Ambala and Simla, thence east to U.P., Bihar, and W. Bengal in light forest edge of the forest near cultivation.

Extralimital : Nepal.

Ali collected specimens from Ajwa (Baroda dist.), Cambay, Vaghjipur (Mehsana dist.), Songadh, Medha (Both in Navsari dist.), Radhanpur, Juna Rajpipla, Mahal (Surat Dangs), Okha, Gujarat.

Z.S.I. party noted this bird in Nalsarobar environs, Gandhinagar dist., Sasan Gir environs, Amreli dist., and Khijidia Bird sanctuary, Jamnagar dist., Gujarat, Oct. Nov. '1993.

323. Northern large Racket tailed Drongo:  
*Dicrusus paradiseus grandis* (Gould)

(*Edolius grandis* Gould, 1836, Proc. Zool. Soc. London : 5 (Nepalia); Baker, FBI No. 789, Vol. 2 : 378; Ali & Ripley, HB No. 976, Vol. 5 : 136).

Local names : Hindi Bhimraj

Size. Myna, length c. (14 in. with tail).

A large metallic black drongo with a conspicuous backward curving tuft or crest on forehead, and two long wire-like spatula tipped streamers in tail. Sexes alike (Ali & Ripley).

Resident. It ranges from lower Himalayas from Kumaon east to Sikkim and NE India. Northern India roughly east of a line from pilibhit in Kumaon (c. 80°E) to Surat in Gujarat (c. 21°N) thence southeast to Rajamundry, A.P., (C. 17°N). Affects deciduous and evergreen biotope.

Extralimital : Nepal, Bhutan, Bangladesh, N. Burma, N. Shan states, Yunan, N & C. Vietnam.

Ali listed this bird as southern race, ie, *D.p. malabaricus* = *O.p. paradiseus* and collected specimens from Juna Rajpipla, Waghai, Malegaon, Laochali, Mahal, Mheskatri (All in

Surat Dangs), Gujarat and further noted it absent in Kutch.

Southern Gujarat, specially Surat Dangs area is the overlapping zone of both the races. So the specimens collected from this region may be either of the two races.

324. Ashy Swallow-Shrike : *Artamus fuscus*  
Vieillot.

(*Artamus fuscus* Vieillot, 1817, Nouv. Dict. d'Hist. Nat. 17 : 297 (Bengal); Baker, FBI No. 763, Vol.2 : 348; Ali & Ripley, HB No. 982, Vol. 5 : 143).

Local name : Hindi Tadi ababeel

Size. Bulbul : Length c. (7-8 in.).

A dark slaty grey short-tailed bird with paler rump and underparts. Tail slaty black tipped with white. Bill bluish, heavy, somewhat finch-like. Sexes alike (Ali & Ripley).

Resident with seasonal migration due to rain. Thinly and patchily distributed in all India. Affects open wooded forest with a predominance of palm. Regularly seen perching on telegraph line like Swallows.

Extralimital : Nepal, Bhutan, Bangladesh, Burma, Thailand, China.

Family STURNIDAE

Key to the genera of the family STURNIDAE.

1. Distinct white wing-patch on the underparts of the wings.....2  
No wing-patch or patch suffused  
.....*Sturnus*
2. Patch near base of wings..... *Acridotheres*  
Patch at about middle length of wings  
.....*Gracula*

*Sturnus malabaricus* (Gmelin)

Key to the subspecies

1. Head grey or grey tinged with rufous
  - a. Abdomen tawn .....*S.m.malabaricus*
  - b. Abdomen whitish washed with buff on the sides .....*S.m.nemoricola*
2. Head white .....*S.m.blythii*

325. Greyheaded Myna : *Sturnus m. malabaricus* (Gmelin).

(*Turdus malabaricus* Gmelin, 1789, Syst. Nat. 1 : 816 (Malabar Coast); Baker, FBI No. 982, Vol. 3 : 39; Ali & Ripley, HB No. 987, Vol. 5 : 152)

*Local names* : Hindi Pawei.

Size. Myna + : Length c. (8 in.).

Plumage, above, head and upperparts silvery grey, tail ferruginous, underparts rufous, sexes alike.

Resident with local migration with SW monsoon and winter. Common and widespread throughout the Indian Union except islands.

Extralimital : Nepal, Bhutan, Bangladesh.

Not recorded by Ali

326. Whiteheaded Myna : *Sturnus malabaricus blythii* (Jerdon).

(*Pastor Blythii* Jerdon, 1844, Madras Jour. Lit. Sci. 13 : 133 (Malabar); Baker, FBI No. 983, Vol. 3 : 40; Ali & Ripley, HB No. 988, Vol. 5 : 154).

*Local names* : As in earlier race.

Plumage similar to earlier race but head, chin, throat and breast white (Male).

Resident and breeds in SW Peninsula in Kerala and Western Karnataka (Coorg dist.) and probably north to Belgaum (c. 16°N.).

Migrates/Straggles with the advent of SW monsoon or in winter northwards to Bombay (July) and Ahmedabad (Gujarat).

The distributional range of this race towards NW Peninsula and intergradation with earlier race are yet to be worked out.

There may be a chance of intergradation of the both races in southern Gujarat specially in Surat Dangs area.

Ali collected specimens from Ajwa (Baroda dist.), and the specimens has the whole head, sides of face, chin and throat silvery grey white.

327. Blackheaded or Brahminy Myna : *Sturnus pagodarum* (Gmelin).

(*Turdus pagodarum* 1789, Syst. Nat. 1 : 816 (Malabar); Baker, FBI No. 991, Vol. 3 : 47; Ali & Ripley, HB No. 994, Vol. 5 : 160).

*Local name* : Hindi Brahmini Myna

Size. As in earlier race.

A crested myna, grey above fawn below, glossy forehead, crown, nape and long pointed crest. Wings black and tail brown. Sexes alike.

Mainly resident. Marked seasonal movement with monsoon and winter. Patchily but thickly found in the entire Indian Union excepting islands in suitable biotope.

Extralimital : Pakistan, Bangladesh.

Ali collected specimens from Ajwa (Baroda dist.), Nadiad (Kaira dist.), Dediapada (Rajpipla).

Ali further noted it local in Kutch, fairly common in Saurashtra region of Gujarat. Breeding in Kutch August/September. According to Lester June / July.

Z.S.I. party noted it from sasan Gir environs and Jamnagar town environs in Gujarat, Nov. '1993.

328. Rosy Starling or Rosy Pastor : *Sturnus roseus* (Linnaeus)

(*Turdus roseus* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 171 (Lapland, Switzerland); Baker, FBI No. 972, Vol. 3 : 29; Ali & Ripley, HB No. 996, Vol. 5 : 163).

*Local names* : Hindi Gulabi Myna, Tilyar

Gujarati Wyhe, Waheeo

Size. As in earlier race.

A distinctive rose-pink starling with glistening black head, neck and upper breast, wings and tail. A long pointed crest on crown. Sexes alike.

Winter visitor. It ranges in India eastward to Bihar, W. Bengal, Assam. Southward throughout the Peninsula. More in Gujarat and Deccan less in southern Peninsula. Also vagrant in Andaman Is.

Extralimital : Pakistan, Bangladesh, Sri Lanka (Straggler).

Breeds in SE Europe and SW Asia.

Ali collected specimens from Bhuj, Chobari (Bhachau dist. Kutch), Ajwa (Baroda dist.), Vaghjipur (Mehsana dist.), Radhanpur, Kharaghoda, Gujarat.

329. Finsch's or Common Indian straling :  
*Sturnus vulgaris poltaratskyi* Finsch

(*St. (urnus) poltaratskyi* Finsch, 1878, Proc. Zool. Soc. London : 713 (Marka Kul, Eastern Kazakhstan); Baker, FBI No. 976, Vol. 3 : 34; Ali & Ripley, HB No. 997, Vol. 5 : 166).

Local name : Hindi Tilyar Myna.

Size. Same as earlier race.

A gregarious glossy black starling with metallic green and purple reflections and finely stripped with whitish. Sexes alike but female duller.

Passage migrant. Commonest straling in our Indian limit. It passage through Kashmir, H.P. also winter visitor to Punjab, Delhi, Gangetic Plain, east to Bihar, W. Bengal, Assam (?), southward to Rajasthan, N. Gujarat, north to M.P. Also Vagrant (Sightrecord) elsewhere in India.

Winter ranges of various races of *Sturnus vulgaris* Linnaeus overlap, two or more forms sometimes even occurring in the same flock; therefore, subspecific determination impossible unless specimens in the hand (Ali & Ripley).

Extralimital : Pakistan, Nepal, Bangladesh; Breeds in Siberia. Winters also in E. Iran, Afghanistan.

Ali collected specimens from Dabka, Sairat (Both in Kaira dist.), but elsewhere not noted, but recorded from Kutch.

Mr. R.M. Simmons recorded in winter at Tarapur (*ca.* cambay) and Bareja.

Dr. H.C. Aldrich recorded a large flocks at Pariej (Kaira dist.) in sep. '1945.

*Acridotheres* Vieillot.

Key to the species

A. Side of head party bare

1. Under wing-coverts white .....*A. tristis*

2. Under wing-coverts buff...*A. ginginiannus*
- B. No bare skin on sides of head.
3. No collar on sides of neck
  - a. Base of Mandible blackish .....*A. fuscus*
  - b. Base of Mandible yellow .....*A. javanicus*
4. A white collar on sides of neck  
.....*A. albocintus*

330. Indian Myna : *Acridotheres t. tristis*  
(Linnaeus).

(*Paradisea tristis* Linnaeus, 1766, Syst. Nat., ed. 12, 1 : 167 (Pondichery); Baker, FBI No. 996, Vol. 3 : 53; Ali & Ripley, HB No. 1006, Vol. 5 : 177).

Local name : Hindi Desi myna

Gujarati Kabar.

Size. Universally known.

A dark brown bird with black head, yellow legs bill and naked patch behind eye. Diagnostic white mirror on wings. Sexes alike.

Resident. One of the commonest and most familier bird in the entire Indian Union includin islands (Introduced).

Extralimital : Asia. Introduced in Australia, New Zealand, Hawaii, S Africa.

Ali collected specimens from Chobari (Bhachau dist. Kutch), Ajwa, Bodeli (Both in Baroda dist.), Malegaon (Surat Dangs), Kharaghoda, Gujarat.

Z.S.I., party noted eslewhere in Gujarat near human habitation and urban localities.

331. Bank Myna : *Acridotheres ginginianus*  
(Latham).

(*Turdus gingininus* Latham, 1790, Index Orn. 1 : 362 (Gingee); Baker, FBI No. 998, Vol. 3 : 55; Ali & Ripley, HB No. 1008, Vol. 5 : 181).

Local names : Hindi Ganga Myna

Size. Myna : Length c. (8-9 in.).

Similar to earlier race but smaller and pale bluish grey overall. Naked skin behind eye brick red. Wing patch and tips of tail feathers pinkish buff. A tuft of feathers on forehead. sexes alike.

Resident. local migratory and nomadic, patchily distributed in the plains of northern and central India, southward roughly to a line from Bombay (c. 19°N) to Balasore in N. Orissa (c. 21°N.) eastward to W. Bengal.

Extralimital : Pakistan, Bangladesh, Afghanistan.

Ali collected specimens from Ajwa (Baroda dist.), and further noted it common in Kutch, abundant in Viramgam, Ahmedabad, Surat, cambay, Broach, Baroda etc.

Z.S.I. party noted everywhere in Gujarat in large numbers and it virtually replace the Common Myna in many places.

332. Southern Jungle Myna : *Acridotheres fuscus mahrattensis* (Sykes).

(*Pastor mahrattensis* Sykes, 1832, Proc. Zool. Soc. London : 95 (the Ghauts (near Poona); Baker, FBI No. 999 (Part), Vol. 3 : 57; Ali & Ripley, HB No. 1010, Vol. 5 : 185).

Local name : Hindi Jungli Myna

Gujarati Vana kabar

Size. Common Myna.

Similar to common Myna but distinctly greyer brown overall. Tuft of black feathers on forehead, no naked skin around eye. Tail tips broad and yellow iris are diagnostic. Sexes alike.

Resident, Patchily distributed from Mt. Abu (Rajasthan) to the mouth of Mahanadi River (Orissa), in the western Peninsula from Gir (Gujarat) and Ahmedabad south along the coastal and Sahyadri tract to Kerala, Goa (?), W. Karnataka (Coorg), W. Tamil Nadu (Nilgiri & Palni Hills). Also recorded from M.P., S. Orissa, Shevaroy and Chitteri Hills. Affects well- wooded country, edge of the forest near cultivation. Not listed by Ali

Family CORVIDAE

Key to the genera of the family CORVIDAE

1. Plumage predominantly or black with ashy nape and central rectrices not elongated .....*Corvus*

Plumage with brilliant or contrasting colours with two central rectrices elongated .....2

2. Plumage with shades of blue .....*Cissa*  
Plumage with shades of brown .....*Dendrocitta*

333. Western Tree Pie : *Dendrocitta vagabhuna pallida* (Blyth).

(*Crypsirina pallida* Blyth, 1846, Jour. Asiat. Soc. Bengal 15 : 30 (Western Himalayas, Restricted to Galkund, Surat Dangs (Gujarat) by Paynter); Baker, FBI No. 26 (Part), Vol. 1 : 48; Ali & Ripley, HB No. 1031, Vol. 5 : 217).

Local names : Hindi Mahalat, Mootri.

Gujarati Khakhedo.

Size. Myna + : Length (12-12 in. with tail).

A long-tailed bright rufous arboreal bird with dark sooty grey head, neck and breast. Broad black tips to graduated greyish tail, and greyish, white and black pattern on wings. Sexes alike (Ali & Ripley).

Resident. Commonly found and restricted to and from Rajasthan through Gujarat, Saurashtra, Western M.P. and Maharashtra in well wooded country and edge of the forest near human habitation.

Ali collected specimens from Cambay, Vaghjipur, Patan (Both in Mehsana dist.), Deesa (Palanpur), Galkund, Malegaon, Mheskatri, Sarwar, Pimpri (All in Surat Dangs), Amreli, Dalkhanja, Gujarat.

Z.S.I. party noted it in Sasan Gir Forest area, Gujarat.

334. Indian House Crow : *Corvus s. splendens* Vieillot.

(*Corvus splendens* Vieillot, 1817, Naur. Diet. d'Hist. Nat. 8 : 44 (Bengal); Baker, FBI No. 11, Vol. 1 : 33; Ali & Ripley, HB No. 1049, Vol. 5 : 244).

Local names : Hindi Desi Kowwa

Gujarati Kagda

A glossy black and grey universally known bird. Sexes alike.

Resident. Common to excessively common locally. All India except Kerala east and south of a line roughly from H.P. to Kutch.

Extralimital : Nepal, Bhutan, Bangladesh, Burma, Also introduced in Zanzibar, Aden, Mauritius.

Ali collected specimens from Bhuj, Mandvi (Kutch), Bodeli (Baroda dist.), Radhanpur, Dwarka, Dalkhania (Amreli dist.).

Z.S.I. party noted it very common in towns and villages in Gujarat.

335. Indian Jungle Crow : *Corvus macrorhynchos culminatus* Sykes.

(*Corvus culminatus* Sykes, 1832, Proc. Zool. Soc. London : 96 (Poona); Baker, FBI No. 6, Vol. 1 : 28; Ali & Ripley, HB No. 1057, Vol. 5 : 256).

*Local names* : Hindi- Jangli Kawwa  
Gujarati- Girnari Kagdo.

Size. Larger than House crow.

A uniformly glossy jet-black crow with a heavy black bill. Sexes alike.

Resident. The Gangetic Plain, all Peninsular India south to Cape Comarin.

Extralimital : Sri Lanka.

Ali collected specimens from Ajwa (Baroda dist.), Vaghjipur (Mehsana dist.), Dediapada (Rajpipla), Gujarat.

Ali further noted it absent in Kharaghoda, Radhanpur, Patan (Mehsana dist.), Deesa, Palanpur, and in Kutch.

Maharao Vijayarajji recorded it breeding in Mandvi (Kutch).

336. Punjab Ravan : *Curvus corax subcorax* Severtzov.

(*Curvus subcorax* Severtzov, 1872, Vertik. Turkest. Zhivotn. : 115 (NW and SE Turkestan); Baker, FBI No. 1, Vol. 1 : 21; Ali & Ripley, HB No. 1059, Vol. 5 : 262).

*Local names* : Hindi Domkak.

Size. Larger than Jungle Crow.

An enlarged heavy replica of Jungle Crow; glistening jet-black with massive bill and

hoarse wooden bell-like caw. Sexes alike (Ali & Ripley).

Locally resident (breeding) and/or winter visitor in variable numbers. Punjab salt Range and foot of outer Himalayas upto c. 600 m. W. Rajasthan, Delhi (rare), Kutch (boarders of Great and Little Ranns.).

Extralimital : Pakistan, Afghanistan, Iran, Syria, Israel, Jordan, Kashgaria, W. Turkestan.

Ali collected specimens from Nanda, ca. Adesar (Little Rann.) also noted in Nir (Pacham Island), Dholovira (Khadir Island) in the Great Rann.

337. Grey Hypocolius or Shrike-Bulbul : *Hypocolius ampelinus* Bonaparte.

(*Hypocolius ampelinus* Bonaparte, 1850, Consp. Gen. Av. 1 : 336 (NE Africa); Baker, FBI No. 378, Vol. 1 : 357; Ali & Ripley, HB No. 1063; Vol. 5 : 268).

A blue-grey bird, with a distinctive black band from lores through eye to nape. Wings black tipped with white. Tail longish blue-grey with a broad black terminal band. (Male); Female grey above, dirty cream below, no black eye band.

Rare vagrant. Individual examples seen and collected within our limit only at long intervals, all between November and April. Gujarat (Kuar Bet in Great Rann. of Kutch), and Maharashtra (Kihim, Kolaba dist.), in semi-desert and open scrub-jungle.

Extralimital : Pakistan (vagrant), S. Iran, Afghanistan, Iraq, Arabia, N. Africa. Not listed by Ali

338. Blackbacked Pied Flycatcher-shrike : *Hemipus p. picatus* (Sykes).

(*Muscicapa picata* Sykes, 1832, Proc. Zool. Soc. London : 85 (Dukhun); Baker, FBI No. 724 (Part), Vol. 2 : 306; Ali & Ripley, HB No. 1065, Vol. 6 : 3).

*Local names* : Hindi Chhota kala latora  
Gujarati Kalopeeth kabaro latoro

Size. Sparrow; length c. (5-6 in.).

Plumage, above, black and white under.

Presence of white collar and rump. Tail and wings black and white (Male); female similar but black replaced by brown.

Resident. Sparsely found in thin forest edged sometimes cultivation, gardens etc. It distributed in India from Narbada River and northern M.P. south through the Peninsula except Kerala, east to lower W. Bengal.

Extralimital : Bangladesh, Southern Thailand, Indo-Chinese countries, Malay Peninsula, Sumatra, Borneo.

Ali collected specimens from Malegaon (Surat Dangs).

Ali further noted it in Waghai (Surat Dangs).

339. Malabar Wood Shrike : *Tephrodornis gularis sylvicola* Jerdon.

(*Tephrodornis sylvicola* Jerdon, 1839, Madras Jour. Lit. Sci., 10 : 236 (Malabar Coast); Baker, FBI No. 728, Vol. 2 : 311; Ali & Ripley, HB No. 1068, Vol. 6 : 8).

Local names : Hindi Pahari latora size. Myna; length c. (9 in.).

A short-tailed bluish grey brown shrike with a broad black band through eye to ear coverts. Rump and upper tail covered barred with black and white band across. Below ashy fawn fading to white on abdomen (Male); female similar but crown and back concolour and eye band brown.

Resident, patchily and thinly found in moist-deciduous forest with tall trees from plains upto c. 1800 mt. alt in our Indian limit and ranges from Gujarat (Narbada River) south through Maharashtra to Tamil Nadu (Western part), Western Karnataka and Kerala in Kerala hills, Nilgiris and Hills.

Extralimital : Indo-Chinese and Malaysian subregions.

Ali collected one specimens from Waghai (Surat Dangs), and not noted elsewhere in Gujarat.

340. Sind Wood Shrike :

*Tephrodornis pondicerianus pallidus* Ticehurst.

(*Tephrodornis pondicerianus pallidus* Ticehurst, 1920, Bull. Brit. Orn. Cl. 41 : 56

(Larkhana, sind); Baker, FBI No. 731, Vol. 2 : 314; Ali & Ripley, HB No. 1069, Vol. 6 : 10).

Local names : Hindi Keroula

Size. Bulbul + : Length c. (6-7 in.).

Plumage, above, paler ashy grey and less ashy, more creamy, on the underparts. Lores and eye-streak pale brown (Contra. dark brown, *pondicerianus*). Whitish supercillium and white outer rectrices. Sexes alike.

Resident. and sparsely found in the scrub jungle in arid and semidesert country with bushy field and terail grassland in the foothills. it ranges in our Indian limit from Punjab, Delhi, Western U.P., Rajasthan to Gujarat (Saurashtra and Kutch), arbitarily a boundary line is fixed from SW to Nw in India, i.e., from Cambay to kumaon wherein it intergrades with the next race *pondicerianus*.

Extralimital : Resident in West Pakistan.

Ali did not mentioned this race in Birds of Gujarat.

*Tephrodornis pondicerianus* (Gmelin)

Key to the subspecies

Upper parts ashy brown.

- A. Darker; lores and eye-streak dark brown  
.....*T.p. pondicerianus*  
B. Paler; lores and eye-streak pale brown  
.....*T.p. pallidus*

Both the races are distributed in Gujarat. Sind wood shrike (*T.p. pallidus*) are found mainly arid parts of Gujarat specially in the north and whole of other parts except south where in Indian Wood Shrike (*T.p. pondicerianus*) is dominating. But with all probability birds from north Gujarat are supposed to be paler than the birds from Surat Dangs (S. Gujarat) forested area. So it would be very difficult to determine the sub-specific status of a specimens collected from Gujarat.

341. Indian Wood Shrike : *Tephrodornis p. pondicerianus* (Gmelin)

(*Muscicapa pondiceriana* Gmelin, 1789, Syst. Nat., 1 : 939 (Coromandel); Baker, FBI

No. 729, Vol. 2 : 312; Ali & Ripley, HB No. 1070, Vol. 6 : 11).

*Local name* : Hindi- Keraula

*Size*. Bulbul + : Length c. (6-7 in.).

Plumage, similar to earlier race but much more smaller in size, and a whitish supercillium and outer tail feathers almost white. Sexes alike.

Resident and more commonly found than preceding race in scrub and secondary jungle and light wooded country from plains upto normally c. 450 m. alt. Distributed throughout the India (mainland) except the Indian range of earlier race.

Overlap with each other and subsequently intergrades with the earlier race in SW Rajasthan and southern Gujarat.

*Extralimital* : Extends east to Thailand and Laos.

Ali collected specimens from Godsar (Bhuj dist.), Bodeli (Baroda dist.), Cambay town environs, Deesa (Palanpur), Songadh (Navsari dist.), Malegaon (Surat Dangs).

Ali also noted from Chaduva (Kutch), Bhuj, Mandvi, Mata-no-madh (Kutch), Pavagadh (Panchmahal dist.), Ajwa (Baroda dist.), Vaghjipur and Patan (Mehsana dist.), Balaram and Ganga Sagar (Palanpur), Juna Rajpipla and Rajpipla town environs, Galkund (Surat Dangs), Amreli, Dhariand Dalkhania, Gujarat.

Z.S.I. party also noted it from Sasan Gir Forest, Amreli dist., Gujarat, Nov.'1993.

Out of 9 specimens (4 Male, 5 female), Ali commented that his specimens are intermediate between *pondicerianus* and *pallidus* but closer to the former, except two from Deesa which go better with the pale N.W. Indian race *pallidus*.

The intergrading zones between the two races are Surat Dangs and Cambay town environs. So the specimens collected in Deesa are interesting for their affinity towards *Pallidus*. In other words the nominated race extended as far as Deesa (Palanpur), Gujarat.

#### 342. Indian Large Cuckoo-Shrike :

*Coracina novaehollandiae macei* (Lesson).

(*Graucalus macei* Lesson, 1830, Traite D'Orn : 349 (Calcutta, Bengal); Baker, FBI No. 758, Vol. 2 : 343; Ali & Ripley, HB No. 1072, Vol. 6 : 14).

*Local names* : Hindi Kasya.

Gujarati - Moto Kasio.

*Size*. Pigeon - : c. (11 in.).

Plumage, male, above, grey, wings and tail black, black eye streak and heavy, slightly hooked bill. Female, underparts barred with grey and white.

Resident. It ranges in and Indian limit in the through the entire Peninsula from a arbitrary line c. 24°N (Kutch) to M.P., Bihar and southern W. Bengal. Also extended to the forested part of Mt. Abu (Rajasthan).

*Extralimital* : Central East Bangladesh.

Ali collected specimens from Ajwa (Baroda dist.), Jambughoda, Vaghjipur Patan (Mehsana dist.), Radhanpur, Juna Rajpipla, Laochali, Mheskatri, Sarwar, Pimpri (All in Surat Dangs).

Ali also noted it from Cambay town environs, Nadiad (Kaira dist.), Deesa (Palanpur), Dediapada (Rajpipla), Songadh (Navsari dist.), Waghi, Galkund (Both in Surat Dangs.). Absent in Kutch.

Z.S.I. party noted it in Sasan Gir, and Khijidia Bird Sanctuary environs, Jamnagar dist, Nov. '1993.

#### 343. Peninsular Blackheaded Cuckoo-Shrike: *Coracine melanoptera sykesi* (Strickland).

(*Lalage sykesi* Strickland, 1844, Ann. Mag. Nat. Hist., 13 : 36 (Dukhun); Baker, FBI No. 756, Vol. 2 : 340; Ali & Ripley, HB No. 1079, Vol. 6 : 22).

*Local names* : Hindi Jungli Kasya

Gujarati Kala mathano Kasio.

*Size*. Bulbul + : Length c. (7-8 in.).

Plumage, male, above, grey, head, wings and tail black, the latter tipped white except the middle pair. Underparts white. Female brown above and buffy white below. No black on head.

Resident. Fairly common but overlooked in non-breeding season due to its silent nature, and distributed in the whole of the Peninsula, from Gujarati (Kutch) through Rajasthan (Mt. Abu) to U.P. (Barily), W. Bengal, Assam (S, of Brahmputra), Nagaland and Manipur in our Indian limit.

Extralimital : Nepal, Bangladesh.

Ali collected specimens from Dabka (Baroda dist.).

Ali noted it from Vaghjipur (Mehsana dist. and it is absent in Kutch).

Status in Gujarat is uncertain. Rare, but presumably resident though apt to be overlooked in seasons when it is silent. Ali

R.M. Simmons noted it in Ahmedabad (May) and records a nest at Abu Road (JBNHS. 47 : 735).

#### 344. Peninsular Indian Scarlet (or Orange)

Minivet :

*Pericrocotus f. flammeus* (Forster).

(*Muscicapa flammea* Forster, 1781, Ind. Zool. : 25-26, Pl. 15 (No locality = Ceylon, vide Whistler & Kinnear, 1933, JBNHS 36 : 341); Baker, FBI No. 737, Vol. 2 : 322; Ali & Ripley, HB No. 1081, Vol. 6 : 27).

*Local names* : Hindi Pahari bulalchashm.

Gujarati Kasariyo rajalal.

Size. Bulbul; Length c. (8 in.).

Plumage, male, above, head, neck and back black; rump and underparts except throat. Wings and tail black and scarlet. Female similar but scarlet is replaced by bright yellow.

Resident, very commonly found in deciduous, mixed and evergreen forest. Its distributional range in our Indian limit is restricted to and from Tapti River in Gujarat south through Maharashtra, Mysore and Western Tamil Nadu to Kerala, east to the Shevaroy Hills.

Extralimital : Sri Lanka.

Two sub-species of *Pericrocotus flammeus* (Forster), viz., *flammeus* and *semiruber* are needed to be discussed here. Both the races have more orange and less scarlet in their underparts, but the race, *semiruber*, is larger in size.

The deepness/richness of scarlet; vis-a-vis orange, and amount of red on wings and rectrices may, I think, be not a constant character as such sub-specific isolation could definitely be made solely on these variable characters. All those above characters vary individually depending

upon climate condition and physiography of geographical landmass, i.e., from extreme cold to hot arid zone; moist evergreen biotope to sandy desert country. At this juncture the disjunct distribution rather geographical isolation from one to other is a much debated question. The race, *semiruber*, is isolated to and from Wester, M.P. (Batul) to Orissa, Southern Bihar, W. Bengal and northern Andhra. (Ali & Ripley). So the portion of land mass in between the distribution of two races is remain unmolested either of the two races. But there is no geographical barrier in this untouched area as such as arboreal bird like minivet could not crossed and pass through on either side.

So to conclude whole thing as cited above, it is necessary to ascertain critically the status of the both races and to attributed fresh knowledge on the distributional ranges of the two race.

Ali collected specimens from Waghai, Galkund, Malegaon, Pandwa, Laochali, Mahal, Mheskatri, Sarwar (All in Surat Dangs).

Ali also noted in Medha near Songadh (Navsari dist.), not noted in Kutch or Saurashtra.

Ali further commented that, "These specimens represent a considerable extension northward of the range given in F.B.I. (ii : 332) and by H.G. Diagan (Auk; 63 : 516) for Western India, namely Cape Comorin to Khandla" This minivet extends eastward along the Satpura mountain trend to link up with the allied race *semiruber* of the Visakhapatnam Ghats.

#### 345. Sind Small Minivet :

*Pericrocotus cinnamomeus pallidus* Baker.

(*Pericrocotus cinnamomeus pallidus* Baker, 1920, Bull. Brit. Orn. Cl. 40 : 115 (Larkhana, Sind); Baker, FBI No. 748, Vol. 2 : 332; Ali & Ripley, HB No. 1090, Vol. 6 : 40).

*Local name* : Hindi Bulalchashm

Size. Sparrow : Length c. (6 in.)

Plumage, Male, above, head, throat, back dark grey, wings black with yellow-orange patch, rump orange-red, underparts orange diffuse to yellow on belly. Tail black and orange-yellow. Female similar but underparts whitish grey suffused with yellow. Throat grey, upper parts much paler.

Resident. Common in semidesert biotope, with some tall trees around. It mainly distributed in Jammu and extends its ranges to our Indian limit in N. Gujarat (Kutch), Central Rajasthan (Mt. Abu) and Kanga dist., Punjab.

Extralimital : Pakistan (Indus Valley, SW Punjab, Baluchistan) and Iran.

Kutch (N. Gujarat) area is the intergrading zone, wherein it intergrades with allied race, *P. c. peregrinus*. So, in other words, the Northern Small Minivet, *P. c. peregrinus* (Linnaeus) is also extending its distributional ranges to Gujarat.

Ali did not mention this bird in Birds of Gujarat.

346. Southern Small Minivet :  
*Pericrocotus c. cinnamomeus* (Linnaeus).

(*Motacilla cinnamomea* Linnaeus, 1766, Syst. Nat., ed. 12, 1 : 335 (Ceylon); Baker, FBI No. 745, 747 (Part), Vol. 2 : 329, 331; Ali & Ripley, HB No. 1093, Vol. 6 : 42).

Local name : As in earlier race.

Size. As in earlier race.

Plumage, as in earlier race, but smaller in size, throat blacker, flame-orange on breast deeper.

Resident. Commonly found in thin deciduous forest, edge of the forest near cultivation and hilly tract upto 1500 mt. alt. It ranges in our Indian limit from Saurashtra (Gujarat), Southern Rajasthan, M.P. southern Orissa south through Peninsula to Tamil Nadu.

Extralimital : Sri Lanka.

Ali collected specimens from Bhuj, Ajwa, Bodeli (Both in Baroda dist.), Cambay town environs, Nadiad (Kaira dist.), Deesa (Palanpur dist.), Rajpipla, Malegaon (Surat Dangs).

Ali also noted it from Godsar, Mandvi, Ratnal, Bachau, Rudra Mata, Jakhan, (All in Kutch), Kanewal (Cambay), Vaghjipur and Patan (Mehsana dist.), Radhanpur, Balasar and Ganga sagar (Palanpur), Ghatwad (Kodinar).

Z.S.I. party noted it in Sasan Gir Forest area, Amreli dist., Gujarat, Nov.'1993.

Ali further noted that his two Kutch specimens and one from Deesa, show passage

to *Pallidus*, chiefly in the slightly paler grey of the upperparts.

347. Whitebellied Minivet : *Pericrocotus e. erythropygius* (Jerdon).

(*Muscicapa erythropygia* Jerdon, 1840, Madras Jour. Lit. Sci., 11 : 17 (s. India = Ajanta); Baker, FBI No. 749, Vol. 2 : 332; Ali & Ripley, HB No. 1096, Vol. 6 : 45).

Local names : Hindi Safed rajalal

Gujarati Kabaro rajalal

Size. Sparrow : Length c. (6 in.).

A small black and white minivet, with white wing patch, forming a V-shaped design when seen from the rear. Rump and breast orange-red (male); Female similar, but black is replaced by brownish grey.

Resident. Sparsely and patchily distributed in our Indian limit from Ambala, Jodhpur, Kutch, south and east to Belgaum, Hyderabad, the Chhota Nagpur Plateau, South West Bihar and U.P. Also recorded sporadically in W. Bengal, Kerala, Nilgiris, Trihut (Bihar), Affects semi-desert stony and bushy country and dry grassland.

Extralimital : Pakistan (Sind Wanderer Ticehurst, 1922, Ibis : 614).

Ali collected specimens from Rapar (Wagad dist. - Kutch), Bodeli (Baroda dist.).

Ali also noted from Bhuj, Nir and Kala Dongar (Paccan Is Kutch).

Common in Kutch. Specimen from Bodeli seemed to be a straggler. Breeds in Kutch in July - September. Parties of parents with 2-3 youngs are commonly observed in Kutch.

Butler (S.F. iii : 465) noted it rare in N. Gujarat. He recorded once or twice in a low bush jungle near Deesa (Palanpur), Gujarat.

Family IRENIDAE

1. General colouration yellow .....*Aegithina*  
General Colouration not yellow .....2
2. General colouration grass green  
.....*Chloropsis*  
General colouration deep blue .....*Irena*

348. Central Indian Iroa : *Aegithina tiphia humei* Baker.

(*Aegithina tiphia humei* Baker, 1922, Fauna Brit. Ind., Bds. 1 : 342 (Raipur, M.P.); Baker, FBI No. 364, Vol. 1 : 342; Ali & Ripley, HB No. 1099, Vol. 6 : 50).

*Local name* : Hindi shaubeegi

Gujarati Shobinga

*Size*. Sparrow Length c. (4-5 in.).

*Plumage*, Male, a black and yellow tit like arboreal bird with two white bars across the wing. Female, yellowish green throughout with greenish brown wings instead of black. Tail green in non breeding dress.

*Resident*. Commonly found in thin bushy forest, near garden and cultivation. It ranges in our Indian limit from Saurashtra, Mt. Abu, U.P. (Plains) and Bihar, south to lat. 20°N. and east to northern Orissa and southern W. Bengal. Intergrades will allied race, *tiphia*, in Bihar.

Ali collected specimens from Bodeli, Jambughoda, Dabka (All in Baroda dist.), Cambay, Vaghjipur, Patan (Mehsana dist.), Radhanpur, Mahal (Both in Surat Dangs), Ghatwad (Kodinar), Dalkhania (Amreli), Bhavnagar (DKS. collection).

Ali also noted it from Baroda City, Paragadh, Champaner, Nadiad, Songadh (Navsari dist.), Deesa (Palanpur), Rajpipla, Galkund (Surat Dangs). Absent in Kutch and about kharaghoda (?).

Z.S.I. Party noted this birds in Nalsarobar environs, Gandhinagar dist., in Oct.' 1993.

349. Marshall's Iora : *Aegithina nigrolutea* (Marshall).

(*Iora nigrolutea* Marshall, 1876, S.F., 4 : 410 (Meerut); Baker, FBI No. 366, Vol. 1 : 344; Ali & Ripley, HB No. 1102, Vol. 6 : 53).

*Local names* : Same as earlier race.

*Size*. Same as earlier race.

Male resembles the common Iora but has a yellow collar in the black-backed breeding dress. Tail in both sexes black with broad white tips, instead of black in male and green in female. The green plumage of both sexes is paler and more suffused with white.

*Resident*. Sparsely and rather thinly distributed than the earlier race in almost same habitat in our Indian limit. It ranges in and from NW India through west and east Punjab, Southern U.P., Western M.P. including Satpuras, west to Kutch and Rajasthan.

*Extralimital* : Pakistan (West).

*Aegithina tiphia* (Linnaeus), with its five different sub-species are well distributed all over India except arbitrarily the range of *A. nigrolutea* in NW India. The distributional ranges of three races of *A. tiphia*, viz. *tiphia*, *humei* and *septentrionalis*, are virtually touching the distributional range of the present race. It is further observed that specimens showing *nigrolutea* characters collected within the range of *A. tiphia* (Linnaeus). (Ali & Ripley) collected such specimens from Bihar, W. Bengal, Khandesh, Tamil Nadu and Mysore. They further noted that two specimens collected Gwalior (M.P.) are intermediate between *A.t. humei* and *A. nigrolutea*. They also questioned about the status of *A. nigrolutea* as a distinct species, Genetical analysis, vis-a-vis, external characters, habit/habitat of the races of *A. tiphia* and *A. nigrolutea* can only ascertain as to whether the present race would get specific status or would be a sub-species of *A. tiphia*.

Ali collected specimens from Bhujia Fort, Mandvi, Nakhatrana, Godsar (Bhuj dist.), Sela (Great Rann.) (All in Kutch); Deesa (Palanpur).

Ali also noted it from Chaduva, Anjar, Bachau, Rudra Mata, Mata-no-Madh, Lakhpat (All in Kutch); Dhari (Amreli dist.).

Ali further noted that juvenile plumage of the present race and the earlier race is indistinguishable.

350. Southern Goldfronted Chloropsis : *Chloropsis aurifrons frontalis* (Pelzeln).

(*Phyllornis frontalis* Pelzeln, 1856, Sitzungs, math. Acad. Wiss. Wien, 20 : 157, pl. 2, Fig. 1, ex Natterer MS. (Khelgate, near Goa); Baker, FBI No. 369 (Part), Vol. 1 : 348; Ali & Ripley, HB No. 1104, Vol. 6 : 57).

*Local names* : Hindi Chhota harial or harewa.

*Size*. Bulbul : Length c. (7-8 in.).

Plumage, leafgreen overall with orange forehead, blue shoulder patch and black slightly decurved bill. chin black. Sexes alike.

Resident. Fairly common in all type of forest ranges from S. Gujarat and Maharashtra from the Tapti River south through Goa, to Western Karnataka (Malnaad) and Western Tamil Nadu to the Palghat Gap, and Eastern Ghats in Tamil Nadu and A.P.

Ali collected specimens from Medha (Navsari dist.), Waghai and Mahal (Surat Dangs).

Ali did not found this bird to the north of the Narbada River.

351. Jerdon's Chloropsis : *Chloropsis cochinchinensis jerdoni* (Blyth).

(*Phyllornis jerdoni* Blyth, 1844, Jour. Asiat. Soc. Bengal, 13 : 392 (Central India); Baker, FBI No. 374, Vol. 1 : 352; Ali & Ripley, HB No. 1107, Vol. 6 : 60).

Local name : Hindi Harewa

Size. As in earlier race.

Plumage, male, above, similar to earlier race but yellowish green forehead instead of orange, black of Chin and throat restricted above eye; yellow ring around black throat border. Female similar, but Chin and throat pale bluish green, Check-stripe bright greenish blue.

Resident, but less common than earlier race in identical biotope. More common in the hilly tract rather than in the plains wherein it is patchily distributed. It ranges from the Gulf of Cambay to Central U.P., east to West Bengal, south throughout the Peninsula.

Extralimital : Sri Lanka.

Ali Collected specimens from Bodeli (Baroda dist.), Songadh (Navsari dist.), Galkund (Surat Dangs).

Ali also noted from Pavagadh (Panchmahal dist.).

Family PYCNONOTIDAE

Key to the genera of the Family  
PYCNONOTIDAE

1. Numerous hair springing from nape and hind neck with long pointed crest ..... *Criniger*

No numerous hair springing from nape and hind neck without long printed crest ..... 2

2. Bill moderately thick usually shorter than length of tarsus ..... *Pycnonotus*  
Bill slender, longer than tarsus ..... *Hypsipetes*

352. Rajasthan Redwhiskered Bulbul :  
*Pycnonotus jocosus abuensis* (Whistler).

(*Otocompsa jocosa abuensis* Whistler, 1931. Bull. Brit. Orn. Cl., 52 : 40 (Mt. Abu); Baker, FBI No. 411 (Part), Vol. 1 : 396; Ali & Ripley, HB No. 1119, Vol. 6 : 76).

Local names : Hindi Kanera Bulbul, Pahari Bulbul.

Size. Red Vented Bulbul. Length c. (8 in.).

Plumage, same as next race but paler overall, collar broken in centre. Sexes alike.

Resident and restricted to central, southern and SE Rajasthan, and N. Gujarat.

Ali did not listed this bird in Birds of Gujarat.

353. Southern Redwhiskered Bulbul :  
*Pycnonotus jocosus fuscicaudatus* (Gould).

(*Otocompsa fuscicaudate* Gould, 1866 (1865), Proc. Zool. Soc. London, Pt. 3 : 664 (Nilgiri Hills); Baker, FBI No. 411, Vol. 1 : 396; Ali & Ripley, HB No. 1120, Vol. 6 : 77).

Local names : Hindi As in earlier race.

A commonly known bird with plumage, above, hair-brown and white underparts and scarlet under tail coverts. Diagnostic black crest and crimson tuft behind eye and a dark collar. Sexes alike.

Resident. Common and widespread. It distributed from W. India (Tapti River), M.P., South to Cape Comorin, including Maharashtra, Karnataka, Kerala and Western parts of both Tamil Nadu and A.P.

Ali did not collect any specimens, but a single pair was observed at Waghai (Surat Dangs). Not met elsewhere in Gujarat. Absent in Kutch.

Z.S.I. party noted this birds in the Nalsarobar environs, Gandhinagar dist., Gujarat during October ' 1993.

354. Whiteeared Bulbul : *Pycnonotus leucogenys leucotis* (Gould).

(*Ixos leucotis* Gould, 1836, Proc. Zool. Soc. London : 6 (Karachi, Sind); Baker, FBI No. 406, Vol. 1 : 390; Ali & Ripley, HB No. 1123, Vol. 6 : 81).

*Local names* : Gujarati Kenera Bulbul; Joggido (Kutch).

*Size*. Redvented Bulbul : Length c. (8 in.).

An unmistakable bulbul, above grey brown and white underparts, head and throat black, undertail coverts and vent yellow and a diagnostic large white check patch. Sexes alike.

*Resident*. Less common than Redvented/ Red-Whiskered Bulbul, patchily distributed in thin jungle, preferably in semi-desert tracts. It ranges in India from Eastern Rajasthan, east Punjab, U.P., Northern M.P., south to Gujarat, and northern Maharashtra (Bombay).

*Extralimital* : West Pakistan, Southern Afghanistan and Southern Iran.

Ali collected specimens from Dabka (Baroda dist.), Golana (Cambay), Patan (Mehsana), Radhanpur, Kharaghoda, Rudra mata (Bhuj dist.).

Ali also noted it from Bhuj and environs, Tapkeshwari, Chaduva, Mandvi, Nakhatrana, Bachau, Pachham Island, Jakhan, Mata-no-Madh, Khadir Is. Bela Is. (All in Kutch); Ajwa (Baroda dist.), Deesa (Palanpur).

355. Central Indian Redvented Bulbul : *Pycnonotus cafer humayuni* Deignan.

*Pycnonotus cafer humayuni* Deignan, 1951, Auk 68 : 110 (Deesa); Baker, FBI No. 399, Vol. 1 : 385; Ali & Ripley, HB No. 1127, Vol. 6 : 86).

*Local names* Hindi- Bulbul

Gujarati Bhilbhil.

A earth brown bulbul with black head and throat, white rump, scarlet vent and white tipped tail. Sexes alike.

*Resident*. Most common and widespread near urban country and human inhabitation rather than forest. This race ranges in India from along the Jumna River to Eastern M.P. and south to a line running from Jagdalpur to Bombay.

*Extralimital* : Pakistan.

The type locality of this race is Deesa (Gujarat)

Ali collected specimens from Tapkeshwari (Bhuj dist.), Dabka (Baroda dist.), Golana (Cambay), Vaghjipur (Mehsana dist.), Kharaghoda, Rajpipla.

Ali also noted it from Bodeli, Jambughoda, Ajwa, Pavagadh (All in Boroda dist.), Harij (Mehsana dist.), Radhanpur, Deesa, Palanpur, Ahmedabad, Wadiad, Surat, Waghai, Mahal, Galkund (All in Surat Dangs), Kodinar, Dalkhania, Dwarka, Okha, Morvi, Rajkot, Bhuj, Chaduva, Nakhatrana, Bachau, Rapar, Kala Dongar (Pachhan Is.), Dhunara, Jakhau, Mata-no-Madh, Dholovira (Khadir Isl.), Bela (All in Kutch).

Z.S.I. party noted this birds elsewhere in Gujarat.

Ali further noted that birds from South Gujarat (Baroda) are showing affinity to the nominated race, i.e., *P.c. cafer* distributed upto 18°N. lat in Maharashtra.

356. Whitebrowed Bulbul : *Pycnonotus l. luteolus* (Lesson).

(*Haematornis luteolus* lesson, 1841, Rev. Zool. : 354 (Bombay); Baker, FBI No. 433 (Part), Vol. 1 : 417; Ali & Ripley, HB No. 1138, Vol. 6 : 98).

An uncrested olivebulbul with pale underparts, white forehead and supercillium. Sexes alike.

*Resident*. Less common than earlier race, patchily and thinly distributed in dry and open country intersected by bushes and small trees. Avoids moist and evergreen biotope. It ranges within India in Peninsula roughly south of 20°N. lat.- south a line from Ahmedabad (Gujarat) through Southern M.P. to Midnapur (W. Bengal). Recorded also as far as east in Burdwan (W. Bengal Law, JBNHS, 38 : 620-1).

Ali collected specimens from Dabka (Baroda dist.), and cambay.

Ali also noted from Baroda city and environs, Pavagadh (Panchmahals), Vaghjipur (Mehsana dist.), Navagram (Rajpipla). Not noted in Saurashtra region and also absent in Kutch.

Betham recorded two eggs at Baroda in June (JBNHS, 11 : 316).

357. Peninsular Spotted Babbler :  
*Pellorneum r. ruficeps* Swainson.

(*Pellorneum ruficeps* Swainson, 1832, Fauna Boreali Americana. : 487 (Coonoor, Nilgiris); Baker, FBI No. 240, Vol. 1 : 238; Ali & Ripley, HB No. 1154, Vol. 6 : 117).

Size. Bulbul : Length c. (6 in.).

Plumage, above, brown, chestnut cap, pale supercillium extended behind eye. Below, throat white, rest buff, boldly streaked and spotted with dark brown. Sexes alike.

Resident. Common in hilly tracts and scrubby jungle, sholas and deciduous forest. It ranges within India from the hills of Indian Peninsula, Satpuras, hilly tract of Bihar and Orissa, Western and Eastern Ghats, from the Narbada River and the Rajmahal Hills, south to the Palghat Gap and the Chitteri Hills.

Ali collected specimens from navagam (Rajpipla), Juna Rajpipla, Madha (Navsari dist.), mahal (Surat Dangs).

Ali also noted it from Ghantoli (Rajpipla) Galkund (Surat Dangs). Not in Saurashtra and Kutch regions.

358. Mount Abu Scimitar Babbler :  
*Pomatorhinus schisticeps obscurus* Hume.

(*Pomatorhinus obscurus* Hume, 1872, S.F. 1 : 7 (Mount Abu); Baker, FBI No. 207, Vol. 1 : 211; Ali & Ripley, HB No. 1172, Vol. 6 : 133).

Size. Bulbul +; Length c. (8-9 in.).

A dark brown and white babbler with throat, breast and centre of the belly white. A diagnostic white supercillium and long decurved yellow bill. Sexes alike.

Resident but sparsely found in suitable biotope, like hilly tracts intersected by bamboo groves, and thick forest. It ranges within India and restricted to South Western Rajasthan (Mt. Abu and adjacent parts of Aravalli Range), Northern Gujarat (Upto Gir Forest).

Ali not listed this bird in the Birds of Gujarat.

This race found in the northern part of Gujarat and extends upto Gir forest (DKS, JBNHS 48 : 188) and intergrading with allied race *horsfieldii* south to the Tapti River in Gujarat.

Ali further commented that the exact eastern limit of this race needs to be determined. It is said to occur in the neighbourhood of Seoni in the Satpuras, ca. 350 miles NE of Medha (Surat Dangs), Gujarat.

359. Deccan Scimitar Babbler :  
*Pomatorhinus schisticeps horsfieldii* Sykes.

(*Pomatorhinus horsfieldii* Sykes, 1832, Proc. Zool. Soc. London : 89 (Mahableswar, W. Ghats); Baker, FBI No. 206, Vol. 1 : 210; Ali & Ripley, HB No. 1173, Vol. 6 : 134).

Local names : None recorded.

Size. As in earlier race.

Plumage, similar to earlier race but less grey than earlier race, back dark earthy brown; dark edge of plastron blackish brown.

Resident. Locally common where it patchily distributed. It ranges within India from Southern Gujarat from the Tapti River south through Maharashtra in the W. Ghats complex to Goa and Northern Karnataka (Londa), east to Orissa (Hindol- c. 21°N. lat.) through E. Ghats complex to the Krishna River in Eastern A.P.

Ali collected specimens from Medha (Navsari dist.), Waghai, Malegaon, Laochali, Mahal, Mheskatri (all in Surat Dangs).

Ali also noted it from Dediapada and Ghantoli (Rajpipla). Not met with in Saurashtra or Kutch region.

Both the races, viz., *obscurus* and *horsfieldii* are distributed in Gujarat. The *obscurus* is extending its ranges from north to south and vice-versa in the case of *horsfieldii*.

Ali wanted to fix Tapti River as the boundary line between the two races. "All birds north of the Tapti to be arbitrarily considered *obscurus* and all birds south of it *horsfieldii*"

360. Mount Abu Whitethroated Babbler :  
*Dumetia hyperythra abuensis* Harington.

*Dumetia albigularis abuensis* Harington, 1915, Jour. Bombay Nat. Soc. 23 : 429 (Mount Abu); Baker, FBI No. 231, Vol. 1 : 230; Ali & Ripley, HB No. 1219, 1220, Vol. 6 : 178).

*Local names* : Hindi Shah dumri  
Gujarati Karamadi laledo.

*Size*. Sparrow: Length c. (5 in.).

*Plumage*, above, olive brown, reddish brown of head brighter and extending to crown. Throat white, rest of the underparts ochraceous. Sexes alike.

Resident. Sporadically found in well-wooded biotope and scrubby jungle. It ranges within India from Southern Rajasthan (Sambar and Mt. Abu), Saurashtra peninsula, Eastern Gujarat, Western most Satpuras, Western Ghats south to Poona and east to Kannad in Marathwada, to a line c. 20°N., 75°E.

Ali listed this bird as *D.h. albogularis* (Blyth) which is distributed in southern India south of the Krishna River and Mahableswar, intergrades with *abuensis* in the Poona dist.

Ali collected specimens from Dabka (Baroda dist.), Cambay, Vaghjipur (Mehsana dist.), Dediapada (Rajpipla).

Ali also noted it from Baroda City and environs, Pavagadh and Champaner (Panchmahal dist.), Balaram and Hathidura (Palanpur), Juna Rajpipla, Waghai (Surat Dangs), Ghatwad and Kodinar (Amreli dist.), Bhavnagar (DKS). Absent in Kutch.

361. Western Yelloweyed Babbler :  
*Chrysomma sinensis hypoleuca* (Franklin).

(*Timalia hypoleuca* Franklin, 1831, Proc. Zool. Soc. London : 118 (U.P.); Baker, FBI No. 234 (Part), Vol. 1 : 233; Ali & Ripley, HB NO. 1230, Vol. 6 : 189).

*Local names* : Hindi Bara-podna, Barapida, Gotah.

*Size*. Bulbul : Length c. (7 in.).

An unmistakable babbler, above, rufescent brown, wings cinnamon. Bill, short and black. Below, buffish white, yellow eye and white supercillium. Diagnostic orange-yellow eyerim. Sexes alike.

Resident, patchily but densely populated locally in scrubby jungle and thin bushy forest. This race is distributed within India from NW India, east to northern and eastern U.P., NW M.P., and extreme NE Maharashtra.

Extralimital : Pakistan.

Ali collected specimens from Chaduva (Bhuj dist.), Ajwa, Dabka (Both in Baroda dist.), Vaghjipur and Patan (Mehsana dist.), Deesa (Palanpur), Dediapada (Rajpipla).

Ali also noted it from Rudra Mata (Bhuj), Cambay, Golana (Cambay), Nadiad, Ahmedabad (Kaira dist.), Radhanpur, Hathidhara (Palanpur), Juna Rajpipla, Kharaghoda. Not recorded in the Saurashtra region.

Ali recorded its breeding in August (Kutch).

Butler recorded its nests in July near Deesa (Palanpur) (S.F., iii : 471-1875).

Ali further commented that the specimens collected from Gujarat are intermediate in between the races *C.s. sinensis* and *C.s. hypoleuca*. Specimens of N. Gujarat (Mehsana dist.) are markedly paler than specimens from S. Gujarat (Rajpipla). Ali kept his paler specimens in this race merely based on distributional range rather than colouration of plumage on which sub-specific differentiation is made.

## Family MUSCICAPIDAE

### Key to the sub-families of the family MUSCICAPIDAE

1. Juvenal plumage spotted .....2  
   Juvenal plumage unspotted .....3
2. Bill slender and fairly strong .....*Turdinae*  
   Bill broad and flat .....*Muscicapinae*

3. Bill small, slender; legs short and weak  
.....*Sylvicnae*  
Bill very variable; legs and feet strong  
.....*Timaliinae*

Key to the genera of the family  
MUSCICAPIDAE

1. Wing more than 100 mm. ....2  
Wing less than 100 mm. ....9
2. Sexes dissimilar .....3  
Sexes alike .....6
3. Tail graduated and longer than wing  
.....*Copsychus*  
Tail shorter than wing .....4
4. White on bases of secondaries and parts of  
primaries .....5  
No white on the bases of primaries and  
secondaries .....*Turdus*
5. Plumage largely with blue or bluish  
.....*Monticola*  
Plumage largely with brownish and slaty  
.....*Zoothera*
6. Tail shorter than wing .....*Myiophoneus*  
Tail longer than wing .....7
7. Bill very strong and slightly curved with  
long rictal bristles .....*Garrulax*
8. Colour of head, back, wing and tail uniform  
or concolours .....*Turdoides*  
Colour of head and back with fine streak  
and broad stripe .....*Megalarus*
9. Wing in between 50 mm. 100 mm  
.....10  
wing in between 40 mm 65 mm .....23
10. Sexes dissimilar .....11  
Sexes similar .....15
11. Bill short and slender .....12  
Bill stout and notched at tip.....13
12. Tail chestnut .....*Phoenicurus*  
Tail black .....*Saxicoloides*
13. Secondaries narrowly tipped with yellow or  
chestnut .....14  
Secondaries edged with black .....*Saxicola*
14. Secondaries edged with yellow ...*Leiothrix*  
Secondaries tipped with chestnut  
.....*Pteruthius*
15. Eye yellow with conspicuous orange  
yellow eye-rim .....*Chrysomma*
16. Head with erectile crest .....*Yuhina*  
Head with no erectile crest .....17
17. Bill well-wooded and strong .....18  
Bill slender .....19
18. Rictal bristles, numerous and long bill wide  
at base .....*Culicicapa*  
Rictal bristles well-developed, bill  
depressed and wide at base .....*Muscicapa*
19. Tail shorter than wing .....*Eithacus*  
Tail equal or longer than wing .....20
20. Outer edge of tail brightly coloured *Minla*  
Outer edge of tail not coloured .....21
21. Rictal bristles minute and inconspicuous  
.....22  
Rictal bristles moderate .....*Heterophasis*
22. Rectrices slightly pointed .....*Locustella*  
Rectrices not pointed, round  
.....*Bradypterus*
23. Chin, throat and breast pale yellow  
.....*Mixornis*  
No such colour present .....24
24. Rectal bristles long, wing feathers  
narrowly cross barred .....*Actinodura*  
Rectal bristles short .....25
25. Wing equal to tail .....*Lucinicola*  
Wing larger or smaller than tail .....26
26. Wing larger than tail, bill slender and  
pointed .....27  
Wing smaller than tail; rictal bristles (Two)  
.....*Prinia*
27. Bill as long as head length .....28  
Bill shorter than head .....30
28. Rictal bristles (three) or (Two) well  
developed .....29  
Rictal bristles few and very small  
.....*Orthotomus*
29. Rictal bristles (three) tarsus long  
.....*Acrocephalus*

- Rictal bristles (two), tarsus moderate ..... *Cisticola*
- 30. Culmen curved ..... 31
- Culmen sharp and pointed, tail square or slightly forked..... *Phylloscopus*
- 31. Bill more pointed, elongated and culmen greatly curved ..... *Staschyris*
- Bill short and stout, culmen slightly curved ..... *A!cippe*

362. Common Babbler : *Turdoides c. caudatus* (Dumont)

(*Cossyphus caudatus* Dumont, 1823, Diet. Sci. nat. (ed. Levrault) 29 : 268 (India); Baker, FBI No. 192, Vol. 1 : 198; Ali & Ripley, HB No. 1254, Vol. 6 : 215).

*Local names* : Hindi - Sor, Genga, Dumri, Chilchil.

Gujarati Sheradi

Size. Bulbul +; length c. (9 in.).

A slim earthy brown babbler with a long, graduated loosely attached tail. Throat white, breast and vent creamy buff, the latter streaked brown. Sexes alike.

Resident. Fairly common and widely distributed. More preferably in dry plains and scrub jungle and dry deciduous forest. It ranges within India from along the foothills to Dehradun (U.P.) and east to Eastern Bihar and Eastern M.P. Whole of the Peninsula upto Cape Comurin, Rameswar Is. and Laccadive Is.

Extralimital : Pakistan.

Ali collected specimens from Rudra Mata (Bhuj dist.), Chobari (Bachau dist.), Dabka (Baroda dist.), Golana (Cambay dist.), Nadiad (Kaira dist.), Kharaghoda.

Ali also noted it from Padhar, Mandvi, Anjar, Bachau, Kala Dongar (Pachham), Pung Bet (Little Rann.) (All in Kutch); Dwarka, Okha, Amreli, Dhari, Kodinar, Baroda City and environs, Vaghjipur (Mehsana dist.), Deesa, Palanpur environs, Radhanpur.

363. Large Grey Babbler : *Turdoides malcolmi* (Sykes).

(*Timalia malcolmi* Sykes, 1832, Proc. Zool. Soc. London : 88 (Dukhun - Poona); Baker, FBI

No. 195, Vol. 1 : 200; Ali & Ripley, HB No. 1258, Vol. 6 : 220).

*Local names* : Hindi Ghogoi, Satbhai

Gujarati - Laledo.

Size. Myna; Length c. (11 in.).

Plumage, above, greyish brown mottled with dark brown on back, forehead ashy with whitish shaft-streaks. Underparts creamy buff. Diagnostic bright yellow eye and whitish outer tail feather. Sexes alike.

Resident; common but locally distributed in dry, open, sparsely scrubbed country intersepted by babool jungle. It ranges in India from Punjab (Ferozepore and Ludhiana) east to Eastern U.P., south through Rajasthan to Kutch and Saurashtra (Gujarat) and through the Peninsula south to Tamil Nadu and east to a line Ghazipur - Ambikapur (M.P.) Nellore.

Extralimital : Pakistan (sind Sehwan vide Ibis : 541, 1922).

Ali collected specimens from Dabka (Baroda dist.), Cambay.

Ali also noted it from Baroda City and environs, Nadiad (Kaira dist.), Vaghjipur (Mehsana dist.), Radhanpur, Deesa, Palanpur town and environs, Amreli, Dhari, Kodinar, Verabal (Junagadh).

Ali not met with this bird in Kutch, Lester (1903) did not include this birds in his list from Kutch.

Hume recorded it not as uncommon in the desert portion of Kutch (S.F., iii : 472- 1875) Stoliczka (JASB, 51 1872), recorded from Kutch.

Z.S.I. party recorded it from Sasan Gir Forest (Amreli dist.) and from Verabal, Gujarat, Oct. Nov. '1993.

364. Sind Jungle Babbler : *Turdoides striatus sindianus*. (Ticehurst).

(*Crateropus terricolor sindianus* Ticehurst, 1920, Bull. Orn. Cl. 40 : 156 (Karachi, Sind); Baker, FBI No. 185, Vol. 1 : 193; Ali & Ripley, HB No. 1261, Vol. 6 : 224).

*Local names* : Hindi Satbhai

Gujarati Vana laledo.

Size. As in earlier race.

A grey brown bird, with rump and tail coverts buff, tail rufousbrown, breast streaked pale brown. Diagnostic creamy white eyes, yellowish legs and bill. Sexes alike.

Resident common but unevenly distributed in India in the West Himalayan foothills; east from the Gulf of Kutch, Punjab, Rajasthan to the Yamuna and Chambal Rivers, including Aravalli Range (excluding Thar Desert).

Extralimital : West Pakistan (Kohat, along the Indus Valley to Karachi).

365. Peninsular Jungle Babbler : *Turdoides striatus orientalis* (Jerdon).

*M. Calrocircus orientalis* Jerdon, 1847, Ill. Orn. text to pl. 19 (Horsleykonda, West of Nellore); Baker, FBI No. 183 (Part), Vol. 1 : 191; Ali & Ripley, HB No. 1262, Vol. 6 : 226).

*Local names* : Gujarati- As in earlier race.

*Size*. As in earlier race.

Plumage similar to earlier race, but general colour greyer and breast heavily streaked. Sexes alike.

Resident. One of the commonest babbler of the Peninsula. In ranges in India from Gujarat and Western half of M.P., south through the Peninsula to the Nilgiris and Plains except for the range of *somervillei*, *malabaricus* and *orissae*.

This race intergrades with *sindianus* in the Little Rann. of Kutch, Gujarat.

The specimens collected from Gujarat by (Ali) were listed as *Turdoides somervillei*, *orientalis sindianus*

Ali collected specimens from Bodeli, Dabka (Both in Baroda dist.), Cambay, Nadiad (Kaira dist.), Vaghjipur (Mehsana dist.), Gangasagar (Palanpur), Kharaghoda, Ghatwad (Amreli dist.).

Ali also noted it from Baroda City and environs, Ajwa, Pavagadh, Jambughoda, Radhanpur, Palanpur, Juna Rajpipla, Dediapada (Rajpipla), Verabal town (Junagadh), Kodinar (Amreli dist.).

Z.S.I. party noted this bird in the Sasan Gir Forest (Amreli dist.), Gujarat, Nov. 1993.

Ali further commented that birds from north of the Narbada River, and northern Gujarat and Saurashtra, are intermediate between *orientalis* and *sindianus*.

Ali did not find this bird in Kutch region. Hugh who originally published a list of Kutch birds in 1978, not Capt Lester, who revised and added to it in 1903, make mention of the race.

Hume (SF, iii : 472 - 1875) collected it from Kutch. and it was included in Stoliczka's List of Kutch birds published in 1872 (JASB, Vol. 51).

366. Bombay Jungle Babbler : *Turdoides striatus somervillei* (Sykes).

(*Timalia somervillei* Sykes, 1832, Proc. Zool. Soc. London : 88 ('Ghauts' = Bombay Ghats); Baker, FBI No. 188, Vol. 1 : 194; Ali & Ripley, HB No. 1263, Vol. 6 : 228).

*Local names* : As in earlier race.

*Size*. As in earlier race.

Plumage, similar to earlier race, but with blacker wing quills and markedly red-coverts and tail.

Resident. It distributed within India and restricted to south-eastern Gujarat and coastal Maharashtra, from Tapti River south along the western flank of the Ghats to Goa. Intergrades in the north and east with *orientalis*.

Ali collected specimens from Waghai, Mahal, Malegaon, Laochali, Mahal (All in Surat Dangs).

Z.S.I. party noted this birds as fairly common in the Nalsarobar environs, Gandhinagar dist., Gujarat, Oct. 1993.

367. Bombay Quaker Babbler : *Alcippe poiocephala brucci* Hume.

(*Alcippe brucci* Hume, 1870, Jour, Asiat. Soc. Bengal 39 : 122 (Mahableswar); Baker, FBI No. 289, Vol. 1 : 278; Ali & Ripley, HB No. 1389, Vol. 7 : 122).

*Size*. Sparrow; length c. (6 in.).

A nondescript olive-brown babbler with grey crown and nape, rusty brown on wings and tail, and pale fulvous underparts. Sexes alike.

Resident, locally very common in wet and mixed deciduous forest rather arid or deforested country. It ranges within India from the hills of the Indian Peninsula, south of a line running from Kathiawar and Mt. Abu across Southern M.P. (Panchmari, Balaghat) to Southern Bihar (Parasnath).

Ali collected specimens from Medha (Navsari dist.), Waghai, Malegaon, Laochali, Mahal, Mheskatri, Sarwar, Pimpri (all in Surat Dangs).

Ali also noted that it was not found in Saurashtra or Kutch region or elsewhere in Gujarat, but Harrinton recorded it from Rajkot (JBNHS, 23 : 451). This race is one of the commonest bird in Surat Dangs area.

368. Spotted Flycatcher : *Muscicapa striata sarundnyi* Snigirewski.

(*Muscicapa striata sarundnyi* Snigirewski, 1928, Jour. f. Orn. 76 : 595, new name for *Butalis griseola* var. *pallida* Zerudny, 1903, *Nec Muscicapa pallida* Muller (Eastern Iran and Transcaspia); Baker, FBI No. 631, Vol. 2 : 202 (= *neumani*); Ali & Ripley, HB No. 1403, 1404, Vol. 7 : 140).

*Local names* : None recorded.

*Size*. Sparrow; length c. (5 in.).

Similar to and mistakable identity with yellow throated sparrow in the field. A drab brow flycatcher, darker on tail and wings, crown streaked with pale and dark brown. Diagnostic white eye ring. Below whitish, streaked with brown on throat and breast. Sexes alike.

This race recorded within Indian limit on passage migration. NW India as far as east Shimla, Western Rajasthan, Northern Gujarat (Deesa), Kutch and the Kathiawar Peninsula (Autumn migration).

*Extralimital* : A Palaearctic sp. found across Europe and Asia to Lake Baikal and S. Asia.

Ali collected specimens from Nakhatrana (Kutch), Dwarka, Dhari (Amreli dist.).

Ali also noted it from Rudra-Mata, Tuna, Anjar, Bachau, Rapar, Chaduva, Dhunara, Khadra (All in Kutch). Not met with elsewhere in Gujarat.

Ali collected and recorded it as passage

migrant in Kutch and Saurashtra region to its winter journey to Arabia and Africa. First noted on 1st September and last on October 20. Never winter in this region of Gujarat.

369. Brown Flycatcher : *Muscicapa latirostris* Raffles.

(*Muscicapa latirostris* Raffles, 1822, Trans. Linn. Soc. London 13 : 312 (Sumatra); Baker, FBI No. 674, 675, Vol. 2 : 248, 249; Ali & Ripley, HB No. 1407, Vol. 7 : 145).

*Local name* : Hindi - Zakki

*Size*. Sparrow : Length c. (5 -6 in.).

*Plumage*, above, ashy brown, below sullied white and throat white. Diagnostic white eyering around large eyes. Sexes alike.

A partial migrant having a disjunct breeding ranges. Movements imperfectly understood.

Common summer (breeding) visitor in the Himalayas at lower elevation c. from 900 mt. to 1800 mt.; actually from western foot hills in Chamba, Dharamsala, Dhola Dhar, Kulu, Mussooree, Ranikhet, Naini Tal, east to Jalpaiguri duars, rare in southern Kashmir (Kishtwar Ward, JBNHS 7 : 480).

A common breeder in the hills around Sehore and Mhow (Vindhya Range).

A scarce breeder in the Southern parts of the Western Ghats in North Kanara (Davison), Coorg (Betts), the Palnis (JBNHS 55 : 160) and Cardamon Hills (sparrow, in epist to Whistler; Jackson, 1971, JBNHS 68 : 112-13). May breeds also in the Chitteri range (Whistler, JBNHS 36 : 85) and Biligirirangan Hills (Ali, JBNHS 43 : 334).

Winters erratically but sparsely over most of the Peninsula but mainly in the Ghats of Peninsula. Stragglers recorded in Kathiawar and Kutch (Gujarat), Andamans Islands, Car Nicobar and Camota (Abdulali, JBNHS 64 : 183), Very scarce in Manipur (Hume), the Cahchar Hills (Baker, JBNHS 9 : 126) and the Garo Hills (Godwin - Austin), Passage migrant recorded in Punjab (Ludhiana), Gujarat (Sasan, and the Gir Forest), Chimre (Ladakh) in September.

*Extralimital* : Breeding visitor to Nepal

Valley, Bhutan Foot Hills and also breeds in Southern Siberia from the Yenisey to Sakhalin, Japan, Korea.

Winters in Sri Lanka, Bangladesh, SE Asia, Philippines and Indonesia.

Ali collected specimens from Medha (Navsari dist.), Waghai and Galkund (Surat Dangs).

Ali did not noted it elsewhere in Gujarat.

Z.S.I. party noted it from Nalsarobar environs, Gandhinagar dist., Gujarat in October, 1993.

370. Western Redbreasted Flycatcher :  
*Muscicapa p. parva* Bechstein.

(*Muscicapa parva* Bechstein, 1794, Allg. uber. Vog. 2 : 356 (Thuringerwald); Baker, FBI No. 638, Vol. 2 : 210; Ali & Ripley, HB No. 1411, Vol. 7 : 154)

Local name : Hindi - Turra

Size. Sparrow : Length c. (5 in.).

Plumage, Male, above, pale brown, chin and throat orange rufous, rest of the underparts white. Diagnostic white patch on either side of basal half of blacktail.

Female similar but has a whitish throat and buffy breast.

A widespread winter visitor and passage migrant. Winters in our Indian limit from Himalayan foothills (Dehradun) south through Gujarat, Maharashtra and Karnataka. Also recorded in Jalpaiguri duars (W. Bengal Straggler).

Extralimital : Winter visitor to Pakistan and Bangladesh.

Breeds in eastern Europe and Russia to the Urals and the southern Caspian region. On passage migration through Afghanistan.

Ali collected specimens from Khadva, Kala Dongar (Paccham Is.), Lakhpat, Chobari (Bachau dist.), Dholovira (Khadir Is.)- All in Kutch; Dalkhania (Amreli dist.), Bodeli (Baroda dist.), Jambughoda, Cambay, Vaghjipur (Mehsana dist.), Kharaghoda.

Ali also noted it from Bhuj, Chaduva, Nand

(near Adesar); Baroda City, Pavagadh (Panchmahals dist.), Ajwa (Baroda dist.), Nadiad town and environs, Patan (Mehsana dist.), Radhanpur, Gangasagar (Palanpur), Rajpipla town and environs, Dediapada (Rajpipla), Medha and Songadh (Navsari dist.).

371. Tickell's Redbreasted Blue Flycatcher:  
*Muscicapa t. tickelliae* (Blyth).

(*C. (Yornis) tickelliae* Blyth, 1843, Jour. Asiat. Soc. Bengal 12 : 941 (Central India = Borabhum); Baker, FBI No. 660, Vol. 2 : 234; Ali & Ripley, HB No. 1442, Vol. 7 : 193).

Local names Hindi- As in earlier race.

Gujarati - Adharanga

Size. Sparrow : Length c. (4-5 in.).

Plumage, Male, above, indigo-blue, brighter azure blue on forehead, supercillium and shoulders. Throat and breast orange-rufous; belly white.

Female like male but duller, over all greyer above.

Resident. Fairly common from the foothills (1500 mt.) down to the plains in deciduous forest, edge of the forest near cultivation and bushy jungle country. It ranges within India in the Peninsula from U.P. (Dehra Dun) and Siwalik foothills (Dismaston), Gonda and Gorakhpur, Southern Bihar and SW Bengal, south to Kerala and West to a line from Kutch, Mt. Abu, Sambhar Lake and Mussooree, thence east through Assam (N. Chachar, Baker, JBNHS 9 : 124)

Extralimital : Bangladesh, extends through Burma, the Indo- chinese countries, Malaysia, Indonesia and the Philippines.

Ali collected specimens from Cambay, Vaghjipur (Mehsana dist.), Juna Rajpipla, Kodinar, Dalkhania (Amreli dist.).

Ali also noted it from Pavagadh (Panchmahal dist.), Ajwa (Baroda dist.), Balaram (Palanpur) Medha (Navsari dist.), Waghai (Surat Dangs). Absent in Kutch.

Fairly common in Surat Dangs area.

Z.S.I. party noted this bird in Sasan Gir Forest, Amreli dist., in November, 1993.

372. Verditer Flycatcher : *Muscicapa t. thalassina* Swaison.

(*Muscicapa thalassina* Swaison, 1838, Nat. Library, Flycatchers 21 : 252 (India); Baker, FBI No. 665, Vol. 2 : 239; Ali & Ripely, HB No. 1445, Vol. 7 : 198).

Size. Sparrow : Length c. (6 in.).

Plumage. Male, entirely blue-green (Colour of Oxydized copper), brighter on head and throat, darker on wings and tail. A black patch in front of eye.

Female duller and greyer.

Summer (Breeding) visitor to the Himalays. Breeds in our Indian locality from Kashmir and east to whole of NE India.

Winters throughout the Indian Peninsula.

Migration. Arrives on its breeding ground as cited above in early March and April and stay there until October, thence starts downward movement to the plain of Indian Peninsula east of a line Sambhar Lake - Dwarka (Kutch (JBNHS 61 : 449), Kathiawar (JBNHS 60 : 456) south upto Kerala (South).

Extralimital : Breeds in Pakistan. Winters in Bangladesh, east to Western China and Vietnam.

Ali collected specimens from Ajwa (Baroda dist.), Cambay, Vaghjipur (Mehsana dist.).

Ali not noted it elsewhere from Gujarat.

Z.S.I. party not met with this bird.

373. Northern Greyheaded Flycatcher :  
*Culcicapa ceylonensis calochrysea*  
Oberholser.

(*Culcicapa ceylonensis calochrysea* Oberholser, 1923, Smith. Misc. Coll. 76 : 8 (Quamoo Choung = Laft bank of Thaungy in River, lat. 17°15'N. Amherst Dist., Tenasserim); Baker, FBI No. 679 (Part), Vol. 2 : 254; Ali & Ripely, HB No. 1448, Vol. 7 : 202).

Size. Sparrow : Length c. (3-4 in.).

Plumage, above, head, throat, breast ashy grey, back yellowish green, rump yellow, belly bright yellow. Wings and tail brown edged yellow. Sexes alike.

Summer (breeding) visitor or resident in the hills. Common but disjunctly breeding in our Indian limit from Kashmir, east to the Mishmi hills, thence south to NE India in between 1500 mt. and 2400 mt.

Also breeds in the Central Satpuras (Betul and Panchmari) and in the Eastern Ghats (Vishakhapatnam dist.).

Winters in the foot hills of the Himalayas from West to east and most of the Indian Peninsula in the Plains, west to Kutch, south to about the Krishna River.

Extralimital : Breeds in Indus Valley (Pakistan), Nepal, Bangladesh (Chittagong Hill Tracts), Burma, Winters in the plains of West Peshawar and Bannu, South in the plain of the Indus.

Ali collected specimens from Cambay, Hathidhara (Palanpur).

Ali not noted elsewhere in Gujarat.

374. Northern Whitebrowed Fantail  
Flycatcher :  
*Rhipidura a. aureola* Lesson.

(*Rhipidura aureola* Lesson, 1830, traits d'Orn. : 290 (Bengal); Baker, FBI No. 700 (Part), Vol. 2 : 277; Ali & Ripley, HB No. 1451, Vol. 7 : 207).

Local names : Hindi Machharya, Nachan, Chakdil.

Gujarati Nachan.

Size. Bulbul : Length c. (6-7 in.).

Plumage, above, crown black, forehead and diagnostic supercillium white, back and wings brown, the latter with two rows of white spots. Tail black, outer rectrices white, others except central pair, tipped white. Below, throat black, belly white. Sexes alike.

Resident. Commoner in winter than in the other season in thin deciduous forest. Sometimes in the orchards and gardens. It ranges in Indian in the Himalayan foothills, from the Indus River east to Brahmaputra River. South through Gujarat to SW and Central Maharashtra, east to Orissa, W. Bengal through Jalpaiguri duars to Assam.

Extralimital : West Pakistan (Sind to Karachi), Bangladesh.

Ali collected specimens from Bodeli (Baroda dist.), Cambay, Vaghjipur (Mehsana dist.).

Ali also noted it from Baroda City, Dabka and Pada (Baroda dist.), Nadiad town and environs (Kaira dist.), Patan (Mehsana dist.); Dediapada (Rajpipla), Deesa, Balaram, Gangasagar, Hathidhara (Palanpur), Ghatwad (Kodinar).

Lester recorded it in Kutch.

Z.S.I. party noted it in the Jamnagar town environs (Zoogarden), Nov. ' 1993.

Ali further commented, on the basis of the specimens collected by him, that specimens from Bodeli, Cambay and from Mehana show their affinity towards allied southern race, i.e., *compressirostris*, but he retained these birds in *auseola* realizing that they are intermediate in characters (colouration) and smaller in size.

### *Rhipidura aureola* Lesson

#### Key to the subspecies

- A. White on outer pair of rectries not reaching under tail coverts .....*R.a. compressiostris*
- B. White on under pair of rectries reaching under tail coverts.
1. Darker above, crown blacker than back .....*R.a. aureola*
2. Paler, above, crown nearly concolours with back .....*R.a. burmanica*

375. Whitespotted Fantail Flycatcher :  
*Rhipidura albicollis albogularis* (Lesson).

(*Muscicapa (Muscyuva) albogularis* Lesson, 1832, in Belanger, Voy, Ind-Orient., Zool. : 264 (Salem district, Madras); Baker, FBI No. 705 (part), Vol. 2 : 282, Ali & Ripley, HB No. 1458, Vol. 7 : 214).

Local names : Hindi As in earlier race.

Size. Sparrow; length c. (6-7 in with long tail).

A dark, slaty brown fan-tailed flycatcher with a prominent white band across the throat and short white supercillia and outer rectries tipped whitish, entire belly buff. Sexes alike.

Resident, common but unevenly distributed in the Indian Peninsula from Mt. Abu and the Vindhya Range southward to Kerala - coastal plain, Central Plateau, Western and Eastern Ghats and their associated hills upto c. 2000 m. (Nilgiris).

Ali collected specimens from Ajwa (Baroda dist.), Cambay, VAGhipur (Mehsana dist.), pandwa (Surat Dangs).

Ali also noted it from Jaspur (Baroda dist.), Hathidhara (Palanpur), Juna Rajpipla, Malegaon (Surat Dangs). Absent in Kutch.

Z.S.I. party not met with this bird elsewhere in Nalsarobar (Gandhinagar Dist.), Jamnagar, Sasan Gir, Dwarka and Okha.

### *Terpsiphone paradisi* Linnaeus

#### Key to the Subspecies

Back cinnamon

1. Paler .....*T.p. leucogaster*.
2. Darker .....*T.p. paradisi*  
(\*Excluded other 4 Sub-species - Not concerned).

376. West Himalayan Paradise Flycatcher :  
*Terpsiphone paradisi leucogaster*  
(Swainson).

(*Muscipeta leucogaster* Swainson, 1838, Nat. Library, Flycatchers, 21 : 205 (Simla); Baker, FBI No. 690, Vol. 2 : 268; Ali & Ripley, HB No. 1460, Vol. 7 : 216).

Local names : Hindi - Shah bulbul, Husani bulbul

Gujarati - Dhudhraj, Tarwario.

Size. Bulbul : Length, Male, c. (20 in. - with long tail - streamers).

Plumage, Male, head and throat black, head with crest, wings black and white, rest of plumage white, extremely elongated central

pair of ribbon like white rectries. male sub-adult similar but back, tail and streamers rufous. First year birds have ashy breast. Female similar to 1st year male.

Breeds in the Western Himalayas from c. 1800 m. to 2400 mt. in well-wooded nullah, bushes, gardens and near cultivation.

Winters over most of the Peninsula, from the Gangetic plains and Kutch and Kathiawar south to Kerala and Tamil Nadu.

Extralimital : Pakistan, Nepal and Bangladesh.

Ali collected specimens from Rapar (Kutch), Juna Rajpipla, Dediapada (Rajpipla), Malegaon, Laochali, Mheskatri, Pimpri (All in Surat Dangs).

Ali also noted this bird in Mahal (Surat Dangs) and Dalkhania (Amreli dist.) (Sub-species uncertain).

Z.S.I. party noted this birds from Sasan Gir Forest (Sub -species uncertain), Amreli dist., Nov.' 1993.

Ali further noted as follows "The sub-specific identity of white males as *Leucogaster* rests mainly on the narrower bill possessed by this race"

"The status of the paradise Flycatcher in Gujarat needs to be determined. No doubt it varies from one locality to another within the area".

Ali assumed that *paradisi* is resident and breeds in Gujarat, easily in Rajpipla, Navsari dist. and Surat Dangs. *Leucogaster* On the other is a winter visitor to Gujarat (Passage migrant. Kutch).

(DKS), noted *Paradisi* breeding in Gir Forest (JBNHS 48 : 188).

### 377. Peninsular Indian Paradise Flycatcher : *Tersiphone p. paradisi* (Linnaeus)

(*Corvus paradisi* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 170 (India - Chandernagor); Baker, FBI No. 688 (Part), Vol. 2 : 264; Ali & Ripley, HB No. 1461, Vol. 7 : 218).

Plumage. Similar to earlier race but darker overall.

Resident. Common but unevenly distributed in the Indian Peninsula from Kathiawar (Gir Forest), Western Rajasthan, M.P., (Neemuch, Jhansi), south to the hills of Kerala and the Chitteri range, and to lower W. Bengal. Sporadically records in Bihar and Orissa and in Deccan (Rare). Affects well-watered and shady forest tracts.

Extralimital : Bangladesh.

Ali collected one specimens from Medha (Navsari dist.).

### 378. Indian Blacknaped Monarch Flycatcher : *Monarcha azurea styani* (Hartlaub).

(*Siphia stayni* Hartlaub, 1898, Abh. Nat. Ver. Bremen 16 : 248 (Horhow, Hainan); Baker, FBI No. 692 and 693, Vol. 2 : 270, 271; Ali & Ripley, HB No. 1465, Vol. 7 : 223).

Size. Sparrow; length c. (6 in.).

Plumage, Male, a partially fan-tailed azure-blue flycatcher, duller on the wings, with a velvety black patch on nape and thin black crescent throat. Belly whitish. Female. Above. crown blue, rest of upperparts brown; below, ashy blue fading to whitish on belly. No black nape-patch (Ali & Ripley).

Resident. Widespread but subject to erratic local and winter movements. More frequent in winter than other seasons in evergreen and mixed deciduous forest, cultivation. It ranges within India south and east of a line running from the Gulf of Kutch to Gorakhpur (U.P.), south to Kerala and Tamil Nadu (including Palnis JBNHS 55 : 159); east through whole of NE India upto Arunachal Pradesh and north along the Himalayan foothills west to Dehra Dun (Osmaston, 1935) and Lucknow (Straggler).

Extralimital : Nepal, Bangladesh, Bhutan, Pakistan (Karachi), extends east through Southern china and the Indo-Chinese countries to Hainan.

Ali collected specimens from Ajwa (Baroda dist.), Juna Rajpipla, Medha (Navsari dist.), Malegaon, Galkund, Pandwa, Laochali, Sarwar, Waghai, Chikhli (All in Surat Dangs), Dwarka.

Ali also noted it from Mheskatri Pimpri (Surat Dangs). Absent in Kutch.

Z.S.I. party noted it from Nalsarobar environment, Gandhinagar dist., Gujarat, Oct. 1993.

This race is one of the commonest flycatcher in mixed deciduous forest in Gujarat.

379. Brown Rock Chat : *Cercomela fusca* (Blyth).

(*Saxicola fusca* Blyth, 1851, Jour. Asiat. Soc. Bengal 20 : 523 (Muttra); Baker, FBI No. 516, Vol. 2 : 54; Ali & Ripley, HB No. 1692, Vol. 9 : 20).

Local names : Hindi- Dauma (U.P.)

Gujarati Kalo patharal piddo.

Size. Sparrow +; length c. (6-7 in.).

A plain brown chat, rufous brown below, with darker wings and blackish tail. Easily confused in the field with Indian Robin (Female), but larger and lacks chestnut patch under tail. Sexes alike.

An endemic species. Resident, common but capriciously distributed and with some seasonal local movements, it ranges in India from the Punjab south through Eastern Rajasthan to Northern Gujarat (including Kathiawar and Kutch), M.P. to the Narmada River, U.P., Bihar to West Bengal. Affects boulders and scarps in rocky hills, ravines, ruins, old buildings in town and suburbs.

Extralimital : North Eastern Pakistan east to the Chenab River.

Ali collected specimens from Bhujia Fort, Tapkeshwari (Bhuj environs), Deesa (Palanpur), Gangasagar (Palanpur).

Ali also noted it from Rapar, Kala Dongar (Pachham), Naliya (Jakhau dist.), Mata-no-Madh (All in Kutch).

380. Stoliczka's Bush Chat : *Saxicola macrorhyncha* (Stoliczka).

(*Prantincola macrorhyncha* Stoliczka, 1872, Jour. Asiat. Soc. Bengal 41 : 238 (Rapur and Bhuj, Kutch); Baker, FBI No. 499, Vol. 2 : 32; Ali & Ripley, HB No. 1693, Vol. 9 : 23).

Size. Sparrow : Length c. (6 in.).

Plumage, above, (winter- Male), sandy buff streaked with brown, pale supercilium, white wing patch, upper tail coverts buffish white. Tail dark brown with outer rectrices white. Below throat white, rest pale buff. Female similar but no white wing-patch, no white on tail.

Resident, rare and sparsely distributed in arid zone and desert from Haryana (Hissar dist.), Eastern U.P. (Aligarh), Eastern Rajasthan and Gujarat (Deesa, Kutch and Kathiawar).

This race was described from Gujarat (Rapur, and Bhuj, Kutch).

Extralimital : Pakistan east of the Indus River. Two recorded from Kandahar, Afghanistan (JBNHS 31 : 706).

Ali did not mention this bird in 'Birds of Gujarat' though it is described from Gujarat.

*Saxicola torquata* (Linnaeus)

Key to the subspecies

Smaller; wing usually under 71 mm.

- a. Paler, more white at base of tail .....*S.t. maura*
- b. Darker, less white at base of tail *S.t. indica* (Cf. Ticehurst, C.B., 1938, Ibis : 338-40) (\*Excluded two sub-species - not concerned)

381. West Siberian Collared Bush Chat : *Saxicola torquata maura* (Pallas).

(*Muscicapa maura pallas*, 1773, Reise Russ. Reichs 2 : 428, 708 (Karassum, Ishim River, W. Siberia); Baker, FBI No. 495 (part), Vol. 2 : 28; Ali & Ripley, HB No. 1695, Vol. 9 : 26).

Size. Sparrow: Length c. (5 in.).

Plumage, (Male- summer), above, black with white rump and wing- patch. Below, throat black with patch on sides of neck and breast which is chestnut paling to buff on belly. Female, above, rufous brown, tail blackish brown, below duller.

Sparse winter visitor to Northern India, South northern Maharashtra (Nasik) in pastur land, Fallow field and bushy forest.

Extralimital : A widespread sp. in Europe, Africa, Madagasker, S and SE Asia.

This race may winters in Gujarat, especially to the arid zone. (Ali & Ripley).

Ali did not mentioned it in the 'Birds of Gujarat'

382. Indian Collared Bush Chat : *Saxicola torquata indica* (Blyth).

(*Pratincola indica* Blyth, 1847, Jour. Asiat. Soc. Bengal 16 : 129 (India = Calcutta); Baker, FBI No. 495 (Part), Vol. 2 : 28; Ali & Ripley, HB No. 1697, Vol. 9 : 28).

Local names : Hindi Kharpidda

Gujarati Mendio piddo.

Size. Sparrow : Length c. (5 in.).

Similar to earlier race but over all darker.

Breeds in whole of the Himalayas between 1500 m. and 2500 m. in our Indian limit. winters down to the foothills and south through the Peninsula upto Karnataka, east to Jalpaiguri duars and Assam.

Extralimital : Breeds in N. Baluchistan, Gilgit (Pakistan), Nepal (Biswas, JBNHS, 58 : 666). Winters in the Bhutan Foothills, Bangladesh.

Ali collected specimens from Mandvi (Kutch), Ajwa (Baroda dist.), Golana (Cambay), Nadiad (Kaira dist.), Radhanpur, Laochali (Surat Dangs), Dwarka, Dalkhania & Dhari (Amreli dist.).

Ali aslo noted from Pung Bet (Little Rann), Dabka, Pariej, Dakor (Kaira dist.), Patan (Mehsana dist.), Rajpipla, Dediapada, Ghatoli (Rajpipla), Muldwarka, Kodinar.

\*(*saxicola caprata*) (Linnaeus)

Key to the subspecies

A. White of lower parts extending to abdomen and lower breast .....*S.c. bicolor*

B. White of lowerparts restricted to vent and undertail coverts.

1. Size small; bill finer and shorter, 13-15 mm..... *S.c. burmanica*

(\*Excluded other 2 sub-species not concerned).

383. Northern Pied Bush Chat : *Saxicola caprata bicolor* Sykes.

(*Saxicola bicolor* Sykes, 1832, Proc. Zool. Soc. London : 92 (Dukhun); Baker, FBI No. 494, Vol. 2 : 26; Ali & Ripley, HB No. 1700, Vol. 9 : 32).

Local names : Hindi Kala pidda

Size. Sparrow : Length c. (5 in.).

Plumage, Male, above, jet black with white wing patch and upper tail coverts. Below, black and white belly and under tail coverts. Female, black and white replaced by buff/ fulvous and rusty.

Partial migrant, summer (breeding) visitor in our Indian limit from Kashmir. east through Punjab, U.P., Bihar to Northern Bengal. Recorded also as winter visitor in Gujarat, M.P., Maharashtra, Northern Karnataka and A.P. Affect cultivated field, scrubbed hill-side, bushy forest.

Extralimital : Pakistan, Nepal.

Ali collected specimens from Anjar, Bhuj, Mandvi, (Kutch),

Ajwa & Bodeli & Dabka (Baroda dist.), Cambay, Baduchi (Cambay), Golana (Cambay), Pariej (Kaira dist.), Radhanpur.

Ali also noted it from Pung Bet (Little Rann.), Sairat and Dakor (Kaira dist.); Patan and Harij (Mehsana dist.), Deesa (Palanpur) and Dhari (Amreli dist.).

Z.S.I. party noted this bird in the Nalsarobar reed-beds (sub- species ucertain), Gandhinagar dist., Gujarat, Oct. '1993.

384. Burmese Pied Bush Chat : *Saxicola caprata brumanica* Baker.

(*Saxicola caprata brumanica* Baker, 1923, Bull. Brit. Orn. Cl. 43 : 9 (pegu); Baker, FBI

No. 492, Vol. 2 : 24; Ali & Ripley, HB NO. 1701, Vol. 9 : 34).

Size. As in earlier race.

Similar to earlier race, but white of lower parts restricted to vent and undertail coverts, smaller and shorter bill.

Resident. Breeds south of the range of *bicolor*, from Gujarat south of Karnataka and Tamil Nadu to the Cuvery River, east through M.P., Southern Bihar, Bengal, Assam, Meghalaya, Nagaland, Manipur, Mizoram in our Indian limit (Ali & Ripley).

Extralimital : Bangladesh extends eastwards through Burma, Thailand and the Indochinese countries.

Ali listed this Pied Bush Chat as the Southern Indian Pied Bush Chat : *Saxicola caprata atrata* (Blyth), but *S.c. atrata* (Kelaart) is endemic to Sri Lanka (Ali & Ripley). However, he mentioned it as resident race and fairly common in the broken, undulating country about the base of Fort Salher in March.

Ali collected specimens from Salhet, ca. 2000' (Navsari dist.), Gujarat.

### 385. Isabelline Chat : *Oenantha isabellina* (Temminck).

(*Saxicola isabellina* Temminck, 1829, Pl. col. (79), Pl. 472, Fig. 1 (Nubia, Africa); Baker, FBI No. 512, Vol. 2 : 49; Ali & Ripley, HB No. 1706, Vol. 9 : 40).

Local name : Gujarati- Pilo piddo.

Size. Sparrow +; length c. (6-7 in.).

Plumage, above, sandy brown with a pale supercillium and eye ring. Tail blackish brown, upper tail coverts white. Creamy buff underparts. Sexes alike.

Winter visitor, widespread but sparsely distributed in Indian limit from NW India, Gujarat, straggling east and southeast to Varanasi and south to Ahmednagar (Fair bank, Blandford) and Poona, c. 18°30' N. Recorded also as passage migrant in Maldiv Island (Phillips, JBNHS 60 : 58). Affects sandy arid country and waste land with bush.

Extralimital : S. Europe, C. Asia, Middle East, E. Siberia, NW China.

Ali collected specimens from Anjar, Rapar, Bhuj environs (All in Kutch), Patan (Mehsana dist.), Radhanpur, Deesa (Palanpur).

Ali also noted it from Jakhan (Kutch) and Amreli.

### 386. Redtailed Chat : *Oenanthe xanthopyrna kingi* (Hume).

(*Saxicola kingi* Hume, 1871, Ibis : 29 (Jodhpur); Baker, FBI No. 515, Vol. 2 : 53; Ali & Ripley, HB No. 1707, Vol. 9 : 42).

Local names : None recorded.

Size. Sparrow +; length c. (6-7 in.).

Plumage, Male, above, grey, greyish white supercillium, rump rufous ochre, Centre of tail and broad terminal band blackish brown. Below, Whitish tinged with pink. Sexes alike.

Winter visitor, locally and very thinly winters in Rajasthan (Mt. Abu) and northern Gujarat. Recorded also in autumn passage in Dharamsala and Ranital (U.P.). Affects arid, stony country mixed with scattered bush and rocky hill side.

Extralimital : Pakistan, Iran, Afghanistan, Egypt, Sudan, Sinai, Arabia.

Ali recorded as *O.x. chrysopygia*, an allied extralimital race of west to Iraq and Armenia, and collected specimens from Khadva (Pachham Is.), Lakhpat (Kutch).

Ali also noted it from Nir and Kala Dongar (Pachham Is.), Dholovira and Chhaparia Hills (Khadir Is.), Patan (Mehsana dist.).

Ali further noted that this bird in northern Kutch and along the edge of the Great Rann.

### 387. Central Asian Desert Wheatear : *Oenanthe d. deserti* (Temminck).

(*Saxicola deserti* Temminck, 1825, Pl. Cot. (60), Pl. 359, fig. 2 (Egypt); Baker, FBI No. 513, Vol. 2 : 51; Ali & Ripley, HB No. 1710, Vol. 9 : 47).

Local names : Gujarati - Rann piddo.

Size. Sparrow; length c. (6 in.).

Plumage, Male (Summer), above buff, diffused to creamy white on uppertail coverts

and half of the tail, rest of tail black. Below, throat and sides of head black, rest buffish white. Black parts are fringed with Whitish.

Female, above, greyer, wings and tail brown, ear coverts rufous brown, underparts whitish buff.

Mostly winter visitor. India east to Bihar and south to Central Maharashtra (Poona, Ahmednagar) and Northern A.P. (Nirmal). Affects arid semi-desert broken tracts, also in cultivated land.

Extralimital : Pakistan (Winter). Breeds in Central Asia, West the Eastern Mediterranean.

Ali listed this bird as the Desert Chat : *O.d. atrogularis* (Blyth).

Ali collected specimens from Anjar, Khadva (Pachham Is.) - Kutch; Bodeli and Dabka (Baroda dist.), Baduchi (Cambay), Vaghjipur and Patan (Mehsana dist.).

Ali also noted it from Khari Rohar, Nanda (SW of Adesar), Pung Bet (Little Rann.), Mandvi, Jakhau, Lakhpat, Mata-no-Madh (All in Kutch), Dwarka, Amreli, Kodinar, Golana, Radhanpur, Deesa (Palanpur).

### 388. Pied Chat : *Oenanthe picata* (Blyth).

(*Saxicola picata* Blyth, 1847, Jour. Asiat. Soc. Bengal. 16 : 131 (Scinde); Baker, FBI No. 506 and 508, Vol. 2 : 42-4; Ali & Ripley, HB No. 1712, Vol. 9; 50).

*Local name* : Gujarati - Kabaro piddo.

*Size*. Sparrow +; length c. (6-7 in.).

A black and white polymorphic chat.

*Black-bellied phase* : Male, entirely black except rump, under tail coverts, Central rectries and terminal band of tail black. Black replaced by sooty black in female.

*White bellied phase* : The most common within our limit. Male, like the preceding phase but belly white. Black replaced by greyish brown in female.

*White crowned phase* : Like earlier phase, but crown and nape white. Female similar to male but black parts and crown earthy brown and belly more buffish.

The geographical dominance of the three

types of female does not exactly correspond to the dominances of the three colour phases of the males (Paluden, p. 208). Party resident, chiefly winter visitor, it ranges in Indian limit from NW India southeast to Delhi, central M.P. and Northern Maharashtra (Khandesh). Affects arid country and cultivation, semi-desert bushy forest etc.

Ali collected specimens from Bhujia Fort., Devisar Tank (Bhuj dist.), Nakhatrana (All in Kutch), Dabka (Baroda dist.), Pariej (Kaira dist.), Patan (Mehsana), Radhanpur, Deesa (Palanpur), Palanpur, Kharaghoda.

Ali also noted it from Kandla, Mandvi, Chaduva, Bhachau, Rapar, Khadva, Nir, Jakhau, Mata-no-madh, Chobari, Dholovira, Adesar (All in Kutch); Dwarka, Amreli, Kodinar, Dalkhania, Naralkhi (Morvi), Verabal (Junagadh). Very common and abundant in Kutch and semi-arid zone Of N. Gujarat.

Ali also listed two species of *Oenanthe*, viz, as *O. capistrata* (Gould) : Whiteheaded Chat and *O. opistholeuca* (Strickland) : Strickland's Chat. Both the races are now synonymised under the present race as both of them are different colour phase of *O. picata* (Blyth). No specimen collected but noted at Patan (Mehsana dist.) - (*O. capistrata*).

Ali collected specimens from Khadva (Pachham Island), Bodeli (Baroda dist.), Deesa (Palanpur) - (*O. opistholeuca*).

### 389. \*Brownbacked Indian Robin : *Saxicola fulvicata cambaiensis* (Latham).

(*Sylvia cambaiensis* Latham, 1790, Index Orn. 2 ; 254 (Gujarat, India); Baker, FBI No. 557 (Part), Vol. 2 : 111; Ali & Ripley, HB No. 1717, Vol. 9 : 60).

*Local names* : Hindi - Kalchuri

Gujarati Deoli, Kalideva.

*Size*. Sparrow; Length c. (6-7 in.).

Plumage, Male, above, dark brown with black tail and white wing-patch. Below black with with vent and undertail coverts chestnut. Female similar but no wing patch.

Resident. Type locality Gujarat. Commonly found in bushy semi-arid country in our Indian

limit from NW India through Rajasthan, Gujarat, U.P., Bihar and M.P. upto Tapti River.

Ali collected specimens from Bhuj, Ajwa (Baroda dist.), Cambay, Deesa (Palanpur), Kharaghoda.

Ali also noted it from Khandla, Padhar, Chaduva, Nakhatrana, Bachau, Khadva, Kala dongar, Mata-no-madh Dholovira, Bela, Adesar (All in Kutch), Dabka, Vaghjipur, Patan, Harij, Radhanpur, Rajpipla, Waghai (Surat Dangs), Dwarka, Okha, Amreli, Dahri, Kodinar, Dalkhania.

Z.S.I. party noted this bird as fairly common in Sasan Gir Forest and compound of F.R.H. of Gir National Park, Amreli dist., Gujarat, Nov. ' 1993.

390. Blueheaded Rock Thrush : *Monticola cinclorhynchus* (Vigors).

(*Petrocincla cinclorhyncha* Vigors, 1832, Proc. Zool. Soc. London : 172 (Himalayan Mountains = Simla); Baker, FBI No. 606, Vol. 2 : 171; Ali & Ripley, HB No. 1723, Vol. 9 : 67).

Local names : Hindi None recorded.

Size. Bulbul +; length c. (8 in.).

A blue, black and chestnut through white wing patch. Crown, nape throat, shoulder blue, rump rufous. Underparts orange-rufous (Male-summer). Black feathers of back edged fulvous (Winter).

Female, above, olive-brown, below, squamated white and brown.

Commonly breeds in whole of the Himalayas from Kashmir east to NE India.

Winters more or less in disjunct fashion in the Western Ghats from Surat Dangs (Gujarat - Tapi River), south to Western Tamil Nadu. Occasional winter records in M.P. (JBNHS 38 : 97, 53 : 608); U.P. (S.F. 10 : 37), Mt. Abu (S.F. 3 ; 470).

Extralimital : Pakistan, Afghanistan and Burma.

Ali collected specimens from Malegaon and Pandwa (Both in Surat Dangs).

Ali not noted it elsewhere in Gujarat, but remarked that it may occur in suitable biotope in the Rajpipla area.

391. Indian Blue Rock Thrush : *Monticola solitarius pandoo* (Sykes).

(*Petrocincla pandoo* Sykes, 1832, Proc. Zool. Soc. London : 87 (Ghats, Dukhun); Baker, FBI No. 608 and 609, Vol. 2 : 175; Ali & Ripley, HB No. 1726, Vol. 9 : 73).

Size. As earlier race.

Plumage, Male, above, azure blue, wings and tail brown, breast brown and white belly (summer), feathers tinged fulvous above (Winter).

Female, above, grey brown, barred blackish on rump. Below whitish, cross-banded brown.

Summer (breeding) visitor to the entire Himalayas, winters from the foothills of the Himalayas down to the plains in the entire India including Andamans and Car Nicobar in suitable biotope.

Extralimital : Pakistan, Nepal (Mt. Everest), Bhutan, Tibet, Bhutan, Bangladesh, Sri Lanka, and also Turkestan, Burma.

*Monticola solitarius* (Linnaeus) is represented by two sub-species. The other one is *M.s. longirostris* (Blyth). The sub-specific difference is based on richness of colour of upperparts (*Paler contra darker*), which may vary in individual specimens collected in summer/winter or in dry-country of NW or moist evergreen southern India. *Longirostris* may also extend its winter range and may be available in NW. Gujarat. The specimens collected from Gujarat needs critical examination, actually to which race individual specimen belongs.

Ali collected specimens from Bodeli and Dabka (Baroda dist.), Balaram (Palanpur), Juna Rajpipla, Mheskatri (Surat Dangs), Dhari (Amreli).

Ali also noted in Rapar, Mata-no-madh, Bhuj & environment, Adesar (All in Kutch), Champaner (Panchmahals), Deesa (Palanpur), Waghai (Surat Dangs).

Z.S.I. party noted this bird by the side of Hiron River shaded by dense bush, in Sasan Gir, Amreli dist., Gujarat, Nov. ' 1993.

392. Malabar Whistling Thrush :  
*Myiophoneus horsfieldii* (Vigors).

(*Myiophonus horsfieldii* Vigors, 1831, Proc. Zool. Soc. London : 35 (Malabar); Baker, FBI No. 613, Vol. 2 : 178; Ali & Ripley, HB No. 1728, Vol. 9 : 77).

*Local names* : Hindi - Bhangraj

Gujarati Kasturo, Indraraj.

Size. Myna; length c. (10 in.).

A blue and black thrush. Crown, neck, throat, upper breast dull black. Rest including wings and tail blue except diagnostic cobalt blue forehead and shoulder patch. Sexes alike.

Resident. Common but unnoticed due to its silent nature and preference of deep forest with large foliage trees. It ranges in our Indian limit from Western Gujarat, Surat Dangs, the Satpura Range east to Chhota Nagpur and extreme NW Orissa (Bonai, Sundergadh dist.). The Western Ghats Complex from Khandesh south to Merala and Shevaroy Hills (Tamil Nadu).

Ali collected specimens from Pandwa (Surat Dangs) and also noted it from Waghai (Surat Dangs).

393. Whitethroated Ground Thrush :  
*Zoothera citrina cyanotus* (Jardine & Selby).

(*Turdus cyanotus* Jardine & Selby, 1828, Ill. Orn. I, pl. 46 (India, Bangalore); Baker, FBI No. 588, Vol. 2 : 150; Ali & Ripley, HB No. 1734, Vol. 9 : 89).

*Local names* : Gujarati - Malagir Kasturo.

Size. As in earlier race.

Plumage, Male, above, bluish grey, underparts orange chestnut, vent and undertail, coverts white. Throat, ear-coverts and shoulder bar white, and black and white diagnostic head pattern. Female similar, but mantle tinged with olive-brown.

Resident, with some local migration depending upon coolness from foothills to the plains. More or less common but unnoticed like other thrushes due to its silent and shy nature and preference of dark and shady forest nearby perennial water sources. It distributed in our Indian limit within Peninsula from SE Gujarat

(Navsari & Dangs dist.), M.P. (Satpura Range, Probably not in Vindhya Range), Bihar, Orissa (Mahendragiri), south through Maharashtra, A.P. and extreme to Kerala.

Ali collected specimens from Medha (Navsari dist.).

394. Blackcapped Blackbird : *Turdus merula nigropileus* (Lafresnaye).

(*Merula nigropileus* Lafresnaye, 1840, Rev. Zool. : 65 (Kalhatti, Northern Nilgiri Plateau); Baker, FBI No. 569, Vol. 2 : 128; Ali & Ripley, HB No. 1753, Vol. 9 : 117).

*Local names* : Hindi - Kasturi

Size. As in earlier race.

Plumage, male, dark greyish brown with a black cap; orange-yellow bill, eye-rim and legs, Female more ashy and cap indistinct.

#### Family PARIDAE

Resident or partial migrant, prefers to take ashylum in elevation rather than plains in moist-deciduous evergreen forest/ sholas and wooded revines. It is found in our Indian locality in Southern Rajasthan (Mt Abu), Eastern Gujarat (Panchmahal dist.), east in the Western Vindhya Range and along the Satpuras upto Karnataka (Belgaum). More frequent in winter in Satpuras and Western Ghat Complex and arid plains (Gir-forest DKS.).

Ali collected specimens from Pavagadh (Panchmahals dist.), Cambay, Juna Rajpipla, Medha (Navsari dist.) , Mahal and Malegaon (Surat Dangs).

Not met with in Saurashtra region and absent in Kutch.

This race mainly winters in Gujarat, but Butler (SF, iii : 470) notes its breeding at Mt. Abu and also presumably breeds in the hilly area of Pavagadh and Salher Ali

#### Key to the Subfamilies of the family PARIDAE

Tail longer than wing and graduated  
.....*Aegithalinae*

Tail shorter than wing and not graduated  
.....*Parinae*

Key to the genera of the family PARIDAE

1. Tail longer than wing, much graduated  
.....*Aegithalos*  
Tail shorter than wing .....2
2. Slightly forked tail .....*Sylviparus*  
Slightly rounded tail .....*Parus*

395. Indian Grey Tit : *Parus major stupae*  
Koelz.

(*Parus major stupae* Koelz, 1939, Proc. Biol. Soc. Washinton 52 : 61 (Sanchi, Bhopal); Baker, FBI No. 55 (part), Vol. 1 : 77; Ali & Ripley, HB No. 1794, Vol. 9 : 169).

*Local names* : Gujarati Ramachakli.

*Size*. Sparrow : Length c. (5 in.).

Plumage, above, Crown black, cheeks white, back grey, tail blackish; outer rectries white, a white wing-bar. Below, throat black continued upto breast. Sexes alike.

Resident., Common but patchily found in light forested area, edge of the forest, bushy country, garden and cultivation during winter. It is distributed within our Indian limit and ranges in Peninsula from Rajasthan (Jodhpur, Sambar), Gujarat (including Kathiawar Peninsula), east through M.P., Orissa and south through Maharashtra, Karnataka, A.P. and Tamil Nadu.

Ali collected specimens from Ghatwad, Dalkhania, Jamughoda, Gangasagar (Palanpur) Dediapada (Rajpipla), Malegaon, Pandwa, Laocahli (Surat Dangs).

Ali also noted it from Hathidhara (Palanpur), Juna Rajpipla, Songadh, Medha (Navsari dist.), Waghai, Galkund (Surat Dangs).

Absent in Kutch Ali

Z.S.I. party noted this bird in the Compound of F.R.H. Gir National Park, Sasan Gir, Amreli dist., Gujarat, Nov.' 1993.

396. Whitewinged Black Tit : *Parus nuchalis*  
Jerdon.

(*Parus nuchalis* Jerdon, 1844, Madras Jour. Lit. Sci. 13 : 131 (Eastern Ghats); Baker, FBI No. 58, Vol. 1 : 79; Ali & Ripley, HB No. 1798, Vol. 9 : 172).

*Local name* : Gujarati - Kabari ramachakli

*Size*. As in earlier race.

A black and white tit. Above glossy blue black with white on nape, wings and outer rectries. Below, black on chin to vent. Sexes alike.

Resident. Sparsely distributed in thin forest intersepted by small bush in semi-desert country. Indisguishable in the field from *P. major* with whom it mutually share the distributional range. It is restricted and quiriously have disjunct distribution in our Indian limit, (A) in NW India in Gujarat (Kutch, Deesa, Palanpur, Mehsana), Central and South Central Rajasthan, (B) thence to Southern India, but very rare and recorded only once from each localities : Eastern Ghats west of Nellore, Bangalore, and Satyamangla (Biligirirangan Hills).

Ali collected specimens from Bhuj environs, Chaduva, Bhuj, Mata-no-madh (All in Kutch); Deesa, Gangasagar and Balaram (Palanpur).

R.M. Simmons recorded it on Taranga Hills (Mehsana dist.).

Ali also noted its breeding in Chaduva (Bhuj dist.) on August 20, and 21.

397. Central Indian Yellowcheeked Tit :  
*Parus xanthogenys aplonotus* Blyth.

(*P. (arus) aplonotus* Blyth, 1847, Jour. Asiat. Soc. Bengal 16 : 444 (Chaibasa, Singhbhum, Bihar); Baker, FBI No. 76 (Part), Vol. 1 : 92; Ali & Ripley, HB No. 1810, Vol. 9 : 188).

*Size*. A bit larger than earlier race.

A black and yellow crested tit. Above, crown, crest and eye band black. Yellow supercillium and nape patch. Back olive-green, Wings black spotted with white. Below, bright yellow with a broad black median band. Male; female similar but median band greyish olive.

Resident. Widespread and fairly common than other tits, always prefers elevation in the hills than plains and coastal country, in well wooded biotope. It ranges in Peninsula from Eastern Gujarat, Southern Rajasthan, M.P., Southern Bihar, Orissa, south in the Eastern Ghats to the Krishna River and in the Western Ghats to Mahabaleshwar.

Ali collected specimens from Bodeli (Baroda dist.), Hathidhara (Palanpur), Juna Rajpipla, Dediapada (Rajpipla), Malegaon and Pandwa (Surat Dangs).

398. Velvetfronted Nuthatch : *Sitta f. frontalis* Swainson.

(*Sitta frontalis* Swainson, 1820, Zool. 111 (1), pl. 2 (Ceylon = Sri Lanka); Baker, FBI No. 119, Vol. 1 : 132; Ali & Ripley, HB No. 1838, Vol. 9 : 224).

*Local name* : Gujarati-Makhmali zad-chad.

*Size. Sparrow* : Length c. (4 in.).

A small purplish blue bird with velvety black forehead, red bill, orange-yellow orbital skin and yellow eye, black supercillium, chin and throat white Male; Female similar but lacks black supercillium.

Resident. Patchily distributed but locally abundant where it occurs in suitable habitat like well wooded forest and hilly forest with tall trees where in it parch like pigmy wood packer. This race is distributed in our Indian limit from DehraDun (U.P. c. 30°N., 78°E), to Navsari (Gujarat - c. 21°N, 73°E), eastward along the Himalayas entire to NE Indian upto Arunachal Pradesh, thence to Bengal south to entire Peninsula upto Tamil Nadu.

*Extralimital* : Burma, Indochinese countries, Hainan, Southern Sumatra and Java, and Sri Lanka.

Ali collected specimens from Medha (Navsari dist.), Galkund and Poona (Surat Dangs).

Ali did not note it elsewhere in Gujarat.

Z.S.I. party not met with bird elsewhere in Gujarat.

399. Indian Spotted Grey Creeper : *Salpornis s. spilonotus* (Franklin).

(*Certhia spilonota* Franklin, 1831, Proc. Zool. Soc. London : 125 (Vindhyan Hills); Baker, FBI No. 456 (part), Vol. 1 : 439; Ali & Ripley, HB No. 1841, Vol. 9 : 229).

*Local names* : None recorded.

*Size. Sparrow* : Length c. (4-5 in.).

An entirely dark brown spotted with white, bird with long, slender decurved bill and white supercillium. Below, throat white, rest fulvous spotted and barred with dark brown. Sexes alike.

Resident, but on the whole scarce and patchily distributed in deciduous forest with tall trees (Teak etc.). It ranges within India in the Central Peninsula from Gurgaon, Gonds (U.P.), Bihar terai (Hume) east to Manbhum (Bihar), south through Eastern M.P. (Baster dist.) roughly to the Godavari River (Sironcha, Ahmednagar) and west to Khandesh, Rajpipla and Deesa (Gujarat).

Ali collected specimens from Deesa (Palanpur), Dediapada (Rajpipla).

Ali did not find it elsewhere in Gujarat.

400. Indian Tree Pipit : *Anthus h. hodgsoni* Richmond.

(*Anthus trivialis hodgsoni* Richmond, 1907, in Blackwelder, Ras. in China, (2) : 493 (Calcutta); Baker, FBI No. 1186, 1187, Vol. 3 : 281; Ali & Ripley, HB No. 1852, Vol. 9 : 243).

*Local names* : Hindi- Musarichi.

Gujarati Dhan Chidi.

*Size. As in the next race.*

Similar to the next race but upperparts greenish (v. browner) and the streaks on the underparts bolder.

Summer (breeding) visitor to the entire Himalayas and winters to the foothills down to the entire Indian Peninsula, east to Assam. and NE India, West to Kangra and Mt. Abu (Rajasthan).

*Extralimital* : Nepal, Burma, Bangladesh. Also ranges north and east to Kansu, Korea and

Japan south to the Philippines and the Indo-Chinese countries.

Ali collected one specimens from Mahal (Surat Dangs).

Capt. Butler (S.F., iii : 490) obtained specimens in the Deesa neighbourhood and noted it common in N. Gujarat.

401. European Tree Pipit : *Anthus t. trivialis* (Linnaeus).

(*Alauda trivialis* Linnaeus, 1758, Syst. nat., ed. 10, 1 : 166 (Sweden); Baker, FBI No. 1184, Vol. 3 : 279; Ali & Ripley, HB No. 1854; Vol. 9 : 246).

Local name : Hindi- Musarichi

Gujarati - Dhan Chidi

Size. Sparrow +; Length c. (6 in.).

Plumage, above, brown, streaked with darker brown, white supercillium, double wingbar and outer rectries. Below, buff whitish, finely streaked with dark brown. It is indistinguishable in the field from Indian Tree Pipit (*Anthus h. hodgsoni*), the latter have more greenish tinge on plumage.

Winter visitor. Commonly found with other pipits and wagtails in open country, cultivation and wetty land near marshes/ jheels etc. In winters in our Indian limit from the Himalayan foothills down to the entire Peninsula east to Brahmaputra River and south to Nilgiri Hills.

Extralimital : A Palearctic breeding sp. in wintering Europe, S.W. Asia to tropical Africa.

Ali collected specimens from Ajwa and Dabka (Baroda dist.), Cambay, Golana (Cambay), Vaghjipur (Mehsana dist.), Songadh (Navsari dist.), Pandwa, Sarwar, Chikhli (Surat Dangs), Dhari (Amreli dist.), Dalkhania (Amreli dist.).

Rare in Kutch.

Z.S.I. party noted it fairly common in the Nalsarobar environs, Gandhinagar dist., Oct.' 1993.

Ali further commented that specimens collected from Ajwa (Baroda dist.), Golana (Cambay) and Songadh (Navsari dist.), are included to allied race *haringtoni* on the basis

of greater breadth of bill of the base. Ali also noted, "I am inclined to agree with Col. Meinertzhagen, however, that *Haringtoni* is not a good race, the breadth and depth of bill at base being a most variable characters".

*Anthus novaeseelandiae* Gmelin

Paler, less heavily streaked and smaller; wing usually under 88 mm., tarsus usually under 28 mm.

1. Paler and less heavily streaked ..... *A.n. waitei*
2. Intermediate ..... *A.n. rufulus*

402. Northwestern Paddyfield Pipit : *Anthus novaeseelandiae waitei* Whistler.

(*Anthus rufulus waitei* Whistler, 1936, J. Bombay nat. Hist. Soc. 38 : 766 (Jhelum, Punjab); Baker, FBI No. 1195 (Part), Vol. 3 : 290; Ali & Ripley, HB No. 1858, Vol. 9 : 252).

Local names : Hindi- Rugail, charchari

Gujarati - Dhan Chidi

Size. As in earlier race.

Plumage, above, pale greyish brown, less heavily streaked both above and below. Tail dark brown and short tursus. Sexes alike.

Resident. fairly common, subject to local movement; mostly a summer visitor to the Himalayan foothills and NW India, east to U.P., south through Haryana. Rajasthan, Gujarat, M.P. upto Narbada River from 1800 mt. alt. to the plains in abandoned field and semi-cultivation.

extralimital : Pakistan, Kandahar (Afghanistan).

403. Indian Paddyfield Pipit : *Anthus novaeseelandiae rufulus* Vieillot.

(*Anthus rufulus* Vieillot, 1818, Nouv. Diet. d'Hist. Nat. 26 : 494 (Bengal); Baker, FBI No. 1195 (Part), Vol. 3 : 290; Ali & Ripley, HB No. 1859, Vol. 9 : 253).

Plumage, similar to earlier race but overall paler than earlier race.

Resident. It ranges in India east and south range of *Waitei* (excepting Kerala), Jalpaiguri duars and Assam. On Autumn passage through Sikkim.

Extralimital : Nepal Bhutan, Burma, Thailand, Northern Viet Nam and Southern China.

Ali collected specimens from Ratnal, Rapar, Bhuj, Mandvi (All in Kutch); Ajwa and Bodeli (Baroda dist.), Golana (Cambay), Patan (Mehsana dist.).

Ali further noted that the Kutch specimens approximate to the pale race *Waitei* of Sind and NW India.

404. Tawny Pipit : *Anthus c. Campestris*  
(Linnaeus).

(*Alauda campestris* Linnaeus, 1758, Syst. Nat. ed. 10, 166 (Europe = Sweden); Baker, FBI No. 1197 (part), 1198, Vol. 3 : 292, 293; Ali & Ripley, HB No. 1861, Vol. 9 : 256).

*Local name* : Hindi - Chillu,

Gujarati As in earlier race.

*Size*. As in earlier race.

Plumage, above, pale brown, lightly streaked. Outer rectrices white, whitish buff underparts, sometimes with dark streaks on breast. Sexes alike.

Winter visitor. It winters within India in the greater part of the Peninsula east to the Brahmaputra River and south to Londa (Koelz, JBNHS 43 : 22) and Kolar (Karnataka Ali JBNHS 43 : 587); in the north to base of the hill in Kangra, Simla and Dehra Dun.

Extralimital : A Palearctic breeding sp., wintering in tropical Africa and South-west Asia.

Ali collected specimens from Nakhatrana, Bhuj, Bhachau, Rapar (All in Kutch); Bodeli and Dabka (Baroda dist.), Nadiad (Kaira dist.), Vaghipur and Patan (Mehsana dist.), Radhanpur, Deesa (Palanpur), Kharaghoda, Dwarka, Amreli, Dalkhanja (Amreli Dist.).

Z.S.I. party not met with this bird elsewhere in Gujarat.

405. Blyth's Pipit : *Anthus godlewskii*  
(Taczanowski).

(*Agrodroma godlewskii* Taczanowski, 1876, Bull. Soc. Zool. France : 158 (Argun River, south Dauria);

Baker, FBI No. 1194, Vol. 3 : 289; Ali & Ripley, HB No. 1863; Vol. 9 : 259).

*Local name* : Hindi - Chilū

*Size*. Sparrow : Length c. (6 in.).

Plumage, similar to paddyfield pipit, but above tawny brown clearly streaked on head and mantle, below pale buff, the upper breast streaked with dark brown.

Winter visitor. It ranges in India in Assam, most of the Peninsula west to Fatehgarh (near Agra) and Udaipur (Rajasthan) and south to Nellore (Karnataka), and Kerala. Also in Andaman Islands.

Extralimital : Transbaikalia, W. China, Burma, Sri Lanka, Bangladesh, SE Tibet, Bhutan, Nepal, Yunnan.

Ali collected single specimen from Dwarka.

Ali also noted several scattered individuals on the grassy margin of a tank at Mithapur.

Ali further noted that the identity of this specimen is not undoubted. It seems rather small for *godlewskii* and may only be *rufulus*.

406. Redthroated pipit : *Anthus cervinus*  
(Pallas).

(*Motacilla cervinus* Pallas, 1811, Zoogr. Rosso-Asiat. 2; 511 (Siberia); Baker, FBI No. 1199, Vol. 3 : 294; Ali & Ripley, HB No. 1864, Vol. 9; 260).

*Local name* : Hindi Lal gala chillu

*Size*. same as earlier race.

Plumage, above, similar to Indian Pipit, with buffish supercillium. Below, creamy buff, streaked dark brown, throat pinkish clay colour. Sexes alike.

This race confusingly similar to *A. trivialis* and *A. hōdgsoni* specially in autumn plumage.

Very scarce passage migrant to our Indian

limit. Recorded from Baroda, (Gujarat) (18 Nov. - Ali, JBNHS 51 : 777), Manipur (April-Hume, S.F. ii : 237), Maldive Islands, Andaman and Nicobar Islands (Hume & Davison, Osmaston).

Extralimital : A Palaearctic breeding sp., wintering S. and W. Asia and Africa.

Ali collected one unsexed specimens from Dabka (Baroda dist.), Gujarat.

407. Vinaceousbreasted pipit : *Anthus roseatus* Blyth.

(*Anthus roseatus* Blyth, 1847, Jour. Asiat. Soc. Bengal 16 : 437 (Nepal); Baker, FBI No. 1200, Vol. 3 : 295; Ali & Ripley, HB No. 1865, Vol. 9 : 261).

Size. As in earlier race.

Plumage, above, grey, streaked dark brown, buff supercillium, brown wings edges greenish, two pale wing-bars. Tail brown. Throat and breast vinaceous buff, belly buff. Sexes alike (Summer).

Olive brown above, supercillium tinged with yellow, pinkish buff breast heavily streaked. (Autumn).

Summer (breeding) visitor. in the entire Himalayas above the timber line upto 4200 mt., from Ladakh (deosai Plain) east through Arunachal Pradesh. Winter records from India : Haryana (south to Sirsa), Gwalior (M.P.), Central Bihar, Kathiawar (Bhavnagar, 21°46'N., 72°14' E - DKS., JBNHS 50 : 175), Bengal, Nagaland and Manipur.

Extralimital : Pakistan, Bangladesh, Nepal, SE Tibet, Burma, China, Korea, Afghanistan and Siberia.

Ali did not collect any specimen, but however, he examined two specimens collected by (DKS), at Gaurisanker Lake in Bhavnagar. This marks the most southerly point of extension of ranges of this race in India.

*Anthus similis* Jerdon

\*Key to the subspecies

A. Palest and greyest, marking on breast fainter ..... *A.s. decaptus*

B. Darker, marking on breast distinct ..... *A.s. jerdoni*  
(Two sub-species excluded - Not concerned).

408. Persian Rock Pipit : *Antire similis decaptus* Meinertzhagen.

(*Anthus sorididus decaptus* Meinertzhagen, 1920, Bull Brit. Orn. Cl. 41 : 23 (Rud-i-Taman, East Persia); Baker, FBI No. 1192, Vol. 3 : 287; Ali & Ripley, HB No. 1866, Vol. 9 : 263).

Size. Bulbul; length c. (8 in.).

Large brown, long tailed pipit, buff supercillium, throat whitish, breast and abdomen pinkish buff with faint brown streak or breast. Sexes alike.

Winter visitor. sparsely recorded in Gujarat, Khandesh, Western M.P., Rajasthan and Haryana of Our Indian limit. Affects grassland, scrub jungle of semi-arid country.

Extralimital : Pakistan, Iran, Lebanon, southern Arabia and Africa south of Sahara.

Ali not listed this bird in 'Birds of Gujarat'

409. Brown Rock Pipit : *Anthus similis* Jerdoni Finsch.

(*Anthus jerdoni* Finsch, 1870, Trans. Zool. Soc. London 7 (4) : 241 (Kotegurh, NW Himalaya); Baker, FBI No. 1191, Vol. 3 : 286; Ali & Ripley, HB No. 1867, Vol. 9 : 265).

Size. As in earlier race.

Similar to earlier race but palest and greyest, marking on breast fainter. Sexes alike.

Common summer (breeding) visitor and partly resident, subject vertical movements. It ranges in our Indian limit from the foothills of Western Himalayas east to Almora, Winters mostly below c. 900 m., south to Gujarat and M.P., east to Bihar, northern Bengal and Sikkim foothills.

Extralimital : A disjunct population occurs in dry central Burma.

Ali listed this bird as *Anthus sprididus jerdoni* (Finsch), and collected specimens from Bhachau, Mandvi, Dholovira (Khadir Is.) - All

in Kutch. Ajwa (Baroda dist.), Baroda City environs, Dwarka.

Ali also noted that earlier race *decaptus* also occurs in India, but no so definitas as to whether the earlier race also occur in Gujarat.

410. Forest Wagtail : *Motacilla indica*  
Gmelin.

(*Motacilla indica* Gmelin, 1789, Syst. nat. 1 : 962 (Malabar); Baker, FBI No. 1183, Vol. 3 : 276; Ali & Ripley, HB No. 1874, Vol. 9 : 273).

Size. Sparrow; length c. (7 in.).

Plumage, above, olive brown, pale supercillium and eyering, two yellowish wing patches on coverts. Tail dark brown, outer rectrices white. Below white washed with yellow, a brown collar. Sexes alike.

Winter visitor, thinly and locally found along the marshes and other water sources, grassland and cultivated field. It winters in our Indian limit from Mahableswar, Goa, Western Karnataka Kerala, Western Tamil Nadu, east to North Bengal, Khasi & Cachar Hills, Tripura, Nagaland, Manipur and Andaman Island.

It not winters in Gujarat, but recorded on the migration route in

Kutch (Gujarat, Straggler, Dec. Jan. JBNHS 65 ; 235).

Extralimital ; Siberia, N. China, Burma, Indochinese and Malaysian Subregions.

Ali collected specimens from Waghai and Pimpri (Surat Dangs).

Ali did not observed it elsewhere in Gujarat, but noted that it possibly occurs in Gir Forest.

*Motacilla flava* Linnaeus

Key to the subspecies.

- D. Head black .....*M.f. melanogrisea*
- E. Head grey
  - 1. Supercillium vestigial or lacking .....*M.f. thunbergi*
  - 2. Supercillium complete.
    - a. Ear-coverts pale grey mixed with white; a white malar streak .....*M.f. beema*

411. Greyheaded yellow Wagtail : *Motacilla flava thunbergi* Billberg.

(*Motacilla thunbergi* Billberg, 1828, Synops. Faun. Scand 1 (2) : 50 (Lapland); Baker, FBI No. 1176, Vol. 3 : 269; Ali & Ripley, HB No. 1875, Vol. 9 : 276).

Local names : Hindi- Pilkya.

Gujarati Motano Pilamyo.

Size. Sparrow; length c. (7 in - with lontail).

Plumage, above, olive, head, nape slaty grey, wings brown with two faint yellow bars, tail brown edged white. Underparts yellow. Sexes alike.

Winter visitor. Fairly common and widely spread in and arround marshy land, cultivated field and near large jheels and winters throughout the Indian Union including islands.

Extralimital : A Palaearctic breeding sp., Wintering in S. Asia and Africa.

Ali collected specimens from Bhuj environs, Ajwa and Bodeli (Baroda dist.), Vaghjipur (Mehsana dist.).

412. Blackheaded Yellow Wagtail : *Motacilla flava beema* (Sykes)

(*Budytes Beema* Sykes, 1832, Proc. Zool. Soc. London : 90 (Dukhun); Baker, FBI No. 1175, Vol. 3 : 267; Ali & Ripley, HB No. 1876, Vol. 9 : 278).

Local names : As in earlier race

Size. As in earlier race.

Plumage, similar to earlier race but head pale bluish grey with a prominent white supercillium and malar streak.

Winter visitor. Fairly common in India from the plains of the Ganges south to A.P., Kerala, east to Assam, also Nicobar and Maldive Is.

Extralimital : As in earlier race.

No specimens collected by Ali however, he examined two specimens in summer plumage collected by (DKS) at Gourisanker Lake, Bhavnagar on 3-4-1951.

413. Turkestan Blackheaded Wagtail :  
*Motacilla flava melanogrissa* (Homeyer).

(*Budytes melanogriseus* Homeyer, 1878, Jour. f. Orn. 26 : 128 (India); Baker, FBI No. 1180, Vol. 3 : 272; Ali & Ripley, HB No. 1878, Vol. 9 : 280).

Size. As in earlier race.

Similar to earlier race but head black, no supercillium.

Winter visitor. It ranges in India from the foothills east to Veranasi, and south to Kerala (JBNHS 60 : 412) and Northern A.P. (JBNHS 36 : 909).

Extralimital : Pakistan, Sri Lanka (Vagrant). Breeds in Russian Turkestan.

Migration : Earliest data from Kutch (Gujarat 30 August, 1875).

Ali collected specimens from Jakhau and Dholovira (Khadir Is.)- Both in Kutch.

*Motacilla citreola* Pallas

Key to the subspecies.

- A. Back grey
  - a. Darker; a black hind collar between yellow head and upper back .....*M.c. citreola*
  - b. Paler; black hind collar usually absent .....*M.c. werae*
- B. Back black or mixed with black ..... *M.c. calcarata*

414. Northern Yellowheaded wagtail :  
*Motacilla c. citreola* Pallas.

(*Motacilla citreola* Pallas, 1776, Reise Russ. Reichsz : 696 (Siberia); Baker, FBI no. 1181 (part), Vol. 3 : 273; Ali & Ripley, HB No. 1881, Vol. 9 : 282).

Local names : Hindi Pilkya, Pani-ka-pilkya.

Size. Sparrow, length c. (7 in. - with long tail).

Plumage similar to *M.c. calcarata*, but back grey instead of black; plumage phase variable and confusing and subspecific identification

especially in winter often unreliable (Ali & Ripley).

Winter Visitor. It ranges in India from the Himalayan foothills east to Assam, south to Northern Karnataka and Tamil Nadu (JBNHS 60 : 412).

Extralimital : A Palaearctic breeding sp., wintering in Asia.

Ali collected specimens from Bhuj environs, Ajwa (Baroda dist.), Patan (Mehsana dist.), Kharaghoda.

415. Western Yellowheaded Wagtail :  
*Motacilla citreola werae* (Buturlin).

(*Budytes citreola werae* Buturlin, 1907, Orn. Monatsb. 15 : 197 (Sura Valley, Simbirsk, se Russia); Baker, FBI No. 1181 (part), Vol. 3 : 273; Ali & Ripley, HB No. 1882, Vol. 9 : 283).

local names : As in earlier race.

Size. As in earlier race.

Plumage, similar to next race, but always grey-backed rarely with black hind-collar.

Winter visitor. It ranges in Indian from the Himalayan foothills south at least to N. Karnataka (London Koelz), and Hyderabad Ali and east to Assam.

Extralimital : As in earlier race.

Ali collected specimens from Bodeli (Baroda dist.), Banduchi (Cambay), Vaghipur (Mehsana dist.), Kharaghoda.

Ali noted that the two races, i.e., the present and earlier race often together, on marshy margins of tanks, inundated field.

416. Blackbacked Yellowhead Wagtail :  
*Motacilla citreola calcarata* Hodgson.

(*Motacilla (Budytes) calcardata* Hodgson, 1836, Asiat. Res. 19 : 190 (Nepal); Baker, FBI No. 1182, Vol. 3 : 274; Ali & Ripley, HB No. 1883, Vol. 9 : 284).

Local names : Hindi - As in earlier race.

Size. As in earlier race.

Plumage. above, Male, black, head lemon yellow, wings and tail brown, former edged white, underparts lemon yellow; Female

similar to male or variable colouration of grey/yellow on head and upperparts.

Summer (breeding) visitor to Ladakh, Kashmir, Lahul, Spiti in our Indian limit. Winters to Northern India, south to Kutch, M.P., Bengal through Assam. Affects grassy margin of lakes, water meadow etc.

Extralimital : As in earlier race.

Ali not listed this bird in 'Birds of Gujarat'

417. Grey Wagtail : *Motacilla c. caspica*  
(Gmelin).

(*Parus caspicus* Gmelin, 1774, Reise d. Russ. 3, pl. 20, Fig. 2 : 104 (Southern Shore of Caspian sea); Baker, FBI No. 1174, Vol. 3 : 265; Ali & Ripley, HB No. 1884, Vol. 9 : 285).

Local name : Hindi - As in earlier race.

Size. As in earlier race.

Plumage, Male, above, grey, white supercillium, wings and tail dark brown, both edges white, uppertail coverts and underparts yellow. Throat black with a white malar streak. (Summer); Male in winter and buffish throat.

Summer (breeding) visitor to the entire Himalayas from 1200 mt. Upto 3900 mt. alt. Winters in the entire Indian Union including Islands.

Extralimital : A Palaearctic sp., wintering Africa, Middle East, S. Asia, S. China, Philippines, Celebes, New Guinea.

Ali collected specimens from Anjar (Kutch) and Sarwar (Surat Dangs).

Z.S.I. party noted this bird fairly common in the environs of Nalsarobar, Gandhinagar dist., in October, 1993.

418. Indian White Wagtail : *Motacilla alba dukhunensis*. Sykes.

(*Motacilla dukhunensis* Sykes, 1832, Proc. Zool. Soc. London : 91 (Dukhun); Baker, FBI No. 1156, Vol. 3 : 257; Ali & Ripley, HB No. 1885, Vol. 9 : 288).

Local names : Hindi- Dhoban

Gujarati Khatriani.

Size. Bulbul ; length c. (7 in.).

Plumage, Male Winter, above, ashy,

forehead, round the eyes and sides of the head and breast white. A black patch on hind crown. Wings and tail brown both edged white. A diagnostic crescent shaped black patch on breast.

Chin, throat and breast black in breeding plumage.

Winter visitor, more or less common from the Himalayan foothills south through the Peninsula upto Kerala (Rare), east to Assam, Nagaland and Manipur.

Extralimital : A Palaearctic sp., wintering in tropical Africa and Asia.

Migration record : Two birds banded in Kutch (Gujarat c. 22°N., 69°E.) on 16 and 17 March 1961 were recovered in the U.S.S.R., one at Kinov (c.58°N., 49°E) in June/July 1961, the other near Volgagarad (C. 49°N., 49°E) on 11. vii. 1961 at distance of c. 4200 and 3600 km. north west.

Ali collected specimens from Khadva, Bodeli (Baroda dist.), Patan (Mehsana dist.).

Z.S.I. party noted in fairly common in the marshy ground of Nalsarobar environs, Gandhi nagar dist. in October, 1993.

419. Large Pied Wagtail : *Motacilla maderaspatensis* Gmelin.

(*Motacilla maderaspatensis* Gmelin, 1789, Syst. Nat. 1 : 961 (Madras); Baker, FBI No. 1172, Vol. 3 : 263; Ali & Ripley, HB No. 1891, Vol. 9 : 296).

Local names : Hindi Mamula, Bhuin mamula

Size. As in earlier race.

A large black and white wagtail looks like Magpie Robin in the field but with diagnostic white supercillium and large white band on wing. Sexes alike. Summer and winter plumages alike.

Resident. Fairly common in similar biotope like other Wagtails. It ranges from the Himalayan foothills upto 1700 mt. alt., south to the entire Indian Peninsula from Kutch to Kanya Kumari.

Extralimital : Winter in Pakistan (Kohat,

Salt Range), Bangladesh and Sri Lanka (Whistler, 1944), Nepal.

Ali collected specimens from Bhuj environs, Anjar (Kutch), Bodeli (Baroda dist.), Vaghjipur (Mehsana dist.).

Z.S.I. party noted this bird in the Marshy land of Nalsarobar environs, Gandhinagar dist. in October, 1993.

420. Indian Thickbilled Flowerpecker :  
*Dicaeum a. agile* (Tickell).

(*Fringilla agilis* Tickell, 1833, Jour. Asiat. Soc. Bengal 2 : 578 (Borabhum and Dholbhum); Baker, FBI No. 1311 (part), Vol. 3 : 435; Ali & Ripley, HB No. 1892, 1894, Vol. 10 : 2).

*Local names* : Hindi - Phoolchuki  
Gujarati Phul sunghani.

Size. Sparrow : Length c. (3-4 in.).

Plumage, above, olive-grey, greener on rump. A narrow white terminal band on tail, greyish white underparts and boldly streaked brown on breast. Diagnostic short, finch like bill and orange-red eyes. Sexes alike.

Resident and also breeds in the entire Himalayas, from 1500 mt. to 2100 mt. withdrawing in the winter to the foothills and down to plains from the outer Himalayas east to Assam, Meghalaya, Nagaland, south through Gujarat (Gir Forest, JBNHS 66 : 378) to Kerala (Peermada, Maraiyur) and east through W. Bengal, Orissa, A.P., and Tamil Nadu (Upto Sheveroy Hills c. 11°N).

Extralimital : Pakistan, Bhutan, Nepal and Northern Burma.

Ali collected specimens from Patan (Mehsana dist.), Dediapada (Rajpipla), Laochali, Sarwar, (All in Surat Dangs).

Ali not recorded it from Saurashtra or Kutch region of Gujarat. Breeding was in progress in March.

Z.S.I. party noted this birds in the compound of F.R.H., Nalsarobar, Gandhinagar dist., Gujarat, Oct. 1993.

421. Tickell's Flowerpecker : *Dicaeum e. erythrorhynchos* (Latham).

(*Certhia erythrorhynchos* Latham, 1790, Index Orn. 1 : 299 (Bombay); Baker, FBI No. 1308, Vol. 3 : 432; Ali & Ripley, HB No. 1899, Vol. 10 : 10).

*local names* : Hindi - As in earlier race.

Size. As in earlier race.

Looks like female sunbird but smaller in size. A plain olive-brown bird with greyish white underparts, bill like earlier race but flesh coloured. Sexes alike.

Resident, thinly distributed in suitable biotope, but local distribution almost entirely dependant on the presence or absence of plant parasites. It ranges within India from the Himalayan foothills in the Dharmasala, Kangra (U.P.) east to Assam, south to W. Bengal, Bihar and through out the Peninsula east and west through a line from Jabalpur (M.P.) to Baroda (Gujarat).

Extralimital : Bhutan foothills, Nepal, Bangladesh, and extends to Burma South to Tenasserim.

Ali collected specimens from Dediapada (Rajpipla), Songadh (Navsari dist.), Pandwa, Mheskatri, Sarwar (All in Surat Dangs).

Ali also noted it from Pavagadh (Panchmahal dist.), not observed in Kutch.

Z.S.I. party not met with elsewhere in Gujarat.

Ali further noted that Nilgiri Flowerpecker. (*Dicaeum c. concolor* Jerdon) may possibly occur in the Surat Dangs Songadh Rajpipla area.

This bird with the earlier race is closely associated with *Loranthus* Plant parasites infesting mangro and other trees. Wherever, *Loranthus* was absent, so was this bird.

Breeding was in progress during March and April.

Family NECTARINIIDAE

Key to the genera of the family  
NECTARINIIDAE

1. Central rectrices elongated .....*Aethopyga*
- Central rectrices not elongated .....2

2. Plumage non-metallic in both sexes  
.....*Arachnothera*

Plumage metallic (Male), greenish below  
(female) .....*Netarinea*

422. Indian Purplerumped Sunbird :  
*Nectarinia zeylonica sola* (Vieillot).

(*Cinnyris sola* Vieillot, 1819, Nouv. Diet.  
d'Hist. Nat. 31 : 512 (pondichery); Baker, FBI  
No. 1289 (part), Vol. 3 : 406; Ali & Ripley, HB  
No. 1907, Vol. 10 : 22).

*Local name* : Hindi Shakar khora

*Size*. Sparrow : Length c. (4 in.).

Plumage, male, above, crown metallic  
green. Back deep chestnut. Rump metallic  
purple. Throat purple, sides of the head and a  
band across the throat chesnut, breast and belly  
lemon yellow.

Female, brown above, throat and flanks  
greyish white, breast and belly lemon yellow.

Resident. Common in Peninsular India,  
south of a line from Nasik (Maharashtra),  
Jabalpur (M.P.) ad Lohardaga (Bihar),  
Southern Bengal and from thence entire  
Peninsula upto Cape Comorin, from plains upto  
hills.

*Extralimital* : Bangladesh.

No authentic record so far from the Gujarat  
state.

But Ali made a single unconfirmed sight  
record from Pavagadh (Panchmahal dist.) on  
31.10.44, and further commented that the  
Species should be so rare in Gujarat.

Z.S.I. party noted this bird (?) (2-3 Nos.) in  
the Compound of F.R.H., Nalsarobar, Gandhi-  
nagar Dist. in October '1993.

#### *Nectarinia asiatica* (Latham)

\* Key to the subspecies.

A. Bill shorter, under 18 mm.  
.....*N.a. brevirostris*

B. Bill longer, Usually over 18 mm  
..... *N.a. asiatica*

\*(Excluded one subspecies not  
concerned).

423. Sind Purple Sunbird : *Nectarinia*  
*asiatica brevirostris* Blandford.

(*Nectarinia arachnechthra brevirostris*  
Blandford, 1873, Ibis : 86 (Persian)  
Baluchistan near Task); Baker, FBI No. 1280,  
Vol. 3 : 399; Ali & Ripley, HB No. 1916, Vol.  
10 : 33).

*Local names* : Hindi Phul Soongni

Gujarati Phul chakli.

*Size*. Sparrow : Length c. (4 in.).

Plumage, Male (breeding), above, metallic  
dark blue and purple, below, throat and breast  
metallic purple seperated from dark purple  
belly by a inconspicuous reddish brown band.  
Diagnostic pectoral tufts bright yellow and  
scarlet. Male (non- breeding or eclipse  
plumage), above, pale olive-brown, below  
yellow with a broad blue black and down  
middle of throat and breast. female Similar to  
Male (non- breeding) but uniform yellow  
underparts.

Male in breeding and non-breeding  
plumage may be seen at almost any season.

Partial migrant. This bird migrates in  
Western Gujarat (Kutch) and Western  
Rajasthan only in our Indian limit.

NW Gujarat is also the intergrading zone  
with the next race, i.e., *N. a. asiatica*

Further wintering recod as far south as  
Londa (Karnataka Koelz, JBNHS 43 : 22).

Affects gardens, cultivation, and orchard  
more preferably than in the forest without  
flowering and fruiting trees.

424. Indian Purple Sunbird : *Nectarinia a.*  
*asiatica* (Latham).

(*Certhia asiatica* Latham, 1790, Index Orn.  
1 : 288 (Indo = Gurgaon); Baker, FBI No. 1278,  
Vol. 3 : 396; Ali & Ripley, HB No. 1917, Vol.  
10 : 35).

*Local names* : Gujarati As in earlier race.

*Size*. As in earlier race.

Plumage, similar to earlier race, but the bill  
longer.

Resident. Most common among the sunbird  
distributed in India. Widespread in suitable

biotope. More commonly found in garden rather than forest. It practically distributed in whole of India excepting the range of earlier race.

Extralimital : Nepal, Bhutan, Bangladesh and Sri Lanka.

Ali collected specimens from Chaduva (Bhuj Dist.), Mandvi, Bhachau, (All in Kutch), Jambughoda, Dabka (Baroda dist.), Radhanpur, Deesa (Palanpur), Malegaon, Mahal, Mheskatri and Pimpri (Surat Dangs).

Z.S.I. party noted this bird fairly common in the compound of F.R.H. Nalsarobar, Gandhinagar dist. in October, 1993.

425. Vigor's Yellowbacked Sunbird :  
*Aethopyga siparaia vigorsii* (sykes)

(*Cinnyris vigorsii* Sykes, 1832, Proc. Zool. Soc. London : 98 (Ghauts, Dukhun); Baker, FBI No. 1265, Vol. 3 : 381; Ali & Ripley, HB No. 1929, Vol. 10 : 49).

Size. Sparrow: Length male, c. (6 in. including tail).

Plumage, male, above, crown metallic green. Sides of the neck and back dark crimson. Rump bright yellow. Tail metallic green, the two central rectrices elongated. Chin and throat scarlet with purple malar streaks. Breast streaked yellow. Belly yellowish olive.

Female entirely olive, more yellow on under parts.

Resident, thinly distributed but locally common in evergreen and moist deciduous forest. It is distributed within Indian limit in the Western Ghat Complex from Narbada River, south to North Kanara and also the Nilgiris (Dotacamund).

Ali collected specimens from Juna Rajpipla, Songadh (Navsari dist.), Waghai, Malegaon, Mheskatri, Pimpri (All in Surat Dangs).

Ali noted that the Juna Rajpipla specimens extends the range of this species northward to the Narbada River. It is common in Surat Dangs area of Gujarat.

426. Indian White-eye : *Zosterops p. palpebrosa* (Temminck).

*Sylvia palpebrosa* Temminck, 1824, Pl. Col. d'Ois, 49, Pl. 293, Fig. 3 (Bengal); (Baker, FBI No. 1274 (Part), 1248, 1249, 1250, Vol 3 ; 358- 61; Ali & Ripley, HB No. 1933, Vol. 10 : 57).

Local name : Hindi Baboona

Size. Sparrow : Length c. (4 in.).

Plumage, above, yellow-olive. Diagnostic white eye ring.

Throat and undertail coverts bright yellow, breast greyish white and belly whitish. Sexes alike.

Resident. Commonly found in thin bushy forest, edge of the forest, gardens, orchards etc. Practically distributed in the whole of India excluding Western Rajasthan and the ranges of allied races, viz., *Salimalii* (A.P., from Godavari River south in Tamil Nadu) and *nilgiriensis* (Southern Karnataka, Kerala), and Laccadive Islands.

Extralimital : Pakistan, Nepal, Bangladesh east through Northern Burma, SE Tibet, Szechuan, Yunan and the Indo-Chinese Peninsula (mees, 1957).

Ali collected specimens from Ajwa and Dabka (Baroda dist.), Vaghjipur (mehsana dist.), Deesa (Palanpur dist.), Dediapasa (Rajpipla), Mahal, Malegaon, Mheskatri, Pimpri, Waghai (Surat Dangs), Dalkhania (Amreli dist.).

Ali did not recorded it in Kutch.

Z.S.I. party noted it from the compound of F.R.H., Nalsarobar, Gandhinagar dist., in October, 1993.

Family PLOCEIDAE

Key to the subfamilies of the family  
PLOCEIDAE

1. 1st primary long, much exceeding the greater wing coverts..... *Passerinae*
- 1st primary minute, never exceeding the wing coverts .....2

2. Bill longer than the width at base  
.....*Ploceinae*  
Bill shorter than the width at base  
.....*Estrildinae*

## Key to the genera of the family Ploceidae

1. Bill short and stout, culmen slightly curved  
.....2  
Bill broad at base, stout, culmen not curved  
.....4
2. Both sexes exhibit a double half hour glass  
shaped rufous patch on the base of the  
primaries .....*Passer*
3. 1st primary minute, 3rd and 4th longes  
.....*Estrilda*  
1st primary minute, 2nd, 3rd, 4th, 5th  
longest .....*Ploceus*
4. Wing long, almost reaching and of tail  
.....*Petronia*  
Wing reaching almost in the middle part of  
tail .....*Lonchura*

427. Indian House Sparrow : *Passer domesticus indicus* Jardine & Selby.

(*Passer indicus* Jardine & Selby, 1835, I11. Orn. 3, pl. 118 (Bangladesh);  
Baker, FBI No. 1096, 1097 (Part), Vol. 3 : 170, 172; Ali & Ripley, HB No. 1938, Vol. 10 : 63).

*Local names* : Hindi - Gouriya, Khar Churi.

Gujarati Chakli

Size. Universally known.

Most common, needs no introduction so far plumage is concerned.

Resident. Most common and widespred. An unfaling commensial to men. It is well placed throughout the India except the range of allied race *parkini* (Kashmir east to Sikkim). Introduced in the Andaman Is. (Port Blair).

Extralimital : Pakistan, Bangladesh, Sri Lanka, also ranges from Arabia to Burma, introduced in South Africa, Zanzibar, Comoro and Mascarene Is.

Ali collected specimens from Chaduva

(Bhuj dist.), Dabka (Baroda dist.), Nadiad town environs (Kaira dist.).

*Petronia xanthocollis* (Burton)

Key to the subspecies.

Darker; more grey-brown *P.x. xanthocollis*.

Paler; More sandy brown *P.x. transfuga*

428. Sind Yellowthroated Sparrow : *Petronia xanthocollis transfuga* (Hartert).

(*Gymnorhis flavicollis tranfuga* Hartert, 1904, Vog. Pal. Fauna 1 : 45 (Bagu Kelat, Baluchistan); Baker, FBI No. 1095, Vol. 3 : 168; Ali & Ripely, HB No. 1948, Vol. 10 : 78).

*local names* : None recorded.

Size. Sparrow : Length c. (5-6 in.).

Plumage, above, grey brown, with a chestnut shoulder patch and two whitish wing bars. Below dul grey brown to Whitish. Diagnostic lemon yellow throat patch. Sexes alike but female duller.

Resident or short range migrant, sparsely but locally with good population are usually found on the edge of the cultivation preferably in semi-arid country. It ranges in India from Haryana south through Central Rajasthan and Gujarat to Kutch.

Extralimital : Pakistan and also west to Southern Iraq.

Ali did not mention this race in 'Birds of Gujarat'

429. Indian Yellowthroated sparrow : *Petronia x. xanthocollis* (Burton).

(*Fringilla xanthocollis* Burton, 1838, Cat. Bds. Mus. Fort. Pitt, Chatham : 23 (Ganges between Calcutta and Benares); Baker, FBI No. 1094, Vol. 3 : 166; Ali & Ripley, HB No. 1949, Vol. 10 : 80).

*Local names* : Hindi Raji Jangli Chiria.

Size. As in earlier race.

Plumage, similar to earlier race but darker overall.

Resident, with some local movements depending upon habit and habitat. It ranges in

India in the Whole of Peninsula east to the range of *transfuga* (Kutch to Punjab, where intergradations are found), north to the foothills of U.P., east to the eastern terai, Bihar, W. Bengal (lower) and south to Kanya Kumari.

Extralimital : Nepal, Sri Lanka (rare Vagrant).

Ali collected specimens from Dhinodhar Hill, Nakhatrana, Bhuj (All in Kutch; Bodeli and Dabka (Baroda dist.), Vaghjipur and Patan (Mehsana dist.), Radhanpur, Deesa (Palanpur), Juna Rajpipla, Songadh (Navsari dist.), Malegaon, Pandwa, Mahal, Pimpri, Laochali, Mheskatri, Sarwar (all in Surat Dangs).

Ali further noted that birds from Nadiad (N), i.e., Patan and Vaghjipur (Mehsana dist.), Radhanpur, Deesa (Palanpur) and also from Kutch, are intermediate between *Xanthocollis* and *transfuga*.

Thousands of birds were seen during Nov./Dec. roosting on the bank of the Mahi River at Dabka (Baroda dist.).

Z.S.I. party noted a large flock, comprising of about a few hundred birds were seen on the cultivated field near Nalsarobar environs in October ' 1993.

430. Indian Baya : *Ploceus p. Philippinus* (Linnaeus)

(*Loxia philippina* Linnaeus, 1766, Syst. Nat., ed. 12, 1 : 305 (Ceylon); Baker, FBI No. 1008 (Part), Vol. 3 : 67; Ali & Ripley, HB No. 1957, Vol. 10 : 88).

Local names : Hindi Baya, Son-Chiri Gujarati -Sunghari.

Size. As in earlier race.

Plumage, Male (Breeding), above, crown yellow. Rest of upperparts dark brown streaked with yellow on back. Throat brown, breast yellow belly creamy buff.

Female, Crown and neck yellowish buff streaked dark brown. Throat white, tinged yellow, breast yellowish buff, belly creamy buff.

Male (non-breeding), similar to female but darker and more boldly streaked upperparts.

Resident. More commonly found in the

rainy seasons in open cultivation, grassland and secondary scrub dotted with palm and babool trees. It is practically distributed throughout India from the foothills down to the plains, except the ranges of allied races, viz., *travancorensis* (Goa, c. 16°N, south through Kerala - coastal region) and *burmanicus* (Eastern Bihar, Bengal and east to Assam).

Extralimital : Pakistan, Nepal Valley and Sri Lanka.

Ali collected specimens from Chaduva (Bhuj dist.), Chobari (Bachau dist.), Ajwa (Baroda dist.), Cambay town environs, Palanpur.

Z.S.I. party noted in the Sasan Gir Forest, Amreli dist., in November, 1993.

431. Blackthroated Weaver Bird : *Ploceus benghalensis* (Linnaeus).

(*Loxia benghalensis* Linnaeus, 1758, Syst. Nat., ed. 10. 1 : 175 (Benghals); Baker, FBI No. 1012, Vol. 3 : 72; Ali & Ripley, HB No. 1961, Vol. 10 : 96).

Local name : Hindi Sarbo baya

Size. As in earlier race.

Plumage, Male (breeding), above, crown golden yellow, surrounded by a black band. Rest of the Upperparts dark brown. Below whitish with a broad brown band across breast.

Female. No yellow on crown, a supercillium and a yellow patch on each side of the neck. Chin and throat pale yellow with a brown malar streak.

Male (Non-breeding) similar, common but locally and capriciously distributed is isolated biotope like earlier race. It ranges within India from the Gangetic Plain, east to Assam and Manipur. Also recorded from Kutch (Vagrant), Deesa, Baroda and Kaira dist. (Gujarat), Bhandup (near Bombay), Bastar (M.P. one recorded S.F. 5 : 418).

Extralimital : Pakistan, Bangladesh, Western Nepal terai.

Ali collected specimens from Ajwa (Baroda dist.), Sairat (Kaira dist.).

Locally and patchily distributed in Gujarat.

432. Indian Streaked Weaver Bird : *Ploceus manyar flaviceps* Lesson.

(*Ploceus flaviceps* Lesson, 1831, Traits d'Orn : 435 (Pondichery); Baker, FBI No. 1013, 1014, Vol. 3 : 73; Ali & Ripley, HB No. 1662, Vol. 10 : 98).

*Local name* : Hindi - Bamani baya

*Size*. As in earlier race.

*Plumage*, Male (breeding), similar to earlier race but throat brown, rest of the underparts buff streaked with dark brown. Female and male (non-breeding) No yellow on crown, throat and belly whitish, confusingly like female of the earlier race but primose yellow supercillium continued as a loop round brownish ear-coverts is diagnostic.

Resident, but sparsely distributed in swampy and rain flooded land intersepted by bush or reeds. It practically distributed in the whole of India from the Peninsula south to Kerala and east to Bihar and Bengal.

Extralimital : Pakistan, Sri Lanka.

433. Red Munia or Avadavat, *Estrilda a. amandava* (Linnaeus).

(*Fringilla amandava* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 180 (Calcutta); Baker, FBI No. 1036, Vol. 3 : 96; Ali & Ripley, HB No. 1964, Vol. 10 : 101).

*Local name* : Hindi Lal munia.

*Size*. Sparrow : Length c. (3 in.).

*Plumage*, Male (breeding), above, crimson with a few small white drops. Tail dark brown finely tipped white. below crimson, lower belly dark brown.

Female, above, brown, a few white spots on wings, lores black, upper tail coverts crimson with some white drops, throat and breast greyish buff, belly saffron-yellow.

Male (non-breeding) like female but throat and breast greyer.

Resident. Thinly distributed in suitable biotope like seed beds, grass lands, preferably sugarcane, maize and wheat field. More commonly found near human habitation than in the forest. It distributed in our Indian limit in

the Peninsula, south to Madurai (Tamil Nadu), east to Assam and also in the foothills of Jammu and Garhwal (U.P.).

Extralimital : Pakistan, Nepal, Bangladesh.

Ali not collected any specimens from Gujarat but observed at Ajwa (Baroda dist.) and Dakar (Kaira dist.), in reedy, swampy environs of tanks.

R.M. Simmons observed a flock of 20-30 in reeds of Hathmatti River in Himmatnagar (Sabar Kantha) in Feb. 1932.

434. Green Munia : *Estrilda formosa* (Latham).

(*Fringilla formosa* Latham, 1790, Index Orn. 1 : 441 (India); Baker, FBI No. 1035, Vol. 3 : 94; Ali & Ripley, HB No. 1965, Vol. 10 : 103).

*Local name* : Hindi Hari Munia

Gujarati Lili Munia.

*Size*. As in earlier race.

*Plumage*, Male, above, olive-green. Tail blackish brown. Underparts yellow. Flanks barred olive-brown and white. Female, similar to male brown above, duller below.

An endemic species. Resident, locally and unevenly distributed. It ranges from Central India from Mt. Abu, Gwalior, Jhanshi, Surguja, south to Mahableswar, Utmur (Adilabad dist., A.P.), Vishakapatnam Ghats. Also recorded from Lucknow (Reid, S.F. 10 : 56).

Extralimital : Pakistan.

Ali collected specimens from Gangasagar (Palanpur), Navagam (Rajpipla), Dediapada (Rajpipla).

Ali not recorded it Saurashtra and Kutch region. Always avoid semi-desert and arid country in Gujarat.

435. Whitethroated Munia : *Lonchura m. malabarica* (Linnaeus).

(*Loxia malabarica* Linnaeus, 1858, Syst. Nat., ed. 10, 1 : 175 (India); Baker, FBI No. 1030, Vol. 3 : 89, Ali & Ripley, HB No. 1966, Vol. 10 : 105).

*Local names* : Hindi - Charga, Charchara, Pidda.

Gujarati : Pavai Munia.

Size. As in earlier race.

A plain brown thickbilled bird with a pointed blackish tail, dart brown wings, white rump and whitish underparts. Sexes alike.

Resident. Most common and widespread. Locally sometimes it acts like pest to standing crops. Practically distributed throughout the Indian Union from the foothills down to the plains.

Extralimital : Pakistan, Nepal, Bangladesh, Bhutan and Sri Lanka.

Ali collected specimens from Chaduva (Bhuj dist.), Bodeli (Baroda dist.), Golana (Cambay), Vaghjipur (Mehsana dist.).

Z.S.I. party noted a large flock in a cultivated field near Nalsarobar environment, Gandhinagar dist., in October, 1993.

436. Southern Whitebacked Munia :  
*Lonchura s. striata* (Linnaeus).

(*Loxia striata* Linnaeus, 1766, Syst. Nat., ed. 12, 1 : 306 (Ceylon); Baker, FBI No. 1021, Vol. 3 : 83; Ali & Ripley, HB No. 1968, Vol. 10 : 108).

*Local names* : Hindi- None recorded.

Size. As in earlier race.

A small brown and white bird with a heavy bluish conical bill and pointed tail, rump white and throat blackish brown. Sexes alike.

Resident. Common and widespread but this and earlier race replace each other on locality basis. It mainly confined to the Indian Peninsula from the southern parts of Bihar (Manbhum), M.P. (Seoni, Batul) and Gujarat (Surat Dangs) - South through Kerala and Tamil Nadu.

Extralimital : Sri Lanka.

Ali collected specimens from Mahal (Surat Dangs).

This race not recorded so far elsewhere from Gujarat.

437. Indian Spotted Munia : *Lonchura p. punctulata* (Linnaeus).

(*Loxia punctulata* Linnaeus, 1758, Syst. Nat., ed. 10, 1 : 173 (Asia = Calcutta); Baker, FBI No. 1031, Vol. 3 : 91; Ali & Ripley, HB No. 1974, Vol. 10 : 113).

*Local names* : Hindi - Telia munia, seenabaz.

Size. As in earlier race.

Plumage, (breeding), above, chocolate-brown with faint pale shaft-streak, tail fulvous rump barred with white, below chestnut, belly white. Sexes alike.

Adult (Non-breeding), plain brown above, fulvous below, unspckled.

Resident. Common and wide spread. The whole of India east to a line roughly Madapur - Ludhiane - Sambar lake Mt. Abu Southern Kathiawar, east to Bengal and south to Kanya Kumari.

Extralimital : Bhutan, Bangladesh, Sri Lanka.

Ali collected specimens from Ajwa (Baroda dist.), Dediapada (Rajpipla).

Z.S.I. party noted a few birds in the compound of F.R.H., Nalsarobar, Gandhinagar dist., Gujarat, Oct. ' 1993.

Family FRINGILLIDAE

Key to the genera of  
Family FRINGILLIDAE

1. Rump white ..... *Pyrrhula*  
Rump not white ..... 2
2. Tail forked ..... 3  
Tail square ..... *Coccothraustes*
3. Bill sparrow like but slender and more pointed ..... *Leucosticte*  
Bill not sparrow like, thick at base, conical nearly straight ..... *Carpodacus*

438. Indian Rosefinch : *Carpodacus erythrinus roseatus* (Blyth).

(*Pyrrhula roseata* 'Tickell' = Blyth, 1842, Jour. Asiat. Soc. Bengal 11 : 461 ('Sold ...in calcutta'); Baker, FBI No. 1069, Vol. 3 : 137; Ali & Ripley, HB No. 2011, Vol. 10 : 164).

*Local names* : Hindi - Lattuti, sukhar tuti

*Size*. Sparrow; Length c. (6 in.).

*Plumage*, Male, above, Crown crimson with a paler, more rosy eye-stripe. A darker stripe behind eye, back, and rump, chin, throat and breast crimson paler on flanks and belly. Female, replics of female sparrow but with two wing bars, breast heavily streaked with brown.

Breeds in whole of the Himalayas between 3900 - 4000 mt. Winters down to the foothills into Assam and most of the Indian Peninsula in open wooded country.

*Extralimital* : Nepal, Bhutan, SE Tibet, Western China, Bangladesh, Indo-Chinese countries.

Ali collected specimens from Bodeli (Baroda dist.), Vaghjipur (Mehsana dist.), Balaram (Palanpur dist.), Juna Rajpipla, Dediapada (Rajpipla), Galkund, Pimpri and Waghai (Surat Dangs).

Ali also observed in several parts of Saurashtra and Kutch region.

439. Blackheaded Bunting : *Emberiza melanocephala* Scopoli.

(*Emberiza melanocephala* Scopoli, 1769, Annus I, Hist. Nat : 142 (Caeniola); Baker, FBI No. 1133, Vol. 3 : 213; Ali & Ripley, HB No. 2043, Vol. 10 : 207).

*Local name* : Hindi - Gandam

*Size*. Sparrow +; Length c. (7 in.).

*Plumage*, Male, above, crown and sides of the head black; back and rump rufous, whitish double wing bar. Below, lemon-yellow, sides of the breast rufous. Female, above, fulvous brown with dark streaks, underparts buffish white with yellowish tinge.

Winter visitor. Abundantly found in India from Western and Central India in Rajasthan, Gujarat, M.P. (east to Sangor, once to

Lohardaga in Bihar), Maharashtra (east to Nagpur and Mander) and Karnataka (south to Haryana). Affects cereal cultivation.

*Extralimital* : Pakistan, Nepal, Iran, Middle-East, Caucasus, Southern Russia and the Balkans.

*Migration* : A bird ringed in Kutch (c. 23°N., 69°E) on 26.9. 1959 was recorded on 20.5. 1961 in Karsnodar dist. (C. 45°N, 40°E. USSR). Another ringed in Kathawar (c. 22°N., 71°E) on 22.9.1964 was recovered 16.5. 1965 in Cyprus (c. 35°N., 34°E) c. 4500 km. in the same general trend.

Ali collected specimens from Chobari (Bhachau dist.), Ajwa and Dabka (Baroda dist.), Kharagthoda.

Ali also noted that a large flock roosting in the thorn-scrub covered ravines along the banks of the Mani River near of its mouth at Dabka (Baroda dist.).

440. Redheaded Bunting : *Emberiza bruniceps* Brandt

(*Emberiza bruniceps* Brandt, 1841, Bull. Sci. Acad. Imp. St. Petersburg 9, col. 12 (Turkmenis); Baker, FBI No. 1134, Vol. 3 : 215; Ali & Ripley, HB No. 2044, Vol. 10 : 209).

*Local names* : Hindi As in earlier race.

*Size*. As in earlier race.

*Plumage*, Male, above; crown golden brown, back yellow with blackish stripe, whitish double wing bars, throat cinnamon, rest of the underparts yellow.

Female, similar to male but duller overall.

Mostly winter visitor to the Indian Peninsula from Haryana (Ambala), Rajasthan, Gujarat, Eastern M.P. and Maharashtra (Chanda), western A.P. (Cuddapah), southern Karnataka and Western Tamil Nadu (Coimbatore).

Migrates through Kashmir, Kangra, Lahul and Spiti in our Indian limit.

*Extralimital* : Pakistan, Bangladesh, SE Tibet. Also Afghanistan, north to the Altai, the Northern Caspian region and Northern Iran.

Ali collected specimens from Dhari (Amreli dist.), Bodeli (Baroda dist.), Sairat (Kaira dist.).

441. Whitecapped Bunting : *Emberiza stewarti* (Blyth).

(*Euspiza stewarti* Blyth, 1854, Jour. Asiat. Soc. Bengal 23 : 215 (Landour and Dehradun); Baker, FBI No. 1124, Vol. 3 : 203; Ali & Ripley, HB No. 2048, Vol. 10 : 215).

*Local names* : None recorded.

*Size*. As in earlier race.

*Plumage*, Male, above, crown grey, a broad black eye-stripe, back, rump, lower breast chestnut, belly fulvous white. Female overall brown, back streaked with dark brown, rump rufous-chestnut, throat fulvous buff with dark moustachial streak. Underparts fulvous with dark streak.

Breeds in the Western Himalayas. Winters in the foothills and in the plains of Punjab, Haryana, Western U.P. (Etawah), Rajasthan (Jodhpur, Ajmer, and Bharatpur (once), M.P. (N), NE Maharashtra (Wagpur) and Gujarat. Abundant passage noted in Kashmir, Shimla and Dehradun.

*Extralimital* : Pakistan. Central Nepal, Afghanistan, Eastern Iran and North to SE Kazakhstan.

Ali not listed this bird in 'Birds of Gujarat'

(once recorded in Jasdan, Gujarat (JBNHS 59 : 956).

442. Greynecked Bunting : *Emberiza b. buchanani* Blyth.

(*Emberiza buchanani* Blyth, 1845 (1844), Jour. Aisat. Soc. Bengal 13 : 957 (Indian Peninsula); Baker, FBI No. 1129, Vol. 3 : 208; Ali & Ripley, HB No. 2050, Vol. 10 : 219).

*Local name* : Hindi Jamjohara

*Size*. Sparrow; Length c. (6 in.).

*Plumage*, male, above, head grey, whitish eyering, upper parts rufous brown streaked dark. Below, throat whitish to rufous, breast rufous chestnut, a faint moustachial streak. Female similar to male but duller overall.

Winter visitor to Western and Central India, from N. Gujarat east to south to Central U.P. (Lucknow), Eastern Maharashtra (Nagpur) Northern A.P. (Asifabad) and Central Karr itaka.

*Extralimital* : Pakistan, Afghanistan.

Ali collected specimens from Bhuj, Mata-no-madh (Kutch), Bodeli, Ajwa (Baroda dist.), Patan (Mehsana dist.), Deesa (Palanpur), Ghatwad (Kodinar), Dwarka, Dhari (Amreli dist.).

443. Striolated Bunting : *Emberiza s. striolata*. (Lichtenstein).

(*F. (ringilla) striolata* Lichtenstein, 1823, Verz. Doubl. Mus. Berlin : 24 (Ambukol, Nubia); Baker, FBI No. 1136, Vol. 3 : 217; Ali & Ripley, HB No. 2057, Vol. 10 : 229).

*Size*. Sparrow: Length c. (5 in.).

*Plumage*, male, above, brown with dark brown streak, crown throat, breast greyish, white streaked blackish, a white malar stripe and a dark moustachial streak, belly fulvous buff. Female similar to male but overall brown.

Resident, locally common with suitable biotope but overall sparsely distributed north western India to Southern U.P. (Etawah), Central M.P. (Sagar) and Central Maharashtra (Daulatabad).

Affects rocky, thorny bushy country to sandy plains.

Ali collected specimens from Bhuj, Deesa (Palanpur).

Ali also noted it from Nakhatrana, Bachau, Rapar, Nir, Mata-no-madh, Khadir Isl. (Great Rann.). Bela Is., Kala Dongar (All in Kutch); Patan (Mehsana dist.), Dwarka, Ghatwad (Kodinar).

Ali further noted that large numbers of this birds gathered to drink at a water hole in arid stony country bordering the Great Rann. of Kutch regularly between 8-11 A.M. in March.

444. Crested Bunting : *Melophus lathami* (Grey).

(*Emberiza lathami* Grey, 1831, Zool. Misc. 1: 2 (Canton, Kwantung); Baker, FBI No. 1132, Vol. 3 : 221; Ali & Ripley, HB No. 2060, Vol. 10 : 232).

*Size*. Sparrow : Length c. (6 in.).

An entirely black bunting with chestnut wings and tail, and a long pointed crest (male). Female, olive-brown with dark brown streak. Below yellowish buff with dark streaks on the

breast. and dark moustachial streak.

Resident but very local and capricious. from the Himalayan foothills south in India through Eastern Rajasthan and Mt. Abu to Gujarat (Gir), SW Maharashtra (Satara), Northern A.P. (Wardha Valley), Eastern M.P. (Raipur) and Southern Bihar (Lohardaga) and also hills of Meghalaya, Cachar, Manipur. Also in Sikkim, Nagaland (Tytler). Affects dry stony sparsely scrubbed hillside in summer, also grassland, rice field, cultivation in the winters.

Extralimital : Pakistan, Bhutan, Nepal, Bangladesh, Kwangtung and Chekiang.

Ali collected specimens from Dabka (Baroda dist.), Dediapada (Rajpipla).

Not noted in Saurashtra and Kutch region of Gujarat.

### SUMMARY

A comprehensive information on the bird

life of Gujarat has been furnished based on the published accounts as well as from the collected present in the National Zoological collections. The bird community of the region comprises 452 species and subspecies belonging to 228 genera, 59 families and 17 orders.

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## REPTILIA

R.C. SHARMA

*Desert Regional Station Zoological Survey of India, Jodhpur 342009*

### INTRODUCTION

As per the objectives of Zoological Survey of India, besides the fauna of India series, it is essential to give importance to the regional faunal works also, which will certainly serve useful purpose. The present paper on the reptiles of Gujarat State includes a brief taxonomic account of all the reptile species so far available in the region along with their geographical distribution, zoogeography and status. A total of 14 species and subspecies of the order Testudines distributed in 11 genera and 5 families; 1 species of the order Crocodylia; 22 species and subspecies of suborder Sauria of order Squamata distributed in 15 genera and 6 families; and 52 species and subspecies of suborder Serpentes of order Squamata distributed in 34 genera and 8 families are dealt with here.

Studies on the Gujarat reptiles started in the middle of the last century. and most intensive studies have been taken up recently. The present faunal work is based on the collection made from numerous localities in Gujarat by the Zoological Survey of India. Various Institutes and individuals during 1872-1993. The enormous material belongs to 89 species and subspecies (14 testudines, 1 crocodylian, 22 lizards and 52 snakes) distributed in 61 genera and 20 families. For related works on the subject references may be made to the publications of Stoliczka (1872), Murray (1884), Smith (1931, 1935, 1943), McCann (1938), Acharya (1949), Kapadia (1951), Daniel & Shull (1963), Minton (1966), Tiwari

& Sharma (1970). Sharma (1971 & 1982), Prakash (1973), Rao & Rajabai (1974) Indurkar & Sabnis (1976) and Sharma & Vazirani (1977).

### ZOOGEOGRAPHY

Reptile fauna of Gujarat represents the admixture of endemic Indian, Palaearctic, Ethiopian and other oriental faunal elements. The following is a brief synthesis of the distributional pattern of reptiles in Gujarat and their relations with the adjoining zoogeographical Regions.

1. Reptile species of Palaearctic origin with some admixture of Ethiopian elements and which have their main origin from Mediterranean. Irano-Turanian, Saharo, Sindian and Palaeotropical sub regions.

*Lizards* : Family Scincidae : *Ablepharus grayanus* (Stoliczka) and *Ophiomorus raithmai* Anderson & Leviton.

2. Reptile species exclusively endemic to the Indian sub region of the Oriental Region. These species are mainly from the climatically diversified geographical zones of Indian subregion namely the desert area of Rajasthan and North western India; Kashmir and the western Himalaya; the plains of Ganga and Yamuna ; Central India; the Indian peninsula; Western Ghats; Eastern Ghats; the Chota Nagpur area and the North east India including Eastern Himalayas. *Testudines* : Family Emydidae: *Hardella thurgi* (Gray). *Lizards* : Family Gekkonidae: *Hemidactylus porbandarensis* Family Agamidae : *Sitana ponticeriana*, *calotes rouxi*. *Agama minor*.

Family Chamaeleonidae : *Chamaeleo zeylanicus* Family Scincidae : *Mabuya carinata*, *Riopa punctata*. Snakes : Family Uropeltidae: *Uropeltis elliotti* *Uropeltis macrolepis*. Family Colubridae: *Dendrelaphis tristis*.

3. Reptile species of Palaearctic origin, intruded in Gujarat area of Indian subregion. Lizards: Family Scincidae: *Eumeces taeniolatus*. Family Lacertidae: *Acanthodactylus cantoris* and *Ophisops jerdoni*.

4. Reptile species which are common to the Oriental and Palaearctic Regions. Testudines : Family Emydidae: *Kachuga tecta*. Family Testudinidae: *Geochelone elegans* Family Trionychidae : *Lissemys punctata punctata*, *Lissemys punctata granosa*, *Chitra indica*. *Trionyx gangeticus* and *Trionyx leithi*. Crocodilia: Family Crocodylidae: *Crocodylus palustris*, Lizards: Family Gekkonidae *Cyrtodactylus kachhensis kachhensis*, *Hemidactylus maculatus*, *Hemidactylus brooki*, *Hemidactylus leschenaulti* and *Hemidactylus flaviviridis*. Family Agamidae: *Calotes versicolor* and *Uromastix hardwicki*. Family Scincidae: *Mabuya macularia*. Family Lacertidae : *Ophisops microlepis*. Family Varanidae: *Varanus bengalensis*. Snakes : Family Typhlopidae: *Typhlops braminus*, *Typhlops porrectus*, *Typhlops acutus*. Family Boidae : *Python molurus*, *Eryx johni*, *Eryx conicus*. Family Colubridae : *Lycodon striatus*, *Lycodon flavomaculatus*, *Oligodon arnensis*, *Oligodon taeniolatus*, *Sibynophis subpunctatus*, *Amphiesma stolata*, *Macropisthodon plumbicolor*, *Xenochrophis piscator*, *Elaphe helena*, *Ptyas mucosus*, *Argyrogena ventromaculatus*, *Argyrogena fasciolatus*, *Sphalerosophis diadema*, *Psammophis longifrons*, *Psammophis leithi*, *Psammophis condanarus*, *Boiga forsteni*. Family Elapidae: *Bungarus caeruleus*, *Callophis melanurus*, *Callophis nigrescens* and *Naja naja naja*. Family Viperidae: *Vipera russelli*, *Echis carinatus* and *Trimeresurus gramineus*.

5. Reptile species common to Indian, Indo-chinese and Malayan subregions. Family Acrochordidae : *Chersydrus granulatus*. Family Colubridae : *Lycodon aulicus*,

*Chrysopelea ornata*, *Ahaetulla nasutus* and *Ahaetulla pulverulentus*, *Cerberus rhynchops* and *Gerardia prevostiana*. Family Elapidae: *Ophiophagus hannah*.

## SYSTEMETIC LIST OF REPTILES FROM GUJARAT

### ORDER 1. TESTUDINES

Key to the families of the order Testudines

#### Family 1. CHELONIIDAE

#### Key to the Genera of the family CHELONIIDAE

##### Genus 1. *Chelonia*

1. *Chelonia mydas* (Linnaeus)

##### Genus 2. *Eretmochelys*

2. *Eretmochelys imbricata* (Linnaeus)

Hawksbill sea Turtle

or

Tortoise shell Turtle

##### Genus 3. *Lepidochelys*

3. *Lepidochelys olivacea* (Eschscholtz)

#### Family 2. DERMOCHELYIDAE

##### Genus 4. *Dermochelys*

4. *Dermochelys coriacea* (Vandelli)

Leatherback Sea Turtle

#### Family 3. EMYDIDAE

Key to the Genera of the family EMYDIDAE

##### Genus 5. *Melanochelys*

5. *Melanochelys trijuga trijuga* (Schweigger)

Indian Snail eating Turtle

##### Genus 6. *Geoclemys*

6. *Geoclemys hamiltoni* (Gray)

North Indian Freshwater Tortoise

or

Black spotted pond Turtle

##### Genus 7. *Hardella*

7. *Hardella thurgi* (Gray)

Brahminy River Turtle

##### Genus 8. *Kachuga*

Key to the species of the genus *Kachuga*8. *Kachuga tecta* (Gray)

North Indian Roofed Turtle

9. *Kachuga tentoria tentoria* (Gray)

South Indian Roofed Turtle

## Family 4. TESTUDINIDAE

Genus 9. *Geochelone*10. *Geochelone elegans* (Schoepff)Star Tortoise or  
Indian Starred Tortoise

## Family 5. TRIONYCHIDAE

Key to the genera of the family  
TRIONYCHIDAEGenus 10. *Lissemys*Key to the subspecies of *Lissemys punctata*11. *Lissemys punctata punctata* (Lacepede)

North Indian Flap Shelled Turtle

12. *Lissemys punctata granosa* (Schoepff)

Southern Flap- Shelled Turtle

Genus 11. *Trionyx*Key to the species of genus *Trionyx*13. *Trionyx gangeticus* (Cuvier)

Indian Soft Shelled Turtle

14. *Trionyx leithi* Gray

Peninsular Soft Shelled Turtle

## Order 2. CROCODYLIA

## Family 6. CROCODYLIDAE

Genus 12. *Crocodylus*Key to the species of the genus *Crocodylus*15. *Crocodylus palustris* Lesson

Mugger or Freshwater Crocodile

## Order 3. SQUAMATA

## Suborder 1. SAURIA

## Key to the families of suborder Sauria

## Family 7. GEKKONIDAE

## Key to the genera of family Gekkonidae

Genus 13. *Cyrtodactylus*16. *Cyrtodactylus kachhensis kachhensis*  
(Stoliczka)Genus 14. *Hemidactylus*Key to the species of Genus *Hemidactylus*17. *Hemidactylus maculatus* (Dum. & Bibr.)18. *Hemidactylus brooki* Gray19. *Hemidactylus leschenaulti* Dum. & Bibr.20. *Hemidactylus flaviviridis* Ruppell21. *Hemidactylus porbandarensis* Sharma

## Family 8. AGAMIDAE

Genus 15. *Sitana*22. *Sitana ponticeriana* CuvierGenus 16. *Calotes*Key to the species of genus *Calotes*23. *Calotes versicolor* (Daudin)24. *Calotes rouxi* Dum. & Bibr.Genus 17. *Agama*25. *Agama minor* Hardwicki & GrayGenus 18. *Uromastix*26. *Uromastix hardwicki* Gray

## Family 9. CHAMAELEONIDAE

Genus 19. *Chamaeleo*27. *Chamaeleo zeylanicus* Laurenti

## Family 10. SCINCIDAE

Genus 20. *Mabuya*Key to the species of genus *Mabuya*28. *Mabuya macularia* (Blyth)29. *Mabuya carinata* (Schneider)Genus 21. *Ablepharus*30. *Ablepharus grayanus* (Stoliczka)Genus 22. *Riopa*31. *Riopa punctata* (Linnaeus)Genus 23. *Eumeces*32. *Eumeces taeniolatus* (Blyth)Genus 24. *Ophiomorus*33. *Ophiomorus raithmai* Anderson & Leviton

## Family 11. LACERTIDAE

Genus 25. *Acanthodactylus*34. *Acanthodactylus cantoris cantoris* GuntherGenus 26. *Ophisops*Key to the species of genus *Ophisops*35. *Ophisops jerdoni* Blyth36. *Ophisops microlepis* Blanford

## Family 12. VARANIDAE

Genus 27. *Varanus*

37. *Varanus bengalensis* (Linnaeus)

Suborder 2. SERPENTES

Key to the families of suborder Serpentes

Family 13. TYPHLOPIDAE

Genus 28. *Typhlops*

38. *Typhlops braminus* (Daudin)

39. *Typhlops porrectus* Stoliczka

40. *Typhlops acutus* (Dum. & Bibr.)

Family 14. UROPELTIDAE

Genus 29. *Uropeltis*

41. *Uropeltis ellioti* (Gray)

42. *Uropeltis macrolepis* (Peters)

Family 15. BOIDAE

Key to the species of family Boidae

Genus 30. *Python*

43. *Python molurus* (Linnaeus)

Genus 31. *Eryx*

44. *Eryx conicus* (Schneider)

45. *Eryx johni* (Russell)

Family 16. ACROCHORDIDAE

Genus 32. *Chersydrus*

46. *Chersydrus granulatus* (Schneider)

Family 17. COLUBRIDAE

Key to genera of family Colubridae

Genus 33. *Elaphe*

47. *Elaphe helena* (Daudin)

Genus 34. *Ptyas*

48. *Ptyas mucosus* (Linnaeus)

Genus 35. *Argyrogena*

49. *Argyrogena ventromaculatus* (Gray)

50. *Argyrogena fasciolatus* (Shaw)

Genus 36. *Sphalerosophis*

51. *Sphalerosophis diadema* (Schlegel)

Genus 37. *Oligodon*

52. *Oligodon arnensis* (Shaw)

53. *Oligodon taeniolatus* (Jerdon)

Genus 38. *Dendrelaphis*

54. *Dendrelaphis tristis* (Daudin)

Genus 39. *Chrysopelea*

55. *Chrysopelea ornata* (Shaw)

Genus 40. *Lycodon*

56. *Lycodon striatus* (Shaw)

57. *Lycodon flavomaculatus* Wall

58. *Lycodon aulicus* (Linnaeus)

Genus 41. *Sibynophis*

59. *Sibynophis subpunctatus* (Dum. & Bibr.)

Genus 42. *Xenochrophis*

60. *Xenochrophis piscator* (Schneider)

Genus 43. *Amphiesma*

61. *Amphiesma stolata* (Linnaeus)

Genus 44. *Macropisthodon*

62. *Macropisthodon plumbicolor* (Cantor)

Genus 45. *Boiga*

63. *Boiga trigonata* (Schneider)

64. *Boiga forsteni* (Dum. & Bibr.)

Genus 46. *Psammophis*

65. *Psammophis condanarus* (Merrem)

66. *Psammophis longifrons* Boulenger

67. *Psammophis leithi* Gunther

Genus 47. *Ahaetulla*

68. *Ahaetulla nasutus* (Lacepede)

69. *Ahaetulla pulverulentus* (Dum. & Bibr.)

Genus 48. *Cerberus*

70. *Cerberus rhynchops* (Schneider)

Genus 49. *Gerardia*

71. *Gerardia prevostiana* (Eydoux & Gervias)

Family 18. ELAPIDAE

Genus 50. *Bungarus*

72. *Bungarus caeruleus* (Schneider)

Genus 51. *Callophis*

73. *Callophis melanurus* (Shaw)

74. *Callophis nigrecens* Gunther

Genus 52. *Naja*

75. *Naja naja naja* (Linnaeus)

76. *Naja naja oxiana* (Eichwald)

Genus 53. *Ophiophagus*

77. *Ophiophagus hannah* (Cantor)

Family 19. HYDROPHIIDAE

Key to the genera of the family Hydrophiidae

Genus 54. *Enhydrina*

78. *Enhydrina schistosa* (Daudin)

Genus 55. *Hydrophis*

79. *Hydrophis spiralis* (Shaw)

80. *Hydrophis cyanocinctus* (Daudin)

81. *Hydrophis mamillaris* (Daudin)

82. *Hydrophis caerulescense* (Shaw)

Genus 56. *Lapemis*

83. *Lapemis curtus* (Shaw)

Genus 57. *Microcephalophis*

84. *Microcephalophis gracilis* (Shaw)

85. *Microcephalophis cantoris* (Gunther)

Genus 58. *Pelamis*

86. *Pelamis platurus* (Linnaeus)

Family 20. VIPERIDAE

Genus 59. *Vipera*

87. *Vipera russelli* (Shaw)

Genus 60. *Echis*

88. *Echis carinatus* (Schneider)

Genus 61. *Trimeresurus*

89. *Trimeresurus gramineus* (Shaw)

## SYSTEMATICS ACCOUNT

Class REPTILIA Aristotle 400 B.C.  
Sub Class – ANAPSIDA Williston 1925

### Order TESTUDINES Linnaeus 1758.

Testudines or Chelonians are most primitive typically clumsy and Poikilothermous animals. They are mainly amphibious creatures and have adapted to various ways of life. Some live in freshwater some in muddy habitats, while some have become terrestrial and some have adapted themselves to marine way of life, leading a semi pelagic life. Common turtles and tortoises are small to medium size reptiles ranging from 100 grams to a few kilograms in body weight but the giant sea turtles might attain a weight of many hundred kilograms. The largest and the most pelagic species among the living turtles these days is the huge Leather back turtle (*Dermochelys coriacea*) which reaches a body weight of over 750 kg. These reptiles have a very long life span and the available records

indicate that a giant tortoise *Geochelone gigantea* survived for 152 years in Seychelles islands in the Indian Ocean, from 1776 to 1918.

Their body is well protected as it is enclosed in a box like bony or leathery shell. The upper portion of the shell is the carapace and the lower one is the plastron. The carapace and plastron are generally composed partly of a modified inner layer of bony dermal plates and partly of a covering of modified outer layer of horny scales, scutes or shields.

The carapace and plastron are connected by a hinge at the sides. In the turtle species of families Dermochelyidae and Trionychidae the shell is covered by a leathery soft skin. All the species of Testudines are devoid of sternum or sternal ribs. The clavicles and inter-clavicles have been merged into the plastron. A major portion of the vertebral column and most of the ribs with capitular portion have fused with the carapace. The vertebrae are procoelous, amphicoelous or opisthocelous. There is a remarkable and drastic reduction of the axial skeleton in the Testudines. The skull is most primitive like earliest cotylosaurian reptiles, typically anapsid and is devoid of true temporal fossae and arches. Teeth are not available in the living species except in the embryonic stage of the species of genus Trionyx (Family Trionychidae). Limbs are typically pentadactyle and complete; the phalangeal formula is generally 2,3,3,3,3 and 2,2,2,2,2, Elephantine hind limbs are a characteristic features of the terrestrial species; webbed limbs are present in the freshwater species and these are modified as flippers in the marine turtles. Eyelids are present and the pupil is round. Tympanum and columella auris are present. The neck is long; flexible and retractile. In all the Indian species the bending of the neck is vertical and enables the head and neck to be withdrawn for protection within the shell. The cloacal opening is longitudinal and circular. The copulatory organ is a well developed unpaired structure which is retracted into the ventral sheath of the cloaca anterior to cloacal aperture. The lungs and other soft parts have been modified drastically in all the species of modern turtles and are dorsally situated, lying immediately beneath the carapace and are ventilated mainly by changes in pressure in the viscera.

Organs of sense are quite specialized and are absolutely capable to judge any physical or chemical stimulation. The sense of smell is

acute as the olfactory parts of the brain are considerably large. The sense of hearing is moderate and the ears are most effective within a narrow range of sound. Males generally have longer nail on fore feet, longer preanal region and long, thick tails in comparison to the females. While copulating the male mounts the female back and coincides its cloacal region with that of the female. In aquatic species courtship and copulation occurs in water only. There is no viviparity and all the species are oviparous and lay cleidoic eggs. Eggs are round or oval, soft or hard shelled laid in a nest excavated in the soil or sand. The number of eggs laid at a time varies from one to over 200 and some turtles lay several times in a year. Clutch size varies from 10 in some terrestrial species to hundreds in marine turtles. Parental care is not exhibited by any species at any stage in life. Hatchlings are provided with a horny curuncle on upper jaw for slitting the egg shell. Most of the species become sexually mature within ten years.

Order 1. TESTUDINES

Suborder CRYPTODIRA

Key to the families of the order TESTUDINES

- 1. Digits elongated flattened, and bound together; limbs paddle-shaped.....2
- Digits not elongated, flattened, and bound together..... 3
- 2. Limbs paddle shaped with clawless feet, scaleless; carapace covered with smooth skin no epidermal shields and with seven prominent longitudinal keels ..... DERMOCHELYIDAE
- Limbs paddle shaped with one or two claws; feet covered with scales; carapace covered with epidermal horny shields .....CHELONIIDAE
- 3. Forelimbs semi paddle shaped with 3 claws; carapace covered with smooth skin; edge of carapace flexible .....TRIONYCHIDAE
- Forelimbs paddle shaped with more than 3 claws; carapace covered with horny shields.....4

- 4. Limbs paddle shaped but more or less flattened; digits webbed top of head covered with smooth skin or with the posterior part of it divided into shield; claws 4-5; carapace covered with horny shields or its skin bears many projections giving it a roughened appearance .....EMYDIDAE
- Limbs more or less cylindrical the hind limbs clubshaped or elephantine digits not webbed; upper portion of the head shielded plastron with 12 shifts, pectoral shield forming front part of bridge .....TESTUDINIDAE

Family 1. CHELONIIDAE Gray 1825

Key to the genera of the family CHELONIIDAE

- 1. Costal shield four on each side; one pair of prefrontals between the eye; horny scutes juxtaposed not overlapping (imbricated) horny edge of lower jaw strongly dentate; bony alveolar surface of upper jaw having low but regularly raised ridge; jaws not hooked; single claw is present on each flipper; carapace greenish with violet marking; skin of neck yellow or creamish .....*Chelonia*
- Costal shields 4-9 on each side; 2 pairs of prefrontals between the eye; horny edge of lower jaw smooth or feebly dentate, bony alveolar surface of upper jaw smooth or with a sharp crested ridge.....2
- 2. Costal shields 4 on each side; horny scutes imbricated two pairs of pre-frontal scutes; nuchal not in contact with the first costal on each side; snout elongate, narrow; premaxilla deeply excavated and not toothed terminally alveolar surface of upper jaw with a single sharp crested ridge; jaws are hooked; 2 claws are present on each flipper; carapace is brown with deep brown markings; neck is light orange.....*Eretmochelys*
- Costal shields 5 or more on each side, not imbricate; nuchal in contact with first costal on each side; snout comparatively

short and broad; pre-maxilla toothed; bony alveolar surface of upper jaw smooth or with a rounded ridge.....3

3. Costal shields 5-9 (generally 6 or 7) on each side; plastron with 4 pairs of inframarginals on bridge; each inframarginal is provided with pores on the hinder margin; Maxillae separated by vomer, single claw is present on each flipper. Dorsal colour grey to olive green (generally carapace is grey and plastron yellow).....*Lepidochelys*

### Genus 1 *Chelonia* Brongniart 1800

1800. *Chelonia* Brongniart *Bull, Sci. Soc. philom.* Paris, 2:89

1990. *Sea turtles of the world, Marouez* FAO *Species catalogue* 125(11) : 1-81.

#### 1. *Chelonia mydas* (Linnaeus 1758) GREEN SEA TURTLE

1758. Linnaeus *Systema Nature* Ed.10,T.1: 197 (type loc, Ascension island; Mus. Upsala).

1990. *Sea turtles of the world. Marquez, FAO species catalogue* 125 (11): 1-81.

The Green sea turtle is the largest of the hard shell species of marine turtles. A fully grown adult attains a carapace length up to 155cm. and normally attains a weight of 135-175 kg. the heaviest recorded is of 425kg. The head is round and small the snout is short and jaws are not hooked. Carapace is not ossified completely; feebly unicarinate in the young, arched in fully grown adults and feebly serrated or smooth posteriorly. Coastal scutes 4 on each side neural or central scutes 5; marginal shields 25. The plastron consists of paired gular, humeral, pectoral, abdominal, femoral and anal shields; single intergular shield and a series of inframarginal shields. Head is covered with symmetrical shields and one pair of prefrontal shields present. Neither the head nor legs can be pulled under the shell. The flippers are long and each is provided with a single claw. Tail is quite short in comparison to the

body. The carapace is dark blue in the hatchlings and green olive, brown, buff or black in adults. Limbs are yellow with a large dark patch on each hand and foot. Ventrums are yellowish.

*Distribution:* The Green Sea Turtle is a circumtropical species nesting mainly in tropical and subtropical zones of the world. The species is generally distributed throughout Indian and Indo Chinese waters.

*Status:* This extremely migratory turtle has become quite endangered and its population has alarmingly dwindled throughout the world.

### Genus 2. *Eretmochelys* Fitzinger 1843.

1843. *Eretmochelys* Fitzinger, *Syst. Rept.* 30. (type *Eretmochelys imbricata*)

1990. *Sea turtles of the world Marquez, FAO species catalogue* 125(11) : 1- 8.

#### 2. *Eretmochelys imbricata* (Linnaeus 1757) HAWKSBILL SEA TURTLE OR TORTOISE SHELL TURTLE

1766. *Testudo imbricata* Linnaeus *Sys, Nat.* Ed. 12. Vol. 1 : 350.

1990. *Seaturtles of the world Marquez FAO species catalogue* 125(11) : 1-81.

The Hawksbill or Tortoise shell Turtle is one of the smallest but the most colourful species of the marine turtle. A large fully grown adult may develop a shell generally about a metre in length. The fully grown adult Hawksbill generally attains a weight between 60-120kg. The largest record so far is 140 kg. Its head is very narrow with distinct scales over it, and the snout tapers to a point. Its powerful ridged jaws which look like a hawk's bill, allow it to break open molluscs, crabs and other hard animals and to pull them out from the crevices of rocks and coral reefs. Carapace is narrow and strongly serrated behind. Coastal scutes are 4 on each side. Neural or central scutes are 5; marginal shields are 25. The plastron consists of paired gular, humeral, pectoral, abdominal,

femoral and inframaginal shields. Head is covered with symmetrical shields and with two pairs of prefrontals. The flippers are long and each one is provided with two claws. Tail is quite short. Carapace of the adult is amber coloured or greenish with violet markings or dark brown to black with yellow mottling or blotches and in all cases plastron is yellow, orange or reddish brown in colour.

**Distribution** : Hawksbill Turtle is a circumtropical species nesting mainly on beaches of tropical and subtropical zones of the Pacific Atlantic and Indian Oceans. In India these turtles are available and make nests on various islands in the Gulf of Mannar and in the vicinity of Lakshadweep, Andaman and Nicobar Islands.

**Status**: The Hawksbill has become extremely endangered as it is killed in large numbers for the horny shields of keratin layer of its shell.

### Genus 3. *Lepidochelys* Fitzinger 1843

1843. *Lepidochelys* Fitzinger, *Syst. Rept.* 30. (type *Chelonia olivacea*).

1990. *Sea turtles of the world* Marquez, *FAO species Catalogue* 125 (11) : 1-81.

### 3. *Lepidochelys olivacea* (Eschscholtz 1829) OLIVE RIDLEY TURTLE

1829. *Chelonia olivacea* Eschscholtz, *Zool. Atlas.* 1 : 3 (type loc. China Sea, Manila Bay and Sumatra)

1990. *Sea Turtles of the world* Marquez, *FAO Species Catalogue* 125 (11) : 1-81.

The Olive Ridley is a small, broad and flattened marine turtle, whose carapace-length varies between 56.5 and 75 cm. A fully grown female at the time of breeding ranges from 40 to 55 kg. in weight. Its head is large and triangular. The Carapace in adult is arched and devoid of keels, margin is slightly serrated on the posterior aspect. The costal scutes are 5-9 (generally 6 or 7) on each side; neural or central scutes are 8-9; marginal shields are 27-29. The plastron consists of paired gular, humeral, pectoral, abdominal, femoral and anal shields;

intergular is variable, may be single, double or even absent; 4 pairs of inframarginals. Single claw is present on each flipper. Tail is quite short. Dorsal colouration is grey to olive.

**Distribution** : Olive Ridley Turtle is a circumglobal species and is widely distributed in the tropical waters of the Pacific, Indian and Atlantic Oceans. The minor nesting takes place on the coasts of Gulf of Kachchha in Gujarat.

**Status** : The Olive Ridley Turtle has become endangered on account of its commercial exploitation by man for flesh, skin, leather and eggs.

### Family 2. DERMOCHELYIDAE Stebenrock 1909.

1909. Stebenrock, *Dermochelyidae*, *Zool. Jahrb. Jene. Suppl.* 10 : 551.

1990. *See turtles of the world* Marquez, *FAO species catalogue* 125 (11) : 1-81.

The family comprises a single species of largest marine turtle whose dorsal bony shell is composed of numerous small polygonal plates of different size which do not articulate with the vertebral column and ribs. The largest of these plates compose seven absolutely regular longitudinal ridges, separated from one another by grooves. Plastron comprises an annulus of 8 delicate bones namely the epiplastron, hyoplastron and xiphiplastra. The neck is short and slightly retractile. The limbs are paddle-shaped, clawless and feet are scaleless.

### Genus 4. *Dermochelys* Blainville 1816.

1816. *Dermochelys*, Blainville, *Bull. Soc. Philom.* 119 (type *Testudo coriacea* Vandelli 1761).

1990. *Sea turtles of the world* Marquez, *FAO species catalogue* 125(11) : 1-81.

### 4. *Dermochelys coriacea* (Vandelli 1761) LEATHER BACK SEA TURTLE

1761. *Testudo coriacea* Vandelli, *Epistola de Holoturlo et Testudine coriacea ad Celeberrimum Caolum Linnaeum*, Pauda : 2 (Maris Tyrreni, oram in agro Laurentiano).

1990. *Sea turtles of the world Marquez, FAO species catalogue* 125(11) : 1-81.

Its carapace-length varies between 140-200 cm. Its average weight is about 400 kg. and the maximum recorded is 727 kg. In the adult, the carapace is smooth-skinned and is made up of 7 strong, nodular longitudinal ridges which provide it considerable rigidity. Head is large and the neck is massive. The limbs are paddle-shaped and clawless. Tail is quite short. The carapace is slaty black with white spots; ventral colouration is variable and is generally a mixture of pink, white and black.

**Distribution :** The Leatherback Turtle is a circum-global species and its nesting takes place on the beaches of tropical seas of the Atlantic, Pacific and Indian Oceans. In India its nesting has been reported from Quilon on the Kerala Coast, Goa and certain parts of the east coast.

**Status :** The species has become endangered on account of excessive consumption of eggs and adults for food. Adults are also used for oil and as a shark-bait.

Family 3. EMYDIDAE Gray 1825.  
(The Freshwater Tortoises- Terrapins)

Key to the Genera of the Family EMYDIDAE

1. Vertebral shields hexagonal and short sided anteriorly .....2
- Vertebral shields, short sided posteriorly ..... 3
2. Plastron and carapace suturally articulated.
- Axillary and inguinal buttresses well developed and extend almost up to vertebral shields, alveolar surface of jaws broad and with one or two median ridges .....4
- Axillary and inguinal buttresses short, do not extend even halfway along the coastal plates, alveolar surface of jaws broad or narrow, without a median ridge .....*Geoclemys*
3. Plastron united to carapace by a suture; bony temporal arch and squamosal bone present; upper jaw feebly notched at the middle; skin of hinder part of head divided into very large shields; hind limb flattened, fingers fully webbed..... *Melanochelys*

4. Fourth vertebral shield moderate not longer than broad, not longer than third vertebral shield; fore limbs with 5 claws .....*Hardella*
- Fourth vertebral shield elongate, large, much longer than third vertebral shield; fore limbs with 5 claws .....*Kachuga*

Genus 5. *Melanochelys* Gray 1869.

1869. *Melanochelys*, Gray, *Proc. Zool. Soc. London*, 187 (type *Melanochelys trijuga*)

1985. Tikadar & Sharma, *Handbook Indian Testudines*. Published by the Director, Zoological Survey of India, Calcutta. 1-156.

5. *Melanochelys trijuga* (Schweigger 1814)

1814. *Emys trijuga* Schweigger, *Prodr. Monog. Chel.* 41. (type loc. Java).

1985. Tikadar & Sharma *Handbook Indian Testudines*. Published by the Director, Zoological Survey of India, Calcutta. 1-156.

Size is moderate, reaching up to a length of 23 cm. The head is moderately small, snout shorter than the orbit, slightly projecting beyond the lower jaw; upper jaw notched at the middle. Skin of the posterior portion of head smooth but divided into large shields. The carapace is moderately depressed, tricarinate, the lateral margins slightly reverted, the posterior margin feebly serrated in the young. Plastron is intimately attached to the carapace by a suture. Limbs are flattened and with completely webbed digits; front of arm and hinder part of leg with enlarged horny scales. Tail very short. Dorsum light brown in the juveniles and dark brown to blackish in the adults. The plastron has a yellow margin which reduces in width by the advancement of age.

**Distribution:** India : Goa, Karnataka, Kerala, Maharashtra, Gujarat and Tamil Nadu.

**Status:** Indeterminate, possibly vulnerable on account of large scale exploitation of eggs and adults for food.

Genus 6. *Geoclemys* Gray 1855.

1855. *Geoclemys* (In part), Gray *Cat. Sh. Rept.* 1 : 17. (*Geoclemys hamiltonii*)

1985. Tikadar & Sharma, *Handbook Indian Testudines* Published by the Director, Zoological Survey of India, Calcutta. 1-156.

6. *Geoclemys hamiltoni* (Gray 1831)  
NORTH INDIAN FRESHWATER  
TORTOISE OR  
BLACK SPOTTED POND TURTLE

1831. *Emys hamiltoni* Gray *Illus. Ind. Zool.* Pt. 6, Pl. 9 (*guttata* on the plate)

1985. Tikadar & Sharma, *Handbook Indian Testudines*. Published by the Director, Zoological Survey of India, Calcutta. 1-156.

This is a fairly large species (31 cm. in length). The head is large, broad, snout rounded, as long as the orbit and slightly projecting the lower jaw. The carapace is tricarinate, strongly convex with three interrupted keels in addition to the vertebral and costal keels; posterior margin serrated. The plastron consists of paired gular, humeral, axillary, pectoral, abdominal, inguinal, femoral and anal shields. Limbs are with fully webbed digits and have transversely enlarged scales. Tail is short. General dorsal colouration is dark brown to black and richly spotted and streaked with deep yellow.

*Distribution* : India : Ganga and Sind river systems. In Gujarat it is available in the Southern Part adjoining to Maharashtra. Elsewhere : Pakistan (Sind).

*Status* : The species extremely vulnerable on account of its over exploitation by man for eggs and adults for food.

Genus 7. *Hardella* Gray 1870.

1870. *Hardella* Gray, *Cat. Sh. Rept. Suppl.* 1 : 58 (type *Emys thurgi*)

1985. Tikadar & Sharma, *Handbook Indian Testudines*. Published by the Director, Zoological Survey of India, Calcutta. 1-156.

7. *Hardella thurgi* (Gray 1831)  
BRAHMINY RIVER TURTLE

1831. *Emys thurгии* Gray *Syn. Rept.* 22 & 72.

1985. Tikadar & Sharma, *Handbook Indian Testudines*. Published by the Director, Zoological Survey of India, Calcutta. 1-156.

This is a completely aquatic river tortoise showing extraordinary sexual dimorphism. Its females reach to a length of 65 cm while males attain a maximum length up to 20 cm. The head is moderately large with a pointed and extremely projecting snout. The carapace is moderately depressed, the unicarinate, and the posterior portion of each vertebral shield has a knob-like structure. The plastron consists of paired gular, humeral, axillary, pectoral, abdominal, inguinal, femoral and anal shields. Limbs are with fully and broadly webbed digits and have narrow transversely enlarged scales. Fore limbs are provided with five claws. Tail is quite short. General dorsal colouration is dark brown-black with a yellow margin in juveniles and adults. Ventrums are pale yellow with two large black spots on each side on the plastral bridge.

*Distribution*: Available in the Ganga, Brahmaputra, and Sind River systems, ranging from Sind (Pakistan) to Sylhet (Bangladesh), in the east. Available in North-western Gujarat.

*Status* : The species is extremely vulnerable due to the over-exploitation of adults and their eggs by animal predators and man for food and habitat destruction.

Genus 8. *Kachuga* Gray 1869.

1869. *Kachuga* Gray *Proc. Zool. Soc.* 186, 200 (type *Kachuga trilineata*).

1985. Tikadar & Sharma, *Handbook Indian Testudines*. Published by the Director, Zoological Survey of India; Calcutta. 1-156.

8. *Kachuga tecta* (Gray 1831)  
NORTH INDIAN ROOFED TURTLE

1831. *Emys tectum*, Gray, *Illus. Ind. Zool.* Pl. 72.

1985. Tikadar & Sharma, *Handbook Indian Testudines*. Published by the Director, Zoological Survey of India, Calcutta. 1-156.

This is a small species and the female never reach more than 23 cm. in length, males are still smaller. The head is moderately small, pointed, shorter than the orbit. The carapace is elevated and rounded in adult individuals. The plastron consists of paired gular, humeral, axillary, pectoral, abdominal, inguinal, femoral and anal shields. Limbs are with fully and broadly webbed digits and have transversely enlarged scales. Tail is quite short. General dorsal colouration is olivaceous with minute black spots and orange or reddish vertebral stripe. Ventrums are reddish, yellowish or reddish-yellow with large dark brown or almost black spots.

*Distribution* : The species is available in the Ganga, Brahmaputra and Sind river systems of India and Pakistan. Available in larger freshwater bodies in Gujarat.

*Status* : Extremely vulnerable due to over exploitation (eggs as well as adults) for food and habitat destruction.

9. *Kachuga tentoria tentoria* (Gray 1834)

1834. *Emys tentoria*, Gray, *Proc. Zool. Soc.* 54 (type loc. Dhond, Poona Dist., Brit. Mus.)

1985. Tikadar & Sharma, *Handbook Indian Testudines*. Published by the Director, Zoological Survey of India, Calcutta. 1-156.

This is a small species in which the adult female is smaller to *Kachuga tecta* in size and maximum length never reaches beyond 19 cm. The carapace is elevated and rounded in adults. The plastron consists of paired gular, humeral, axillary, pectoral, abdominal, inguinal, femoral and anal shields; is almost as long as the carapace. Limbs are with fully and broadly webbed digits and have transversely enlarged scales. Tail is quite short. General dorsal

colouration is pale olivaceous.

*Distribution* : Available in the Mahanadi, Godavari and Krishna river systems of peninsular India. The species available in Southern Gujarat.

*Status*: Species has become vulnerable on account of large scale habitat destruction.

FAMILY 4. TESTUDINIDAE Gray 1825.

1825. Testudinidae, Gray, *ann. Phil.* 10(2) : 210.

1988. A nomenclatural History of Tortoises (Family Testudinidae). Crumly, *Smithsonian Herpetological Information Service*, 75 : 1-17.

This family comprises the true land tortoises, whose neck is completely retractile within the solid shell. The carapace is covered with horny epidermal shields, frequently with distinct growth rings and is generally dome shaped. The marginal shields of the carapace are connected to the somewhat flat or slightly concave plastron by a broad bridge. The plastron is usually flat in females and concave in males, composed of nine bones. The digits are short and completely devoid of webs, with not more than two phalanges; metacarpals not or but slightly longer than broad, the hind feet are club-footed. The tail is relatively short. Eggs are spherical in shape. Scent glands are absent in Testudinidae.

Genus 9. *Geochelone* Fitzinger 1835.

1758. *Testudo* Linnaeus, *Syst. Nat.* ed. 10 : 197.

1988. A nomenclatural History of Tortoises (Family Testudinidae). Crumly *Smithsonian Herpetological Information Service*. 75 : 1-17.

10. *Geochelone elegans* (Schoepff 1792)

STAR TORTOISE OR  
INDIAN STARRED TORTOISE

1792. *Testudo elegans* Schoeff. *Hist. Test.* 111, pl. 25 (type loc. India.).

1988. A Nomenclatural History of Tortoises (Family Testudinidae). Crumly, *Smithsonian Herpetological Information Service*. 75 : 1-17.

It is a small tortoise in which the length of largest female reaches up to 25 cm. males never exceed more than 16 cm. in length. Carapace is elongated, highly domed. Plastron is large, truncate or openly matched anteriorly, deeply notched posteriorly. Forelimbs are with five claws. Tail is moderately long and terminating into a spur-like scute. Shell is black above, each vertebral and costal shield is with a yellow areol from which radiate as many as light streaks, ultimately producing a radiated or starred pattern which is continuous over the marginals to the plastron. Head and limbs are yellow, more or less spotted with dark brown or black.

**Distribution :** Peninsular India and offshore islands like Karadura and Rameswaram, Sri Lanka, extending west as far as Sind (Pakistan). Available in plenty in Gujarat and south western Rajasthan.

**Status :** Indeterminate, suspected to be threatened by habitat loss.

#### Family 5. TRIONYCHIDAE, Bell 1828.

##### Key to the Genera of the Family TRIONYCHIDAE

1. Plastron with soft, semicircular flaps, which permit the retracted hind feet to be completely concealed. Marginal bones are present. Front part of the plastron is also flexible and quite suitable for the closure of the anterior shell opening. Plastron with seven callosities in the adult. Carapace without a definite pattern, yellow spots may be present or absent. Snout comparatively short.....*Lissemys*
2. Plastron without flexible skin-flaps and without cutaneous femoral valves. Marginal bones are not present. Plastron with four callosities only in the adult. Carapace with a definite pattern in juvenile specimens. Snout rather long.
  - Head small to moderate, its postorbital arch not reduced; neural shields do not separate all the costal plates are in contact with one another medially.
  - Orbit nearer the temporal fossa than the nasal fossa; postorbital arch narrower than diameter of the orbit; proboscis as long as the eye-opening .....*Trionyx*

#### Genus 10. *Lissemys* Smith 1931.

1931. Smith, *Fauna Brit. Ind.* 1 : 147-149.

1985. Tikadar & Sharma, *Handbook Indian Testudines*. Published by the Director, Zoological Survey of India, Calcutta. 1-156.

Nuchal bone is butterfly-shaped; dorsal shield is with a prenuchal, marginal and series of posterior marginal bony plates; seven or eight neural plates forming a continuous series; eight pairs of costal plates, the last two pairs forming a median suture. Plastron is with a cutaneous femoral valve, under which the hind-limb may be concealed; seven plastral callosities are present in the adult; hyoplastron co-ossified with hypoplastron. Skull convex above; postorbital arch narrower than the orbital diameter; posterior margin of pterygoid is with a median ascending process which forms a suture with the opisthotic. Tail is very short. A single species with three sub-species inhabiting Indian Region.

##### Key to the subspecies of *Lissemys punctata*

1. First marginal bone much longer than the second in the adult; ectoplastral callosity is generally small in the adult; head and carapace with yellow spots  
.....*L.p. punctata*
2. First marginal bone much larger than the second in adult; ectoplastral callosity is generally moderate in the adult; carapace is uniform brown or blackish; head with black longitudinal lines, these are most prominent in the juveniles  
.....*L.p. granosa*

#### 11. *Lissemys punctata punctata* (Lacepede 1788)

##### NORTH INDIAN FLAP SHELLLED TURTLE

1788. *La Tortue chagrinee* Lacepede *Hist. Quad Ovip.* 1 : 171, pl. 11.

1985. Tikader & Sharma, *Handbook Indian Testudines*. Published by the Director, Zoological Survey of India, Calcutta. 1-156.

This is a small, flat turtle whose length hardly exceeds more than 24 cm. The head is

moderately large, the snout is short and broad. The carapace and plastron covered by a continuous sheet of skin and their callosities are finely granulated. The lateral and the hinder portions of the carapace are most flexible. Plastron is with soft semicircular flaps which accommodate the retracted hind feet to be totally concealed; front portion of the plastron is quite flexible and permits the closure of the anterior shell opening quite effectively. Limbs are fully webbed. with only three claws on each foot. Tail is very short olive brown above. Carapace is grey green with numerous blackbordered yellow spots. irregularly arranged and with a light yellow marginal rim.

**Distribution** : India : Gujarat (Kachchha and Viramgaon), Ganga river system, Sikkim and Andaman Islands *Elsewhere* Bangladesh Burma, Nepal, Pakistan (Sind river system) and Sri Lanka.

**Status** : Suspected to be threatened on account of ruthless killing and overexploitation of adults and their eggs for protein rich food.

12. *Lissemys punctata granosa*  
(Schoepff 1792)

SOUTHERN FLAP SHELLED TURTLE

1792. *Testudo granosa*. Schoepff *Hist. Test.* 127, pls. 30. A & B (type loc. Coromandal coast; *Mus. Blochianum*)

1985. Tikader & Sharma. *Handbook Indian Testudines*. Published by the Director, Zoological Survey of India, Calcutta. 1-156.

Other taxonomic characters and size etc. are same as available in the *Lissemys p. punctata* except that the first marginal bone is smaller than the second, entoplastral callosity is very large in the adult individuals and in certain specimens it is in contact with the hypo-plastral callosities. It differs in colouration also and the carapace is uniformly olivebrown. juveniles sometimes with light longitudinal markings on the greenish head.

**Distribution** : Peninsular India, Gujarat. *Elsewhere* Sri Lanka.

**Status** : Suspected to be threatened on account of large scale killing for eggs and adults habitat destruction and urbanisation on the nesting sites.

Genus 11. *Trionyx* Geoffery 1809

1809. *Trionyx* (in part) Geoffery. *Ann. Mus. Hist. nat. Parts.* 14 : 4 & 20 (type *Trionyx aegyptiacus*)

1985. Tikader & Sharma, *Handbook Indian Testudines*. Published by the Director, Zoological Survey of India, Calcutta. 1-156.

Normally eight pairs of costal plates are present; outer extremity of nuchal plate overlying the second dorsal rib; normally eight neural plates: eight dorsal plates; the last one or two are in contact in the middle line. Hyoplastron is distinct from hypoplastron; not more than five plastral callosities are present in the adult. Skull is convex dorsally. Limbs exposed. with three claws. Tail short. Proboscis about as long as the opening of the eye; Dorsal disc of the young are with small tubercles mostly arranged in longitudinal series. In Indian Region six species are present.

Key to the species of Genus *Trionyx*

1. Alveolar surface of mandible raised at its inner margin, the edges meeting and forming a projection at the symphysis, the length of which is less than the diameter of the orbit in the adult; maxillary groove is well defined, head with black streaks: disc of young without ocelli ..... *T. gangeticus* ✓
2. Alveolar surface of mandible not raised at the inner margin more or less flat at the symphysis. which is usually longer than the orbital diameter in the adult : maxillary groove well defined; head with black streaks, disc of young with 4 or more ocelli ..... *T. leithi*

13. *Trionyx gangeticus* (Cuvier 1825)

INDIAN SOFT SHELLED TURTLE

OR

GANGA SOFT SHELLED TURTLE

1824. *Trionyx gangeticus* Cuvier *Oss. Foss.* 5: 186, 203, 206. pls. 11 & 12 (type loc. Gnges : Paris Mus. Nat. Hist. )

1985. Tikader & sharma *Handbook Indian Testudines*. published by the director Zoological Survey of India Calcutta. 1-156.

This is a very large, soft shelled turtle with an oval shell and reaches up to 45 cm. in length. The head is comparatively large and broad with dorso laterally situated eyes and quite thick and somewhat elongated proboscis. The snout is equal to the diameter of the orbit. Carapace coarsely pitted and vermiculated. Four plastral callosties, hyo-hypoplastral and xiphiplastral are well developed in the fully grown adults. Limbs are with three claws. Tail is short in both sexes. Dorsal colouration is olive green, plastron is ivory white head is greenish

*Distribution* The species inhabits the Ganga, Sind and Mahanadi river systems. It is common in N.W. Pakistan, Bangladesh and the Nepal foothills. Recorded from Dangs district in Gujarat.

*Status* The species has become endangered on account of excessive killing of the adults for flesh and overexploitation of eggs for food.

#### 14. *Trionyx leithi* Gray 1872 PENINSULAR SOFT SHELLED TURTLE

1872. *Trionyx leithi* Gray *Ann. mag. nat, Hist.* 10 (4) : 334. (type loc. *Poona*. Brit Mus.)

1985. Tikader & Sharma *Handbook Indian Testudines*. Published by the Director, Zoological Survey of India. Calcutta. 1-156.

This very large, soft shelled turtle reaches slightly above 50 cm. in length. This species is quite similar to *Trionyx gangeticus* in the taxonomic characters of the carapace and plastron but differs from it in having a bony snout longer than the diameter of the orbit. Dorsal colouration is olive green with lighter vermiculations. Ventrums is whitish. Head is greenish with black longitudinal lines from between the eyes and two or three oblique black streaks emerge on either side and one streak starts behind the eye. The carapace in juveniles is with four distinct ocelli (concentric circles).

*Distribution* Ganga river systems and all the rivers of peninsular India as far south as Madras (Chennai). Available in the south-eastern districts of Gujarat.

*Status* : Endangered on account of excessive killing of the adults for flesh. and overexploitation of eggs for food.

#### Order 2. CROCODYLIA (GHARIALS, CROCODILES, ALLIGATORS AND CAIMANS)

Crocodyles are the diapsid archosaurian reptiles closely allied to the Dinosaurs. Now it has been established that primitive archosaurian thecodonts like *Euparkeria* from Permian and Triassic periods have given rise to the modern crocodylians. *Skin* : The whole body is covered with a hard integument comprising the horny cutaneous scutes or scales, between which the skin is soft.

*Skull* : The Skull in crocodylia is typically diapsid i.e. the temporal region is with two fossae, both the supra and infra temporal fossae are complete in the crocodyles of Indian Region.

*Vertebral column* : The vertebral column consists of 66 procoelous vertebrae, 9 cervical, 15 dorsal and lumber, 2 sacral and upto 40 caudal vertebrae.

*Sternum* : The sternum in crocodylia is cartilaginous and articulates with the coracoids, 7-8 pairs of ribs and inter clavicle remains wedged at its antero-dorsal aspect. Sternum bifurcates on its posterior aspect, each half bearing two or three ribs.

*Ribs* : The ribs are double headed and both the heads distinctly articulate with most of the vertebrae.

*Pelvis* : In the adult crocodyles the pelvis is formed by the union of three separate bones. Ilium on side unites with the ischium and takes a major role in the formation of the acetabulum.

*Teeth* : The teeth in crocodyles are conical; restricted to the jaws; set in separate, deep, alveolar sockets and are replaced many times in the life.

*Digestive system* : The additional space is provided in the crocodylia to the small stomach for food storage by the presence of a large gullet. Large quantity of food can be stored in the gullet when the digestion is in the progress in the stomach.

## Family 6. CROCODYLIDAE Gray 1825

Snout not very long and slender; not more than two times longer than its basal width; 16-19 teeth on each side of the maxilla; 14-15 teeth on each side of the mandible; the lower teeth interlocking with the upper teeth and fit into pits or notches in the upper jaw; the supratemporal fossae are small; two or more rows of scutes on the back and no scutes on the belly.

Genus 12. *Crocodylus* Gronovius 1763.

1763. *Crocodylus* Gronovius *Zoophyl. fasc. 1.10.*

1977. Testudines, Crocodylia, Wermuth & Mertens, *Rhynchocephalia. Das Tierreich*, 100: 1- 174.

15. *Crocodylus palustris* Lesson 1834.

1834. *Crocodylus palustris*, Lesson in *Belang. Vov. Ind. or., Zool. 305. (type loc. Ganges)*

1977. *Testudines, Crocodylia, Rhynchocephalia* Wermuth & Mertens, *Das Tierreich*, 100 : 1-174.

A moderately large 3 to 5 meters in length, short and broad snouted, commonest of all crocodylians and much smaller than the saltwater crocodile and the Gharial. Snout in adult individuals is almost 1 1/3 to 1 1/2 times longer than its basal width and is generally devoid of ridges in front of the eyes. Body strongly armoured. All fingers are webbed at the base. Outer aspects of the limbs bear serrated fringes. Upper jaws bear 17 to 19 sharp teeth on each side (5 in each premaxilla). Adult crocodiles are dark olive, juveniles are pale with black spots.

*Distribution* : Its range includes India, Bangladesh, Iran, Nepal, Pakistan, and Sri Lanka. Marsh crocodiles are available in scattered populations over most of India, except the state of Jammu and Kashmir, Himachal Pradesh and Punjab in the extreme north-west and the north west desert region. The eastern limit of distribution extends beyond the Darrang district into Arunachal Pradesh. In India *C. palustris*, still occurs in small scattered and isolated population in many states like Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Madhya Pradesh, Maharashtra, Orissa, Gujarat,

Rajasthan, Uttar Pradesh, Bihar, Haryana, and West Bengal.

*Status* : Extremely endangered on account of Set net fishing. Egg predation for food by humans, mongooses, jackals, monitor lizards and sloth bears, hatchling predation by birds like herons and storks, Natural calamities like flooding and desiccation, Habitat destruction and Medical use of crocodile parts and their eggs by human beings.

Population has been depelted considerably throughout the range and present population rise is estimated to be around 5,000 in India. The best remaining populations are in Tamil Nadu (400 crocodiles) and Gujarat (200 crocodiles).

## Order 3. SQUAMATA

The order Squamata comprises three suborders namely Sauria (Lizards), Serpentes (Snakes) and Amphisbaenia (Limbless worm like reptiles). The present work covers lizards and snakes only.

## Suborder 1. SAURIA

Macartney 1803.

## Key to the families of suborder SAURIA of Gujarat.

Body dorsoventrally flat, covered with granule like imbricate scales, no symmetrical shields on the top of head. The digits are with adhesive pads. Eyes are devoid of movable lids, eyeball is covered with a transparent membrane. Teeth are pleurodont (emerging from the side of jaws). Tongue is fleshy, short, broad, protrusible, nicked anteriorly and is covered with villose papillae. Skull is devoid of temporal and postorbital arcades, parietals are paired and without parietal foramen. Vertebrae are amphicoelous. ....GEEKONIDAE

Body dorsoventrally or laterally compressed, covered with imbricate scales, no symmetrical shields on the top of head. Eyes are with movable lids. Teeth are acrodont (situated on the summit of the jaws), Pleurodont (emerging from the side of jaws) and are differentiated in

to 'incisor', canine and molars. Tongue is broad and short, smooth or covered with villose papillae, not protrusible. Skull is having temporal and postorbital arcades

.....AGAMIDAE

Body laterally compressed, covered with flat, rounded granular scales or tubercles. Eyes are large and move independently, the upper and lower eyelids are joined forming a complete ring around the eye with a small aperture at the centre. The feet have the digits permanently opposed in groups of two or three and are modified to form clasping organs. Teeth are acrodont, small and triangular. Tongue is clubshaped, sticky at the tip and rapidly extensible up to a distance of 15 cm. for catching the insects. Skull is having temporal and postorbital arcades. The ear is devoid of tympanum.....CHAMAELEONIDAE

Body is circular in cross section, covered with cycloid, overlapping scales, osteoderms are present under the scales of head and body, head with symmetrical shields above. The legs are short, in many species the legs are not present at all. Teeth are pleurodont. Tongue is short, feebly nicked anteriorly, covered with scale like papillae. Only temporal arcade is present

.....SCINCIDAE

Body dorsoventrally flat. covered with scales. On the head with osteoderms which generally fuse with the top of the skull, no osteodermal plates on the body. Legs are well developed. Teeth are pleurodont. Tongue is long and forked anteriorly. covered with scale-like papilla skull is having both the Temporal and post orbital arcades .....LACERTIDAE

Body stout. dorsoventrally compressed, covered with small scales. generally without osteoderms. The head is typically long. tail is very long and laterally compressed. Teeth are large. pointed, pleurodont. Tongue is very long, snake-like, forked, smooth and retractile. The temporal arcade is present but the postorbital arcade is incomplete. ....VARANIDAE

#### Family 7. GEKKONIDAE Smith 1935.

1817. *Ascalabotes* Cuvier, *Regne Anim.* ii, p. 44.

1966. *Gekkonidae*, Minton, *Bull. Amer. Mus. Nat. Hist.* 134, P. 72.

Family Gekkonidae is very ancient and comprises the group of highly specialised lizards exhibiting remarkable adaptive radiations, evolutionary history, distribution pattern, varied habitat selection, flexibility for change and a tendency to evolve in to new and more advance forms. These lizards are widely distributed in all the warmer parts of the world.

#### Key to the Genera of Family GEKKONIDAE

1. Digits feebly dilated  
.....*Cyrtodactylus*
2. Digits strongly dilated  
.....*Hemidactylus*

#### Genus 13. *Cyrtodactylus* Gray 1827

1827. *Cyrtodactylus* Gray. *Phil. Mag.* (2) ii p. 55  
(type *pulchellus*).

Head and body depressed. Head covered above with small granular scales. Digits are not dilated, clawed and cylindrical, dorsal scales of the body mixed with enlarged tubercles. Pupil verticle. Males are with or without preanal or femoral pores.

#### 16. *Cyrtodactylus kachhensis* (Stoliczka 1872).

1872. *Gymnodactylus kachhensis* Stoliczka. *P. Asiat. Soc. Beng.* P. 79 (type loc. Kutch).

1966. *Cyrtodactylus kachhensis* (Stoliczka), Minton. *Bull. Amer. Mus. Nat. Hist.* 134, p. 78.

Dorsum is light brown or gray; dark black spots on the back are most irregularly arranged; belly is whitish. The head is moderately large and depressed, covered above with minute granular scales intermixed with large keeled tubercles. The eyes are large, pupil vertically elliptical. Body is depressed, flattened dorsoventrally, with a distinct lateral fold, digits long, slender, toes elongate. Tail is slightly depressed, Males with 4 to 7 preanal pores arranged in a transverse series. Standard length 34-43 mm.; tail 40 mm.

*Distribution* : India : Gujarat (Kachchha)  
Elsewhere : Pakistan : Sind.

*Status* : These lizards are in abundance throughout their range.

Genus 14. *Hemidactylus* Oken 1817.

1817. *Hemidactylus* Oken. *Isis*, p. 1183.

1935. *Hemidactylus* Oken. Smith, *Fauna of British India* II Sauria, pp. 1-440.

Digits strongly dilated, lamellae beneath transversely divided; terminal phalanges compressed, free or united with the expanded portion, inner digit well developed with free clawed terminal phalanges; pupil vertical; males with preanal and or femoral pores.

Key to the Species of Genus *Hemidactylus*

1. Back with larger number of strongly keeled tubercles, arranged in longitudinal series; free distal phalanx of inner digit is half as long as the dilated portion.
  - (a) Lamellae under the digits are in a transverse series, 11-13 lamellae under the fourth toe; males with 19-25 femoral pores on each side  
.....*H. maculatus*
  - (b) Lamellae under the digits are in oblique series. 7-16 under the fourth toe.  
Males with preanal pores only. Back with large tubercles; digits free; 8-10 lamellae under the fourth toe; dorsum is with small dark spots or blotches; males with 7-16 preano-femoral pores. ....*H. brooki*
  - (c) Lamellae under the digits are in a semi transverse series; 8- 10 under the fourth toe; males with preanal pores only; free distal phalanx of inner digit not even half as long as the dilated portion.
- Back with small irregular scales mixed with large; round or oval strongly keeled tubercles; digits free; 9-10 lamellae under the fourth toe; dorsum is with dark-brown irregular spots; males with 6 preanal pores  
.....*H. porbanderensis*
11. Back with a smaller number of rounded, smooth or feebly keeled, irregularly arranged tubercles (missing in *H. garnoti*).

(a) Tail without lateral denticulations.

1. Inner toe more than half of length of second toe; males with 10-20 femoral pores on each side; 9-12 lamellae under the fourth toe; tail with enlarged tubercles above, swollen at the base  
.....*H. leschenaulti*
2. Inner toe more than half of length of second toe; males with 5-7 femoral pores on each side; 11-15 lamellae under the fourth toe; tail with enlarged tubercles above, swollen at the base .....*H. flaviviridis*

17. *Hemidactylus maculatus* Dum. & Bibr. 1836.

1836. *Hemidactylus maculatus* Dum. & Bibr. *Erp. Gen.* 3. p. 358 (type loc. Bombay).

1935. *Hemidactylus maculatus* Dum. & Bibr., Smith, *Fauna Brit. Ind.* 2, p. 85.

This giant gecko in which dorsum is brown with dark-brown spots, undulating transverse bars and streaks; belly is dirty- white. Head is large and prominent. with a bulging on the tip of snout; eye is moderately large with an vertical pupil; ear opening is small; head is covered with small granular scales intermixed with larger conical tubercles. Dorsum is with small juxtaposed scales and large trihedral tubercles, arranged in 18-20 regular longitudinal rows. Tail is longer than the head and body. Male with 19-25 femoral pores on each side. Standard length 83-122 mm.; tail length 90-130 mm.

*Distribution* : India : Gujarat : Surat, Dangs. Kerala : Malabar coast. Maharashtra : Bhaji caves, Karla, Khandalaghat, Khopoli in Poona district : Panchgani in Satara district. Tamil Nadu: Tinnevely Hills, Ramnad district and Salem.

*Status* : Common.

18. *Hemidactylus brooki* Gray 1848

1845. *Hemidactylus brooki* Gray *Cat. Liz. Brit. Mus.* p. 153 (type loc. Borneo)

1935. *Hemidactylus brooki*, Smith, *Fauna Brit. Ind.* 2. p. 89.

This moderately large gecko is with a light brown and dark-brown spotted dorsum; dirty white belly and with a dark streak along the side of head. Head is large, ovate, and prominent, eye is moderately large with an vertical pupil; ear opening is oval; head is covered with small granular and larger scales. Dorsum is with small granular scales mixed with conical, keeled tubercles, which are arranged in 16-20 longitudinal rows; digits are free, moderately dilated, with 5-6 oblique lamellae under the first and 6-10 under the fourth toes. Tail is much longer than the head and body. Male with 6-16 preano-femoral pores on each side generally interrupted mesially. Standard length 14-60 mm; tail length 17-75 mm.

*Distribution* : India : Widely distributed in whole of India. Elsewhere: Widely distributed in Sri Lanka, Borneo, Pakistan, Burma, South China, West Indies. Tropical Asia and Northern half of Africa.

*Status* : Very common.

19. *Hemidactylus leschenaulti* Dum. & Bibr.  
1836.

1836. *Hemidactylus leschenaulti* Dum. & Bibr.  
*Erp.Gen.* 3. p. 364 (type loc. Sri Lanka).

1985. *Hemidactylus leschenaulti*, Smith. *Fauna Brit. Ind.* 2, p. 97.

This large ashy grey gecko is with undulating crossbars or rhomboidal spots on the back; a black stripe emerges from behind the eye and extends up to flanks; belly is whitish. head is large with a broad snout: ear opening is subcircular; head is covered with small granular scales which becomes quite large near the snout. Dorsum is with small granular scales intermixed with few larger, rounded feebly keeled tubercles: digits are free. moderately dilated, with slightly oblique lamellae: 6-7 lamellae under the first and 9-11 under the fourth toe. Tail is almost equal to the head and body. strongly depressed. Male with 10-17 femoral pores on each side Standard length 32-83 mm. tail length 31-83 mm.

*Distribution* : India : Peninsular India: Gujarat (Dangs). Rajasthan. West Bengal. Elsewhere : Sri Lanka, Pakistan.

*Status* : Abundant.

20. *Hemidactylus flaviviridis* Ruppell 1835

1835. *Hemidactylus flaviviridis* Ruppell. *Neue Wirb. paun. Abyss.* p.18. pl.6, fig.2 (type loc. Massana Is. Eritree).

1935. *Hemidactylus flaviviridis* Smith. *Fauna Brit. Ind.* 2. p.98.

This large and robust gecko is with a pale-grey or greenish-grey, brown or olive dorsum; back is with wavy dark cross bands which are clearly visible during the day; belly is yellowish. Head is large with a broad snout; ear opening is subcircular; head is covered with minute granules; which become more prominent and large on the snout. Dorsum is with small granular scales intermixed with very few larger, rounded, feebly keeled tubercles; digits are free, moderately dilated; with oblique lamellae beneath; 7-10 lamellae under the first toe and 11-14 under the fourth. Tail is almost equal to the head and body strongly depressed. Male with 5-7 femoral pores on each side. Standard length 42-90 mm; tail length 38-90 mm.

*Distribution* : India : Whole of India, but widely distributed in north India above 20°N Also available in Pakistan, Iran & shores of the Red sea. Widely distributed in Gujarat.

21. *Hemidactylus porbandarensis* Sharma  
1981

1981. *Hemidactylus porbandarensis* Sharma. *Bull. Zool. Surv. India.* 1-2 4(1). p. 1 (type loc. port area. Porbandar, Junagarh District, Gujarat).

This small gecko is with a light grey dorsal back ground; back with dark brown, irregularly arranged spots, which are continuous on the dorsal aspect of tail and limbs; maximum concentration of these spots is on the neck, a dark streak along each side of head passing through the eye; belly is yellowish white. Head and body slender, slightly depressed.

*Distribution* : India : Port area, Porbandar, Junagarh district. Gujarat.

*Status* : Undeterminate.

Family 8. AGAMIDAE Gray 1827.

1825. *Stellionidae* Gray, *Ann. Phil.* (2) 10. p. 196.

1935. *Agamidae*, Smith. *Fauna Brit. Ind.* 2, p. 130.

All agamids are with well-developed limbs and long tail. Teeth are differentiated in to incisors, canines and molars. The tongue is broad and is a short fleshy structure and is not protrusible. The skull is much ossified and is with both the temporal and post orbital arcades. The eyes are generally well developed, with complete eyelids and a round pupil. The skin is without osteoderms and large symmetrical shields are not available on the head and belly.

#### Key to the Genera of family AGAMIDAE

1. Femoral pores are not present .....2
  - A. Body not depressed.
    - a. Only four toes are present .....*Sitana*
    - b. Toes are five in number.
      - Tympanum is present : always exposed.
      - Tympanum exposed; dorsal scales are equal in size, regularly arranged; dorsal crest is present; tail of male is rounded and swollen at the base .....*Calotes*
  - B. Body is depressed.
    - Tympanum exposed; males are with callose preanal scales; a transverse gular fold is present; dorsal crest is not present .....*Agama*
2. Femoral pores are present.
  2. Body depressed, dorsal crest is not present; dorsal scales small, uniform, smooth, with or without scattered large scales on the back; ventral scales subquadrangular, smooth; gular scale rounded, much smaller than the ventrals; tail with whorls of large spinose scales; 12-18 femoral pores on each side.....*Uromastix*

#### Genus 15. *Sitana* Cuvier 1829

1829. *Sitana* Cuvier, *Regne Anim.* 2nd ed. 2, p. 43. (type *ponticeriana*).
1935. *Sitana*, Smith, *Fauna Brit. Ind.* 2, p. 144.

The body is compressed, dorsum is with regularly arranged keeled scales, which are smallest on the lateral aspects of the body; dorsal crest is not present; limbs long, with five fingers and four toes. Males are with a large folding gular appendage which extends

backwards on to the belly, tympanum is clearly visible, not covered with scales. Femoral and preanal pores are not present.

#### 22. *Sitana ponticeriana* Cuvier 1844.

1644. *Sitana ponticeriana* Cuvier, *Regne Anim.* 2nd ex. 2, p. 43 (type loc. Pondicherry).
1935. *Sitana ponticeriana*, Smith, *Fauna Brit. Ind.* 2, p. 144.

This is a small agamid lizard, brown above, with a series of drak-brown, black margined, rhomboidal, vertebral spots on the back; the throat fan in male is brilliantly coloured in red, blue and black; belly is whitish. Head scales unequal, strongly keeled; dorsal scales large, strongly keeled; lateral scales small, uniform, upper ones pointing upwards and backwards; limbs long, with uniform, strongly keeled scales, only four toes are present, fourth toe longest, fifth toe is absent. Tail is extremely longer than the head and body. Standard length 40-80 mm; tail length 60-170 mm.

*Distribution* : India : Whole of India but not reported east of Ganga. In Gujarat recorded from Jamnagar, Rajkot, Kachchha, Surat, Dangs, Junagadh, Panchmahals and Wagai districts. Elsewhere : Srilanka, and Thar-Parkar district in Pakistan.

*Status* : Rare.

#### Genus 16. *Calotes* Rafinesque 1815

1815. *Calotes* Rafinesque, *Anal. Nat.* p. 75 (nom. nud.)
1935. *Calotes* Smith, *Fauna Brit. Ind.* 2, p. 180.

These agamids are with compressed body; dorsal scales are regularly arranged, uniform; a dorsal crest is generally present, in some cases is less developed as mere denticulations; gular sac is generally available; an oblique fold or pit is generally present with the exception of few species where such structures are missing. tympanum is open, not covered with scales. Tail is comparatively longer, slender, in males swollen and rounded at the base, the scales on the swollen and rounded basal part are enlarged and thickened; femoral and preanal pores are not present.

Key to the Species of Genus *Calotes*

- A. No fold or pit in front of the shoulder.  
 — Colour is brown; 35-82 scales round the body; two erect and separated spines above the tympanum; no erect row of scales by the side of neck; snout is long.  
 .....*Calotes versicolor*
- B. A long fold is present in front of the shoulders, which extends across the throat; two spines on each side of the back of the head.
1. Dorsal crest is a mere denticulation; no spine behind the supercilium; 50-60 scales round the body; no white spot below the eye, colour is olive-brown above  
 .....*Calotes rouxi*

23. *Calotes versicolor* (Daudin 1802)

1802. *Agama versicolor* Daudin, *Hist. Nat. Rept.* 3, p. 395, pl. 44. (type loc. India).

1935. *Calotes versicolor*, Smith, *Fauna Brit. Ind.* 2, p. 189.

The body is compressed, dorsal colour light-brown greyish, transverse spots on back and sides, dark streak from eyes; head is large, swollen at angle of jaws in males; eye large; males with gular sac; limbs long well developed; digits long, slender, slightly compressed laterally, strongly clawed; tail almost round, slender. Head scales irregular, a dorsal crest is present, which is more prominent in males. Standard length 86-129 mm.; tail length 300-350 mm.

*Distribution* : India : whole of India widely distributed in Gujarat. Elsewhere: Sumatra to South China, Sri Lanka, Pakistan, Afghanistan.

*Status* : Most common, throughout its range.

24. *Calotes rouxi* Dum. & Bibr. 1837.

1837. *Calotes rouxi* Dum. & Bibr., *Erp. Gen.* 4, p. 407 (type loc. India).

1935. *Calotes rouxi*, Smith, *Fauna Brit. Ind.* 2, p. 206.

The body is dwarfed, cheeks swollen in adult male. Dorsal colour is olive-brown; head, nape and gular pouch red; side of head and neck banded with brown; antehumeral fold black; dark brown lines radiate from the eye; belly is brownish. Head is moderately large; gular pouch is very small, missing in the female; a long oblique, curved fold in front of the shoulder, extends across the throat, covered with small granular scales; limbs are moderately developed, slender, tail is long, slightly compressed, in adult male swollen at the base. Head scales unequal, strongly keeled. Standard length 29-77 mm.; tail length 49-170 mm.

*Distribution* : India : Western coastal areas from Bombay to Kerala. (Matheran, Kandala, Kanara, Jog, Goa and Malabar). Recorded from Dangs district in Gujarat.

*Status*: Vulnerable on account of habitat destruction.

Genus 17. *Agama* Daudin 1802.

1802. *Agama* (in part) Daudin, *Hist. Nat. Rept.* 3, p. 333 (type *Lacerta agama* Linn.)

1935. *Agama* Smith, *Fauna Brit. Ind.* 2, p. 211.

The head and body are depressed; head may be short or elongate; tympanum is not covered with scales, distinct, may be large or small, dorsal crest may be altogether absent or feebly developed; gular sac may be present or absent; there is a fold in front of the shoulders which is generally united with a transverse gular fold; dorsal scales may be uniform or may be intermixed with large scales; toes may be longer or shorter. In many species both preanal and abdominal scales are available, in many species only callose preanal scales are available and in *Agama minor* both are absent.

25. *Agama minor* Hardwicke & Gray 1827.

1827. *Agama minor* Hardwicke & Gray, *Zool. Journ.* 3, p. 218 (type loc. Chittagong).

1935. *Agama minor*. Smith, *Fauna Brit. Ind.* 2, p. 225.

Head is high and large but short, body is feebly depressed tympanum small, deeply

sunk. Dorsal colour is olive-brown, with three rows of dark-brown light-edged spots on the back and base of the tail. Upper head scales large, unequal strongly keeled or tubercular; a short oblique fold in front of the shoulder, not extending across the throat, nuchal and dorsal crests are present but are not well developed. Limbs are short, toes shorter, not compressed. Tail is shorter than the head and body, rounded, slightly compressed, not annulated. Standard length 53-90 mm.; tail length 45-86 mm.

*Distribution* : India : Gujarat (Veraval and Kachchha), Madhya Pradesh, Uttar Pradesh, Elsewhere : Pakistan.

*Status* : Vulnerable, on account of habitat destruction and urbanisation for man.

#### Genus 18. *Uromastix* Merrem 1820.

1820. *Uromastix* Merrem, *Tent. Syst. Amphib.* p. 56 (type *spinipes*).

1935. *Uromastix*, Smith, *Fauna Brit. Ind.* 2, p.242.

Body is depressed, no crests are present, dorsum is with small scales which are uniform or intermixed with the larger scales; gular sac is not available, tympanum is distinctly open. Tail short, depressed, covered with whorls of spinose scales; preanal and femoral pores are present.

#### 26. *Uromastix hardwicki* Gray 1827

1827. *Uromastix hardwickii* Gray, *Zool. Journ.* 3, p. 219 (type loc. Kanauj district, U.P.)

1966. *Uromastix hardwicki*, Minton, *Bull. Amer. Mag. Nat. Hist.* 134, p. 90.

Dorsum is sandy-brown or yellowish-brown, with dark-brown reticulation, throat white, with dark-brown spots; belly is white, a dark blue spot in the groin region.

The body is dorsoventrally depressed head is small and broad behind; snout blunt; eyes small; nostril is large; ear-opening is like a vertical slit, as large as the eye, deeply sunk, anterior margin of the ear-opening slightly denticulate. Upper head scales are not equal, smooth or obtusely keeled. Preano-femoral pores are 12-18 on each side. Standard length 168-240 mm.; tail length 143-207 mm.

*Distribution* : India : Andhra Pradesh, Gujarat, Uttar Pradesh, Rajasthan. Elsewhere: Pakistan.

*Status* : Endangered on account of excessive killing by man for its fat, meat and skin.

#### Family 9. CHAMAELEONIDAE Gray 1825.

1825. *Cameleonidae* Gray, *Ann. Phil.* (2) 10, p. 200.

1966. *Chamaeleonidae* Minton, *Bull. Amer. Mus. Nat. Hist.* 134, p. 98.

The family includes highly specialised arboreal, insectivorous, diurnal lizards. The body is laterally compressed; the skin is granular suitable for quick and extensive colour change; the teeth are compressed, small, triangular, tricuspid, uniform, acrodont the palate is toothless; the tongue is club-shaped, sticky at the tip and quickly extensible up to a distance of 15- 20 cm. for catching the insect prey; the skull is strongly ossified, typically diapsid and both the temporal and post- orbital arcades are well developed. The feet are with the digits permanently opposed in groups of two and three for grasping; the tail is prehensile; the eyes are large and move independently; the upper and lower eyelids are fused and form a complete ring around the eye a small opening at the centre; the ear is devoid of tympanum and tympanic cavity.

#### Genus 19. *Chamaeleo* Laurenti 1768.

1763. *Chamaeleon* Gronovius, *Zooph. Anim.* 1. p. 12 (type *Lacerta chamaeleon* Linn.).

1966. *Chamaeleo*, Minton, *Bull. Amer. Mus. Nat. Hist.* 134, p. 98.

The genus *Chamaeleo* is with simple claws; scales on the soles are smooth; tail is prehensile at least as long as the head and body.

#### 27. *Chamaeleo zeylanicus* Laurenti 1768.

1768. *Chamaeleo zeylanicus* Laurenti, *Syn. Rept.* p. 46 (based on Seba, 1, pl. 82, fig. 3, type loc. not given, probably Sri Lanka).

1966. *Chamaeleo zelanicus* Minion. *Bull. Amer. Mus. Nat. Hist.* 134. p.99.

The skull of this green coloured species is strongly ossified. anterodorsal crest is most prominent; which bends slightly on the posterior direction and from a army cap like structure called as casque; tympanum is not present; the eyes are large, opening for the pupil is just like a transverse slit otherwise the whole eye is covered by a lid; eyes have the power of independent movement and they can revolve in all direction like a search light. The tongue is cylindrical and extremely extensive, and is made up of extremely elastic tissue, its anterior end is club shaped almost like a cup at the tip and provided with a viscid secretion: The tongue is fixed on the hyoid apparatus like a coiled spring. when fully extended it exceeds the standard length of the lizard. It can be shot out with marked speed and most accuracy. The Indian chamaelon has got a remarkable power of changing its colour. The hands and feet have been modified for clasping. Claws are simple, scales on the soles are smooth, tail is prehensile at least as long as the head and body. Head and body covered with uniform flat granular tubercles dorsal crest is low serrated. Male is with a spur like tarsal process. Standard length 175 mm.: tail length 200 mm.

**Distribution** India : Peninsular India. Gujarat (Kachchha and Banaskantha districts). Sri Lanka.

**Status** : Endangered in India on account of the habitat loss. due to urbanisation for man.

#### Family 10. SCINCIDAE Gray 1825.

1825. *Scincidae* Gray. *Ann. Phil.* 26. p.201 (in part).

1935. *Scincidae* Smith *Fauna Brit. Ind.* 2. p.254.

The family includes the terrestrial lizards which are cosmopolitan in distribution, generally inhabiting the warmer parts of the world.

The body is subcylindrical and almost circular in cross section without showing marked distinction between the head and body, head is generally in continuation with the body

without any evidence of neck. The scales are overlapping and the body limbs and tail are protected with osteoderms; the head is covered with symmetrical shields; the pupil is round; lower eyelid is generally with a transparent disc.

The tongue may be short or moderately long; covered with imbricate scale like papillae, feebly nicked anteriorly. Limbs may be present or absent. Legs are markedly short and exhibit different degrees of reduction in different species; many species have lost their limbs completely but the vestiges of pectoral and pelvic girdles are always present. The tail may be long or reduced: extremely fragile but regenerates quickly. Generally these lizards are oviparous but many (four) species exhibit vivipary also.

#### Key to the Genera of family *Scincidae*

1. Union of palatine bones takes place at the mid- line of the palate.
  - (a) Pterygoid bones are not touching one another, supranasals are present; limbs are well developed.....*Mabuya*
  - (b) Pterygoid bones are in contact anteriorly; limbs are well developed.
    1. Tympanum is distinct but sunk.
      - lower eyelid with a very large semitransparent disc which is fused with the upper eyelid; no supranasals. .... *Ablepharus*
    - (c) pterygoid bones are in contact: limbs short, vestigial or absent.
      1. Limbs short or vestigial; lower eyelid scaly or with a semitransparent disc. .... *Riopa*
  11. Union of palatine bones not taking place at the mid- line of the palate.
    - (a) Nostril in the nasal or between the nasal and supranasal.
      1. Limbs pentadactyle, without denticulation ..... *Eumeces*
      2. Limbs very small, fingers and toes are 3 in number; body elongated. .... *Ophiomorus*

Genus 20. *Mabuya* Fitzinger 1826.1815. *Mabuya* Rafinesque, *Anal. Nat.* p. 76. n.n.1935. *Mabuya* Smith. *Fauna Brit. Ind.* 2.p. 257.

Eyelids are movable. the lower eyelid may be with or without a transparent disc; ear is distinct, tympanum in most cases deeply, sunk. Limbs are well developed, pentadactyle, digits subcylindrical or compressed, with transverse subdigital lamellae. Snout is obtusely pointed.

Key to the species of genus *Mabuya*

Lower eyelids scaly.

1. 28-30 scales round the middle of body; dorsal scales with 5-9 strong keels; 12-17 lamellae under the fourth toe  
.....*M.macularia*
2. 30-34 scales round the middle of body; dorsal scales with 5-7 moderate keels; 14-18 lamellae under the fourth toe.  
.....*M.carinata*

28. *Mabuya macularia* (Blyth 1853)1839. *Euprepes sebae* (in part) Dum. & Birb. *Erp. Gen.* 5.p. 692.1935. *Mabuya macularia* Smith *Fauna Brit. Ind.* 2.p, 264.

The skink is brown olive or bronzy. with or without longitudinally arranged black spots; light dorsolateral stripe is always present, sides of neck and flanks dark- brown. generally spotted with white. Lower eyelid scaly; dorsal and lateral scales are almost equal. with 5-9 keels; 28-34 scales round the middle of the body; digits moderately long. with 12-17 obtusely keeled lamellae beneath the fourth toe. Standard length 60-75 mm., tail length 110-140 mm.

*Distribution* : India: whole of India In Gujarat recorded from Kachchha, Broach, Dangs district. *Elsewhere* : Burma, Pakistan, Thailand, North Vietnam, South Vietnam, Malaysia.

*Status* : Very common every where.

29. *Mabuya carinata* (Schneider 1801)1801. *Mabuya carinata* (in part) Schneider. *Hist. Amphib.* 2. p. 183 (type loc. not given)1935. *Mabuya carinata* Smith, *Fauna Brit. Ind.* 2.p.266.

The skink is olivaceous brown or of shining bronze colour dorsally; back and antero- dorsal portion of the tail is with dark brown spots or longitudinal lines along the lateral margins of the scales: lateral aspects are dark brown or slightly lighter in colour; generally with brown spots; two somewhat lighter dorsolateral stripes are present; belly is yellowish white. Dorsal and lateral scales are almost equal, with 3-5, prominent keels; 30-34 scales round the middle of the body; digits are moderately long, with 14-18 smooth or obtusely keeled lamellae beneath the fourth toe. Standard length 125 mm: tail length 165 mm.

*Distribution*: India: Indian peninsula. Gujarat (Junagarh, Jamnagar and Dangs district.) Assam, Bengal. *Elsewhere* Sri Lanka, Nepal.

*Status* : Very common.

Genus 21. *Ablepharus* Fitzinger 18231823. *Ablepharus* Fitzinger, in Lichtenstein, *Ver. Doub. Zool. Mus. Berlin.* p. 103 (type *pannonicus* = *brandti*)1935. *Ablepharus* Smith, *Fauna Brit.Ind.* 2.p.309.

Both the eyelids are fused resulting in the formation of a transparent eye cap or disc. Head shields are fused. Ear may be distinct or hidden. Scales of body are smooth; limbs more or less developed, digits 5, 5 or reduced in number.

30. *Ablepharus grayanus*  
(Stoliczka 1872)1872. *Blepharosteres grayanus* Stoliczka, *P. Asiat. soc. Beng.* p.74 (type loc. Wagger district, N.E. Cutch).1966. *Ablepharus grayanus* Minton. *Bull. Amer. Mus. Nat. Hist.* 134. p.103.

This tiny skins is greenish olive above with a shining metallic lustre, speckled dorsoventrally with dark brown; a silver green line emerge from the supraciliary margin and goes to the base of the tail, this line is with a black margin on both sides; dorsal aspect of the limbs with faint longitudinal lines; belly is greenish-white; tail is somewhat pinkish. Snout is short and obtusely pointed. Scales round the middle of the body 18-20 dorsal scales are largest; limbs short and pentadactyle; underside of the tail is with transversely enlarged plates. Standard length 30 mm. tail length 55 mm.

*Distribution:* India : Gujarat : Kachchha district. Rajasthan, (Mt. Abu). *Elsewhere* Pakistan (eastern Baluchistan, Punjab, North west frontier provinces).

*Status:* Common.

#### Genus 22 *Riopa* Gray 1839

1839. *Riopa* Gray, *Ann. Mag. Nat. Hist.* 2, p. 332 (type *Lygosoma punctata*)

1935. *Riopa* Smith. *Fauna Brit. Ind.* 2. p. 312.

Frontonasal shield is broader than long; prefrontal shields are quite separated from one another; parietal shields are large and in contact with one another behind the interparietal; supraoculars are 4, quite large; palms of hands and soles of feet with conical tubercles, tail tapering to a point, eyelid are well developed the lower eyelid may be scaly or in certain species with a transparent disc. Ear opening is distinct, tympanum deeply sunk; limbs short or vestigial.

#### 31. *Riopa punctata* (Linnaeus 1766)

1766. *Lacerta punctata* Linnaeus, *sys. Nat.* p.369 (type loc. Asia)

1966. *Riopa punctata* Minton, *Bull. Amer. Mus. Nat. Hist.* 134, p.104.

The dorsum is brown, each scale is with a dark basal spot. which form longitudinal series and in juveniles and semiadult individuals confluent into 4-6 lines down the back; a yellow dorsolateral stripe start from the snout; belly is yellowish white, each scale dotted with black;

tail is red in young lizards. Snout obtusely pointed; lower eyelid is with an undivided semi-transparent disc. Body scales are smooth. almost equal, 24-28 scales round the body, 62-76 down the middle of the back. Digits long fourth toe is longer than the third. 11-14 keeled lamellae under the fourth toe. Tail swollen at the base, slightly longer than the head and body. Standard length 85 mm. tail length 92 mm.

*Distribution:* India : Almost whole of India including Gujarat. *Elsewhere* Sri Lanka and Manson Mountain, Tonking.

*Status:* Most common.

#### Genus 23. *Eumeces* Wiegmann 1834

1834. *Eumeces* (in part) Wiegmann. *Herp. Mex.* p. 36 (type *pavimantatus* = *schneideri*).

1935. *Eumeces* Smith, *Fauna Brit. Ind.* 2.p.337.

The snout is obtusely pointed. slightly longer than the orbit; Scales of the body are quite smooth. Eyelids are well developed lower eyelid is scaly; Limbs are well developed, pentadactyle, digits are with the transversely enlarged subdigital lamellae.

#### 32. *Eumeces taeniolatus* (Blyth 1854)

1854. *Eurylepis taeniolatus* Blyth, *J. Asiat. Soc. Beng.* 23.p.470 (type loc. salt Range Punjab, Pakistan).

1935. *Eumeces taeniolatus* Smith *Fauna Brit. Ind.* 2.p.342.

The dorsum of this mole skink is sandy to light bronze, richly speckled with cream colour, three dark brown stripes enclosing the pale spots, tail variegated with black brown or grey, lower parts including the belly are shining yellow. Head is small; lower eyelids are scaly; ear opening is like a vertical slit. Scales round the middle of body are 20-23; limbs and toes are short, tail round and thick at the base, longer than the head and body. Standard length 120-150 mm., tail length 180 mm.

*Distribution* India: Gujarat (Kachchha district), Rajasthan, Kashmir, *Elsewhere* Arabia to Transcaspia, Pakistan.

*Status:* Nowhere common but not endangered.

### Genus 24. *Ophiomorus*

The genus comprises the serpentine skinks with degenerated limbs, much reduced in size, with three or four digits, head small and wedge shape, lower jaw countersunk.

#### 33. *Ophiomorus raithmai* Anderson & Leviton 1966

1872. *Sphenocephalus tridactylus* Stoliczka, *Proc. Asiat. Soc. Beng.* pp.76 & 88.

1966. *Ophiomorus raithmai*. Anderson and Leviton, *Proc. Calif. Acad. Sci.* 33(16) p.519 (type loc. Ghizri, Karachi district Sind, Pakistan.)

Dorsal colouration is creamy or pale brown, each of the 8 or 10 dorsal and dorsolateral longitudinal scale rows are with a dark brown line composed of discrete dots extending from the nape to the level of the hind limbs, dorsal aspect of hind limbs is with brown dots; ventrum is immaculate cream or tan. Standard length 63-99 mm., tail length 43-58 mm.

*Distribution* The sandy arid areas of southern and eastern Pakistan and north western India (western Rajasthan, Kachchha in Gujarat) The species comprises a distinct population, inhabiting Pakistan east of Sulaiman range and Punjab. The species widely distributed in the Barmer, Jodhpur, and Nagour districts of Rajasthan.

*Status* : Common.

### Family 11. LACERTIDAE Gray 1825

1825. *Lacertinidae* Gray. *Ann. Philos.* 26.p.200.

1935. *Lacertidae* Smith *Fauna Brit. Ind.* 2.p.363.

This family during recent times is confined to the parts of the old world and mostly comprises the terrestrial, ground dwelling lizards, which prefer to live in open rocky or

sandy places. The body is covered with scales, the head scales have osteoderms, which in most species fuse with the top of the skull. The head is quite distinct from the neck. Limbs are always well developed and the tail is quite long. The tongue is long, deeply notched anteriorly. Teeth are pleurodont (born on the sides of the jaws); hollow at the base. Head is covered with symmetrical shields and the ventral and dorsal scalation is distinctly differentiated. Femoral organs are present in most species.

### Key to the Genera of family LACERTIDAE

1. Dorsal scales are 26-36 across the middle of the body: 14-20 medium dorsal scales are much larger strongly keeled, overlapping; nostril between the two nasals and the first labial; digits are fringed laterally..... *Acanthodactylus*
2. Dorsal scales are pointed strongly keeled and overlapping, a fold is available in front of the shoulder, no distinct collar is present; lower eyelid is with a large semitransparent disc, completely fused with the upper eyelid (which is extremely small or vestigial), nostril is between 2-4 nasals..... *Ophisops*

### Genus 25. *Acanthodactylus* Wiegmann 1834

1834. *Acanthodactylus* Wiegmann *Herp. Mex.* p.10 (type *Lacerta boskiana* Lichtenstein)

1935. *Acanthodactylus* Smith *Fauna Brit. Ind.* 2. p.370.

Head shields normal; lower eyelid is scaly, collar is distinct; dorsal scales are small and juxtaposed. Ventral plate like shields are subquadrangular smooth and imbricate; digits are subcylindrical with keeled lamellae below and a distinct lateral denticulation, Femoral pores are available.

#### 34. *Acanthodactylus cantoris cantoris* Gunther 1864

1864. *Acanthodactylus cantoris* Gunther *Rept. Brit. Ind.* p. 73 (type loc. Ramnagar)

1935. *Acanthodactylus cantoris cantoris* Smith, *Fauna Brit. Ind.* 2.p.371.

The dorsum of juveniles and semiadults is with black and white longitudinal streaks. 5 white streaks on the nape 4 or 5 on the middle of back and three on the base of tail, a light lateral denticulated streak starting from the ear and terminating at the groin, head with black symmetrical markings; upper lip is with black vertical bars which in some individuals extend up to the temple. Limbs with large round light black or dark brown spots, in many examples the tail is blue, the streaks are generally retained by the adults also but the males are generally greyish on brownish, uniform or with round, light dark edged spots; lower parts are white. Snout acuminate; nasal shields swollen. 26-36 dorsal scales across the middle of the body; ventral plates in regular longitudinal and transverse series, The hind limb reaches to between ear and the collar in the male, to between the collar and the axilla in the female. Fourth toe with well developed lateral denticulation. Caudal scales large. Standard length 64-76 mm., tail length 115-185 mm.

*Distribution* : India : Gujarat, Jamnagar, Junagarh, and Kachchha districts. Haryana, Punjab, Rajasthan, Uttar Pradesh, Elsewhere Pakistan, Eastern Iraq, Saudi Arabia, Southern Afghanistan and Iran.

*Status* : Very common.

#### Genus 26. *Ophisops* Menetries 1832.

1832. *Ophisops* Menetris, *Cat. Rais.* p.63(type *elegans*).

1935. *Ophisops* Smith *Fauna Brit. Ind.* 2.p.376.

Nasal shields are in contact with one another. Head shields are normal; eyelid is with a very large transparent disc, completely fused with the upper eyelid, dorsal scales are pointed, imbricate and smooth; subdigital lamellae are sharply keeled. Tail is cylindrical. Femoral pores are available.

#### Key to the species of Genus *Ophisops*

1. Upper head shields are rugose, keeled and striated.
- Only one frontonasal is present; 28-35 scales round the middle of the body .....*O. jerdoni*

11. Upper head shields are smooth; 56-66 scales round the middle of the body; snout as long as the breadth of the head across the eyes. ....*O. microlepis*

#### 35. *Ophisops jerdoni* Blyth. 1853.

1853. *Ophisops jerdonii* Blyth. *J. Asiat. Soc. Beng.* 22, p. 653 (type loc. Mhow, Indore, Madhya Pradesh).

1935. *Ophisops jerdoni*, Smith, *Fauna Brit. Ind.* 2, p. 377.

The dorsum is olive-brown, golden or greyish with a golden tinge; with two golden lateral stripes, the upper is extending from the supraciliary margin to the tail, the lower strips borders the upper lip and extends along the flanks to the base of the hind- limb; the space between the two stripes and the upper margin of the upper stripe is densely spotted with black, belly is yellowish white. Upper head shield strongly keeled and striated, smooth in juveniles, dorsal scales are almost equal, rhomboidal, almost as large as the caudal, ventral plates are in 6 longitudinal and 23-29 transverse series; 28-35 scales round the middle of the body; 6-12 femoral pores are available on each side. Standard length 45 mm; tail length 90 mm.

*Distribution* : India : Andhra Pradesh, Maharashtra, Gujarat (Jamnagar, Rajkot and Kachchha district) Madhya Pradesh (Sarai, Rewa), Rajasthan, Tamil Nadu, Elsewhere: Pakistan.

*Status* : Commonly available in various localities of its range.

#### 36. *Ophisops microlepis* Blanford 1870.

1870. *Ophisops (Gymnops) microlepis* Blanford, *J. Asiat. Soc. Beng.* 39, p. 351, pl. 15, figs. 1-5 (type loc. Korba, Bilaspur, Madhya Pradesh).

1935. *Ophisops microlepis*, Smith, *Fauna Brit. Ind.* 2, p. 380.

The dorsum is olive-greenish or brownish; a light dorso-lateral stripe starts from behind the supraciliary edge and extends on the base of the tail; it is bordered above with black, or black spots; a second stripe, much less distinct passes along the upper lip and along the flanks

as far as the base of the hind-limb; sides of neck and flanks are densely spotted with black and white; ventrum is greenish white; in the juveniles the tail is red; the juveniles are brownish, with the most distinct stripes and bordered with black. Snout elongated and pointed; 56-66 scales round the middle of the body; a large preanal plate is generally present; digits have very sharply keeled scales beneath, 12- 16 femoral pores on each side; tail is cylindrical, long and tapering to a point. Standard length 65 mm.; tail length 145 mm.

*Distribution* : India : Bihar, Gujarat, Madhya Pradesh, Rajasthan.

*Status* : Vulnerable on account of habitat loss.

#### Family 12. VARANIDAE Gray 1827.

1827. *Varanidae* Gray, *Phil. Mag.* 2, p. 54.

1935. *Varanidae*, Smith, *Fauna Brit. Ind.* 2, p. 397.

The body of the monitor lizard is strong, with well developed limbs and is covered with small scales generally devoid of the osteoderms. The head is quite long and the tail is very long not fragile and laterally compressed. Tongue is smooth, very long and slender, bifid, retractile in to a sheath at the base, as found in snakes. Eyes are moderately large, pupil is round, eyelids are well developed. Head is covered with small juxtaposed scales; back with rounded or oval scales, surrounded by rings of granules, except in the juveniles (in which they are not developed); ventral scales are quadrangular, arranged in transverse series. Preanal pores are present.

#### Genus 27. *Varanus* Merrem 1820.

1818. *Monitor* (not of Blainville, 1816) Lichenstein, *Zool. Mus. Univ. Berlin*, ed. 2, p. 66 (type *niloticus*).

1935. *Varanus*, Smith, *Fauna Brit. Ind.* 2, p. 398.

#### 37. *Varanus bengalensis* (Linnaeus 1758)

1758. *Lacerta monitor* Linnaeus, *Syst. Nat.* ed. 10, p. 201.

1966. *Varanus bengalensis*, Minton, *Bull. Amer. Mus. Nat. Hist.* 134, p. 112.

Dorsal colouration of juveniles is dark olive, with transversely arranged dull spots or ocelli, ventrum is whitish, with thin dark transverse bars. Grown up adults are brownish or olive dorsally, generally speckled with black; throat is with numerous black spots; ventrum is yellowish. The head is long and narrow, neck is long, snout is pointed, lateral fold on neck is well developed; lateral fold on body is feeble, ear-opening is like an oblique slit, teeth are acute and slightly compressed, scales of neck, back and belly are sub-equal, abdominal scales are smooth, in 90- 110 transverse rows; scales at middle of body are in 132-176 rows. Limbs are long and strong, digits are elongate. Tail is strongly compressed laterally, with a low double-toothed crest of scales above except at its base and tip. Standard length 280-750 mm., tail length 475-1000 mm.

*Distribution* : Whole of India including Gujarat; Burma; Sri Lanka ; Pakistan (Waziristan and most of other parts); Nepal and Uzbekistan.

*Status* : Endangered, as they are killed in large numbers for their skin and flesh.

#### Suborder 2. SERPENTES Linnaeus 1758.

1758. Linnaeus, *Syst. Nat.* 10th ed. i. : 214.

1943. Smith, *Fauna Brit. Ind.* 3 : 39.

Limbs and girdles are not present in most of the species but in Boids these are represented by certain rudimentary structures; body is tubular and much elongated covered with ungranulated overlapping scales; tail exhibits great variations in length; snakes are devoid of eyelids and nictitating membrane and a well developed transparent spectacle is developed over the eye, external ear opening is missing, the tongue is suitably retractile with in a sheath, is a olfactory organ and conjugates with Jacobson's organ; teeth are pointed, sharp and recurved, replaced after certain interval and in most species are born by the maxilla, palatine, pterygoid and dentary; in certain species teeth are carried out by unpaired premaxilla also; teeth on jaws are pleurodont; most of the bones

of skull (including the palatal region) are having most flexible and movable articulations which renders in forming a utmost large gape while swallowing a large prey; there is a considerable reduction in the number of skull bones; left lung is either rudimentary or altogether missing; locomotion is effected by lateral undulations of dorsal musculature, sidewinding and rectilinear crawling. Gujarat snakes are divided in to 8 families.

#### Key to the Families

- I. Skull is devoid of ectopterygoid and supratemporal; prefrontal and nasal bones are suturally articulated; coronoid bone is present; maxilla bone is transversely located, loosely attached and bear teeth; mandibles are devoid of teeth; vestiges of pelvis are present. ....TYPHLOPIDAE
- II. Coronoid bone is present; prefrontal articulates with nasal.
  - A. Skull is with ectopterygoid, supratemporal and other bones of palate; both jaws are with teeth; supratemporal articulates with the cranium like a scale, completely suspending the quadrate, fascial bones are movably articulated. Vestiges of hind-limbs are present. ....BOIDAE
  - B. Skull is devoid of supratemporal; tail is very short, blunt and covered with modified scales; Vestiges of limbs are not present .....UROPELTIDAE
- III. Coronoid bone is not present.
  - A. No poison fangs in front of the jaw: premaxillae are devoid of teeth: prefrontal not in contact with nasal: fascial bones movable; a mental groove is present.
    1. Ventral shields are distinct .....COLUBRIDAE
    2. No ventral shields; complete body is covered with small granular or tuberculate juxtaposed scales .....ACROCHORDIDAE
  - B. Poison fangs are present in front of the mouth; anterior most maxillary teeth are grooved or tubercular.
    1. Maxillary bone is with teeth behind the fangs: tail cylindrical, loreal not present; pupil round; ventrals almost as broad as the body .....ELAPIDAE

2. Maxillary bone is with teeth behind the fangs; tail is vertically compressed. peddle shaped pupil round .....HYDROPHIIDAE
3. Maxillary bone is quite short, bearing fangs only; pupil vertical, Ventrals almost as broad as the body .....VIPERIDAE

#### Family 13. TYPHLOPIDAE Gray 1845

1845. *Typhlopidae* Gray *Cat. Liz. Brit. Mus.*: 130

1943. *Typhlopidae* Smith *Fauna Brit. Ind.*: 41

Worm like cylindrical body is covered uniformly with cycloid scales; eyes are minute but distinct covered by enlarged shield like scales; mouth is quite small and ventrally situated; mandibles are devoid of teeth; Vestiges of the pelvic girdle are available.

#### Genus 28. *Typhlops* Oppel 1811

1811. *Typhlops* Oppel, *Ordn. Rept.* 54 (type *lumbricalis*)

1977. *Ramphotyphlops* Stimson, *Bull. Zool. Nomecl.*, 33 : 204.

Worm like burrowing snakes; head not differentiated from the tubular body; mouth is small and inferior; tail is quite small and bears a terminal spinous hook which helps the snake in locomotion; supralabials are 4 in all the species. In Gujarat following 3 species of this genus are available.

#### 38. *Typhlops braminus* (Daudin, 1803) COMMON BLIND SNAKE, WORM SNAKE

1803. *Eryx braminus*. Daudin *Hist. Nat. Rept.* 7 : 279 (based on Russell, 1796 *Ind. Serp. i* : 48, pl. 43, *Vizagapatam*).

1985. *Ramphotyphlops bramina* Murthy, *The snakes*, 17:58.

Maximum length 190 mm; nostril are lateral in position; eyes are minute but distinct situated in the ocular shield or at its junction with the supraocular; scales round the body are 20; total length of the snake is between 30-45 times of the diameter of its body; 290-320

transverse rows of scales on the whole body length; tail is short, ending into a fine point like hook. Dorsal colouration is brownish to black; ventrum is light brown, snout, anal portion and the end of the tail is somewhat whitish.

*Distribution* Gujarat : Gandhinagar, Ahmedabad, Bharoch, Vadodra, Junagarh, Jamnagar, Surat, and Dangs districts. *Elsewhere* : Whole of India, Burma, Sri Lanka, East Indies, North Vietnam, South Vietnam, Malaysia, Mexico, Pakistan, Bangladesh, Iran, southern China, Arabia, South Africa, Islands of Indian Ocean, Hawai and other islands of Pacific ocean.

*Status* : Available in abundance throughout its range.

### 39. *Typhlops porrectus* Stoliczka 1871 SLENDER BLIND SNAKE

1871. *Typhlops porrectus* Stoliczka, *Jour, Asiat, Soc. Beng.* 40 :426, pl. 25. figs. 1-4.

1943. *Typhlops porrectus* Smith, *Fauna Brit. Ind.* : 46.

This slender worm snake rarely exceeds 290 mm. in length. Snout is rounded, strongly projecting; nostrils lateral; tail is short and ends into a fine spine; scales round the body are 18; total length of the snake is between 50-60 times of the diameter of its body. 400-440 transverse rows of scales on the whole body length. Dorsal colouration is from brown to blackish; ventrum is light brown or still paler; snout, chin, and anal portion is generally whitish.

*Distribution* : Gujarat : Junagarh, Vadodra, Bhavnagar and Kheda districts. *Elsewhere* : Whole of India. Sri Lanka, Burma and Pakistan.

*Status* : Available in abundance throughout its range.

### 40. *Typhlops acutus* (Dumeril & Birbon 1844) BEAKED BLIND SNAKE

1844. *Onychocephalus acutus* Dum. & Birb. *Erp. Gen.* 6 :333.

1943. *Typhlops acutus* Smith, *Fauna Brit. Ind.* 3. 56-57.

This is the largest species among the worm

snakes. reaches up to a length of 600 mm. Its body is long, slender and cylindrical; snout is pointed and forms a hooked beak like strongly projecting structure, with sharp horizontal edge; nostrils are inferior; tail ends in to a spinose structure; scales round the body are 28-34; total length of the snake is between 40-60 times of the diameter of its body; 450-500 transverse rows of scales on the whole body length. Dorsal colouration is brown, ventrum is light brown, in many individuals dorsal and lateral scales are with a light yellow centre.

*Distribution* : Gujarat : Surendra- nagar, Vadodra, and Dangs districts. *Elsewhere* Paninsular India, Bihar, Orissa and West bengal. This is absolutely an endemic Indian species.

*Status* : No where common, but not endangered.

## Family 14. UROPELTIDAE Gray 1845.

1832. *Uropeltacea* Mullar, *Zeitschr. Physiol* 4: 270.

1967. *Uropeltidae* Underwood, *Cont. Classi. Snakes* 64.

In the snakes called Uropelts or Rough tails the head is not distinct from neck; body is short, and cylindrical and is covered with smooth scales; ventral scales are slightly larger than the dorsal scales, tail is quite short and its end is transformed into a large, file like naked shield; eyes are quite small and with a round pupil, mouth is comparatively small; skull bones are firmly united; vestigial pelvis may be present, it is formed by three bones, hemipenis is very small.

### Genus 29. *Uropeltis* Cuvier 1829

1829. *Uropeltis* Cuvier, *Renge, Anim.* 2nd ed. 2; 76.

1890. *Silibura* Boulenger, *Fauna Brit, Ind.* : 257.

Eyes are situated in ocular shields; devoid of supraocular and temporal shields mental groove is missing; tail is cylindrical or obliquely truncate; the terminal scute ends in two points side by side or simply a transverse ridge.

41. *Uropeltis ellioti* (Gray 1858)

1858. *Uropeltis ellioti* Gray *Proc, Zool. Soc.* 5: 262.

1943. *Uropeltis ellioti* Smith *Fauna Brit. Ind.* 3:75-76.

This small cylindrical snake never exceeds 260 mm. in total body length. head is not differentiated from neck and snout is acute, pointed; eyes are distinct with round pupils. 17 scales round the body; ventrals in Gujarat material 145-171, caudal scales 5-11; tail is quite short, general body colouration is dark brown with purple blue tinge and with small yellow spots scattered all over.

*Distribution* : Gujarat: Dangs district, Elsewhere Western Ghats, Sirumalai Hills, Madurai district, Tamilnadu.

*Status* : Rare.

42. *Uropeltis macrolepis* (Peters 1861)

1861. *Silybura macrolepis* Peters. *Serp. Fam. Uropelt.*: 904.

1935. *Uropeltis macrolepis* Smith, *Fauna Brit, Ind.* 3:79.

This moderately large, cylindrical uropeltid snake reaches to a maximum length of about 300 mm., head is not differentiated from neck and snout is rounded; eyes are distinct with round pupils, 15 scales round the body; ventrals, 125-140, caudal scales 7-10; tail is moderately long. Body colouration is black to dark brown with purple tinge.

*Distribution* : Gujarat : Dangs district, Elsewhere : Western Ghats.

*Status* : Quite common.

## Family 15. BOIDAE Gray 1842

1842. *Boidae* Gray, *Zool. Misc.*: 41

1943. *Boidae* Smith, *Fauna Brit, Ind.* 3 : 102.

This family comprises the largest living snakes- the Pythons and Boas, some of them reach to a length of about 10 metres or even more. The body is covered with small, smooth

scales; ventrals are in the form of large transversely enlarged plates, the head is broad and quite distinct from the neck; tail is short and partly prehensile; eyes are larger in pythons but comparatively smaller in the burrowing forms; mouth is quite large and both the jaws are most flexible; teeth are large uniform, pointed and recurved.

## Key to the genera of the family BOIDAE

- I. Supraorbital bone is present; teeth are present on the premaxilla, head is with large symmetrical shields and labial scales are pitted .....*Python*
- II. Supraorbital bone is not present; teeth are not present on the premaxilla; head is covered with small scale like shields and labial scales are not pitted .....*Eryx*

Genus 30. *Python* Daudin 1803.

1803. *Python* Daudin, *Mag. Encyl. An.* 8:434 (type molurus)

1943. *Python*, Smith, *Fauna Brit. Ind.* 3: 105.

This genus includes large snakes in which head is quite distinct from neck, with large and symmetrical shields; ventral shields do not cover the whole width of the belly and are narrow; eyes are large, pupil vertically elliptical; dorsal body scales are smooth, in 60-75 rows; hemipenis is forked for about half the length.

43. *Python molurus* (Linnaeus 1758)  
INDIAN ROCK PYTHON OR AZGAR

1758. *Coluber molurus* Linnaeus *Syst, Nat,* 10 : 225.

1943. *Python molurus* Smith, *Fauna Brit, Ind,* 3:106.

The Indian Rock Python or Azgar is an impressively large and heftiest snake and is the second largest of the Indian snakes. Its length ranges from 2.5 to 6 m.; the maximum recorded length is 7 m. and weight 85 kg. The head is quite distinct from the neck and has symmetrical shields. Costals are smooth and arranged in 60-75 rows; ventrals 245-270;

caudals in 60-72 pairs. Eyes are small and with vertical pupils. Tail is short and prehensile. The colour of the body varies from pale grey to yellow above, and is yellow below; the flanks are paler. A dorsal series of large walnut-coloured crown saddles alternate with pinkish laterals.

**Distribution** : This species is distributed in India, Pakistan and Sri Lanka.

**Status** : Vulnerable on account of over exploitation during the last sixty years.

#### Genus 31. *Eryx* Daudin 1803 SAND BOAS

1803. *Eryx* Daudin, *Mag. Encycl.An.* 8: 437 (type turcicus)

1943. *Eryx* Smith, *Fauna Brit, Ind.* 3: 111

This genus comprises robust short tailed cylindrical snakes slightly less than a meter in length; head not distinct from neck; eyes are small, with vertically elliptical pupil; whole body is covered with small scales; top of head covered with minute scales except on the snout; ventrals do not cover the whole width of the ventrum; subcaudals are not divided; mental groove is present; all the species are devoid of genials; anterior maxillary and mandibular teeth are very long.

#### 44. *Eryx conicus* (Schneider 1801) RUSSELL'S SAND BOA

1796. Russell, *Ind, Serp.* 1:5, pl.4 (Madras.)

1943. *Eryx conicus* Smith, *Fauna Brit Ind* 3:112.

This is a robust snake, body is cylindrical which tapers abruptly, just anterior to vent, total length not exceeding 950 mm. in females and 590 mm. in males; head is slightly distinct from the neck; nostril is like a slit. The head is covered with small scales except nasals and internasals which are enlarged; 8-10 scales across eyes are small but distinct. Body scales are 40-55, ventral scales, 161-196; subcaudal scales, 16-24; anal is small undivided; tail is very short and bluntly pointed, hemipenis is not forked. Dorsal colouration is yellowish, brownish or grayish mixed with a dorsal series of prominent dark brown, black-edged spots.

**Distribution** : Gujarat: Bhavnagar, Banaskantha, Vadodra, Surendranagar, Dangs and Kachchha districts. **Elsewhere** : Whole of India, Sri Lanka, Afghanistan and Pakistan.

**Status** : It is a common snake, throughout its range.

#### 45. *Eryx johni* (Russell 1801) INDIAN SAND BOA OR JOHN'S SAND BOA

1801. *Boa johni* Russell, *Ind. Serp.* 2: 18 & 20 pls. 26 & 27.

1943. *Eryx johni johni* Smith, *Fauna Brit, Ind.* 3:113

The body is robust cylindrical which tapers a little just anterior to vent, total length not exceeding 1080 mm. in females and 980 mm. in males; head not distinct from the neck, snout broad; nostril is like a slit; eyes are distinct; dorsal scales are smooth or feebly keeled; scale rows at the middle of body are 51- 67; ventral scales in males 193-212; in female 198-215; anal shield is small and undivided; caudals in males 28-40; in females 29-34; tail ending into a large blunt shield. Dorsal colouration is sandy, grayish, yellowish or bronzy.

**Distribution** : Gujarat: Junagarh, Bhavnagar, Kachchha, Dangs, Vadodra, Panchmahal and Gandhinagar districts, **Elsewhere** : Recorded from Andhra Pradesh, Maharashtra, Tamil Nadu, Punjab, Rajasthan and Uttar Pradesh in India; Sri Lanka, Pakistan, Afghanistan and Iran.

**Status** : It is a common snake throughout its range.

#### Family 16. ACROCHORDIDAE Bonaparte 1840.

1840. *Acrochordidae* Bonaparte, *Mem. Acad. Sci.Torino* 2:393.

1943. *Acrochordinae* Smith, *Fauna Brit, Ind.* 3: 131.

This family comprises wart snakes in which the scales are small and generally granular; ventral scales are slightly larger than the other dorsal scales; body is slightly flattened on

lateral aspects; head is distinctly broader than the neck; tail is short and prehensile; eyes are moderately large; teeth are uniform, moderate in size; pelvic vestiges are not present.

Genus 32. *Chersydrus* Cuvier 1817.

1817. *Chersydrus* Cuvier, *Regne Anim.* 2:75 (type *fasciatus*)

1943. *Chersydrus* Smith, *Fauna Brit Ind.* 3:131.

Head is not differentiated from the neck, covered above with small granular scales; nostrils are quite close and are encircled in nasal shield; eyes are small but distinct, situated on the upper surface of head, with vertically elliptical pupil; body is quite stout and robust and covered with loose skin; general body scales are small juxtaposed or subimbricate; ventral shields are not present; tail is short, slightly compressed and prehensile.

46. *Chersydrus granulatus* (Schneider 1799)  
ELEPHANT TRUNK SNAKE

1799. *Hydrus granulatus* Schneider, *Hist, Amphib.* 1:243.

1943. *Acrochordus granulatus* Smith *Fauna Brit Ind.* 3 : 134.

This robust snake reaches to a length of about 1100 mm.; head is not distinct from neck and is covered with small granular scales; eyes are absolutely lateral in position; nostril are on the upper surface of the snout and point mainly upwards; body is having about 100 scales at the middle which are juxtaposed or feebly imbricate; hemipenis is forked for more than half its length. The general body colouration is dark grey or some what blackish with whitish annulation all over the body.

*Distribution* : Gujarat : Coastal areas of Bhavnagar, Vadodra, and Valsad districts. *Elsewhere* : The coastal waters of India (about Nicobar Islands) Pakistan, SriLanka, Vietnam, Indo- Australlian Archipelago, North Australia and Soloman Islands.

*Status* : Most common throughout its range, quite common in Gujarat.

Family 17. COLUBRIDAE Cope 1893.

1811. *Colubrini* Oppel *Ord, Gatta. Farm, Munich* 47.

1943. *Colubridae* Smith *Fauna Brit, Ind.* 3: 114.

This cosmopolitan family comprises a very large number of snakes, roughly more than 2500 species and subspecies of arboreal, burrowing (subterranean), terrestrial and aquatic snakes distributed over 250 genera. These small, moderately large, large and very large snakes exhibit lot of diversity and are having the following general characters.

The head may or may not be distinct from the neck, the tail is generally long; the dorsal scales are small to medium and exhibit plenty of variation in size and micro scale structure more or less rhomboidal or oval in shape and overlapping, the ventral scales are transversely enlarged and constitute a single row; eyes are comparatively large and prominent; teeth are solid, numerous, backwardly pointed, show lot of variation, present along the entire length of the maxilla and dentary, many species bear teeth on the palatine and pterygoid; the posterior maxillary teeth may be opisthognathous (grooved to carry poison) but in the form of an elaborate fang, like Elapidae.

Key to the genera of family COLUBRIDAE

I. All the teeth solid, not grooved (Aglypha).

(A) Hypapophyses not developed on the posterior dorsal vertebrae.

(a) posterior maxillary teeth are longest (Not grooved)

1. Maxillary teeth 19 or less, last 2 or 3 are generally largest and separated from the other by a distinct diastema; subocular one or more; scales in 19-23 rows, smooth, head shields entire; head distinct from the neck.....*Argyrogena*

2. Maxillary teeth 16- 18, diastema not distinct, a series of suboculars; scales in 29 rows, smooth, head shields broken up; head distinct from the neck

..... *Sphalerosophis*

3. Maxillary teeth 28 or less, enlarge gradually and form a continuous series; scales in 15-17 rows, slightly keeled; head shields entire; body scales smooth or keeled on the medium rows; head distinct from neck. ....*Ptyas*
4. Maxillary teeth 16 or less, posterior strongly enlarged and compressed; scales in 13-21 rows, smooth, head shield normal or reduced in number; head may or may not be distinct from neck (not or scarcely distinct); rostral large, extends well on the upper surface of the snout. ....*Oligodon*

**(B) Maxillary teeth subequal; pupil round or horizontal.**

1. Scales in 19-27 rows, with apical pits, pupil round. ....*Elaphe*
2. Scales in 13 or 15 rows, smooth; pupil round. ....*Dendrelaphis*
3. Scales in 13-15 rows, oblique, the vertebrae are enlarged; ventrals and caudals with a suture like lateral keel and a notch on each side, corresponding to the keel; pupil horizontal.....*Ahaetulla*

**(C) Some of the anterior maxillary teeth are enlarged and fang like pupil vertically elliptical; scales in 15-19 rows.**

Maxillary bone strongly arched; scales in 15-17 rows, smooth or feebly keeled, subcaudals divided. ....*Lycodon*

**(D) Hypapophyses developed throughout the vertebral column represented on the posterior dorsal vertebrae by a more or less developed crest or tubercle projecting below the centrum.**

- (a) Dentary bone has got a loose attachment to the apex of the articular and freely movable on it; 30-50 teeth equal in size; scale in 17 rows. ....*Sibynophis*
- (b) Dentary bone either not having a loose attachment or having a slight attachment to the apex of the articular as such slightly movable on it generally less than 30 teeth.
  1. Posterior maxillary teeth longest, 2 internasals; pupil round, maxillary teeth

11- 18 followed by a pair of very large fangs, scales are strongly keeled, in 25-27 rows.....*Macropisthodon*

2. Maxillary teeth are unequal 19-35 in number; head distinct from the neck; nostrils lateral; scales in 19 rows, keeled; hemipenis and sulci spermaticus simple. ....*Amphiesma*
3. Maxillary teeth equal 20- 25 in number, head quite distinct from the neck; nostril is in the nasal pointing upwards; scales in 19 rows and are strongly keeled; hemipenis and sulci spermaticus forked .....*Xenochrophis*

**II. Last 2 or 3 maxillary teeth are grooved, hypapophyses may be present or absent on the posterior dorsal vertebrae.**

(a) Pupil round.

1. Maxillary teeth are solid subequal, 18-20 in number; scales in 17 rows, ventrals and caudals with a suture like lateral keel and a notch on each side corresponding to the keel.....*Chrysopelea*
2. Maxillary teeth 10-13 one or two in the middle enlarged and fang-like; scales in 17 rows. ....*Psammophis*

(b) Pupil vertical; maxillary teeth are solid, subequal, 10-14 in number; scales are arranged in an oblique fashion, vertebral are enlarged, in 19-29 rows .....*Boiga*

**III. Dentition well developed, last 2 or 3 maxillary teeth grooved and generally enlarged hypapophysis developed throughout the vertebral column, ventrals moderately well developed, not keeled.**

- (a) Nasal shields in contact with one another; parietal shields more or less broken up; scales keeled. ....*Cerberus*
- (b) Nasal shields are separated by the internasal; scales in 17 rows; body not elongate. ....*Gerardia*

**Genus 33. *Elaphe* Fitzinger 1833.**

1828. *Gonyosoma* Wagler, *Icon Amphib* Pl. a (type *Viride* = *Oxycephala* )

1943. *Elaphe*, *Smith Fauna Brit. Ind.* 3: 139.

This genus includes the snakes with elongate cylindrical or slightly compressed body; head elongate, quite distinct from the neck; maxillary teeth 14-24; slightly enlarged anteriorly or posteriorly, scales in 19-27 rows with paired apical pits smooth or keeled; ventral shields rounded or angulate laterally; tail is quite long; subcaudal shields paired; nostril is between the two nasals; hemipenis is divided into three areas distally, it is calyculate.

47. *Elphae helena* (Daudin 1803)  
TRINKET SNAKE

1796. Russell *Ind, Serp.* 1: 37, pl 32 (Vizagapatam).

1943. *Elphe helena*, Smith, *Fauna Brit, Ind*, 3: 149.

This trinket snake never exceeds 1700 mm. in length (males are comparatively shorter). Body elongated and compressed slightly on the lateral aspects; snout long; head is quite distinct from the neck; tail is long; scale around the body in 21 or 19 rows; ventral shields are 217-265, laterally angulated, caudal scales 73-100, anal not divided; hemipenis extends upto the 27th caudal plate. Dorsal colouration is from light to dark brown with brown or black crossbars having the white ocelli. Ventrums are yellowish uniformly or with distinct margins in certain individuals on the belly.

*Distribution* : Gujarat : Bharuch, Gandhinagar, Kheda, Vadodra and Dangs districts. *Elsewhere* : India : Complete peninsula, Himalayas (Almora and Jalpaiguri district). Assam and Nagaland, Sri Lanka and Pakistan (Sind).

*Status* : It is available in sufficient numbers, throughout its range.

Genus 34. *Ptyas* Fitzinger 1843.

1843. *Ptyas* Fitzinger, *Syst. Rept.* (type *Coluber blumenbachii*).

1943. *Ptyas*, Smith *Fauna Brit, Ind*. 3: 158.

This genus comprises long, quite slender and most agile snakes with 20-28 maxillary teeth, 2-3 loreals and 15- 18 scales at the

middle of the body.

48. *Ptyas mucosus* (Linnaeus 1758)  
DHAMAN

1758. *Coluber mucosus* Linnaeus, *Mus, Ad. Frid.* 1:37.

1943. *Ptyas mucosus*, Smith *Fauna Brit, Ind*. 3: 159.

Body is slender, cylindrical, tapering with a long head which is quite distinct from the neck, total body length reaches up to 2800 mm. in males and 2300 mm, in females; snout obtusely pointed; body scales in 10 or 20 or 21 (At neck): 16 or 17 (at middle of body) : 14 or 15 at tail just anterior to vent. Ventral shields are 190-213; subcaudal shields 100-146; anal shields are two; hemipenis extends to the 10th, 11th or 12th caudal plate, not forked. Dorsal colouration is olive- green, brown, yellowish, grey, dull tan, dark olive brown, ventrum is creamish or turbid white, free edges of the ventrals and subcaudals are blackish.

*Distribution*: Gujarat : Rajkot, Jamnagar, Vadodara, Gandhinagar, Bhavnagar, Bharuch, Panchmahals, Sabarkantha, Dangs and Kachchha districts. *Elsewhere*:- India: Whole of India and Andaman Islands; South China; Vietnam; Iran; Southern Afghanistan to Transcaspia; Sri Lanka; Java; Sumatra; Malaysia; Taiwan and Pakistan.

*Status* : It is a common snake throughout its range but is subject to the commercial exploitation on account of its large scale killing for skin.

Genus 35. *Argyrogena* Werner 1924.

1924. *Argyrogena werner*, *Sitz. Ber. Akad. Wiss. Wien.* 133 : 51.

1943. *Coluber*, Smith, *Fauna Brit. Ind.* 3 : 166.

This genus comprises the snakes with elongated, cylindrical body and head quite distinct from the neck. The snout is long and generally project beyond the lower jaw; eyes are distinctly large, with round pupil, maxillary teeth are 13-15, with distinct diastema; scales at the middle of body are smooth, in 19,21 or 23 rows; ventral shields are enlarged and

rounded, many individuals are with a lateral keel; tail is moderately long, subcaudal shield is paired.

49. *Argyrogena ventromaculatus* (Gray & Hardwicke 1833- 1834)  
GLOSSY - BELLIED RACER

1833-1834. *Coluber ventromaculatus* Gray & Hardwicke, *Ill. Ind. Zool.* 2 : pl. 80, fig. 1.

1943. *Coluber ventromaculatus*, Smith, *Fauna Brit. Ind.* 3 : 168.

This snake with slender, cylindrical, tapering body reaches to a maximum length about 1400 mm. in males and about 1300 mm. in females; head is long and narrow but is quite distinct from the neck; body scales are smooth in 19:19:15 or 13 rows; ventral shields are 195-213. subcaudals are 82-119; anal shield is divided; hemipenis extends upto the tenth caudal plate. Dorsal colouration is lightgrayish or reddish brown with a dorsal series of 57-74 black cross bars or rhomboidal spots which are composed of brown or grey scales edged with black and alternating series of small spots, some of which touch the ventral shields.

*Distribution* : Gujarat : Jamnagar, Rajkot, Junagarh, Surat, Valsad, Dangs and Kachchha district. *Elsewhere* : India : Uttar Pradesh (Almora), Rajasthan, Maharashtra; Pakistan; Uzbekistan; Israel; Iran and Afghanistan.

*Status* : Quite common in throughout its range.

50. *Argyrogena fasciolatus*  
(Shaw 1802).  
BANDED RACER

1802. *Coluber fasciolatus* Shaw, (based on Russell, 1796, p. 26, pl. 21).

1983. *Argyrogena fasciolatus*, Daniel, *Indian Reptiles* : 78.

The banded racer is a diurnal snake, reaching to a length of 1350 mm. (males are comparatively shorter than the females). The body is elongate, cylindrical, head is short but distinct from the neck; snout projects out a little bit; eyes are large and with round pupil; tail is quite long. Scales are smooth, at the middle of

body are 21 or 23, at neck 21 or 23, near the vent 19 or 17 or 15, all the scales are with apical pits; ventral shields are from 185-234, obtusely angulated laterally; subcaudals 75-95; anal shield divided; hemipenis is devoid of spines. Dorsal colouration of adult snakes is brown, cinnamon to grayish brown, posterior part of body with faint cross-bars or spots, which gradually disappear towards the tail; tail is of uniform brown; head is beautifully coloured with light and dark olive and two white spots are present on parietal shields on either side of the interparietal suture; ventrum is whitish or yellowish.

*Distribution* : Gujarat : Bharuch, Bhavnagar, Dangs, Valsad, Panchmahals, Gandhinagar, Mehsana and Sabarkantha districts. *Elsewhere* : India : West Bengal, Himalayan foot hills, south of Nepal, Maharashtra, Karnataka, Madhya Pradesh and many other parts of Peninsular India; Sri Lanka and Pakistan (Larkana district).

*Status* : It is a common snake in many parts of its range.

Genus 36. *Sphalerosophis* Jan 1865.

1865. *Spalerosophis* Jan, *De Fillipi. Viagg. Persia* : 356 (type by designation, *microlepis*)

1966. *Sphalerosophis*, Minton, *Bull. Am. Mus. Nat. Hist.* 134 : 124.

Certain larger species of the colubrids like *diadema*, *arenarius* and *microlepis* were assembled by Schmidt (1930) in a revived genus *Sphalerosophis* Jan on the basis of divided prefrontal shields, scale like and small temporals, many loreal plates (2-5) and a single anal shield. Other distinctive characters are : maxillary teeth are either devoid of diastema or if present it is quite narrow; eyes are separated from the upper labials by a distinct series of suboculars and scales are in 25-43 at the middle of the body.

51. *Sphalerosophis diadema* (Schlegel 1837).  
ROYAL SNAKE-OR RAJAT BANSI

1837. *Coluber diadema* Schlegel, *Phys Serp.* 2 : 148. (based on Russell 1801 p. 34, type loc. Buchier, near Bombay).

1966. *Sphalerosophis diadema diadema*, Minton, *Bull. Am. Mus. Nat. Hist.* 134 : 126.

This large snake reaches up to a total length of 1975 mm. the body is quite long, cylindrical; head distinct from the neck, snout long; tail is quite long; eyes are large with round pupil; maxillary teeth are 16-18, diastoma is not distinct, generally absent; 25-33 rows of scales at middle of the body. Ventral shields are 216-278; subcaudal shields are 70-118; anal shield not divided. Dorsal colouration is orange, pale grey, sandy, buff or dusky pink; ventrum is whitish or pinkish, mottled with darker spots, head is blackish.

*Distribution* : Gujarat : Banaskantha, Kachchha and Mehsana district. *Elsewhere* : India : North-western India, Jammu and Kashmir, Punjab, Uttar Pradesh, Haryana, Rajasthan. Pakistan (Sind, Baluchistan); Afghanistan, Iran, Southern Turkestan and Northern Africa.

*Status* : Common throughout its range.

### Genus 37. *Oligodon* Boie 1827.

1827. *Oligodon* Boie, *Isis*: 519 (type *bitorquatus*)

1943. *Oligodon*, Smith, *Fauna Brit. Ind.* 3 : 195.

Genus *Oligodon* includes the snakes with a short body with stout and cylindrical shape; head is quite short and can not be differentiated with neck; snout is short, blunt, obtusely rounded and having much enlarged rostral which is quite visible from above; eyes are distinct, with round pupil; body scales are smooth and are devoid of apical pits; ventral shields are rounded or in many species with obtuse lateral keel; subcaudal shields are paired.

### 52. *Oligodon arnensis* (Shaw 1802). RUSSET KUKRI SNAKE

1802. *Colouber arnensis* Shaw, *Gen. zool.* 3 : 526 (based on Russell's fig. 38, *Ind. Serp.* 1 : 41 and 43, pls. 35 and 38, 1796.

1943. *Oligodon arnensis*, Smith, *Fauna Brit. Ind.* 3 : 225.

The length of the snake never exceeds 650

mm. (tail is 100 mm). Beside the characters already mentioned under the genus, the loreal in most species is generally united with the prefrontal shield; dorsal body scales are in 17 rows; ventral shields are 164-202, angulate laterally; subcaudals are 40-59; anal shield is divided; hemipenis extends to the 8th caudal plate, not forked, it is covered with spines all over, the spines are comparatively smaller at the tip and these are more compact in this area. Dorsal colouration is reddish-brown or purple, with distinct cross-bars or transversely arranged spots; ventrum is whitish, uniform or with faint lateral spots; head with 3 chevron shaped marks.

*Distribution* : Gujarat : Vadodara, Bharuch, Gandhinagar, Bhavnagar and Dangs districts. *Elsewhere*: India : Peninsular India, western Himalayas, Bengal; Sri Lanka; Pakistan (Baluchistan, Sind, North west Frontier Provinces); Nepal.

*Status* : Available in sufficient number throughout its range.

### 53. *Oligodon taeniolatus* (Jerdon 1853). STREAKED KUKRI SNAKE

1853. *Coronella taeniolata* Jerdon, *Jour. Asiat. Soc. Bengal*, 22 : 528.

1943. *Oligodon taeniolatus*, Smith, *Fauna Brit. Ind.* 3 : 223.

This snake with slender body and uniform diameter from neck to vent never exceeds 650 mm. in length (including the tail), males are comparatively smaller than the females; head is slightly distinct from the neck; snout is blunt; rostral is large, scales in 15 rows at mid-body. Ventral shields are 158-218; subcaudal scales 29-56; anal shield is divided; hemipenis extends to the 11th caudal plate, forked and spinose. Dorsal colouration is quite variable and light brown; blackish brown or buff; with narrow cross bars or transverse spots which are rounded or longitudinally elongated; ventrum is yellowish or grayish, may or may not be spotted; a dark band across the head at level of eyes is present in most of the individuals; nape with W-shaped dark collar.

**Distribution:** Gujarat : Bhavnagar, Vadodara, Gandhinagar and Rajkot districts. **Elsewhere:** India : Peninsular India and Bihar, Sri Lanka and Pakistan.

**Status :** Common throughout its range.

Genus 38. *Dendrelaphis* Boulenger 1890.

1890. *Dendrelaphis* Boulenger, *Fauna Brit. Ind.* 339 (type *caudolineatus*).

1943. *Ahaetulla*, Smith, *Fauna Brit. Ind.* 3 : 239.

Body is elongated, slightly compressed; head is distinct from the neck, which is quite slender and elongate; eyes are large, with round pupil; ventral shields are enlarged, tail is quite long; subcaudal shields are paired and keeled.

54. *Dendrelaphis tristis* (Daudin 1803).  
COMMON BRONZE-BACK TREE SNAKE

1803. *Coluber tristis* Daudin, *Hist. Nat. Rept.* 6 : 430 (based on Russell's pl. 31).

1943. *Ahaetulla tristis*, Smith, *Fauna Brit. Ind.* 3 : 248.

The common Bronze-back reaches to a maximum length of 1700 mm., females are larger than the males. Body elongated, head distinct from neck; eyes are large with round pupil, maxillary teeth are 17-22, body scales are in 15:15:11 or 9 rows; ventral shields are 163-205; subcaudals, 105-150; anal shield is divided; hemipenis extends up to the 8th caudal plate, undivided. Dorsal colouration is bronzy, brownish, or purple-brown; ventrum is greenish, yellowish or grayish.

**Distribution :** Gujarat : Rajkot, Junagarh, Vadodara and Bhavnagar districts. **India :** Peninsular India, West Bengal (Darjeeling); **Elsewhere:** Sri Lanka; Pakistan (Sind).

**Status :** This species has become vulnerable on account of habitat destruction.

Genus 39. *Chrysopelea* Boie 1826.

1826. *Chrysopelea* Boie, *Feruss. Bull. Sci. Nat.* 9 : 237 (type *Coluber ornatus*).

1943. *Chrysopelea*, Smith, *Fauna Brit. Ind.* 3 : 250.

This genus includes slender bodied snakes in which head is quite distinct from the neck; head is flat and obtusely pointed anteriorly, eyes are large, with round pupil; body scales are smooth or feebly keeled, with apical pits, usually in 17 rows, anal and subcaudal shields are divided.

55. *Chrysopelea ornata* (Shaw 1802).  
GOLDEN TREE SNAKE

1801. *Indian Serp.* 2 : 4, pl. 2 "Kalla Jin"

1943. *Chrysopelea ornata*, Smith, *Fauna Brit. Ind.* 3 : 251.

The total length of golden tree snake reaches up to 1100 mm.; body elongate; head distinct from the neck; eyes are large with round pupil; tail very long; body scales are feebly keeled, outermost rows are smooth and with apical pits, in 15:17:14 rows, ventrals 207-230; subcaudal shields are 118-138; anal shield is divided; hemipenis extends up to the 34th caudal plate, undivided. Dorsal colouration is most variable but generally with red or orange spots or markings and a longitudinal series of oval or flower shaped flecks, which are in some individuals are separated from one another by a pair of black cross-bars; lateral aspects are greenish.

**Distribution:** **Gujarat:** Surat and Dangs districts. **India:** Goa, Kerala, Bihar, Uttar Pradesh and Orissa. **Elsewhere:** Sri Lanka, Thailand, Vietnam, Southern, China, Hong Kong, Malaysia, Singapore and Upper Burma.

**Status :** Vulnerable on account of habitat loss during the recent years in many parts of its range.

Genus 40. *Lycodon* Boie 1826.  
WOLF SNAKES

1826. *Lycodon* Boie, *Ferussac's Bull. Sci. Nat.* 9 : 238.

1943. *Lycodon* Smith, *Fauna Brit Ind.* 3 : 255.

This genus includes small to medium sized snakes, with elongated body and elongated flat head (depressed); nostrils situated between two nasals; diameter of the eye greater than its distance from the mouth, eyes are moderately developed and are with vertically elliptic pupil;

body scales are smooth or feebly keeled, with apical pits and in 19, 17 or 15 rows; ventral shields are with or without a lateral keel; subcaudal shields are paired.

56. *Lycodon striatus* (Shaw 1802).  
NORTHERN WOLF SNAKE OR BARRED  
WOLF SNAKE

1796. *Indian Serp.* 1 : 22 & 32, pls. 16 & 26.  
(Vizagapanam and Hyderabad).

1943. *Lycodon striatus*, Smith, *Fauna Brit. Ind.* 3 :  
261.

This wolf snake never exceeds 430 mm. in length, its body is slender, cylindrical and tapering; head is slightly differentiated from the neck; snout is blunt almost two times wider than its height; nostril is pierced between nasals; scale rows at the middle of body are 17 (17:17:15); ventral shields are 172-214, strongly angulate laterally; subcaudal shields are 57- 80; anal is divided; hemipenis extends up to the 10th caudal plate, forked near the tip.

*Distribution* : Gujarat : Gandhinagar, Bhavnagar, Bharuch, Vadodara and Panchmahal districts. *India*: Whole of India as far as east as Chota Nagpur and northward to Punjab. *Elsewhere*: Sri Lanka; Pakistan (Sind, Baluchistan, North- West Frontier Provinces); Transcaspia and eastern Iran.

*Status*: Though no where common, but not endangered.

57. *Lycodon flavomaculatus* Wall 1907.  
WALL'S YELLOW-SPOTTED WOLF  
SNAKE

1907. *Lycodon flavomaculatus* Wall, *J. Bombay Nat. Hist. Soc.* 17 : 612 (type loc. Oudi and Kirkee).

1943. *Lycodon flavomaculatus* Smith, *Fauna Brit. Ind.* 3 : 262.

This snake which is about 480 mm. in length. Snout projects beyond the lower jaw; dorsal body scales are smooth, in 17:17:15 rows; ventral shields 170-183; subcaudal shields are 53-63; anal shield is divided; hemipenis extends up to the 15th subcaudal plate and its distal half is beset with large

papillae. Dorsal colouration is blackish, with a series of round or triangular yellowish vertebral spots, opposite which bars of the same colour descend and broaden to form a reticulation on the flanks.

*Distribution*: Gujarat : Bhavnagar district. *India* : Western Ghats (Nasik, Oudi, Kirkee, Poona, Deolali, Dharwar, Sangali); central India (Buldana, Berar).

*Status* : It is rare and most secretive snake.

58. *Lycodon aulicus* (Linnaeus 1754).  
COMMON WOLF SNAKE

1754. *Coluber aulicus* Linnaeus, *Mus. Adolph. Frider.* 1 : 29, pl. 12, fig. 2 (America).

1943. *Lycodon aulicus*, Smith, *Fauna Brit. Ind.* 3 :  
263.

This wolf snake reaches to a length of about 950 mm; its snout is spatulate and well beyond the lower jaw; body scales are smooth, in 17:17:15 rows; ventral shields are 172-224, strongly angulate laterally; subcaudal shields are 56-80; anal shield is divided in most of the individuals, rarely single anal shield is also present; hemipenis extends up to the 10th caudal plate. Dorsal colouration is brown or grayish with white or yellow cross-bars; ventrum is whitish; upper lip is white or with brown spots.

*Distribution* : Gujarat : Banaskantha, Gandhinagar, Vadodara, Dangs, Bhavnagar, Kachchha and Bharuch districts. *India* : Whole of India including Andaman and Nicobar Islands. *Elsewhere* Sri Lanka; Hong Kong; Laos; Malaysia; Mauritius; Nepal; North and south Vietnam; Pakistan; Bangladesh; Philippines; Celebes and the Maldiv Islands,

*Status* : It is a most common snake throughout its range.

Genus 41. *Sibynophis* Fitzinger 1843.

1843. *Sibynophis* Fitzinger, *Syst. Rept.* 26 (type *Herpetodryus geminatus*).

1943. *Sibynophis* Smith, *Fauna Brit. Ind.* 3 : 276

Head slightly differentiated from the neck; teeth are very numerous and closely set, equal

in size, beyonet shaped 30-50 in each maxilla; body is cylindrical with smooth scales in 17 rows, eyes are quite large with a round pupil; ventral shields are rounded; subcaudal shields are paired.

**59. *Sibynophis subpunctatus***  
(Dum. & Birb. 1854).

1854. *Oligodon subpunctatus* Dum. & Birb. *Erp. Gen. 7* :58 (type loc. Malabar.)

1943. *Sibynophis subpunctatus*, Smith, *Fauna Brit Ind. 3*: 279.

This snake reaches to a length of about 460 mm; Ventral shields are 151-215; subcaudal shields are from 42-76; the hemipenis extends to 8th or 9th subcaudal plate and is not forked. Dorsal colouration is light brown with a dorso-median series of black spots; ventrum is yellowish.

*Distribution* : Gujarat : Vadodra and Bharuch districts. *India* West Bengal; Peninsular India. *Elsewhere* Sri Lanka.

*Status* Vulnerable on account of the habitat loss.

**Genus 42. *Xenochrophis* Gunther 1894.**

1864. *Xenochrophis*, Gunther, *Rept, Brit, Ind.* 273. (type *cerasogaser*.)

1943. *Xenochrophis*, Smith, *Fauna, Brit, Ind.* 3; 317.

This genus comprises fresh water snakes with cylindrical body; head quite distinct from the neck; snout long; eyes are moderately large with round pupil; nostril is dorsolateral, pierced into a single nasal, directed outwardly upward; scales round the body are in 19 or 17 rows some what rounded; tail is moderately long; subcaudal shields are paired.

**60. *Xenochrophis piscator***  
(Schneider 1799).

CHECKRED KEELBACK

1799. *Hydrus poseator* schneider, *Hist. Amph.* 1 : 247.

1943. *Natrix piscator*, Smith, *Fauna, Brit Ind.* 3: 293.

The maximum recorded length is 1.48 m. The head is oval and distinct from neck; slightly flattened with a bluntly pointed snout; eyes are moderately large; with round pupil. 19 scales at the middle of the body, ventrals are 122-158; subcaudals 60-97; anal is divided. Hemipenis and sulci spermaticus are forked. The colour of the body is much variable may be yellowish, olive, light green, grey brown with a reddish tinge, with five rows of small light black spots, bars which are generally narrower than interspaces separating them quincuncially arranged; head olive brown above with two oblique black streaks, one below, the other behind the eye.

*Distribution* : Gujarat: Valsad, Bharuch, Dangs, Vadodra, Gandhinagar, Bhavnagar, Surendranagar, Viramgam districts. *India* : Whole of India (including the Himalayas and Andaman) It is widely distributed in the complete Ganga basin. Distributed in the complete Malayan region, Southern China, Taiwan, Bangladesh, Borneo, Burma, Sri Lanka, Pakistan and Indo-chinese subregion.

*Status* : Common throughout its range.

**Genus 43. *Amphiesma* Dumeril and Birbon 1854.**

1854. *Amphiesma* Dumeril & Birbon, *Erp. Gen. 7*: 724.

1960. *Amphiesma*, Malnate, *Proc. Acad. Nat. sci. Phila.* 112 : 41-71.

Slender bodied, elongated snake with head quite distinct from the neck; maxillary teeth are from 19-35, in a continuous series gradually become larger posteriorly or the last two teeth are abruptly enlarged; nostrils, are lateral in position; scales round the body are in 19 rows, keeled; hemipenis and *sulci spermaticus* are simple.

**61. *Amphiesma stolata* (Linnaeus 1758).**  
STRIPED KEELBACK

1758. *Coluber stolatus* Linnaeus, *Syst. Nat.*: 219.

1943. *Natrix stolata*, Smith, *Fauna Brit Ind* 3: 303.

The striped keelback reaches to a length of about 550 mm. Maxillary teeth 21-24 last two are enlarged; body scale in 19 rows, which are keeled except the outer most row, which is smooth; ventral shields are from 118-158; subcaudal shields are from 50- 89; anal shield is divided; hemipenis extends up to the 8th caudal plate, Dorsal colouration is olivaceous or olive brown or some what greenish with a pair of pale yellow stripe which some times break up in to spots, in the anterior region of the body; the space between these stripes is with dark-brown to black spots; which are extremely distinct in the anterior region; dorsal aspect of head is with a tinge of bluish grey colour on olive back ground; frontal and parietal region is with a black border, there is a black V-shaped mark on the neck; black streaks are present in front and underside of the eye and from postocular to angle of mouth; ventrum is whitish some what creamy in most snakes, small black spots are present at the tips of the ventral shields.

*Distribution* : Gujarat : Gandhinagar, Vadodra, Panchmahal, Dangs and Bhavnagar districts. *India* : Whole of India including the Andaman Islands. *Elsewhere* : Sri Lanka, Pakistan, Southern China, Hainan and Vietnam.

*Status* : Most common throughout its range.

#### Genus 44. *Macropisthodon* Boulenger 1893.

1893. *Macropisthodon* Boulenger, *Cat, Sn, Brit. Mus.* 1 : 265 (type *flaviceps*)

1943. *Macropisthodon*, Smith, *Fauna Brit Ind.* 3 : 314.

Snakes with robust body with a head distinct from the neck; eyes are moderately large; with round pupil; tail is quite short; maxilla with 11-18 solid teeth followed by two large ungrooved pointed fangs directed almost in a backward direction and separated from the other teeth by short diastem; scales round the body, 19-27 rows, strongly keeled and are with apical pits; ventral shields rounded; subcaudal shields paired.

#### 62. *Macropisthodon plumbicolor* (Cantor 1839).

#### GREEN KEELBACK SNAKE

1839. *Tropidonotus plumbicolor* Cantor, *Proc. Zool. Soc.* London: 54 (type loc. Malwa, Saugar, Central India).

1943. *Macropisthodon plumbicolor*, Smith, *Fauna Brit. Ind.* 3 : 314.

This stout bodied green keelback reaches to a length of 580 mm., in males (the maximum recorded length is 750 mm. by Wall) and 775 mm., in females (940 mm by Wall); head is distinct from the neck; eyes are moderately large with round pupil, tail is quite short; maxilla is with 10-14 teeth, body scales in 21-27 rows, strongly keeled, Ventral shields are from 144-162; subcaudal shield are divided, males: 39-48, females : 34-47; anal shield is divided; hemipenis reaches up to the 15th caudal plate; Dorsal colouration is greenish with yellow tinge or olive green with faint irregular black cross lines; dorsal aspect of head is with two black inverted V-shaped marks; ventrum is whitish gray or dark gray with black spots.

*Distribution* : Gujarat : Kheda, Valsad, Vadodra, Bharuch, and Dangs districts. *India*: The whole of India except the Ganga Valley and the extreme north west. *Elsewhere* : Sri Lanka.

*Status* : Commonly available throughout its range.

#### Genus 45. *Boiga* Fitzinger 1826. CAT SNAKES

1826. *Boiga*, Fitzinger *Neve class Rept.* 29, 31,60 (type *Coluber irregularis* Merrem).

1943. *Boiga*, Smith, *Fauna Brit. Ind.* 3 : 344.

The genus *Boiga* includes nocturnal, terrestrial, arboreal, large headed snakes with laterally compressed body; eyes are large, with vertical pupil and duplex retina; tail moderately long; anal shield is not divided, tubercles and pits are present on the head and trunk scales; body scales are smooth, obliquely arranged, with apical pits and in 19-29 rows; ventral shields are rounded or obtusely angulate

laterally, subcaudal shields are paired; hemipenis is divided not forked anal sac is abnormally long in females.

**63. *Boiga trigonata* (Schneider 1802).  
INDIAN GAMMA SNAKE**

1802. *Coluber trigonatus* Schneider, *Bechst, transl. Lincep.* 4; 256, pl. 40, fig. 1 (Vizagapatnam)

1943. *Boiga trigonata*, Smith, *Fauna Brit, Ind* 3: 349.

This snake reaches to a length of about 1000 mm. in males and 1200 mm. in females, body is long and cylindrical with a distinct triangular head; maxillary teeth are 8-10 last one or two are enlarged fangs; body scales are in 21: 21: 15 rows; vertebral scales are slightly enlarged; ventral shields are 206-256; caudal shields are from 75-96; hemipenis reaches up to the 10th, 11th, or 12th caudal shield. Dorsal colouration is grayish brown with two alternating series of large rounded or oval dark brown generally light edged spots, and two other series of much smaller spots on the sides of the body; dorsal aspect of head is with two broad dark brown or black longitudinal stripes which diverge posteriorly; nape is with a longitudinal mark; a stripe emerge from the eye and reach up to the angle of mouth; ventrum is whitish marbled or spotted with brown and most individuals are with a series of brown spots along each side of the belly.

*Distribution* : Gujarat : Vadodara, Panchmahal, and Dangs districts. *India* : Peninsular India, Rajasthan, Western (Sabathu, Almora) and Eastern Himalayas (Sikkim, North Bengal). *Elsewhere* : Sri Lanka, (Uva Province), Pakistan (Baluchistan, North west frontier provinces), Eastern Iran, Saudi Arabia; Southern Uzbekistan (Transcaspia).

*Status* : Common throughout its range.

**64. *Boiga forsteni*  
(Dum. & Birb. 1854)  
FORSTEN'S CAT SNAKE**

1854. *Triglyphodon forsteni* Dum. & Birb. *Erp. Gen.* 7:1077.

1943. *Boiga forsteni*, Smith, *Fauna Brit. Ind* 3:358.

This cat snake reaches to a larger length than *Boiga trigonata* i.e. up to 2150 mm. in males and 2312 mm. in females. Maxillary teeth from 9-12, last one is a fang, anterior palatine teeth are strongly enlarged; body scales are in 25 or 27 or 29: 17 rows, vertebral scales are feebly or in some individuals are strongly enlarged, the degree of enlargement of vertebral varies even in the same individuals. Ventral shields are from 254-273, with a distinctly prominent lateral keel; sub caudal shields are from 102-119; anal shield is not divided; hemipenis extends up to the 12th caudal shield. Dorsal colouration is uniformly brown or reddish brown or with regular, angular black spots or cross bars, with white spots between them.

*Distribution* : Gujarat : Dangs districts. *India* : Ganga Valley, Orissa, West Bengal, Rajasthan, and complete Western Ghats. *Elsewhere* : Sri Lanka.

*Status* : Common throughout its range.

**Genus 46. *Psammophis* Fitzinger 1826.  
SAND SNAKES**

1826. *Psammophis* Fitzinger, *Neue class Rept* 29, 30 (type *sibilans*).

1943. *Psammophis*, Smith, *Fauna Brit. Ind.* 3 : 361.

This genus includes sand snakes with slender, cylindrical body; head distinct from neck; eyes are large, with round pupil, nostrils are situated between the nasals; maxillary teeth are from 10-13 one or two in the middle are moderately enlarged; last two teeth are quite enlarged, grooved and recurved (directed backward); body scales are smooth obliquely arranged in 17 rows at the middle of the body; ventral shields are some what rounded; tail is

quite long; with divided subcaudal shields; hemipenis is short and very slender without spines or calyces.

**65. *Psammophis condanarus***  
(Merrem 1820).  
INDIAN SAND SNAKE

1820. *Coluber condanarus* Merrem *Tent. syst. Amph.* 107.

1943. *Psammophis condanarus*, Smith *Fauna Brit Ind* 3: 364.

The body of this snake is quite robust and cylindrical reaching to a maximum length of 1325 mm. in females, males are comparatively shorter; head is long and narrow quite distinct from the neck; snout bluntly pointed; ventral shields are from 156- 179; caudal shields in males 75-93, divided. Dorsal colouration is pale olive or brassy or buff, with 4 or 5 dark brown longitudinal stripes, distinctly edged with black; head is brownish.

*Distribution* : Gujarat: Kachchha district. *India* : Maharashtra (Poona, Jalna, Kurnul, Berar) Punjab, Uttar Pradesh, Bihar, Orissa, West Bengal. *Elsewhere* : Pakistan (Lahore & Sind) Burma, Thailand, Laos and Cambodia.

*Status* : Common in all the parts of its range.

**66. *Psammophis longifrons***  
Boulenger 1896.

1896. *Psammophis longifrons* Boulenger, *Cat, Sn, Brit. Ind.* 3 : 165 (type loc. Cuddapah Hills, Madras).

1943. *Psammophis longifrons*, Smith, *Fauna Brit, Ind.* 3 : 365.

This stout sand snake reaches to a maximum length of about 1600mm.; head is distinct from the neck; snout is quite long and slender; maxillary teeth are 12 or 13, two in the middle are very strongly enlarged and separated by other teeth by the wide gaps. Ventral shields are 166- 175, subcaudal shields are 79-93; anal shield is divided. Dorsal colouration is grayish in the anterior part,

brownish behind, ventrum is grayish or yellowish white.

*Distribution* : Gujarat: Valsad, Surat and Panchmahals districts. *India* : Maharashtra (Thana, Bulsar, Nagpur), Madhya Pradesh.

*Status* : It is a rare snake and is known by few examples only.

**67. *Psammophis leithi* Gunther 1869.**  
INDIAN RIBBON SNAKE

1869: *Psammophis leithi*, Gunther, *Proc. Zool. Soc. London*: 505 (type loc. Sind)

1943. *Psammophis leithi*, Smith, *Fauna Brit Ind.*3;366.

The body of this long, thin, and cylindrical snake reaches to a maximum length of about 1000 mm.; head is distinct from neck; snout is long; eyes are large, with round pupil; tail is quite long; maxillary teeth are from 10-12 the median ones are feebly enlarged wide gaps exist before on after, ventral shields are 159-175 in males and 170- 185 in females; subcaudals are 92-100 both in males and females; anal shield is not divided. Dorsal colouration is of ground colour or yellowish grey, or pale amber or straw coloured. Ventrums is uniformly yellowish white.

*Distribution* : Gujarat : Surendranagar, Rajkot, Vadodara, Jamnagar, and Kachchha Districts. Nirwand and Pachum Islands. *India*: Uttar Pradesh, Maharashtra, Kashmir, *Elsewhere* : Pakistan, (Waziristan, Kalat district and Thar area.)

*Status* : Common snake in its range.

**Genus 47. *Ahaetulla* Link 1807.**  
BRONZE BACKS

1807. *Ahaetulla* Link, *Beschr, Nat, Samml. Rostock*: 73 (type *fasciata* = *Coluber ahaetulla* Linn.)

1943. *Dryophis*, Smith, *Fauna Brit Ind* 3: 370.

This genus comprises very long snakes with compressed body; head is elongated and distinct from the neck; canthus rostralis is quite strong; concave loreals; eyes are quite large,

transversely oval, with horizontal pupil; tail is very long; maxilla is with 12-15 teeth, 1 or 2 posterior grooved fangs situated below the posterior border of the eye; scale in 15 :15: 13 row obliquely arranged, vertebral rows; slightly enlarged, ventral shields are some what rounded or with an obtuse lateral keel; subcaudal shields are paired. Hemipenis is short not forked.

68. *Ahaetulla nasutus*

(Lacepede 1789).

COMMON GREEN WHIP SNAKE

1789. *Coluber nasutus*, Lacepede *Hist, Nat, Serp*1;100.

1943. *Dryophis nasutus*, Smith, *Fauna Brit Ind* 376.

This thin-bodied laterally compressed snake reaches to a length of 1855 mm. in males and 2600 in females, head is distinct from the neck; snout is long, acuminate and terminates in a dermal beak shaped appendage. Body scales are smooth in 15 : 15 : 11 rows, vertebral row is larger than other dorsal rows; ventral shields are 166-207, laterally notched; sub caudal shields are 156-180 in males and 135-152 in females; anal shield is divided. Dorsal colouration is verdant green, the interstitial skin is black and white forming oblique lines which are most distinct on the anterior half of the body. Ventrums are pale with a greenish tinge.

*Distribution* Gujarat : Bharuch, Valsad, Junagarh, and Dangs districts. *India* : Peninsular India excluding the Ganga Valley West to Patna, Bengal. *Elsewhere* : Complete Indo-chinese region, Vietnam, Thailand, Cambodia, Cochinchina, Sri Lanka, Burma.

*Status* : The species is gradually becoming vulnerable on account of habitat loss and skin trade.

69. *Ahaetulla pulverulentus*

(Dum. & Birb. 1854).

BROWN WHIP SNAKE

1854. *Dryinus pulverulentus* Dumeril & Birbon, *Erp. Gen.* 7: 812.

1943. *Dryophis pulverulentus*, Smith, *Fauna Brit, Ind.* 3 : 378.

The brown whip snake reaches to a maximum length of about 1600 mm. in males 2450 mm. in females; dermal appendage is long. Ventral shields are 179- 203; subcaudal shields are from 151- 208; anal shield is divided. Dorsal colouration is grayish or brownish, powdered with brown and with black transverse or oblique spots above; a dark brown rhomboidal spot is present on the top of the head and a brown stripe on either side passing through the eye.

*Distribution* : Gujarat : Junagarh and Dangs districts. *India* : Western Ghats (Karwar, North Kanara, Nilgiris, Castle Rock, Nellampatty hills, Travancore) *Elsewhere* : Sri Lanka.

*Status* : The species is vulnerable on account of habitat loss

Genus 48. *Cerberus* Cuvier 1829.

1829. *Cerberus* Cuvier *Reg, Anim.* (2nd ed.) 2 : 81 (type *Coluber cerberus*)

1943. *Cerberus*, Smith, *Fauna Brit, Ind.* 3 ; 392.

Stout bodied cylindrical, aquatic snakes with a distinct, head small eyes, moderately long tail; dentition well developed, maxillary teeth are 12-17. Body scales are in 21-29 rows; ventral shields are well developed, subcaudals shields are paired.

70. *Cerberus rhynchops* (Schneider 1799).

DOG- FACED WATER SNAKE

1799. *Hydrus rhynchops* Schneider, *Hist, Amphib.* 1 : 246 (based on Russell, pl. 17)

1943. *Cerberus rhynchops*, Smith, *Fauna Brit Ind.*, 3:393.

The maximum length reaches 850 mm. in males and 1180 mm. in females; head is distinct from the neck; snout is long but broadly rounded; Body scales are striated and strongly keeled, in 23-25 rarely in 21 rows the lateral

scales are slightly larger than the median dorsal; ventral shields are from 122-159 (generally 137- 159); subcaudal shields are from 50-68; anal shield is divided. Dorsal colouration is grayish, brownish or olivaceous, with dark spots or cross bars; lateral aspects of head is with black streak. Ventrums are light yellow or deep yellow, variegated or barred with black; in some individuals the ventral aspect is blackish or dark gray; the outer 3 scale rows are generally yellow.

*Distribution* : Gujarat : Valsad (Purna river) Vadodara (Mahi river) and Surat (Tapti river) districts. *India & Elsewhere*: Coasts and tidal rivers of India and Vietnam (Indo-China) from Bombay to Cochinchina; Andaman and Nicobar Islands; Malaysia; Singapore and Sri Lanka.

*Status* : A common snake.

#### Genus 49. *Gerardia* Gray 1849.

1849. *Gerardia* Gray, *Cat. Sn. Brit. Mus.* 77 (type *bicolor*).

1943. *Gerardia* Smith, *Fauna Brit Ind.* 3 : 394.

Snakes with cylindrical body, small eyes with vertical pupil; head is not distinct from the neck and is with large shields; body scales are smooth in 17 rows; ventral shields are well developed; tail is quite short; subcaudal shields are paired.

71. *Gerardia prevostiana* (Eydoux and Gervais 1832-1837).

#### GLOSSY MARSH SNAKE

1932-1837. *Coluber (Homalophis) prevostianus* Eydoux & Gervais, in *Guer. Mag. Zool. CL. 3* : 5, Col. pl. 15 (Manila).

1943. *Gerardia prevostiana*, Smith, *Fauna Brit. Ind.* 3:394.

This cylindrical snake reaches to a maximum length of about 587 mm. Dorsal scales are subequal, in 17 rows; ventral shields are 145-153; subcaudal shields are 29-36; anal

is divided. Light to dark gray or deep brown, generally uniformly coloured; upper lip, chin and 3 outer rows of scales are white; ventrum is whitish with dark margins.

*Distribution* : Gujarat : Valsad district (Purna river), *India* : Coasts and tidal rivers of India. (Bombay and Kerala) *Elsewhere* : Sri Lanka (Kalani river); Burma (Gulf of Martaban); Coastal parts of Malaysia.

*Status* : A common snake.

#### Family 18. ELAPIDAE Boie 1827. PROTEROGLYPHA

1827. *Elapidae*, Boie, *Isis* 510.

1890. *Elapinae*, Boulenger, *Fauna Brit Ind* : 382.

Family of terrestrial and arboreal poisonous snakes. The family includes Cobras, King Cobra, Kraits, Mambas and Coral snakes. Long slender, cylindrical body; the head may or may not be distinct from the neck; the tail is quite long, cylindrical and tapering to a point, the dorsal body scales are comparatively small rhomboidal, overlapping, ventrals are transversely enlarged to form a single row; eyes are shining and relatively large; teeth are recurved, pointed;

#### Genus 50. *Bungarus* Daudin 1803. KRAITS

1803. *Bungarus* Daudin, *Mag. Eneyel, An.* 8(5): 434, based on Russell's *Bungarus pamab* 1, 1796, p.3 pl. 3 (type *fasciatus*)

1943. *Bungarus*, Smith, *Fauna Brit Ind.* 3 : 407.

Head not distinct from neck; head shields are normal; loreal shield is not available; eyes are moderately large or small, with round pupil; poison fangs which are fixed, hollow maxillary teeth are followed by 2-4 small solid teeth; body scales are smooth in 13-19 rows, vertebral row of scales are moderately enlarged in most of the species but it is strongly enlarged in *lividis*; tail is moderately long, subcaudal scales are single or many of them divided.

72. *Bungarus caeruleus*

(Schneider 1801).

## COMMON INDIAN KRAIT

1801. *Pseudoboa caerulea*, Schneider, *Hist. Amphib.* 2 : 284 (based on Russell).1943. *Bungarus caeruleus*, Smith, *Fauna Brit. Ind* 3:413.

The maximum recorded length of common Krait is 1500 mm, body is cylindrical slightly tapers anteriorly; head is not distinct from the neck; it is flat and with a blunt snout; eyes are small with round pupil; fangs are followed after a wide gap by two or three small teeth; scales round the body are in 15 or 17 rows; ventral shields are from 194-234; subcaudal shields are 42-52, the hemipenis extends up to the 6th 9th caudal plate. Dorsal colouration is jet black to dark brown, with a series of 3-9 vertebral spots on neck and anterior most part of the body followed by 38-56 narrow, transverse bands or spots, generally in pairs. Upper labials are yellowish or whitish, ventrum is whitish.

*Distribution* : Gujarat : Gandhinagar, Bhavnagar, Dangs, Mehsana, Panch- mahals and Bharuch districts. *India*: West Bengal, Peninsular India, Rajasthan, Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, Orissa, Maharashtra, Andhra Pradesh, Karnataka, Tamil Nadu and Kerala. *Elsewhere* : Sri Lanka, Pakistan.

*Status* : Becoming rare on account of habitat loss.

Genus 51 *Callophis* Gray 1834.

## CORAL SNAKES

1834. *Callophis* Gray, *III Ind. Zool.* 2, pl. 86, fig. 1 (type *gracilis*)1943. *Callophis*, Smith, *Fauna Brit Ind.* 3 : 418.

This genus includes the poisonous snakes popularly known as coral snakes, with cylindrical; elongated body, of almost equal diameter from head to anus; head not distinct from neck; head shields normal; eyes are of small to moderate size with round pupil;

poison fangs followed after an interval by from 0-5 small solid teeth; body scale are smooth subequal, in 13 or 15 rows throughout; tail short, subcaudals are paired.

73. *Callophis melanurus* (Shaw 1802).

## SLENDER CORAL SNAKE

1796. *Indian Serp.* Russell. 1:12. pl. 8 (Nerva. Bengal).1943. *Callophis melanurus*, Smith, *Fauna Brit. Ind.* 3 : 420.

Apart from the characters given under the genus these small snakes of about 360mm. in length have 2 or 3 minute teeth behind the poison fangs; eyes are small; body scales are in 13 rows; ventral shields are in 249- 277; subcaudal shields in males are 33-37, in females 24-27. Structure of hemipenis is not fully known but it extends up to 6th- 8th caudal plate. Dorsal colouration is light brown, center of each scale speckled with brown and form resultant longitudinal lines on the complete dorsum. *Ventrum is yellowish with a red tinge.*

*Distribution* : Gujarat: Valsad, Bhavnagar, and Dangs Districts. *India* : Maharashtra, (Bombay, Dharwar district, Nagpur) Tamil Nadu (Coimbatore, and Anaimalais) Kerala (Malabar), West Bengal (Nerva). *Elsewhere* : Sri Lanka (Trincomalee, Matale, Tissamaharama, Balangoda).

*Status* : This is a rare snake and seems to be vulnerable on account of habitat loss.

74. *Callophis nigrescens* Gunther 1862.

## STRIPED CORAL SNAKE

1862. *Callophis nigrescens* Gunther. *Ann. Mag. Nat. Hist.* (3) ix: 131.1943. *Callophis nigrescens*, Smith, *Fauna Brit Ind* 3 : 422.

This most elongate species of all the Indian coral snakes reaches to a length of about 900mm. with a circumference of about 25mm. is quite similar to the *melanurus* but differs in the following characters; three or four teeth are present behind the poison fangs; ventral shields are 234-251; subcaudal shields are 35- 44 in

males and 32-36 in females; anal shield is divided, hemipenis is quite short reaching up to the sixth caudal plate. Dorsal colouration is blackish, with a white oblique bar on the nape; dorsum is with 5 black stripes.

*Distribution* : Gujarat : Dangs district (Saputara). *India* : Western Ghats (Nilgiri, Anaimalai, Shevaroy and other hilly areas), Panchgani. *Elsewhere* : Endemic to India.

*Status* : A rare snake.

Genus 52. *Naja Laurenti* 1766.  
COBRAS

1766. *Naja Laurenti*, *Syn, Rept*, 90. (type *Coluber naja* Linnaeus).

1943. *Naja* Smith, *Fauna Brit Ind*, 3 : 426.

The genus includes deadly poisonous snakes with anterior ribs elongated, neck can be expanded into a hood; maxilla is either having fangs only or if present they are followed by one to three small solid teeth; body scales are smooth, rows are arranged in an oblique fashion, particularly in the anterior half portion of the body; subcaudal shield are divided.

75. *Naja naja naja* (Linnaeus 1758).  
INDIAN COBRA

1758. *Coluber naja* Linnaeus *Syst. Nat.* 221.

1943. *Naja naja naja*, Smith, *Fauna Brit. Ind.* 3:427.

This deadly poisonous snake reaches to a maximum length of 1211- 1515 mm. in males and 1294-1515mm. in females. Head is quite wide expanded and heavy and slightly distinct from the neck; eyes are moderately large with round pupil; a single minute tooth is present on maxilla behind the fangs; scales are 25- 35 across the neck; 21-25 at the middle of the body, 17 or 15 in front of the vent; ventral shields are 176-200; subcaudal shields are 48-75. Hemipenis, reaches up to the 10th caudal plate, forked. Dorsal colouration is uniformly jet black, dark olive or dark brown, ventrum is pale gray to butter yellow; ventral side of hood is with 2-4 irregular dark transverse bars in many individuals it is uniformly dark, generally

there is a spectacle mark on dorsal aspect of hood.

*Distribution* : Gujarat : Sabarkantha, Ahemdabad, Surendra Nagar, Surat, Dangs, Junagarh, Bhavnagar, Panchmahals, Kheda, Vadodara, Bharuch and Valsad districts. *India*: Peninsular India, Kashmir, Punjab, Rajasthan, Uttar Pradesh, Haryana, Bihar, West Bengal, Orissa, Madhya Pradesh, Andhra Pradesh, Maharashtra, Goa, Karnataka, Tamil Nadu, Kerala, *Elsewhere* : Sri Lanka.

*Status* : The population has been reduced considerably in certain parts of its range on account of habitat destruction for urbanization.

76. *Naja naja oxiana* (Eichwald 1831).  
OXUS COBRA

1831. *Tomyris oxiana* Eichwald, *Zool. Sper* 3: 171 (Transcaspia).

1943. *Naja naja oxiana*, Smith, *Fauna Brit, Ind*, 3:428.

Other characters are like the nominate subspecies except that 23-27 scales on the neck; 19-23 at the middle of the body, 17 or 15 in front of the vent; ventral shields are 186-213; subcaudal shields are 62-75. Dorsal colouration is brownish or blackish, devoid of other marking, ventrum is comparatively lighter. Juveniles are grayish or brownish, uniform or with dark reticulation or with dark transverse or chevron shaped cross bars; bars on hood are more prominent; ventrum is whitish.

*Distribution* : Gujarat: Banaskantha and Kachchha district. *India* : Punjab, Rajasthan and Kashmir *Elsewhere* : Transcaspia and Southern Turkmenstan east across most of Afghanistan and Pakistan (North frontier province, Northern Baluchistan).

*Status* : Same as *naja naja*.

Genus 53. *Ophiophagus* Gunther 1864.

1864. *ophiophagus* Gunther, *Rept. Brit. Ind.* 341 (type *elaps*).

1943. *Naja*, Smith, *Fauna Brit Ind.* 3: 426.

Largest of the poisonous snakes reaching to

a length of 4620 mm. and popularly known as King Cobra or Hamadryad. Maxillary bone extends anteriorly beyond the palatine; poison fangs are followed by 3 small solid teeth, neck can be expanded into a hood; eyes are moderately large, with a round pupil; a pair of large occipital shields is in contact with each other behind the parietals; body scales are smooth arranged obliquely; those of the 3 vertebral series are comparatively larger than the others; anterior subcaudal shields are single; anal shield is not divided.

**77. *Ophiophagus hannah***

(Cantor 1836).

**KING COBRA OR HAMADRYAD**

1836. *Hamadryas hannah* Cantor, *Asiat Research* 19: 187, pls. 10-11 (Sunderbans, near Calcutta).

1984. *Ophiophagus hannah*, Mahendra *Ann. Zoology*. 22.

Scales are smooth in 17 or 19 : 15 : 15 rows; ventral shields are from 215-270; subcaudal shields are 80-120; hemipenis is very long and deeply forked extending to the 30th caudal plate or even beyond. Dorsal colouration is yellow or olive green or olive brown or blackish brown or completely black; generally with distinct yellowish or whitish cross bars or chevrons on the body. Ventrums are with a uniform colour with mottling or distinct bars; throat is generally with light yellow or creamy colouration. The juveniles are jet black with distinct white or yellow cross bars of chevron shaped marking on the body and the tail; head is with 4 distinct bars.

*Distribution* : Gujarat: Banaskantha (Deesa) district. *India*: Peninsular India to the Himalayas, Bengal, Bihar, Orissa, Assam. *Elsewhere* : As given under genus.

*Status* : It is extremely vulnerable in certain parts of its range on account of large scale killing by man for its skin.

**Family 19. HYDROPHIIDAE Boie 1827.  
SEA SNAKES**

1827. *Hydrophiidae* Boie, *Isis*: 410.

1943. *Hydrophiidae*, Smith, *Fauna Brit. Ind.* 3 : 439.

This family includes the snakes which lead a marine life either living quite near the shore in coastal water and go quite away in off-shore waters for food capture or lead a perfect semi pelagic life, depending completely on the sea. Most of the species are viviparous, deadly poisonous and piscivorous in food habits. Body scales are small, rhomboidal and overlap; except in few species head is small and not distinct from the neck; the body, including the tail is compressed; eyes are quite small; cranial characters are quite similar to the family Elapidae. Teeth are present on maxilla, dentary, palatine and pterygoid bones; maxilla and dentary bones are quite shortened in marine snakes and bear recurved pointed teeth; the anterior most maxillary tooth is a large, erect fang which is grooved and is connected with the poison gland and exhibits proteroglyphus condition; the vestiges of the pelvis or hind limbs are not present.

**Key to genera of family HYDROPHIIDAE**

- I. Ventral shields are prominent and generally entire; maxillary bone never extends anteriorly beyond the palatine; diastema after the poison fangs are quite distinct; more than 25 scales round the thickest part of the body.
  - A. Mental shield is elongate; partly concealed, in a groove in the symphysis; ventral shields are uniform in size; 3-5 maxillary teeth are present. ....*Enhydrina*
  - B. Mental shield is normal; ventral shields are of uniform size; 1-18 maxillary teeth are present. ....*Hydrophis*
- II. Ventral shields are generally divided by a medial longitudinal fissure (except quite anteriorly) or are vestigial (smaller than adjoining dorsal scale or absolutely missing).
  - A. Ventral shields entire or vestigial or absent; dorsal scales juxtaposed, the lower most 3 or 4 rows larger than the others .....*Lepemis*
  - B. Ventral shields, if distinct are with a longitudinal fissure; dorsal scales

juxtaposed, subquadrangular in shape.  
.....*Pelamis*

- C. Ventral shields are divided by a longitudinal fissure; scales are juxtaposed .....*Microcephalophis*

Genus 54. *Enhydrina* Gray 1849.

1849. *Enhydrina* Gray, *Cat. Sn. Brit. Mus.* : 47 (type *valakadyen*).

1943. *Enhydrina*, Smith, *Fauna Brit. Ind.* 3 : 449.

With elongated, compressed body; head shields are entire; nostrils are superior, nasal shields are in contact with one another; mental shield is narrow, somewhat elongated, partly concealed in a groove in the symphysis, poison fangs are followed after an interval by 3 or 4 teeth; body scales are imbricate or subimbricate, in 49-66 rows at the thickest part of the body; ventral shields are distinct throughout, hemipenis is forked for about half its length, the tip of the hemipenis bears coarse, flattened, papilla-like structure arranged in longitudinal series; the rest of the organ is with moderately large, closely set spines which are slightly larger towards the base.

78. *Enhydrina schistosa* (Daudin 1803).

1803. *Hydrophis schistosus* Daudin, *Hist. Nat. Rept.* 7 : 386. (based on Russell 2 : pl. 10; Tranquebar).

1943. *Enhydrina schistosa*, Smith, *Fauna Brit. Ind.* 3 : 449.

These snakes reach to a maximum length of about 1580 mm., eyes are moderately large; 40-52 scales rows on the neck in males, 42-55 in females; 49-60 on the body in males, 51-66 in females; the body scales are imbricate or subimbricate, with a short central keel; ventral shields are from 239-354 (generally 239-322), distinct throughout, slightly broader than the adjoining scales; preanal shields are feebly enlarged. Dorsal colouration is gray or greyish with a bluish tinge; with dark-gray or black annulation, which are broadest on the dorsum; ventrum is whitish.

*Distribution* : Gujarat: Bhavnagar, Amreli, Junagarh and Jamnagar district. *India*: Coastal

waters of Goa, Tamil Nadu, Orissa, West Bengal, *Elsewhere*: Gulf of Oman, Seychelles, South Vietnam Coast, North coast of Australia, Rockhampton coast, Coast of Burma and Sunday Bay in Thailand.

*Status* : A common snake, throughout its range.

Genus 55. *Hydrophis* Latreille 1802.

1802. *Hydrophis* Latreille, *Hist. Nat. Rept.* 4 : 193. (type *fasciatus*)

1943. *Hydrophis*, Smith, *Fauna Brit. Ind.* 3 : 451.

Tail is laterally compressed; nostrils are dorsal in position, pierced in nasal shields, eyes are small with round pupil; poison fangs are short and fixed, followed after an interval by 1-18 maxillary teeth; loreal shield is not present; ventral shields are small, but quite distinct.

79. *Hydrophis spiralis* (Shaw 1802).  
YELLOW SEA SNAKE

1802. *Hydrus spiralis* Shaw, *Gen. Zool.* 3 : 564, pl. (Indian ocean).

1943. *Hydrophis spiralis*, Smith, *Fauna Brit. Ind.* 3 : 453.

Total length of the snake generally reaches up to 1760 mm. in males and 1950 mm. in females. The body is elongated, head moderately large, snake is not slender in the anterior region; 25-31 scales rows on the neck, 33-46 on the thickest part of the body; ventral shields are 295-362, preanal shields are enlarged; hemipenis is forked near the tip, and bears spines every where on the organ except near the base. Dorsal colouration is yellowish or yellowish-green, golden-yellow. About 44-48 black annulation on the whole body, which are widest in the vertebral region and become narrow on flanks and on the ventrum.

*Distribution*: Gujarat : Bhavnagar, Junagarh and Jamnagar districts. *India*: All coasts of India. *Elsewhere*: From Persian Gulf to Celebes on southern side and Philippines in the north.

*Status:* Common snake throughout its range.

80. *Hydrophis cyanocinctus* Daudin 1803.  
ANNULATED SEA SNAKE

1803. *Hydrophis cyanocinctus* Daudin, *Hist. Nat. Rept.* 7 : 383 (based on Russell's pl. 9, p. 10 (Sunderbans)).

1943. *Hydrophis cyanocinctus*, Smith, *Fauna Brit. Ind.* 3 : 454.

This snake is with an elongated body reaches to a length of about 1630 mm. in males 2020 mm. in females, body is not slender anteriorly, compressed posteriorly; eyes are comparatively smaller in adults; 25-35 scale rows are present on the neck, 37-47 on the thickest part of the body (increase 8-14), ventral shields are 290-390, which are distinct throughout, preanal shields are much enlarged; hemipenis is forked near the tip, and bears spines. Dorsal colouration is dirty white, pale-greenish or yellow, with 48-67 sooty cross bands, in adult the head is olive, reddish or dull yellow.

*Distribution* : Gujarat : Bhavnagar, Junagarh and Kachchha districts. *India:* West coast of Indian Peninsula; east coast of India. *Elsewhere* : Persian Gulf to the Idzu Sea of Japan; Sri Lankan coast; islands of Indonesia; Gulf of Siam; the Burmese coast; coastal areas of Pakistan.

*Status:* It is most common species, throughout its range, rare south of equator.

81. *Hydrophis mamillaris* (Daudin 1803).  
BOMBAY SEA SNAKE

1803. *Anguis mamillaris* Daudin, *Hist. Nat. Rept.* 7 : 340 (based on Russell, 1:49, pl.44; Vizagapatnam).

1943. *Hydrophis mamillaris*, Smith, *Fauna Brit. Ind.* 3 : 462.

The body of this snake reaches to a maximum length of 870 mm. in males and 895 mm. in females. Head is small, body slender anteriorly, much compressed posteriorly eyes

are moderately large; 25-29 scale-rows on the neck, 35-43 on the body; ventral shields are 302-390, distinct throughout; hemipenis forked near the tip and with spines of uniform size distributed throughout the organ. Dorsal colouration is yellowish or greyish, with 44-55 broad black bands on the body, almost two times broader than the interspaces between the bands; these bands expand dorsally and in most individuals connected along the line of the ventrals; head is completely black or with a yellow streak on the temporal region.

*Distribution:* Gujarat: Coastal area of Jamnagar district. *India:* The coast of India and Pakistan (Gulf of Cambay, Bombay and Vizagapatnam; Las Bela).

*Status:* This is a rare species.

82. *Hydrophis caerulescens* (Shaw 1802).  
MANY TOOTHED SEA SNAKE

1802. *Hydrus caerulescens* Shaw, *Gen. Zool.* 3 : 561. (Indian Ocean).

1943. *Hydrophis caerulescens*, Smith, *Fauna Brit. Ind.* 3 : 463.

Reaches to a maximum length of about 920 mm. in males and slightly more than 800 mm. in females. The body is not much slender anteriorly, compressed in the posterior region, head is moderately small; eyes are moderately large; 31-43 scale-rows on the neck, 38-54 on the body. Ventral shields are 253-334, hemipenis is forked near the tip, is having longitudinal series of flattened and coarse papillae. Dorsal colouration is bluish-gray; with 40-60 broad bands, almost two times broader than the interspaces between at the anterior portion of the snake; head is black in young, some individuals bear a curved mark but in adults the colour becomes dark gray, with or without a light stripe on the back side of the eye; ventrum is whitish with a yellow tinge.

*Distribution:* Gujarat: Coasts of Junagarh district. *India:* Coasts of Goa, Maharashtra, Karnataka, Tamil Nadu, West Bengal. *Elsewhere:* Burma coast, Gulf of Thailand, Straits of Malacca, Malaysia (Archipelago).

*Status:* Common, throughout its range.

Genus 56. *Lapemis* Gray, 1835.

1835. *Lapemis* Gray, *Illus. Ind. Zool.* 2 : Col. Pl. 87, fib. 2 (type *curtus*).

1943. *Lapemis*, Smith, *Fauna Brit. Ind.* 3 : 468.

Stout, short, deep-bodied marine snakes having ventral shields quite distinct in the anterior part, but small or missing in the posterior portion; dorsal body scales are squarish or hexagonal, juxtaposed, lower 3-4 rows are larger than the others; poison fangs are followed after an interval by from 3-6 solid teeth; head shields are entire or the parietals may be divided; nostrils are superior in position; nasal shields are in contact with one another.

83. *Lapemis curtus* (Shaw, 1802).

## SHORT SEA SNAKE

1802. *Hydrus curtus* Shaw, *Gen. Zool.* 3 : 562 (type loc. not known).

1943. *Lapemis curtus*, Smith, *Fauna Brit. Ind.* 3 : 470.

The total length of this sea snake generally never exceeds 950 mm. Its body is short, stout; eyes are moderately large; 28-31 scale rows on the neck in males, 31-35 in the females; 33-39 scales on the body of the males and 36-43 in females; the scales are hexagonal or squarish, the lowermost rows are with a short central keel or tubercle, which in most adult males becomes strongly spinose; ventral shields are 154-168 in males, 160-194 in females. Preanal shields are feebly enlarged; hemipenis is forked near the tip and with moderate sized, closely set spines evenly distributed on the complete organ. Dorsal colouration is greenish or yellowish-olive, with 35-50 pale olive or dark-gray bars on the dorsum. Ventrals are whitish; head is pale olive to black, with or without yellow markings across the snout and along the side of the head.

**Distribution:** Gujarat: Coasts of Junagarh district. *India:* Coasts of Goa, Maharashtra, Tamil Nadu, Orissa and West Bengal. *Elsewhere:* Coastal waters of Burma, Arabia, Iran, Sri Lanka and Mekran coast of Pakistan.

**Status:** It is quite common on the west coast

of India but seems to be rare on the eastern coast.

Genus 57. *Microcephalophis* Lesson 1834.

1834. *Microcephalophis* Lesson, in *Belang. Voy. Ind. Orient.* 320 (type *gracilis*).

1943. *Microcephalophis*, Smith, *Fauna Brit. Ind.* 3 : 472.

Marine snakes with small head; long and slender neck; comparatively thick long body; ventral shields are entire in the anterior part but are divided by a median fissure in the posterior portion; maxillary bone extends forward as far as or a little further than the palatine; poison fangs are followed after an interval by 5 or 6 solid teeth; head shields are entire; nostrils are superior, nasals are in contact with one another; 30-36 hexagonal, juxtaposed scales round the thickest part of the body.

84. *Microcephalophis gracilis*

(Shaw 1802)

## COMMON SMALL-HEADED SEA SNAKE

1802. *Hydrus gracilis* Shaw, *Gen. Zool.* 3 : 560 (type loc. not known).

1943. *Microcephalophis gracilis*, Smith, *Fauna Brit. Ind.* 3 : 472.

In this species the total length of males is about 1050 mm. and females 1120 mm. The body is very long and most slender anteriorly and extremely compressed posteriorly, eyes are moderately large; head is very small in comparison to the body, 17-23 scale rows are present on the neck, 29-43 on the body; ventral shields are 212-360, preanal shields are feebly enlarged; hemipenis forked near the tip; it is with spines all over. The dorsal colouration of young is blackish with a series of whitish dorsal bands or oval spots on lateral aspects on the slender portion of the body and posterior part is completely covered with 40-60 bands. In adult individuals these markings become dull and the whole dorsum looks greyish; ventrum is paler; head is olivaceous or yellowish.

**Distribution:** Gujarat : Coastal areas of Bhavnagar district. *India :* Both western and

eastern coasts of India. *Elsewhere*: From Persian Gulf to southern China and the coast of Australia. Gulf of Thailand; from the coastal areas of Patani and Singgora, in southern China from the Straits of Hainan and Macao.

*Status* : It is common sea snake throughout its range.

**85. *Microcephalophis cantoris***  
(Gunther 1864)

**CANTOR'S SMALL-HEADED SEA SNAKE**

1864. *Hydrophis cantoris* Gunther. *Rept. Brit. Ind.* 374 (Penang).

1943. *Microcephalophis cantoris*, Smith, *Fauna Brit. Ind.* 3 : 475.

This snake reaches to a length of about 1570 mm. in males and 2020 mm. in females. The body is long and very slender anteriorly, much compressed posteriorly, head very small and elongated; eyes are moderately large; 23-25 or sometimes 21 scale-rows are present on the neck, 41-48 on the body, ventral shields are from 404-468, preanal shields are feebly enlarged; hemipenis forked near the tip, bearing spines every where on the complete organ. Dorsal colouration is dark- olive or greyish anteriorly with yellow cross- bars or lateral spots; ventrum is yellowish with dark bands or bars, head is black in the juveniles but greyish or yellow with a greenish tinge in the adults.

*Distribution*: Gujarat: Coastal parts of Bhavnagar district. *India*: On western coast of India, recorded from Cannanore, Orissa coast. *Elsewhere*: Sunderbans and Chittagong in Bangladesh, Pakistan (coastal parts near Karachi).

*Status* : A common sea snake in its range.

**Genus 58. *Pelamis* Daudin 1803.**

1803. *Pelamis* Daudin, *Hist. Nat. Rept.* 7 : 361. (type *platurus*).

1943. *Pelamis*, Smith, *Fauna Brit. Ind.* 3 : 475.

Maxillary bone never extend anteriorly beyond the palatine bone; poison fangs are followed after an interval of 7-11 teeth; head

shields are entire; nostrils are in a superior position; nasal shields are in contact with one another; body is short, very stout, covered with squarish or hexagonal, juxtaposed scales, 49-67 round the thickest portion of the body; ventral shields are very small, divided by a median longitudinal furrow, in many individuals ventrals can not be distinguished from the adjoining body scales.

**86. *Pelamis platurus* (Linnaeus 1766).**  
**YELLOW-BELLIED SEA SNAKE OR**  
**PELAGIC SEA SNAKE**

1766. *Anguish platurus* Linnaeus, *Syst. Nat.* ed. 12 : 391 (type loc. not known)

1943. *Pelamis platurus*, Smith, *Fauna Brit. Ind.* 3 : 476.

The length of this sea snake never exceeds 800 mm. in males and 970 mm. in females. The body is much compressed, head is narrow and snout is elongated; 49-67 scale-rows on the thickest portion of the body, preanal shields are moderately enlarged; hemipenis is forked near the tip, it is having spines every where except near the base of the penis. Dorsal colouration is extremely variable, this may be black or lemon yellow, with black dorsal stripe; ventrum, top and side of the head are of the same colouration; chin is pigmented with dark; tail is with black and white bars or vermiculation.

*Distribution*: Gujarat: Coastal areas of Junagarh and Kachchha districts. *India*: Complete coastal line of India. *Elsewhere*: Persian Gulf to the cape of Good hope, eastward range extends to North Island, New Zealand, Possiet Bay, Kamchatka, Gulf of California to the Coast of Equator.

*Status*: Most Common, throughout its range.

**Family 20. VIPERIDAE Bonaparte 1840.**  
**SOLENOGLYPHA**

1840. *Viperidae* Bonaparte, *Mem. Ace. Torin.* (2) II : 393.

1943. *Viperidae*, Smith, *Fauna Brit. Ind.* 3 : 477.

The maxilla is greatly shortened but becomes quite deep, bearing a single large, erectile, tube like poison fang. The anterior skull bones are flexibly movable on the cranium. There are no vestiges on the pelvis or hind-limb. Eyes are moderately large. The head is quite distinct from the neck. The dorsal scales are small, more or less rhomboidal in shape and overlapping; the ventral scales are transversely enlarged to form a single row and some times a double, especially in the tail region; the tail is of moderate length. In pit-vipers there is a deep pit between the eye and the nostril, which is heat sensitive.

Genus 59. *Vipera* Laurenti 1768.

1768. *Vipera* Laurenti; *Syn Rept.*: 99 (type redi = aspis)

1943. *Vipera*, Smith, *Fauna Brit. Ind.* 3 : 482.

Head is distinct from the neck, covered with small scales or a small frontal and parietal shields are present; eyes are with vertically elliptical pupil, eyes are not in contact with the labials; there is no pit between the eye and the nostril; more than 3 head shields (scales) across top of head between the two eyes; nostril is lateral in position and pierced into a large nasal shield; a naso-rostral shield is present between the nasal and the rostral or partly united with the nasal; dorsal body scales are keeled, keels without serration, in straight rows of 19-33 scales round the body; ventral shields are rounded and smooth; sub-caudal shields are divided; tail is short.

87. *Vipera russelli* (Shaw 1797).  
RUSSELL'S VIPER; DABOIA,  
TIC-POLONGA

1796. *Ind. Serp.* 1 : pl. 7 and 2 : pl. 32.

1943. *Vipera russelli*, Smith, *Fauna Brit. Ind.* 3 : 482.

Obtuse snout with prominent canthus rostralis, nostril is very large, pierced in nasal, scales in 25 to 29; 27 : 33 : 21 to 23 rows, which

is quire smooth; ventral shields in males and females are from 153-180; subcaudal shields in males and females are 41- 64 and are paired; hemipenis extends up to 10th caudal plate, forked opposite the 2nd and 3rd caudal plate. Dorsal colouration is light tan to sandy, with a vertebral series of 23-29 large, oval, chestnut spots, with black or dark brown margins, narrowly edged with cream, a lateral series of similar spots are present, but these are comparatively smaller than the vertebral spots; under side of head is with two large dark spots; a light V-shaped mark with its apex on top of snout; labials and lateral aspect of snout spotted with brown and cream colour; ventrum is whitish with a pink tinge and is with black semilunar spots; chin and throat are whitish.

*Distribution* : Gujarat : Surat, Vadodara, Gandhinagar, Dangs and Bharuch districts. *India* : Whole of India. *Elsewhere* : Sri Lanka, Pakistan, Eastern Himalayas, Burma, Thailand and many parts of Indo-Chinese region.

*Status*: Though the snake is available every where in its range, but no where common, the species is abundant in some areas, rare or missing in others.

Genus 60 *Echis* Merrem 1820.

1820. *Echis* Merrem, *Tent. Syst. Amphib.* : 149 (type *carinata*).

1943. *Echis* Smith, *Fauna Brit. Ind.* 3 : 487.

Nostrils are small and dorsolateral in position directed upward and outward and situated in small nasal; head is very distinct from the neck, covered with small imbricate scales; eyes are moderately large, with vertical pupil; body scales are keeled, in 27-37 rows, dorsal body scales are arranged in strongly longitudinally oblique series; the lateral scales are smaller, oblique; pointing downwards, with heavy serrated keels; ventral shields are rounded; tail is quite short with undivided subcaudal shields.

88. *Echis carinatus* (Schneider 1801).  
SAW-SCALED VIPER; PHOORSA

1796. *Ind. Serp.* Russell, 1 : pl. 2, p. 2 (Arni.).

1943. *Echis carinatus*, Smith, *Fauna Brit. Ind.* 3 : 487.

Length is about 760 mm. in males and females. Head is short, quite distinct from the neck; snout is short and bluntly pointed, eyes are large, surrounded by 13-21 small scales, scales on the top of the head are small, elongate, imbricate, strongly keeled, scales of the body are in 25-29; 27-37: 21- 27 rows, two outermost rows are the largest; ventral shields are from 132-185; subcaudal shields are from 23-39; hemipenis is deeply forked and bears spines all over. Dorsal colouration is from light buff or tan or olive-brown or chestnut; dorsum is with a median row of 28-36 whitish spots, with darker margins; lateral aspects are with narrow; undulating, white line; dorsal parts of loops are generally with more distinct in colour than ventral; dorsal aspect of head is with light arrow head mark; a pale, but distinct stripe emerges from the zone of eye and reaches up to the angle of mouth; labials are with dark brown spots; ventrum is whitish with light pinkish brown stripes, which may be broken up, some individuals are stippled with dark gray; chin portion and throat is white.

*Distribution* : Gujarat : Bharuch, Bhavnagar, Jamnagar, Rajkot, Dangs, Panchmahals, Vadodara, Banaskantha, Surendranagar, Kachchha, Surat districts; available in Nirwand and Panchum Islands. *India*: Widely distributed in Andhra Pradesh, Goa, Maharashtra, Karnataka, Tamil Nadu, Rajasthan, Jammu and Kashmir. *Elsewhere*: Arabia, Ghana, Kenya, Nigeria, Sri Lanka, Iran, whole of middle east, southern portion of Russian Asia, Pakistan and Iraq.

*Status*: Most common throughout its range.

Genus 61. *Trimeresurus*  
Lacepede 1804.  
PIT VIPERS

1804. *Trimeresurus* Lacepede, *Ann. Mus. Paris*, 4 : 209 (type *viridis*).

1943. *Trimeresurus*, Smith, *Fauna Brit. Ind.* 3 : 502.

Pit vipers with head is well demarcated

from the neck; nostrils are small and pierced in nasal shields, eyes are moderately large, with vertical pupil; upper surface of head is covered with small scales or larger shields; 2 or 3 postoculars are present; a deep pit is present on the lateral aspect of the face, between the preoculars and the loreal; scales of the body are in 17-31 rows; ventral shields are rounded; tail is moderately large or short; subcaudal shields are paired; anal shield is not divided.

89. *Trimeresurus gramineus*  
(Shaw 1802).  
BAMBOO PIT VIPER

1802. *Coluber gramineus* Shaw. *Gen. Zool.* 3 : 420. (based on Russell's "Bodroo Pam" *Ind. Serp.* 1 : pl. 9, p. 13 and 2 : p. 24; type loc. Vizagapatam).

1943. *Trimeresurus gramineus*, Smith, *Fauna Brit. Ind.* 3 : 515.

The length of this pit-viper reaches up to 745 mm. in males and 935 mm. in females. Head is quite distinct from the neck, snout two times as long as the diameter of the eye; upper head scales are small, subequal, subimbricate and smooth scales of the body are in 21:21:15 smooth rows or the median posterior rows are feebly keeled; ventral shields in males are 145-175 and in females are 164-177; sub-caudal shields in males are 55-71 and in females 57-62; tail is prehensile; hemipenis extends up to the 11th 12th caudal plate, forked opposite the third sub-caudal shield.

Dorsal colouration is yellowish- green, uniform or in many individuals with small drak-brown spots; ventrum is whitish with a green tinge.

*Distribution* : Gujarat : Dangs district. *India* : Complete Peninsular India south of Latitude 22°

*Status*: Its population is decreasing on account of its habitat loss for urbanisation.

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## AMPHIBIA

A.K. SARKAR & S. RAY

Zoological Survey of India, Calcutta

### INTRODUCTION

Only a few scattered reports on the Amphibian fauna of Gujarat are available. These are by McCann (1938), Soman (1960) and Daniel and Shull (1963). Sarkar (1984) made an ecological study of the Amphibians of Gujarat while Naik and Vinod (1993) have given an account of their distribution pattern in the State.

The present work is a taxonomic account of the Amphibian fauna of Gujarat, based mainly on material collected by the various survey parties from the Zoological Survey of India from 1989 to 1993. In addition to these, species recorded in literature from Gujarat have also been incorporated to make the faunal list more exhaustive.

In all, 18 species covering 9 genera, 5 families and 2 orders are being reported here which includes a single species of *Ichthyophis* known from the state.

The southern part of Gujarat covering the districts of Valsad, The Dangs, Surat and Baruch is under tropical rain forests and a greater species diversity is observed here. Naik and Vinod (1993) have made a number of new records from this area. More intensive surveys shall undoubtedly enhance the number of species further.

### MATERIAL AND METHODS

Amphibians are aquatic, terrestrial or arboreal. Aquatic species are collected by the help of a hand-net, cast-net or hook and line. Both terrestrial and arboreal forms are collected by hand or long forceps. As some

amphibians hibernate during winter, collections have been made mainly during pre-monsoon and monsoon months which constitute their breeding season.

Collections were made from aquatic vegetation, bush, litter, banks of ponds and canals, dark corners inside village hutments, under tree-bark, soil and stones. Nocturnal forms were collected at night with the aid of a torchlight. Collected specimens were chloroformed and preserved in 5% formalin. An incision on the abdomen for smaller specimens and injection of 10% formalin into the viscera for larger specimens were made from fixation of visceral organs.

### SYSTEMATIC ACCOUNT

Class AMPHIBIA

Order ANURA

Key to the families of ANURANS of Gujarat

1. Upper jaw toothless .....2
1. Upper jaw toothed..... 3
2. Skin rough with spiny warts, parotoids present .....BUFONIDAE
2. Skin more or less smooth, parotoids absent .....MICROHYLIDAE
3. Intercalary ossicle between the distal and penultimate phalanges absent ...RANIDAE
3. Intercalary ossicle between the distal and penultimate phalanges present ..... RHACOPHORIDAE

## Family 1. BUFONIDAE

Genus 1. *Bufo* Laurenti, 1768Key to the species of genus *Bufo*

1. Head with bony ridges, parotoids kidney-shaped.....*melanostictus*
2. Head without bony ridges, parotoids flat (not kidney-shaped) .....*stomaticus*

1. *Bufo melanostictus* Schneider  
(Common Indian Toad)

1799. *Bufo melanostictus* : Schneider, *Hist. Amph.* 1 : 216.

1963. *Bufo melanostictus* : Daniel, *J. Bombay nat.Hist. Soc.*, 60 (2) : 435-437.

1984. *Bufo melanostictus* : Sarkar, *Bull. Zool. Surv. India*, 6 (1-3) : 90-91.

*Material examined* : 21 adults from the districts of Sabarkantha, Rajkot, Junagad, Kheda, Panchmahal and Bharuch.

*Measurements* : Snout to vent length 16-95 mm.

*Diagnostic characters*: Head broader than long, with cornified bony ridges; snout rounded, nearly equal to the diameter of the eye; interorbital width broader than that of upper eyelid; tympanum very distinct, two-thirds the diameter of the eye. Fingers free, first a little longer than second, tips of fingers and toes swollen. Toes nearly half webbed, more than three phalanges of fourth toe free; two oval (inner and outer) metatarsal tubercles present. Tarsometatarsal articulation reaches in between tympanum and eye. Dorsum dark brownish rough with several spiny warts, parotoids large, kidney-shaped. Venter dull whitish with numerous small spiny warts.

*Distribution* : Gujarat : As mentioned in the *Material examined*. It is more or less found all over Gujarat. *Elsewhere*: Common throughout the plains of India, also Nepal, Sri Lanka, Bangladesh, Myanmar, South China, Malaya Peninsula and Archipelago.

2. *Bufo stomaticus* Lutken  
(Marbled Toad)

1863. *Bufo stomaticus* : Lutken, *Vidensk, Meddr dansk naturh-foren*, 14 : 305.

1963. *Bufo stomticus*: Daniel, *J. Bombay nat. Hist. Soc.*, 60 (2) : 433-434.

1984. *Bufo stomaticus*: Sarkar, *Bull. zool. Surv. India*, 6(1-3) : 91.

*Material examined*: 45 exs from the districts of Kachchh, Banaskantha, Mahesana, Sabarkantha, Jamnagar, Rajkot, Bhavnagar, Amreli and Kheda.

*Measurements*: Snout to vent length 22-57 mm.

*Diagnostic characters* : Head broader than long; without bony ridges; snout rounded, nostril nearer to the tip of snout than to the eye; interorbital width broader than that of upper eyelid; tympanum very distinct, nearly once the diameter of the eye. Fingers free, first a little longer than second, tips of fingers and toes swollen. Toes more than half-webbed, two phalanges of fourth toe free; two oval (inner and outer) metatarsal tubercles present. Tarsometatarsal articulation reaches in between tympanum and eye. Dorsum brownish, rough with several non-spiny warts, parotoids large, flat not kidney-shaped. Venter dull-whitish with numerous small, non-spiny warts.

*Distribution* : Gujarat : As mentioned in the *Material examined*. Sarkar (1984) reports it from the districts of Banaskantha, Sabarkantha, Mahesana, Jamnagar and Rajkot, Naik and Vinod (1993) from Vadodara, Bharuch and Valsad district. New record from Kheda; Bhavnagar and Amreli districts. *Elsewhere*: Plains of India from Kashmir to Karnataka, and Assam in the east. Also Nepal, Myanmar, Sri Lanka, Pakistan and Arabia.

*Status* : More or less common in Saurashtra region and northern Gujarat.

## Family II. MICROHYLIDAE

Key to the genera of the family  
MICROHYLIDAE

1. Tips of fingers more or less blunt (or rounded), but not dilated into discs ..... 2

- Tips of fingers dilated into triangular discs ..... 3
- 2. Two strong, shovel-shaped metatarsal tubercles (inner larger) present ..... *Uperodon*
- Two small, distinct, (not shovel-shaped) metatarsal tubercles present ..... *Microhyla*
- 3. A bony ridge immediately below internal nares ..... *Kaloula*
- A fleshy ridge some way below internal nares ..... *Ramanella*

**Genus 2. *Uperodon***  
Dumeril & Bibron, 1841

**Key to the species of the genus *Uperodon***

- Interorbital width about twice the width of upper eyelid; dorsum marbled ..... *systema*
- Interorbital width about thrice the width of upper eyelid; dorsum not marbled ..... *globulosus*

**3. *Uperodon systema* (Schneider)**  
(Marbled Ballon Frog)

1799. *Rana systema* Schneider, *Hist. Amph.*, 1 : 144.

1934. *Uperodon systema* : Parker, *Monogr. Microhylidae* : 75-76.

1963. *Uperodon systema* : Daniel, *J. Bombay nat. Hist. Soc.*, 81 : 488-489.

*Material examined* : Nil; record from published literature.

*Diagnostic characters* : Head broader than long; snout rounded, as long as the diameter of the eye; nostril equidistant from the tip of the snout and the eye; interorbital width about twice the width of the upper eyelid; tympanum hidden. Fingers free, first shorter than second, tips not bearing discs; subarticular tubercles of fingers and toes not very distinct; two shovel-shaped metatarsal tubercles present, the inner very large. Tibiotarsal articulation not reaching the shoulder. Dorsum smooth or

slightly tuberculated, olive, marbled and spotted, darker. Venter smooth, white and spotless.

*Distribution* : Gujarat : Naik (1993) reports it from Baroda, Vadodara district. *Elsewhere* : Himachal Pradesh, Uttar Pradesh, Orissa, Madhya Pradesh, Andhra Pradesh, Karnataka, Kerala and Tamil Nadu in India. Also Sri Lanka.

*Remarks* : It leads a secretive subterranean life and found on surface only during breeding season.

*Status*: Rare.

**4. *Uperodon globulosus* (Günther)**  
(Balloon Frog)

1864. *Cacopus globulosus* Günther, *Rept. Br. India*, : 416.

1934. *Uperodon globulosum* : Parker, *Monogr. Microhylidae*, : 76 : 697-698.

1993. *Uperodon globulosus*: Naik and Vinod, *Hamadryad* 18 : 29.

*Material examined* : Nil; record from published literature.

*Diagnostic characters* : Head broader than length. Snout rounded, twice as long as the diameter of the eye; nostril equidistant from the tip of snout and the eye; interorbital width about thrice the width of upper eyelid; tympanum hidden. Fingers free, tips not bearing discs; subarticular tubercles of fingers and toes not very distinct. Toes with rudiment of web; both inner and outer shovel-shaped metatarsal tubercles present, inner very large. Tibiotarsal articulation not reaching shoulder. Dorsum smooth or slightly tuberculated, reddish brown. Venter wrinkled and dull whitish.

*Distribution* : Gujarat: Daniel and Shull (1963) reported it from Ahwa, The Dangs district, and Naik and Vinod (1993) from Bharuch district. *Elsewhere* : Assam, West Bengal, Bihar, Madhya Pradesh, Maharashtra and Karnataka in India.

*Remarks* : It leads a subterranean life surfacing only during breeding season.

*Status* : Rare.

Genus 3. *Microhyla* Tschudi, 1838.Key to the species of the genus *Microhyla*

- Two small, oval (not shovel-shaped) metatarsal tubercles present .....*ornata*
- Two large, shovel-shaped metatarsal tubercles present .....*rubra*

5. *Microhyla ornata* (Dumeril & Bibron)  
(Ornate Microhylid)

1841. *Enqystoma ornatum* Dumeril and Bibron, *Erpet*, Gen. 8: 745.
1934. *Microhyla ornata* : Parker, *Monogr Microhylidae*, 139-141.
1984. *Microhyla ornata* : Sarkar, *Bull Zool Surv India*. 6 (1-3) : 92.

*Material examined* : 42 exs. from the districts of Banaskantha, Sabarkantha, Jamnagar, Rajkot, Surendranagar, Ahmedabad, Bhavnagar, Amreli and Kheda.

*Measurements* : snout to vent length 11-20mm.

*Diagnostic characters* : Head broader than long; snout obtusely pointed, a little longer than the diameter of the eye; nostril nearer to the tip of snout than to the eye; interorbital width a little broader than that of upper eyelid; tympanum not so distinct. Fingers free, tips flattened. Toes with a rudiment of web, tips blunt, two small but distinct oval (inner and outer) metatarsal tubercles present. Tibiotarsal articulation reaches near to eye. Dorsum smooth, brownish with broad darker markings. venter smooth, dull whitish, little darker on throat.

*Distribution* : Gujarat: As mentioned in the *Material examined*. Soman (1960) records it from Bhuj (Kachchh district). Daniel and Shull (1963) from Ahwa (The Dangs district). Sarkar (1984) from Palanpur, (Banaskantha district) and Naik and Vinod (1993) from Panchmahal and Bharuch districts. New records from the districts of Sabarkantha, Jamnagar, Surendranagar, Ahmedabad, Bhavnagar, Amreli and Kheda. *Elsewhere* : widely distributed all over

the plains of India upto an altitude of 1524 meters, and Andaman Islands. Also Pakistan, Nepal, Bangladesh, Sri Lanka, Myanmar, South China, Southeast Asia and Taiwan.

*Remarks* : Small frog found inside bush and under dry leaves.

*Status* : Common.

6. *Microhyla rubra* (Jerdon)  
(Red Microhylid)

1854. *Enqystoma rubrum* : Jerdon, *J. Asiat. Soc., Bengal*, 22 : 534.
1934. *Microhyla rubra* : Parker, *Monogr Microhylid* : 142- 143.
1993. *Microhyla rubra* : Naik and Vinod, *Hamadryad* 18:29

*Material examined* : Nil; record from published literature.

*Diagnostic characters* : Head broader than long; snout rounded, a little shorter than the diameter of the eye; nostril nearer to the tip of the snout than to the eye; interorbital width broader than that of upper eyelid; tympanum hidden. Fingers free, first finger much shorter than second, tips swollen. Toes more than one fourth webbed, tips swollen; two large shovel-shaped metatarsal tubercles present. Tibiotarsal articulation reaching nearer to eye. Dorsum a little tuberculated, brownish. Venter smooth, dull-whitish, darker on gular region.

*Distribution* : Gujarat: Naik and Vinod (1993) report a single specimen from Bharuch district. *Elsewhere* : Assam, Andhra Pradesh, Karnataka, Kerala and Tamil Nadu in India. Also Sri Lanka.

Genus 4. *Kaloula* Gray, 1831.7. *Kaloula pulchra* Gray (Painted frog)

1831. *Kaloula pulchra* Gray, *Zool. Misc.* 1:38.
1934. *Kaloula pulchra taprobanica*: Parker, *Monogr Microhylidae* : 86-87.

1993. *Kaloula pulchra*: Naik and Vinod, *Hamadryad* 18:29

*Material examined* : Nil; record from Published literature.

*Diagnostic characters*: Head broader than long; snout rounded, as long as the diameter of the eye; nostril nearer to the tip of snout than to eye; interorbital width much broader than that of upper eyelid; tympanum hidden. Bony ridge below internal nares. Fingers free, first shorter than second, tips bearing well developed truncate discs; subarticular tubercles of fingers and toes distinct. Toes one-third webbed, tips obtusely swollen; inner metatarsal tubercles well developed, large, shovel-shaped; outer metatarsal tubercles small, shovel-shaped. Tibiotarsal articulation reaches the axil Dorsum rough with scattered warts, and greyish with reddish brown patches fringed with black. Venter wrinkled on belly, granular on throat and under surface of things, light brownish.

*Distribution* : Gujarat: Naik and Vinod (1993) report it from Panchmahal and Bharuch Districts. *Elsewhere* : West Bengal, Madhya Pradesh, Karnataka, and Tamil Nadu in India. Also Sri Lanka.

*Status*: Rare.

Genus 5. *Ramanella*  
Rao and Ramanna, 1925.

8. *Ramanella montana* (Jerdon)  
(Jerdon's *Ramanella*)

1854. *Hylaedactylus montanus* Jerdon, *J. Asiat. Soc. Bengal.* 22:533.

1934. *Ramanella montana* : Parker, *Monogr Microhylidae* : 91-92.

1963. *Ramenella montana* : Daniel and Shull, *J. Bombay nat. Hist. Soc.*, 60 : 740.

*Material examined* : Nil; record from published literature.

*Diagnostic characters* : Head broader than long; snout truncate, a little longer than the diameter of the eye; nostril nearer to the tip of

the snout than the eye, interorbital width about one and half times broader than that of upper eyelid; tympanum hidden. Fleshy ridge some way below internal nares. Fingers free, tips bearing large triangular discs; subarticular tubercle of fingers and toes moderately distinct. Toes one-third webbed in female and half webbed in male, tips slightly dilated; both inner and outer metatarsal tubercles present. Tibiotarsal articulation reaching the shoulder or posterior border of eye. Dorsum smooth, pale-brown to chocolate. Venter smooth with regular spots and blotches.

*Distribution* : Gujarat : Daniel and Shull (1963) report it from The Dangs district of Gujarat. *Elsewhere* : Maharashtra and Kerala in India.

*Remarks* : Small sized frog. Generally found in holes on tree-trunk.

*Status* : Rare in the State.

Family III. RANIDAE

Key to the genera of the family RANIDAE

- Outer metatarsal separated by web in the distal half ..... *Rana*
- Outer metatarsal united or separated only in the distal extremity ..... *Tomopterna*

Genus 6. *Rana* Linnaeus, 1758.

Key to the species of the genus *Rana*

1. Tips of toes with discs..... *leithii*
- Tips of toes without discs..... 2
2. Toes webbed upto tips..... 3
- Toes webbed not upto tips..... 4
3. Ventral surface smooth with no porous warts; tips of toes swollen ..... *cyanophlyctis*
- Ventral surface more or less granulated with porous warts on throat, under-surface of thighs and sides of belly; tips of toes pointed ..... *hexadactyla*
4. Toes entirely webbed, outer metatarsal tubercles absent..... *tigerina*

- Toes not entirely webbed; outer metatarsal tubercle present.....5
5. Lateral sides of body and outer surface of limbs darker in colour than other parts of the body .....*malabarica*
- Lateral sides of body and outer surface of limbs not darker in colour than other parts of the body .....6
6. Head a little broader than long; two penultimate phalanges of fourth toe free from webbing .....*keralensis*
- Head as long as broad; more than two penultimate phalanges of fourth toe free from webbing..... *limnocharis*

### 9. *Rana leithii* Boulenger

1888. *Rana leithii* Boulenger, *Ann & Mag. N.H.* (6) II: 506

1920. *Rana leithii* Boulenger : *Rec. Indian Mus.* 20: 116- 117.

1963. *Rana leithii*: Daniel and Shull, *J. Bombay nat. Hist. Soc.* 60: 41.

*Material examined* : Nil; record from published literature.

*Diagnostic characters* : Head as long as broad ; snout rounded, projecting a little beyond the mouth, as long as the eye; nostril nearer to the tip of the snout than to the eye; interorbital width less than that of upper eyelid; tympanum very distinct, about 2/3 diameter of the eye. Fingers free, tips with large discs; subarticular tubercles of fingers and toes moderately prominent. Toes 2/3 webbed, three penultimate phalanges of fourth toe free, tips with distinct discs; inner metatarsal tubercle oval, not very distinct, outer metatarsal tubercles absent. Tibiotarsal articulation reaches in between eye and tip of snout. Dorsum brownish with scattered warts of various shape. Venter white and smooth, throat a little brownish.

*Distribution* : Gujarat: Ahwa, The Dangs district (Daniel and Shull, 1963), *Elsewhere*: Madhya Pradesh, Maharashtra, and Kerala, in India.

*Remarks* : Daniel and Shull (1963) report the tadpoles from The Dangs district of Gujarat.

*Status* : Rare in the State.

### 10. *Rana cyanophlyctis* Schneider (Skipping Frog)

1799. *Rana cyanophlyctis* Schneider, *Hist. Amph.*, 1: 137.

1920. *Rana cyanophlyctis* : Boulenger, *Rec. Indian Mus.* 20: 26-27.

1984. *Rana cyanophlyctis* : Sarkar *Bull. Zool. Surv. India.* 6(1-3) : 87-88.

*Material examined* : 168 adults from the districts of Kuchchh, Banaskantha, Mahesana, Sabarkantha, Jamnagar, Rajkot, Surendranagar, Ahmedabad, Bhavnagar, Amreli, Junagad, Kheda, Panchmahal, Bharuch, Surat, The Dangs and Valsad.

*Measurements* : Snout to vent length 20-62mm.

*Diagnostic characters* : Head broader than long; nostril equidistant from the tip of the snout and the eye; interorbital width much smaller than that of the upper eyelid; tympanum distinct nearly equal to the diameter of the eye. Fingers free, first equals seconds, tips pointed; subarticular tubercles of fingers and toes feebly prominent. Toes fully webbed, tips swollen ; a pointed digit-like inner metatarsal tubercles present, outer metatarsal tubercle absent. Tibiotarsal articulation reaches in between tympanum and nostril. Dorsum darker with small warts. Venter whitish and smooth.

*Distribution* : Gujarat: As mentioned in the material examined. The species is found in all the districts of Gujarat. *Elsewhere* : Throughout the plains of India, and upto 1846 m. in the Himalayas. Also Pakistan, Afghanistan, Bluchistan, Iran, South Arabia, Bangladesh, Thailand and Sri Lanka.

*Remarks*: It is one of the commonest species of frogs, which is found floating in ponds, ditches and other water bodies in Gujarat almost throughout the year. They tolerate pollution and are found living in open drains in cities like Ahmedabad, Rajkot, Jamnagar, Bhuj, Palampur, Baroda, Surat etc.

*Status* : Very common.

11. *Rana hexadactyla* Lesson (Pond frog)

1834. *Rana hexadactyla* Lesson in Balang, *Voy. Indian or Rept.* : 331.

1920. *Rana hexadactyla* : Boulenger, *Rec. Indian Mus.* 20:10-11.

1984. *Rana hexadactyla* : Sarkar, *Bull Zool. Surv. India*, 6(1-3): 87.

*Material examined* : Nil; record from published literature.

*Diagnostic characters* : Head as long as broad or a little broader than long; snout rounded or very slightly pointed, hardly projecting beyond the mouth; longer than the diameter of the eye; nostril nearer to the tip of the snout than to the eye; interorbital width much smaller than that of upper eyelid; tympanum distinct, nearly once the diameter of the eye; Fingers free first longer than second, tips pointed; subarticular tubercles of fingers and toes feebly prominent. Toes fully webbed, tips pointed, digit-like inner metatarsal tubercles present, outer metatarsal tubercles absent. Tibiotarsal articulation reaching in between tympanum and eye. Dorsum leaf-green or darker with porous warts. Venter dull whitish. Granular with warts on the throat, lateral sides of belly and under the thighs.

*Distribution* : Gujarat: Halwad and Jamnagar (Sarkar, 1984), and Surat, Navsari, Bulsar, Dangs and Bharuch (Naik and Vinod 1993). *Elsewhere* : West Bengal, Orissa, Rajasthan, Gujarat, Maharashtra, Goa, Karnataka, Andhra Pradesh, Tamil nadu and Kerala in India. Also Bangladesh, Sri Lanka and Pakistan.

*Status* : Uncommon in the state.

12. *Rana tigerina* Daudin (Indian Bull Frog)

1803. *Rana tigerina* Daudin *Hist. Rain. Gren. crip.*, p.64.

1920. *Rana tigerina* : Boulenger, *Rec. Indian Mus.*, 20:17-20

1984. *Rana tigerina* : Sarkar, *Bull Zool. Surv. India* 6(1-3):88-89

*Material examined* : 25 exs. from the districts of Kachchh, Banaskantha, Mahesana,

Sabarkantha, Jamnagar, Rajkot, Ahmedabad, Bhavnagar, Amreli, Junagadh, Kheda and Surat.

*Measurements* : Snout to vent length 28-172mm.

*Diagnostic characters* : Head as long as broad or a little broader than long; snout rounded or pointed, projecting beyond the mouth, longer than the diameter of the eye; nostril generally equidistant from the tip of snout and the eye; interorbital width much less than that of upper eyelid; tympanum distinct, nearly equal to the diameter of eye. Fingers free, tips not sharply pointed; subarticular tubercles of fingers and toes not very distinct. Toes entirely webbed, tips not pointed; a blunt not shovel-shaped inner metatarsal tubercles present; outer metatarsal tubercle absent. Tibiotarsal articulation reaches in between eye and nostril. Dorsum olive green with darker spots, distinct warts and long glandular folds. Venter whitish and smooth.

*Distribution* : Gujarat: As mentioned in the material examined: Sarkar (1984) reports it from Kachchh, Vadodara and the Dangs districts. It is a common species and more or less found in all the districts of the state. *Elsewhere* : The species is common throughout India from the base of the Himalaya to Southern Part of the country, and Andaman. Also Pakistan, Nepal, Bangladesh, Sri Lanka, Myanmar, Thailand, South China and Taiwan.

*Remarks* : Large sized frog. In Gujarat They are common in water, holes in the dry zones of Kuchchh and Saurashtra.

*Status*: Common.

13. *Rana malabarica* Tschudi.  
(Fungoid Frog)

1838. *Rana malabarica* Tschudi, *Class. Batr.*: 40 & 80.

1920. *Rana malabarica* : Boulenger, *Rec. Indian Mus.*, 20:99- 101.

1986. *Rana malabarica*: Naik and Patel, *J. Bombay. nat. Hist. Soc.* 83: 672.

*Material examined* : Nil; record\* from published literature.

*Diagnostic characters* : Head as long as broad; snout rounded or obtusely pointed,

projecting beyond the mouth, as long as or little longer than the diameter of the eye; nostril a little nearer to the tip of the snout than to eye; interorbital width more or less equal to that of upper eyelid. Tympanum very distinct, two third to once the diameter of the eye. Fingers free, first a little longer than second, tips blunt and swollen; subarticular tubercles of fingers and toes very distinct. Toes half webbed, three penultimate phalanges of fourth toe free, tips swollen; very prominent both inner and outer metatarsal tubercle present. Tibiotarsal articulation reaches tympanum to eye. Dorsum dull whitish with darker colouration on lateral sides of body and outer surface of limbs, white bars on limbs, venter dark brown with white spots on belly and undersurface of limbs, granular or smooth.

*Distribution* : Gujarat: Naik and Patel (1986) reported from Valsad district of Gujarat. *Elsewhere* : Orissa, Madhya Pradesh, Maharashtra, Goa, Kerala and TamilNadu.

*Remarks* : Medium sized frog. Nocturnal in habit and generally found in forest area During monsoon days they are found on moist ground in dense forest area during day time.

*Status* : Rare in the state.

#### 14. *Rana keralensis* (Dubois) (Gunther's Warty-Frog)

1875. *Rana verrucosa* Gunther, *Proc. zool. Soc.*, London, p. 567.

1980. *Rana keralensis* : Dubois, *Bull Mus, natn., Hist. nat. Paris*, (94) 2, Sec. A: 928 (replacement name).

1993. *Rana keralensis* : Naik and Vinod, *Hamadryad* 18 : 30-31.

*Material examined* : Nil; record from published literature.

*Diagnostic characters* : Head a little broader than long; snout bluntly pointed, equal the diameter of the eye; nostril less equidistant from the tip of the snout and the eye; interorbital width shorter than that of upper eyelid. Tympanum distinct, about two-third the diameter of the eye. Fingers free, first longer than second, tips more or less pointed; subarticular tubercles of fingers and toes large

and distinct. Toes three fourth webbed, two penultimate phalanges of fourth toe free, inner metatarsal tubercles elliptical, outer metatarsal tubercles small, oval. Tibiotarsal articulation reaching in between nostril and tip of snout. Dorsum greyish and warty. Venter whitish, smooth.

*Distribution* : Gujarat: Shoolpane- shwar, Sanctuary, Bharuch District (Naik and Vinod, 1993). *Elsewhere* : Kerala, Tamil Nadu, Orissa and West Bengal in India.

*Remarks* : Medium sized frog. Generally found inside forests near streams.

*Status*: Rare.

#### 15. *Rana limnocharis* Boie (Cricket frog)

1835. *Rana limnocharis* (Boie), Weigmann, *N. Acta Ac. Leop. Carol.* 17

1920. *Rana limnocharis* : Boulenger, *Rec. Indian Mus.*, 20:28

1984. *Rana limnocharis*: Sarkar, *Bull. Zool. India* 6(1-3):89

*Material examined* : 333 exs. from the districts of Kuchchh, Banaskantha, Mahesana, Sabarkantha, Jamnagar, Rajkot, Surendranagar, Ahmedabad, Bhavnagar, Amreli, Junagadh, Kheda, Panchmahal, Vadodra, Baruch, Surat, The Dangs and Valsad.

*Measurement* : Snout to vent length 11-40mm.

*Diagnostic characters* : Head as long as broad; snout, pointed projecting beyond mouth, as long as or a little longer than the diameter of the eye; nostril nearer to the tip of snout than to the eye; interorbital width much smaller than that of upper eyelid; tympanum distinct, nearly two third the diameter of the eye. Fingers free, first longer than second, tips swollen subarticular tubercles of fingers and toes distinct. Toes half webbed, normally three phalanges of fourth toe free; a distinct oval inner metatarsal tubercle and a feebly distinct outer metatarsal tubercle present. Tibiotarsal articulation reaches in between tympanum and nostril. Dorsum greyish and warty. Venter whitish and smooth.

**Distribution** : Gujarat: As mentioned in the *Material examined* The species is found in all the districts of Gujarat. *Elsewhere* : It is a widely distributed species in India and found in almost all biotopes. Also eastern Asia from Pakistan, Nepal, Bangladesh, Sri Lanka and China to Japan.

**Remarks** : Medium sized frog. Found in the vicinity of water.

**Status** : Common throughout the state.

Genus 7. *Tomopterna* Dumeril and Birbon, 1841.

16. *Tomopterna breviceps* (Schneider)  
(Burrowing Frog)

1799. *Rana breviceps* Schneider, *Hist. Amph.*, 1:40.

1920. *Rana breviceps* : Boulenger, *Rec. Indian Mus.*, 20:103-105.

1984. *Rana breviceps* : Sarkar *Bull. Zool. Surv. India*, 6(1-3):90.

1986. *Tomopterna breviceps* Inger and Dutta, *J. Bombay nat. Hist. Soc.* 83:138.

**Material examined** : 31 adults and 2 tadpoles from the districts of Mahesana, Sabarkantha, Jamnagar, Rajkot, and Bhavnagar.

**Measurements** : Snout to vent length 16-38mm.

**Diagnostic characters** : Head broader than long; snout rounded not projecting beyond the mouth, shorter than the diameter of the eye; nostril equidistant from the tip of the snout and the eye; interorbital width less than that of the upper eyelid; tympanum distinct more or less half diameter of the eye. Fingers free, first much longer than second, tips swollen, subarticular tubercles of fingers and toes well-developed. Toes minutely webbed, more than three phalanges of the fourth toe free; a large shovel shaped inner metatarsal tubercle present. Outer metatarsal tubercle absent. Tibiotarsal articulation reaches axil or shoulder. Dorsum greyish and warty. Venter whitish and granular.

**Distribution** : Gujarat : As mentioned in the *Material examined* : Earlier authors reported it from the districts of Kachchh, Jamnagar, Bharuch, and The Dangs, New record from the districts of Mahesana, Sabarkantha, Rajkot and Bhavnagar. *Elsewhere* The species is distributed all over the plains of India, and also Sri Lanka, Nepal and Myanmar.

**Remarks**: Medium sized frog Burrowing and nocturnal in habit. Found in crevices and under stones alongwith toads during day.

**Status** : More or less common in Saurashtra region and northern Gujarat.

Family IV. RHACOPHORIDAE

Genus 8. *Polypedates* Tschudi, 1838.

17. *Polypedates maculatus* (Gray)  
(Tree frog)

1832. *Hyla maculatus* Gray, *Ill. Indian Zool.* 1 pl. 82, fig. 1.

1890. *Rhacophorus maculatus* : Boulenger, *Fauna Br. Indian Rept. & Batr.* : 475-476.

1993. *Polypedates maculatus* : Naik and Vinod, *Hamadryad* 18:29.

**Material examined**: Nil; record from published literature.

**Diagnostic characters**: Head broader than long, pointed, projecting little beyond the mouth, generally longer than the diameter of the eye; nostril nearer to the tip of the snout than to the eye; interorbital width broader than that of the upper eyelid; tympanum distinct, about three-fourth diameter of the eye; Fingers with rudimentary web, first equals the second, tips of toes bear horse-shoe-shaped discs; subarticular tubercles of fingers and toes distinct. Toes nearly three fourth webbed, two phalanges of fourth toe free; a distinct oval inner metatarsal tubercles present, outer metatarsal tubercles absent. Tibiotarsal articulation reaches in between posterior end of eye and tip of snout. Dorsum brownish with light darker spots, smooth. Venter dull whitish and granular; skin on head free.

*Distribution* : Gujarat: Bharuch and Surat Districts (Naik and Vinod, 1993). *Elsewhere* : Plains of India in general. Also Sri Lanka.

*Remarks* : Nocturnal in habit, generally found inside holes on tree-trunk, under bark and inside the roof of thatched village huts.

*Status* : Uncommon.

## Order GYMNOPIHIONA

### Family V. ICHTHYOPHIIDAE

#### Genus 9. *Ichthyophis* Fitzinger, 1876.

#### 18. *Ichthyophis bombayensis* Taylor

1960. *Ichthyophis bombayensis* Taylor, *Univ. Kansas Sci. Bull.*, 40:67.

1963. *Ichthyophis bombayensis* : Daniel, *J. Bombay nat. Hist. Soc.*, 60(2):429-430.

1968. *Ichthyophis bombayensis* : Taylor, *The Caecilians of the World* : 72-74.

*Material examined* : Nil; record from published literature.

*Diagnostic characters* : A large species, reaching a length of 390mm., having 386 transverse folds, 14 of which are confined to tail; latter elongate and tapering to a point; tail length about 26 times. Splenial teeth, 9-9. Colour above dark brown, tip of head mottled with darker brown; somewhat lighter brown

below. Cream spots at vent, eye, tentacle and nostril. The lips and an area at mouth angle cream.

*Distribution*: Gujarat : Waghai: The Dangs district.

*Remarks*: A large species, so far known from type-locality only.

*Status*: Rare.

## SUMMARY

Amphibian fauna of Gujarat is presented based on the study of collection and from earlier records.

18 species are included under 9 genera, 5 families and 2 orders. Methods of collection, illustration of measurements of essential morphological characters and keys for families, genera and species are incorporated. A district-wise distribution map is also presented.

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## MARINE AND ESTUARINE FISHES

R.P. BARMAN, P. MUKHERJEE & S. KAR

Zoological Survey of India, Calcutta 700 016

### INTRODUCTION

Gujarat has a long coastal line of 1650 km. intercepted by many estuaries, marshy lands, bays, inlets and roadsteads. It has two important gulfs of India viz., the Gulf of Kutch and the Gulf of Khambhat which surround the Kathiawar or Saurashtra Peninsula and has over 1,20,000 sq. km of ocean area spread over the inshore, offshore and midwater areas available for the development of fish and fisheries resources. The full extent of the fish fauna has not been extensively assessed so far. It is, therefore, an attempt has been undertaken to take an account of the marine and estuarine fishes of the state.

Six faunistic field surveys were undertaken for the exploration of the marine and estuarine fishes during the period from 1988 to 1993 covering almost all the important fish landing centers of all the coastal districts of Gujarat. The present publication is the synthesis of our own collections of the field surveys undertaken and the earlier records of the fishes from this state. This study includes 486 species belonging to 257 genera, 112 families and 26 orders of marine and estuarine fishes of Gujarat. Key to the classes, orders, families and species are provided for easy segregation of the multivarious species of fishes. For the sake of brevity only the characters of all the families are furnished. English names of the fishes of almost all the species are also furnished. A numbers of literature were consulted during the study of the fishes of Gujarat, their names are given in the bibliography.

### SYSTEMATIC ACCOUNT

Grade : PISCES

Fishes can be defined as an aquatic cold-blooded vertebrate that have gills for respiration throughout their-life, and limbs, if any, in the form of fins and are mainly dependent on water as a medium in which to live. They exhibit enormous diversity in their morphological characters, habitat and biology. Fishes constitute almost half the total number of vertebrates. Nelson (1984) estimated 21,723 extant species of fish in the world compared with 21,450 extant tetrapods (a total of almost 43,173 recognized vertebrate species have been described). All members of fish species live either in marine or fresh waters. Some species of fishes are diadromous, passing part of their lives in marine and part in the fresh waters. Classification on the basis of their habitat as marine, diadromous and freshwater is, therefore, a very difficult task except a generalization for some members of fishes.

The marine and estuarine fishes found in Gujarat can be classified under two classes as follows :

#### Key to the class

- Skeleton cartilaginous. 5 to 7 pairs of lateral or ventral, nonconfluent gill openings without operculum  
.....CHONDRICHTHYES
- Skeleton bony one pair of lateral gill openings confluent as a single ventral slit or non-confluent as two lateral slits with operculum .....OSTEICHTHYES

Class : CHONDRICHTHYES  
(Cartilaginous fishes)

Key to the orders

- 1a. Gill slits present on lateral sides of head. Anal fin present (Shark) .....2
- 1b. Gill slits present entirely on ventral sides of head. Anal fin absent (Batoid fishes- Skates and Rays) .....4
- 2a. Mouth considerably ahead of eyes .....ORECTOLOBIFORMES
- 2b. Mouth behind front of eyes .....3
- 3a. Eyes with nictitating eyelids. Spiral or scroll intestinal valve present .....CARCHARIHIIFORMES
- 3b. Eyes without nictitating eyelids. Spiral or scroll intestinal valve absent .....LAMNIFORMES
- 4a. Body shark-like appearance, moderately depressed only. Pectoral fins barely enlarged. Tail not distinctly marked off from the body sector .....5
- 4b. Body not shark-like but distinctly depressed. Pectoral fins broadly enlarged. Tail almost marked off from the body sector.....6
- 5a. Snout markedly elongate, prolonged into a narrow, flat plate having a row of large teeth-like structures (saw-like) on each side.....PRISTIFORMES (PRISTIDAE)
- 5b. Snout wedge-shaped and much prolonged, but not as a blade and without lateral teeth .....RAJIFORMES
- 6a. Caudal fin well-developed. Electric organs in head region present. Skin soft and flabby ...TORPEDINIFORMES (NARCINIDAE)
- 6b. Caudal fin and electric organs absent. Skin firm .....MYLIOBATIFORMES

Key to the families of the order  
CARCHARHINIFORMES

- 1a. Head with lateral, blade-like expansions. Hammerhead sharks .....SPHYRNIDAE
- 1b. Head, normal, without lateral expansions .....2

- 2a. First dorsal fin base opposite or behind pelvic fin bases .....SCYLIORHINIDAE
- 2b. First dorsal fin base considerably anterior to pelvic fin bases .....3
- 3a. Precaudal pits absent. Dorsal caudal margin not undulated .....TRIAKIDAE
- 3b. Precaudal pits present, Dorsal caudal margin undulated.....4
- 4a. Intestinal valve of spiral type-Weasel sharks .....HEMIGALEIDAE
- 4b. Intestinal valve of scroll type Requiem sharks .....CARCHARHINIDAE

Key to the families of the order  
ORECTOLOBIFORMES

- 1a. Caudal fin almost as long as rest of the body of shark .....STEGOSTOMATIDAE
- 1b. Caudal fin less than half the length of rest of the body of shark .....2
- 2a. Mouth extremely large and terminal. Head very broad and flattened. Gill slits very large, internal gill slits with unique filter screens. Lowest ridge on sides of body ending in a strong keel on caudal peduncle. Ventral caudal lobe strong. A checker-board pattern of light spots and stripes on head and body .....RHINIODONTIDAE
- 2b. Mouth small and subterminal. Head cylindrical or moderately flattened. Gill slits small, internal gill slits without filter screens. Ridges either absent from body or not forming a strong keel on caudal peduncle when present. Ventral caudal lobe absent or weak. Body plain or spotted, but without a checker- board pattern of light spots and stripes .....3
- 3a. A lobe and groove around outer edge of each nostril. Spiracles large. Precaudal tail long, subequal or greater than the length from snout to vent. Anal fin low and keel-like .....HEMISCYLLIDAE
- 3b. No lobe and groove around outer edge of nostril. Spiracles small. Precaudal tail shorter, its length from vent to lower caudal origin much less than distance from snout to vent. Anal fin high and subangular .....GINGLYMASTOMATIDAE

Key to the families of the order  
LAMNIFORMES

- 1a. Caudal fin almost equal to the rest of shark. Last two gill openings above pectoral fin base- Thresher sharks .....ALOPIDAE
- 1b. Caudal fin much shorter than rest of shark. All gill openings anterior to pectoral fin bases .....2
- 2a. Caudal fin asymmetrical, not lunate, ventral caudal lobe short, pre-ventral caudal margin much shorter than dorsal caudal margin. Caudal peduncle without lateral keels or with weak ones .....ODONTASPIDIDAE
- 2b. Caudal fin almost symmetrical and lunate, with a long ventral lobe and pre-ventral caudal margin more or less as long as dorsal caudal margin. Caudal peduncle with very strong lateral keels .....LAMNIDAE

Key to the families of the order  
RAJIFORMES

- 1a. Caudal fin rudimentary or absent. Two dorsal fins inserted on tail..... RAJIDAE
- 1b. Caudal fin well-developed. Two dorsal fins inserted on trunk .....2
- 2a. Caudal fin bilobed. First dorsal fin origin above pelvic fin bases. Posterior margins of pectoral fins considerably anterior to pelvic fins origin .....RHYNCHOBATIDAE
- 2b. Caudal fin not bilobed. First dorsal fin origin considerably posterior to hind tip of pelvic fins. Posterior margins of pectoral fins extend rearward as far or further than pelvic fins origin..... RHINOBATIDAE

Key to the families of the order  
MYLIOBATIFORMES

- 1a. Eyes and spiracles on top of head. No distinct dorsal fin.....2
- 1b. Eyes and spiracles on sides of head. Dorsal fin present .....3
- 2a. Disc extremely broad, more than 1.5 times broader than long. Tail distinctly shorter than disc width. No buccal papillae on floor of mouth .....GYMNURIDAE

- 2b. Disc at most 1.3 times as broad as long. Tail (if complete) much longer than disc width. Floor of mouth with several papillae .....DASYATIDAE
- 3a. Head with two widely separated anterior horn-like projections (cephalic flippers) resemble ears .....MOBULIDAE
- 3b. Head with one soft fleshy lobe protruding markedly forward under the head, resemble a duck's beak .....4
- 4a. Subrostral lobe (snout) undivided. Floor of mouth with several fleshy papillae .....MYLIOBATIDAE
- 4b. Subrostral lobe deeply incised in middle, thus forming two basally continuous lobes. Floor of mouth without papillae .....RHINOPTERIDAE

Class OSTEICHTHYES  
(Bony fishes)

Key to the orders

- 1a. Body not bilaterally symmetrical, highly flattened. Eyes present on each side of body only. Dorsal and anal fin long .....PLEURONECTIFORMES
- 1b. Body bilaterally symmetrical. Eyes present on both sides of body .....2
- 2a. Gill openings, below or behind pectoral fins. First spine of dorsal fin modified to form a fishing pole. Body globose or depressed ..LOPHIIFORMES (LOPHIIDAE)
- 2b. Gill openings before pectoral fins .....3
- 3a. Body very elongate and eel-like. Gill openings narrow, on sides of head. Fin spines absent .....ANGUILLIFORMES
- 3b. Body not very elongate and eel-like, but if eel-like, then either the gill openings not separate from each other (as in true eels) but confluent on ventral side of body near throat, or pelvic fins present, or spiny rays in dorsal and anal fins, or else gill cavity not enlarged .....4
- 4a. Snout considerably elongate, tube-like, with the mouth at the end of tube. Pelvic fins, when present, abdominal. Gill tufted, lobe-like .....SYNGNATHIFORMES

- 4b. Snout not tubular, but if it resembles a tube then pelvic fins under or not far behind pectoral fins and as a rule with a strong spine .....5
- 5a. Snout beak-like with upper and/or lower jaws greatly prolonged or with enlarged, wing-like pectoral and sometimes also pelvic fins. Lateral line near ventral profile of body. A single dorsal fin consisting of soft rays. Pelvic fins abdominal .....**BELONIFORMES**
- 5b. Snout not beak-like without prolongation of upper or lower jaw. Pectoral fin not greatly elongated, if so, not wing-like .....6
- 6a. Pelvic fins with 2 rays. Dorsal and anal fin confluent with caudal fin .....**OPHIDIIFORMES (OPHIDIIDAE)**
- 6b. Pelvic fins with more than 2 rays. Dorsal and anal fins not confluent with caudal fin .....7
- 7a. Body without scales but a bony head shield often present. Barbels well developed, present around mouth. A strong spine usually present in front of dorsal and pectoral fins. An adipose fin often present .....**SILURIFORMES**
- 7b. Body with scales. Barbels generally not present, if present, poorly developed. Adipose fin generally absent .....8
- 8a. Mouth very small. Gill openings restricted (small). Scales generally modified into spines, shields or plates ..... **TETRAODONTIFORMES**
- 8b. Mouth moderate. Gill openings normal. Scales not modified as in 8a .....9
- 9a. Head usually with well developed spines. Cheeks with a bony strut (posterior extension of suborbital bone to preopercle). Pectoral fins usually rounded. Caudal fin rarely forked .....**SCORPAENIFORMES**
- 9b. Head and cheeks without spines and bony strut respectively. Pectoral fins not rounded .....10
- 10a. Pectoral fin greatly enlarged. Head encased in a bony shield with a spiny crest from nape to below base of first dorsal fin .....**DACTYLOPTERIFORMES (DACTYLOPTERIDAE)**
- 10b. Pectoral fin normal, not enlarged. Head not encased in a bony shield and without a spiny crest from nape to below base of first dorsal fin .....11
- 11a. Head large and depressed, body compressed. Eyes dorsolateral. Body without scales .....**BATRACHOIDIFORMES (BATRACHOIDIDAE)**
- 11b. Head not depressed. Eyes lateral. Body with scales .....12
- 12a. Mesocoracoid present .....13
- 12b. Mesocoracoid absent .....15
- 13a. Lateral line absent. Body generally compressed. ....**CLUPEIFORMES**
- 13b. Lateral line present .....14
- 14a. Jaws toothless. Branchiostegal rays 3 or 4 .....**GONORHYNCHIFORMES (CHANIDAE)**
- 14b. Jaws with tooth. Branchiostegal rays 6 to 35 .....**ELOPIIFORMES**
- 15a. Adipose dorsal fin generally present. Premaxillae form the gape of mouth (maxillae extended). Photophores often present .....**AULOPIIFORMES**
- 15b. Adipose dorsal fin absent .....16
- 16a. Fins without spine. Pelvic fins widely separated. First dorsal fin with single ray .....**GADIFORMES (BREGMACEROTIDAE)**
- 16b. Fins with spines. Pelvic fins close together .....17
- 17a. A silvery stripe present on side. Anal fin with 1 spine .....**ATHERINIFORMES**
- 17b. A silvery stripe absent on side. Anal fin generally with more than 1 spine .....18
- 18a. Body usually compressed and deep. Jaws greatly distensible ..... **ZEIFORMES (CAPROIDAE)**
- 18b. Body usually elongate. Jaws not greatly distensible .....**PERCIFORMES**

Key to the families of the order  
**ELOPIIFORMES**

Scales small, 95 to 120 along lateral line. Last dorsal fin ray not elongated .....**ELOPIDAE**

- Scales large, 30 to 40 along lateral line.  
Last dorsal fin ray filamentous  
.....MEGALOPIDAE

Key to the families of the order  
ANGUILLIFORMES

- 1a. Body with minute embedded scales. Dorsal, anal and caudal fins well developed; pectoral fins present  
.....ANGUILLIDAE
- 1b. Body naked (without scales) .....2
- 2a. Large canine teeth (often fang-like) on vomer (medially on roof of mouth) .....3
- 2b. Large canine teeth on vomer absent .....4
- 3a. Well developed pectoral fins present  
.....MURAENESOCIDAE
- 3b. Pectoral fins absent .....MURAENIDAE
- 4a. Posterior nostrils openings inside mouth, on upper lip or just above mouth. Branchiostegal rays overlapping midventrally .....OPHICHTHIDAE
- 4b. Posterior nostrils not labial, but lateral or superior. Branchiostegal rays not overlapping ventrally.....CONGRIDAE

Key to the families of the order  
CLUPEIFORMES

- 1a. Dorsal fin considerably behind midpoint of body. Fang-like teeth in jaws  
.....CHIROCENTRIDAE
- 1b. Dorsal fin more ahead, generally at midpoint of body. Teeth small or absent  
.....2
- 2a. Articulation of lower jaw behind eyes, mouth underslung (inferior). Snout tapering and 'pig-like' .....ENGRAULIDAE
- 2b. Articulation of lower jaw under of before eyes. Mouth almost terminal. Snout not 'pig-like; .....3
- 3a. Anal fin long (more than 30 rays). Pelvic fins with 6 or 7 rays or absent. Lower jaw very prominent .....PRISTIGASTERIDAE
- 3b. Anal fin short (less than 30 rays). Pelvic fins present, with 7 to 9 rays  
.....CLUPEIDAE

Key to the families of the order  
SILURIFORMES

- Caudal fin rounded, extends far forward on dorsal surface. Adipose dorsal fin absent..... PLOTOSIDAE
- Caudal fin forked, does not extend on dorsal surface of body. Adipose dorsal fin present .....ARIIDAE

Key to the families of the order  
AULOPIFORMES

- 1a. Caudal fin trilobed. Body semitransparent. Lateral line extending on to pointed median lobe of caudal fin  
.....HARPADONTIDAE
- 1b. Caudal fin forked .....2
- 2a. Upper jaw extending backward to level of eyes or slightly in front of it. Pectoral fin large extending beyond end of dorsal fin. Caudal fin bilobed  
.....CHLOROPHTHALMIDAE
- 2b. Upper jaw extending beyond level of middle of eyes and generally much farther. Pectoral fin short, not extending beyond end of dorsal fin. Caudal fin forked  
.....SYNODONTIDAE

Key to the families of the order  
BELONIFORMES  
(CYPRINODONTIFORMES)

- 1a. Scales small (usually 130 to 350 in lateral line). Mouth opening large, both upper and lower jaws extended into beaks with numerous needle-sharp teeth  
.....BELONIDAE
- 1b. Scales large (usually 38 to 60 in lateral line). Mouth small, only lower jaw prolonged or none of the jaws prolonged. Teeth minute, no needle-like teeth .....2
- 2a. Mouth normal, jaws short and not produced in a long beak. Pectoral fins strikingly long, extending beyond dorsal fin origin. Pelvic fins exceptionally large in some species  
.....EXOCOETIDAE

- 2b. Lower jaws usually prolonged, much longer than upper jaw, Pectoral and pelvic fins generally short .....HEMIRAMPHIDAE

Key to the families of the order  
ATHERINIFORMES

Pectoral fin inverted midway up on side of body. Breast not cultrate

.....ATHERINIDAE

Pectoral fins inserted abnormally high on body. Breast cultrate, the ventral edge of abdomen reduced to keel

.....NOTOCHEIRIDAE

Key to the families of the order  
SYNGNATHIFORMES

Pelvic fins absent. Body elongate, angular or laterally compressed or rounded

.....SYNGNATHIDAE

Pelvic fins present, with 6 soft rays. Body elongate fleshy, depressed

.....FISTULARIIDAE

Key to the families of the order  
SCORPAENIFORMIS

Pelvic fins widely separated. Head greatly depressed, much broader than deep

.....PLATYCEPHALIDAE

Pelvic fin bases adjacent. Head not depressed, usually deeper than its breadth

.....SCORPAENIDAE

Key to the families of the order  
PERCIFORMIS

- 1a. Pectoral fins divided into two parts the upper part normal with rays attached, the lower with 4 to 7 free (unattached), filamentous rays .....POLYNEMIDAE
- 1b. Pectoral fins normal, without free rays in lower part of fin, lower rays sometimes separate from one another .....2
- 2a. Two short dorsal fins, widely separated from each other. Pelvic fins subabdominal and markedly posterior to pectoral fin base, almost equidistant between pectoral fin base and insertaion of first dorsal fin ..... 3

- 2b. Dorsal fin either one or two (when two), with continuous bases, but if (rather rarely) the fins are separate, the interspace is negligible. Pelvic fine insertion not on belly but near pectoral fin bases .....4
- 3a. Lateral line well developed. First dorsal fin with 5 spines. Jaws with strong canine teeth. ....SPHYRAENIDAE
- 3b. Lateral line absent. First dorsal fin with 4 spines. Teeth in jaws small, feeble hidden or absent .....MUGILIDAE
- 4a. Dorsal and anal fins with only soft rays, without spines.....5
- 4b. Dorsal and anal fins with spines and soft rays .....7
- 5a. Head flattened with a characteristic transversely laminated, oval-shaped sucking disc .....ECHENEIDAE
- 5b. Head without sucking disc .....6
- 6a. Body elongated and compressed. Dorsal fin originating on nape, very long, continuing almost to caudal fin. First pelvic fin ray not prolonged .....CORYPHAENIDAE
- 6b. Body disc-like, with sharp abdomen. Dorsal fin originating far behind head, not extending to caudal fin. First pelvic fin ray in adult specimens prolonged .....MENIDAE
- 7a. Pelvic fin with 2 strong spines separated by 3 soft rays .....SIGANIDAE
- 7b. Pelvic fin with at most 1 spine or absent .....8
- 8a. Upper jaw prolonged into a long bill ....9
- 8b. Upper jaw normal, not prolonged into a long bill .....10
- 9a. Pelvic fins absent. First dorsal fin short-based, well separated from the second dorsal fin in adults. Caudal peduncle with a single median keel on each side .....XIPHIIDAE
- 9b. Pelvic fin present. First dorsal fin with very long base, sometimes sail-like, depressible into groove and not well separated from second dorsal fin. Caudal peduncle in adults with two keels on each side .....ISTIOPHORIDAE

- 10a. Pelvic fins either very close together, or united into a single cup-like structure .....11
- 10b. Pelvic fins separated, not close together or united .....13
- 11a. Body not eel-like. Dorsal and anal not confluent with caudal fin .....GOBIIDAE
- 11b. Body eel-like. Dorsal and anal fins confluent with caudal fin .....12
- 12a. Opercular region with a pouch-like cavity. Caudal fin lanceolatus .....TRYPAUCHENIDAE
- 12b. Opercular region without a pouch-like cavity. Caudal fin rounded .....GOBIOIDIDAE
- 13a. Body naked or with modified scales. Head often with tentacles.....BLENNIDAE
- 13b. Body with scales. Head never with tentacles .....14
- 14a. Anal fin with 1 spine....MUGILOIDIDAE
- 14b. Anal fin with more than 1 spine .....15
- 15a. Anterior part of oesophagus immediately posterior to last gill arch having lateral sacs (pharyngeal sacs) supplied inside with papillae or longitudinal folds bearing teeth; small uniserial teeth in jaws .....16
- 15b. No toothed pharyngeal sacs .....17
- 16a. A continuous dorsal fin or two dorsal fins scarcely separated. Pelvic fins absent .....STROMATEIDAE
- 16b. Two dorsal fins distinctly though scarcely separated. Pelvic fins always present .....ARIOMMATIDAE
- 17a. Premaxilla fixed (non protrusible upper jaw), upper jaw often form a long, forward projecting sword-like process .....18
- 17b. Maxillary bones not very firmly attached to premaxillae which are hence free to move forward .....20
- 18a. Caudal fin always present, well developed, lunate or strongly notched. Body spindle-shaped. Keels present on caudal peduncle..... SCOMBRIDAE
- 18b. Caudal fin often absent, but if present then not large nor lunate-shaped. Body oblong or elongate, often ribbon-like. No keels on caudal peduncle .....19
- 19a. Body ribbon-like. Single dorsal fin, very long and running almost entire length of body. No finlets behind dorsal and anal fins. Body silvery ..... TRICHIURIDAE
- 19b. Body elongated and compressed or somewhat fusiform. Two dorsal fins. Isolated finlets behind dorsal and anal fins usually present. Back usually brown .....GEMPYLIDAE
- 20. A single pair of nostrils (rarely two). Body deep (rarely terete) and laterally compressed. Preorbital and usually suborbital not attached to cheek .....POMACENTRIDAE
- 20b. Two pairs of nostrils. Preorbital and suborbital attached to cheek .....21
- 21a. Two long barbels behind chin (which can be folded into a median groove on throat). Two widely separated dorsal fins .....MULLIDAE
- 21b. No barbels on chin .....22
- 22a. Dorsal fin with 6 to 9 isolated (not connected by membrane) spine, each depressible in a groove. Two silvery stripes on sides of body .....RACHYCENTRIDAE
- 22b. Dorsal fin with no free spines .....23
- 23a. First 2 anal fin spines detached from rest of fin (these partially or completely embedded in large carangids). Scutes on straight part of lateral line usually present ..... CARANGIDAE
- 23b. First 2 anal fin spines not detached from rest of fin. No scutes on caudal peduncle .....24
- 24a. Anterior rays of soft dorsal and anal fins markedly elongated, giving both fins a sickle shaped. Pelvic fins usually small or vestigial. Body deep .....MONODACTYLIDAE
- 24b. Anterior rays of soft dorsal and anal fins not elongated, when elongate they do not give either fin a sickle shape .....25
- 25a. Body very deep, its maximum depth more than half the total length, single dorsal fin, spines clearly distinguishable .....26

- 25b. Body oblong or moderately deep, its maximum depth less than half the total length. When deep-bodied and single dorsal fin, there are no spines or the spiny rays hard to distinguish from soft rays .....31
- 26a. No procumbent spine in dorsal fin .....27
- 26b. Procumbent spine in dorsal fin present .....28
- 27a. No spine at angle of preopercle. Well developed pelvic axillary process .....CHAETODONTIDAE
- 27b. Preopercular spine present. Pelvic axillary process not developed .....POMACANTHIDAE
- 28a. Anal fin with 4 spines. Gill membranes narrowly united to isthmus .....SCATOPHAGIDAE
- 28b. Anal fin with 3 spines. Gill membranes broadly united to isthmus .....29
- 29a. Spinous dorsal fin confluent with soft dorsal portion. Spines of dorsal fin increasing in length posteriorly .....PLATACIDAE
- 29b. Spinous dorsal fin separated from soft rayed portion by a notch. Spines in dorsal fin not increasing in length posteriorly .....30
- 30a. Mouth protractile. Pectoral fins falcate, longer than head length. Maxillae distally exposed .....DREPANIDAE
- 30b. Mouth not protractile or scarcely so. Pectoral fin short, rounded, shorter than head length, Maxillae distally hidden .....EPHIPPIDAE
- 31a. Two dorsal fin well separated but if close together then not joined by membrane .....32
- 31b. Single dorsal fin, sometimes deeply notched between spinous and soft parts of fin but in such cases, the membrane joining the two parts in intact .....35
- 32a. Anal fin base considerably longer than second dorsal fin base. Mouth large, oblique, with two small canine teeth at front .....LACTARIIDAE
- 32b. Anal fin base as long or shorter than second dorsal fin base .....33
- 33a. Mouth small. Upper jaw (maxilla) ending far short of eye and even before nostrils .....SILLAGINIDAE
- 33b. Mouth moderate size or large. Upper jaw (maxilla) reaching nostrils, but often extending beyond anterior margin of eye .....34
- 34a. Caudal fin forked. Preoperculum with a double edge (edge and ridge) .....AMBASSIDAE
- 34b. Caudal fin rounded. Preoperculum with a single edge (no ridge) .....CENTROPOMIDAE
- 35a. Pelvic fins usually with an axillary scale .....36
- 35b. Pelvic fins without an axillary scale .....46
- 36a. Anal fin with 2 spines. Lateral line scales extending to hind margin of caudal fin .....SCIAENIDAE
- 36b. Anal fin with 3 spines. Lateral line scales ending at caudal fin base .....37
- 37a. Dorsal and anal fins rounded and symmetrical so that with the tail they appear as a single three lobed fin .....LOBOTIDAE
- 37b. Dorsal and anal fins not as above .....38
- 38a. Mouth strongly protractile .....39
- 38b. Mouth moderately protractile .....40
- 39a. Head usually naked (but small scales on cheek in few species). Upper surface with bony ridges with a nuchal spine on nape. Gill membranes united with isthmus .....LEIOGNATHIDAE
- 39b. Head entirely covered with clearly visible scales, upper surface smooth. Gill membranes free from isthmus .....GERREIDAE
- 40a. Distal end of premaxilla overlapping maxillae externally. Molar-like teeth present at sides of jaws; no teeth on roof of mouth..... SPARIDAE
- 40b. Maxillae not overlapped by hind tip of premaxillae .....41
- 41a. Outer row of teeth in jaws of a peculiar hockey-stick shape, with their bases set horizontally, resembling a radially striated bony plate inside mouth .....KYPHOSIDAE

- 41b. Typical scalpriform teeth absent .....42
- 42a. Suborbital process well developed, sometimes forming a spine posteriorly .....43
- 42b. Suborbital process either absent or weakly developed .....45
- 43a. No teeth on roof of mouth. Weak spines in dorsal and anal fins .....NEMIPTERIDAE
- 43b. Teeth usually present on vomer and palatines (roof of mouth). Moderately strong spines in dorsal and anal fins ....44
- 44a. Caudal fin deeply forked .....CAESIONIDAE
- 44b. Caudal fin slightly forked, often truncate or lunate .....LUTJANIDAE
- 45a. Dorsal fin with 12 to 26 soft rays. Lips not soft and fleshy.....HAEMULIDAE
- 45b. Dorsal fin with 9 to 10 soft rays. Lips soft and fleshy .....LETHRINIDAE
- 46a. Inner ray (s) of pelvic fins attached to abdomen by membrane .....PRIACANTHIDAE
- 46b. Inner ray (s) of pelvic fins not connected to abdomen by membrane .....47
- 47a. Dorsal and anal fins each with a well developed basal scaly sheath. Dorsal fin with 10 spines .....KUHLIIDAE
- 47b. Dorsal and anal fins each without or a low basal scaly sheath .....48
- 48a. Mouth large, the upper jaw usually extending to below hind margin of eye. Dorsal fin with 7 to 12 spines. Operculum with 1 to 3 flat spines .....SERRANIDAE
- 48b. Mouth small or moderate, the upper jaw not reaching beyond eye centre. Dorsal fin with 12 to 14 spines. Operculum with 1 or 2 strong spines .....TERAPONIDAE

Key to the families of the order  
PLEURONECTIFORMES

- 1a. Dorsal fin with spinous rays, its origin considerably posteriorly to eyes .....PSETTODIDAE
- 1b. Dorsal fin with only soft rays, its origin above or in front of lower eye .....2

- 2a. Preopercular border free and visible, not concealed by skin or scales ..BOTHIDAE
- 2b. Preopercular border not free, hidden under the skin and scales .....3
- 3a. Eyes on right side of head .....SOLEIDAE
- 3b. Eyes on left side of head .....CYNOGLOSSIDAE

Key to the families of the order  
TETRAODONTIFORMES

- 1a. Body covered with spines, capable of great inflation. Teeth fused into a single beak-like unit in each jaw, without a median suture dividing upper and lower jaws into right and left halves .....DIODONTIDAE
- 1b. Body not covered with spines and capable of inflation. Teeth not fused into a single beak-like as in 1a .....2
- 2a. Body almost completely encased in a bony shell or carapace of enlarged, thickened scale plates, generally hexagonal in shape. Spinous dorsal fin absent .....OSTRACIIDAE
- 2b. Body not encased in a bony shell or carapace like as in 2a. Spinous dorsal fin present .....3
- 3a. Pelvic fins represented by a pair of strong spines. Dorsal fin spines 6 (usually only 5 visible, the 6th being a rudiment) .....TRIACANTHIDAE
- 3b. Pelvic fins and spines rudimentary or absent. Dorsal fin spines 2 to 3 .....4
- 4a. Dorsal fin spines 2, only the first spine is especially large and prominent. Body covered by smooth to rough shagreen-like skin consisting of minute to small scales armed with 1 to many fin spinules .....MONACANTHIDAE
- 4b. Dorsal fin with 3 visible spines. Body encased with very thick, tough skin with large rectilinear scale plates easily discernible as individual units .....BALISTIDAE

**LIST OF MARINE & ESTUARINE  
FISHES OF GUJARAT**

- GRADE : PISCES  
CLASS : CHONDRICHTHYES  
ORDER : ORECTOLOBIFORMES  
FAMILY : HEMISCYLLIDAE
1. *Chiloscyllium griseum* Muller & Henle
  2. *C. indicum* (Gmelin)  
FAMILY : STEGOSTOMATIDAE
  3. *Stegostoma fasciatum* (Hermann)  
FAMILY : GINGLYMOSTOMATIDAE
  4. *Nebrius ferrugineus* (Lesson)  
FAMILY : RHINIODONTIDAE
  5. *Rhiniodon typus* Smith  
ORDER : LAMNIFORMES  
FAMILY : ODONTASPIDIDAE
  6. *Eugomphodus taurus* Rafinesque  
FAMILY : ALOPIIDAE
  7. *Alopias pelagicus* Nakamura
  8. *A. vulpinus* (Bonnaterre)  
FAMILY : LAMNIDAE
  9. *Isurus oxyrinchus* Rafinesque  
ORDER : CARCHARHINIFORMES  
FAMILY : SCYLIORHINIDAE
  10. *Atelomycterus marmoratus* (Bennett)  
FAMILY : TRIAKIDAE
  11. *Iago omanensis* (Norman)
  12. *Mustelus mosis* Hemprich & Ehrenberg  
FAMILY : HEMIGALEIDAE
  13. *Chaenogaleus macrostoma* (Bleeker)
  14. *Hemipristis elongatus* (Klunzinger)  
FAMILY : CARCHARHINIDAE
  15. *Charcharhinus dussumeri* (Valenciennes)
  16. *C. hemiodon* (Valenciennes)
  17. *C. leucas* (Valenciennes)
  18. *C. limbatus* (Valenciennes)
  19. *C. longimanus* (Poey)
  20. *C. macloiti* (Muller & Henle)
  21. *C. melanopterus* (Quoy & Gaimard)
  22. *C. seatei* (Pietschmann)
  23. *Galeocerdo cuvier* (Peron & Le Sueur)
  24. *Lamiopsis temmincki* (Muller & Henle)
  25. *Loxodon macrorhinus* Muller & Henle
  26. *Negaprion auctidens* (Ruppell)
  27. *Prionace glauca* (Linnaeus)
  28. *Rhizoprionodon acutus* (Ruppell)
  29. *R. oligolinx* Springer
  30. *Scoliodon laticaudus* Muller & Henle
  31. *Triaenodon obesus* (Ruppell)  
FAMILY : SPHYRNIDAE
  32. *Eusphyra blochii* (Cuvier)
  33. *Sphyrna lewini* (Griffith & Smith)
  34. *S. mokrran* (Ruppell)  
ORDER : PRISTIFORMES  
FAMILY : PRISTIDAE
  35. *Anoxypristis cuspidatus* (Latham)
  36. *Pristis microdon* Latham  
ORDER : TORPEDINIFORMES  
FAMILY : NARCINIDAE
  37. *Narcine brunnea* Annandale
  38. *N. indica* Henle  
ORDER : RAJIFORMES  
FAMILY : RAJIDAE
  39. *Raja mamillidens* Alcock  
FAMILY : RHINOBATIDAE
  40. *Rhinobatos granulatus* Cuvier
  41. *R. obtusus* Muller & Henle
  42. *R. thouniana* (Shaw)  
FAMILY : RHYNCHOBATIDAE
  43. *Rhina ancylostoma* Schneider
  44. *Rhynchobatus djeddensis* (Forsskal)  
ORDER : MYLIOBATIFORMES  
FAMILY : MYLIOBATIDAE
  45. *Aetobatus narinari* (Euphrasen)
  46. *Aetomylaeus maculatus* (Gray)
  47. *A. milvus* (Valenciennes)
  48. *A. nichofii* (Schneider)  
FAMILY : RHINOPTERIDAE
  49. *Rhinoptera javanica* Muller & Henle  
FAMILY : MOBULIDAE
  50. *Mobula diabolus* (Shaw)
  51. *M. mobular* (Bonnaterre)  
FAMILY : DASYATIDAE
  52. *Dasyatis kuhlii* (Muller & Henle)
  53. *D. zugei* (Muller & Henle)
  54. *Himantura bleekeri* (Blyth)
  55. *H. imbricata* (Schneider)
  56. *H. uarnak* (Forsskal)
  57. *Hypolophus sephen* (Forsskal)  
FAMILY : GYMNURIDAE
  58. *Gymnura poecilura* (Shaw)

- CLASS : OSTEICHTHYES  
 ORDER : ELOPIFORMES  
 FAMILY : ELOPIDAE
59. *Elops machnata* (Forsskal)  
 FAMILY : MEGALOPIDAE
60. *Megalops cyprinoides* (Broussonet)  
 ORDER : ANGUILLIFORMES  
 FAMILY : ANGUILLIDAE
61. *Anguilla bengalensis bengalensis* (Gray & Hardwicke)
62. *A. bicolor bicolor* McClelland  
 FAMILY : MURAENIDAE
63. *Echidna nebulosa* (Ahl)
64. *Lycodontis meleagris* (Shaw & Nodder)
65. *Siderea picta* (Ahl)
66. *Thyrsoidea macrura* (Bleeker)  
 FAMILY : OPHICHTHIDAE
67. *Lamnostoma orientalis* (McClelland)
68. *Muraenichthys schultzei* Bleeker
69. *Neenchelys buitendijki* Weber & Beaufort  
 FAMILY : MURAENESOCIDAE
70. *Congresox talabonoides* (Bleeker)
71. *Muraenesox bagio* (Hamilton-Buchanan)
72. *M. cinereus* (Forsskal)  
 FAMILY : CONGRIDAE
73. *Uroconger lepturus* (Richardson)  
 ORDER : CLUPEIFORMES  
 FAMILY : CLUPEIDAE
74. *Amblygaster leiogaster* (Valenciennes)
75. *A. sirm* (Walbaum)
76. *Anodontostoma chacunda* (Hamilton-Buchanan)
77. *Dussumieria acuta* Valenciennes
78. *D. elopsiodes* Bleeker
79. *Escualosa thoracata* (Valenciennes)
80. *Herklotsichthys quadrimaculatus* (Ruppell)
81. *Hilsa kelee* (Cuvier)
82. *Nematolosa nasus* (Bloch)
83. *Sardinella albella* (Valenciennes)
84. *S. gibbosa* (Bleeker)
85. *S. longiceps* Valenciennes
86. *S. melanura* (Cuvier)
87. *S. sindensis* (Day)
88. *Spratelloides delicatulus* (Bennett)
89. *S. gracilis* (Temminck & Schlegel)
90. *Tenualosa ilisha* (Hamilton Buchanan)
91. *T. toli* (Valenciennes)  
 FAMILY : PRISTIGASTERIDAE
92. *Ilisha filigera* (Valenciennes)
93. *I. megaloptera* (Swainson)
94. *I. melanostoma* (Schneider)
95. *I. sirishai* Seshagiri Rao
96. *I. striatula* Wongratana
97. *Opisthopterus tardoore* (Cuvier)
98. *Pellona ditchela* Valenciennes
99. *Raconda russeliana* Gray  
 FAMILY : CHIROCENTRIDAE
100. *Chirocentrus dorab* (Forsskal)
101. *C. nudus* Swainson  
 FAMILY : ENGRAULIDAE
102. *Coilia dussumieri* Valenciennes
103. *C. neglecta* Whitehead
104. *C. reynaldi* Valenciennes
105. *Setipinna taty* (Valenciennes)
106. *Stolephorus bagenensis* Hardenberg
107. *S. commersonii* Lacepede
108. *S. devisi* (Whitley)
109. *S. heterolobus* (Ruppell)
110. *S. indicus* (van Hasselt)
111. *S. punctifer* (Fowler)
112. *Thryssa dussumieri* (Valenciennes)
113. *T. hamiltoni* (Gray)
114. *T. malabarica* (Bloch)
115. *T. mystax* (Schneider)
116. *T. purava* (Hamilton-Buchanan)
117. *T. setirostris* (Broussonet)
118. *T. vitirostris* (Gilchrist & Thompson)  
 ORDER : GONORHYNCHIFORMES  
 FAMILY : CHANIDAE
119. *Chanos chanos* (Forsskal)  
 ORDER : SILURIFORMES  
 FAMILY : ARIIDAE
120. *Arius arius* (Hamilton-Buchanan)
121. *A. caelatus* Valenciennes
122. *A. crossocheilus* Bleeker
123. *A. dussumieri* Valenciennes
124. *A. jella* Day
125. *A. maculatus* (Thunberg)
126. *A. platystomus* Day
127. *A. sagor* (Hamilton-Buchanan)
128. *A. sona* (Hamilton-Buchanan)

129. *A. subrostratus* Valenciennes  
 130. *A. sumatranus* (Bennett)  
 131. *A. tenuispinis* Day  
 132. *A. thalassinus* (Ruppell)  
 133. *Batrachocephalus mino* (Hamilton-Buchanan)  
 134. *Osteogeneiosus militaris* (Linnaeus)  
 FAMILY : PLOTOSIDAE  
 135. *Plotosus lineatus* (Thunberg)  
 ORDER : AULOPIFORMES  
 FAMILY : CHLOROPHTHALMIDAE  
 136. *Chlorophthalmus agassizi* Bonaparte  
 FAMILY : SYNODIDAE  
 137. *Saurida longimanus* Norman  
 138. *S. tumbil* (Bloch)  
 139. *S. undosquamis* (Richardson)  
 140. *Synodus englemani* Schultz  
 141. *S. macrops* Tanaka  
 142. *S. variegatus* (Lacepede)  
 143. *Trachinocephalus myops* (Forster)  
 FAMILY : HARPODONTIDAE  
 144. *Harpadon nehereus* (Hamilton-Buchanan)  
 ORDER : GADIFORMES  
 FAMILY : BREGMACEROTIDAE  
 145. *Bregmaceros macclellandi* Thompson  
 ORDER : OPHIDIFORMES  
 FAMILY : OPHIDIIDAE  
 146. *Brotula multibarbata* (Temminck & Schlegel)  
 ORDER : BATRACHOIDIFORMES  
 FAMILY : BATRACHOIDIDAE  
 147. *Austrobatrachus dussumieri* (Valenciennes)  
 ORDER : LOPHIFORMES  
 FAMILY : LOPHIIDAE  
 148. *Lophiodes mutilus* (Alcock)  
 149. *Lophiomus setigerus* (Vahl)  
 ORDER : BELONIFORMES  
 (= CYPRINODONTIFORMES)  
 FAMILY : EXOCOETIDAE  
 150. *Cheilopogon nigricans* (Bennett)  
 151. *Cypselurus spilopterus* (Valenciennes)  
 152. *Exocoetus monocirrhus* Richardson  
 153. *E. volitans* Linnaeus  
 154. *Hirundichthys coromandelensis* (Hornell)  
 155. *H. oxycephalus* (Bleeker)  
 156. *Parexocoetus mento* (Cuvier)  
 157. *Prognichthys brevipinnis* (Valenciennes)  
 FAMILY : HEMIRAMPHIDAE  
 158. *Hemiramphus lutkei* Valenciennes  
 159. *Hyporhamphus limbatus* (Valenciennes)  
 FAMILY : BELONIDAE  
 160. *Ablennes hians* (Valenciennes)  
 161. *Strongylura leiura* (Bleeker)  
 162. *S. strongylura* (van Hasselt)  
 163. *Tylosurus acus melanotus* (Bleeker)  
 164. *T. choram* (Ruppell)  
 165. *T. crocodilus* (Peron & Le Sueur)  
 ORDER : ATHERINIFORMES  
 FAMILY : ATHERINIDAE  
 166. *Atherinomorus lacunosus* (Forster)  
 167. *Hypoatherina temminckii* (Bleeker)  
 FAMILY : NOTOCHEIRIDAE  
 168. *Iso natalensis* Regan  
 ORDER : ZEIFORMES  
 FAMILY : CAPROIDAE  
 169. *Antigonia rubescens* (Gunther)  
 ORDER : SYNGNATHIFORMES  
 FAMILY : FISTULARIIDAE  
 170. *Fistularia petimba* Lacepede  
 FAMILY : SYNGNATHIDAE  
 171. *Hippocampus kuda* Bleeker  
 172. *Trachyrhamphus serratus* (Schlegel)  
 ORDER : DACTYLOPTERIFORMES  
 FAMILY : DACTYLOPTERIDAE  
 173. *Dactyloptena orientalis* (Cuvier)  
 ORDER : SCORPAENIIFORMES  
 FAMILY : SCORPAENIDAE  
 174. *Apistus carinatus* (Bloch & Schneider)  
 175. *Choridactylus multibarbus* Richardson  
 176. *Minous monodactylus* (Bloch & Schneider)  
 177. *Pterois russellii* Bennett  
 178. *P. volitans* (Linnaeus)  
 FAMILY : PLATYCEPHALIDAE  
 179. *Cociella crocodila* (Tilesius)  
 180. *Grammoplites suppositus* (Troschel)  
 181. *Platycephalus indicus* (Linnaeus)  
 182. *Rogadius asper* (Cuvier)  
 183. *Suggrundus rodricensis* (Cuvier)  
 ORDER : PERCIFORMES  
 FAMILY : AMBASSIDAE  
 184. *Ambassis commersoni* Cuvier

185. *A. gymnocephalus* (Lacepede)  
 FAMILY : CENTROPOMIDAE
186. *Lates calcarifer* (Bloch)  
 FAMILY : SERRANIDAE
187. *Cephalopholis formosa* (Shaw & Nodder)
188. *Epinephelus areolatus* (Forsskal)
189. *E. coioides* (Hamilton-Buchanan)
190. *E. diacanthus* (Valenciennes)
191. *E. erythrurus* (Valenciennes)
192. *E. fuscoguttatus* (Forsskal)
193. *E. lanceolatus* (Bloch)
194. *E. latifasciatus* (Temminck & Schlegel)
195. *E. malabaricus* (Bloch & Schneider)
196. *E. polylepis* Rangall & Heemstra  
 FAMILY : TERAPONIDAE
197. *Terapon jarbua* (Forsskal)
198. *T. puta* (Cuvier)
199. *T. theraps* (Cuvier)  
 FAMILY : KUHLIIDAE
200. *Kuhlia mugil* (Schneider)  
 FAMILY : PRIACANTHIDAE
201. *Priacanthus cruentatus* (Lacepede)
202. *P. hamrur* (Forsskal)
203. *P. tayenus* Richardson  
 FAMILY : SILLAGINIDAE
204. *Sillago sihama* (Forsskal)
205. *S. (Sillaginopodys) chondropus* Bleeker  
 FAMILY : LACTARIIDAE
206. *Lactarius lactarius* (Schneider)  
 FAMILY : RACHYCENTRIDAE
207. *Rachycentron canadus* (Linnaeus)  
 FAMILY : ECHENEIDIDAE
208. *Echeneis naucrates* Linnaeus
209. *Remora remora* (Linnaeus)  
 FAMILY : CARANGIDAE
210. *Alectis ciliaris* (Bloch)
211. *A. indicus* (Ruppell)
212. *Alepes djedaba* (Forsskal)
213. *A. melanoptera* Swainson
214. *A. vari* (Cuvier)
215. *Atropus atropas* (Schneider)
216. *Atule mate* (Cuvier)
217. *Carangoides armatus* (Ruppell)
218. *C. caeruleopinnatus* (Ruppell)
219. *C. chrysophrys* (Cuvier)
220. *C. ferdau* (Forsskal)
221. *C. fulvoguttatus* (Forsskal)
222. *C. gymnostethus* (Cuvier)
223. *C. malabaricus* (Bloch & Schneider)
224. *C. oblongus* (Cuvier)
225. *C. praeustus* (Bennett)
226. *C. talamparoides* Bleeker
227. *Caranx ignobilis* (Forsskal)
228. *C. melampygus* Cuvier
229. *C. sem* Cuvier
230. *C. sexfasciatus* Quoy & Gaimard
231. *Decapterus macrosoma* Bleeker
232. *D. russellii* (Ruppell)
233. *Elagatis bipinnulata* (Quoy & Gaimard)
234. *Gnathanodon speciosus* (Forsskal)
235. *Megalaspis cordyla* (Linnaeus)
236. *Naucrates ductor* (Linnaeus)
237. *Parastromateus niger* (Bloch)
238. *Scomberoides commersonianus* Lacepede
239. *S. lysan* (Forsskal)
240. *S. tala* (Cuvier)
241. *S. tol* (Cuvier)
242. *Seler boops* (Cuvier)
243. *S. crumenophthalmus* (Bloch)
244. *Selaroides leptolepis* (Cuvier)
245. *Seriolina nigrofasciata* (Ruppell)
246. *Trachinatus baillonii* (Lacepede)
247. *T. blochii* (Lacepede)
248. *T. mookalee* Cuvier
249. *Uraspis helvola* (Forster)  
 FAMILY : CORYPHAENIDAE
250. *Coryphaena equisetis* Linnaeus
251. *C. hippurus* Linnaeus  
 FAMILY : MENIDAE
252. *Mene maculata* (Bloch)  
 FAMILY : LEIOGNATHIDAE
253. *Gazza minuta* (Bloch)
254. *Leiognathus berbis* (Valenciennes)
255. *L. bindus* (Valenciennes)
256. *L. blochii* (Valenciennes)
257. *L. brevisrostris* (Valenciennes)
258. *L. daura* (Cuvier)
259. *L. dussumieri* (Valenciennes)
260. *L. equulus* (Forsskal)
261. *L. fasciatus* (Lacepede)
262. *L. leuciscus* (Gunther)
263. *L. splendens* (Cuvier)

264. *Secutor insidiator* (Bloch)  
 265. *S. ruconius* (Hamilton-Buchanan)  
 FAMILY : LUTJANIDAE  
 266. *Aphareus furcatus* (Lacepede)  
 267. *A. rutilans* Cuvier  
 268. *Aprion virescens* Valenciennes  
 269. *Etelis carbunculus* Cuvier  
 270. *E. coruscans* Valenciennes  
 271. *Lipocheilus carnolabrum* (Chan)  
 272. *Lutjanus argenteomaculatus* (Forsskal)  
 273. *L. bengalensis* (Bloch)  
 274. *L. bohar* (Forsskal)  
 275. *L. ehrenbergii* (Peters)  
 276. *L. erythroterus* Bloch  
 277. *L. fulviflamma* (Forsskal)  
 278. *L. fulvus* (Schneider)  
 279. *L. gibbus* (Forsskal)  
 280. *L. johnii* (Bloch)  
 281. *L. kasmira* (Forsskal)  
 282. *L. lunulatus* (Mango park)  
 283. *L. lutjanus* Bloch  
 284. *L. madras* (Valenciennes)  
 285. *L. malabaricus* (Bloch & Schneider)  
 286. *L. monostigma* (Cuvier)  
 287. *L. quinquelineatus* Bloch  
 288. *L. rivulatus* (Cuvier)  
 289. *L. russelli* (Bleeker)  
 290. *L. sanguineus* (Cuvier)  
 291. *L. sebae* (Cuvier)  
 292. *L. vitta* (Quoy & Gaimard)  
 293. *Macolor niger* (Forsskal)  
 294. *Paracaesio xanthurus* (Bleeker)  
 295. *Pinjalo pinjalo* (Bleeker)  
 296. *Pristipomoides filamentosus* (Valenciennes)  
 297. *P. multidentis* (Day)  
 298. *P. sieboldii* (Bleeker)  
 299. *P. zonatus* (Valenciennes)  
 FAMILY : CAESIONIDAE  
 300. *Caesio lunaris* Cuvier  
 301. *C. varilineata* Carpenter  
 FAMILY : LOBOTIDAE  
 302. *Lobotes surinamensis* (Bloch)  
 FAMILY : GERREIDAE  
 303. *Gerres abbreviatus* bleeker  
 304. *G. filamentosus* Cuvier  
 305. *G. macracanthus* Bleeker  
 306. *G. oblongus* Cuvier  
 307. *G. poeti* Cuvier  
 308. *Gerreomorpha setifer* (Hamilton-Buchanan)  
 309. *Pentaprion longimanus* (Cantor)  
 FAMILY : HAEMULIDAE  
 310. *Diagrama pictum* (Thunberg)  
 311. *Plectorhynchus gibbosus* (Lacepede)  
 312. *P. griseus* (Cuvier)  
 313. *P. orientalis* (Bloch)  
 314. *P. pictus* (Tortonese)  
 315. *P. polytaenia* (Bleeker)  
 316. *P. schotaf* (Forsskal)  
 317. *Pomadasys argenteus* (Forsskal)  
 318. *P. argyreus* (Valenciennes)  
 319. *P. commersoni* (Lacepede)  
 320. *P. furcatus* (Schneider)  
 321. *P. kaakan* (Cuvier)  
 322. *P. maculatus* (Bloch)  
 323. *P. multimaculatum* (Playfair)  
 324. *P. olivaceum* (Day)  
 FAMILY : SPARIDAE  
 325. *Acanthopagrus berda* (Forsskal)  
 326. *A. bifasciatus* (Forsskal)  
 327. *A. latus* (Houttuyn)  
 328. *Argyrops spinifer* (Forsskal)  
 329. *Cheimereus nufur* (Valenciennes)  
 330. *Crenidens crenidens* (Forsskal)  
 331. *Diplodus sergus kotschy* (Steindachner)  
 332. *Rhabdosargus sarba* (Forsskal)  
 333. *Sparidentex hasta* (Valenciennes)  
 FAMILY : LETHRINIDAE  
 334. *Gymnocranius grandoculis* (Valenciennes)  
 335. *Lethrinus nebulosus* (Forsskal)  
 FAMILY : NEMIPTERIDAE  
 336. *Nemipterus japonicus* (Bloch)  
 337. *N. randalli* Russell  
 338. *N. zysron* (Bleeker)  
 339. *Parascolopsis aspinosa* (Rao & Rao)  
 340. *P. townsendi* Boulenger  
 341. *Scolopsis taeniatus* (Ehrenberg)  
 342. *S. vosmeri* (Bloch)  
 FAMILY : SCIAENIDAE  
 343. *Argyrosomus amoyensis* (Bleeker)  
 344. *A. hololepidotus* (Lacepede)  
 345. *Dendrophysa russelli* (Cuvier)

346. *Johnieops aneus* (Bloch)  
 347. *J. dussumieri* (Cuvier)  
 348. *J. macrorhynchus* (Mohan)  
 349. *J. sina* (Cuvier)  
 350. *J. vogleri* (Bleeker)  
 351. *Johnius belangerii* (Cuvier)  
 352. *J. carutta* Bloch  
 353. *J. dussumieri* (Valenciennes)  
 354. *J. elongata* Mohan  
 355. *J. glaucus* (Day)  
 356. *J. macropterus* (Bleeker)  
 357. *Kathala axillaris* (Cuvier)  
 358. *Nibea maculata* (Schneider)  
 359. *N. soldado* (Lacepede)  
 360. *Otolithes cuvieri* Trewaveas  
 361. *O. ruber* (Schneider)  
 362. *Otolithoides biauritus* (Cantor)  
 363. *Paranibea semiluctuosa* (Cuvier)  
 364. *Pennahia macrophthalmus* (Bleeker)  
 365. *Protonibea diacanthus* (Lacepede)  
 366. *Umbrina canariensis* Valenciennes  
 FAMILY: MULLIDAE  
 367. *Mulloides flavolineatus* (Lacepede)  
 368. *M. vanicolensis* (Valenciennes)  
 369. *Parupeneus barberinus* (Lacepede)  
 370. *P. bifasciatus* (Lacepede)  
 371. *P. cinnabarinus* (Cuvier)  
 372. *P. indicus* (Shaw)  
 373. *P. macronema* (Lacepede)  
 374. *Upeneus bensasi* (Temminck & Schlegel)  
 375. *U. moluccensis* (Bleeker)  
 376. *U. (Upeneus) sulphureus* Cuvier  
 377. *U. sundaicus* (Bleeker)  
 378. *U. (Pennon) tragula* Richardson  
 379. *U. (Upeneus) vittatus* (Lacepede)  
 FAMILY : MONODACTYLIDAE  
 380. *Monodactylus argenteus* (Linnaeus)  
 381. *M. falciformis* Lacepede  
 FAMILY : KYPHOSIDAE  
 382. *Kyphosus cinerascens* (Forsskal)  
 FAMILY : EPHIPPIDIDAE  
 383. *Ephippus orbis* (Bloch)  
 FAMILY : PLATACIDAE  
 384. *Platax orbicularis* Forsskal  
 385. *P. pinnatus* (Linnaeus)  
 FAMILY : DREPANIDAE  
 386. *Drepane punctata* (Linnaeus)  
 FAMILY : SCATOPHAGIDAE  
 387. *Scatophagus argus* (Linnaeus)  
 FAMILY : CHAETODONTIDAE  
 388. *Chaetodon vagabundus* Linnaeus  
 389. *Heniochus acuminatus* (Linnaeus)  
 FAMILY : POMACANTHIDAE  
 390. *Pomacanthus annularis* (Bloch)  
 391. *P. semicirculatus* (Cuvier)  
 FAMILY : POMACENTRIDAE  
 392. *Abudefduf bengalensis* (Bloch)  
 FAMILY : MUGILIDAE  
 393. *Liza carinata* (Valenciennes)  
 394. *L. macrolepis* (Smith)  
 395. *L. melinoptera* (Valenciennes)  
 396. *L. parsia* (Hamilton-Buchanan)  
 397. *L. subviridis* (Valenciennes)  
 398. *L. tade* (Forsskal)  
 399. *L. vaigiensis* (Quoy & Gaimard)  
 400. *Mugil cephalus* Linnaeus  
 401. *Valamugil cunnesius* (Valenciennes)  
 402. *V. seheli* (Forsskal)  
 403. *V. speigleri* (Bleeker)  
 FAMILY : SPHYRAENIDAE  
 404. *Sphyraena jello* Cuvier  
 405. *S. obtusata* Cuvier  
 FAMILY : POLYNEMIDAE  
 406. *Eleutheronema tetradactylum* (Shaw)  
 407. *Polydactylus heptadactylus* (Cuvier)  
 408. *P. indicus* (Shaw)  
 409. *P. plebeius* (Broussonet)  
 410. *P. sextarius* (Bloch)  
 411. *Polynemus paradiseus* Linnaeus  
 FAMILY : MUGILOIDIDAE  
 412. *Parapercis hexophthalma* (Ehrenberg)  
 413. *P. nebulosa* (Quoy & Gaimard)  
 FAMILY : BLENNIDAE  
 414. *Exallia brevis* (Kher)  
 FAMILY : GOBIIDAE  
 415. *Apocryptichthys cantoris* (Day)  
 416. *Boleophthalmus boddarti* (Pallas)  
 417. *Ctenogobius andhraensis* Herre  
 418. *Glossogobius giuris* (Hamilton Buchanan)  
 419. *Periophthalmus koelreuteri* (Pallas)

420. *Scartelaos histophorus* (Hamilton-Buchanan)

FAMILY : TRYPAUCHENIDAE

421. *Trypauchen vagina* (Bloch & Schneider)

FAMILY : GOBIOIDIDAE

422. *Brachyamblyopus urolepis* (Bleeker)

FAMILY : SIGANIDAE

423. *Siganus canaliculatus* (Park)

424. *S. javus* (Linnaeus)

FAMILY : GEMPYLIDAE

425. *Gempylus serpens* Cuvier

426. *Neopinnula orientalis* (Gilchrist & Von Bonde)

FAMILY : TRICHIURIDAE

427. *Eupleurogrammus glossodon* (Bleeker)

428. *E. muticus* (Gray)

429. *Lepturacanthus savala* (Cuvier)

430. *Trichiurus auriga* Klunzinger

431. *T. lepturus* Linnaeus

FAMILY : SCOMBRIDAE

32. *Acanthocybium solandri* (Cuvier)

433. *Auxis rochei* (Risso)

434. *A. thazard* (Lacepede)

435. *Euthynnus affinis* (Cantor)

436. *Katsuwonus pelamis* (Linnaeus)

437. *Rastrelliger kanagurta* (Cuvier)

438. *Sarda orientalis* (Temminck & Schlegel)

439. *Scomberomorus commerson* (Lacepede)

440. *S. guttatus* (Bloch & Schneider)

441. *S. koreanus* (Kishinouye)

442. *S. lineolatus* (Cuvier)

443. *Thunnus albacares* (Bonnaterre)

444. *T. obesus* (Lowe)

445. *T. tonggol* (Bleeker)

FAMILY : XIPHIIDAE

446. *Xiphias gladius* Linnaeus

FAMILY : ISTIOPHORIDAE

447. *Istiophorus platypterus* (Shaw & Nodder)

448. *Makaira indica* (Cuvier)

449. *Tetrapturus audax* (Philippi)

FAMILY : ARIOMMATIDAE

450. *Ariomma indica* (Day)

FAMILY : STROMATEIDAE

451. *Pampus argenteus* (Euphrasen)

452. *P. chinensis* (Euphrasen)

ORDER : PLEURONECTIFORMES

FAMILY : PSETTODIDAE

453. *Psettodes erumei* (Schneider)

FAMILY : BOTHIDAE

454. *Bothus myriaster* (Temminck & Schlegel)

455. *B. pantherinus* (Ruppell)

456. *Chascanopsetta lugubris* Alcock

457. *Engyprosopon grandisquamis* (Temminck & Schlegel)

458. *Pseudorhombus arsius* (Hamilton-Buchanan)

459. *P. elevatus* Ogilby

460. *P. javanicus* (Bleeker)

461. *P. malayanus* Bleeker

462. *P. triocellatus* (Bloch)

FAMILY : CYNOGLOSSIDAE

463. *Cynoglossus arel* (Schneider)

464. *C. bilineatus* (Lacepede)

465. *C. carpenteri* Alcock

466. *C. dispar* Day

467. *C. dubius* Day

468. *C. lingua* Hamilton-Buchanan

469. *C. macrostomus* Norman

470. *C. puncticeps* (Richardson)

471. *Paraplagusia bilineata* (Bloch)

FAMILY : SOLEIDAE

472. *Aesopia cornuta* Kaup

473. *Euryglossa orientalis* (Schneider)

474. *Solea elongata* Day

475. *S. ovata* Richardson

476. *Synaptura commersoniana* (Lacepede)

477. *Zebrias quagga* (Kaup)

478. *Z. synapturoides* (Jenkins)

ORDER : TETRAODONTIFORMES

FAMILY : TRIACANTHIDAE

479. *Pseudotriacanthus strigilifer* (Cantor)

480. *Triacanthus biaculeatus* (Bloch)

FAMILY : BALISTIDAE

481. *Abalistes stellatus* (Lacepede)

FAMILY : MONOCANTHIDAE

482. *Alutera monoceros* (Linnaeus)

FAMILY : OSTRACIIDAE

483. *Lactoria cornuta* (Linnaeus)

484. *Tetrosoma gibbosus* (Linnaeus)

FAMILY : DIODONTIDAE

485. *Chilomycterus orbicularis* (Bloch)

486. *Diodon holocanthus* Linnaeus

Order ORECTOLOBIFORMES

Family HEMISCYLLIDAE

(Bamboo sharks, Longtailed carpet sharks)

Body cylindrical or slightly depressed, with or without ridges on sides. Head narrow to moderately broad and cylindrical to more or less flattened, without lateral flaps of skin. Eyes dorsolaterally situated on head. Spiracles very large, subequal in size to eyes and almost below them. Gill slits small, 5th overlapping 4th. Nostrils with short, pointed barbels and distinct circumnarial folds and grooves around outer edges of incurrent apertures. Mouth small, subterminal and somewhat transverse. Caudal peduncle without lateral keels and precaudal pits. Two spineless equal-sized dorsal fins, the second dorsal origin well anterior to anal fin origin. Anal fin with broad base and broadly rounded, keel-like apex, separated by a narrow notch. Caudal fin with its upper lobe hardly elevated above the body axis, less than a fifth as long as the entire shark, with a strong terminal lobe and subterminal notch but no ventral lobe.

The Bamboo sharks are common, small, harmless, inshore bottom fishes of continental waters of the tropical western Pacific, ranging from Madagascar in the west to Japan, the Philippines and the Australian region in the east. They are represented by 2 genera with 11 species throughout the world, 1 genus with 4 species in India and 1 genus with 2 species in Gujarat.

*Species known to occur in Gujarat*

1. *Chiloscyllium griseum* Muller and Henle (Grey bamboo-shark).
2. *C. indicum* (Gmelin) (Slender bambooshark)

Key to the species

Body and tail very slender. Anal fin origin far behind free rear tip of second dorsal, length of anal fin from origin to free rear tip subequal to

length of hypural caudal lobe from lower caudal origin to subterminal notch. Colour pattern with numerous small dark spots and bars ..... *C. indicum*

Body and tail moderately slender to relatively stout. Anal fin origin below or close behind rear tip of second dorsal, length of anal fin considerably shorter than hypural caudal lobe. Without colour pattern, adults generally light brown but young with conspicuous dark transverse bands..... *C. griseum*

*Interest to fisheries* : Both these two species, *C. indicum* and *C. griseum* are common sharks found in both the coasts of India. These bamboosharks are utilized for human consumption and regularly caught in inshore fisheries in India.

Family STEGOSTOMATIDAE

(Zebra sharks)

Body cylindrical with conspicuous ridges on sides. Head broad, conical and more or less flattened without lateral flaps of skin. Snout very broadly rounded or truncated. Spiracles subequal in size to eyes but not below them. Gill slits small, 5th overlapping 4th. Nostrils with short barbels but without circumnarial folds and grooves. Mouth moderately large, subterminal on head and transverse. Caudal peduncle without lateral keels or precaudal pits. First dorsal fin larger than second, with origin expanded well anterior to pelvic fin origins and insertion about over pelvic fin bases. Caudal fin with its upper lobe at a low angle above body axis, about half as long as the entire shark with a strong terminal lobe and subterminal notch but no ventral lobe. Young specimen are dark brown above, yellowish below, with vertical yellow stripes and spots breaking the dorsal colour pattern into dark saddles; between 50 and 90 cm length the saddle break up into small brown spots on a yellow back-ground, these becoming less linear and more uniformly distributed with further growth.

This Indo-West Pacific zebra shark is represented by 1 genus with 1 species throughout the world.

*Species known to occur in Gujarat :**Stegostoma fasciatum* (Hermann) (Zebra shark)

*Interest to fisheries :* This is a common shark to occur in both the coasts of India. It is caught in bottom trawls, in floating and fixed bottom gillnets and with long lines and other line gear. It is utilized fresh and dried salt for human food, its livers processed for vitamins, fins dried and processed for the oriental sharkfin trade and offal for fishmeal.

Family GINGLYMOSTOMATIDAE  
(Nurse sharks)

Body cylindrical or moderately depressed, without ridges on sides. Head broad and flattened, without lateral flaps of skin. Spiracles much smaller than eyes, behind but not below them. Gill slits small, 5th virtually overlapping 4th. Nostrils with short to moderately long, pointed barbels but without circumnarial folds and grooves. Mouth moderately large, transverse and subterminal on head. Caudal peduncle without lateral keels or precaudal pits. Dorsal fins equal-sized or first dorsal larger than second, the second dorsal fin origin well anterior to anal fin origin. Caudal fin with its upper lobe at a low angle above the body axis, with a strong terminal lobe and subterminal notch but no ventral lobe or a very short one. A short precaudal tail much shorter than head and body.

These sharks are common, small to large, nocturnal, inshore bottom fishes with a circumglobal distribution in subtropical and tropical continental and insular waters, in depths from intertidal down to at least 70m. They are represented by 2 genera with 3 species throughout the world and 1 genus with 1 species in India as well as in Gujarat.

*Species known to occur in Gujarat :**Nebrius ferrugineus* (Lesson) (Tawny nurse shark)

*Interest to fisheries :* It is a common monotypic species, found in both the coasts of India. It is utilized fresh and dried salted for human consumption, its liver is rendered for oil and vitamins, its fins are used in the oriental sharkfin trade and offal is processed into

fishmeal. Its thick, armor-like hide is potentially valuable for leather.

Family RHINIODONTIDAE  
(Whale sharks)

Body cylindrical or moderately depressed with conspicuous ridges on sides. Head very broad and flattened, without lateral flaps of skin. Snout truncate. Spiracles much smaller than eyes, behind but not below them. Gill slits very large, 5th well separated from 4th. Mouth extremely large, terminal on head with minute, extremely numerous teeth and unique filter screens on its internal gill slits. First dorsal fin much larger than second, its origin well anterior to pelvic fin origin and insertion over pelvic fin bases. Caudal peduncle with a strong lateral keels and an upper precaudal pit. Caudal fin lunate or semilunate with a vestigial terminal lobe and subterminal notch and a very strong ventral lobe or a very short one. A unique colour pattern of light spots and vertical and horizontal stripes, in the form of a checkerboard.

The family comprises a single species which is by far the World's largest fish (possibly up to 18 m).

*Species known to occur in Gujarat :**Rhiniodon typus* Smith (Whale shark)

*Interest to fisheries :* This species is apparently of relatively limited interest for fisheries. Small harpoon fisheries exist in India and Pakistan. It is a monotypic species esteemed for the large quantity of oil it yields. Its immense size makes it an attraction until the effects of decay overcome curiosity.

## Order LAMNIFORMES

Family ODONTASPIDIDAE  
(Sand tiger sharks)

Head short, much shorter than trunk. Snout pointed and conical to slightly depressed. Mouth large, extending beyond eyes. Eyes small, without nictitating eyelids. Gill openings moderately large, not extending onto dorsal surface of head, all anterior to pectoral fin bases. Large teeth with slender cusps and lateral cusplets, small intermediate teeth separating anterior and lateral teeth in the upper

jaw. Two dorsal fins and an anal fin. Caudal fin not lunate, upper lobe moderately long, less than half as long as rest of shark, lower lobe short but strong. Upper precaudal pit present, caudal peduncle compressed and without keels.

Odontaspids are tropical to cool-temperate, inshore and deepwater sharks with a wide geographic distribution practically found in all seas. They are represented by 2 genera with 4 species (Compagno, 1984) and 1 genus with 1 species in India as well as in Gujarat.

*Species known to occur in Gujarat :*

*Eugomphodus taurus* (Rafinesque) (Sand tiger shark)

*Interest to Fisheries :* It is a very common species found in both the coasts of India, especially on the Bombay-Gujarat coast. This species attains a maximum total length of about 318 cm. It is caught mostly with line gear but also fixed bottom gillnets and in pelagic and bottom trawls. Its meat is utilized fresh, frozen, smoked and dried salted for human consumption. It is also utilized for fishmeal, its liver for vitamin oil and its fins for the oriental sharkfin trade.

*Remarks :* Another species, *E. tricuspidatus* (Day) is known under this genus which is poorly known, and may be a junior synonym of *E. taurus*. Compagno (1984a) considers it a *Species dubium* since Day (1878) described this species from a skin, now lost, it is possible that the distinguishing characters of the reported snout shape is in error and the labial furrows were overlooked.

Family ALOPIIDAE  
(Thresher sharks)

Head short, much shorter than trunk. Snout moderately long, pointed and conical not greatly elongated nor flattened and blade-like. Mouth small and arcuate, ventral on head. Trunk cylindrical and moderately stout. Gill slits short, not extending onto dorsal surface of head, last two pairs over pectoral fin bases. First dorsal fin large, high, erect and angular; second dorsal and anal fins minute, low and

with pivoting bases, anal fin base behind second dorsal base. Pectoral fins very long and narrow, longer than head in adults. Pelvic fins very large, almost or quite as large as first dorsal fin. Caudal fin long, curving asymmetrical, with dorsal lobe almost or quite as long as rest of the body of shark, ventral lobe short. Caudal peduncle slightly compressed and without keels. Precaudal pits present.

Threshers sharks are large, active, strong-swimming sharks, ranging in habitat from coastal to epipelagic and deepwater epibenthic. They are represented by 1 genus with 3 species, found worldwide in tropical, subtropical and cold-temperate waters. In India they are represented by 1 genus with 3 species and 1 genus with 2 species in Gujarat.

*Species known to occur in Gujarat :*

1. *Alopias pelagicus* Nakamura (Pelagic thresher)
2. *A. vulpinus* (Bonnaterre) (Thresher shark)

Key to the species

Head narrow, snout more elongated, forehead nearly straight. Labial furrows absent. Lateral teeth with well-developed distal cusplets. Pectoral fin nearly straight and broad-tipped. Terminal lobe of caudal shorter, its length from subterminal notch to caudal tip about equal to second dorsal base. Sides above pectoral bases dark, without an extension of the white abdomen area .....*A. pelagicus*

Head broad, snout shorter, forehead strongly arched. Labial furrows present. Lateral teeth generally without distal cusplets. Pectoral fin falcate and narrow tipped. Terminal lobe of caudal longer, its length from subterminal notch to caudal tip over twice second dorsal base. Sides above pectoral bases marked with a white patch extending forward from the abdomen area .....*A. vulpinus*

*Interest to Fisheries :* Thresher sharks form an important component of the economic shark fishery, especially because of their high quality meat which is utilized fresh, frozen, smoked and dried salted. Their fins are used for

shark-fin soup, livers for vitamins extraction and hide for leather. These sharks are caught with floating longlines, line gear (including rod and reel) and fixed bottom gillnets. *A. pelagicus* and *A. vulpinus* attain a maximum total length at least 330cm and 549 cm respectively.

#### Family LAMNIDAE

(Mackerel sharks, Porbeagles, White sharks)

Spindle-shaped body with pointed snout. Head moderately long without lateral expansions. Mouth large, with large blade-like teeth. Eyes moderately large, inserted entirely over mouth. Gill openings large, extending onto dorsal surface of head, all anterior to pectoral fin bases. First dorsal fin large and high, erect and angular or more or less rounded; second dorsal fin and anal fin minute, much smaller than first dorsal fin, with narrow pivoting bases. Caudal fin lunate. Caudal peduncle strongly depressed and with strong and high keels. Precaudal pits present.

Lamnids are tropical to cold-temperate, littoral to epipelagic sharks with a broad geographic distribution in virtually all seas and represented by 3 genera with 5 species. In India as well as in Gujarat they are represented by only 1 genus with 1 species.

#### *Species known to occur in Gujarat :*

*Isurus oxyrinchus* Rafinesque (Shortfin mako)

*Interest to fisheries :* This is an important species for longline fisheries where it occurs, because of its high -quality meat, and also is a prime game high prized by short anglers. The meat is utilized fresh, frozen, smoked and dried salted for human consumption; the oil is extracted for vitamins; the fins used for shark-fin soup ; the hide processed into leather and the jaws and teeth are used for ornaments. The shark is caught in gillnets and on pelagic longlines and hook and line.

### Order CARCHARHINIFORMES

#### Family SCYLIORHINIDAE

(Catsharks)

Body generally elongated, cat-like eyes with rudimentary nictitating eyelids. Head

without laterally expanded blades. Spiracles present and moderately large. Anterior nasal flaps variably shaped but not barbel-like. Labial furrows absent or very short to very long. Mouth long, arched and extending past anterior margin of eyes which is inserted over mouth, with small cuspidate teeth. Two dorsal spineless fins and an anal fin, the first dorsal fin base over or posterior to pelvic fin bases. Precaudal pits absent. Caudal fin without a strong ventral lobe or lateral undulations on its dorsal margin, its length less than half the length of rest of the body of sharks.

The catshark is by far the largest family of sharks, represented by 15 genera with 89 species throughout the world from tropical to cold-temperate and arctic waters. In India and in Gujarat they are represented by 3 genera with 4 species and 1 genus with 1 species respectively.

#### *Species known to occur in Gujarat :*

*Atelomycterus marmoratus* (Bennett) (Coral catshark)

*Interest to fisheries :* This is an unimportant species, captured near inshore and relatively common and forming a minor catch of inshore artisanal fisheries. They are probably captured with line gear and gillnets. The flesh is utilized fresh and dried salted for food or processed for fishmeal and oil. It is a common but little known, harmless inshore sharks, found on coral reefs and thought to inhabit crevices and holes on reefs. It attains a maximum length of 70 cm.

#### Family TRIAKIDAE

(Houndsharks, Smooth-hounds, Topes, Whiskery sharks)

Head without laterally expanded blades. Eyes horizontally oval with nictitating eyelids, inserted over mouth. No nasoral grooves. Anterior nasal flaps generally not barbel-like. A long, angular or arched subterminal mouth that reaches past anterior ends of eyes, moderate to very long labial furrows with small to moderately large molariform, blade like or cuspidate teeth. Two moderate to large sized, spineless dorsal fins and an anal fin, the first dorsal fin base well anterior to pelvic fin base. Precaudal pits absent. Caudal fin without a strong ventral lobe or lateral undulations on its

dorsal border, its length less than half the length of rest of the body.

This is one of the larger families of sharks, with many species found in all warm and temperate coastal seas and are represented by 9 genera and 34 species. In India as well as in Gujarat they are represented by 2 genera consisting of 2 species. None of the species are particularly dangerous to people.

*Species known to occur in Gujarat :*

1. *Iago omanensis* (Norman) (Bigeye hound shark)
2. *Mustelus mosis* Hemprich and Ehrenberg (Arabian smooth- hound)

Key to the species

Eyes lateral, subocular ridges obsolete. Origin of first dorsal fin far ahead, over pectoral fin bases .....*Iago omanensis*

Eyes dorsolateral, subocular ridges strong. Origin of first dorsal fin more posterior, over or behind pectoral inner borders .....*Mustelus mosis*

*Interest to fisheries :* *I. omanensis* is mostly found throughout the western coast of India. Its commercial importance is limited, caught in gillnet fisheries in southern India where it is utilized fresh for human consumption. *M. mosis* is found in both the coasts of India. It is apparently regularly fished off Pakistan and India and used for human consumption.

Family HEMIGALEIDAE  
(Weasel sharks)

Head normal, without laterally expanded blades. Eyes horizontally oval, inserted over mouth. Nictitating eyelids internal. No nasoral grooves or barbels. Small spiracles present. Labial furrows moderately long. Small to moderately large blades-like teeth in upper jaw, almost cuspidate teeth in lower jaw. Intestine with a spiral valve. Two spineless dorsal fins and an anal fin, the first dorsal base in front of pelvic fin bases. Precaudal pits present. Caudal fin with a strong ventral lobe and lateral undulations on its dorsal margin. Generally no colour pattern.

The Hemigaleidae is a small family of common tropical sharks of continental and

insular shelf waters down to 100m depth but usually insular water. They are represented by 4 genera with 5 species throughout the world, 3 genera with 3 species in India and 2 genera with 2 species in Gujarat.

*Species known to occur in Gujarat :*

1. *Chaenogaleus macrostoma* (Bleeker) (Hooktooth shark)
2. *Hemipristis elongatus* (Klunzinger) (Snaggletooth shark)

Key to the species

Snout obtusely wedge-shaped in dorso- ventral view. Lower jaw rounded at symphysis. No toothless space at midline of jaws. Fins not falcate, posterior margin of anal and second dorsal moderately concave, those of pectorals and pelvics straight or slightly concave .....*C macrostoma*

Snout bluntly rounded in dorso-ventral view. Lower jaw truncated at symphysis. A toothless space between teeth at midline of both jaws. Fins strongly falcate, posterior margin of anal, second dorsol, pectoral and pelvic fins deeply concave .....*H. elongatus*

*Interest to fisheries :* Both the species *C macrostoma* and *H. elongatus* are common species of the family Hemigaleidae. These fishes are utilized primarily for human consumption, liver processed for vitamins, fin is used in oriental sharkfin trade and offal for fishmeal. Members of this family are caught in inshore and offshore artisanal fisheries in the Indian Ocean.

Family CARCHARHINIDAE  
(Requiem sharks)

Head normal, without laterally expanded blades. Eyes circular with internal nictitating eyelids, inserted over mouth. Spiracles generally absent (except for *Galeocerdo* sometimes present in *Loxodon*, *Negaprion* and *Triaenodon*). Anterior nasal flaps varying from lobular and tube-shaped (*Triaenodon*) to vestigial, not barbel-like. Labial furrows varying from moderately long and conspicuous to short and hidden when mouth is closed.

Small to large, almost blade-like teeth in both jaws, usually broader in the upper jaw. Precaudal pits present. First dorsal fin moderate-sized to very large but not keel-like, much shorter than caudal fin; first dorsal fin base anterior to pelvic fin bases, varying from closer to pectoral fin bases to closer to pelvic fins; midpoint of first dorsal fin base always anterior to pelvic fins origin; second dorsal fin generally much smaller than first (exceptions in *Lamiopsis* and *Negaprion*). Caudal fin with a strong ventral lobe and lateral undulations on its dorsal margin, its length less than half the length of the rest of the body. Intestine with a scroll valve. Generally no colour pattern.

This is one of the largest and most important families of sharks, with many common and wide ranging species found in all warm and temperate seas. This family contains more dangerous species than any other, several of the larger requiem sharks have attacked people and boats while a few species (specially the bull and tiger sharks) are among the most dangerous living sharks. The requiem sharks are represented by 12 genera comprising 48 species distributed throughout the world. In India they are represented by 10 genera consisting of 23 species and in Gujarat these fishes are represented by 9 genera consisting of 17 species.

#### Species known to occur in Gujarat :

1. *Carcharhinus dussumieri* (Valenciennes) (Whitecheck shark)
2. *C. hemiodon* (Valenciennes) (Pondicherry shark)
3. *C. leucas* (Valenciennes) (Bull shark)
4. *C. limbatus* (Valenciennes) (Blacktip shark)
5. *C. longimanus* (Poey) (Oceanic whitetip shark)
6. *C. macloti* (Muller and Henle) (Hardnose shark)
7. *C. melanopterus* (Quoy and Gaimard) (Blacktip reef shark)
8. *C. sealei* (Pietschmann) (Black spot shark)
9. *Galeocerdo cuvier* (Peron and LeSeur) (Tiger shark)
10. *Lameopsis temmincki* (Muller and Henle) (Broadfin shark)
11. *Loxodon macrorhinus* Muller and Henle (Sliteye shark)
12. *Negaprion auctidens* (Ruppell) (Sicklefin shark)
13. *Prionace glauca* (Linnaeus) (Blue shark)
14. *Rhizoprionodon acutus* (Ruppell) (Milk shark)
15. *R. oligolinx* Springer (Grey sharpnose shark)
16. *Scoliodon laticaudus* Muller and Henle (Spadenose shark)
17. *Triaenodon obesus* (Ruppell) (Whitetip reef shark)

#### Key to the species

- 1a. Upper labial furrows very long, extending to front of eyes. Spiracles present and relatively large. Prominent lateral keels on caudal peduncle. Vertical black or dusky bars on back, obscure or absent on adults .....*G. cuvier*
- 1b. Upper labial furrows long to very short, not extending to front of eyes. Spiracles generally absent. Lateral keels generally absent (except for weak ones in *Prionace*, .....2
- 2a. High proximal and distal cusplets present on most teeth in both jaws. Expanded anterior nasal and mesonarial flaps forming a tube for the excurrent aperture .....*T. obesus*
- 2b. Cusplets generally absent on lower teeth, low or absent on uppers. Nasal flaps not forming a tube .....3
- 3a. Second dorsal fin nearly or quite as large as first dorsal .....4
- 3b. Second dorsal fin considerably smaller than first .....5
- 4a. Snout short, preoral length much less than mouth width. Upper and lower teeth with narrow, unserrated cusps .....*N. auctidens*
- 4b. Snout longer, preoral length about equal to mouth width. Upper teeth with broad, triangular, serrated cusps; lowers with narrow, smooth cusps .....*L. temmincki*

- 5a. Head greatly depressed and trowel- shaped. Pectoral fins broadly triangular. length from origins to free rear tip about equal to their anterior margins. Free rear tip of first dorsal about over midbases of pelvic fins. Postventral margin of caudal fin generally only shallowly concave .....*S. laticaudus*
- 5b. Head varying from conical to slightly depressed. Pectoral fins narrower, length 4/5 or less of anterior margin (generally less). Free rear tip of first dorsal over or (generally) anterior to pelvic origins. Postventral margin of caudal deeply incised .....6
- 6a. Second dorsal origin well behind anal origin, generally over or slightly anterior to anal fin insertion. Preanal ridges very long and prominent, subequal to or greater in length than anal base. Anal fin posterior margin straight or shallowly concave .....7
- 6b. Second dorsal fin origin generally near anal origin, in some species posterior to it, but generally well anterior to anal fin insertion. Preanal ridges variably developed, short and half the anal fin base length or less. Anal fin posterior margin deeply concave or deeply notched .....9
- 7a. Posterior notches present on eye. Labial furrows reduced and confined to mouth corners. First dorsal fin base 2 to 3 times in distance between pectoral and pelvic fins base .....*L. macrorhinus*
- 7b. Eye notches absent. Labial furrows generally conspicuous and long, reduced in *R. oligolinx*. First dorsal fin base generally less than 2 times in distance between pectoral and pelvic fin bases (up to 2 in adult *R. acutus*) .....8
- 8a. Upper labial furrows reduced and often inconspicuous, usually less than 1% of total length and rarely up to 1.3%; uppers generally shorter than lower furrows. Tooth rows averaging fewer, counts 23 to 25/21 to 24 but mostly below 25/24 .....*R. oligolinx*
- 8b. Upper labial furrows long and rather conspicuous, more than 1.1% of the total length and generally more than 1.3%; uppers generally as long as or longer than lower furrows. Tooth rows more numerous in average, counts 23 to 30/21 to 28 but, mostly 25/24 or higher .....*R. acutus*
- 9a. Papillose gillrakers present on gill arches. Weak lateral keels present on caudal peduncle. First dorsal fin base much closer to pelvic fin bases than pectoral fins. Colour brilliant dark blue above in life .....*P. glauca*
- 9b. Papillose gill rakers absent on gill arches. Lateral keels on caudal peduncle absent. First dorsal fin base equidistant between pectoral and pelvic fin bases or generally closer to pectoral fin base. Colour light to dark grey, grey-brown, brown or grey black above .....10
- 10a. Pectoral and first dorsal fins very broad distally and broadly rounded apically, only slightly tapering toward their apices. Most fin tips mottled white in adults, also tipped and with black dorsal saddle marks on the caudal peduncle in juveniles .....*C. longimanus*
- 10b. Pectoral and first dorsal fins tapering distally and generally pointed or narrowly rounded. Fins not mottled white, often black tipped but without black saddle on the caudal peduncle .....11
- 11a. Second dorsal fin with a prominent black tip but other fins plain .....12
- 11b. Second dorsal fin plain, white or black tipped but never the only fin with markings .....13
- 12a. First dorsal fin triangular, erect and with a posteroventrally slopping posterior margin. Generally 13/13 to 14 rows of anteroposterior teeth, and 28/27 to 29 total rows of teeth; distal cusplets serrated on upper anterolateral teeth Pectoral fin length 1.4 to 1.8 in anterior margin length. Mouth width 6.4 to 8.3 of total length .....*C. dussumieri*
- 12b. First dorsal fin falcate, with almost vertical posterior margin (apart from free rear tip). Generally 12/13 rows of anteroposterior teeth and 26/25 total rows of teeth; distal cusplets smooth on upper anterolateral teeth. Pectoral length 1.7 to 2 in anterior margin teeth. Mouth width 4.2 to 6.6 % of total length .....*C. sealei*
- 13a. Interdorsal ridge present .....*C. hemiodon*
- 13b. Interdorsal ridge absent .....14

- 14a. Entire posterior border of caudal fin with a narrow but obvious black edge; pectoral, second dorsal and caudal fins with obvious black tips .....*C. melanopterus*
- 14b. Posterior border of caudal fins not black or only partly dusky or black tipped or not .....15
- 15a. Snout very short and broadly rounded, internarial space generally less than pectoral length. Upper anterolateral teeth with very broad, triangular cusps and straight to concave distal borders; lower anterolaterals with strongly arched roots .....*C. leucas*
- 15b. Snout longer and parabolic or wedge-shaped to pointed, internarial space equal or greater than pectoral length. Upper anterolateral teeth with narrow cusps and strongly notched distal borders; lower anterolaterals with almost transverse roots .....16
- 16a. Second dorsal fin origin well behind of anal fin, almost opposite its midbase .....*C. macroti*
- 16b. Second dorsal fin origin almost over anal fin .....*C. limbatus*

*Interest to fisheries* : This is the most important shark family for fisheries in the tropics and various species figure prominently in the artisanal, commercial and sports fisheries. The monotypic species, *G. cuvier* is a common, wide-ranging coastal pelagic tropical and warm-temperate shark, found in both the coasts of India. It is one of the most dangerous sharks, with more confirmed attacks on divers and swimmers and attacks on boats being recorded for this species than all other sharks except the great white shark. Its meat is utilized fresh, fresh frozen, dried salted and smoked for human consumption; its hide is of high quality and is used for leather and other products; its fins are used for shark fin soup base; its liver which often has a high vitamin potency, is processed for vitamin oil. It is one of the sharks recognized as a big game fish by the International Game Fish Association. The monotypic species, *L. temmincki*, is a little-known, continental inshore shark, apparently only common on the west coast of India. Its

meat is utilized fresh for human consumption and livers for vitamin oil. The monotypic species, *L. macrorhinus*, a small (maximum total length, 91cm), common tropical inshore shark of the continental and insular shelves, found on both the coasts of India; is caught in artisanal and small scale commercial fisheries and is especially important in south-eastern India. Its meat is utilized for human consumption. The monotypic species, *P. glauca*, is a wide-ranging, oceanic-epipelagic and fringe-littoral shark, occurring on both the coasts of India. Its meat is used fresh, smoked and dried salted for human consumption; its hides are used for leather; fins for shark-fin soup base and also for fishmeal and liver for oil. This is also considered a game fish and taken by sports, with several attacks on people and boats on record. The monotypic species, *S. laticaudus*, is an abundant small species (maximum total length 74 cm) in India and Pakistan, commonly taken in artisanal and commercial fisheries. Its meat is utilized fresh for human consumption, processed into fishmeal and used for bait for other sharks and bony fishes. The monotypic species, *T. obesus* is a wide-ranging shark in the Indo-Pacific, found in both the coasts of India. Its meat and liver are utilized fresh for human consumption. Its small size (maximum total length about 213 cm), small teeth and usually placid and unaggressive behaviour make it far less dangerous than many other carcharhinids.

#### Family SPHYRNIDAE

(Hammerhead sharks, Scoophead sharks and Bonnethead sharks)

Head with laterally expanded blades, shaped like a double bitted axe or mallet in profile. Eyes almost circular with nictitating eyelids internal. Spiracles absent. Precaudal pits present. First dorsal fin moderate-sized to very large but not keel-like, much shorter than caudal fin; first dorsal fin base anterior to pelvic fin bases, varying from equidistant between pectoral and pelvic fin bases to closer to pectoral fin bases; midpoint of first dorsal fin base always ahead of pelvic fin origins. Second dorsal fin much smaller than first. Ventral caudal lobe strong, undulations or ripples present in dorsal caudal border. Valvular intestine with a scroll valve.

*Species known to occur in Gujarat :*

1. *Eusphyra blochii* (Cuvier) (Winghead shark)
2. *Sphyrna lewini* (Griffith & Smith) (Scalloped hammer-head shark)
3. *S. mokarran* (Ruppell) (Great hammerhead shark)

Key to the species

- 1a. Lateral blades of head very narrow and winglike. Nostrils greatly enlarged, their widths 0.8 to 0.9 times in the internarial width and nearly twice the mouth width. Knobs present along anterior margin of head, opposite nostrils .....*E. blochii*
- 1b. Lateral blades of head anteroposteriorly broad, not winglike. Nostrils short, their widths 7 to 14 times in internarial width and less than half of mouth width. No knobs along anterior margin of head .....2
- 2a. Anterior margin of head almost straight in adults. Prenarial grooves absent or hardly developed. Teeth strongly serrated at all sizes. Pelvic fins high and falcate. First dorsal fin markedly falcate. Second dorsal fin high, with a short inner margin and deeply concave posterior margin .....*S. mokarran*
- 2b. Anterior margin of head moderately convex in adults, strongly in young. Prenarial grooves well developed. Teeth smooth edged in young, weakly serrate in adults. Pelvic fins low and not falcate, with nearly straight posterior edges. First dorsal fin generally semifalcate. Second dorsal fin low, with a long inner margin and almost straight posterior margin .....*S. lewini*

*Interest to fisheries :* *E. blochii* is a very common species found in both the coasts of India and is a common fisheries species in India, Pakistan, Malayasia and Thailand. Its meat is utilized fresh for human consumption, livers yield a high -potency vitamin oil and offal is perhaps processed into fishmeal. *S. lewini* is also a very common species found in both the coasts of India and constitutes an important component in the artisanal and small commercial fisheries. The meat is utilized fresh, fresh-frozen, dried salted and smoked for

human consumption; the fins are used to prepare shark- fin soup base; the hides are prepared into leather; the oil used for vitamin and carcasses for fishmeal. *S. mokarran* is another very widely distributed species found in both the coasts of India. This species is utilized for its meat, fresh, fresh- frozen, dried salted and smoked for human consumption; hides processed into leather; for fins used for shark-fin soup base; for liver oil processed for vitamins and carcasses for fishmeal.

Order PRISTIFORMES

Family PRISTIDAE  
(Sawfishes)

Rays of very large size and of shark-like appearance. Snout produced in a long flat blade with teeth on each side (teeth of equal size and embedded in deep sockets). Pectoral fins small. Gill-openings on ventral surface. Eyes and spiracles on top of head. Mouth transverse and straight. Teeth numerous, pavement pattern forming bands along jaws. Nasal apertures inferior, well in front of and completely separated from mouth. Barbels absent. Two large and widely separated dorsal fins. Caudal fin well developed. Tail extremely stout, not marked off from trunk. Body, fins and rostrum covered with small, closely-set dermal denticles in adult but young of *Anoxypristis* are completely naked.

The sawfishes are represented by 2 genera with 7 species throughout the Atlantic, Indian and Pacific oceans and also freshwater in some areas. In Indian regions these fishes are represented by 2 genera with 4 species and in Gujarat 2 genera with 2 species.

*Species known to occur in Gujarat :*

1. *Anoxypristis cuspidatus* (Latham) (Pointed sawfish)
2. *Pristis microdon* Latham (Smalltoothed sawfish)

Key to the species

Rostral tooth depressed, broad and blade-like, in shallow, broad sockets on the rostrum. Posterior most rostral teeth ending well anterior

to base of rostrum. Nostrils very narrow, with small nasal flaps. Caudal fin with a prominent subterminal notch and long ventral lobe. First dorsal fin distinctly behind pelvic fins. 24 to 25 pairs of rostral teeth..... *A. cuspidatus*

Rostral teeth narrow, not greatly depressed, and spike-like, in deep, narrow sockets on the rostrum. Posterior most rostral teeth ending just anterior to base of rostrum. Nostrils broad, with large nasal flaps. Caudal fin without a subterminal notch, with a short ventral lobe or none. First dorsal fin almost entirely in advance of pelvic fins. 17 to 22 pairs of rostral teeth .....*P. microdon*

*Interest to fisheries* : *A. cuspidatus* is abundant on the east coast of India, especially on the Tamil Nadu coast. This species reaches a length of about 6 m. *P. microdon* is abundant on the southern region of the east coast of India but good grounds are indicated in the northern region also. Their livers yield considerable oils and flesh is much esteemed. *A. cuspidatus* is a monotypic species and ascends river, euryhaline.

#### Order TORPEDINIFORMES

##### Family NARCINIDAE (Electric rays)

Disc subcircular, with head not distinct from it. Head with electric organs. Snout broadly rounded, twice the interorbital distance. Rostral cartilage present. Nasoral grooves present. Spiracles large, close behind small eyes. 5 pairs of gill openings on ventral side between the electric organs. Two spineless dorsal fins on tail. Anal fin absent. Pelvics well developed. Caudal fin well developed. Tail with lateral folds, almost marked off from the body, slightly shorter than the length of disc, without serrated caudal spine.

They are widespread in tropical Indo-west Pacific and represented by 4 genera with 15 species all over the world. In India and in Gujarat they are represented by 2 genera with 4 species and 1 genus with 2 species respectively.

#### *Species known to occur in Gujarat :*

1. *Narcine brunnea* Annandale (Brown electric ray)
2. *N. indica* Henle (Spotted electric ray)

#### Key to the species

A pair of buccal processes present both on roof and floor of mouth. Body brown spotted above .....*N. brunnea*

No buccal processes. Body uniform brown above .....*N. indica*

*Interest to fisheries* : The fishes of this family have no fisheries importance and only occasionally caught as bycatch.

#### Order RAJIFORMES

##### Family RAJIDAE (Skates)

Body and head greatly depressed, united with pectorals forming a rhomboid disc. Snout produced, pointed. Eyes without nictitating membrane, wide apart on either side of median line. Mouth inferior, transverse or crescentic. Nostrils with 2 valves, front wide reaching mouth, hind folded in tube. Nasoral grooves to each nostril, nasal cirri absent, spiracles larger, close behind eye. 5 pairs of small, ventral gill openings. Two spineless dorsal fins on tail. Rayed portion of pectoral fins reaches beyond eye but not up to snout. Pelvic fins notched, very close to pectoral fins. Anal fin absent. Tail depressed, not whip-like, without spine and without fold along either side. Caudal fin rudimentary or absent.

The skates are distributed in all oceans and are represented by 9 genera with more than 200 species. They are represented by 3 genera with 5 species and 1 genus with 1 species in India and in Gujarat respectively.

#### *Species known to occur in Gujarat :*

*Raja mamillidens* Alcock (Skate)

*Interest to fisheries* : The fishes of this family are not commercially important and only occasionally caught as bycatch.

Family RHINOBATIDAE  
(Guitar fishes)

Head and anterior part of trunk varying from moderately flattened to strongly flattened body. Snout elongate and tapering. Tail stout and shark-like. Posterior margin of pectoral fins moderately enlarged, extending rear ward as far or further than origin of pelvic fins. Eyes and spiracles on top of head. Mouth transverse and nearly straight. Teeth numerous and small. Two distinct dorsal fins and a caudal fin. Origin of first dorsal fin considerably posterior to hind tip of pelvic fins. Body and fins covered with small, closely-set dermal denticles, which form a row on midline of back. Caudal fin without subcaudal fin.

Guitar fishes are found in sandy or muddy bottom in shallow coastal areas, including brackish and freshwater, in all tropical, subtropical and warm temperate latitudes. In India and in Gujarat they are represented by 2 genera with 3 species.

*Species known to occur in Gujarat :*

1. *Rhinobatos granulatus* (Cuvier) (Granulated shovelnose ray)
2. *R. obtusus* Muller and Henle (Grey guitar fish)
3. *R. thouniana* (Shaw) (Shaw's shovelnose guitar fish)

Key to the species

- 1a. Nostril length less than twice width of mouth, greater than distance between them..... *R. thouniana*
- 1b. Nostril length 2 to 3 times width of mouth, about equal to internarial distance .....2
- 2a. Snout very long and narrow, the rostral ridges close together throughout their length. Width of mouth 2.6 to 3.25 times in snout length..... *R. granulatus*
- 2b. Snout short and narrow, the rostral ridge separated by a considerable distance throughout their length. Width of mouth about 1.9 times in snout length ..... *R. obtusus*

*Interest to fisheries :* The fishes of this family are not commercially important as food

fish. They may be caught in large quantities together with other batoid fishes. They constitute a considerable part of the commercial catches. These fishes are caught with gear and in trawls.

Family RHYNCHOBATIDAE  
(Wedgefishes)

Head depressed and broad. Snout broad and rounded or elongate and tapering. Mouth deeply undulated, with three forward projections of lower jaw corresponding with three indentations of upper jaw. Nostrils oblique and large, their length less than internarial width. Spiracle large and no spiracular folds. Origin of first dorsal fin opposite to pelvic fins which are inserted to considerable posterior to pectoral fins. Pectoral fins not extending forward beyond level of mouth. Tail depressed, almost equal to trunk. Subcaudal fin well developed.

The fishes of this family are usually found in shallow coastal waters and are distributed throughout the tropical Indo-West Pacific regions. The family is represented by 2 genera with 2 species in India as well as in Gujarat.

*Species known to occur in Gujarat :*

1. *Rhina ancylostoma* Schneider (Brownmouth angelfish)
2. *Rhynchobatus djeddensis* (Forsskal) (White-spotted wedgefish)

Key to the species

- Snout slongate. Posterior margin of spiracles with two continuous folds. Mouth slightly undulated, with median projection of lower jaw fitting into a corresponding depression in upper jaw .....*R. djeddensis*
- Snout broad and rounded. No spiracular folds. Mouth deeply undulated. with three forward projections of lower jaw corresponding with three indentations of upper jaw .....*R. ancylostoma*

*Interest to fisheries :* *R. ancylostoma* is a monotypic species, commercially caught in small quantities along the coasts of India, particularly Gujarat and Bombay. It attains to a maximum length of at least 240 cm. *R.*

*djeddensis* the large Indo-Pacific whitespotted wedgfish can attain a weight of up to 240 kg and maximum length over 300 cm, is the most common species on the Tamil Nadu coast. They are caught with longlines and trawls.

## Order MYLIOBATIFORMES

### Family MYLIOBATIDAE (Eagle & Cownose rays)

Large size stingray with head elevated and distinctly marked off from disc. Anterior portions pectoral fins forming a projecting subrostral lobe which may be deeply incised in midline. Mouth with a scroll of flat grinding teeth. Eyes and spiracles on sides of head. Gill-openings about length of eye. Tail much longer than disc with venomous spines in some species. A small but distinct dorsal fin present. No caudal fin.

This family is widespread in Indo-west Pacific and is represented by 5 genera with 27 species. In India and in Gujarat they are represented by 3 genera with 5 species and 2 genera with 4 species respectively.

#### *Species known to occur in Gujarat :*

1. *Aetobatus narinari* (Euphrasen) (Spotted eagle ray)
2. *Aetomylaeus maculatus* (Gray) (Mottled eagle ray)
3. *A. milvus* (Valenciennes) (Brown eagle ray)
4. *A. nichofii* (Schneider) (Nieuhof's eagle ray)

#### Key to the species

- 1a. Single series of large teeth only in each jaw. Caudal spine (s) present. Snout long, tapering acute, longer than broad at base .....*A. narinari*
- 1b. Teeth in three series. No caudal spine .....2
- 2a. Origin of dorsal fin behind ends of pelvic fin bases, brown edged ocelli on hind part of disc..... *A. maculatus*

- 2b. Origin of dorsal fin opposite ends of pelvic fin bases .....3
- 3a. Disc twice wide as long, about five blue cross-band on disc (disappearing with age) .....*A. nichofii*
- 3b. Disc less than twice wide as long; green brown edge ocelli on hind part of disc .....*A. milvus*

*Interest to fisheries :* This family is not so commercially important. They are caught by hook and line, harpoons, shore seine hauls and trawl net. These fishes are marketed as fresh condition and consumed as food by the poor people in our country. The oil extracted from the liver is used for smearing boats.

### Family RHINOPTERIDAE (Cownosed rays)

Stingrays of rather large size with head elevated and distinctly from disc. Anterior margin of head concave. Tooth broad, flat, angular in pavement. Spiracles large, behind eyes, open laterally. Tail long, slender, whip-like, longer than disc and with serrated spine further back. Subrostral fin incised (bilobed). A small but distinct dorsal fin present. No caudal fin. Gill- opening about length of eye. Floor of mouth without papillae.

The Rhinopteridae is represented by only 1 genus with 10 species throughout Indo- Pacific. In India these fishes are represented by 3 species and 1 species in Gujarat.

#### *Species known to occur in Gujarat :*

*Rhinoptera javanica* Muller and Henle (Javanese cownose ray)

*Interest to fisheries :* *R. javanica* is occasionally caught along with other rays of commercial importance with shore seines, set-nets and trawls. Huge landings are made by shore-seine hauls on the Cape Comorin banks during the period of November to February. It lives gregariously and depends on oysters. They are marketed fresh.

Family MOBULIDAE  
(Devil rays, Mantas)

Stingrays of very large size with a broad rhombic disc. Tail distinctly marked off from body, much longer than disc and whip-like. Head distinct from disc, on each side of the snout there is a fleshy projection, a cephalic fin or 'horn' separated by the width of the mouth. Mouth terminal or below head. Teeth minute, in many series forming a band either in one or both jaws. No papillae in mouth. Eye and spiracles, lateral on head. Gill opening much larger than eye. Small dorsal fin at base of tail. No caudal fin. A long serrated spine (s) present on tail in some species. Skin naked or more or less rough with prickless or small tubercles.

The family Mobulidae is represented by 2 genera with 10 species in tropical and subtropical waters. They are represented by 2 genera with 3 species and 1 genus with 2 species in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Mobula diabolus* (Shaw) (Pigmy devil-ray)
2. *M. mobular* (Bonnaterre) (Henry ray)

Key to the species

Tail with a spine (s) .....*M. mobular*  
Tail without spine .....*M. diabolus*

*Interest to fisheries :* *M. diabolus* is occasionally caught from the Gulf of Manner area at 40 to 60 m. depth, usually during September to October and sizes vary from 572 to 1674 mm disc width and a weight of 14 to 44 kg. *M. mobular* is caught commercially only occasionally on the Bombay and Gujarat coasts. They are captured mainly by line gear, harpoons and drift nets and marketed fresh. These fishes are not used for food but mainly for fishmeal. Oil is extracted from the liver and used for smearing boats.

Family DASYATIDAE  
(Stingrays or Whiprays)

Disc kite shaped, flattened, outer anterior margin of pectorals continuous along side of

head, no separate cephalic or subrostral fins. A long tail, distinct from disc, with one or more long poisonous spines. No distinct dorsal fin. Gill openings narrow. Spiracles large, close behind eyes. Pelvic fins small, below pectoral fins. Teeth small, on pavement. Skin smooth or rough, with spines or tubercles or both.

The stingrays are represented by 10 genera with 89 species throughout the world. They are represented by 7 genera with 26 species and 3 genera with 6 species in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Dasyatis kuhlii* (Muller and Henle) (Blue-spotted stingray)
2. *D. zugei* (Muller and Henle) (Pale-edged stingray)
3. *Himantura bleekeri* (Blyth) (Whiptail stingray)
4. *H. imbricata* (Bloch and Schneider) (Schneider's scaly stingray)
5. *H. uarnak* (Forsskal) (Honeycombed stingray)
6. *Hypolophus sephen* (Forsskal) (Drab stingray)

Key to the species

- 1a. Tail with cutaneous fold .....2
- 1b. Tail without cutaneous fold .....4
- 2a. Tail with very prominent cutaneous fold (Only on lower side) ...*Hypolophus sephen*
- 2b. Tail with short cutaneous fold (on both the sides) .....3
- 3a. Disc dusky brown. Head of disc pointed. Tail plain .....*Dasyatis zugei*
- 3b. Disc brown with reddish margins of dark-edged blue circular spots. Head of disc not pointed. Tail banded .....*Dasyatis kuhlii*
- 4a. Disc in young with "leopard" pattern, honey-comb or reticulated pattern in adult. Four buccal processes on floor of mouth .....*Himantura uarnak*
- 4b. Disc not like as 4a. Two buccal processes on floor of mouth.....5
- 5a. Underside of disc entirely white. Tail almost equal to length of disc .....*Himantura imbricata*

- 5b. Underside of disc with a broad dark margin.  
Tail more than 3 times length of disc.  
.....*Himantura bleekeri*

*Interest to fisheries:* The fishes of this family are not locally consumed, but the flaps are dried for export or used for fishmeal. Oil is extract from the liver but the quality is said to be rather low.

*Remarks :* The stingrays are ovoviviparous fishes. The spines present on the tail can be rather dangerous and inflict painful wounds which may take a long time to heal.

Family GYMNURIDAE  
(Butterfly ray)

Large-sized stingrays, with a rhombic disc at least 1.5 times broader than long and a distinctly marked off tail. No buccal papillae on floor of mouth; many small teeth in bands along jaws; nasal curtains smooth-edged. Caudal and anal fin absent. Spiracles large, close behind eyes. 5 pairs of gill openings on ventral side of the disc.

Butterfly rays are cosmopolitan in tropical and warm-temperate waters, usually inhabiting sandy and muddy bottoms in shallow coastal waters. They are represented by 1 genus with 5 species and 1 genus with 1 species in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Gymnura poecilura* (Shaw) (Longtailed butterfly ray)

*Interest to fisheries :* It is a very common species in the Palk Bay near Mandapam, in shallow waters at 10 to 30 m depth. It is generally caught by lines, trawl net or bottom-set gill nets. This butterfly ray is not generally consumed locally but dried for export or used for fishmeal.

Class OSTEICHTHYES

Order ELOPIFORMES

Family ELOPIDAE  
(Lady fishes, Tenpounders)

Body elongate and fusiform, with smooth unkeeled caudal peduncle. Mouth terminal,

with many small, sharp teeth; the upper jaw long, reaching well behind eyes; lower jaw projecting slightly. A gular plate present under the mouth, between the arms of the lower jaw. Branchiostegal rays numerous (23 to 25). Dorsal fin with 20 to 25 soft unbranched rays, last ray not elongated, set at a little behind mid-point of body. Anal fin short, with 14 to 17 rays, its origin well behind dorsal fin base. Pelvic fins a little in front of dorsal fin origin. Scales very small, thin, cycloid, usually 95 to 120 along the lateral line.

The ladyfishes are primarily pelagic in coastal waters, entering lagoons and estuaries. The family Elopidae is represented by 1 genus with 6 species throughout the Indo-Pacific regions. They are represented by 1 genus with 1 species in India and in Gujarat.

*Species known to occur in Gujarat :*

*Elops machnata* (Forsskal) Tenpounder.

*Interest to fisheries :* Ladyfishes are caught along the east coast of India, especially at Madras. These fishes are of minor importance to fisheries but caught in sport fishing. They are captured by seines, gillnets and handlines and marketed fresh or frozen form. The flesh is disappointing, being insipid and full of bones.

Family MEGALOPIDAE  
(Tarpons)

Body somewhat compressed, moderately deep; no scutes along belly. Eyes large. Mouth terminal or superior, lower jaw projecting; a gular plate present between arms of lower jaws. Branchiostegal rays numerous (26 or 27). Dorsal fin with 13 to 21 unbranched soft rays, the last ray elongated and filamentous. Anal fin with 22 to 31 soft rays, its origin slightly behind last dorsal ray. Pelvic fins with 10 to 11 rays. Scales large, lateral line scales 30 to 42.

Although primarily marine, these fishes are known from brackish and even fresh water also. They are common in the Indo-West Pacific region and are represented by 1 genus with 2 species throughout the world. In India and in Gujarat the family Megalopidae is represented by 1 genus with 1 species.

*Species known to occur in Gujarat :*

*Megalops cyprinoïdes* (Broussonet) (Indo-Pacific Tarpon)

*Interest to fisheries :* These fishes are caught commercially along the coast of Andhra and Kerala. This is a fast growing carnivore fish but the flesh is poor and bony, reaches a maximum length of a meter. They are generally caught by gillnet, shore seines and trawls and marketed fresh and dried salted condition.

Order ANGUILLIFORMES

Family ANGUILLIDAE  
(Freshwater eels)

Body elongate, cylindrical anteriorly and only moderately compressed along tail with minute, oval scales embedded in skin. Mouth terminal with lower jaw projecting slightly and moderately large, but never extending back much beyond eyes. Teeth always small, conical and multiserial to form narrow to broad bands on jaws and vomer. Eyes relatively small and lips well developed. Gill opening a nearly vertical slit anterior to pectoral fin which is always present and well developed. No spines in fins. Dorsal and anal fins continuous around tail. Dorsal fin originates variously between pectoral fins and anus or over anus which is in anterior half of body. Pelvic fins absent. Lateral line system present but not especially conspicuous typically a series of minute, white pores.

Freshwater eels are known to occur in most freshwaters of the world except principally those of the western side of the American continent and those bordering the south Atlantic. They are represented by 1 genus with 19 species throughout the world and in India as well as in Gujarat they are represented by 1 genus with 2 species.

*Species known to occur in Gujarat :*

1. *Anguilla bengalensis bengalensis* (Gray and Hardwicke) (Indian longfin eel)
2. *A. bicolor bicolor* McClelland (Shortfin eel)

Key to the species

Dorsal fin inserted above anus or very nearly so .....*A. bicolor bicolor*

Dorsal fin inserted above almost midway between gill opening and anus ..... *A. bengalensis bengalensis*

*Interest to fisheries :* Freshwater eels are an important source of food in many countries and several species are cultured artificially in Asia and Europe. They are caught mainly by various types of nets, traps and hook and line and these fishes are mainly marketed fresh. *A. bengalensis bengalensis* is one of the most common commercial eels of India and is fairly abundant on the east coast of our country.

Family MURAENIDAE  
(Moray eels)

Body elongate, robust, powerful and muscular, somewhat compressed along the tail. Typically the occipital region of head is sometimes elevated due to the development of strong muscles. Mouth very wide, usually extending to well behind eyes. Teeth usually sharp, mostly raptorial but sometimes molar-like. Teeth on vomer uniserial or in a median patch. Anterior nostril tubular in front of snout, posterior nostril above anterior portion of eyes. Gill opening restricted to small roundish lateral openings. No spines in fins. Dorsal and anal fins in thick skin, rays rarely visible, sometimes reduced to a short rudiment near end of tail, confluent with caudal fin, end of tail round. Pectoral fins absent. No lateral line pore on body but present on head, two branchial pores present. Scale absent.

Moray eels are widespread in the tropical Indo-West Pacific region. They are represented by 14 genera with 200 species throughout the world. They are represented by 8 genera 35 species and 4 genera with 4 species in India and Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Echidna nebulosa* (Ahl) (Starry moray)

2. *Lycodontis meleagris* (Shaw and Nodder)  
(Turkey moray)
3. *Sidera picta* (Ahl) (Speckled siderial moray)
4. *Thyrsoidea macrura* (Bleeker) (Giant slender moray)

#### Key to the species

- 1a. Teeth mostly blunt, some even molar-like, particularly these on roof of mouth  
.....*Echidna nebulosa*
- 1b. Teeth sharp, some of them fang-like or shark-like.....2
- 2a. Anus to tip of tail 1.5 to 2.0 times rest of body. Anterior nostril simple tube  
.....*Thyrsoidea macrura*
- 2b. Anus to tip of tail less than 1.5 times rest of body .....3
- 3a. One or more long median depressible fang in front of upper jaw  
.....*Lycodontis meleagris*
- 3b. No median depressible fang in upper jaw, at most single median stout conical tooth in front .....*Sidera picta*

**Interest to fisheries :** This family is not much commercial value. *Lycodontis meleagris* is obtained in the longline and bag net catches of Maharashtra and Guajrat coasts. *Thyrsoidea macrura* is the largest known eel, growing to over 3.5 m. It is a monotypic species eel, is of less economic value and is used as fish bait or consumed as food by the poor people in our country. *Echidna nebulosa* and *Sidera picta* are also of minor commercial value in our country. These eels are generally caught by hook and line and various types of nets and traps and spears.

#### Family OPHICHTHIDAE (Snake eels and worm eels)

Body very long, snake-like or worm-like. Mouth either terminal or inferior large, its cleft usually extends beyond eyes. Snout pointed. Teeth on jaws highly variable, strong and fang-like, or small and pointed or blunt and granular; teeth on vomer (roof of mouth) either in 1 to 3 rows or in a solid patch. Nostrils

widely separated, the posterior inside mouth or somewhat penetrating or opening through a valve in upper lip. Gill openings small, slit-like or round. Branchial region and throat swollen, supported by a basket of free branchiostegal rays. No spines in fins. Dorsal and anal fins, when present, continuous around the tail externally or discontinuous, with the caudal fin rays reduced. Pectoral fins present or absent. Pelvic fins always absent. No scales. Lateral line system extending on to head.

Snake eels are found in all tropical and sub-tropical oceans but depth limited up to continental shelf. The family Ophichthidae recognises a total of 59 genera with about 220 species worldwide. These fishes are represented by 13 genera with 24 species and 3 genera with 3 species in India and in Gujarat respectively.

#### Species known to occur in Gujarat :

1. *Lamnostoma orientalis* (McClelland) (Oriental worm eel)
2. *Muraenichthys schultzei* Bleeker (Maimed snaked eel)
3. *Neenchelys buitendijki* Weber & de Beaufort (Faintail serpent eel)

#### Key to the species

- 1a. Tip of tail finless externally, the tail tip hard and pointed. Lateral head profile, when seen from above, narrows sharply behind eyes. then continuous evenly to a pointed snout .....*L. orientalis*
- 1b. Tip of tail with a fringe of fin around it, the dorsal, caudal and anal fins thus forming one continuous external fin. Head bluntly conical .....2
- 2a. Posterior nostril lateral, in front of eyes, not on lip (labial). Pectoral fins present .....*N. buitendijki*
- 2b. Posterior nostril labial, bisecting lip and partly inside, and partly outside mouth. Pectoral fins absent .....*M. schultzei*

**Interest to fisheries :** The fishes of this family are of minor fishery significance. All these species are generally caught in 'Dol' nets (bag nets used with the help of stake or buoys)

from depths varying from 5 to 20 m and appear more frequently in the catches from December to May along the Gujarat and Maharashtra coasts. They are marketed fresh and used as bait.

Family MURAENESOCIDAE  
(Pike congers)

Body very long, cylindrical in front, compressed only along tail. Mouth large, its gape extends beyond eyes; snout very pointed; tongue not free from floor of mouth; no fleshy lip. Anterior nostril tubular, posterior nostril a simple opening in front of eyes. Gill openings large. Teeth always large, prominent, even raptorial especially these on vomer. Dorsal and anal fins long with many segmented rays, confluent with caudal fin; origin of dorsal fin over pectoral fin bases. Pectoral fins well developed, prominent. Pelvic fins absent. Anus well behind pectoral fins and somewhat before midpoint of body. Scaleless body.

They are widespread in the tropical Indo-West Pacific region. This family is represented by 7 genera with 14 species throughout the world. They are represented by 5 genera with 7 species and 2 genera with 3 species in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Congresox talabonoides* (Bleeker) (Indian pike-conger)
2. *Muraenesox bagio* (Hamilton Buchanan) (Common pike-conger)
3. *M. cinereus* (Forsskal) (Daggertooth pike-conger)

Key to the species

- 1a. Principal vomerine teeth large, round in section, very acute, each with only minute cusp distally, the teeth widely separated; principal teeth on lower jaw of same form, directed almost horizontally outwards .....*C. talabonoides*

- 1b. Principal vomerine teeth large, compressed, moderately acute, each with sharp anterior and posterior edges and prominent basal cusps, the teeth in contact or separated; principal teeth on lower jaw of same form, erect or turned slightly inwards .....2

- 2a. Lateral line pores before anus 33 to 39. Posterior nostrils slightly closer to eyes than to anterior nostrils. Eye diameter about 3 times in snout length. Interorbital width about 10 or 11 times in head length .....*M. bagio*

- 2b. Lateral line pores before anus 40 to 47. Posterior nostrils much nearer to eyes than to anterior nostrils. Eye diameter 2 to 2.5 times in snout length. Interorbital width about 8 times in head length .....*M. cinereus*

*Interest to fisheries :* *C. talabonoides* supports an important and flourishing fishery along the north-western part of India. It commands a good market being an important food fish. The yield of this eel is particularly high in the monsoon months in Bombay and Gujarat. *M. bagio* is minor fishery important. *M. cinereus* is one of the common commercial eels of India and often found in the catches of Maharashtra and Gujarat. These fishes are generally captured in bag-nets ('dol'), longlines and trawl nets and drift net also.

Family CONGRIDAE  
(Conger eels)

Body elongate, cylindrical except posteriorly. Snout blunt to pointed. Mouth sometimes terminal but more often slightly inferior, moderately large but never extending back much beyond eyes. Teeth strong, but rarely developed as long canines. Eyes and lips well developed. Nostrils separated, posterior nostril close to or near eyes. Gill openings restricted to sides. Dorsal and anal fins confluent with caudal fin. Pectoral fins present. Pelvic fins absent. No spines in fins. No scales. Lateral line system prominent, extending on to head, the two sides connected through a supratemporal canal only. Anus far behind gill opening, in anterior half of body.

Conger eels are small to large-sized fishes, occurring in tropical to temperate waters from the coast out to the deep sea, but principally on the shelf and slope. Many burrow during the day and actively forage at night. They are represented by 34 genera with 95 species throughout the world. Conger eels are represented by 13 genera with 18 species and 1 genus with 1 species in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Uroconger lepturus* (Richardson) (Slender conger)

*Interest to fisheries :* *U. lepturus* is a relatively small eel living offshore on soft sandy mud and is captured by fine-meshed shrimps trawls. It is frequently trawled in depths of up to 50 m of the west coast of India. It is marketed fresh and is used as fish bait or consumed as food by the local poor people.

Order CLUPEIFORMES

Family CLUPEIDAE  
(Herrings, Sardines)

Body generally silvery, fusiform fishes, oval in cross-section. Scutes present along belly (absent in *Dussumieria* and *Spratelloides*). Pelvic scutes always present. Mouth terminal, lower jaw short but deep. Fins without spiny rays. A single dorsal fin, generally short and inserted near mid-point of body. Anal fin short and its insertion is well behind the last dorsal fin ray. Caudal fin deeply forked. Scales cycloid, about 40 to 50 in lateral series. Lateral line absent.

Clupeids are typically marine coastal and schooling fishes found in all seas from 70°N not about 60°S. Some enter freshwater to feed, some are anadromous (shads) and some live permanently in freshwater. They are represented by some 56 genera with 180 species throughout the world (Whitehead, 1985). In India these fishes are known having 15 genera (including 3 freshwater fish genera) with 28 species (including 3 freshwater fish species) and in Gujarat they are represented by 10 genera with 18 species.

*Species known to occur in Gujarat :*

1. *Amblygaster leiogaster* (Valenciennes)  
(Smoothbelly sardinella)
2. *A. sirm* (Walbaum) (Spotted sardinella)
3. *Anodontostoma chacunda* (Hamilton Buchanan)  
(Chacunda gizzard-shad)
4. *Dussumieria acuta* Valenciennes (Rainbow sardine)
5. *D. elopsoides* Bleeker (Slender rainbow sardine)
6. *Escualosa thoracata* (Valenciennes) (White sardine)
7. *Herklotsichthys quadrimaculatus* (Ruppell)  
(Bluestripe herring)
8. *Hilsa kelee* (Cuvier) (Kelee shad)
9. *Nematolosa nasus* (Bloch) (Bloch's gizzard-shad)
10. *Sardinella albella* (Valenciennes) (White sardinella)
11. *S. gibbosa* (Bleeker) (Goldstripe sardinella)
12. *S. longiceps* Valenciennes (Indian oil-sardinella)
13. *S. melanura* (Cuvier) (Blacktip sardinella)
14. *S. sindensis* (Day) (Sind sardinella)
15. *Spratelloides delicatulus* (Bennett) (Delicate round herring)
16. *S. gracilis* (Temminck & Schlegel) Silver round herring)
17. *Tenualosa ilisha* (Hamilton Buchanan) (Hilsa shad)
18. *T. toli* (Valenciennes) (Toli shad)

Key to the species

- 1a. Pelvic scutes W-shaped, no other scutes along belly.....2
- 1b. Pelvic scutes with ascending arms, scutes generally present before and behind pelvic fins .....5

- 2a. Branchiostegal rays numerous (12 to 17). Premaxillae rectangular.....3
- 2b. Branchiostegal rays few (6 to 7). Premaxillae triangular .....4
- 3a. Body deeper, usually 22 to 29% of standard length. Lower gill rakers fewer (19 to 26). Branchiostegal rays fewer (12 to 15). Posterior part of scales marked with numerous tiny radiating striae .....*D. acuta*
- 3b. Body slender, depth usually 16 to 22 % of standard length. Lower gill rakers more (21 to 32). Branchiostegal rays more (13 to 17). No striae on posterior part of scales .....*D. elopsoides*
- 4a. A bright and prominent silvery midlateral stripe. Scales in lateral series 42 to 48 .....*Spratelloides gracilis*
- 4b. No silvery band, but whole flanks silvery. Scales in lateral series 35 to 41 .....*Spratelloides delicatulus*
- 5a. Upper jaw rounded when seen from front .....6
- 5b. Upper jaw with a distinct median notch or cleft when seen from front .....14
- 6a. Hind border of gill opening evenly rounded, without fleshy outgrowths .....*Escualosa thoracata*
- 6b. Hind border of gill opening with distinct fleshy outgrowths .....7
- 7a. Fronto-parietal striae on top of head few, about 3 to 7. Lower part of second (posterior) supramaxilla larger than upper. Last two anal fin rays not enlarged .....*Herklotsichthys quadrimaculatus*
- 7b. Fronto-parietal striae on top of head numerous, 7 to 14. Second supramaxilla symmetrical. Last two anal fin rays enlarged .....8
- 8a. Lower gillrakers 26 to 43. A median series of predorsal scales .....9
- 8b. Lower gillrakers rarely less than 40 (mostly 45 to 90, but over 200 in some species). Predorsal scales usually paired .....10
- 9a. A series of 10 to 20 gold (in life) or black (on preservation) spots along flanks present. Lower gillrakers on first arch 33 to 43 .....*Amblygaster sirm*
- 9b. No spots on flanks. Lower gillrakers on first arch 31 to 35 .....*Amblygaster leiogaster*
- 10a. Pelvic fin with 9 rays. Gillrakers on lower arm of first arch 145 to 258 .....*Sardinella longiceps*
- 10b. Pelvic fin with 8 rays. Gillrakers on lower arm of first arch not more than 130 .....11
- 11a. Caudal fin tips jet black. Abdominal scutes 28 to 30 .....*Sardinella melanura*
- 11b. Caudal fin tips plain, at most caudal margin dusky. Abdominal scutes 30 to 34 .....12
- 12a. Abdominal scutes 29 to 33 (usually 30 to 32) ..... *Sardinella albella*
- 12b. Abdominal scutes 31 to 34 (Usually 32 to 33) .....13
- 13a. Numerous perforations on exposed portion of scales. Dorsal and caudal fins margin dusky .....*Sardinella gibbosa*
- 13b. Few perforations on exposed portion of scales. Dorsal and caudal fins margin not dusky .....*Sardinella sindensis*
- 14a. Lower jaw normal, mouth terminal. Last dorsal fin ray normal .....15
- 14b. Lower jaw flared outwards, mouth generally inferior. Last dorsal fin ray filamentous in many species .....17
- 15a. Fronto-parietal striae (on top of head) many, 8 to 14. Gillrakers on inner arches distinctly curled outward. Scales perforated .....*Hilsa kelee*
- 15b. Fronto-parietal striae weakly developed, usually hidden by skin. Gillrakers on inner arches straight. Scales not perforated.....16
- 16a. Head length 28 to 32% of standard length. Gillrakers numerous about 100 to 250 on lower part of arch. Caudal fin 25 to 31% of standard length .....*Tenualosa ilisha*
- 16b. Head length 25 to 27% of standard length. Gillrakers not numerous, 60 to 100 on lower part of arch (barely increasing after 10 cm standard length). Caudal fin 31 to 34 % of standard length .....*Tenualosa toli*

- 17a. Last dorsal fin ray produced, filamentous ..... *Nematolosa nasus*  
 17b. Last dorsal fin ray normal, not filamentous .. *Anodontostoma chacunda*

*Interest to fisheries* : The clupeoid fishes are of prime importance to fisheries. In fact, they represent the largest suborder of non-domesticated vertebrate harvested by man. Half of the world catch of fishes comes from about 60 species of various groups, but a third of those prime species are clupeids. *A. chacunda* is available throughout the year except during the monsoon period. *N. nasus* is a common species found in the commercial catches of the west coast of India. *D. acuta* is a common species which contributes a good fishery on the east coast of India particularly Andhra Pradesh and Tamil Nadu. *E. thoracata* is caught mainly from the west coast of our country and its fishery season is from September to November. *H. quadrimaculatus* is an important clupeoid which contributes a minor fishery on the west coast of our country particularly Kerala. Different species of *Sardinella* are used mostly as food fishes and for their oil. *S. longiceps* is the most important source in the neritic pelagic zone off the west coast of India. It ranks as one of the best known commercially important fishes of India and is extensively used as food in the fresh and cured conditions. Its byproducts are of great value; the oil is widely used in the jute, leather, soap and other industries, and also for painting the canoes as it has a deterrent effect on ship-worms and other timber boring organisms; the guano is an important fertilizer of the tobacco, coffee, tea and other crops. *T. ilisha* has a considerable commercial importance in India, Pakistan, Bangladesh and Myanmar, (Burma). This is one of the best known Indian clupeoids and is a migratory fish ascending all the major river systems, where it is captured in large quantities. The esteem in which this fish is held is reflected in Sanskrit and Bengali literature where this fish is described as *Matsyaraja* (the king of the fishes) and is said that *Illisha jitapiyusah* (Hilsa surpasses nectar). *H. kelee* is a monotypic species seasonally abundant along south-east and south-west coast of India. These fishes are captured by seine nets, trawls, gillnets, cast-nets, beach seines and stakenets.

Family PRISTIGASTERIDAE  
(Pristigasterids)

Body compressed, deep or elongate, fully scuted along abdomen. Mouth terminal, lower jaw projecting. Teeth in jaw minute. Dorsal fin short, its insertion ahead of midpoint of body in very deep forms, but behind in elongate forms; sometimes missing (in *Raconda*). Pectoral fins moderate or large in elongate forms. Pelvic fins with 6 or 7 rays or entirely absent. Anal fin long, with at least 30 rays. Scales thin and easily lost, about 35 to 55 in lateral series.

Pristigasterids are mostly marine coastal and schooling fishes of tropical and subtropical seas, represented by 9 genera with 34 species throughout the world. They are represented by 4 genera with 12 species and 4 genera with 8 species in India and in Gujarat respectively (Whitehead, 1985).

*Species known to occur in Gujarat :*

1. *Ilisha filigera* (Valenciennes) (Coromandel ilisha)
2. *I. megaloptera* (Swainson) (Bigeye ilisha)
3. *I. melanostoma* (Schneider) (Indian ilisha)
4. *I. sirishai* Seshagiri Rao
5. *I. striatula* Wongratana (Banded ilisha)
6. *Opisthopterus tardoore* (Cuvier) (Tardoore)
7. *Pellona ditchella* Valenciennes (Indian pellona)
8. *Raconda russeliana* (Russell's smooth-back herring)

Key to the species

- 1a. Toothed hypo-maxilla present ..... *P. ditchella*
- 1b. No toothed hypo-maxilla ..... 2
- 2a. Dorsal and pelvic fins absent. Anal fin very long with 81 to 92 fin rays ..... *R. russeliana*
- 2b. Dorsal fin present ..... 3
- 3a. Anal fin long with 51 to 65 fin rays. Pelvic fins absent ..... *O. tardoore*

- 3b. Anal fin moderate with 34 to 53 fin rays. Pelvic fins present.....4
- 4a. Swimbladder without a posterior tube passing backward into the body muscles .....*I. sirishai*
- 4b. Swimbladder with long one or two post-coelomic extensions.....5
- 5a. Swimbladder with one post-coelomic extension on right side of body .....6
- 5b. Swimbladder with two post-coelomic extensions.....7
- 6a. Abdomen with 30 to 32 scutes .....*I. megaloptera*
- 6b. Abdomen with 34 to 38 scutes ...*I. filigera*
- 7a. Vertical striae on scales traversing whole scale or over lapping across centre of scale .....*I. melanostoma*
- 7b. Vertical striae on scales not continuous, but with a distinct gap across centre of scale .....*I. striatula*

*Interest to fisheries* : No special fisheries exist for particular species of pristigasterids, though are common in tropical fish markets. These fishes generally contribute to clupeoid catches by artisanal fisheries. They are mostly caught by gill nets, boat seines and cast nets. The monotypic species, *R. russeliana* contributes probably slight toward the fisheries since this species seems to be uncommon in catches (Whitehead, 1985).

Family CHIROCENTRIDAE  
(Wolf herrings)

Body much elongate and highly compressed, resembling the clupeidae (herrings and sardines) but without abdominal scutes. Fang-like teeth in the jaws (highly predacious fish). No spiny rays in fins, a single dorsal fin placed behind the mid-point of body with 16 to 18 rays. Pectoral fins with 13 to 15 rays, set low on body. Pelvic fins small, with 6 to 7 rays and placed about equidistant between pectoral fin base and anal fin origin. Anal fin origin below vertical from anterior dorsal fin base, with 32 to 35 rays. Scales small, thin, cycloid, very deciduous. Lateral line absent. Caudal fin deeply forked.

The family Chirocentridae is found in the

Indian ocean (West to South Africa and the Red sea) and western Pacific ocean (Japan to New South Wales). Wolf herring is represented by 1 genus with 2 species. These two species are available in India and in Gujarat.

*Species known to occur in Gujarat :*

1. *Chirocentrus dorab* (Forsskal) (Dorab wolf-herring)
2. *C. nudus* Swainson (Whitefin Wolf-herring)

Key to the species

Upper part of dorsal fin black. Pectoral fin length about equal to distance from eye centre to hind border of gill cover .....*C. dorab*  
Dorsal fin entirely white or colourless. Pectoral fin length greater than distance from eye centre to hind border of gill cover .....*C. nudus*

*Interest to fisheries* : *C. dorab* contributes to an important fishery along both the coasts of India but about 76% of the total catch comes from the east coast. Tamil Nadu occupies the foremost place in the dorab fishery of the country, next comes Andhra Pradesh followed by Maharashtra. *C. nudus* constitutes almost 80% of the total of the two species by number, annually. These fishes are caught with fish traps, gillnets and shallow trawls and marketed fresh or frozen.

Family ENGRAULIDAE  
(Anchovies)

Body generally fusiform, subcylindrical and sometimes greatly compressed (Body tapering to a point in the grenadier anchovies *Coilia*). Scutes generally present along belly. Snout generally pig-like and projecting. Lower jaw characteristically "underslung" Posterior tip of maxilla extending far, sometimes projecting beyond operculum. Teeth in jaw small. No spiny rays in fins. Pectoral fins set low on body, sometimes with filamentous rays. Dorsal fin usually short and inserted at midpoint of body. Caudal fin usually forked, but rounded in the grenadier anchovies (*Coilia*). Lateral line absent. Scales cycloid.

Most anchovies are marine, but some can tolerate low salinities, even freshwater. They

are represented by 16 genera with 139 species throughout the world, 5 genera with 35 species in India and 4 genera with 17 species in Gujarat.

*Species known to occur in Gujarat :*

1. *Coilia dussumieri* Valenciennes (Gold-spotted grenadier- anchovy)
2. *C. neglecta* Whitehead (Neglected grenadier anchovy)
3. *C. reynaldi* Valenciennes (Korus grenadier anchovy)
4. *Setipinna taty* (Valenciennes) (Hairfin anchovy)
5. *Stolephorus bagenensis* Hardenberg (Spined anchovy)
6. *S. commersonii* Lacepede (Commerson's anchovy)
7. *S. devisi* (Whitley) (Devis's anchovy)
8. *S. heterolobus* (Ruppell) (Shorthead anchovy)
9. *S. indicus* (Van Hasselt) (Indian anchovy)
10. *S. punctifer* (Fowler) (Buccaneer anchovy)
11. *Thryssa dussumieri* (Valenciennes) (Dussumieri's thryssa)
12. *T. hamiltoni* (Gray) (Hamilton's thryssa)
13. *T. malabarica* (Bloch) (Malabar thryssa)
14. *T. mystax* (Schneider) (Moustaced thryssa)
15. *T. purava* (Hamilton Buchanan) (Gangetic anchovy)
16. *T. setirostris* (Broussonet) (Long jaw thryssa)
17. *T. vitrirostris* (Gilchrist & Thompson) (Orange mouth thryssa)

Key to the species

- 1a. Body tapering, 'rat tailed' Caudal and anal fins confluent. No gillrakers on posterior face of 3rd epibranchial.....2
- 1b. Body normal. Caudal fin bilobed. Gillrakers present on flanks of body ..... 4
- 2a. Longitudinal rows pearly spots (light orange) on flanks of body ....*C. dussumieri*
- 2b. No pearly spots on flanks of body.....3

- 3a. Pectoral filaments 6 .....*C. neglecta*
- 3b. Pectoral filaments 10 to 14 .....*C. reynaldi*
- 4a. Abdominal scutes present only before pelvic fin bases. Anal fin short with less than 25 rays .....5
- 4b. Abdominal scutes present before and behind pelvic fin base. Anal fin longer, with more than 30 rays .....10
- 5a. Anal fin origin under or a little behind last dorsal fin ray. Muscular portion of isthmus not reaching to hind border of branchiostegal membrane .....6
- 5b. Anal fin origin under dorsal fin base. Muscular portion of isthmus extending forward beyond hind margin of branchiostegal membrane .....7
- 6a. Gillrakers 23 to 29 on lower arm of first arch. Unbranched dorsal and anal fin rays 2 .....*Stolephorus heterolobus*
- 6b. Gillrakers 21 to 26 on lower arm of first arch. Unbranched dorsal and anal fin rays 3 .....*S. devisi*
- 7a. Predorsal spine present and spine on pelvic scute. Gillrakers on lower arm of first arch 20 to 24 .....*S. bagenensis*
- 7b. No predorsal spine and no spine on pelvic scute .....8
- 8a. Maxilla tip reaching to or only beyond anterior border of preoperculum. Pelvic fin tips failing to reach vertical from dorsal fin origin .....*S. indicus*
- 8b. Maxilla tip reaching to or beyond posterior border of preoperculum .....9
- 9a. Pelvic fin tip reaching well past vertical from dorsal fin origin. Anal fin origin below the last dorsal ray...*S. commersoni*
- 9b. Pelvic fin tip not reaching to vertical from dorsal fin origin. Anal fin origin behind dorsal fin base .....*S. punctifer*
- 10a. First pectoral ray filamentous. Anterior supramaxilla absent .....*Setipinna taty*
- 10b. First pectoral ray normal, not filamentous. Anterior supramaxilla small or absent.....11
- 11a. Lower jaw with high coronoid process, maxilla (upper jaw) very long, extending to beyond pectoral fin tip .....*Thryssa setirostris*

- 11b. Lower jaw slender, Maxilla not extending beyond pectoral fin tip .....12
- 12a. Maxilla long, reaching to pectoral fin base or beyond.....13
- 12b. Maxilla short, not reaching to pectoral fin base .....16
- 13a. Gillrakers serrae uneven but not clumped. Lower gillrakers on first arch 13 to 21 .....14
- 13b. Gillrakers serrae in distinct clumps. Lower gillrakers on first arch 16 to 24 .....15
- 14a. Anal fin with 29 to 37 branched rays. Mouth nearly horizontal. Prepelvic scutes 16 to 20. Snout tip on level of eyes centre .....*T. mystax*
- 14b. Anal fin with 38 to 44 branched rays. Mouth oblique. Prepelvic scutes 15 to 17. Snout tip about level of eye centre .....*T. purava*
- 15a. Maxilla reaching 1/2 to 7/8 along pectoral fin. Postpelvic scutes 6 to 9. Anterior supramaxilla absent .....*T. dussumieri*
- 15b. Maxilla shorter, reaching to 1/3 along pectoral fin. Postpelvic scutes 8 to 12. Anterior supramaxilla usually present .....*T. vitirostris*
- 16a. Lower gillrakers on first arch 11 to 15 .....*T. hamiltonii*
- 16b. Lower gillrakers on first arch 17 to 19.....*T. malabarica*

**Interest to fisheries :** Anchovies are small translucent silvery fishes, occurring often in immense shoals in coastal waters. They are valuable marine fishes as a source of food and fishmeal, also suitable for salting, sun drying and canning. The average annual landing of anchovies in India is almost 48, 000 tonnes of which 90% is from west coast of India. *C. dussumieri* is one of the common food fishes of Maharashtra and Gujarat and is an important item of food of the poor and middle class of people. *S. commersonii* is one of the large-sized white-baits growing to a size of 13 cm. *S. heterolobus* is a widespread species which contributes the bulk of the Anchovy fishery in the Andamans and throughout the east coast of our country. *T. mystax* is the most important fish

of the anchovies which contributes an important fishery along the west coast of India particularly Kerala and Maharashtra. They are caught by shore seines, trawls in shallow waters and special type of bag net known as 'Dol' They are marketed fresh and dried salted.

## Order GONORHYNCHIFORMES

### Family CHANIDAE (Milkfishes)

Body elongate, moderately compressed without scutes along abdomen. Eyes large, covered by adipose (fatty) tissue. Mouth small, toothless jaws, lower jaw with symphyseal tubercle. No gular plate between arms of lower jaw. Dorsal fin inserted at about midpoint of body, opposite to pelvic fins, with 13 to 17 rays. Anal fin with 9 to 11 rays far behind dorsal fin base.

Pelvic fin with 11 or 12 rays, no fin spines. Caudal fin deeply forked. Dorsal and anal fins with basal sheath of scales, large axillary scales at base of pectoral and pelvic fins. Scales small, cycloid. Branchiostegal rays 4. Lateral line present.

Milkfishes are marine and brackish (Occasionally freshwater) inhabitants in the Indian and tropical Pacific regions. They are represented by 1 genus with 1 species throughout the world. This species is found both in India and in Gujarat.

#### *Species known to occur in Gujarat :*

##### *Chanos chanos* (Forsskal) (Milkfish)

**Interest to fisheries :** *C. chanos* is of considerable commercial importance as a food fish in south-east Asia. This species is very much esteemed as a food fish and is suitable for introduction into tanks and ponds particularly, where the water is slightly saline. The fry is collected from the coasts and later introduced into ponds and tanks. These fishes are generally caught with scoop nets, dragnets, setnets and traps and marketed fresh, smoked, canned or frozen.

## Order SILURIFORMES

Family ARIIDAE  
(Sea catfish)

Body elongate without scales. Mouth terminal to inferior. Teeth in jaws always fine and villiform in curved bands, teeth on palate villiform or conical, granular or molar-like arranged in 1 to 3 patches of varying shapes and sizes on each side of palate. Barbels 1 to 3 pairs, generally a pair of maxillary (but absent in *Batrachocephalus*), generally 2 pairs of mental barbels (rarely a single pair in *Batrachocephalus* and none in *Osteogeneiosus*). Head covered with a long shield, often rugose, granulated, part of which is usually visible beneath the skin. First dorsal fin short with a long, often rough spine, more or less serrated on inner edge, some also on outer edge, preceded by a very short spine or buckler and followed by 7 rays. A short adipose fin present. Pectoral fins low on sides. with a strong, mostly serrated spine and 7 to 13 rays. Pelvic fins with 6 rays. Anal fin with 14 to 30 rays. Caudal fin forked. Lateral line complete.

Sea catfishes occur mostly in marine, brackish and freshwaters of warm temperate and tropical regions and represented by 20 genera with 120 species, 5 genera with 19 species and 3 genera with 15 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Arius arius* (Hamilton Buchanan) (Threadfin sea catfish)
2. *A. caelatus* Valenciennes (Engraved sea catfish)
3. *A. crossocheilus* Bleeker (Roughback sea catfish)
4. *A. dussumieri* Valenciennes (Blacktip sea catfish)
5. *A. jella* Day (Blackfin sea catfish)
6. *A. maculatus* (Thunberg) (Spotted sea catfish)
7. *A. platystomus* Day (Flatmouth sea catfish)
8. *A. sagar* (Hamilton-Buchanan) (Sagar sea catfish)
9. *A. sona* (Hamilton Buchanan) (Sona sea catfish)
10. *A. subrostratus* Valenciennes (Shovelnose sea catfish)
11. *A. sumatranus* Bennett (Goat sea catfish)
12. *A. tenuispinus* Day (Thinspine sea catfish)
13. *A. thalassinus* (Ruppell) (Giant sea catfish)
14. *Batrachocephalus mino* (Hamilton Buchanan)
15. *Osteogeneiosus militaris* (Linnaeus) (Soldier sea catfish)

## Key to the species

- 1a. Only 1 or 2 pairs of barbels.....2
- 1b. 3 pairs of barbels (1 pair maxillary and 2 pairs mandibular).....3
- 2a. 1 pair of stiff and semiosseous maxillary barbels (mental barbels absent) .....*O. militaris*
- 2b. Only 1 or 2 pairs of soft, minute, rudimentary mental barbels (Maxillary barbels absent) .....*B. mino*
- 3a. Teeth on palate as a single patch on each side.....4
- 3b. Teeth on palate in 2 or 3 patches on each side .....11
- 4a. Teeth on palate as a triangular or oval small patch.....5
- 4b. Teeth on palate as an elliptical, large patch.....8
- 5a. Maxillary barbels short, not extending beyond orbit, Snout long, spatulate ..... *A. subrostratus*
- 5b. Maxillary barbels long, extending beyond orbit. Snout short, obtusely rounded.....6
- 6a. Teeth on palate in an oval patch, with sparsely packed conical teeth .....*A. sumatranus*
- 6b. Teeth on palate in a triangular or oval patch, with densely packed teeth .....7
- 7a. Head shield strongly granulated behind orbit, with a conical protuberance above eye, tapering as wide "V" toward occiput .....*A. caelatus*
- 7b. Head shield not very granulated. Preorbital conical protuberance not well pronounced ..... *A. platystomus*

- 8a. Tooth patch packed for back in buccal cavity. Dorsal fin spine slender, equal to or slightly longer than pectoral fin spine. Median longitudinal groove long, narrow, running onto supraoccipital process .....*A. tenuispinis*
- 8b. Tooth patch placed well forward in buccal cavity. Dorsal fin spine strong, equal to or shorter than pectoral fin spine. Median longitudinal groove shorter, not running onto supraoccipital process.....9
- 9a. Tooth patches on palate fully elliptical, well formed, with densely packed teeth .....*A. maculatus*
- 9b. Tooth patches on palate irregularly ovate, not fully formed, with loosely packed teeth, inner margins of patches being not straight .....10
- 10a. Anal fin with 14 to 16 rays (12 to 14 branched) .....*A. jella*
- 10b. Anal fin with 20 to 22 rays (14 to 16 branched) .....*A. arius*
- 11a. Teeth on palate in 3 patches on each side, triangular, villiform, the vomerine patch in middle and the ectopterygoid patch either from the sides of the vomerine patch or below them, not fused in juveniles, but joined in adults ....*A. thalassinus*
- 11b. Teeth on palate in 2 patches on each side .....12
- 12a. Patches of teeth on palate placed one below the other, the posterior patch very large, 3 or 4 times larger than anterior patch .....13
- 12b. Patches of teeth on palate placed side by side and not one below the other .....14
- 13a. A preorbital oval protuberance of the lateral ethmoid present .....*A. dussumieri*
- 13b. No much preorbital protuberance of the lateral ethmoid .....*A. crossocheilus*
- 14a. Basal bone of dorsal fin (predorsal plate) very large and butterfly-shaped .....*A. sagar*
- 14b. Basal bone of dorsal fin (Predorsal plate) smaller, not butterfly-shaped .....*A. sona*

*Interest to fisheries* : The sea catfishes are valued as human food and are sold mostly fresh and also dried salted for export and utilized for

the production of fishmeal. The air bladder are used for the manufacture of isinglass. *A. dussumieri* is a common catfish of our country and constitute an important element in the catfish fishery. *A. maculatus* and *A. tenuispinis* are commercially important species on the west coast of India. *A. thalassinus* is commercially abundant along both the coasts of India while the other species of *Arius* have more restricted commercial abundance. *B. mino* and *O. militaris* are the two monotypic species of the sea catfishes of Gujarat.

#### Family PLOTOSIDAE

(Stinging catfishes, Coral reef catfishes, eel catfishes, barbel eels)

Body elongate, compressed, tapering to a point posteriorly. Head broad, with dorsal profile arched or straight from snout tip to origin of dorsal fin. Barbels 4 pairs, nasal and maxillary 1 pair each and mental 2 pairs. A pair of widely separated nostrils on each side, anterior nostrils a small tube and posterior nostril slit-like. First dorsal fin short-based, with 1 serrated spine and 4 to 6 soft rays; second dorsal fin (or dorsal procurent caudal fin), anal fin confluent with caudal fin; second dorsal fin with 69 to 143 soft rays, its origin almost opposite to pelvic fins insertion. Caudal fin rounded, to pointed with 6 to 11 rays. Anal fin base long, with 58 to 131 soft rays. Adipose fin absent. Pectoral fins with 1 serrated spine and 9 to 16 soft rays. Pelvic fins with 10 to 16 soft rays. Scales and bony plates absent. Lateral line complete, extending near base of caudal fin rays. A dendritic organ consisting of many vascularised epithelial folds present directly posterior to anal opening.

Stinging catfishes are found in marine, brackish and freshwater of tropical and warm-temperate regions. They are represented by 8 genera with 30 species, 1 genus with 3 species and 1 genus with 1 species throughout the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Plotosus lineatus* (Thunberg) (Striped eel catfish)

*Interest to fisheries* : This is one of the most

dangerous stinging catfish occurring on reefs, along open coasts and in tidal pools of the entire Indo-Pacific region; death may result from the contact with its dorsal and pectoral spines which are equipped with venom glands and capable of causing extremely painful wounds, even with slight contact. Since these fishes often form schools in shallow coastal waters as well as in estuaries and rivers, they are constant menace to the unwary fishermen and swimmers. It is caught with bottom trawls, seines and hook and line and marketed mostly fresh.

### Order AULOPIFORMES

#### Family CHLOROPHTHALMIDAE (Greeneyes)

Body compressed posteriorly, nearly rounded in cross section anteriorly. Eyes large their pupils keyhole-shaped. Mouth large. No spine in fins. Single dorsal fin with 9 to 13 segmented rays. A small, fleshy adipose fin posteriorly above or just posterior to point of insertion of anal fin. Anal fin with 7 to 11 segmented rays. Pectoral fins large, reaching beyond end of dorsal fin, with 15 to 20 fin rays. Caudal fin bilobed. Scales ctenoid or cycloid present on cheek, opercle and body, top of head naked.

This family is represented by 7 genera with 38 species, 4 genera with 8 species and 1 genus with 1 species throughout the world, in India and in Gujarat respectively.

#### *Species known to occur in Gujarat :*

*Chlorophthalmus agassizi* Bonaparte (Shortnose greeneye)

*Interest to fisheries :* These fishes are not very common, captured mostly as bycatch throughout the coastal area mainly at bottom region of continental slopes from about 75 to 100m. and caught by bottom trawls. This fish has not much commercial importance, but it is rather largely taken as trash fish.

#### Family SYNODIDAE (= SYNODONTIDAE) (Lizardfishes)

Body elongate, almost cylindrical. Head usually depressed and lizard-like. Mouth large, with rows of numerous, small, slender and pointed teeth, visible even when mouth is closed. Dorsal fin with 9 to 14 rays. Anal fin with 8 to 16 rays. Dorsal adipose fin present (Absent in only one species). Caudal fin forked. Head and body with scales, scales along lateral line not enlarged.

Lizardfishes not only look-like reptiles, but they also behave like reptiles. Most of their time is spent sitting on the bottom with the body at a slight angle, propped up on the front and by the pelvic fins, like a jet fighter ready to take off. Most lizardfishes are inshore shallow water forms, usually living on sandy or muddy bottom adjacent to rocky or reef areas. They are represented by 4 genera with 50 species, 3 genera with 18 species and 3 genera with 7 species in the world, in India and in Gujarat respectively.

#### *Species known to occur in Gujarat :*

1. *Saurida longimanus* Norman (Longfin lizardfish)
2. *S. tumbil* (Bloch) (Greater lizardfish)
3. *S. undosquamis* (Richardson) (Brushtooth lizardfish)
4. *Synodus englemani* Schultz (Engeman's lizardfish)
5. *S. macrops* Tanaka (Tripplecross lizardfish)
6. *S. variegatus* (Lacepede) (Variegated lizardfish)
7. *Trachinocephalus myops* (Forster) (Bluntnose lizardfish)

#### Key to the species

- 1a. Pelvic fin with 9 rays, inner barely longer than outer. Palatine teeth (on roof of mouth) in 2 pairs of bands.....2
- 1b. Pelvic fin with 8 rays, inner much longer than outer. Palatine teeth in 1 pair of band .....4

- 2a. Pectoral fin very long, extending to about middle of dorsal fin base ....*S. longimanus*
- 2b. Pectoral fin short, extending at most to about level of dorsal fin origin .....3
- 3a. About 8 dark spots on second dorsal fin ray and upper caudal ray. Outer palatine teeth in 2 rows anteriorly. Vomer usually toothless. Pectoral fin almost equal to pelvic fin and reaching to about dorsal fin origin .....*S. undosquamis*
- 3b. No spots on second dorsal ray and upper caudal ray. Outer palatine teeth in 3 or 4 rows anteriorly. A small patch of teeth present on vomer. Pectoral fin about 2/3 as long as pelvic fin, not extending as far as dorsal fin origin .....*S. tumbil*
- 4a. Eye nearer to anterior end of upper jaw. Head not depressed and snout very short. Anal fin base longer than dorsal fin base .....*T. myops*
- 4b. Eye opposite about midpoint of upper jaw. Head depressed and snout long. Anal fin base shorter than dorsal fin base .....5
- 5a. Posterior pelvic process narrow. Peritoneum grey to black. 3 X-shaped pigmented areas on sides .....*S. macrops*
- 5b. Posterior pelvic process wide. Peritoneum pale. 3 X-shaped spots on sides absent ....6
- 6a. Flap of anterior nares short, tubular. Peritoneal spots 7 to 10 .....*S. englemani*
- 6b. Flap of anterior nares long, flagellum extending well beyond edge of nares when depressed anteriorly. peritoneal spots 10 to 12 .....*S. variegatus*

*Interest to fisheries:* *S. tumbil* and *S. undosquamis* are the most widespread and abundant, as well as the largest members of this family. There is no special fishery for any of the species of this family and is marketed fresh or used for fishmeal. The flesh is said to be of good quality and flavour although quite bony. They are fairly common in trawl catches in Visakhapatnam, Andhra Pradesh. They are caught by shore seine and gillnet in the coastal water.

Family HARPADONTIDAE  
(Bombay ducks)

Elongate and flatty compressed, translucent fishes. Eyes small placed near snout and directed forward. Head short and compressed. Snout very short and rounded. Mouth very large, armed with slender, recurved and depressible teeth of unequal size; palatine teeth also large and depressible. Lower jaw longer than upper. Dorsal fin followed by a conspicuous adipose fin. Pelvic fins very long. Caudal fin trilobed. Lateral line extending onto pointed median lobe of caudal fin. Head and body naked except for scales along the lateral line and on part of posterior half.

The family Harpadontidae is represented by 1 genus with 3 species throughout the Indo-Pacific. They are represented by 1 genus with 3 species in India and 1 genus with 1 species in Gujarat.

*Species known to occur in Gujarat :*

*Harpadon nehereus* (Hamilton Buchanan)

*Interest to fisheries :* The bombay duck constitutes a fishery of great commercial importance in the country. It occurs along both the coasts but about 98% is caught from the west coast. The major catch is landed in the Satpati-Dahanu area of Maharashtra and the Jaffrabad-Nawabandar area of Gujarat. The remaining 2% is from West Bengal, Orissa, Andhra Pradesh and Tamil Nadu. The fishing methods vary from area to area. On the Gujarat and Maharashtra coasts it is exclusively caught in the bag net (locally called 'Dol') and the fishing operation is carried up to a depth of 40m. In West Bengal and Orissa the bag nets are in vogue, while in Andhra Pradesh seines are the principal gears. It is marketed fresh, salted, dried or smoked. It is extensively used as a relish with curry.

## Order GADIFORMES

Family BREGMACEROTIDAE  
(Codlets, Codlings)

Fishes with elongate body and short snout. Two dorsal fins, the first dorsal fin on nape and consisting of one elongate ray. Second dorsal fin and anal fin long, with large notch in middle. No chin barbel. Relatively large scales, 40 to 89 along side. Pelvic fins with 5 rays, outer 3 rays elongate, free filaments. Lateral line adjacent to second dorsal fin.

The family Bregmacerotidae is found in tropical and subtropical seas, usually in depths from 200 to 500 m but are also caught on near surface. It is represented by 1 genus with 7 species throughout the world and in India as well as in Gujarat Codlets are represented by 1 genus with 1 species only.

*Species known to occur in Gujarat :*

*Bregmaceros macClellandi* Thompson (Indian Cod)

*Interest to fisheries :* This inserting cod-like fish is caught along the west coast of India supporting a seasonal fishery around Bombay. The fishery commences in October after the south-west monsoon with peak landings but declines by about March. Along other coastal regions of India this species occurs only in stray catches. These fishes are caught in bag nets and trawls and marketed fresh.

## Order OPHIDIFORMES

Family OPHIDIIDAE  
(Cusk eels, Brotulas and Kinglips)

Body short to elongate. Supramaxilla present. Anterior nostril well above upper lip in most species. Barbels present on snout and chin in some species. Median basibranchial tooth patches present or absent. Gill openings wide. Pelvic fins with 1 or 2 soft rays or absent, placed close together below preopercles or further anterior. Dorsal and anal fins with long

bases, united with caudal fin. No spine in all fins.

Members of this family occur from shallow waters to 5000 m. depth. They are widespread in western Indian ocean and east ward to Hawaii. They are represented by 39 genera with 135 species, 14 genera with 20 species and 1 genus with 1 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Brotula multibarbata* (Temminck and Schlegel)  
(Goats beard brotula)

*Interest to fisheries :* Landing of this fish is very poor in India. Occasionally marketed, usually fresh, but it is a good food fish. They are caught by trawl nets and line gears and in traps also.

## Order BATRACHOIDIFORMES

Family BATRACHOIDIDAE  
(Toadfishes)

Body cylindrical and compressed posteriorly. Head generally depressed. Mouth moderate to large, jaws equal or lower projecting. Gill opening on or encompassing pectoral fin base. Gill cover armed with 3 or 4 strong spines, generally embedded under the skin. Teeth small to moderate conical, acute present in both jaws and a curved tooth band on palate. First dorsal fin with 3 strong spines, long-based. Pectoral and caudal fins rounded. Pelvic fins jugular. Skin smooth or with ridges, scaleless and loosely attached to head, body and fins. Fleshy tentacles generally present on gill covers, around mouth and above eyes. Lateral line three along side of body represented by series of small bifid tentacles. A pore or pocket may be present in upper portion of pectoral fin axilla.

Toadfishes are bottom-dwellers, ranging from littoral areas to rather deep waters. They generally hide in the sediment or in rock crevices. They are represented by 19 genera with 64 species, 2 genera with 2 species and 1

genus with 1 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Austrotrachus dussumieri* (Valenciennes)  
(Flat-toadfish)

*Interest to fisheries:* These fishes are of minor or no commercial importance, they are in local artisanal or trawl fisheries and are used as food or in the production of fishmeal. They are caught by handlines and bottom trawls and marketed mostly fresh. The spines of these fishes may inflict wounds to people handling these toadfishes.

Order LOPHIFORMES

Family LOPHIIDAE  
(Anglerfishes, Goosefishes)

Head and anterior part of body much depressed and very broad, posterior portion of body tapering. Head round, bearing numerous sharp spines and ridges on dorsal and lateral surface; one very large, prominent spine or group of spines immediately anterior to each pectoral fin base (humeral spine), one pair of sharp prominent spines on either side of snout, immediately behind mouth; one bony ridge above eyes with 2 or 3 short spines and 2 bony ridges on snout running forward from eyes. Mouth very large and wide, upper jaw protractile and the lower one projecting. Teeth well developed, numerous, long, sharp and depressible. Fairly large gill openings. Two separate dorsal fins, the first composed of 2 or 3 isolated slender spines on head (Cephalic spines); and the second of 1 to 3 spines at the level of pectoral fins. The first two cephalic spines located anteriorly on snout, the foremost modified into angling apparatus, usually bearing a fleshy appendage at tip. Third cephalic spine, when present, located much further back, between eyes and humeral spines. Pectoral fin rays unbranched, terminating in small fleshy filaments. Pelvic fins on ventral surface of head, anterior to pectoral fins. Anal fins with 6 to 11 rays, below second dorsal fin. Caudal fin with 8 rays. Lateral line present, but

usually indistinct. Skin smooth, naked often with fleshy flaps on head or body.

The anglerfishes are exclusively benthic fishes and found at depths between 70 to 600 m. They are represented by 4 genera with 25 species, 3 genera with 6 species and 2 genera with 2 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Lophiodes mutilus* (Alcock) (Smooth angler)
2. *Lophiomus setigerus* (Vahl) (Blackmouth angler)

Key to the species

Frontal ridges rugose, bearing low spines, knobs or ridges. Gill openings not extending in front of pectoral fins. Pectoral fin rays 21 to 25  
.....*L. setigerus*

Frontal ridges smooth, bearing no spines, knobs or ridges. Gill openings extending in front of pectoral fins. Pectoral fin rays 15 to 18  
.....*L. mutilus*

*Interest to fisheries :* Both the species do not contribute any special fishery. They are caught mainly with bottom trawls and marketed fresh.

Order BELONIFORMES  
(= CYPRINODONTIFORMES)

Family EXOCOETIDAE  
(Flying fishes)

Elongate fishes, their bodies broadly cylindrical (round in cross section), flattened ventrally in some species. Snout blunt. Mouth small, jaws relatively short and equal in length (lower jaw produced in some juveniles), teeth absent or very small in jaws. No spines in fins. Dorsal and anal fins set equally far back on body, their bases short and opposed. Exceptionally large pectoral fins, extending beyond dorsal fin origin (gliding flights can be made out water with the pectorals spread like wings). Pelvic fins abdominal in position and

exceptionally large in some species (thus two-winged and four-winged types can be recognized). Caudal fin deeply forked, lower lobe of caudal fin longer than upper lobe. Lateral line low down on body. Scales large, cycloid, easily shed out.

The family Exocoetidae is represented by 7 genera with about 60 species, 36 genera with 12 species and 6 genera with 8 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Cheilopogon nigricans* (Bennet) (African flying fish)
2. *Cypselurus spilopterus* (Valenciennes) (Indian-spotted flying fish)
3. *Exocoetus monocirrus* Richardson (Barbel flying fish)
4. *E. volitans* Linnaeus (Tropical two-wing flying fish)
5. *Hirundichthys coromandelensis* (Hornell) (Coromandel flying fish)
6. *H. oxycephalus* (Bleeker) (Bony flying fish)
7. *Parexocoetus mento* (Valenciennes) (African sailfin flying fish)
8. *Prognichthys brevipinnis* (Valenciennes) (Shortfin flying fish)

Key to the species

- 1a. Pectoral fins not reaching beyond posterior part of anal fin base. Pectoral branch of lateral line present. Upper jaw protrusible .....*P. mento*
- 1b. Pectoral fins reaching beyond anal fin base to, or almost to, caudal fin base. Pectoral branch of lateral line absent. Upper jaw not protrusible .....2
- 2a. Pelvic fins short, not reaching anal fin origin (barely reaching in juveniles). Pelvic fin insertion closer to pectoral fin insertion than to anal fin origin .....3
- 2b. Pelvic fins long, reaching beyond anal fin origin. Pelvic fin insertion closer to anal fin origin than to pectoral fin insertion .....4

- 3a. Body depth usually less than 19% of standard length. Gillrakers on first arch 29 to 37. Usually 6 transverse rows of scales between dorsal fin origin and lateral line. (Juveniles elongate, without chin barbels and with unpigmented pelvic fins) .....*E. volitans*
- 3b. Body depth usually greater than 20% of standard length. Gillrakers on first arch 21 to 29. Usually 7 transverse rows of scales between dorsal fin origin and lateral line (Juveniles hump-backed, with a single chin barbel and with black pelvic fins) .....*E. monocirrus*
- 4a. Origin of anal fin 3 rays or more behind origin of dorsal fin. Dorsal fin usually with 2 to 4 (rarely with one) rays more than anal fin .....5
- 4b. Origin of anal fin slightly before, under or not more than 3 rays behind origin of dorsal fin. Dorsal fin usually with less, or equal number of rays than anal fin (rarely with 1 or 2 more).....7
- 5a. First 3 or 4 pectoral fin rays unbranched .....*P. brevipinnis*
- 5b. Only the first pectoral fin ray unbranched .....6
- 6a. Lower jaw a little shorter than the upper and included beneath the upper jaw .....*C. spilopterus*
- 6b. Both jaws of equal length, or lower jaw a little longer than the upper .....*C. nigricans*
- 7a. Pectoral fins dark with a broad pale transverse stripe and a wide pale margin .....*H. coromandelensis*
- 7b. Pectoral fins dark with a small pale basal triangle and narrow pale margin .....*H. oxycephalus*

*Interest to fisheries :* Flying fishes are tropical members of the epipelagic fish community that inhabit surface waters of the open sea. Although these fishes are present along both the coasts of India, a well marked fishery for flying fishes is limited to Tamil Nadu coast only. Its scope has been increasing in recent years owing to the rising popularity of these delicately flavoured and highly nutritious fishes. *C. spilopterus* is one of the large-sized flying fishes of Indian waters, but is caught in

small quantities along with *H. coromandelensis* in Tamil Nadu and Andhra Pradesh coasts. *E. volitans* has minor fishery importance. *P. mento*. is sometimes caught numerous in the commercial catches at Madras coast during the period of January- February. These flying fishes are captured with the shore seine nets and simple dip nets and are marketed fresh.

**Systematic notes :** Identification of flying fish is not difficult because of the enlarged pectoral fins, sometimes pelvic fins also, and of course, the lopsided tail, with its lower lobe much longer than the upper. Juveniles of many have a pair of long, flap-like whiskers. Maximum length about 45 cm.

**Family HEMIRAMPHIDAE  
(Halfbeaks)**

Elongate fishes with a prolonged lower jaw and a short triangular upper jaw. Nostrils in a pit, anterior to eyes. Teeth minute, often tricuspid, the part of lower jaw in front of upper jaw without teeth; no teeth on roof of mouth or tongue. No spines in fins. Pectoral fins generally short. Pelvic fins with 6 rays, in abdominal position. Dorsal and anal fins posterior in position. Caudal fin emarginate or forked, some species with lower lobe of caudal fin longer than upper lobe. Lateral line running down from pectoral fin origin and then backward along ventral profile of body. Scales moderately large, cycloid, easily detached.

Most halfbeaks are marine and epipelagic but some inhabit freshwaters. They are represented by 12 genera with about 80 species, 7 genera with 21 species and 2 genera with 2 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Hemiramphus far* (Forsskal) (Black-barred halbeak)
2. *Hyporhamphus limbatus* (Valenciennes) (Congaturi halfbeak)

**Key to the species**

Preserbital ridge absent. Upper jaw sealesless. Swimbladder alveolar ..... *H. far*

Preserbital ridge present. Upper jaw scaly. Swimbladder simple (single chamber)

.....*H. limbatus*

**Interest to fisheries :** The flesh of these halfbeaks are delicate but many fine bones eating troublesome. They are of considerable economic value especially on the Tamil Nadu coast and they are collected with seine nets and dip nets under lights at night.

**Family BELONIDAE  
(Garfishes, Needlefishes)**

Body elongate, rather slender, with both upper and lower jaws extended into long beaks, armed with numerous needle-like teeth to its tip. Mouth opening large. No isolated finlets. No spines in fins. Dorsal fin rays usually 10 to 26 and anal fin rays usually 14 to 23, dorsal and anal fins both single and similar in size and shape, posterior in position. Pelvic fins inserted far behind the pectoral fins. Lateral line low down. Scales small, cycloid, easily detached.

These are pelagic fishes of tropical and temperate seas, often congregating into school; enter estuaries freely; several species in freshwater. Some species are capable of high jumps out of water. The family Belonidae is represented by 10 genera with 32 species, 5 genera with 10 species and 3 genera with 6 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Ablennes hians* (Valenciennes) (Flat needlefish)
2. *Strongylura leiura* (Bleeker) (Banded needlefish)
3. *S. strongylura* (van Hasselt) (Spottail needlefish)
4. *Tylosurus acus melanotus* (Bleeker) (Agujon needlefish)
5. *T. choram* (Ruppell) (Ruppell's aligator garfish)
6. *T. crocodilus* (Peron and Le Sueur) (Hound needlefish)

**Key to the species**

1a. Body ribbon-like and greatly laterally compressed and marked with a series of 12 to 14 vertical bars. Anal fin rays 24 to 28 .....*A. hians*

- 1b. Body rounded or squarish in cross-section without vertical bars. Anal fin rays 13 to 23 .....2
- 2a. Caudal peduncle without lateral keels, caudal fin emarginate, truncate or rounded, not deeply forked .....3
- 2b. Caudal peduncle with small lateral keels, caudal fin not rounded, deeply forked .....4
- 3a. Caudal fin rounded or truncate with a prominent black spot near its base. Dorsal fin with 12 to 15 rays and anal fin with 15 to 18 rays..... *S. strongylura*
- 3b. Caudal fin emarginate without any black spot. Dorsal fin with 17 to 21 rays and anal fin with 23 to 25 rays .....*S. leiura*
- 4a. Dorsal fin rays 24 to 27 and anal fin rays 22 to 24. Upper jaw rather strongly curved upward at its origin, so that an appreciable gap is formed between the jaws .....*T. acus melanotus*
- 4b. Dorsal fin rays 20 to 24 and anal fin rays 19 to 22. Upper jaw straight, with no appreciable gap between the jaws .....5
- 5a. Teeth in upper jaw usually inclined anteriorly to some extent. Head length 3 to 3.6 times in body length .....*T. crocodilus*
- 5b. Teeth in upper jaw more or less straight. Head length 2.6 to 3.1 times in body length .....*T. choram*

*Interest to fisheries* : The needlefishes are of minor commercial importance, flesh excellent in flavour although some people have misgivings about eating these fishes owing to their green bones. Fairly good catches of *S. strongylura* are obtained from the coast of Kerala. *T. acus melanotus* is quite common in the commercial catches at Mangalore and from near Mandapam in the Gulf of Mannar. *T. crocodilus* is a fierce predatory fish, very destructive of small fishes. *T. crocodilus* as well as *T. choram* are caught commercially in small quantities in occasional. These fishes are captured mainly by cast nets, shore and purse seine and drift nets or trawling or near surface lures. They are mostly marketed fresh.

## Order ATHERINIFORMES

### Family ATHERINIDAE (Silversides)

Elongate and almost compressed silvery fishes. Mouth usually small, oblique and terminally placed. Two widely separated dorsal fins, the first with a variable number of small, flexible spines; the second dorsal and anal fins with 1 weak spine, 1 unbranched ray and a variable number of branched rays. Pectoral fins set high on body. Lateral line absent but a midlateral stripe present on each side. Scales cycloid and moderately large. Pelvic fins usually abdominal, with 1 spine and 5 rays. Caudal fin moderately forked.

The family Atherinidae is represented by 29 genera with 120 species, 3 genera with 6 species and 2 genera with 2 species in the world, in India and in Gujarat respectively.

#### *Species known to occur in Gujarat :*

1. *Atherinomorus lacunosus* (Forster) (Hardyhead silverside)
2. *Hypoatherina temminckii* (Bleeker) (Samoa silverside)

#### Key to the species

Ascending premaxillary process short and broad, its length about 1/4th of eye diameter. Lateral process of premaxilla broad and flat. Dentary bone sloping gently upwards and backward, with or without a slight tuber-like elevation at distal end .....*A. lacunosus*

Ascending premaxillary process moderately long and narrow, 1/3 to 1/2 of eye diameter. Lateral process broad and short. Dentary bone sloping strongly upward and backward, with posterior ramus highly elevated

.....*H. temminckii*

*Interest to fisheries* : These silversides are usually not of large enough to be considered as human food. They are, however, very important as forage for commercial fishes and are widely

used as bait. These fishes are mainly caught by seine nets.

Family NOTOCHEIRIDAE  
(Surf sardines)

Body highly compressed, very deep at vertical through origin of pectoral fins, than tapering rapidly toward caudal peduncle. Head small and truncated posteriorly. Teeth in jaws small, but well developed and curving backward into mouth. Mouth strongly oblique. Premaxilla extending backward beyond vertical through anterior margin of orbit. Gillrakers moderately long and well developed, longer than diameter of pupil. Anus well behind tips of pelvic fins. First dorsal fin with 3 to 6 spines, second dorsal with 1 spine and 12 to 17 rays. Anal fin with 1 spine and 21 to 28 rays. Scales small, deciduous and absent on predorsal and abdominal regions.

The family recognizes a total of 2 genera with 6 species world wide. They are represented by 1 genus with 1 species in India and in Gujarat.

*Species known to occur in Gujarat :*

*Iso natalensis* Regan (Surf sardine)

*Interest to fisheries :* There is no commercial importance of this family but may be of great importance in food chain of larger surf fishes and sometimes used as bait. *I. natalensis* is most commonly found in boiling surf, quite close to shore and it is an entirely marine species and is caught with seines; but incidental collections are made when seining in surf.

ORDER ZEIFORMES

Family CAPROIDAE  
(Boarfishes)

Body greatly compressed, discoid, with small ctenoid scales. Mouth small, upper jaw protrusible; bands of small teeth on jaws; vomer and palatines toothless. A single dorsal fin with 8 or 9 spines and 25 to 27 soft rays. Anal fin with 3 spines and 25 to 27 soft rays. Pelvic fin with 1 strong spine and 5 soft rays.

Pectoral fin with 15 rays. Caudal fin truncate with 10 branched rays. Gill membranes free from isthmus. Cheeks and operculum with distinct scales.

The family Caproidae is represented by 2 genera with 6 species throughout the world and they are represented by 1 genus with 1 species in India as well as in Gujarat.

*Species known to occur in Gujarat :*

*Antigonia rubescens* (Gunther) (Indo-Pacific boarfish)

*Interest to fisheries :* The fisheries value of this species is not known. It is caught as bycatch in bottom trawls.

Order SYNGNATHIFORMES

Family FISTULARIIDAE  
(Cornetfishes, Flutemouths)

Elongate fleshy depressed body. Mouth small, at end of a long tubular snout, hexagonal in cross section; teeth in jaws small. Dorsal and anal fins short based and opposite, with 14 to 17 segmented (soft) rays. Pectoral fins with 13 to 17 rays. Pelvic fins small with 6 rays, Lateral line arched, running anteriorly along back, than banding downward on side and continuing posteriorly onto an elongate filament produced by the middle 2 caudal fin rays. Body of juveniles covered with rows of small spinules which are retained in the adults of the western Indian species (*F. petimba*).

This family is represented by 1 genus with 4 species, 1 genus with 2 species and 1 genus with 1 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Fistularia petimba* Lacepede (Red cornetfish)

*Interest to fisheries :* This species is not important in the commercial fishery of our country, but it is used as food fish. It is caught with bottom trawls, gillnets and line gear. It is

marketed fresh, dried salted or smoked, also reduced to fishmeal. It is a common fish found in both the coasts of India.

Family SYNGNATHIDAE  
(Pipefishes, Sea horses)

Body elongate, angular or laterally compressed or rounded. Tail long. Head slender, generally with a produced tube-like snout, with a terminal, oblique mouth. One dorsal fin with soft rays only. Pelvic fins absent. Caudal fin sometimes absent. The skin is completely armoured by bony scutes, arranged regularly in series and forming rings round the body. Eggs are attached to belly of male, sometimes enclosed in a pouch.

These are specialised fishes of small size living in the shorewater of tropical and temperate seas. They are bad swimmers, moving about in a vertical position. This family is represented by 52 genera with 205 species, 18 genera with 38 species and 2 genera with 2 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Hippocampus kuda* Bleeker (Sea horse)
2. *Trachyrhamphus serratus* (Schlegel) (Crested pipefish)

Key to the species

Caudal fin present. More or less round, pipe-like body. Head in line with trunk .....*T. serratus*

Caudal fin absent. Horse-like compressed body. Head and trunk at right angle ....*H. kuda*

*Interest to fisheries* The fisheries of this family have no commercial value. They are used only for marine aquarium.

Order DACTYLOPTERIFORMES

Family DACTYLOPTERIDAE  
(Flying gurnard)

Moderately elongate fishes. Head large, blunt, with heavily armoured. Mouth small, subterminal, protractile. Teeth minute, nodular

or absent. Eyes large. A small movable bone between plate-like bones around eye and preopercle. Preopercle with a prominent elongate spine. Spinous and soft dorsal fin separated by a deep notch. Total number of dorsal fin spines 6 or 7, of which the first or the first two anterior ones are separated from the remainder of the fin, soft dorsal with 8 rays. Anal fin with 6 or 7 soft rays. Pectoral fin base horizontal, divided into 2 sections, a short anterior part with 5 rays and a long posterior part with 25 to 31 rays, reaching to caudal fin base in adult. Pelvic fins thoracic, each with one spine and 4 soft rays. Caudal fin emarginate. Lower side of posterior part of trunk with 2 to 4 enlarged keel-like scales. Scales-scute, forming prominent keels. Lateral line present or absent, if present, extends to near base of caudal fin.

These benthic fishes, which superficially resemble triglids, produce sounds by stridulation by utilizing the hyomandibular bone and 'walk' for forage on the bottom by alternately moving pelvic fins and short pectoral fin rays. The enlarged pectoral fin rays are spread when the fish is alarmed. The youngs are pelagic and often taken offshore with lights at night. The flying gurnards are represented by 2 genera with 7 species, 1 genus with 4 species and 1 genus with 1 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Dactyloptena orientalis* (Cuvier) (Oriental flying gurnard)

*Interest to fisheries :* This species is usually of little commercial importance, but are often caught as bycatch in near shore fisheries. Adults are usually caught with seines, youngs are often caught at night the surface where they can be attracted by light. It is marketed fresh occasionally. The flesh is edible and consumed in some localities.

Order SCORPAENIFORMES

Family SCORPAENIDAE  
(Scorpionfishes, Rockfishes, Rosefishes,  
Stingfishes,  
Stonefishes, Turkeyfishes and Waspfishes)

Body moderately compressed to robust, generally bass-like in appearance, with spiny

head. Mouth terminal, oblique and protractile with usually villiform teeth. Eyes moderate to large, a ridge of bone below eye extending posteriorly and firmly attaching to preopercle. Preopercular margin with 3 to 5 spines (usually 5), opercle with 2 divergent spines or a single spine; other spines scattered on head; the uppermost better developed. A single dorsal fin, usually notched at the posterior end of spinous part, with 8 to 18 spines and 4 to 14 segmented soft rays. Anal fin with 2 to 4 spines and 5 to 14 segmented rays. Pectoral fin broad based, large, fan-like with 11 to 23 rays. Pelvic fins thoracic in position, with 1 spine and 3 to 5 branched rays. Caudal fin rounded. Venom glands associated with fin spine. Lateral line always present, sometimes incomplete or represented only as a scaleless groove. Fleshy skin flap, cirri, tentacles or warts present on head and body of many species.

Scorpionfishes are widely distributed to the Indo-west Pacific and are represented by 60 genera with 310 species, 23 genera with 48 species and 4 genera with 5 species in the world, in India and in Gujarat respectively:

*Species known to occur in Gujarat :*

1. *Apistus carinatus* (Bloch and Schneider) (Ocellated waspfish)
2. *Choridactylus multibarbus* Richardson (Orangebanded stingfish)
3. *Minous monodactylus* (Bloch and schneider) (Gray stingfish)
4. *Pterois russellii* Bennett (Plaintail turkeyfish)
5. *P. volitans* (Linnaeus) (Winged firefish)

Key to the species

- 1a. Ventralmost pectoral fin rays not detached or separate from remainder of fin .....2
- 1b. Ventralmost pectoral fin rays detached, separate from remainder of fin .....3
- 2a. Interorbital space without scales. Pectoral fin with 14 to 16 rays .....*P. volitans*
- 2b. Interorbital space scaly. Pectoral fin with 13 rays .....*P. russellii*

- 3a. Body covered with scales. Branchiostegal membranes not fused to isthmus. Posterior half of spinous dorsal fin with a large black blotch .....*A. carinatus*
- 3b. Body scaleless, except for lateral line and sometimes a few deeply buried scales above lateral line. Branchiostegal membranes broadly fused to isthmus. Posterior half of spinous fin without large black blotch .....4
- 4a. Pectoral fin with a single free ray ventrally .....*M. monodactylus*
- 4b. Pectoral fin with 3 free rays ventrally..... *C. multibarbus*

*Interest to fisheries :* The family is not so economically important. Little amount of fish is used as food. All species are not consumed as food because they have venomous spines, therefore, should be handled with extremely care. They are caught by bottom trawls, shore seines, spearing and native fishing methods. Little amount of these fishes marketed fresh, dried and salted.

Family PLATYCEPHALIDAE  
(Spiny flat-head fishes)

Elongate fishes with head moderately or strongly depressed, usually with ridges and spines. Mouth very large, the lower jaw projecting forwards, with fine teeth in jaws and palate, sometimes with canines. Two dorsal fins, well separated, the spinous dorsal with 8 to 10 spines (usually 9), the first spine short and scarcely connected to the second. Soft dorsal and anal fin with 10 to 15 soft rays. Pelvic fins thoracic, set far apart towards sides of body, with 1 spine and 5 soft rays. Lateral line complete. Scales ctenoid generally embedded on head and breast; anterior pored scales of lateral line usually bearing spines, all pored scales with a spine in some species.

The spiny flat heads are benthic fishes found on mud or sand bottom at depth of about 75m or less. These fishes are represented by 12 genera with 60 species, 8 genera with 12 species and 5 genera with 5 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Cociella crocodila* (Tilesius) (Crocodile flat head)
2. *Grammoplites suppositus* (Troschel) (Spotfin flat head)
3. *Platycephalus indicus* (Linnaeus) (Indian flat head)
4. *Rogadius asper* (Cuvier) (Thorhy flat head)
5. *Suggrundus rodricensis* (Cuvier) (Spiny flat head)

## Key to the species

- 1a. Pored scales in lateral series about 65 or more. Vomerine teeth (on roof of mouth) in 1 transverse patch .....*P. indicus*
- 1b. Pored scales in lateral series about 60 or fewer. Vomerine teeth in 2 separate patches .....2
- 2a. Body ridges and below eye either with small spines or finely serrated .....*R. asper*
- 2b. Body ridges above and below eye bearing larger spines .....3
- 3a. All or most pored scales of lateral series bearing a backward directed spine .....*G. suppositus*
- 3b. Pored scales of lateral series never bearing spines on posterior half of body .....4
- 4a. Number of scale rows slanting downward and backward above lateral line greater (by 4 to 23 scales) than number of pored lateral line scales .....*C. crocodila*
- 4b. Number of scale rows slanting downward and backward above lateral line about the same (may differ by 1 or 2) as the number of pored lateral line scales ....*S. rodricensis*

*Interest to fisheries :* Most of the species of this family are good food fishes but are of secondary importance in the commercial trawl fisheries. Although of somewhat repulsive appearance, these fishes are good eating. Its flesh is white, tender and well flavoured. Its keeping qualities are particularly good. These fishes are caught with bottom trawls, hook and line and by spear fishermen.

## Order PERCIFORMES

Family AMBASSIDAE  
(Glassfishes)

Small perch-like fishes with laterally compressed body and somewhat translucent. Mouth large, teeth fine in jaws and on roof of mouth; the upper outer row sometimes enlarged and canine-like. Operculum with a poorly developed single spine; a characteristic feature of the family is the double edge of the preoperculum, so that this bone may be said to have an edge and ridge, lower edge is almost always dentate, but the hind edge is entire in several species. Dorsal fin of two continuous parts defined by a notch, the first dorsal fin with 7 spines and a procumbent spine and second dorsal fin with 1 spine and 9 to 17 soft rays. Pelvic fin with 1 strong spine and 5 soft rays with an axillary scale. Anal fin with 3 spines and 9 to 16 soft rays. Caudal fin forked. Scales small, cycloid and easily shed. Lateral line complete, simply interrupted or very distinctly broken. Dorsal and anal fins in a scaly basal sheath.

The family Ambassidae is represented by 9 genera with 41 species, 4 genera with 17 species and 1 genus with 2 species in the world, in India and in Gujarat respectively. This family is found in the Indo-west Pacific region, enter estuaries and penetrate to freshwater. Usually brilliant or silvery white body colour.

*Species known to occur in Gujarat :*

1. *Ambassis commersoni* Cuvier (Commerson's glassy perchlet)
2. *A. gymnocephalus* (Lacepede) (Naked-head glassy perchlet)

## Key to the species

Supraorbital ridge, smooth, terminating posteriorly in a single backwardly directed spine. Preorbital ridge entire but its edge coarsely serrated. Posterior margin of preoperculum ridge serrated, with a strong spine at angle. Gillrakers 20 to 22 on lower arm of first arch .....*A. commersoni*

Supraorbital ridge dentate, with 2 or 4 well developed spines on its posterior edge. Preorbital edge and ridge with 2 or 3 small serrae. Posterior edge of preoperculum entire. Gillrakers 23 to 25 on lower arm of first arch  
.....*A. gymnocephalus*

*Interest to fisheries* : These glass fishes though small in size are caught in fairly large numbers along the coasts of India. These fishes are not so commercial important and marketed fresh as well as dried and mainly used as bait.

Family CENTROPOMIDAE  
(Sea perches)

Elongate or oblong, slightly compressed body. Mouth large, teeth small and conical in jaws and vomer. Operculum with a single well developed spine; preoperculum with single edge and with an enlarged spine at angle. Scale ctenoid. Lateral line complete, continued up to caudal fin, usually reaching to posterior margin of that fin. Dorsal fin deeply notched or separated into two fins, first part with 7 or 8 spines, and second part with one spine and 8 to 11 soft rays. Anal fin with 3 spines and 6 to 9 soft rays. Caudal fin rounded. Scaly sheath at bases of anal and soft dorsal fins.

The sea perches are usually marine, occurring in coastal waters, estuaries and lagoons. Some ascend rivers and others are permanent residents of freshwater. They are represented by 4 genera with 18 species, 2 genera with 2 species and 1 genus with 1 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Lates calcarifer* (Bloch) (Giant seaperch)

*Interest to fisheries* : The giant seaperch is one of the food fishes of India. It is essentially a marine fish, ascends estuaries and backwaters in search of food and shelter but usually return to estuarine and marine environments for spawning. This is a very popular fish which can be cultured in the estuarine environments. It has a good commercial value. The maximum length known is 200 cm and commercial catches are between 45 to 61 cm. The

gasbladder of this fish is exported as isinglass. It is marketed fresh condition. The seaperch (= Barramundi) is caught mainly with bottom trawls, handlines, bottom gillnets and traps. It is also esteemed as a sport fish.

Family SERRANIDAE  
(Groupers, Hinds, Lyretails, Creole-fish, Mutton hamlets, Spanish flag and Leather bass)

Body generally robust and oblong-oval to rather elongate. Mouth protractile and maxilla exposed when mouth is closed, distinct canine teeth present at front in some species; no molars or incisiform teeth. Operculum with 3 flat spines (upper and lowermost spines often covered by skin and scales). Posterior margin of preopercle generally serrate. A single dorsal fin with 7 to 11 spines and 10 to 21 rays. Anal fin with 3 spines and 7 to 13 rays. Pelvic fin with 1 spine and 5 branched rays, axillary process absent. Caudal fin with 13 to 15 branched rays, rounded, truncate or lunate (never forked). Lateral line single and complete.

Groupers are bottom associated fishes found in the tropical and subtropical waters of all oceans, represented by 48 genera with 320 species, 12 genera with 56 species and 2 genera with 10 species in the world, in India and in Gujarat respectively. They are known to occur in depths of 100 to 200 m (occasionally 500 m) on coral reefs.

*Species known to occur in Gujarat :*

1. *Cephalopholis formosa* (Shaw and Nodder) (Blue lined hind)
2. *Epinephelus areolatus* (Forsskal) (Areolate grouper)
3. *E. coioides* (Hamilton Buchanan) (Orange-spotted grouper)
4. *E. diacanthus* (Valenciennes) (Spinycheek grouper)
5. *E. erythrurus* (Valenciennes) (Cloudy grouper)
6. *E. fuscoguttatus* (Forsskal) (Brown marbled grouper)

7. *E. lanceolatus* (Bloch) (Giant grouper)  
 8. *E. latifasciatus* (Temminck & Schlegel) (Striped grouper)  
 9. *E. malabaricus* (Bloch & Schneider) (Malabar grouper)  
 10. *E. polylepis* Randall & Heemstra (Small scaled grouper)

## Key to the species

- 1a. Dorsal fin with 9 spines .....*C. formosa*  
 1b. Dorsal fin with 11 spines .....2  
 2a. Caudal fin of adult specimen truncate or slightly emarginate.....3  
 2b. Caudal fin adult specimen rounded .....4  
 3a. Lateral line scales 49 to 53 and lateral scale series 97 to 116. Pyloric caeca 11 to 17 .....*E. areolatus*  
 3b. Lateral line scales 65 to 72 and lateral scale series 126 to 137. Pyloric caeca 28 to 34 .....*E. polylepis*  
 4a. Dorsal fin rays 12 to 13 .....*E. latifasciatus*  
 4b. Dorsal fin rays 14 to 17 .....5  
 5a. Lateral line scales with branched tubules. Eye diameter contained about 8 times in head length at 20 cm standard length, about 9 times in head length at 35 cm and 13 times in head length for 145 cm fish. Maximum total length about 2.7m. Juveniles yellow, with 3 broad black bars on body and irregular broad bands on head .....*E. lanceolatus*  
 5b. Lateral line scales with a single tubule (except anterior scales of large *E. coioides* and *E. malabaricus*). Eye diameter contained less than 7 times in head length of 20 cm fish and less than 8 times in head length for 35 cm fish. Maximum total length less than 1.5 cm. Juveniles not coloured as in 5a. ....6  
 6a. Numerous distinct dark spots (not dots) over most of head and body (spots brownish red to black in life and distinct in preservatives).....7  
 6b. No distinct dark spot over most of head and body (there may be yellow or orange spots in life, but these usually do not persist in alcohol or there may be dark dots or scattered dark spots but not over most of head and body) .....9  
 7a. Dorsal fin rays 14 to 15. Total gillrakers 29 to 31. Lateral line scales 52 to 58. Body depth 2.6 to 2.9 times in standard length. Head and body pale yellowish brown, with irregular dark brown blotches and numerous small close-set dark brown spots. Black saddle spot on caudal peduncle. Midlateral body scales of adult specimens smooth..... *E. fuscoguttatus*  
 7b. Dorsal fin rays generally 15 to 16. Total gillrakers 22 to 29. Lateral line scales 54 to 65. Body depth 2.7 to 3.7 times in standard length. Colour not as in 7a. Midlateral body scales rough.....8  
 8a. Head and body with numerous small well separated black spots (largest spots about twice size of rear nostrils). Irregular white or pale spots or blotches generally present on head and body. Pectoral fin rays modally 19 .....*E. malabaricus*  
 8b. Head, body and generally median fins with numerous orange or brownish orange or reddish brown spots (diameter of largest spot 4 to 5 times that of rear nostrils). No white or pale spots on head or body, orange spots become poorly defined and darker with growth; spots on head often coalesce and become elongate, arranged in irregular rows radiating from eye. Fins brownish, with proximal parts brown spotted; orange spots turn brown after death and are poorly defined on preserved specimens. Pectoral fin rays modally 20 .....*E. coioides*  
 9a. Interspinous membranes incised. Lateral scale series 103 to 121. Body pale greyish brown, usually with 5 dark vertical bars broader than interspaces, 4 below dorsal fin and 5th (faintest) on peduncle .....*E. diacanthus*  
 9b. Interspinous membrane not incised. Lateral scale series 92 to 107. Body olive to reddish brown, generally with irregular pale spots and blotches that join randomly to form an irregular dark reticulum of the black-ground colour. 3 dark streaks across operculum .....*E. erythrurus*

*Interest to fisheries:* The fishes of this family are of considerable importance in the commercial, sport and artisanal fisheries of tropical and subtropical seas. Some species, such as *E. coioides* and *E. malabaricus* are used in aquaculture. Most species are taken in traps, on hook and line or on longlines and those inhabiting soft bottom are caught in bottom trawls.

Family TERAPONIDAE  
(Grunters)

Perch like fishes with oblong or oblong-ovate body, moderately compressed. Mouth moderate with oblique gape, jaws equal. Operculum with two spines, preoperculum serrate. Teeth conic or flattened with outer row enlarged and followed by a band of villiform teeth; vomer and palatines endentulous except in a few species. Dorsal fin nearly divided by a deep notch in some species, with 11 to 14 spines and 8 to 14 soft rays. Anal fin with 3 spines and 7 to 12 soft rays. Caudal fin rounded, truncate or emarginate. Scales finely ctenoid. Lateral line continuous. Dark longitudinal stripes often present on body and dark stripes on caudal fin.

Fishes of this family Teraponidae inhabitants of salt, brackish and freshwater throughout the Indo-West pacific region are represented by 15 genera with 37 species, 2 genera with 4 species and 1 genus with 3 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Tarapon jarbua* (Forsskal) (Jarbua terapon)
2. *T. puta* (Cuvier) (Smallscaled terapon)
3. *T. theraps* (Cuvier) (Longscaled terapon)

Key to the species

- 1a. Lateral line with 46 to 56 scales, 6 to 8 scales above the lateral line .....*T. theraps*
- 1b. Lateral line with 70 or more scales, 10 to 17 scales above lateral line .....2

- 2a. Two or four straight longitudinal stripes along side of body. Gillrakers 18 to 24 on lower arm of the first gill arch .....*T. puta*
- 2b. Three or four downward curved longitudinal stripes along body. 12 to 15 gillrakers on lower arm of first gill arch .....*T. jarbua*

*Interest to fisheries :* The grunthers are very common in the commercial catches of India near river mouths and brackish water. They have commercial value for their good taste and are marketed fresh condition. *T. jarbua* is one of the most common species and a good aquarium fish found in both the coasts of India. These fishes are caught with all types of inshore fishing gears, including gillnets traps, handlines and bottom trawls.

Family KUHLIDAE  
(Flagtails)

Body oblong, compressed. Maxilla mostly exposed, without supramaxilla. Upper jaw slightly protrusible; jaws with a band of villiform teeth, no canines. Preorbital and preopercular bones serrate. Opercle with 2 exposed, flat spines. Single dorsal fin with 10 strong spines and 9 to 16 soft rays. Anal fin with 3 spines and 10 to 16 soft rays. Pelvic fins with 1 spine and 5 branched rays. Caudal fin emarginate or forked. Scales ctenoid.

The flagtails are common in freshwater, estuarine and seas. They are represented by 2 genera with 7 species, 1 genus with 2 species and 1 genus with 1 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Kuhlia mugil* Schneider (Barred flagtail)

*Interest to fisheries :* The flagtails are not common in fishery. These are excellent eating fishes but they are generally too small to be of much commercial importance except as bait for larger fishes. They are caught by small hooks and light line, beach seines and cast net. These fishes are marketed fresh as well as dried salted.

Family PRIACANTHIDAE  
(Bigeyes, Glasseyes, Bulleyes)

Small to moderate size fishes with relatively deep, compressed bodies. Ctenoid scales difficult to detach. Mouth large, strongly oblique, lower jaw projecting. Small conical teeth in a narrow band in jaws. Eyes very large. A continuous dorsal fin with 10 spines and 11 to 15 soft rays. Anal fin with 3 spines and 10 to 16 soft rays. Pectoral fin small, no axillary scale. Pelvic fins large with 1 spine and 5 soft rays, inserted anterior to pectoral fins, and broadly joined to body by a membrane. Caudal fin truncate or lunate with 16 rays. Colour usually bright red.

The Bigeyes are wide spread in the central Indo-Pacific and they are shallow water species found on coral reefs and rocky bottom in coastal and continental regions. They are represented by 3 genera with 12 species, 3 genera with 5 species and 1 genus with 3 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Priacanthus cruentatus* (Lacepede) (Glasseye)
2. *P. hamrur* (Forsskal) (Dusky-finned bulleye, Moontail bulleye)
3. *P. tayenus* Richardson (Purple-spotted bigeye)

Key to the species

- 1a. Dorsal fin with 14 to 15 soft rays, spine at angle of preoperculum short, indistinct in large adults. Pelvic fins black or partly black .....*P. hamrur*
- 1b. Dorsal fin with 12 or 13 soft rays, spine at angle of preoperculum strong.....2
- 2a. Dorsal and pelvic fin spines strongly spinulose. No spots on pelvic fins ..... *P. cruentatus*
- 2b. Dorsal and pelvic fin spines feebly spinulose. Pelvic fins with distinct blackish red spots .....*P. tayenus*

*Interest to fisheries :* The bigeyes are of

minor fishery value and are abundant off the Kerala coast at 250 to 300 m. They are caught by trawl catches, handlines and gillnets also and are marketed fresh condition.

Family SILLAGINIDAE  
(Whitings, Smelt-whitings, Sillagos)

Elongate to slightly compressed body, tapering from middle of spinous dorsal fin to head and tail. Operculum with a small, sharp spine; lower part of preopercle sharply angled inwards to meet that of the other side, thus forming the ventral side of head, Mouth small, terminal; end of upper jaw (maxilla) slides below preorbital bone. Teeth small, villiform bands in jaws; small teeth on anterior part of vomer, no teeth on palatines. Two dorsal fins with little or no interspace, first with 9 to 12 slender spines and second with 1 spine and 16 to 26 rays, its base is about twice that of first dorsal fin. Pelvic fin origin slightly behind origin of pectoral fin. Anal fin with 2 weak spines and 15 to 27 soft rays. Caudal fin emarginate. Scales small, ctenoid and easily shed. Lateral line slightly arched. Swim-bladder absent, poorly developed or highly complex.

These whitings are small shore fishes of shallow waters, often found in estuaries. They are represented by 3 genera with 25 species, 2 genera with 10 species and 1 genus with 2 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Sillago sihama* (Forsskal) (Silver sillago)
2. *Sillago (Sillaginopodys) chondropus* Bleeker (Clubfoot sillago)

Key to the species

Pelvic fin with the spine inconspicuous and almost hidden by the much thickened club-shaped outer pelvic fin ray. Swimbladder reduced, without post-coelomic projections into the tail section .....*S. (Sillaginopodys) chondropus*

Pelvic fin spine of normal size, the outer pelvic fin ray normal, not club-shaped. Swimbladder well developed, with 2 post-coelomic projections into the tail section

.....*S. sihama*

*Interest to fisheries* : *S. sihama* is an inshore fish that frequently comes estuaries for a considerable distance and supports a good fishery along the east coast of India. It is an important food fish of delicate flavour and marketed fresh, frozen and dried salted. *S. (S.) chondropus* inhabits shallow sandy bottoms of shores and bays and also estuaries. It does not contribute any fishery in both the coasts of India. Most of the whittings are caught by bag-nets, shore seines, handlines and cast nets.

Family LACTARIIDAE  
(False trevallies, Whitefish)

Oblong and strongly compressed body, slightly deeper than length of head. Mouth large and oblique with conspicuous lower jaws; a pair of small sharp canine teeth in front of each jaw. Two dorsal fins, the first with 7 or 8 weak spines, the second with 1 spine and 20 to 22 soft rays. Anal fin with 3 spines and 25 to 28 soft rays. Pelvic fins just below pectoral fin bases. Caudal fin forked. Scales moderate, cycloid, deciduous.

The Lactariidae is a very small family represented by 1 genus with 1 species only throughout the world. It is wide spread in the tropical Indo-west Pacific.

*Species-known to occur in Gujarat* :

*Lactarius lactarius* (Schneider) (False travally)

*Interest to fisheries* : *L. lactarius* is a monotypic species, very common throughout our coastal waters in sandy bottoms. It has highly commercial value. The largest specimen so far known is 400 mm total length. These fishes are generally caught with bottom trawls, boat seines and traps.

*Systematic notes* : *L. lactarius* appears very similar to the carangids but may be distinguished by its compressed peduncle, its lack of two detached anal fin spines, its lack of scutes and keels and by the possession of the long anal fin.

Family RACHYCENTRIDAE  
(Cobias)

Body elongate and subcylindrical with broad and depressed head. Mouth large with fine teeth in jaws, on palate and tongue. Eyes small with adipose eyelids. Gill openings wide. Two dorsal fins, first dorsal fin with 7 to 9 (usually 8) short but strong isolated spine, not connected by a membrane; second dorsal fin long with 1 to 3 spines and 26 to 33 soft rays. Anal fin long, with 2 to 3 weak spines and 22 to 28 soft rays. Caudal fin lunate in adult, upper lobe longer than lower (caudal fin rounded in young, the central rays much prolonged). Scales small, embedded in thick skin. Lateral line slightly wavy anteriorly. Three dark stripes on side of body.

The cobias are wide spread in tropical and subtropical seas. They are generally pelagic but also found over shallow coral reefs and off rocky shore, occasionally in estuaries. These fishes are represented by a single genus with a single species all over the world.

*Species known to occur in Gujarat* :

*Rachycentron canadus* (Linnaeus) (Black king fish)

*Interest to fishery* : *R. canadus* is an excellent game fish of average food value. The fish occurs all round the year in the commercial catches of our region. Large size fish reaches a weight of 45 kg. and a length of over 1.5 m. Tamil Nadu and Kerala coasts are famous for highest production of this species. This fish is caught mainly handlines, bottom trawls, drift nets and floating gillnets. It is mostly marketed fresh condition.

Family ECHENEIDAE  
(Remoras, Sharksuckers, Discfishes)

Body elongate, fusiform. Head flattened, with a transversely laminated, oval shaped cephalic disc (developed from a transformed spinous dorsal fin, the spines of which are split to form 9 to 28 transverse movable lamina inside a fleshy margin). Skull wide, depressed to support disc. Jaws broad, the lower one

projecting beyond the upper. Villiform teeth in jaws and vomer, usually on tongue and in certain species on palatines. Dorsal fin with 18 to 45 rays, without spine. Anal fin with 18 to 41 rays without spine. Pectoral fins set high on body, pointed or rounded with 18 to 32 rays. Pelvic fins set far forward, close together, narrowly or broadly attached to underside of body, with 1 spine and 5 soft rays. Caudal fin slightly forked, emarginate or slightly rounded. Juvenile of some species with an elongate caudal filament. Scales small, cycloid (smooth), usually embedded in the skin. No swimbladder.

The remoras present the disc against other fish and creates a partial vacuum by operating the movable disc ridges like the slats in a venetian blind, thereby causing the sucking action which permits it to obtain rides on larger animals. They will attach temporarily to a wide variety of hosts, such as sharks, sea turtle and also to ships. They are also found free swimming and occurs in shallow inshore waters. Sometimes they are used as an aid to fishing. A line is tied to the caudal peduncle of the remoras and than it is released; upon attaching to another fish, the remora and its host are hauled in by the fishermen. They are represented by 4 genera with 8 species, 4 genera with 5 species and 2 genera with 2 species throughout the tropical and temperate seas of the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Echeneis naucrates* Linnaeus (Live sharksucker)
2. *Remora remora* (Linnaeus) Remora

Key to the species

Body very elongate, the depth 8 to 14 times in standard length. Anal fin base long, rays 29 to 41 Sucking disc with 18 to 28 laminae. Usually a dark longitudinal band on sides, bordered with white .....*E. naucrates*

Body not elongate, the depth 5 to 8 times in standard length. Anal fin base short, rays 16 to 28. Sucking disc with 13 to 19 laminae. Colour almost uniform without a lateral band .....*R. remora*

*Interest to fisheries :* The remoras do not constitute any special fishery. They are captured by drift nets and trawls on the west coast of India and are marketed regularly fresh at Cochin in South-West India.

Family CARANGIDAE

(Jacks, Trevallies, Bludgers, Scads, Queenfishes, Runners, Amberjacks, Pilotfishes, Pampanos, Leerfish)

Body extremely variable in shape, ranging from elongate and fusiform to deep and greatly compressed. Eyes small to large, with eyelid negligible to strongly developed. Teeth in jaws in rows or bands, either small to minute or an enlarged row of recurved canines present; teeth on roof of mouth (vomer, palatines) or tongue present or absent depending on species or developmental stage. Gillrakers moderate in length and number to long and numerous, their number decreasing with growth in some species. Two dorsal fins that are separate in small juveniles, the first of moderate height or very low, with 4 to 8 spines (the spines absolute or embedded in adult of some species), the second dorsal fin with 1 spine and 18 to 44 soft rays and the anterior lobe scarcely produced to extremely long. Anal fin with 2 anterior spines (but 1 spine in *Elagatis* and *Seriolina*) that are separate from rest of fin by a gap (becoming embedded in adult of some species) followed by 1 spine and 15 to 39 soft rays, with the anterior lobe low to elongate. Pectoral fins with 1 spine and about 14 to 24 soft rays, either long and falcate or short and pointed or rounded. Pelvic fins with 1 spine and 5 soft rays, moderately long in some species to becoming rudimentary in others (absent in *Parastromateus*). Caudal fin forked, with the lobes equal in most species. Scales small, cycloid but strongly lanceolate to needle like in a few species, generally absent from some areas of head and covering body (but absent on certain body areas in some species) and sometimes extending onto fins. Lateral line arched (curved) or elevated anteriorly and straight posteriorly, extending onto caudal fin; scutes (enlarged, thickened and often pointed scales in lateral line) present and prominent or reduced in some species and absent in some

genera. Caudal peduncle of medium width to notably slender, in some species with a moderate lateral keel, bilateral paired keels or dorsal and ventral grooves.

These fishes are mostly schooling species (but *Alectis* usually solitary), some species have largely continental distributions and occur primarily in brackish environments (especially young), others such as *Elagatis* and *Naucrates* are pelagic, generally found at or near the surface, mostly in oceanic waters, often far offshore. They are represented by 24 genera with 140 species, 19 genera with 53 species and 18 genera with 40 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Alectis ciliaris* (Bloch) (African pampano)
2. *A. indicus* (Ruppell) (Indian threadfin)
3. *Alepes djedaba* (Forsskal) (Shrimp scad)
4. *A. melanoptera* Swainson (Blackfin scad)
5. *A. vari* (Cuvier) (Herring scad)
6. *Atropus atropus* (Schneider) (Cleft belly trevally)
7. *Atule mate* (Cuvier) (Yellowtail scad)
8. *Carangoides armatus* (Cuvier) (Longfin trevally)
9. *C. caeruleopinnatus* (Ruppell) (Coastal trevally)
10. *C. chrysophrys* (Cuvier) (Longnose trevally)
11. *C. ferdau* (Forsskal) (Blue trevally)
12. *C. fulvoguttatus* (Forsskal) (Yellow spotted trevally)
13. *C. gymnostethus* (Cuvier) (Bludger)
14. *C. malabaricus* (Bloch and Schneider) (Malabar trevally)
15. *C. oblongus* (Cuvier) (Catchwhip trevally)
16. *C. praeustus* (Bennett) (Brown back trevally)
17. *C. talamparoides* Bleeker (Importer trevally)
18. *Caranx ignobilis* (Forsskal) (Giant trevally)
19. *C. melampygus* Cuvier (Bluefin trevally)
20. *C. sem* Cuvier (Blacktip trevally)

21. *C. sexfasciatus* Quoy and Gaimard (Bigeyed trevally)
22. *Decapterus macrosoma* Bleeker (Shortfin scad)
23. *D. russelli* (Ruppell) (Indian scad)
24. *Elagatis bipinnulata* (Quoy and Gaimard) (Rainbow runner)
25. *Gnathanodon speciosus* (Forsskal) (Golden trevally)
26. *Megalaspis cordyla* (Linnaeus) (Torpedo scad)
27. *Naucrates ductor* (Linnaeus) (Pilotfish)
28. *Parastromateus niger* (Bloch) (Blackpomfret)
29. *Scomberoides commersonnianus* Lacepede (Talang queenfish)
30. *S. lysan* (Forsskal) (Double spotted queenfish)
31. *S. tala* (Cuvier) (Deep queenfish)
32. *S. tol* (Cuvier) (Needlescaled queenfish)
33. *Selar boops* (Cuvier) (Oxeye scad)
34. *S. crumenophthalmus* (Bloch) (Bigeye scad)
35. *Selaroides leptolepis* (Cuvier) (Yellowstripe scad)
36. *Seriolina nigrafasciata* (Ruppell) (Black-banded trevally)
37. *Trachinotus baillonii* (Lacepede) (Small spotted dart)
38. *T. blochii* (Lacepede) (Subnose pampano)
39. *T. mookalee* Cuvier (Indian pampano)
40. *Uraspis helvola* (Forster) (Whitetongue jack)

Key to the species

- 1a. Posterior part of lateral line with hardened scutes. Pectoral fins long and falcate, in most genera longer than head (almost equal to head length in *Selar* and shorter than head in some *Decapterus*).....2
- 1b. No scutes in lateral line (only pored scales, not enlarged). Pectoral fins relatively short, shorter than head length and not falcate .....35
- 2a. Pelvicfins (if present, absent in specimens longer than about 10cm fork length) positioned distinctly anterior to a vertical line through pectoral fin base ..... *P. niger*

- 2b. Pelvic fins (always present) not positioned distinctly anterior to a vertical through pectoral fin base.....3
- 3a. Second dorsal and anal fins with one or more distinct finlets.....4
- 3b. Second dorsal and anal fins without finlets .....6
- 4a. 8 or 9 finlets behind second dorsal and anal fin rays. Shoulder girdle margin smooth. Maximum scute height larger than eye diameter .....*M. cordyla*
- 4b. A single detached finlet behind second and anal fins. Shoulder girdle margin with 2 papillae, the lower papilla larger. Maximum scute height smaller than eye diameter.....5
- 5a. Tip of appressed pectoral fins falling considerably short of a vertical line from second dorsal fin origin. Straight part of lateral line with 14 to 29 scales, followed by 24 to 40 scutes; total scales and scutes in lateral line (excluding caudal scales) 110 to 126. Upper jaw without teeth ..... *D. macrosoma*
- 5b. Tip of appressed pectoral fins extending to or nearly to a vertical line from second dorsal fin origin. Straight part of lateral line with 0 to 4 scales, followed by 30 to 40 scutes; total scales and scutes in lateral line (excluding caudal scales) 77 to 102. Upper jaw with minute teeth near symphysis .....*D. russelli*
- 6a. Shoulder girdle margin with a furrow ventrally, a large papilla immediately above it and a smaller papilla near upper edge.....7
- 6b. Shoulder girdle margin smooth .....8
- 7a. Lateral line becoming straight below middle of soft dorsal fin, with 32 to 38 scutes; largest scute 9 to 10 times in body depth .....*S. crumenophthalmus*
- 7b. Lateral line becoming straight below origin of soft dorsal fin, with 44 to 46 scutes; largest scute about 4 times in body depth .....*S. boops*
- 8a. Body superficially naked, scales minute and embedded where present. Anterior soft rays of dorsal and anal fins filamentous in juveniles.....9
- 8b. Small scales present over most of body. Anterior soft rays of dorsal and anal fins not filamentous in juveniles.....10
- 9a. Profile of nape and head broadly rounded. Suborbital depth relatively narrow, contained 1.7 to 3.0 times in upper jaw length. Gillrakers (excluding rudiments) on lower limb of first arch 12 to 17 .....*A. ciliaris*
- 9b. Profile of nape and head somewhat angular. Suborbital depth relatively broad, contained 0.8 to 1.0 times in upper jaw length. Gillrakers (excluding rudiments) in lower limb of first arch 21 to 26 .....*A. indicus*
- 10a. Tongue, roof and floor of mouth white, the rest dark. Anal fin spines reduced or reabsorbed..... *U. helvola*
- 10b. Lining of mouth not distinctly white or dark. Anal fin spines normal and movable.....11
- 11a. Belly with a deep median groove, accommodating pelvic fins, anus and anal fin spines. Pelvic fins conspicuously long and black, tip of appressed fins extending almost to base of anal fin .....*Atropus atropus*
- 11b. Belly without median groove, pelvic fins not conspicuously long and black .....12
- 12a. Upper jaw without teeth .....13
- 12b. Upper jaw with 1 or 2 rows of a band of minute teeth.....14
- 13a. Lower jaw with a series of minute teeth. A prominent black operculum spot encroaching on shoulder. Adipose eyelid well developed posteriorly .....*S. leptolepis*
- 13b. Lower jaw with a few feeble teeth in young specimens (smaller than 10 cm fork length), absent in adults. No black opercular spot. Adipose eyelid poorly developed .....*G. speciosus*
- 14a. Fleshy adipose eyelid completely covering eye except for a vertical slit centered on pupil. Terminal ray of dorsal and anal fins finlet-like, a little more separated from other rays but not detached and about twice length of penultimate ray .....*A. mate*

- 14b. Fleshy adipose eyelid if present, not developed as above. Terminal ray of dorsal and anal fins not finlet-like (except terminal ray length 1.5 times the length of penultimate ray in large *Alepes djedaba*).....15
- 15a. Both jaws with a single row of numerous, comb-like teeth. Adipose eyelid well developed on posterior half of eye only.....16
- 15b. Dentition not as above. Adipose eyelid, if present, variously developed.....18
- 16a. Spinous dorsal fin distinctly black. Total gillrakers on first arch 24 to 30. Upper jaw with supramaxilla relatively small and without an anterior spine-like extension .....*A. melanoptera*
- 16b. Spinous part of dorsal fin transparent to dark dusky. Total gillrakers on first arch 32 to 47. Upper jaw with supramaxilla relatively large and with an anterior spine-like projection.....17
- 17a. Gillrakers on first gill arch, upper 10 to 14 and lower 27 to 33, total 37 to 47. Lateral line with 31 to 36 scales and 39 to 51 scutes (Total 77 to 85); scutes larger. Ultimate ray of dorsal and anal fins about 1.3 to 1.5 times the length of penultimate ray .....*A. djedaba*
- 17b. Gillrakers on first gill arch upper 9 to 12 and lower 23 to 26, total 32 to 38. Lateral line with 42 to 50 scales, 48 to 69 scutes (total 86 to 119), scutes smaller. Ultimate and penultimate rays of dorsal and anal fin of equal length .....*A. vari*
- 18a. Upper jaw with an outer series of moderate to strong canines and an inner band of fine teeth. Lower jaw with a single row of teeth .....19
- 18b. Dentition not as above.....23
- 19a. Breast completely scaled .....20
- 19b. Breast naked ventrally with a small patch of prepelvic scales.....22
- 20a. Small black spots scattered on head and body (forming at about 16 to 22 cm fork length). Snout length contained 9.2 to 12.7 times in fork length. Total gillrakers (including rudiments) of first arch 25 to 29 (generally 26 or 27). Total soft dorsal and anal fin rays 39 to 44 .....*C. melampygus*
- 20b. No small black spots scattered on head and body. Snout length contained 13.1 to 18.4 times in fork length. Total gillrakers (including rudiments) of first arch 22 to 25 except 24 to 27 in *C. sem* which has 34 to 38 total soft dorsal and anal fin rays .....21
- 21a. No small black spot present on upper margin of opercle. Upper lobe of caudal fin generally with distal half noticeably dark or black, particularly in juveniles. In adults, adipose eyelid only slightly developed .....*C. sem*
- 21b. A small black spot present on upper margin of opercle. Upper lobe of caudal fin usually uniformly pigmented. In adults adipose eyelid well developed. especially posteriorly .....*C. sexfasciatus*
- 22a. Total gillrakers (including rudiments) of first arch 20 to 24. General body colour silvery to black. In specimens longer than 15 cm fork length body depth contained 2.5 to 3.2 times in fork length .....*C. ignobilis*
- 22b. Total gillrakers (including rudiments) of first arch 23 to 30 (rarely 23). General body colour bronze to yellow green. In specimens larger than 15 cm fork length. body depth contained 2.7 to 3.8 times in fork length .....*C. sem*
- 23a. Breast completely scaled or with small, median naked area ventrally, scarcely if at all visible in lateral view .....*C. praeustus*
- 23b. Breast partially to completely naked ...24
- 24a. Naked area of breast separated from naked base of pectoral fin by a broad band of scales.....25
- 24b. Naked area of breast uninterrupted to naked base of pectoral fins .....29
- 25a. Second dorsal fin with a conspicuous black blotch anteriorly. Vomerine teeth patch anchor-shaped, with a long postero-median extension ....*C. praeustus*
- 25b. Second dorsal fin without a conspicuous black blotch. Vomerine tooth patch without a distinct posterior extension....26
- 26a. Segmented dorsal fin rays 25 to 34. Soft anal fin rays 21 to 26 .. 27

- 26b. Segmented dorsal fin rays 17 to 23. Soft anal fin rays 15 to 19 .....28
- 27a. Naked area of breast extends posteroventrally well beyond origin of pelvic fins..... *C. fulvoguttatus*
- 27b. Naked area of breast does not extend posteroventrally beyond origin of pelvic fins .....*C. ferdau*
- 28a. Straight part of lateral line slightly longer than curved part. Scutes 37 to 45 .....*C. oblongus*
- 28b. Straight part of lateral line slightly shorter than curved part. Scutes 20 to 38 .....*C. caeruleopinnatus*
- 29a. Soft dorsal fin rays 25 to 32 (rarely 25) .....30
- 29b. Soft dorsal fin rays 17 to 23 .....31
- 30a. Profile of snout angular and in specimens larger than about 30 cm fork length, horizontal line from snout tip distinctly below level of eye. Soft anal fin rays 22 to 26 (rarely 25 or 26). Gillrakers (including rudiments) on first arch : upper 5 to 8 and lower 16 to 20, total 22 to 27 .....*C. fulvoguttatus*
- 30b. Profile of snout moderately rounded and in specimens larger than about 30cm fork length, horizontal line from snout tip or through level of eye. Soft anal fin rays 24 to 26 (generally 25 or 26). Gillrakers (including rudiments) on first arch : upper 7 to 9 and lower 20 to 22, total 27 to 31 .....*C. gymnostethus*
- 31a. Small area naked of scales anteriorly just above pectoral fin base.....32
- 31b. Area anteriorly just above pectoral fin base completely scaled.....33
- 32a. Gillrakers (including rudiments) on first arch : upper 8 to 12 and lower 21 to 27, total 32 to 38. In life, tongue greyish-brown to brown .....*C. malabaricus*
- 32b. Gillrakers (including rudiments) on first arch : upper 6 to 9 and lower 19 to 22, total 27 to 31 In life, tongue white to pale grey .....*C. talamparoides*
- 33a. Total gillrakers (including rudiments) in first arch 31 to 37 .....*C. armatus*
- 33b. Total gillrakers (including rudiments) on first arch 20 to 27 .....34
- 34a. Dorsal profile of snout gently sloped, then abruptly vertical just above cleft of mouth. Soft dorsal fin rays 18 to 20. Soft anal fin rays 14 to 17 .....*C. chrysophrys*
- 34b. Dorsal profile of snout not as above. Soft dorsal fin rays 20 to 23 (usually 22 or 23). Soft anal fin ray 16 to 20 (usually 18 to 19) .....*C. caeruleopinnatus*
- 35a. Bases of soft dorsal and anal fins unequal in length, anal fin base shorter and only 45 to 70 percent of dorsal fin base length. Caudal peduncle grooves present, dorsally and ventrally .....36
- 35b. Base of soft anal fin as long as or only slightly shorter than base of dorsal fin. No caudal peduncle grooves .....38
- 36a. Terminal 2-rayed, first present in dorsal and anal fins. Upper jaw ending distinctly before eye (to below front border of eye in juveniles) .....*E. bipinnulata*
- 36b. No finlet in dorsal and anal fins. Upper jaw ending below front border of eye to posterior margin of eye .....37
- 37a. Upper jaw broadly rounded at end and terminating below posterior margin of eye. Gillrakers on first arch mostly consisting of rudiments, 4 to 10 total elements..... *S.nigrofasciata*
- 37b. Upper jaw truncate or slightly rounded at end and terminating below almost anterior margin of eye to middle of eye. Gillrakers on first arch mostly well developed, 11 to 29 total elements .....*N. ductor*
- 38a. Posterior soft dorsal and anal fin rays consisting of semidetached finlets distal 1/4 to 1/2 of rays not connected by interradial membrane (unattached portion of rays increasing with growth). Upper lip joined to snout at middle by a bridge of skin (frenum), except crossed by a shallow grooves in juveniles.....39
- 38b. Posterior soft dorsal and anal fin rays not consisting of semidetached finlets. Upper lip separated from snout at midline by a continuous deep groove .....42
- 39a. Total gillrakers on first arch 8 to 15; lobe of dorsal fin uniformly pigmented; height at second dorsal fin lobe 14.4 to 19.8 percent of fork length in specimens larger than 15 cm fork length.....40

- 39b. Total gillrakers on first arch 21 to 27; distal half of dorsal fin lobe abruptly and heavily pigmented; height of second dorsal fin lobe 7.7 to 11.2 percent of fork length in specimens larger than 15 cm fork length.....41
- 40a. Upper jaw extends well beyond posterior margin of eye, especially in adults, in adults teeth of inner and outer rows in lower jaw subequal in size; in life, large oval blotches above or touching lateral line .....*S. commersonianus*
- 40b. Upper jaw extends slightly beyond posterior margin of eye; in adults, inner row of teeth in lower jaw distinctly larger than those in outer row; in life, vertically elongate blotches intersecting lateral line .....*S. tala*
- 41a. Scales on midbody below lateral line lanceolate; in adults, upper jaw extends to or slightly beyond posterior margin of eye; in life a double series of 6 to 8 dusky roundish blotches above and below lateral line, occasionally connected by narrow isthmus .....*S. iysan*
- 41b. Scales on midbody below lateral line slender, needle-like; in adults, upper jaw does not extend to posterior margin of eye; in life, oval or vertically oblong dark blotches, the first 4 or 5 intersecting lateral line .....*S. tol*
- 42a. 1 to 5 spots in a longitudinal row on or near lateral line (spot absent on specimens smaller than about 10 to 13 cm fork length); soft dorsal fin rays 21 to 25 .....*T. baillonii*
- 42b. No spots in a longitudinal row on or near lateral line; soft dorsal fin rays 16 to 20.....43
- 43a. First predorsal bone shaped like inverted tear-drop or oval- shaped, this character is easily observed by simple dissection along middle of nape); supraoccipital bone of skull thin and blade-like in adults; anal fin lobe usually orange yellow with a brownish anterior margin; height of dorsal fin lobe longer, 35 to 60% of fork length in specimens 10 to 40 cm fork length; tongue toothless (except 2 or 3 slender teeth rarely on small specimens) .....*T. blochii*

- 43b. First predorsal bone shaped like an inverted 'L' with the arm projecting anterior; supraoccipital bone of skull becoming broad and sausage-shaped in specimens larger than 30 cm fork length; anal fin lobe yellow without a brownish anterior margin; height of dorsal fin lobe moderate, 24 to 34% of fork length in specimens 10 to 40 cm fork length; teeth in a narrow band on tongue, persisting to 50 cm fork length ..... *T. mookalee*

*Interest to fisheries* : Carangidae is one of the most important commercial fishes and all species are used for food and marketed mostly fresh. They are caught with trawls, purse seines, traps and on line gear. This family contains 8 monotypic species, viz., *A. atropos*, *E. bipinnulata*, *G. speciosus*, *M. cordyla*, *N. ductor*, *P. niger*, *S. leptolepis* and *S. nigrafasciata*.

*Remarks* : *P. niger* was formally been included in a separate family Apolectidae. The spelling of *Atropus atropos* is often misspelt as *Atropus atropus*.

Family CORYPHAENIDAE  
(Dolphinfishes, "Dolphins")

Elongate compressed fishes with cycloid (smooth) scales. Mouth rather large, with many fine teeth in bands. Adult males with a bony crest in front making the forehead blunt. Lateral line curved upward above pectoral fins. Dorsal fin originating on head, with 48 to 65 rays. Dorsal and anal fins very long, continuing almost to caudal fin, no spines in dorsal and anal fins. Pelvic fins thoracic fitting into a groove on body. Caudal fin deeply forked.

The coryphaenids are large oceanic fishes and are fast swimmers, occurring singly or in shoals, sometimes follow ships and form small concentrations below floating objects. They are represented by 1 genus with 2 species throughout the world in tropical and subtropical seas.

*Species known to occur in Gujarat* :

1. *Coryphaena equisalis* Linnaeus (Pompano dolphin fish)
2. *C. hippurus* Linnaeus (Common dolphin fish)

## Key to the species

Dorsal fin rays 52 to 59. Anal fin convex shaped. A broad square tooth patch on tongue. Greatest body depth more than 25% of standard length ..... *C. equisalis*

Dorsal fin rays 58 to 66. Anal fin concave shaped. An oval tooth patch on tongue. Greatest body depth less than 25% of standard length ..... *C. hippurus*

*Interest to fisheries* : *C. hippurus* is caught commercially in small quantities mostly on the Tamil Nadu coast, followed by Andhra Pradesh, Gujarat and Kerala. It is captured primarily by trawling and with tuna loglines, sometimes with drift-nets and marketed mostly fresh. Flesh is excellent to eat. There is no positive record of *C. equisalis* in India (Talwar, 1984) but this species is known to occur throughout the Indo-west region.

Family MENIDAE  
(Moon fishes)

Highly compressed disc-like body and sharp breast, dorsal contour nearly horizontal. Mouth protrudes upward and contain minute teeth. Dorsal fin with 43 to 46 soft rays, no spines. Anal fin with 30 to 33 soft rays, no spines. First two rays of pelvic fin in adult fish prolonged. Scales present but not visible to naked eyes.

This family is represented by only 1 genus with 1 species throughout the world.

*Species known to occur in Gujarat*

*Mene maculata* (Bloch) (Moon fish)

*Interest to fisheries* : *M. maculata* has minor commercial significants in our country. It is mainly caught by trawls, shore seine nets and traps and is marketed fresh or dried.

Family LEIOGNATHIDAE  
(Ponyfishes, Slipmouths)

Body deep, strongly compressed and slimy, with small scales. Head usually naked, the upper surface with bony ridges ending in a nuchal spine on nape. Mouth small and extremely protrusible which form a tube when

extended. Teeth usually small in jaws, sometimes large canines. No teeth on roof of mouth. A single dorsal fin with 8 or 9 spines and 15 to 17 soft rays. Anal fin with 3 spines and 13 to 15 soft rays. Colour silvery often characteristic colour markings on body and fins.

They are widespread in the tropical and Indo-west Pacific, mainly marine in habit but sometimes living in brackish and freshwater also. They are represented by 3 genera with 20 species, 3 genera with 15 species and 3 genera with 13 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Gazza minuta* (Bloch) (Tooth ponyfish)
2. *Leiognathus herbis* (Valenciennes) (Lined ponyfish)
3. *L. bindus* (Valenciennes) (Orangefin ponyfish)
4. *L. blochii* (Valenciennes) (Bloch's ponyfish)
5. *L. brevirostris* (Valenciennes)
6. *L. daura* (Cuvier) (Goldstripe ponyfish)
7. *L. dussumieri* (Valenciennes) (Dussumiers ponyfish)
8. *L. equulus* (Forsskal) (Common ponyfish)
9. *L. fasciatus* (Lacepede) (Striped ponyfish)
10. *L. leuciscus* (Gunther) (Whipfin ponyfish)
11. *L. splendens* (Cuvier) (Pony fish)
12. *Secutor insidiator* (Bloch) (Pugnose ponyfish)
13. *S. ruconius* (Hamilton Buchanan) (Deep pugnose ponyfish)

## Key to the species

- 1a. Distinct canine teeth in jaws. Protracted mouth points forwards ..... *Gazza minuta*
- 1b. No canine teeth in jaws ..... 2
- 2a. Mouth when protracted forming a tube directed upwards ..... 12
- 2b. Mouth when protracted forming a tube directed forward or downward ..... 3

- 3a. Ventral profile of body distinctly more convex than its dorsal profile .....*L. blindus*
- 3b. Dorsal profile of body equally or more convex than its ventral profile .....4
- 4a. Cleft of mouth at or below lower edge of eye.....5
- 4b. Cleft of mouth opposite lower edge of eye .....9
- 5a. Dark saddle-shaped blotch on nape .....*L. brevirostris*
- 5b. No saddle-like blotch on nape .....6
- 6a. Second dorsal spine distinctly elongated and filiform .....*L. fasciatus*
- 6b. Second dorsal spine not elongated.....7
- 7a. Dusky blotch on upper third of spinous dorsal fin. Pelvic fins not reaching to anal fin .....*L. splendens*
- 7b. No dusky blotch on spinous dorsal fin. Pelvic fins reaching to anal fin origin or nearly so .....8
- 8a. Mandibular profile strongly concave. Scales on breast very thin and diaphanous giving the breast a naked appearance .....*L. equulus*
- 8b. Mandibular profile straight or slightly concave. Breast conspicuously covered by normal scales .....*L. dussumieri*
- 9a. Breast naked .....*L. daura*
- 9b. Breast scaly .....10
- 10a. Dark saddle-shaped blotch on nape; black blotch on upper half of spinous dorsal fin .....*L. blochii*
- 10b. No saddle-shaped blotch on nape; no black blotch on spinous dorsal fin.....11
- 11a. Second dorsal spine greatly elongated, exceeding body depth. Second anal spine slightly elongated .....*L. leuciscus*
- 11b. Second dorsal and second anal spines not elongated, less than half body depth .....*L. berbis*
- 12a. Body deep, its depth 1.5 to 1.8 times in standard length. Maxilla tip reach to about level of lower margin of eye .....*S. ruconius*
- 12b. Body more or less slender, its depth 2.0 to 2.3 times in standard length. Maxilla tip reaching well below level of lower margin of eye .....*S. insidiator*

*Interest to fisheries:* The species of the family Leiognathidae are fairly common in both the east and west coasts of India. *L. equulus* attains at least 24cm. the largest size in the family. They are most abundant 8 to 20 meter depth. They are not particularly good to eat, but they are tremendously abundant and form a palate food when dried. These fishes are important in the food economy of our country, since each fish provides a small amount of low-cost protein. In some areas, they are also used for fishmeal. These fishes form good raw material for fishmeal plants, fish protein concentrate and other fish products. The ponyfish catches are the poorest in Gujarat among the maritime states of India.

Family LUTJANIDAE  
(Snappers)

Slender to deep-bodied fishes covered with moderate or small ctenoid scales, with a lunate, emarginate, truncate to slightly forked caudal fin. Lateral line complete, straight or gently curved. Mouth terminal, moderate to large; most with enlarged canine teeth on jaws, small teeth on palatines and generally on vomer; maxilla slips beneath preorbital when mouth closed. Dorsal fin continuous or with a shallow notch with 10 to 12 spines and 10 to 17 soft rays. Anal fin with 3 spines and 7 to 11 soft rays.

The family Lutjanidae is mainly found in tropical and subtropical marine waters, collectively known as snappers, mostly inhabitants of rocky and coral reefs. They are represented by 17 genera with 103 species, 9 genera with 41 species and 9 genera with 34 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Aphareus furcatus* (Lacepede) (Small toothed jobfish)
2. *A. rutilans* Cuvier (Rusty jobfish)
3. *Aprion virescens* Valenciennes (Green jobfish)
4. *Etelis carbunculus* Cuvier (Ruby snapper)
5. *E. coruscans* Valenciennes (Ruby snapper)
6. *Lipocheilus carnolabrum* (Chan) (Tang's snapper)

7. *Lutjanus argentimaculatus* (Forsskal) (Mangroove red snapper)
8. *L. bengalensis* (Bloch) (Bengal snapper)
9. *L. bohar* (Forsskal) (Two spot red snapper)
10. *L. ehrenbergii* (Peters) (Black spot snapper)
11. *L. erythropterus* Bloch (Crimson snapper)
12. *L. fulviflamma* (Forsskal) (Black spot snapper)
13. *L. fulvus* (Schneider) (Black tail snapper)
14. *L. gibbus* (Forsskal) (Humpback red snapper)
15. *L. johnii* (Bloch) (John's snapper)
16. *L. kasmira* (Forsskal) (Common blue stripe snapper)
17. *L. lunulatus* (Park) (Lunartail snapper)
18. *L. lutjanus* Bloch (Bigeye snapper)
19. *L. madras* (Valenciennes) (Indian snapper)
20. *L. malabaricus* Schneider (Malabar blood snapper)
21. *L. monostigma* (Cuvier) (One-spot snapper)
22. *L. quinquelineatus* Bloch (Five-lined snapper)
23. *L. rivulatus* (Cuvier) (Blubberlip snapper)
24. *L. russelli* (Bleeker) (Russell's snapper)
25. *L. sanguineus* (Cuvier) (Humphead snapper)
26. *L. sebae* (Cuvier) (Emperor red snapper)
27. *L. vitta* (Quoy & Gaimard) (Brown stripe snapper)
28. *Macolor niger* (Forsskal) (Black and white snapper)
29. *Paracaesio xanthurus* (Bleeker) (Yellowtail blue snapper)
30. *Pinjalo pinjalo* (Bleeker) (Pinjalo)
31. *Pristipomoides filamentosus* (Valenciennes) (Crimson jobfish)
32. *P. multidentis* (Goldbanded jobfish)
33. *P. sieboldii* (Bleeker) (Lavender jobfish)
34. *P. zonatus* (Valenciennes) (Oblique-banded snapper)

## Key to the species

- 1a. Base of dorsal and anal fins, specially soft portions, with covering of scales.....2
- 1b. Base of dorsal and anal fins entirely scaleless.....24
- 2a. Gillrakers long and slender, very numerous, more than 50 on lower limb of first gill arch .....*M. niger*
- 2b. Gillrakers shorter, less than 25 on lower limb.....3
- 3a. Mouth rather small, somewhat upturned. No caniniform teeth in jaws .....*P. pinjalo*
- 3b. Mouth larger, not upturned. Some caniniform teeth in jaws.....4
- 4a. Preorbital space (distance between upper jaw and eye) very narrow, 9.2 to 16.3 times in head length. Body slender, generally 3.0 (sometimes 2.9) or more times in standard length. Dorsal spines generally 11, sometimes 10 or rarely 12; soft dorsal rays 12 .....*L. lutjanus*
- 4b. Preorbital space wider, 3.3 to 8.9 times in head length. Body deeper, 2.1 to 3.1 but generally less than 3.0 times in standard length. Dorsal spines variable, 10 to 12; soft dorsal rays sometimes 12 generally 13 or more .....5
- 5a. Ground colour pale (mainly yellow in life) with a series of 4 to 8 longitudinal stripes (blue in life, usually brownish in preserved specimens) on sides .....6
- 5b. Colour not as in 5a .....8
- 6a. Dorsal spines 11 or 12 .....*L. bengalensis*
- 6b. Dorsal spines 10 .....7
- 7a. Four stripes on side, abdomen somewhat abruptly whitish, generally with thin grey lines. Scale rows on cheek 5 or 6. Upper pectoral rays darkish .....*L. kasmira*
- 7b. Five stripes on side, abdomen not abruptly whitish and without thin lines. Scale rows on cheek 10 or 11. Upper pectoral rays pale..... *L. quinquelineatus*
- 8a. Longitudinal scale rows above lateral line obliquely positioned .....9

- 8b. Longitudinal scale rows above lateral-line entirely horizontal or some rows rising obliquely from below middle part of dorsal fin .....22
- 9a. Vomerine tooth patch triangular or diamond-shaped with a medial posterior extension.....10
- 9b. Vomerine tooth patch crescentic to triangular without posterior extension .....13
- 10a. A large black spot generally present on upper side, juveniles sometimes with an ocellated spot and/or a series of 4 to 7 broad dark stripes on side.....11
- 10b. Black spot absent, a series of narrow, yellow longitudinal lines on side, those on upper back slanting upward toward dorsal fin base, occasionally an enlarged darker stripe from eye to middle of caudal fin base .....12
- 11a. Dorsal fin with generally 14 soft rays. A relatively wide gap between temporal scale bands of each side. Spot on upper side situated mainly above lateral line. Juveniles with series of 4 to 7 broad stripes (blackish to orange or yellow brown in life) on side, these persisting as thin stripes on adults from the western Indian ocean..... *L. russelli*
- 11b. Dorsal fin with generally 13 soft rays. Little or no gap between temporal scale bands of each side. Spot on upper side situated mostly below lateral line or bisected by it, spots sometimes very elongated. Juveniles without series of 4 to 7 broad dark stripes on side .....*L. fulviflamma*
- 12a. Mid-lateral stripe generally broader and darker than other stripes on sides. Transverse scale rows on cheek 7 to 10 .....*L. vitta*
- 12b. Mid-lateral stripe not broader or darker than other stripes on side, yellow in life and faint or absent in preserved specimens. Transverse scale rows on cheek generally 6 or 7 sometimes 8 ..... *L. madras*
- 13a. Total gillrakers on first arch 25 to 30 .....*L. gibbus*
- 13b. Total gillrakers on first arch 14 to 23 ..... 14
- 14a. Soft anal rays 10. Dorsal fin with 11 spines and 16 soft rays (rarely 15). Colour pattern consisting of 3 dark brown to red transverse bars, although they may be indistinct in large adults. ....*L. sebae*
- 14b. Soft anal rays 8 or 9. Dorsal fin with 10 or 11 spines, 12 to 16 soft rays. Colour not as in 14a ..... 15
- 15a. Preopercular notch distinctive (moderately to well developed) ..... 16
- 15b. Preopercular notch indistinct (shallow or absent) ..... 17
- 16a. Soft dorsal rays 15 or 16. Body relatively deep, 2.1 to 2.4 times in standard length. Head generally with numerous wavy line (bluish in life), a chalky spot usually present on lateral line below junction of spinous and soft parts of dorsal fin, bordered with black in young specimens, but disappear with maturity. Lips thick in large adults. ....*L. rivulatus*
- 16b. Soft dorsal rays 13 or 14. Body generally more slender, 2.3 to 2.8 times in standard length. Colour not as in 16a. Lips not thick in adults. ....*L. fulvus*
- 17a. Nostrils set in a prominent groove running forward from eye in specimens exceeding about 20 cm standard length, specimens under this size usually with 2 whitish spots on upper back, anterior spot below last four dorsal spines and posterior one under six dorsal rays and meeting that of other side across top of caudal peduncle. Colour usually dark brown on upper back grading to tan to light brownish (white or pink in life) ventrally, dorsal and caudal fins dusky; other portion of anal and pelvic fins distinctly blackish; upper third of pectoral fin dusky brown. Tongue with a patch of fine granular teeth .....*L. bohar*
- 17b. Nostrils not set in a groove at all sizes. Colour pattern not as in 17a. Tongue smooth or with a patch of granular teeth.....18

- 18a. Caudal fin with a distinctive crescentic black marking, remainder of body and fins uniformly yellowish tan (yellow in life) with a silvery sheen on lower sides .....*L. lunulatus*
- 18b. Caudal fin without a distinctive black marking. Colour of body and fins variable .....19
- 19a. A black spot on upper side at level of lateral line below soft dorsal fin (faint or sometimes absent in large adults), remainder of body and fins mainly pale (fins yellow body pink or yellow in life). Tongue with a patch of granular teeth, although sometimes absent in young specimens .....*L. monostigma*
- 19b. Black spot on upper side of body absent, although a saddle or spot occasionally present on upper portion of caudal peduncle. Tongue smooth.....20
- 20a. A prominent hump on forehead and a series of shallow, horizontal grooves behind eye in specimens over about 20 to 25 cm standard length. Anterior and posterior nostrils widely separated, the distance between them much greater than length of posterior nostril opening .....*L. sanguineus*
- 20b. Hump on forehead and grooves behind eye absent at all sizes. Anterior and posterior nostrils close-set, the distance between them about equal or less than length of posterior nostril opening.....21
- 21a. Mouth relatively small, maxilla length much less than distance between bases of last dorsal and anal rays. Interorbital width 3.5 to 4.8 times in head length (specimens in excess of 15 cm standard length). Some longitudinal scale rows below lateral line slanting obliquely in posterior direction toward dorsal profile. Head profile convex (in specimens over about 15 cm standard length) .....*L. erythropterus*
- 21b. Mouth larger, maxilla length about equal to distance between bases of last dorsal and anal rays. Interorbital width 5.1 to 6.6 times in head length (specimens in excess of 12 cm standard length). Longitudinal scale rows below lateral line horizontal, although some rows may slant obliquely in young specimens under about 10cm standard length. Head profile straight or slightly concave ..... *L. malabaricus*
- 22a. Vomerine tooth patch triangular with a median posterior extension. Preorbital space narrow; 8.6 to 10.3 times head length. A prominent black spot, larger than eye, bisected by the lateral line below posterior part of spinous dorsal fin .....*L. ehrenbergii*
- 22b. Vomerine tooth patch crescentic to triangular without a medial posterior extension. Preorbital space wider, 4.7 to 4.9 times in head length. Black spot on back present or absent.....23
- 23a. A large black spot on upper back generally present, if absent, ground colour pale .....*L. johnii*
- 23b. Black spot on upper back absent, ground colour dark .....*L. argenteaculatus*
- 24a. Dorsal fin deeply notched between spinous and soft portions. Maxilla scaled .....25
- 24b. Dorsal fin not deeply notched between spinous and soft portions. Maxilla generally scaleless (except scaled in *Parapristipomoides* and some species of *Paracaesio*).....26
- 25a. Total gillrakers on first gill arch 17 to 22, gillrakers, excluding rudiments, on first gill arch 10 to 13. Upper lobe of caudal fin short, 26 to 30% of standard length .....*E. carbunculus*
- 25b. Total gillrakers on first gill arch 23 or more, gillrakers, excluding rudiments, on first gill arch 19 or more. Upper lobe of caudal fin longer, almost always 32% of standard length or more in specimens larger than 130 cm standard length .....*E. coruscans*
- 26a. Pectoral fins short, about equal to snout length. A distinct groove anterior to eye .....*A. virescans*
- 26b. Pectoral fins much longer than snout length. No groove anterior to eye .....27
- 27a. Roof of mouth toothless, teeth in jaws minute, no enlarged canine.....28

- 27b. Roof of mouth with villiform teeth on vomer and palatines, teeth in jaws larger, generally with enlarged canines at front (except in *Parapristipomoides*) .....29
- 28a. Gillrakers on first arch 5 or 6 + 16 to 18 .....*A. furcatus*
- 28b. Gillrakers on first arch 16 to 19 + 30 to 34 .....*A. rutilans*
- 29a. Last ray of dorsal and anal fins conspicuously longer than preceding rays, generally produced into an elongate extension. Interorbital space flattened .....30
- 29b. Last ray of dorsal and anal fins shorter than penultimate ray or only slightly longer, not forming a conspicuous filament. Interorbital space convex except more or less flattened in *Lipocheilus* .....33
- 30a. Scales relatively large, about 47 to 52 in lateral line .....*P. multidentis*
- 30b. Scales smaller, about 54 to 74 in lateral line .....31
- 31a. Scales small about 70 to 74 in lateral line. Gillrakers on lower limb (including rudiments) 17 to 22 .....*P. sieboldii*
- 31b. Scales larger, about 54 to 66 in lateral line. Gillrakers on lower limb 8 to 18 .....32
- 32a. Body moderately deep, its depth about 2.6 to 2.8 times in standard length. Body with 4 oblique, yellow or orange bars on sides .....*P. zonatus*
- 32b. Body more slender, its depth about 3.1 to 3.8 times in standard length. Body without oblique bars on sides .....*P. filamentosus*
- 33a. Upper lip with a median fleshy protuberance, particularly well developed in adult specimens. Mouth relatively large. Dorsal spines thick, robust .....*L. carnolabrum*
- 33b. Upper lip without a fleshy protuberance. Mouth smaller. Dorsal spines relatively feeble to moderately developed .....*P. xanthurus*

*Interest to fisheries* : Snappers are important food fishes but several species are sometimes implicated in cases of human fish

poisoning (Ciguatera), including *L. bohar*, *L. fulvus*, *L. gibbus* and *L. monostigma* of the Indian region. It is believed that *Lutjanus* and other predatory fishes accumulate the responsible toxin by feeding on herbivorous fishes that eat a dinoflagellate found on dead coral or benthic algae. Although snappers seldom constitute the main focus of major commercial fisheries, they are important component of the local artisanal catch throughout their geographic range. Because of their solitary habits and territorial behaviours, the larger species are not caught in huge quantities but nevertheless are popular eating fishes frequently sold at markets. They are captured by a variety of methods which include handlines, traps, various types of nets and trawling gear. Because of their widespread distribution, encompassing numerous national boundaries and the largely artisanal nature of their fisheries, there are limited catch (Allen, 1985).

The monotypic species, *A. virescens* is a excellent eating fish found in both the coasts of India and attains a maximum length of 100cm. Another monotypic species, *L. carnolabrum* is a moderately common constituent of the longline fishery of the continental shelf off the coasts of India, especially Kerala coast. The largest known species of Lutjanids, *L. argentimaculatus* attains a maximum length of about 120cm. It is an important species throughout the Indo-pacific region, but never found in large quantities. In India this species is found in both the coasts, particularly abundant along the Maharashtra and Gujarat coast.

Family CAESIONIDAE  
(Fusilier fishes)

Oblong to fusiform, moderately compressed medium-sized to small lutjanid fishes. Mouth upturned, small and highly protrusible; ascending premaxillary process a separate ossification from premaxilla and 1 to 2 finger-like postmaxillary processes. Jaw teeth small or absent. Dorsal fin continuous with 10 to 15 slender weak spines and 8 to 22 soft rays. Anal fin with 3 spines and 9 to 13 soft rays. Caudal fin deeply forked. Scales moderate to small, weakly ctenoid; lateral scales 45 to 88.

This family is recognized following Johnson (1980) who considers its closest relatives to be the lutjanids or snapper fishes. The caesionids are specialized for planktivorous feeding, while lutjanids are typically benthic carnivores. Fusiliers are primarily reef inhabitants, although they often range over soft bottoms while swimming from reef to reef. They attain a maximum total length of 60 cm. The caesionidae are represented by 4 genera with 20 species, 4 genera with 12 species and 1 genus with 2 species found throughout the Indo-west Pacific, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Caesio lunaris* Cuvier (Lunar fusilier)
2. *C. varilineata* Carpenter (Variable-lined fusilier)

Key to the species

Anal fin generally with 3 spines and 11 soft rays. Sides without distinct yellow stripes .....*C. lunaris*

Anal fin generally with 3 spines and 12 soft rays. Sides with 3 to 6 yellow stripes which are both above and below lateral line .....*C. varilineata*

*Interest to fisheries :* *C. lunaris* is found along both the coasts and *C. varilineata* is found mainly along the western coast of India. They are of minor to moderate importance to coastal fisheries. These fishes are caught by gill nets, handlines, driven nets, seines and traps and are marketed mainly fresh.

Family LOBOTIDAE  
(Tripletails)

Body oblong slightly compressed, covered with weakly ctenoid scales of moderate size. Body depth much greater than head length. Eyes small. No supramaxilla. Jaws with an outer row of short, close-set canines and an inner band of much smaller tooth. Vomer, palatine and tongue toothless. Preoperculum serrated with small spines. Opercle with 1 or 2 flat spines. Branchiostegal rays 6. Dorsal fin

with 11 to 13 strong spines and 13 to 16 soft rays. Anal fin with 3 strong spines and with 9 to 12 soft rays. Caudal fin rounded. Soft dorsal and anal fins large and broadly rounded and symmetrical, extending past the base of caudal fin, giving the fish the appearance of having three tails.

A sluggish fish, inhabiting coastal waters and entering muddy estuaries and also found well offshore near floating objects. The young can camouflage themselves by turning sideways and floating like dead mangrove leaves. The family Lobotidae comprises a monotypic genus and found worldwide in tropical and subtropical waters.

*Species known to occur in Gujarat :*

*Lobotes surinamensis* (Bloch) (Brown Triple-tail)

*Interest to fisheries :* This species attains about 100 cm in total length and is rated highly as an excellent food fish. It is caught with beach seines, gill nets, traps and hook and line and marketed fresh or frozen.

Family GERREIDAE  
(Mojaras Silver-biddies)

Body compressed, back more or less elevated, small to median sized fishes. Head rather small, pointed. Mouth usually small, strongly protractile, pointing downwards when protracted. Gill membranes free from isthmus. Teeth small in both jaws. No teeth on roof of mouth. Single dorsal fin with 9 to 10 spines and 9 to 15 soft rays. Anal fin with 3 to 5 spines and 7 to 13 soft rays. Dorsal and anal fin bases with high scaly sheath into which the fin can be folded. Pectoral fins long and pointed. Pelvic fins with 1 spine and 5 rays, a scaled flap at base of spine. Caudal fin deeply forked. Lateral line complete and continuous with 33 to 48 scales.

These fishes live in coastal waters of all warm seas and widespread in Indo-west Pacific. They are found predominantly in shallow waters, some entering estuaries or even freshwater. This family is represented by 8 genera with 40 species, 3 genera with 10 species and 3 genera with 7 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Gerres abbreviatus* Bleeker (Deepbody mojarra)
2. *G. filamentosus* Cuvier (Whip-fin mojarra)
3. *G. macracanthus* Bleeker (Long-fin mojarra)
4. *G. oblongus* Cuvier (Oblong mojarra)
5. *G. poeiti* Cuvier (Silvery mojarra)
6. *Gerreomorpha setifer* (Hamilton Buchanan) (Black-tipped mojarra)
7. *Pentaprion longimanus* (Cantor) (Long-fin mojarra)

Key to the species

- 1a. Anal fin with 5 spines and 12 or 13 soft rays .....*P. longimanus*
- 1b. Anal fin with 3 spines and 7, soft rays .....2
- 2a. Dorsal fin with 10 spines .....*G. setifer*
- 2b. Dorsal fin with 9 spines.....3
- 3a. Second dorsal spine greatly elongated forming long filament, longer than head .....4
- 3b. Second dorsal spine not forming a filament, usually much less than head length .....5
- 4a. Predorsal distance equal to or less than body depth. A series of vertical or horizontal rows of dusky blotches on back side of the body. Lateral line scales 44 to 48 .....*G. filamentosus*
- 4b. Predorsal distance distinctly greater than body depth. A series of vertical bars on back and side of the body. Lateral line scales 40 to 44 .....*G. macracanthus*
- 5a. Body elongate, its depth at least 3 times in standard length. Lateral line scales 44 to 48 .....*G. oblongus*
- 5b. Body relatively deep, its depth 2.0 to 2.8 times in standard length. Lateral line scales 34 to 41 .....6
- 6a. Body deep, its depth 2.0 to 2.3 times in standard length, forming a sharp angle at dorsal fin origin. Pectoral fin reach up to anal fin origin. Lateral line scales 38 to 41 .....*G. abbreviatus*

- 6b. Body oblong, its depth 2.2 to 2.8 times in standard length. Pectoral fin not reaching anal fin origin. Lateral line scales 34 to 38 .....*G. poeiti*

*Interest to fisheries :* The fishes (locally known as 'Kotto' in Gujarat) of the family Gerreidae are commercially important among the perches. They contribute much to the estuaries fisheries resources of this region. *G. filamentosus* contributes to an important fishery on the Rameshwaram coast. *G. macracanthus* is fairly abundant in Palk bay, Gulf of Manner, Gujarat and Ratnagiri coast (Maharashtra). Trawl net, shore seines, boat seines and gill nets are used for catching these fishes and they are marketed fresh as well as dry condition.

Family HAEMULIDAE  
(=POMADASYIDAE)  
(Grunts, Sweetlips, Rubberlips, Hotlips)

Body oblong, compressed, perch-like. Head profile strongly convex. Mouth terminal, small or moderate; chin with 2 pores anteriorly and a median groove, or 6 pores and no median groove. Teeth in jaws cardiform, in bands, the outer row often enlarged but no canine; no teeth on roof of mouth. Dorsal fin continuous with 9 to 15 strong and 12 to 26 soft rays. Anal fin with 3 spines, the second often strong spines and robust and 7 to 9 soft rays. Caudal fin truncate or emarginate. Scales ctenoid, small to moderate extended on to head. No scale on snout, lip and chin. Basal scaly sheath usually present.

Grunts make sounds, as their common name suggest, by grinding their pharyngeal teeth. The sound is amplified by the adjacent swimbladder. They are widespread in the tropical Indo-west Pacific. The family Haemulidae is represented by 17 genera with 175 species, 4 genera with 17species and 3 genera with 15 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Diagramma pictum* (Thunberg) (Pointed sweetlips)

2. *Plectorhynchus gibbosus* (Lacepede) (Harry hotlips)
3. *P. griseus* (Cuvier) (Grey sweetlips)
4. *P. orientalis* (Bloch) (Oriental sweetlips)
5. *P. pictus* (Tortonese) (Tront sweetlips)
6. *P. polytaenia* (Bleeker) (Ribboned sweetlips)
7. *P. schotaf* (Forsskal) (Minstrel sweetlips)
8. *Pomadasys argenteus* (Forsskal) (Silver grunt)
9. *P. argyreus* (Valenciennes) (Bluecheek silver grunt)
10. *P. commersoni* (Lacepede) (Small spotted grunt)
11. *P. furcatus* (Schneider) (Banded grunt)
12. *P. kaakan* (Cuvier) (Javelin grunter)
13. *P. maculatum* (Bloch) (Saddle grunt)
14. *P. multimaculatum* (Playfair) (Cock grunter)
15. *P. olivaceum* (Day) (Olive grunt)

## Key to the species

- 1a. Chin with 2 pores, a longitudinal median groove at symphysis of lower jaw. Fin spines strong .....2
- 1b. Chin with 6 pores and no median groove or pit. Fin spines often weak.....9
- 2a. A vertical black band about 8 scales wide, over nape, terminating about 3 scales below lateral line; about 6 black blotches posterior to the vertical bands. Spinous part of dorsal fin with a large black blotch  
.....*P. maculatum*
- 2b. No black blotches on body or fins .....3
- 3a. Anal fin rays 11 to 13. A dark blotch edged with yellow anteriorly at upper of gill cover  
.....*P. olivaceum*
- 3b. Anal fin rays 10 or less .....4
- 4a. A row of interradiial scales behind dorsal and anal fin rays; above the basal sheath; about 6 dark stripes on back and flanks  
.....*P. furcatus*
- 4b. No row or rows of fin scales behind the dorsal or anal fin rays .....5
- 5a. Body with conspicuous dark or beige spots, lines or stripes.....6
- 5b. Body uniform silver, bronze or darker, no spots or lines; a dark spot may be present on opercle.....8
- 6a. Spots on body arranged in more or less thin, longitudinal irregular wavy lines  
..... *P. argenteus* (Juvenile)
- 6b. Body and fins with scattered round spots not forming regular wavy lines .....7
- 7a. Spots only on body, absent on head and snout. Anal fin rays 8 to 10  
..... *P. commersoni*
- 7b. Spots only on body, absent on head and snout. Anal fin rays 7....., *P. argenteus*
- 7c. Spots also present on head and snout  
..... *P. multimaculatum*
- 8a. Dorsal fin rays 14 (rarely 13); 7 transverse scales between lateral line and first dorsal fin spine. Spinous part of dorsal fin often spotted .....*P. kaakan*
- 8b. Dorsal fin rays 13.6 transverse scales between lateral line and first dorsal fin spine. Spinous part of dorsal fin never spotted .....*P. argyreus*
- 9a. Dorsal fin with 9 to 10 spines and 21 to 26 soft rays. 20 to 25 scales between lateral line and dorsal fin origin .....*D. pictum*
- 9b. Dorsal fin with 12 or 14 spines and 14 to 23 soft rays. 10 to 17 scales between lateral line and dorsal fin origin.....10
- 10a. Body uniformly grey, brownish or olive, with or without a paler caudal fin or dark tips to fins .....11
- 10b. Body not uniformly coloured .....13
- 11a. Dorsal fin with 14 spines..... *P. gibbosus*
- 11b. Dorsal fin with 12 or 13 spines .....12
- 12a. Pectoral fin length shorter than distance from snout tip to posterior eye margin. 21 to 23 dorsal fin rays .....*P. griseus*
- 12b. Pectoral fin length longer than distance from snout tip to posterior margin of eye. Dorsal fin rays 18 to 20  
.....*P. schotaf*
- 13a. Body with distinct spots .....*P. pictus*
- 13b. Colour pattern including large blotches, longitudinal stripes and / or small spots  
.....14

- 14a. Body with large blotches .....*P. orientalis* (Juvenile)
- 14b. No large blotches on body .....15
- 15a. Regular dark or light horizontal stripes along body. Lateral line with about 65 tubed scales .....*P. orientalis* (adult)
- 15b. Head and body with greyish longitudinal stripes. Lateral line with about 50 to 60 tubes scales .....*P. polytaenia*

*Interest to fisheries* : The family Haemulidae contributes a major element in the trawler landing along the Bombay-Gujarat coast and contributes 5 to 10% of total landings. These fishes are very important food fishes and are of very good economic value. They are caught by trawl net, shore nets, barrier nets, handline, longlines, trap and spear also. These fishes are marketed mostly fresh condition, some portion are dried and salted,.

*Remarks* : In many species (especially the genus *Plectorhinchus*) of the family Haemulidae the colouration of the juveniles, adolescent and adult fish may differ considerably, thus making identification difficult. The key is, therefore, prepared basing on juveniles and adult colouration, dorsal fin counts etc.

Family SPARIDAE  
(Seabreams, Porgies)

Body oblong, usually deep and more or less compressed. Head large, often with steep upper profile. Mouth small, upper jaw (maxilla) not extending beyond middle of eye; distal end of premaxillae overlapping the maxillae externally. Teeth in jaws well developed, usually differentiated into conical (canine-like) or flat (incisor-like) teeth in front, lateral teeth low molariforms; palate toothless. Snout and suborbital area scaleless, hind margin not serrated. Preopercle scaled, without spines or serrations on margin. Dorsal fin continuous, with 10 to 13 spines and 10 to 15 soft rays, last spine and first soft ray usually about equal in length, anterior spines sometimes elongate or filamentous. Pectoral fin long and pointed. Pelvic fins below or just behind pectoral fin base, with 1 spine and 5 soft rays, axillary scale present. Anal fin with 3 spines and 8 to 12 soft

rays, the spines especially the second one often stout. Caudal fin emarginate or forked. Scales cycloid or weakly ctenoid. Maximum length about 1.2 m. The young are often quite different from the adult in shape and markings, sometimes vividly coloured.

The family sparidae is represented by 29 genera with about 100 species, 8 genera with 10 species and 7 genera with 9 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Acanthopagrus berda* (Forsskal) (Picnic seabream)
2. *A. bifasciatus* (Forsskal) (Two-bar seabream)
3. *A. latus* (Houttuyn) (Yellowfin seabream)
4. *Argyrops spinifer* (Forsskal) (King soldier-bream, Longspine-seabream)
5. *Cheimereus nufur* (Valenciennes) (Santer seabream)
6. *Crenidens crenidens* (Forsskal) (Karanteen seabream)
7. *Diplodus sargus kotschy* (Steindechner) (One spot seabream)
8. *Rhabdosargus sarba* (Forsskal) (Goldlined seabream)
9. *Sparidentex hasta* (Valenciennes) (Sobaity seabream)

Key to the species

- 1a. A distinct separate group of 4 to 9 enlarged teeth in front of each jaw.....2
- 1b. No enlarged teeth at front of each jaw.....7
- 2a. Head between eyes scaly (scaling reaching beyond level of vertical diameter of eye) .....*A. spinifer*
- 2b. Head between eyes naked (scales ending at or behind level of vertical eye diameter) .....3
- 3a. More than 6 enlarged incisiform teeth in front of jaws .....*D. sargus kotschy*
- 3b. 4 to 6 more or less compressed, enlarged teeth in front of jaws .....4

- 4a. More than 5 scales between lateral line and 4th dorsal spine. Generally spines slender, not appearing alternately broad and narrow on each side. One enlarged molar posteriorly on each jaw..... *R. sarba*
- 4b. Less than 5 scales between lateral line and 4th dorsal spine. Dorsal spine strong, appearing alternately broad and narrow on each side. No single greatly enlarged molar posteriorly.....5
- 5a. Head with two bars across head, the first through eye and second from nape to opercle .....*A. bifasciatus*
- 5b. Head without markings, or at most with a dark band between eyes .....6
- 6a. 6 series of preopercular scales. Depth of body less than 2.4 times in standard length. Body dusky grey above, silvery white below, with anal and caudal fins blackish grey; no silvery edges to scales and no dark spot at origin of lateral line  
..... *A. berda*
- 6b. 4 or 5 series of preopercular scales. Depth of body greater than 2.4 times in standard length. Anal and lower caudal fins yellow. Scales with dark bases and silvery edges(especially above lateral line) and a dark spot at origin of lateral line  
.....*A. latus*
- 7a. Outer teeth incisiform, compressed  
..... *C. crenidens*
- 7b. Outer teeth canines some enlarged in front of jaws.....8
- 8a. First two dorsal spines short, 3rd and 7th enlarged, filamentous (especially in juveniles and subadults) .....*C. nufar*
- 8b. Dorsal spines normally graduated, not filamentous .....*S. hasta*

*Interest to fisheries:* Fishes of this family Sparidae are excellent food fishes and of considerable commercial importance in Indian waters. *A. spinifer* is captured commercially along the Andhra, Tamil Nadu and also Gujarat coast. *A. berda* is captured commercially in small quantities on Tamil Nadu and Kerala coast. *A. latus* is captured commercially on Tamil Nadu coast occasionally. It is a handsome angling fish.

Family LETHRINIDAE  
(Emperor fishes and large-eye breams)

Mouth small to moderate, terminal; lips soft and fleshy, the upper jaw protrusible. An outer row of canine teeth in front of both jaws, on sides the teeth are conical or molar-like; an inner row of villiform teeth anteriorly and vomer and palatine toothless. Gill membranes broadly united to one another but separated from isthmus. Dorsal fin continuous with 10 spines and 9 to 10 soft rays. Anal fin with 3 spines and 8 to 10 soft rays. Pectoral fin with 13 to 15 rays. Pelvic fins thoracic with 1 spine and 5 rays. Caudal fin emarginate or forked, with 7 to 9 procurrent caudal rays. Scales ctenoid.

Lethrinids are bottom-feeding, carnivorous, coastal fishes, ranging primarily on or near reefs. They are represented by 5 genera with 39 species, 5 genera with 16 species and 2 genera with 2 species throughout the world (Carpenter and Allen, 1989), in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Gymnocranius grandoculis* (Valenciennes)  
(Blue-lined large-eye bream)
2. *Lethrinus nebulosus* (Forsskal) (Spangled emperor fish)

Key to the species

- Rows of scales on cheek present. Dorsal fin with 10 soft rays and anal fin with 10 soft rays  
.....*G. grandoculis*
- Cheek naked. Dorsal fin with 9 soft rays and anal fin with 8 soft rays .....*L. nebulosus*

*Interest to fisheries :* Emperors and large-eye breams are an important component of commercial recreational and artisanal fisheries of the world. Lethrinids are prime importance to fisheries and are potentially utilizable in aquaculture. Certain species grow well in cage culture and at least one species. *L. nebulosus* has been shown to be tolerant of low salinity. They are mostly caught by handlines, traps, trawls, shore seines, gill nets and vertical longlines and are generally marketed fresh.

Family NEMIPTERIDAE

(Threadfin breams, Whilptail breams, Monocle breams, Dwarf monocle breams and Coral breams)

Body elongate to moderately deep and compressed. Mouth terminal, small to moderate; premaxillaries moderately protrusible. A dorsal fin with 10 spines and 9 soft rays. Anal fin with 3 spines and 7 soft rays. Pelvic fin with 2 unbranched and 12 to 17 branched rays. Pectoral fins thoracic with 1 spine and 5 soft rays. Caudal fin emarginate, lunate; the upper and / or lower tips of the fin with or without pointed or filamentous extension. Scales finely ctenoid.

The family Nemipteridae is confined to shallow coastal water of the tropical and subtropical Indo-west Pacific and no species occur in the eastern Pacific, Atlantic or Mediterranean sea. They are represented by 5 genera with 62 species, 3 genera with 13 species and 3 genera with 7 species throughout the world (Russell, 1990), in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Nemipterus japonicus* (Bloch) (Japanese threadfin bream)
2. *N. randalli* Russell (Randall's threadfin bream)
3. *N. zysron* (Bleeker) (Slender threadfin bream)
4. *Parascolopsis aspinosa* (Rao & Rao) (Smooth dwarf monocle bream)
5. *P. townsendi* Boulenger (Scaly dwarf monocle bream)
6. *Scolopsis taeniatus* (Ehrenberg) (Black-streaked monocle bream)
7. *S. vosmeri* (Bloch) (Whitecheek monocle bream)

Key to the species

- 1a. Suborbital naked, with a backwardly pointed spine and a series of smaller spines or serrations on its posterior margin. Posterior margin of preopercle coarsely denticulate or serrate. Canine teeth absent .....2

- 1b. Suborbital scaly or naked, spine weak or absent; posterior margin of suborbital smooth, finely serrate, or a few small denticulations. Posterior margin of preopercle finely denticulate or smooth. Canine teeth in jaws absent or present only anteriorly.....3
- 2a. Antrose suborbital spine present below eye. Dusky stripe above lateral line absent .....*S. vosmeri*
- 2b. Anterior suborbital spine absent below eye. Dusky stripe above lateral line present .....*S. taeniatus*
- 3a. Suborbital spine weak or absent, 4 to 6 transverse scale rows on preopercle .....4
- 3b. Suborbital spine absent, 3 transverse scale rows on preopercle.....5
- 4a. Suborbital scaly. Maxilla scaly or naked. No black blotch at base of middle of dorsal fin .....*P. townsendi*
- 4b. Suborbital and maxilla naked. A black blotch at base of middle of dorsal fin ..... *P. aspinosa*
- 5a. Pelvic fins very long, reaching to or beyond level of origin of anal fin .....*N. randalli*
- 5b. Pelvic fins short or moderately long, not reaching to level of origin of anal fin .....6
- 6a. Pectoral fins very long, reaching to or beyond level of origin of anal fin .....*N. japonicus*
- 6b. Pectoral fins short or moderately long, not reaching to level of origin of anal fin .....*N. zysron*

*Interest to fisheries:* The fishes of this family Nemipteridae are an important component of commercial and artisanal fisheries of Indo-west Pacific region. These are popular eating fishes and are marketed fresh, dry-salted, fermented and steamed. Nemipterids are caught mainly by bottom trawl or handline. Other methods include longline, gill nets, lift nets, surrounding nets, drive-in nets, fish stakes and traps.

*N. japonicus*, *N. randalli*, *N. zysron*, *P. aspinosa*, *P. townsendi*, and *S. vosmeri* are common species found in Gujarat as well as in other coastal states of India. *S. taeniatus*

appears to be uncommon in Gujarat as well as other parts of India.

Family SCIANIDAE  
(Croakers, Drums, Meagres, Weakfishes)

Body fairly elongate and moderately compressed. Body and head scaled except at extreme snout tip. Snout rounded or bluntly pointed. Sensory pores often prominent on tip of snout (rostral pores), on lower edge of snout (marginal pores) and on chin (mental pores). 1 or 2 mental barbels sometimes present on chin. Mouth terminal or subterminal or inferior. Teeth usually smaller, but outer teeth of upper jaw and sometimes inner teeth of lower jaw enlarged; canines may be present. Dorsal fin generally long, continuous, with a deep notch between the anterior (spinous) and posterior (soft) portions. The spinous part with 8 to 10 spines (generally 10) and posterior part with 1 spine and 21 to 34 soft rays. Anal fin with 2 spines of which the second may be greatly enlarged and strong. Caudal fin emarginate to pointed, never deeply forked. Scales cycloid on head and ctenoid on body. Lateral line scales extending to hind margin of caudal fin.

The sciaenids are represented by about 50 genera with about 210 species, 20 genera with 40 species and 12 genera with 24 species throughout the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Argyrosomus amoyensis* (Bleeker) (Amoy croaker)
2. *A. hololepidotus* (Lacepede) (Southern meagre)
3. *Dendrophysa russelli* (Cuvier) (Goatee croaker)
4. *Johnieops aneus* (Bloch) (Greyfin croaker)
5. *J. dussumieri* (Cuvier) (Dussumier's croaker)
6. *J. macrorhynchus* (Mohan) (Bigsnout croaker)
7. *J. sina* (Cuvier) (Sin croaker)
8. *J. vogleri* (Bleeker) (Sharptoothed hammer croaker)

9. *Johnius belangeri* (Cuvier) (Belanger's croaker)
10. *J. carutta* Bloch (Karut croaker)
11. *J. dussumieri* (Valenciennes) (Bearded croaker)
12. *J. elongatus* Mohan (Spirdle croaker)
13. *J. glaucus* (Day) (Pale spotfin croaker)
14. *J. macropterus* (Bleeker) (Largefin croaker)
15. *Kathala axillaris* (Cuvier) (Kathala croaker)
16. *Nibea maculata* (Schneider) (Bloched croaker)
17. *N. soldado* (Lacepede) (Soldier croaker)
18. *Otolithes cuvieri* Trewavas (Lesser tigertooth croaker)
19. *O. ruber* (Schneider) (Tigertooth croaker)
20. *Otolithoides biauritus* (Cantor) (Bronze croaker)
21. *Paranibea semiluctuosa* (Cuvier) (Half-mourning croaker)
22. *Pennahia macrophthalmus* (Bleeker) (Bigeye croaker)
23. *Protonibea diacanthus* (Lacepede) (Spotted croaker)
24. *Umbrina canariensis* Valenciennes (Canary drum)

Key to the species

- 1a. Swimbladder without appendages. A barbel on chin with a pore at its tip  
.....*Umbrina canariensis*
- 1b. Swimbladder with appendages. Barbel on chin, when present, without a pore at its tip  
.....2
- 2a. Swimbladder with only 1 or 2 pairs of simple or branched appendages.....3
- 2b. Swimbladder with more than 2 pairs of arborescent appendages.....4
- 3a. Swimbladder appendages wholly directed forward from anterior end of bladder  
.....*Kathala axillaris*
- 3b. Swimbladder appendages with at least the main part lying parallel to the bladder  
.....*Otolithoides biauritus*

- 4a. Swimbladder carrot shaped.....5
- 4b. Swimbladder hammer shaped, 'head' of tadpole-shaped impression of otolith truncated and obliquely bent, 'tail' extended to form hollow cone .....14
- 5a. Anterior pair of arborescent appendages of swimbladder branching on posterior surface of transverse septum and not entering head .....6
- 5b. Anterior pair of swimbladder appendages extending into head and branching between skull and upper gill arches.....11
- 6a. One or 2 pairs of outstanding canine teeth in upper or both jaws .....7
- 6b. Outer upper teeth enlarged and spaced, but no outstanding canines.....8
- 7a. Swimbladder with about 28 pairs of arborescent appendages. Gillrakers 12 to 17. Body deeper  $3\frac{1}{4}$  to  $4\frac{1}{4}$  times in standard length .....*Otolithes cuvieri*
- 7b. Swimbladder with 32 to 36 pairs of arborescent appendages. Gillrakers 8 to 11. Body more slender, 4 to 5 times in standard length .....*Otolithes ruber*
- 8a. Pores on chin of the 'false five' pattern, these of first pair close together behind tip of jaw and united by a groove. Lower fins dark .....*Protonibea diacanthus*
- 8b. First pair of pores small, on front of chin one on each side of tip of jaw, not united by a groove, one or two pairs behind them 2nd anal fin spine weak .....9
- 9a. Swimbladder appendages without a well-developed dorsal limb, the posterior ones parallel to wall of bladder; 'tail' of tadpole shaped impression of otolith only slightly curved ...*Pennahia macropthalmus*
- 9b. Swimbladder appendages each with a short or branched dorsal limb as well as ventral; posterior appendages simple, very short, at right angles to wall of bladder; tail of tadpole-shaped impression either slightly or strongly curved .....10
- 10a. Swimbladder with 22 to 29 pairs of arborescent appendages. Pectoral fin short, 17% of standard length. Caudal fin rhomboid .....*Argyrosomus amoyensis*
- 10b. Swimbladder with 25 to 35 pairs of arborescent appendages. Pectoral fin longer, 19 to 21% of standard length. Caudal fin almost truncate or with upper corner pointed and lower one rounded .....*Argyrosomus hololepidotus*
- 11a. Lower jaw with a single mental barbel. Lower jaw teeth uniform .....*Dendrophysa russelli*
- 11b. Lower jaw either with 2 or without mental barbels .....12
- 12a. Lower jaw teeth uniform in size. No mental barbel ....*Paranibea semiluctuosa*
- 12b. Lower jaw teeth differentiated in size. Mental barbels 2 or absent .....13
- 13a. Soft dorsal fin rays 22 to 26 .....*Nibea maculata*
- 13b. Soft dorsal fin rays 28 to 31 .....*Nibea soldado*
- 14a. Inner lateral teeth of lower jaw enlarged, outer teeth of upper jaw enlarged and widely spaced. Mouth generally subterminal.....15
- 14b. Teeth of lower jaw subequal, enlarged teeth of upper jaw not widely spaced. Mouth inferior .....19
- 15a. Gillrakers 5 to 8 on lower arm of first arch .....*Johnieops macrorhynchus*
- 15b. Gillrakers 9 to 17 on lower arm of first arch .....16
- 16a. Gillrakers 9 to 12 on lower arm of first arch .....*Johnieops vogleri*
- 16b. Gillrakers 13 to 17 on lower arm of first arch .....17
- 17a. Snout and preorbital inflated .....*Johnieops dussumieri*
- 17b. Snout decurved, but not inflated.....18
- 18a. Teeth slightly differentiated in both jaws, upper jaw without strong anterior teeth. Mouth slightly inferior ..*Johnieops aneus*
- 18b. Teeth in both jaws well differentiated, upper jaw without strong anterior teeth on each side. Mouth subterminal .....*Johnieops sina*
- 19a. A barbel on chin .....20
- 19b. No barbels on chin .....21

- 20a. Ctenoid scales present on body. Gillrakers 8 to 11. Soft dorsal fin rays 27 to 34  
.....*Johnius macropterus*
- 20b. Cycloid scales present on body. Gillrakers 6 to 9. Soft dorsal fin rays 23 to 26  
.....*Johnius dussumieri*
- 21a. Snout swollen, projecting .....22
- 21b. Snout steeply rounded, not projecting  
.....23
- 22a. Gillrakers 6 to 7. Dorsal fin rays 25 to 27. Swimbladder with 13 to 14 arborescent appendages. Body more slender, its depth 24 to 28% of standard length  
.....*Johnius elongatus*
- 22b. Gillrakers 10 to 13. Dorsal fin rays 28 to 30. Swimbladder with 14 to 15 arborescent appendages. Body deeper, its depth 29% of standard length  
.....*Johnius glaucus*
- 23a. Second anal spine rather strong and about 1/2 of head length. Swimbladder with 11 to 15 arborescent appendages  
.....*Johnius belangeri*
- 23b. Second anal spine weak, about 1/4 of head length. Swimbladder with 16 arborescent appendages.....*Johnius carutta*

*Interest to fisheries* : The sciaenids are commercially the most valuable among the ground fishes, rank fifth in the quantitative abundance of the sea fishes of India. Maharashtra ranks first, where the sciaenids form about 6% of the total marine fish catch of the state, followed by Tamil Nadu, Andhra Pradesh and Gujarat. Large fishes are generally consumed fresh or transported to interior markets. Probably the most profitable by-product of sciaenids are the swimbladders, called 'maws' in trade. The maws are used in the preparation of isinglass, a substance utilized in the clarification of wine and beer, as a substitute for gelatin in confectionary and for the preparation of certain cements. The better quality of swimbladder is exported.

Family MULLIDAE  
(Goatfishes)

Body elongate with eyes situated near dorsal profile of head. Mouth small with a pair of long chin barbels (used in detecting food).

Two widely separated dorsal fins, the first dorsal with 6 to 8 spines and second dorsal with 1 spine and 8 soft rays. Anal fin with 1 or 2 spines. Caudal fin forked.

Goatfishes live mostly in shallow waters, on sandy or muddy bottoms or in coral reef areas. They are represented by 6 genera with 55 species, 3 genera with 20 species and 3 genera with 13 species throughout the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Mulloides flavolineatus* (Lacepede) (Yellow-stripe goatfish)
2. *M. vanicolensis* (Valenciennes) (Yellowfin goatfish)
3. *Parupeneus barberinus* (Lacepede) (Dash-and-dot goatfish)
4. *P. bifasciatus* (Lacepede) (Doublebar goatfish)
5. *P. cinnabarinus* (Cuvier) (Cinnabar goatfish)
6. *P. indicus* (Shaw) (Indian goatfish)
7. *P. macronema* (Lacepede) (Longbarbels goatfish)
8. *Upeneus bensasi* (Temminck & Schlegel) (Bonsasi goatfish)
9. *U. moluccensis* (Bleeker) (Goldband goatfish)
10. *U. (Upeneus) sulphureus* Cuvier (Yellow goatfish)
11. *U. sundaicus* (Bleeker) (Ochreband goatfish)
12. *U. (Pannon) tragula* Richardson (Darkband goatfish)
13. *U. (Upeneus) vittatus* (Lacepede) (Yellow-striped goatfish)

Key to the species

- 1a. Teeth present on roof of mouth. No spine on opercular margin. Both the dorsal fins with stripes, but never on anal fin  
.....2
- 1b. No teeth on roof of mouth. A spine present on opercular margin. Either no stripe on any fin, or when stripes present, these are always on second dorsal and anal fin but not on first dorsal fin .....7

- 2a. 5 to 7 vertical scale rows along space between dorsal fins. 12 vertical scale rows along upper part of caudal peduncle. Both dorsal fins with grey or black or red horizontal stripes. Stripes on caudal fin, if present, always more numerous on upper than on lower lobe (Subgenus *Upeneus*) .....3
  - 2b. 4 vertical scale rows along space between dorsal fins. 10 vertical scale rows along upper part of caudal fin. Both dorsal fins with red or brown horizontal stripes. Stripes on caudal fin, if present, always more numerous on lower than on upper lobe (Subgenus *Pennon*) .....5
  - 3a. No cross-bars on caudal fin .....*U. sulphureus*
  - 3b. Dusky cross-bars on caudal fin .....4
  - 4a. Caudal fin with 5 to 6 dusky cross-bars on upper lobe only, no bars on lower lobe ..... *U. moluccensis*
  - 4b. Caudal fin black cross-bars on both lobes .....*U. vittatus*
  - 5a. Dorsal fin with 7 spines, the first spine longest .....*U. bensasi*
  - 5b. Dorsal fin with 8 spines, the first minute .....6
  - 6a. Lateral line scales 30 to 32. Caudal fin with a characteristic dark brown triangular stripe prolonging the lateral band along lower fin lobe ...*U. sundaicus*
  - 6b. Lateral line scales 33 to 34. Caudal fin with brown or red cross-bars (4 to 6 on upper lobe and 5 to 8 on lower) .....*U. tragula*
  - 7a. Band of fine teeth in each jaw. 5 vertical scale rows along space between dorsal fins. 12 vertical scale rows along upper part of caudal peduncle. Fins devoid of any stripes .....8
  - 7b. Single row of large, blunt teeth in each jaw, 2 to 3 vertical scale rows along space between dorsal fins. 8 to 10 vertical scale rows along upper part of caudal peduncle. Stripes always present on second dorsal and anal fins, but never on first dorsal fin .....9
  - 8a. A black spot often present in lateral yellow stripe on body. Body depth 3.6 to 4.7 times in standard length. Gillrakers 25 to 30. Fins whitish to faintly yellowish .....*M. flavolineatus*
  - 8b. No blackish spot in lateral yellow stripe on body. Body depth 3.3 to 3.9 times in standard length. Gillrakers 32 to 36. Fins yellow ..... *M. vanicolensis*
  - 9a. Caudal peduncle with a roundish black spot.....10
  - 9b. Caudal peduncle without a roundish black spot .....12
  - 10a. Barbels very long, reaching or almost reaching base of pelvic fins. Last ray of second dorsal and anal fins elongate. Gillrakers on first arch 33 to 39 .....*P. macronema*
  - 10b. Barbels short, not reaching base of pelvic fins. Last ray of second dorsal and anal fins, normal, not elongate. Gillrakers on first arch 24 to 30.....11
  - 11a. A dark stripe on snout, postorbital head and upper side of body. No large yellow blotch on lateral line.....*P. barberinus*
  - 11b. No dark stripe on body. A large, horizontally elongate yellow blotch on lateral line below posterior part of first dorsal fin and interdorsal space .....*P. indicus*
  - 12a. Body with 2 or 3 blackish vertical broad saddle-like dark bar, centered below anterior part of first dorsal fin, another below posterior part of second dorsal fin and often a third faint one on caudal peduncle. Gillrakers on first arch 35 to 41 .....*P. bifasciatus*
  - 12b. Body without dark vertical bars. Gillrakers on first arch 24 to 27 .....*P. cinnabarinus*
- Interest to fisheries* : The goatfishes constitute a fishery along the Andhra and Tamil Nadu coasts along the east and throughout the western coasts of India. The flesh of these fishes is of good quality and highly esteemed in certain areas of their occurrence. These fishes are caught with bottom trawls, shore seines, traps, gillnets and hook and line. Goatfishes contribute 0.26 to 1.4% of the total marine fish production in India.

Family MONODACTYLIDAE  
(Silverbat fish; Moonies)

Fishes with oval, deep silvery, compressed body. Mouth small, with feeble teeth, some also on palate. Single dorsal fin with long base, with 7 to 8 spines and 25 to 31 soft rays. Pelvic fins small or vestigial. Anal fin with 3 spines and 25 to 30 soft rays. Scales fine, cycloid or ctenoid, extending over vertical fins also.

The moonfishes live in marine, estuarine and freshwaters throughout many parts of the tropical Indo-Pacific. They are represented by 2 genera with 3 species throughout the world. The Moonies are represented by 1 genus with 2 species in India as well as in Gujarat.

*Species known to occur in Gujarat :*

1. *Monodactylus argenteus* (Linnaeus) (Silverbat fish)
2. *M. falciformis* Lacepede (Moon fish)

Key to the species

Body depth 1.5 to 2.0 times in standard length  
.....*M. falciformis*

Body depth 1.2 to 1.5 times in standard length  
.....*M. argenteus*

*Interest to fisheries :* These silverbat fishes are common in the coastal waters and trawling grounds especially on the Gujarat and Kerala coasts during monsoon months and are of minor commercial value. The moonies are marketed fresh as well as dry condition. *M. argenteus* is a favourite of aquarists since it thrives well in captivity, living for a number of years. Trawl nets and shore seine nets are used for catching these fishes.

Family KYPHOSIDAE  
(Rudderfishes)

Body rather deep, oval-shaped, compressed. Head small with a blunt snout. Mouth small terminal, each jaw with a regular row of close-set, strong, incisor-like, round tipped teeth of a peculiar hockey-stick shaped, with their bases set horizontally, resembling a radially striped bony plate inside the mouth.

Fine teeth on roof of mouth. Single dorsal fin with 10 to 11 spines and 12 to 15 soft rays. Anal fin with 3 spines and 11 to 16 rays. Pectoral fins short. Pelvic fins with 1 spine and 5 soft rays and with a scaly axillary process. Caudal fin forked or emarginate. Scales ctenoid, small, covering also fins (except spinous part of dorsal fin) and head (except snout).

They are widespread in the Indo-west Pacific and are represented by 3 genera with 9 species, 1 genus with 3 species and 1 genus with 1 species throughout the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Kyphosus cinerascens* (Forsskal) (Ashen drummer)

*Interest to fisheries :* The rudderfish is not quite important as food fish and brings a low price. These fishes are caught with hook and line and several types of artisanal gears and marketed fresh. The flesh is edible but in some areas not consumed due to the odour emanating from the gut.

Family EPHIPPIDAE  
(Spadefishes)

Body very deep to almost orbicular, strongly compressed. Head fairly short with steep upper profile, most of head naked or densely covered with irregular scales, but no scales on preopercular flange or in the preorbital region between mouth and eye. Gill membranes broadly attached to isthmus. Mouth small, terminal but not protrusible. Maxilla distally hidden. Teeth in jaws small and setiform. Dorsal fin with 9 spines (young said to have a procumbent point before first dorsal spine), interspinous membranes deeply incised, spinous portion of dorsal fin distinct from soft-rayed portion by a deep notch. Pectoral fins rounded and small. Pelvic fins thoracic pointed with an axillary process. Anal fin with 3 spines. Caudal fin somewhat emarginate. Scales moderate to small, cycloid. Lateral line angularly arched. Young with about 4 to 10 vertical bands extending around body which are lost with growth.

The family Ephippidae is represented by 5

genera with 6 species, 3 genera with 3 species and 1 genus with 1 species in the world, In India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Ephippus orbis* (Bloch) (Spadefish)

*Interest to fisheries :* *E. orbis* contributes a small fishery in both the coasts of India. It is found in shallow water in depths of 10 to 30 m. and is caught mainly with handlines and traps. It is marketed fresh.

Family PLATACIDAE  
(Batfishes)

Body very deep, rhomboid and strongly compressed. Head much shorter than high, with front profile more or less parabolic. Mouth small, horizontal, terminal, scarcely protractile; teeth more or less clearly tricuspid; disposed in brush-like bands in each jaw; roof of mouth usually toothless. A single, unnotched dorsal fin; spinous part with 3 to 9 spines, increasing in size posteriorly and nearly concealed by the scaly covering of the fin; 23 to 40 soft rays. Anal fin with 3 spines and 22 to 30 soft rays. Pectoral fins rounded, shorter than head. Pelvic fins well developed, the first soft ray extending to at least the anal fin. Caudal fin truncate. Lateral line arched, about concurrent with back. Scales small, finely ciliated.

The family Platacidae is found from Red sea and coast of Africa to western Central Pacific to China and Queensland (Australia). These fishes inhabit on coral reefs, in bays and along rocky shores. They are represented by 1 genus with 2 species in India as well as in Gujarat.

*Species known to occur in Gujarat :*

1. *Platax orbicularis* Forsskal (Batfish)
2. *P. pinnatus* (Linnaeus) (Round Batfish)

Key to the species

- Lateral line with 60 to 65 scales....*P. pinnatus*  
Lateral line with 50 to 55 scales... *P. orbicularis*

*Interest to fisheries :* The fishes of this family Platacidae are of minor commercial significance and are caught mainly with handlines and various types of nets. They are edible and even palatable, but poorly favoured as food on account of their foul feeding habits and feebly marketed but appreciated as aquarium fishes. *P. orbicularis* and *P. pinnatus* are common species found in both the coasts of India.

Family DREPANIDAE  
(Sickle fishes)

Body very deep and strongly compressed. Head short, with parabolic profile. Mouth very small, terminal and protractile, forming a downward-pointing tube, teeth small and setiform. Maxillae distally exposed. Subocular shelf absent. Dorsal fin with 8 to 10 spines, the first spine small, procumbent and visible only in young; the fourth spine largest, the spinous dorsal differentiated from soft dorsal fin by a deep notch. Anal fin with 3 spines. Pectoral fins long, falcate, longer than head reaching to base of caudal fin. Caudal fin rounded. Scales of moderate size finely ciliated. Lateral line strongly arched 4 to 11 vertical bands of small black spots usually present on upper half of body. The family Drepanidae is represented by 1 genus with 2 or 3 species (Smith & Heemstra, 1986), 1 genus with 2 species and 1 genus with 1 species found in the Indo-Pacific, in India (Murthy, 1969) and in Gujarat respectively.

*Species known to occur in Gujarat*

*Drepane punctata* (Linnaeus) (Spotted sicklefish)

*Interest to fisheries :* *D. punctata* supports a seasonal fishery at several places along the Indian coasts. It is a rather common coastal species, often entering estuaries. Its flesh is said to be of excellent quality. These fishes are caught with handlines, traps and bottom trawls.

Family SCATOPHAGIDAE  
(Butterfish, Scats)

Deep and compressed, angular body, with firm skin and small ctenoid scales. Mouth small, with bands of setiform and tricuspid teeth; no teeth on roof of mouth. Gill membranes narrowly attached to isthmus. A procumbent spine present before dorsal fin, spinous dorsal fin differentiated from soft dorsal fin. Dorsal fin with 11 or 12 strong

spines and 16 to 18 soft rays. Anal fin with 4 spines and 13 to 16 soft rays. Caudal fin with 16 branched fin rays. Lateral line complete. The young specimens have bony shields on head and a large shoulder spine, all vanishing with growth.

The Scatophagidae is small family represented by 2 genera with 4 species and 1 genus with 1 species all over the world and in India as well as in Gujarat respectively. This family is widespread in tropical Indo-Pacific. Although primarily marine species they enter back water and estuaries and river also.

*Species known to occur in Gujarat :*

*Scatophagus argus* (Linnaeus) (Spotted butterflyfish)

*Interest to fisheries :* *S. argus* contributes a very minor fishery in India but it has a good commercial value. It attains 30 cm in length. These fishes are popular aquarium fishes because of the attractiveness for their colour pattern of black spots on the body and orange-red colour on the dorsal surface. These fishes are locally known as Veda or Sungeli.

*Systematic notes :* The other species of the family Scatophagidae *Scatophagus tetracanthus* (Lacepede), though widespread in the tropical Indo-Pacific, has not been reported in India. The scats have 4 anal spines, an exceptional character which is quite helpful for identification.

Family CHAETODONTIDAE  
(Butterfly fishes)

Body deep and strongly compressed, oval to orbicular. Head almost as high as long. Mouth small, terminal, protractile; teeth comb like. Gill membranes united to isthmus. Dorsal fin continuous or with a slight notch between spinous and soft parts and no procumbent spine preceding dorsal fin. Dorsal fin with 6 to 16 spines and 15 to 31 soft rays. Anal fin with 3 spines and 14 to 27 soft rays. Preoperculum without a strong spine in adult. Ventrals with an axillary scale. Scales ctenoid, small to large. Lateral line extending to caudal fin base or ending near base of soft portion of dorsal fin.

The chaetodons form one of the most colourful elements of coral reefs. Their range in colour and pattern are fantastic and very popular among the aquarists. In India these fishes are quite common in the Andaman Island and are widespread in the tropical Indo-west Pacific. These butterfly fishes are represented by 10 genera with 114 species, 3 genera with 29 species and 2 genera with 2 species throughout the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Chaetodon vagabundus* Linnaeus (Vagabond butterfly fish)
2. *Heniochus acuminatus* (Linnaeus) (Pennant coral fish)

Key to the species

Lateral line incomplete, ending in vicinity of last ray of dorsal fin. Lateral line scale 34 to 40. All dorsal spines are normal size. Dorsal fin with 13 strong spines. 6 diagonal lines running from head to spinous dorsal fin and 11 to 12 lines running at right angles from the last of these to anal fin and caudal peduncle .....*C. vagabundus*

Lateral line complete, ending at base of caudal fin. Lateral line scales 45. Dorsal fin with 11 strong spines; 4th dorsal spine elongated, filamentous often longer than body depth. Deep cross bar present on body .....*H. acuminatus*

*Interest to fisheries :* Chaetodons are popularly known as reef fishes. The juveniles of these species are of commercial importance in the marine aquarium fish trade. They are marketed fresh condition.

Family POMACANTHIDAE  
(Angelfishes)

Body oval to orbicular in shape, strongly compressed. Mouth very small, terminal, protrusible, the gape not extending to anterior rim of orbit. Snout never produced. Teeth setiform, usually arranged in brush-like band in jaws. Preopercle always with a strong spine at

angle. Dorsal fin with 9 to 15 spines and 15 to 33 soft rays; continuous, greatly extended into filaments. Anal fin with 3 spines and 14 to 25 soft rays. Scales ctenoid. No axillary scaly process at bases of pelvic fins. Lateral line complete.

The angelfishes are represented by 7 genera with 80 species, 6 genera with 8 species and 1 genus with 2 species all over the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Pomacanthus annularis* (Bloch) (Ringed angelfish)
2. *P. semicirculatus* (Cuvier) (Angelfish)

Key to the species

Longitudinal more or less oblique stripes on sides of body. Anal fin rounded ...*P. annularis*  
 Vertical stripes on side of body. Anal fin acute or produced in adult..... *P. semicirculatus*

*Interest to fisheries :* The angelfishes are excellent food fishes and are great commercial importance. The juveniles of these species are of commercial value in the marine aquarium fish trade. They are caught by trawl nets, traps, gillnets, shore seines and mostly marketed fresh condition.

Family POMACENTRIDAE  
(Damsel-fishes)

Body moderately elongate to orbiculate, laterally compressed. Mouth relatively small, oblique and terminal. Subocular shelf present. Teeth of jaws small, conical to incisiform in one or more rows. Palate toothless. Single nostril on each side. A single dorsal fin with 9 to 17 spines and usually 10 to 20 soft rays. A single anal fin with usually 2 spines and 10 to 17 soft rays. Pectoral fins relatively short, with 14 to 24 rays. Caudal fin variable in shape, forked to rounded. Lateral line incomplete, interrupted. Head and body covered with small to moderate sized scales, 28 to 76 in a horizontal row from upper edge of gill opening to base of caudal fin.

Pomacentrids are small, marine, territorial fishes found mainly on shallow coral reefs of all tropical seas primarily in the Indo-Pacific and are represented by 23 genera with about 230 species throughout the world. Only 1 genus with 1 species of Damsel-fishes is known to occur in Gujarat.

*Species known to occur in Gujarat :*

*Abudefduf bengalensis* (Bloch) (Damsel-fish)

*Interest to fisheries :* The fishes of this family Pomacentridae are not of commercial value. Some species are popular aquarium fishes.

Family MUGILIDAE  
(Mulletts)

Body fairly elongate, generally with broad and flattened head. Mouth moderate in size. Teeth small or absent. Eyes generally partly covered by fatty tissue (adipose). Lateral line absent. Two short widely separated dorsal fins, the first with 4 spines and the second with soft rays. Pelvic fins subabdominal, with 1 spine and 5 branched soft rays. Pectoral fins set rather highly on body. Caudal fin moderately forked, emarginate or truncate. Scales moderate or large, modified (axillary) scales may be present below first dorsal fin and above pectoral and pelvic fins.

Mulletts inhabit coastal marine waters, estuaries and freshwaters. They are represented by 13 genera with 70 species, 7 genera with 15 species and 3 genera with 11 species throughout all tropical and temperate seas of the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Liza carinata* (Valenciennes) (Keel-mullet)
2. *L. macrolepis* (Smith) (Largescale mullet)
3. *L. melanoptera* (Valenciennes) (Otomebora mullet)
4. *L. parsia* (Hamilton-Buchanan) (Goldspot mullet)

5. *L. subviridis* (Valenciennes) (Greenback mullet)
6. *L. tade* (Forsskal) (Tade mullet)
7. *L. vaigaiensis* (Quoy & Gaimard) (Square-tail mullet)
8. *Mugil cephalus* Linnaeus (Flathead mullet)
9. *Valamugil cunnesius* (Valenciennes) (Longarm mullet)
10. *V. scheli* (Forsskal) (Bluespot mullet)
11. *V. speigleri* (Bleeker) (Speigler's mullet)

#### Key to the species

- 1a. Posterior tip of maxilla (upper jaw) not curved down tip of premaxilla .....*M. cephalus*
- 1b. Posterior tip of maxilla (upper jaw) curved down tip of premaxilla .....2
- 2a. Scales without membranes digitated hind margin. Pectoral axillary scale rudimentary or absent.....3
- 2b. Scales with membranes digitated hind margin. Pectoral axillary scales very long .....9
- 3a. Anal fin rays 8 .....*L. vaigaiensis*
- 3b. Anal fin rays 9 .....4
- 4a. Back keeled in front of first dorsal fin .....*L. carinata*
- 4b. Back not keeled in front of first dorsal fin .....5
- 5a. 12 transverse rows of scales .....*L. macrolepis*
- 5b. Transverse rows of scales less than 12 .....6
- 6a. Second dorsal fin origin over posterior half of anal fin base..... *L. tade*
- 6b. Second dorsal fin origin over anterior half of anal fin base.....7
- 7a. Preorbital bone narrow, not filling space between mouth and eye .....*L. subviridis*
- 7b. Preorbital bone wide, filling space between mouth end eye .....8
- 8a. First dorsal fin origin nearer to snout tip than to caudal fin base. 11 transverse rows of scales .....*L. parsia*

- 8b. First dorsal fin origin nearer to caudal fin base than to snout tip. 9 or 10 transverse rows of scales .....*L. melanoptera*
- 9a. Fatty (Adipose) tissue covering only a rim around eye .....*V. scheli*
- 9b. Fatty (adipose) tissue covering most of eye .....10
- 10a. Scales in lateral series 30 to 35 .....*V. cunnesius*
- 10b. Scales in lateral series 37 to 40 .....*V. speigleri*

*Interest to fisheries* : Mulletts are important food fishes and they constitute an important fishery throughout India. These fishes are generally caught with cast nets, shore seines. Most of the species are suitable for culture either in enclosed coastal waters or in freshwater tanks. The maximum landings of mulletts are from Gujarat, followed by Andhra Pradesh, Tamil Nadu and Maharashtra. *L. macrolepis* is the important species of mulletts in India and is known to occur in the seas, brackish water and freshwater. *L. vaigaiensis* is a common species in the commercial catches of west coast of India and on the east coast up to Tamil Nadu. *M. cephalus* is the most common and widely distributed species of mullet in India.

#### Family SPHYRAENIDAE (Barracudas)

Body elongate with long pointed snout. Mouth large with lower projecting beyond upper. Strong sharp fang-like teeth in both jaws and on palatines, of unequal size. Two widely separated short dorsal fins, the first with 5 spines, inserted almost opposite to pelvic fins; the second with 1 spine and 9 soft rays, inserted opposite to anal fin. Pectoral fins relatively low. Caudal fin forked. Lateral line well developed, almost straight. Gillrakers obsolete.

Barracudas are pelagic in habitat and caught at varying depths up to 100 m, though they are shoaling species but the large individuals are solitary. They are known to attack humans and are feared more than sharks in some areas. These fishes are represented by 1 genus with 18 species, 1 genus with 10 species and 1 genus with 2 species in the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Sphyraena jello* Cuvier (Banded barracuda)
2. *S. obtusata* Cuvier (Obtuse barracuda)

Key to the species

Gillrakers present on first arch. Sides devoid of any dark serpentine bars..... *S. obtusata*  
 Gillrakers absent on first arch. Sides with 10 to 20 vertical dark serpentine bars reaching below lateral line .....*S. jello*

*Interest to fisheries :* The fishes of the family Sphyraenidae are of some commercial importance as food, the flesh being delicate and well flavoured. They are caught in sizable quantities along the coasts of India. Most of the larger species are caught in hooks and lines, bottom-set gillnets and drift gillnets and also by trawlers from the inshore waters along the Indian coasts.

Family POLYNEMIDAE  
(Threadfins)

Body somewhat elongate and compressed. Mouth subterminal. Two widely separated dorsal fins (one spiny and one soft rayed), the first dorsal fin with 7 or 8 flexible spines. Anal fin with 2 or 3 spines. Pectoral fins divided into two parts, the upper normal, the lower with 3 to 15 free filamentous rays. Pelvic fins subabdominal with 1 spine and 5 branched rays. Caudal fin deeply forked. Lateral line present. Scales ctenoid, head almost completely scaled.

Threadfins are found in shallow coastal waters, over sandy or muddy bottom, marine brackish water and some in rivers. They are represented by 7 genera with 32 species, 3 genera with 12 species and 3 genera with 6 species throughout the world (Nelson, 1984), in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Eleutheronema tetradactylum* (Shaw) (Fourfinger-threadfin).
2. *Polydactylus heptadactylus* (Cuvier) (Sevenfinger-threadfin)
3. *P. indicus* (Shaw) (Indian threadfin)
4. *P. plebeius* (Broussonet) (Common threadfin)
5. *P. sextarius* (Bloch) (Blackspot threadfin)
6. *Polynemus paradiseus* Linnaeus (Paradise threadfin)

Key to the species

- 1a. Pectoral fin inserted high, upper part of its base in level with middle line of body or higher, without a sharp pectoral fold extending down from lower part of pectoral fin base to cover the bases of one or more pectoral filaments. Lateral line with its anterior part rising in a long, low curve. Free filaments very long, 7 or 8 .....*P. paradiseus*
- 1b. Pectoral fin inserted low, upper part of its base well below middle line of body; a sharp fold of skin projecting downward or forward from lower end of base of pectoral fin and covering the base of one or more of the pectoral filaments. Lateral line almost straight. Free pectoral filaments rather short, 3 to 7 .....2
- 2a. Lower lip absent, except towards the rictus (mouth corners). Teeth extending on exterior part of jaws .....*E. tetradactylum*
- 2b. Lower lip fully developed, extending far forward. No teeth on exterior part of jaws .....3
- 3a. Pectoral fin with 5 free filamentous rays .....4
- 3b. Pectoral fin with 6 or 7 filamentous rays .....5
- 4a. Eyes small, almost 7 times in head. Longest free pectoral filamentous ray extending nearly to anal fin. Body with faint dark stripes along rows of scale .....*P. indicus*

4b. Eyes large, 3.8 to 4 times in head. Free pectoral filamentous rays extending only to tip of pelvic fins. Body with dark narrow stripes along rows of scale

.....*P. plebeius*

5a. Pectoral fin with 7 free filamentous rays  
.....*P. heptadactylus*

5b. Pectoral fin with 6 free filamentous rays  
.....*P. sextarius*

**Interest to fisheries :** Threadfins are found along both the coasts especially on the north-west coast of India and support fisheries of considerable importance throughout the year. They constitute about 0.46% of the total marine fish catch in our country and almost 80% of the catches come from Maharashtra and Gujarat. These are excellent food fishes. *P. indicus* forms one of the major threadfin fisheries in India particularly in Gujarat and Maharashtra. Its swimbladder is utilized for the manufacture of isinglass. These fishes are caught with beach seines, gillnets, traps and bottom trawls.

#### Family MUGILOIDIDAE (Sandmelts, Sandperches, Grubfishes)

Body elongate, subcylindrical, posteriorly compressed. Maxilla mostly covered by preorbitals; jaws with a band of villiform teeth and an outer row of larger cardiform teeth, which are enlarged as canines in front of jaws; teeth present on vomer. One stout spine on preopercle. Dorsal fin with 4 or 5 short spines and 19 to 24 soft rays, the last spine attached by a membrane to the first ray. Anal fin with 1 weak spine and 16 to 19 branched soft rays. Pelvic fins with a short spine concealed in the skin and 5 soft rays, inserted below or slightly ahead of pectoral fins. Caudal fin rounded, or truncate to emarginate with 15 branched rays. Body scales small to moderate; opercular scales ctenoid; cycloid scales on cheeks.

The sandmelts are represented by 4 genera with 60 species, 1 genus with 6 species and 1 genus with 2 species all over the world, in India and in Gujarat respectively. They are widespread throughout Indo-west Pacific region found in coral and sandy areas near reefs

and rocky outcrops, from shore line to moderate depth over the continental shelf.

#### Species known to occur in Gujarat :

1. *Parapercis hexophthalma* (Ehrenberg) (Spotted sandmelt)
2. *P. nebulosa* (Quoy & Gaimard) (Barfaced sandmelts)

#### Key to the species

3 to 7 small, white-ringed, black ocelli along the vertical side of the body. Lateral line scales 62 to 72. Scales around caudal peduncle 27 to 34 .....*P. hexophthalma*

No black ocelli on ventral part of body. Lateral line scales 79 to 85. Scales around caudal peduncle 42 to 44 .....*P. nebulosa*

**Interest to fisheries :** No specific fishery exists for the fishes of this family Mugiloididae. Most species are too small to be considered as food fishes. They are caught as bycatch in bottom trawls or caught with hook and line. They are marketed mostly fresh and a little portion dried also.

#### Family BLENNIDAE (Combtooth and sabertooth blennies)

Small, elongate fishes. Head often with cirri on eyes, also on the nape and on posterior rim of anterior nostril. Mouth small, close-set teeth, a single row of incisor-like teeth in each jaw and often a canine-like tooth posteriorly on each side of lower and sometimes, upper jaw. Dorsal and anal fins long, their spines flexible. Dorsal fin with fewer spines than segmented. Anal fin with 2 spines, first not visible in females. Pelvic fins inserted anterior to pectoral fins, with 1 spine and 2 to 4 segmented rays. Pelvic sometimes deformed or absent. Caudal fin rays branched, or unbranched, all other segmented fin rays unbranched. Lateral line tubes or canals varying from complete to present only anteriorly on body, or absent. No scale on body.

The blennids are represented by 53 genera

with 301 species, 21 genera with 56 species and 1 genus with 1 species throughout the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Exallia brevis* (Kner) (Sabertooth blennid)

*Interest to fisheries :* Although the blennids are abundant in littoral zones, none of the blennids are of commercial importance, mainly because of their small size and are generally not used for food. They are sometimes caught in traps or by bottom trawls.

Family GOBIIDAE  
(Gobies)

Body compressed or oval. Head blunt, naked. Pores present or absent. Pelvic fins united which are sometimes totally or posteriorly incised, usually forming an adhesive or sucking disc. Usually 2 dorsal fins, but often one; spinous dorsal fin when present, separate from soft dorsal fin and with 2 to 17 flexible spines. The second, or soft-rayed, dorsal fin and the anal fin mirror each other in size and shape. Teeth variable in size, in one to several rows on both jaws. Body with ctenoid or cycloid scales. Lateral line absent in the typical members of this family.

Gobies are small bottom-dwelling fishes that are generally less than 15 cm. They commonly rest on the bottom, sometimes propped on their pelvic fins and they dart quickly from place to place. Some species live in burrows in the sand or mud and found in tidal pools or near to shore. They are widely distributed, few in freshwaters, numerous estuarine and coral reef region throughout the world. This family contains the world's smallest fishes. The Gobies are represented by 220 genera with 1600 species, 46 genera with 92 species and 6 genera with 6 species throughout the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Apocryptichthys cantoris* (Day)

2. *Boleophthalmus boddarti* (Pallas)
3. *Ctenogobius andhraensis* Herre
4. *Glossogobius giuris* (Hamilton Buchanan)
5. *Periophthalmus koelreuteri* (Pallas)
6. *Scartelaos histophorus* (Valenciennes)

Key to the species

- 1a. Teeth of lower jaw in some rows .....2
- 1b. Teeth of lower jaw in one row .....3
- 2a. Tongue emarginate to bilobate  
.....*G. giuris*
- 2b. Tongue round .....*C. andhraensis*
- 3a. Second dorsal fin not elongated  
.....*P. koelreuteri*
- 3b. Second dorsal fin elongated.....4
- 4a. Free lower eyelid absent .....*A. cantoris*
- 4b. Free lower eyelid present .....5
- 5a. Mandibular teeth obliquely notched. Scales small. No barbels on head  
.....*B. boddarti*
- 5b. Mandibular teeth pointed. Scales minute. Lower side of head with barbels  
.....*S. histophorus*

*Interest to fisheries :* The fishes of the family Gobiidae are mostly small in size. Most of the species have no commercial value. *G. giuris* is a big gobiid which has a good commercial importance.

Family GOBIOIDIDAE  
(Eel-like gobies)

Body eel-like and compressed. Eyes very small to virtually absent. Pelvic fins united. Single dorsal fin which is very elongated, usually confluent or nearly so with caudal fin. Anal fin long with 31 to 45 rays. No pouch-like cavity in opercular region. Body naked or with cycloid scales.

Those fishes inhabit marine, brackish and freshwaters throughout the Indo-west Pacific. They are represented by 8 genera with 19 species, 4 genera with 8 species and 1 genus

with 1 species throughout the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Brachyamblyopus urolepis* (Bleeker) (Sumatra eelgoby)

*Interest to fisheries :* The fishes of the family Gobioididae are very small and have no commercial value.

Family TRYPACHENIDAE  
(Burrowing gobies)

Body very elongate, eel-like. One dorsal fin which is very elongated with a distinct short spinous part. Eyes very small to indistinct. At the upper margin of the opercle there is a pit, which opens to a pouch-like cavity in opercular region. Pelvic fins usually from an adhesive disc.

These fishes, like the closely related gobiids, live in shallow waters and often burrow in muddy bottoms in marine, brackish and freshwater of the Indo-Pacific region. The burrowing gobies are represented by 5 genera with 10 species, 4 genera with 4 species and 1 genus with 1 species throughout the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Trypauchen vagina* (Bloch & Schneider)  
(Burrowing goby)

*Interest to fisheries :* *T. vagina* is a very small fish. It has no commercial value, sometimes consumed by poor people.

Family SIGANIDAE  
(Rabbitfishes, Spinefoots)

Body laterally compressed, oval, deep or slender, covered with minute, thin cycloid scales. Mouth small and terminal with a single row of incisor-like teeth in jaws. No vomerine or palatine teeth. Gill openings lateral and restricted. Dorsal fin with 13 strong spines with 10 soft rays. An antrorse (procumbent) spine before dorsal fin (sometimes covered by skin).

Pelvic fins each with 2 spines and 3 soft rays between them, a character unique to the family. Anal fin with 7 spines and with 9 soft rays. The spines are venomous.

The rabbitfish is moderate sized, herbivorous of shallow coastal waters; some species live in pairs around coral, others in schools around rock and reefs, mangroves, estuaries and brackish lagoons. They are represented by 2 genera with 27 species, 2 genera with 14 species and 1 genus with 2 species throughout the Indo-Pacific and eastern Mediterranean seas, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Siganus canaliculatus* (Park) (Whitespotted spinefoot)
2. *S. javus* (Linnaeus) (Streaked-spinefoot)

Key to the species

Depth of body 2.4 to 2.8 times in standard length. 21 to 27 scale rows between lateral line and bases of leading dorsal spines

.....*S. canaliculatus*

Depth of body 2.0 to 2.3 times in standard length. 30 to 35 scale rows between lateral line and bases of leading dorsal spines

.....*S. javus*

*Interest to fisheries :* *S. canaliculatus* and *S. javus* are caught commercially occasionally in small quantities in the Indian coast. They are captured mainly by trawls, gillnets and traps and marketed fresh. Some species are found among the more important inshore economic fishes in the tropics.

*Systematic notes :* The siganids, popularly known as rabbitfishes because of the rabbit-like appearance of the mouth and rounded nose. They can always be identified by the presence of 2 spines on each pelvic fin, the 2 spines on the margins of the fins are separated by 3 soft rays. All spines have along sides deep grooves containing venom glands. The slightest contact with one of those spine-tips produces a very painful puncture wound.

**Family GEMPYLIDAE**

(Snake mackerels, Gemfishes, Sackfishes)

Body elongate and compressed or semi-fusiform. Mouth large, not protractile, strong teeth, those at front of upper jaw often usually fang-like and sometimes also a pair of fangs at front of lower jaw. Two nostrils on each side of snout. 2 distinctly separated dorsal fins, the second dorsal fin (excluding finlets) shorter than the first. Caudal fin forked and rather large. Lateral line single or double. No caudal keels on caudal peduncle. Scales small to minute or variously modified or absent.

The snake mackerels are represented by 16 genera with 23 species, 7 genera with 7 species and 2 genera with 2 species known as far throughout the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Gempylus serpens* Cuvier (Snake mackerel)
2. *Neopinnula orientalis* (Gilchrist & von Bonde)

**Key to the species**

Pelvic fins rudimentary (with 1 spines and 0 to 4 rays) or absent .....*G. serpens*  
 Pelvic fins well developed (with 1 spine and 5 rays) .....*N. orientalis*

*Interest to fisheries :* There appears to be no special fishery for the fishes of this family Gempylidae. *G. serpens* appears sometimes as bycatch in the tuna longline fishery. It is found in both the coasts of India. *N. orientalis* is distributed mostly throughout the western coast of India.

**Family TRICHIURIDAE**

(Cutlassfishes, Hairtails, Scabbard fishes and Frost fishes)

Body exceptionally elongate and compressed with a small forked or hair like caudal fin. A single nostril on each side of snout. Mouth large, strong teeth in jaws, those at front of upper jaw fang-like. Pelvic fins

absent or reduced to 1 scale-like spine and 0 to 2 rudimentary soft rays. A single lateral line generally situated nearer to the ventral contour than the dorsal contour on posterior half of body. Scales absent.

The family Trichiuridae is represented by 9 genera with 32 speceis, 5 genera with 9 species and 3 genera with 5 speceis distributed in tropical to warm temperate waters of the world (Nakamura and Parin, 1993), in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Eupleurogrammus glossodon* (Bleeker) (Longtooth hairtail)
2. *E. muticus* (Gray) (Smallhead hairtail)
3. *Lepturacanthus savala* (Cuvier) (Savalani hairtail)
4. *Trichiurus auriga* Klunzinger (Pearly hairtail)
5. *T. lepturus* Linnaeus (Largehead hairtail)

**Key to the species**

- 1a. Pelvic fins absent. Free margin of subopercle concave .....2
- 1b. Pelvic fins scale-like. Free margin of subopercle convex.....4
- 2a. First anal fin spine large, its length half of eye diameter, soft anal fin rays pungent spinules breaking through ventral skin. Two small canine teeth on upper jaw project forward. A small slit present on ventral side of lower jaw for receiving anteriormost fang of upper jaw .....*L. savala*
- 2b. First anal fin spine small; its length less than pupil of eye; soft anal fin rays slightly breaking through ventral skin in smaller specimens. No canine tooth on upper jaw project forward. No slit on underside of lower jaw .....3
- 3a. Fangs on jaws with barbs. Dorsal fin elements more than 130 .....*T. lepturus*
- 3b. Fangs on jaws without barbs. Dorsal fin elements less than 120 .....*T. auriga*

- 4a. A pair of fangs on tip of lower jaw. Dorsal fin membrane slightly tinged with black along spines. Dorsal side of posterior part of body black. A black spot just behind dermal process on ventral side of lower jaw. Pelvic fins situated below 11th to 14th dorsal fin soft ray..... *E. glossodon*
- 4b. No fangs on tip of lower jaw. Dorsal fin membrane pale. Both dorsal and ventral sides of posterior part of body black. No black spot behind dermal process on ventral side of lower jaw. Pelvic fins situated below 15th. to 18th dorsal soft rays  
..... *E. muticus*

*Interest to fisheries* : The fishes of the genera, *Trichiurus*, *Eupleurogrammus* and *Lepturacanthus* are exploited commercially. Though flesh scanty, meat excellent to eat. These are marketed mainly fresh or salted, sometimes also frozen. The degree to which their flesh are esteemed varies locally. These fishes are caught commercially with shore seines, boat seines, bag nets, set net and bottom or midwater longlines in inshore waters and with coastal bottom trawls.

#### Family SCOMBRIDAE (Mackerels and Tunas)

Body strongly built torpedo-shaped. Gill membranes free from isthmus. 2 dorsal fins (depressible into grooves) with finlets behind second dorsal and anal fins. Lateral line simple or branched. Scales cycloid and small. Scombrids differ from most other fishes in having the caudal fin rays so deeply divided that they completely cover the hypural plate. Slender caudal peduncle with two keels.

The family Scombridae is composed of 15 genera with 49 species, 11 genera with 23 species and 8 genera with 14 species throughout the tropical and subtropical seas of the world (Collette and Nauen, 1983), in India and in Gujarat respectively.

#### *Species known to occur in Gujarat :*

1. *Acanthocybium solandri* (Cuvier) (Wahoo)
2. *Auxis rochei* (Risso) (Bullet tuna)

3. *A. thazard* (Lacepede) (Frigate tuna)
4. *Euthynnus affinis* (Cantor) (Kawakawa)
5. *Katsuwonus pelamis* (Linnaeus) (Skipjack tuna)
6. *Rastrelliger kanagurta* (Cuvier) (Indian mackerel)
7. *Sarda orientalis* (Temminck and Schlegel) (Striped bonito)
8. *Scomberomorus commerson* (Lacepede) (Narrow-barred spanish mackerel)
9. *S. guttatus* (Bloch & Schneider) (Indo-Pacific king mackerel)
10. *S. koreanus* (Kishinouye) (Korean seerfish)
11. *S. lineolatus* (Cuvier) (Streaked seerfish)
12. *Thunnus albacares* (Bonnaterre) (Yellowfin tuna)
13. *T. obesus* (Lowe) (Bigeye tuna)
14. *T. tonggol* (Bleeker) (Longtail tuna)

#### Key to the species

- 1a. Two small keels on either side of caudal peduncle. 5 dorsal and 5 anal finlets. Adipose eyelids cover front and rear of eyes ..... *R. kanagurta*
- 1b. Two small keels and a large median keel between them on either side of caudal peduncle. 7 to 10 dorsal and 6 to 10 anal finlets. Adipose eyelids absent.....2
- 2a. Teeth in jaws strong, compressed, almost triangular or knife-like. Corset of scales obscure .....3
- 2b. Teeth in jaws slender, conical, hardly compressed. Corset of scales well developed.....7
- 3a. Snout as long as rest of head. No gillrakers. 23 to 27 spines in first dorsal fin. Posterior end of maxilla concealed under preorbital bone ..... *A. solandri*
- 3b. Snout much shorter than rest of head. Gillrakers on first arch 1 to 27. 12 to 22 spines in first dorsal fin. Posterior end of maxilla exposed.....4

- 4a. Lateral line with a deep dip below first or second dorsal fin .....*S. commerson*
- 4b. Lateral line straight or descending gradually .....5
- 5a. Lateral line without auxillary branches or with only a few anteriorly... *S. lineolatus*
- 5b. Lateral line with many small auxillary branches anteriorly.....6
- 6a. Dorsal fin spines 15 to 18, generally 16 or more. Intestine with 2 loops and 3 limbs. Head longer, 20.2 to 21.5% of fork length. Body depth less, 22.8 to 25.2% of fork length ..... *S. guttatus*
- 6b. Dorsal fin spines 14 to 17, generally 14 to 15. Intestine with 4 loops and 5 limbs. Head shorter, 19.7 to 20.4% of fork length. Body depth greater, 24.4 to 26.7% of fork length..... *S. koreanus*
- 7a. Upper surface of tongue without cartilaginous longitudinal ridges ..... *S. orientalis*
- 7b. Upper surface of tongue with 2 longitudinal ridges .....8
- 8a. First and second dorsal fins widely separated, the space between them at least equal to length of first dorsal fin base. 10 to 12 spines in first dorsal fin. Interpelvic process single and long, at least as long as longest pelvic fin ray.....9
- 8b. First and second dorsal fins barely separated, at most by a space equal to eye diameter. 12 to 16 spines in first dorsal fin. Interpelvic process bifid and short, much shorter than pelvic fin rays .....10
- 9a. Posterior extension of corselet narrow, only 1 to 5 scales wide under origin of second dorsal fin. Pectoral fin extends back beyond a vertical with the front border of dorsal scaleless area .....*A. thazard*
- 9b. Posterior extension of corselet much wider, generally 10 to 15 scales wide under origin of second dorsal fin. Pectoral fin does not extend as far as dorsal scaleless area .....*A. rochei*
- 10a. 3 to 5 prominent dark longitudinal stripes on belly. Total gillrakers on first arch 53 to 63 .....*K. pelamis*
- 10b. No dark longitudinal stripes on belly. Total gillrakers on first arch 19 to 45 .....11
- 11a. Body naked behind corselet of enlarged and thickened scales. Several black spots generally present between pectoral and pelvic fin bases. Back dark blue green with a complex striped pattern under dorsal fin bases. Pectoral fin rays 25 to 29 .....*E. affinis*
- 11b. Body covered with very small scales behind corselet. No black spots on body. Back dark blue without any striped pattern. Pectoral fin rays 30 to 36 .....12
- 12a. Ventral surface of liver with prominent striations. Central lobe of liver equal to or longer than left and right lobes ..... *T. obesus*
- 12b. Ventral surface of liver without striations. Right lobe of liver much longer than left or central lobes .....13
- 13a. Total gillrakers on first arch 26 to 34, generally 27 or more. Second dorsal and anal fins of longer specimens (120 cm fork length or longer), elongate, more than 20% of fork length .....*T. albacares*
- 13b. Total gillrakers on first arch 19 to 28, generally 26 or fewer, Second dorsal and anal fins never greatly elongate, less than 20% of fork length at all sizes .....*T. tonggol*

*Interest to fisheries* : Mackerels and tunas support very important commercial and recreational fisheries as well as substantial artisanal fisheries throughout the tropical and temperate waters of the world. Many species of tunas and mackerels are the target of long-distance fisheries. Practically all scombrids are highly esteemed fishes for their high quality flesh. Mackerels and Spanish mackerels are marketed fresh, frozen, canned, smoked and salted, most of the catch of tunas are canned, though they may also be marketed fresh. The principal fishing methods used for fish schooling near the surface include purse seine, drift netting hook and line bait, boat fishing and trawling. Standard and deep longlining are used for (generally bigger) fish occurring at least temporarily in deeper water. Recreational

fishing methods involve mainly surface trawling and pole-and-line fishing while the numerous artisanal fisheries deploy great variety of gear including bag nets, cast nets, lift nets, gill (drift) nets, beach seines, hook and line, handlines, harpoons, specialized traps and fish corals (Collette and Nauen, 1983)

Two monotypic species, viz., *A. solandri* and *K. pelamis* are found mostly along the west coast and east coasts of India respectively.

#### Family XIPHIIDAE (Swordfish)

Upper jaw prolonged into a long bill, flat-oval in cross-section (in immature individuals both jaws prolonged into long bills), Fine, file-like teeth present in specimens of about 1m (body length), disappearing with growth. Two widely separated dorsal fins in adults (continuous in immature specimens), the first much larger than second; first dorsal with 34 to 49, second dorsal with 4 to 6 rays. Two separate anal fins in adults (continuous in immature specimens) the first much larger than the second; the first anal fin with 13 or 14, second anal fin with 3 or 4 rays; position of second anal fin slightly more forward than that of second dorsal fin. Pectoral fins falcate, a little right and situated low on body sides; with 16 to 18 rays. No pelvic fins and pelvic girdles. Caudal fin large and lunate with a large median keel on each and a deep notch on both the dorsal and ventral surfaces. Lateral line absent in adults, but recognizable in specimens to about 1 m body length as a wavy line, disappearing with growth. No scales in adults but scales with small spines present in specimens to about 1 m body length.

This family includes a single species, *Xiphias gladius* Linnaeus which is an epi- and mesopelagic, primarily warm-water oceanic species, generally found in surface waters warmer than 13<sup>0</sup> C, the optimum temperature range being 18<sup>0</sup> to 22<sup>0</sup> C.

#### *Species known to occur in Gujarat :*

*Xiphias gladius* Linnaeus (Swordfish)

*Interest to fisheries :* The quality of the flesh is excellent for steaks and canning. *X. gladius* is utilized mostly fresh or frozen. Catch

records from the high tuna longline fishery indicate that swordfish are taken almost throughout all the tropical and temperate oceans of that fishery. This valuable commercial species reaches a maximum size of 445 cm total length and about 540 kg weight.

*Systematic note :* *X. gladius* can be easily identified from the istiophorids by its flat bill, the absence of jaw teeth and scales in adults, the short-based first dorsal fin which is well separated from the second dorsal in adults, the absence of pelvic fins and the presence of a single median keel on each side of the caudal peduncle. In its preadult stage, the swordfish undergoes drastic morphological transmission with growth which affect the body shape, the bill and especially the dorsal anal and caudal fins.

#### Family ISTIOPHORIDAE (Marlins, Sailfishes and Spearfishes)

Premaxilla elongate, forming a long, pointed rostrum, round in cross-section. Jaws with file-like teeth in adults. Caudal peduncle fairly depressed and slightly compressed with 2 keels on each side and a shallow notch on dorsal and ventral profiles. Pelvic fins with one spine and 2 soft rays fused together, depressible into a groove. Body covered with elongate scales, each with one to several points.

Istiophorids are primarily inhabitants of warm seas generally in upper layers of water above the thermocline. These fishes are represented by 3 genera with 11 species, 3 genera with 5 species and 3 genera with 3 species throughout the world, in India and in Gujarat respectively.

#### *Species known to occur in Gujarat :*

1. *Istiophorus platypterus* (Shaw and Nodder)  
(Indo-Pacific sailfish)
2. *Makaira indica* (Cuvier) (Black marlin)
3. *Tetrapturus audax* (Philippi) (Striped marlin)

#### Key to the species

- 1a. First dorsal fin sail-like and remarkably higher than body depth at level of midbody. Pelvic fin rays very long, almost extending to anal fin origin, with well developed membrane ..... *I. platypterus*

- 1b. First dorsal fin lower than body depth at level of midbody, not sail-like. Pelvic fin rays short, well separated from anal fin origin, with moderately developed membrane .....2
- 2a. Height of anterior lobe of first dorsal fin slightly greater than or almost equal to body depth. Nape slightly elevated or not elevated. Body well compressed laterally .....*T. audax*
- 2b. Height of anterior lobe of first dorsal fin lower than body depth. Nape highly elevated. Body not compressed laterally .....*M. indica*

*Interest to fisheries* : The flesh of *I. platypterus* is dark red and not as good as that of marlin. In summer it is good for sashimi (sliced flesh with say-sauce and horse radish) or sushi (vinegred boiled rice with sliced flesh and horse radish, dipped in say-sauce during meal). This species attains a maximum size beyond 340 cm in total length and 100 kg in weight. *T. audax* is abundantly found in the western Arabian Sea. The quality of the flesh is the best among the billfishes for sashimi and sushi. It is marketed mostly frozen, sometimes fresh. *I. platypterus*, *M. indica* and *T. audax* are generally caught by surface tuna longliners.

Family ARIOMMIDAE  
(Ariommas)

Body either deep and compressed or elongate and rounded. Eyes large, with a conspicuous supraorbital ridge, centrally located and surrounded by thick adipose tissue. Mouth small and terminal, lacrimal bone covering upper jaw when mouth is closed. Two dorsal fins, the first with 10 to 12 slender spines, the second with 1 spine and 14 to 18 soft rays. Anal fin with 3 short spines and 13 to 16 soft rays. Pelvic fins inserted under posterior end of pectoral fin base, attached to the abdomen with a membrane and folding into a long pronounced groove. Caudal fin stiff and deeply forked. Caudal peduncle with two low, fleshy, lateral keels on each side. Scales large, cycloid (smooth), thin and very easily shed.

They occur in schools over muddy bottoms in moderately deep water on the continental

shelf. These fishes are represented by 1 genus with 8 species throughout the world and 1 genus with 1 species in India and in Gujarat.

*Species known to occur in Gujarat :*

*Arioma indica* (Day) (Indian ariomma)

*Interest to fisheries*: Ariommas are fine food fishes and trawling is the primary means of capture and are marketed fresh and dried salted.

Family STROMATEIDAE  
(Silver Pomfret)

Body deep and compressed. Mouth small and maxilla immovable. Gill membranes united to isthmus. Single dorsal fin, the rays not preceded by stout spines, but in some species 2 to 10 small blade-like spines are present anterior to dorsal fin. Anal fin generally with 2 to 6 spines and 30 to 50 soft rays. Pelvic fins absent in adult.

This family is represented by 3 genera with about 13 species throughout the world and 1 genus with 2 species in India and in Gujarat.

*Species known to occur in Gujarat :*

- 1. *Pampus argenteus* (Euphrasen) (Silver pomfret)
- 2. *P. chinensis* (Euphrasen) (Chinese pomfret)

Key to the species

Dorsal and anal fins falcate, preceded by 5 to 10 flat, blade-like spines. Caudal fin strongly forked..... *P. argenteus*

Dorsal and anal fins not falcate, but fin rays gradually diminish in length posteriorly; no spines preceding the median fins. Caudal fin emarginate.....*P. chinensis*

*Interest to fisheries*: The fishes of the family Stromateidae are highly desirable and marketed fresh. They occur in shoals generally away from the shore in comparatively deep waters. These fishes are abundantly caught from September to December in Gujarat, Maharashtra and Kerala. Pomfrets are taken

with bottom trawls, sometimes with driftnets and bottom gillnets.

## Order PLEURONECTIFORMES

### Family PSETTODIDAE (Indian Halibuts)

Body oval and flat but thicker than most other flatfishes. Both eyes on either left or right side. The upper eye very close to dorsal edge of body. Mouth large with strong teeth, the maxillary extends well beyond hind edge of lower eye. Gillrakers not developed. Single long dorsal fin, its origin well behind eyes; anterior fin rays spinous. Lateral line with 70 to 75 scales, almost straight.

The Indian Halibuts are widespread in the Indo-west Pacific and are found on muddy and sandy bottom of the continental shelf down to about 100m. depth. The family Psettodidae is represented by 1 genus with 3 species, all over the world and in India and 1 genus with 1 species is known to occur in Gujarat.

#### *Species known to occur in Gujarat*

*Psettodes erumei* (Schneider) (Indian Halibut)

*Interest to fisheries* : *P. erumei* is an important food fish and occurs in small quantities on both the east and west coasts of India and also occurs in deeper waters. It forms an important fishery at Madras and Bombay coasts where it is much valued as a good food fish. It is the largest flatfish of India and grows up to a length of 60 cm.

### Family BOTHIDAE (Lefteye flounder)

Flatfishes with eyes on left side of body. Males with spines sometimes present before eyes. Mouth asymmetrical, teeth present in jaws, occasionally caniniform. Preopercle exposed, its posterior border free and visible. Pectoral and pelvic fins present. Dorsal fin long, its origin above or in front of eyes. Caudal fin free from dorsal and anal fins. No spiny rays in fins. Single lateral line, sometimes forked behind upper eye, occasionally faint or absent on blind side.

Lefteye flounders are bottom-dwelling predators, usually burrowing in sand or mud bottom of the continental shelf. They are able to change their colour pattern rapidly in order to match the back-ground. Some species show sexual dimorphism in length of rays, colour pattern etc. They are represented by 37 genera with about 212 species, 12 genera with 38 species and 4 genera with 9 species throughout the world in the Atlantic, Indian and Pacific oceans, in India and in Gujarat respectively.

#### *Species known to occur in Gujarat :*

1. *Bothus myriaster* (Temminck & Schlegel) (Oval flounder)
2. *B. pantherinus* (Ruppell) (Leopard flounder)
3. *Chascanopsetta lugubris* Alcock (Pelican flounder)
4. *Engyprosopon grandisquamis* (Temminck & Schlegel) (Largescale flounder)
5. *Pseudorhombus arisus* (Hamilton Buchanan) (Largetooth flounder)
6. *P. elevatus* Ogilby (Deep flounder)
7. *P. javanicus* (Bleeker) (Javan flounder)
8. *P. malayanus* Bleeker (Malayan flounder)
9. *P. triocellatus* (Bloch) (Three spotted flounder)

#### Key to the species

- 1a. Pelvic fin base of eyed side generally much longer than that of blind side.....2
- 1b. Pelvic fin base of eyed side almost equal to that of blind side..... 5
- 2a. Maxilla contained less than 2 times in head length. Lower jaw very prominent .....*C. lugubris*
- 2b. Maxilla contained more than 2 times in head length. Lower jaw not prominent .....3
- 3a. Lateral line without a forked branched behind upper eye .....*E. grandisquamis*
- 3b. Lateral line with a forked branched behind upper eye .....4
- 4a. Scales of eyed side cycloid, except edges of body ctenoid .....*B. myriaster*

- 4b. Scales all ctenoid on eyed side .....*B. pantherinus*
- 5a. Anterior rays of dorsal fin prolonged. 3 distinct blotches forming a triangular on body. 20 to 25 gillrakers on lower arm of first gill arch .....*P. triocellatus*
- 5b. Anterior rays of dorsal fin not prolonged. 1 to 3 distinct blotches on straight part of lateral line but never forming a triangular on body. 8 to 15 gillrakers on lower arm of first arch .....6
- 6a. Scales on blind side of body ctenoid .....*P. malayanus*
- 6b. Scales on blind side of body cycloid.....7
- 7a. Teeth strong, rather widely set, canines large; 6 to 13 teeth in lower jaw of blind side .....*P. arsius*
- 7b. Teeth smaller, more close-set, not much enlarged anteriorly; generally more than 20 teeth in lower jaw of blind side .....8
- 8a. Eyed side with numerous blotches arranged in 5 irregular rows along body and 3 large distinct blotches along straight part of lateral line .....*P. elevatus*
- 8b. Eyed side with darker spots and blotches. A large blotch at anterior end of straight part of lateral line and a smaller blotch halfway to caudal fin base .....*P. javanicus*

*Interest to fisheries* : Lefteye flounders are of minor fishery importance in our country. Although never caught in large quantities, some species are often present in the catches. The flesh is of good quality but majority of the species are quite small in size. They are mostly caught by bottom trawls and marketed fresh and dried salted.

**Family CYNOGLOSSIDAE**  
(Tongue soles)

Tongue-shaped flat fishes, with eyes sinistral (left side) of head. Mouth asymmetrical, lips sometimes fringed, rostral hook present below mouth. Teeth minute and on blind side only. Preopercle margin not free, covered with skin and scales. Dorsal fin originates on head; both dorsal and anal fins confluent with caudal fin. Pectoral fin absent; only left pelvic

fin present; no spiny rays in dorsal and pelvic fins. Scales small, ctenoid or cycloid. Lateral line variable 0 to 3 on ocular side and 0 to 2 on blind side.

Tongue soles are small to medium-sized benthic fishes, found mainly on muddy bottom of shelf area. They are represented by 3 genera with 103 species, 3 genera 21 species and 2 genera with 9 species throughout the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Cynoglossus arel* (Schneider) (Largescale tonguesole)
2. *C. bilineatus* (Lacepede) (Fourlined tonguesole)
3. *C. carpenteri* Alcock (Hooked tonguesole)
4. *C. dispar* Day (Roundhead tonguesole)
5. *C. dubius* Day (Carrot tonguesole)
6. *C. lingua* Hamilton Buchanan (Long tonguesole)
7. *C. macrostomus* Norman (Malabar tonguesole)
8. *C. puncticeps* (Richardson) (Speckled tonguesole)
9. *Paraplagusia bilineata* (Bloch) (Doublelined tonguesole)

**Key to the species**

- 1a. Lips with row of fringed tentacles .....*P. bilineata*
- 1b. Lips smooth, not fringed .....2
- 2a. Caudal fin with 12 rays .....3
- 2b. Caudal fin with 10 rays .....4
- 3a. One lateral line on blind side .....*C. dubius*
- 3b. Two lateral lines on blind side .....*C. bilineatus*
- 4a. Two lateral lines on blind side .....*C. dispar*
- 4b. No lateral line on blind side .....5
- 5a. Scales cycloid on blind side of body .....6
- 5b. Scales ctenoid on blind side of body .....8
- 6a. Three lateral lines on ocular side of body .....*C. carpenteri*

- 6b. Two lateral lines on ocular side of body ...7  
 7a. Scales 11 or 12 between lateral lines on ocular side of body..... *C. lingua*  
 7b. Scales 7 to 9 between lateral lines on ocular side of body..... *C. arel*  
 8a. Cleft of mouth extending far back to hind border of fixed eye .....*C. macrostomus*  
 8b. Cleft of mouth extending to only middle or almost hind border of fixed eye .....*C. puncticeps*

*Interest to fisheries* : Tonguesole are not so commercially important. *C. macrostomus* is the object of an important fishery on the South-west coast of India. These fishes are caught mainly by bottom trawls, boat and shore seines and marketed fresh, frozen and dried salted.

#### Family SOLEIDAE (Soles)

Flat fishes with eyes dextral (on right side of body). Margin of preoperculum not entirely free, embedded in skin and scales of the head. Mouth small and asymmetrical, terminal or slightly inferior; snout sometimes hook-shaped. Teeth small, villiform, better developed on blind side. Dorsal fin extends on head to above eye or beyond; dorsal and anal fins free or confluent with caudal fin. Pectoral fins usually absent in adult. Pelvic fins sometimes asymmetrical, either free or joined to anal fin. Scales moderately large, cycloid or ctenoid; sometimes modified into skin flaps fringed with sensory filaments. Lateral line single on body; sometimes branched on head.

Soles are found in shallow and muddy bottom in coastal waters and widespread in the tropical Indo-west Pacific. The family Soleidae is represented by 31 genera with 120 species, 9 genera with 22 species and 5 genera with 7 species throughout the world, in India and in Gujarat respectively.

#### *Species known to occur in Gujarat :*

1. *Aesopia cornuta* Kaup (Horned sole)
2. *Euryglossa orientalis* (Bloch & Schneider) (Oriental sole)

3. *Solea elongata* Day (Elongate sole)
4. *S. ovata* Richardson (Ovate sole)
5. *Synaptura commersoniana* (Lacepede) (Commerson's sole)
6. *Zebrias quagga* (Kaup) (Fringefin zebra sole)
7. *Z. synapturoides* (Jenkins) (Zebra sole)

#### Key to the species

- 1a. Caudal fin separate from dorsal and anal fins .....2
- 1b. Caudal fin confluent with dorsal and anal fins .....3
- 2a. Body ovate, its depth 2.0 to 2.2 times in total length. Dorsal fin with 58 to 67 rays. Anal fin with 41 to 51 rays..... *S. ovata*
- 2b. Body elongate, its depth 2.4 to 3.0 times in total length. Dorsal fin with 67 to 77 rays. Anal fin with 52 to 63 rays .....*S. elongata*
- 3a. Opercular membrane not joined to pectoral fins .....4
- 3b. Opercular membrane of both sides of body joined to upper rays of pectoral fins .....5
- 4a. Body elongate, a bony process on snout .....*S. commersoniana*
- 4b. Body oblong, no bony process on snout .....*E. orientalis*
- 5a. First ray of dorsal fin elongated and free .....*A. cornuta*
- 5b. First ray of dorsal fin not elongated .....6
- 6a. Posterior rays of dorsal and anal fins joined to basal half of caudal fin .....*Z. synapturoides*
- 6b. Posterior rays of dorsal and anal fins more or less completely joined to caudal fin .....*Z. quagga*

*Interest to fisheries* : Soles are mostly small fishes, taken commercially in small quantities. Some species are of commercial importance, highly esteemed as food. These fishes are caught with bottom trawls and shore seines. They are marketed fresh and dried salted and locally known as 'Lep' or 'Indi'

Order TETRAODONTIFORMES

Family TRIACANTHIDAE  
(Tripodfishes, Triplespines)

Small fishes with deep compressed bodies. Skin moderately thick with numerous scales not individually visible to the naked eyes. Each scale bears upright spinules. Gill openings a relatively short vertical slit in front of pectoral fin base. Mouth small and usually terminal. Teeth in an outer series of about 10 heavy incisors in each jaws, internal to which are several molariform teeth, usually 4 in upper jaw and 2 in lower jaw. Dorsal fin spines 6 (usually 5 visible only, the 6th being rudiment) with 20 to 26 rays. Anal fin rays 13 to 22. Pelvic fins represented by a large spine which is movably articulated with anterior end of pelvic and capable of being locked erect by a flange of the pelvis. Caudal fin deeply forked, caudal peduncle distinctly tapered. Lateral line inconspicuous.

Tripod fishes are shallow benthic, occurring usually on flat, sandy or weed covered bottoms. The family Triacanthidae is represented by 4 genera with 8 species, 3 genera with 5 species and 2 genera with 2 species throughout the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Pseudotriacanthus strigilifer* (Cantor)  
(Long-spined tripodfish)
2. *Triacanthus biaculeatus* (Bloch) (Short-nosed tripodfish)

Key to the species :

Scale-covered ventral surface of pelvis almost as wide anteriorly as posteriorly not distinctly tapered to a point. Length of second dorsal fin spine not greater than half the length of first dorsal spine ..... *T. biaculeatus*

Scale-covered ventral surface of pelvis much wider anteriorly than posteriorly, distinctly tapered to a point. Length of second dorsal fin spine more than half the length of first dorsal spine ..... *P. strigilifer*

*Interest to fisheries :* *T. biaculeatus* and *P. strigilifer* do not contribute fishery and most commonly caught off the coast of India. These fishes are captured by bottom trawls, gillnets and shore seines and are not considered as food fish.

Family BALISTIDAE  
(Trigger fish, Leather jackets, Durgons)

Body generally deep and compressed, encased with very thick, tough skin with large rectilinear scale plates easily discernible as individual units; scales above pectoral fin base generally enlarged and slightly separated, forming a flexible tympanum. Mouth small and generally almost terminal, teeth heavy, 8 in an outer series in the upper jaw and 8 in the lower jaw. 3 dorsal fin spines, the second spine more than one-half the length of the first; the spine capable of being locked in an upright position of erection by the second. Most dorsal, anal and pectoral fin rays branched. Pelvic fins and spines rudimentary or absent, represented by a series of 4 pairs of enlarged scales encasing the end of pelvis.

This family is represented by about 42 genera with 135 species, 10 genera with 14 species and 1 genus with 1 species throughout the world (Nelson 1984) in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Abalistes stellatus* (Lacepede) (Starry triggerfish)

*Interest to fisheries :* *A. stellatus* is of no commercial importance, only accidentally caught as bycatch in commercial bottom trawls.

Family MONACANTHIDAE  
(File fishes, Trigger fishes, Leather jackets)

Small or median-sized fishes usually with deep highly compressed bodies covered by smooth to rough shagreen-like skin consisting of minute to small scales armed with 1 to many fine spinules. Mouth small generally terminal, non-protractile; teeth pointed and not fused together. Gill openings, a short vertical to oblique slit in front of or above pectoral fin base. Two dorsal fin spines, the first large and

usually armed with downward-curving barbs; the second spine very small and capable of locking the first in an upright position. Pelvic fins rudimentary represented by a series of 3 or fewer pairs of enlarged scales encasing the posterior end of the pelvis which projects through the skin, or a single scale anterior to the posterior end of the pelvis disappearing with age or entirely absent. Pelvic generally capable of vertical movement giving rise to a vertical flap. Caudal peduncle sometimes armed with prominent spines elongate bristles or a dense patch of the bristles. Caudal fin rounded. The trigger fishes are found in all the tropical and temperate coastal waters of the world. They are represented by 31 genera with 95 species, 8 genera with 12 species and 1 genus with 1 species all over the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

*Alutera monoceros* (Linnaeus) (Unicorn leather jacket)

*Interest to fisheries :* *A. monoceros* is reported to be excellent eating when skinned and taken commercially only occasionally in our country. They are mainly caught with bottom trawls and are marketed fresh.

Family OSTRACIIDAE  
(Boxfishes, Cowfishes)

Small to medium-sized fishes, the body almost completely encased in a bony shell, or carapace formed of enlarged, thickened scale plates, usually hexagonal in shape and firmly sutured to one another. The carapace has opening for mouth, eyes, gill slits, pectoral, dorsal and anal fins and for the flexible caudal peduncle, and is either triangular in cross section, rectangular or pentangular. Scale-plates often have surface granulations and in some species these are prolonged into prominent carapace spine over eye or along ventrolateral or dorsal angles of the body. Gill openings short, vertical to oblique slits in front of pectoral fin bases. Mouth small, terminal with fleshy lips; teeth moderate, conical usually less than 15 in each jaw. Spinous dorsal fin absent, most dorsal, anal and pectoral fins with branched rays.

Pelvic fins absent. Lateral line inconspicuous. Caudal fin long.

Boxfishes are slow-swimming benthic-dwelling fishes found on rocky and coral reefs to depth of 100m. They are widespread to the Indo-West Pacific and represented by 14 genera with 37 species, 4 genera with 7 species and 2 genera with 2 species throughout the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Lactoria cornuta* (Linnaeus) (Longhorn cowfish)
2. *Tetrosoma gibbosus* (Linnaeus) (Hunchback boxfish)

Key to the species

Carapace 3 or 5 angled, roughly triangular in cross section. A large triangular flat spine on middle dorsal ridge. A small and backwardly directed spine on each side and 4 or 5 acute, flat spines along each ventrolateral ridge ..... *T. gibbosus*

Carapace 5 angled. Not triangular in cross section. No such triangular spine on middle of dorsal ridge. Spines present on carapace projecting anteriorly from eyes, posteriorly from rear end of ventrolateral ridge ..... *L. cornuta*

*Interest to fisheries :* The boxfishes have no economic importance, generally considered as trashfish and not consumed because many species are reported to have toxic flesh. They are caught by trawls and other types of nets or traps.

Family DIODONTIDAE  
(Porcupinefishes, Spiny puffers, Burrfishes, Balloonfishes)

Body wide and capable of great inflation, covered with well developed sharp spines. The spines are long and short and have large bases or roots under the skin. Long spines are usually erectile and are two-rooted, while short spines are fixed in an erect position by three rooted

bases. Head broad and blunt. Gill openings a relatively small vertical slit immediately before the pectoral fin base. Mouth large, wide and terminal. Two fused teeth in jaws to form a beak-like crushing structure without a median suture dividing upper and lower jaws into right and left halves. Dorsal and anal fins without spines, set far back on the body. Most of the fin rays branched. Caudal fin rounded. No pelvic fins. Lateral line inconspicuous. No normal scales.

Most species are benthic around coral or rocky reefs and are represented by 9 genera with 19 species 4 genera with 6 species and 2 genera with 2 species throughout the world, in India and in Gujarat respectively.

*Species known to occur in Gujarat :*

1. *Chilomycterus orbicularis* (Bloch) (Bird beak burrfish)
2. *Diodon holocanthus* Linnaeus (Balloonfish)

Key to the species

All spines two-rooted long and erectile, except for a few around gill opening, dorsal fin base and an caudal peduncle. 5 large dark blotches on back and head .....*D. holocanthus*

Atleast the spines on the sides and back, posterior to the pectoral fin three-rooted in an erect position. Clusters of pupil to eye-size black spots on back and head .....*C. orbicularis*

*Interest to fisheries :* Both the species do not contribute any fishery and rarely consumed

as considered to be poisonous.

SUMMARY

The present study has recorded 26 orders, 112 families, 257 genera consisting of 487 species of marine and estuarine fishes so far known from Gujarat. The cartilaginous fishes (Class : Chondrichthyes) comprises 7 orders, 22 families and 58 species. The bony fishes (class : Osteichthyes) consists of 19 orders, 90 families and 429 species. All the 112 families of fishes are described with their important characters in brief. Key to the classes, orders, families and species have been furnished in this work. English names of almost all the species are given along with the scientific names of the fishes occurring in Gujarat. The fisheries importance of the species and families are also provided in this study. Systematic notes of some species and families of fishes and remarks, if any, are given in this work.

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## FRESHWATER FISHES

T.K. SEN & P.K. BANERJEE

Zoological Survey of India, Calcutta

### INTRODUCTION

Since the publication of Day's (1878-1889) monumental legend on the "*Fishes of India*" a large number of additional data have accumulated. Many taxonomic changes altering the basic concept of Day have also come into being. It is now certain that no single ichthyologist or even a team of ichthyologists can do justice for a complete revision of all the fishes known from India.

The obvious recourse would be to undertake regional faunal revision and compendiums. This paper on the "*Freshwater fish fauna of Gujarat*" is one such offering.

Freshwater fish fauna of the present political state of Gujarat is least known ichthyologically (except a few scattered publications) compared to other states of India. An urgent need, for a complete and comprehensive scientific account on the freshwater fish fauna of Gujarat was seriously felt by the Zoological survey of India since the days of its political separation from the earlier state of Bombay presidency in 1960.

The districts of Gujarat are connected directly or indirectly by the principal river systems of Gujarat viz., Sabarmati, Mahi, Tapi and Narmada, besides, other small rivers, rivulets, streams and host of feeders that either merge in the Rann of Kutch or fall into the Gulf of Cambay and Arabian Sea.

The present drainage acts like a key to the past and portrays almost connected evolution of drainage at least in the recent past. The drainage divide is formed by the discontinuous hilly backbone in Kutch. Rising from its southern slope, numerous streams abound from

Kori Creek in the West to the eastern terminus of the Gulf of Kutch. They carve out their valleys for a few kilometres before uniting with the Gulf of Kutch. Pachcham island in the north reveals a radial pattern of drainage within its narrow compass from its central summit. In the mudflats of the Rann, live creeks, lakes, marshes and traces of dendritic drainage do not lack even when they have been modified by recent earthquakes.

The radial drainage pattern of Kathiawar is guided by two hill masses of Rajkot (383m) and Gir Range (728m) which are linked by tortuous narrow neck of high-land, North flowing streams unite with Gulf of Kutch and the Little Rann, while south-flowing streams merge in the Arabian Sea. Carving out their valleys in the Surat sea coast, the Bhadar and Ojat rivers together with other west-flowing streams terminate in the Arabian sea whereas the eastward drainage lines like the striped 'shatranji' and others discharge their waters in the Gulf of Cambay. A detailed study of the drainage also reveals annular pattern flanking the Girnar Hills. Another drainage source lies on the south-western slope of the Aravallis. The Sabarmati and the Mahi with their feeders form the drainage net.

The eastern highland-face registers the source of various streams south of Tapi. The Narmada and the Tapi running from east to west along the rift valleys. They enter the western coast of peninsular India to unite with the Gulf of Cambay but the currents generated in the Cambay wash away the silts of the Narmada and Tapi. The free movements of their silt is arrested by the Cambay currents and is further responsible for causing estuary on their

respective mouths. The streams south of Tapi are short, swift and young. They are engaged in notching the scraps of the western Ghats. The Mahi, the Narmada and the Tapi form the main arteries of the Gujarat plain whereas the Banas, the Saraswati, the Viswamitra, the Dhadhar, the Kim, the Purna, the Ambica, the Auranga, the Damanganga, the Shatrunji, the Bhadar, the Aji and a host of other feeders either merge in the Rann of Kutch or fall into Gulf of Cambay and the Arabian sea.

Zoogeographically Gujarat fishes have more affinities with that of the central India. i.e., the Stapura and the Narmada drainage system than to the Peninsula and especially the Western Ghats. They traced the affinity of zoogeography of the fish fauna of Rajasthan, Punjab and Western Himalayas. It has been observed that the Aravallis during the more recent geological epochs tilted to the north and in the process carried the fish fauna of the Peninsula and Satpuras to north and north western regions like Rajasthan, Gujarat, W. Ghats, Sind and Western Himalayas. During the course of studies of the Gujarat fishes, it has been observed that the main concentration zone of the Gujarat fishes are the adjoining tilting core regions like the North, North- Western, Central, some parts of Peninsula and W. Ghats of India, Pakistan and Afghanistan. Due to this Zoogeographical significance we find many fishes found in Jammu & Kashmir, Rajasthan, Punjab, Maharashtra, M.P., U.P., Afghanistan and Pakistan, are also found commonly in Gujarat. These typical fishes probably migrated or extended their known range of distribution to Gujarat from adjoining regions through the main drainage routes like the Narmada, Ganges and Sind during the upheaval changes of the Himalayas during the Middle or Upper miocene period which is thought to have been the most violent geological movements.

This report includes material collected by the author and his colleagues in the fish Division of the Z.S.I. and also by the earlier survey-parties of the Z.S.I. preserved in the Zoological survey of India National collection. It covers species of freshwater fishes of Gujarat described in detail with their latest scientific names, earliest and latest standard references,

meristic counts, diagnostic characters, material examined, size, colour, distribution and special scientific remarks, if any. The systematic list made upon the entire fish collections studied, reveals a wide range of riverine fishes belonging to 8 orders 24 families 119 species and 25 new records.

The classification of fishes adopted in this paper is after Green-wood *et.al.* (1966).

## SYSTEMATIC LIST OF FISHES

Class : Osteichthys (Bony fishes)

Order : Clupeiformes

Family : Clupeidae

1. *Gudusia chapra* (Ham.)
2. *Gonialosa manmina* (Ham.)
3. *Hilsa (Tenualosa) ilisha* (Ham.)

Order : Osteoglossiformes

Family : Notopteridae

4. *Notopterus notopterus* (Pallas)
5. *Notopterus chitala* (Ham.)

Order : Cypriniformes

Family : Cyprinidae

Subfamily : Abramidinae (Cultrinae)

6. *Chela laubuca* (Ham.)
- \* 7. *Chela cachius* (Ham.)
- \* 8. *Salmostoma boopis* (Day)
- \* 9. *Salmostoma bacaila* (Ham.)
10. *Salmostoma clupeoides* (Bloch)

Subfamily : Rasborinae

11. *Amblypharyngodon mola* (Ham.)
12. *Barilius bendelisis* (Ham.)
- \* 13. *Barilius gatensis* (Val.)
- \* 14. *Barilius evezardi* Day
- \* 15. *Barilius bola* (Ham.)
- \* 16. *Danio fraseri* Hora
- \* 17. *Danio aequipinnatus* (McClland.)
- \* 18. *Danio dangila* (Ham.)
19. *Danio devario* (Ham.)
20. *Danio malabaricus* (Jerdon)

\* Recorded for the first time by the author from Gujarat.

21. *Brachydanio rerio* (Ham.)  
 22. *Parluciosoma daniconius* (Ham.)

## Subfamily : Cyprininae

23. *Cirrhinus reba* (Ham.)  
 24. *Cirrhinus mrigala* (Ham.)  
 \* 25. *Crossocheilus latius latius* (Ham.)  
 26. *Garra mullya* (Sykes)  
 27. *Garra lamta* (Ham.)  
 28. *Labeo rohita* (Ham.)  
 29. *Labeo boggut* (Sykes)  
 30. *Labeo fimbriatus* (Bloch)  
 31. *Labeo procellus* (Heckel)  
 32. *Labeo bata* (Ham.)  
 33. *Labeo calbasu* (Ham.)  
 34. *Labeo dyocheilus* (McClland.)  
 35. *Labeo gonius* (Ham.)  
 36. *Labeo konticus* (Jerdon)  
 37. *Labeo potail* (Sykes)  
 \* 38. *Osteobrama bakeri* (Day)  
 39. *Osteobrama cotio cotio* (Ham.)  
 \* 40. *Osteobrama neilli* (Day)  
 41. *Osteobrama vigorsii* (Sykes)  
 42. *Puntius sophore* (Ham.)  
 43. *Puntius parrah* (Day)  
 \* 44. *Puntius phutunio* (Ham.)  
 45. *Puntius melanostigma* (Day)  
 \* 46. *Puntius jerdoni* (Day)  
 47. *Puntius arenatus* (Day)  
 48. *Puntius sarana sarana* (Ham.)  
 49. *Puntius bovanicus* (Day)  
 50. *Puntius chola* (Ham.)  
 51. *Puntius vittatus* Day  
 52. *Puntius ticto* (Ham.)  
 53. *Puntius amphibius* (Val.)  
 \* 54. *Puntius conchoniis* (Ham.)  
 55. *Puntius fraseri* (Hora & Misra)  
 56. *Puntius pleurotaenia* Bleeker  
 57. *Cyprinus carpio carpio* (L.)  
 58. *Tor putitora* (Ham.)

59. *Tor tor* (Ham.)  
 60. *Ctenopharyngodoa idellus* (Vol.)  
 61. *Catla catla* (Ham.)

## Subfamily : Hypophthalmichthyinae

62. *Hypophthalmichthys molitrix* Vol.

## Family : Homalopteridae

## Subfamily : Noemacheilinae

63. *Noemacheilus botia* (Ham.)  
 \* 64. *Noemacheilus anguilla* Annandale  
 \* 65. *Noemacheilus moreh* (Sykes)  
 \* 66. *Noemacheilus ruppelli* (Sykes)

## Family : Cobitidae

67. *Lepidocephalus guntea* (Ham.)  
 68. *Lepidocephalus thermalis* (Vol.)

## Order : Siluriformes

## Family : Siluridae

69. *Ompok bimaculatus* (Bloch)  
 70. *Ompok pabda* (Ham.)  
 71. *Wallago attu* (Sch.)

## Family ; Bagridae

72. *Aorichthys seenghala* (Sykes)  
 73. *Aorichthys aor* (Ham.)  
 74. *Mystus cavasius* (Ham.)  
 75. *Mystus bleekeri* (Day)  
 76. *Mystus vittatus* (Bloch)  
 77. *Mystus montanus* (Jerdon)  
 78. *Mystus qulio* (Ham.)  
 79. *Mystus punctatus* (Jerdon)  
 80. *Rita rita* (Ham.)  
 81. *Rita pavimentatus* (Val.)

## Family : Schilbeidae

82. *Clupisoma garua* (Ham.)  
 \*83. *Eutropiichthys vacha* (Ham.)

## Family : Sisoridae

- \*84. *Nangra viridescens* (Ham.)  
 85. *Nangra itchkeea* (Sykes)  
 86. *Glythorax conirostre* (Stenid.)  
 \*87. *Glythorax madraspatanum* (Day)  
 88. *Bagarius bagarius* (Ham.)

Family : Clariidae

89. *Calrias batrachus* (Lin.)

Family : Heteropneustidae

90. *Heteropneustes fossilis* (Bloch)

Order : Atheriniformes

Family : Cyprinodontidae (Aplocheilidae)

91. *Aplocheilus blocki* (Arnold)

92. *Aplocheilus lineatus* (Val.)

93. *Aplocheilus panchax* (Ham.)

Family : Oryziidae

94. *Orizias melastigma* (McClland)

Family : Poeciliidae

95. *Gambusia affinis* (B. & G.)

Family : Belonidae

96. *Xenentodon cancila* (Ham.)

Order : Channiformes

Family : Channidae

97. *Channa orientalis* Bloch & sch.

98. *Channa punctatus* (Bloch)

\* 99. *Channa stewartii* (Playfair)

100. *Channa striatus* (Bloch)

101. *Channa marulius* (Ham.)

Order : Perciformes

Family : Centropomidae

102. *Lates calcarifer* (Bloch)

Family : Ambassidae

103. *Chanda nama* Ham.

104. *Pseudambassis ranga* (Ham.)

Family : Nandidae

105. *Badis badis* (Ham.)

106. *Nandus nandus* (Ham.)

Family : Mugilidae

107. *Liza parsia* (Ham.)

108. *Mugil cephalus* Lin.

109. *Rhinomugil corsula* (Ham.)

\*110. *Sicamugil cascasia* (Ham.)

111. *Valamugil cunnesius* (Val.)

Family : Cichlidae

112. *Oreochromis mossambica* (Peters)

Family : Gobiidae

\*113. *Awaous qutum* (Ham.)

114. *Glossogobius quiris* (Ham.)

Family : Anabantidae

115. *Anabas testudineus* (Bloch)

Family : Belontiidae

116. *Colisa fasciatus* (Sch.)

Order : Mastacembeliformes

Family : Mastacembelidae

117. *Mastacembelus armatus* (Lac.)

118. *Macrognathus pancalus* Ham.

119. *Macrognathus aculeatus* (Bloch)

## SYSTEMATIC ACCOUNT

### Order CLUPEIFORMES

#### Family CLUPEIDAE

#### Genus *Gudusia* Fowler

1911. *Gudusia* Fowler, *Proc. Acad. nat. sci. philad.*, 63, p. 207 (type- *Clupanodon chapra* Ham.).

#### 1. *Gudusia chapra* (Ham.)

1822. *Clupanodon chapra* Hamilton, *Fish, Ganges*. pp. 248 (type loc. Upper parts of the Ganges.).

1992. *Gudusia chapra*, Sen, *Freshwater Fish.*, State Fauna Series 3, Fauna of West Bengal, pt. 2, p. 116.

*Meristic Counts*: D.14-16, p. 13, V.8, A.21-24, C, 17, L.I. 80-110.

*Material examined*: 5 exs., 3.5 to 7.0 cm., Narmada R. at Bharuch, adjacent to the Dt. Bharuch; Gujarat, 22.5.92, A.K.Sarkar & Party.

*Diagnostic characters*: Head Length 4.3 to 4.5 in total length, eyes with broad, adipose lids ventral profile more convex than dorsal, dorsal fin nearer to caudal base than to snout end, post and pre-ventral scutes 9 to 18 and 19 respectively.

*Distribution* : Freshwater of Gujarat, W. Bengal, Assam, Bombay as far as the Krishna

river; Sind, Bangladesh, Pakistan, Malay, Philippines, Penang.

*Remarks* : A typical freshwater *Clupeoid* fish found all over Gujarat more particularly near the estuarine zones; economically less important due to small size, dense bones and less flesh; generally cured as dry fishes.

### Genus *Gonialosa* Regan

1917. *Gonialosa* Regan, *Ann. Mag. nat. Hist.*, 19 (8), p. 315 (type *Chatoessus modestus* Day).

#### 2. *Gonialosa manmina* (Ham.)

1822. *Clupanodon manmina* Hamilton, *Fish, Ganges.*, pp. 247, 383 (type loc. Branches of the Ganges).

1992. *Gonialosa manmina*, Sen, *Freshwater Fish, State fauna series 3 : Fauna of West Bengal* pt. 2, p.116.

*Meristic counts* : D. 14-15, V.8, A.22-24, L.1. 58-65

*Material examined* : 9exs, 5.7 to 7.5 cm, Mahi R. at Sindhrat, 18 km N-W of Baroda (new Umata bridge), Dt. Baroda, Gujarat : 10.5.92, A.K. Sarkar & Party.

*Diagnostic characters* : Head length 4.6 to 5.0 in total length, prominent snout, maxilla short not reaching eye orbit; dorsal origin nearer to snout end than to caudal fin base, 17 strong scutes between throat and base of pelvic fin and 13 behind it.

*Distribution* : Tributaries of Ganges, Yamuna, Brahmaputra and Mahanadi rivers. Spreading all over India through the tanks and estuaries of major Indian rivers except Deccan, S. India and Western India : Bangladesh, Pakistan, Sri Lanka.

*Remarks* : Economically less important due to small size and dense thin bones. Generally cured for dry fish markets; live in small rivers, tanks, lakes. etc.

### Genus *Hilsa* Regan

1916. *Paralosa* (nec. Bleeker) Regan, *Ann. Durban Mus.*, I, p. 167 (type. *P.durbanensis* Regan monotypic).

1917. *Hilsa* Regan, *Ann. Mag. nat. Hist.*, (8), 19, p.303 (type *Paralosa durbanensis* Regan).

#### 3. *Hilsa (Tenualosa) ilisha* (Ham.)<sup>1</sup>

1822. *Clupanodon ilisha* Hamilton, *Fish. Ganges*, p. 243, pl. 19, fig. 73 (type loc.-Ganges estuaries).

1991. *Hilsa (Tenualosa) ilisha*, Talwar & Jhingran, *Inland fishes of India* Vol.1.p. 100.

*Meristic counts* : D. 18-19, p. 15, V. 9, A. 23, C. 19, L.I.46-49

*Material examined*: 32 exs, 7.0 to 15.5cm, Ukai Fish Market (From Ukai Reservoir), 102 km from Surat, 11.2.93, T.K.sen & Party; 2exs, 10 to 12.5 cm, Tapi R. at Kamza (near Kakrapar), 82 km east of Surat, Dt. Surat, 22.5.92, A.K. Karmakar & Party; 3exs. 11.0 to 13.0 cm, Narmada R. at Sisodra, 15km N-W of Rajpipla, Dt. Bharuch, 16.5.92, A.K. Karmakar & Party.

*Diagnostic characters* : Head length 4.2 to 4.5 in total length, fusiform body, fairly deep and compressed; upper jaw with a distinct median notch when seen from above, eyes with broad adipose eyelids; maxilla reaches a little beyond the posterior border of eye, dorsal origin nearer to snout end than to caudal fin base.

*Distribution*: Eastern and Western coasts of India, rivers of India adjoining estuaries; Ganges at Calcutta, Kanpur, Allahabad, Benaras, Buxor, Patna, W. Bengal (Hooghly river), Bombay, Coromandal Coast, Malabar, Gujarat, Cochin and Vizagapatnam: Myanmar Bangladesh, Pakistan, Sri Lanka, Gulf and China.

*Remarks*: Most popular and commercially important fish of India particularly in W. Bengal, due to its taste. Live in seas, estuaries and rivers adjoining estuaries.

## Order OSTEOGLOSSIFORMES

### Family NOTOPTERIDAE

#### Genus *Notopterus* Lacepede

1800. *Notopterus* Lacepede, *Hist. Nat. poissons.*, 2. p. 189 (type *Notopterus kaporat* Lacepede=*Gymnotus notopterus* Pallas).

1. Revised as (*Tenualosa*) *ilisha* from its popular name *H. ilisha* by Talwar and Jhingran (1991)

#### 4. *Notopterus notopterus* (Pallas)

1769. *Gymnoius notopterus* Pallas, *Spicil Zool.*, 7, pl. 6. fig.2 (type locality-ponds and rivers of Bengal).

1992. *Notopterus notopterus*, Sen. *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal* pt. 2.p.118, Z.S.I.

*Meristic counts* : D.7-8, P.17, V.5-6, A. 100-110, C.19, L.I.225.

*Diagnostic Characters* : Head length 5 to 5.5 in total length, body oblong and strongly compressed, head compressed dorsal fin nearer snout tip than to caudal fin base, minute scales, anal and caudal fins continuous, united; pelvic rudimentry.

*Material examined* : lexe, 26.5cm, Sidpur, Mahesana Dt., 50 km from Dharo Camp. 31.1.91. P.Krishnamurthy & Party; lexe, 19.6cm, Karjan R. at Jitnagar, 7km South of Rajpipla. Bharuch Dt., 17.5.92, A.K.Sarkar & Party; 2exs, 14.0 to 18.5cm, Vatrack R., Anand Dt. Kheda, 7.2.93., T.K.Sen & Party.

*Distribution* : Tanks, ponds, rivers, lakes and brackish waters of India : Bangladesh, Myanmar, Malay, Indonasia and Thailand.

*Remarks* : A commercially important fish in Gujarat, inspite of its disturbing thin bones; also very much popular in West Bengal, Assam and Orissa. Live in rivers, beels. canals and lakes.

#### 5. *Notopterus chitala* (Ham.)

1822. *Mystus chitala* Hamilton, *Fish ganges* pp.236, 382 (type locality-larger freshwater rivers of Bengal).

1992. *Notopterus chitala*, Sen, *Freshwater Fish, State Fauna Series 3: Fauna of West Bengal*, pt.2, p.117.

*Meristic counts* : D.9-10, P.16, V.6, A.110-125, C.12-14, L.I.180

*Material examined* : 4exs., 30.4 to 60.9 cm. Tapi river, Surat Dt., 18.3.92., A.K.Sarkar & Party : lexe, 45.6 cm, Tarwa River at village Muzda, Bharuch Dt., 21.3.92., A.K.Sarkar & Party.

*Diagnostic characters* : Length of head 4.6 in TL. upper profile of head deeply curved or

concave, snout prominent, small cycloid scales on body, opercles, some fins and head rigion; rudimentary ventral fim, anal and caudal confluent, lower edge of opercle very finely serrated.

*Distribution* : India Assam, W. Bengal, Orissa, U.P., Bihar : Myanmar, Pakistan, Bangladesh, Thailand, Malay and Indonesia.

*Remarks* : Not very much popular in Gujarat due to its thin bones. People of some districts like it too much for its oily ventral region in W. Bengal. Live in big rivers only.

### Order CYPRINIFORMES

#### Family CYPRINIDAE

#### Subfamily Abramidinae (Cultrinae)

#### Genus *Chela* Hamilton

1822. *Chela* Hamilton, *Fish.Ganges* pp.258, 383 (type *Cyprinus (Chela) cachi* Hamilton).

#### Key to the species of genus *Chela*

- Cleft of mouth very much oblique, abruptly upwards; lateral line scales 34-37, larger, not many on body  
.....*C. laubuca*
- Cleft of mouth moderately oblique, directed upwards; lateral line scales 55-65, small, much more numerous on body  
.....*C. cachi*

#### 6. *Chela laubuca* (Ham.)

1822. *Cyprinus laubuca* Hamilton, *Fish, Ganges* pp. 260, 360 (type- locality-ponds of northern parts of Bengal).

1992. *Chela (Chela) laubuca*, Sen, *Freshwater Fishes, State Fauna Series 3 : Fauna of West Bengal* pt.2. p.119, Z.S.I.

*Meristic counts* : D.10-11 (2/8-9), P.13, V.7, A.19-23 (2/17-21). C.19, LI.34-37.

*Material examined* : 5exs, 6.5 to 9.5cm, Sabarmati R, Kheda Dt.,7.2.93, T.K.Sen & Party; 9exs,7.0 to 10.5cm, Khareswar village,

10 km from Dhrangdhra, Surendranagar Dt., 10.12.92; A.K. Sarkar & Party; 15exs, 4.5 to 11.0cm, Chhrodia village, Dhandhuka, Ahmedabad Dt; 4.12.92, A.K. Sarkar & Party.

**Diagnostic characters** Head length 5 to 6 in total length, upwards mouth with dorsal head profile curved upwardly, cleft of mouth very much oblique, origin of dorsal fin midway between hind border of eye and caudal fin extremity, abdominal edge-cutting from pectoral to anal fin.

**Distribution** : India, Bangladesh, Pakistan, Sri Lanka, Myanmar, Malay, Peninsula and Sumatra.

**Remarks** : Live in rivers, rivulets, streams, tanks, canals etc. No commercial importance because of its small size.

### 7. *Chela cachi* (Ham.)

1822. *Cyprinus cachi* Hamilton, *Fish, Ganges*, pp.258, 384 (type locality: rivers of Bengal).

1992. *Chela (chela) cachi*, Sen, *Freshwater fishes: State Fauna Series 3 : Fauna of West Bengal*, pt.2, p.119, Z.S.I.

**Meristic counts** : D.9(2/7), P., 10, V.5-6, A.22-24, L.I.55-65

**Material examined** : 6 exs. 5.0-9.5cm, Nagrama village, Kheda Dt, 30.11.92, A.K. Sarkar & Party; 7 exs. 4.7-8.6cm, Ukai Reservoir at Selur village, Ukai, Surat Dt., 10.2.93, T.K.Sen & Party; 4 exs, 4.0-7.5cm, Mahi River, Godhra Dt., 9.5.92, A.K. Karmakar & Party.

**Diagnostic characters** : Length of head 5.5 to 6.0 in TL, ventral fin with an elongated outer ray extending to the middle or even end of anal fin, pectoral fin elongated, caudal forked.

**Distribution** : Freshwaters of Assam, Gujarat, W. Bengal, Orissa, M.P., Madras, Karnataka : Pakistan, Bangladesh.

**Remarks** : A larvicidal fish, found in ditches, ponds and river sides and can tolerate saline conditions to some extent. Feed upon mostly on mosquito larvae.

### Genus *Salmostoma*

#### Key to the species of genus *Salmostoma*

1. Caudal fin lobed, lower lobe the longer; lateral line scales 80-93  
.....*Salmostoma clupeoides*
- Caudal fin deeply forked .....2
2. Lateral line scales 38-40  
.....*Salmostoma boopis*
- Lateral line scales 86-110  
..... *Salmostoma bacaila*

### Genus *Salmostoma* Swainson

1839. *Salmostoma* Swainson, *Nat. Hist. Fish.*, 2, p. 184 (type- *Cyprinus bacaila* Hamilton)

### 8. *Salmostoma boopis* (Day)

1873. *Chela boopis*, Day, *Proc. Zool. Soc. Lond.*, p. 708 (type-locality: S.Canara).

1991. *Salmostoma boopis*, Talwar & Jhingran, *Inland Fishes*, Vol.I, p.332, Oxford & IBH publishing Co. Pvt. Ltd., New Delhi.

**Meristic counts** : D.10, A.15-17, P.15. V.9

**Material examined** : 4exs, 7.5-9.5cm, Pond at Thubav village, 22km N.E. of Baroda Dt., 14.5.92., A.K.Sarkar & Party; 9exs. 5.0-10.5cm, Vatrak River, Anand, Kheda Dt., 7.2.93., T.K.Sen & Party; 3exs, 4.7-8.5cm, Purna River, Dangs Dt., 13.3.92., A.K.Sarkar & Party.

**Diagnostic characters** : Head length 5.2 to 5.5 in total length, eye diameter 2.5 to 3.0 in head length, suborbital ring of bones nearly cover the cheeks, cleft of mouth extends to below the anterior margin of orbit, caudal deeply forked, predorsal scales 22 to 24.

**Distribution** : Western Ghats, S.Canara, Krishna River, Mutha-mola River, Poona, Gujarat.

**Remarks** : First time recorded new from Gujarat. Live in rivers, hill-streams and small rivulets with shallow depth. Taken as food by the poorer section. Grows to atleast 13cm in length.

9. *Salmostoma bacaila* (Ham.)

1822. *Cyprinus bacaila* Hamilton, *Fish, Ganges* pp. 265, 384, pl.8, fig.76 (type-locality-Gangetic Provinces).

1992. *Salmostoma bacaila*, Sen, *Freshwater Fishes, State Fauna Series 3: Fauna of West Bengal*, pt.2. p.120. fig.8, Z.S.I.

*Meristic counts* : D.9(2/7). P.13., V.9. A. 13-15 (2/11- 13). C.19, LI 86-110

*Material examined* : 4exs, 6.5-9.5cm, Mathal Village, Bhuj Dt., 30.1.91., P. Krishnamurthy & Party; 7exs, 4.5-9.0cm, Fish Market at Tin Darwaja, Ahmedabad Dt. 18.11.91, P. Krishnamurthy & Party ; 14exs, 4.6-9.7cm, Narmada River at Sisodra, 15kms N.W. of Rajpipla, Bharuch Dt, 16.5.92., A.K. Sarkar & Party.

*Diagnosis characters* : Head length 5.2 to 6.0 in total length, eye diameter 3.5 to 3.7 in head length, suborbital ring of bones nearly covering the cheeks, pectoral nearly reaching ventral, dorsal origin half in advance of anal.

*Distribution* : Throughout India except Malabar, Travaneore-cochin, Karnataka and Madras; Pakistan, Bangladesh.

*Remarks* : Live in rivers, rivulets and ponds, Grows to atleast 17.7cm in length.

10. *Salmostoma clupeioides* (Bloch)

1782. *Cyprinus clupeioides* Bloch, *Naturg Ausland. Fische.*, 12. p.49. pl.408, fig.2 (type locality-Tranquebar).

1991. *Salmostoma clupeioides* Talwar & Jhingran, *Inland Fishes*, Vol. 1, P. 323, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

*Meristic counts* : D.9(2/7), P.13, V.9, A. 13-15 (2/11-13), C.19, LI.80-93

*Material examined* : 5exs. 4.5-7.3cm. Badi Bazdi village, 8km south of Rajkot, Rajkot Dt, 8.9.92., A.K. Sarkar & Party; 7exs, 5.8-9.5 cm, Ukai Reservoir, Ukai, Surat Dt., 10.2.93., T.K. Sen & Party; 5 exs., 4.6-8.5cm, Andhra Village, 12km from Kheda Town, Kheda Dt, A.K. Sarkar & Party, 29.11.92.

*Diagnostic characters* : Head length 5.5 to 5.7 in total length, eye diameter 4.0 in head length, a well developed knob on the

symphysis, dorsal fin originates in advance of anal fin, pectoral fin longer than head but does not touch pelvic fin, caudal fin lobed, the lower the longer.

*Distribution* : Live in rivers, rivulets and canals. Can withstand slight admixture of saline water. Grows to atleast 15cm in length, a tasty food fish.

## Subfamily Rosborinae

Genus *Amblypharyngodon* Bleeker

1860. *Amblypharyngodon* Bleeker, *Nat. Tijdschr. Ned. Indie*, 20 : 433 (type *Cyprinus mola* Ham.)

11. *Amblypharyngodon mola* (Ham.)

1822. *Cyprinus mola* Hamilton, *Fish, Ganges*, pp.334,392., pl.30. Fig. 92 (type locality : ponds and Freshwaters of Gangetic provinces).

1992. *Amblypharyngodon mola*, Sen, *Freshwater Fishes, State Fauna Series 3 : Fauna of West Bengal*, pt.2; 124, Z.S.I.

*Meristic counts* : D.2/7, V. 9, P.15, A.2/5, C.19, L.I.65-75

*Material examined* : 19exs, 4.5 to 8.7cm, Khareswar village, 10km from Dhrangadhra, Surendranagar Dt, 10.12.92. A.K.Sarkar & Party ; 17exs.,4.0 to 9.5cm, Chhrodia village, Dhandhuka, Ahmedabad Dt., A.K.Sarkar & Party, 4.12.92.

*Diagnostic characters* : Length of head 5.2 to 6.0 in total length, eyes 3.5 to 3.7 in head length, suborbital ring of bones broad, nearly covering cheeks; pectoral nearly reaching ventral, dorsal origin half in advance of anal, scales small sized, a deep greyish silvery lateral line, silvery body.

*Distribution*: India (except Malabar coast). Bangladesh, Pakistan, Myanmar.

*Remarks* : Though small in size, this fish is popular and known for its good taste specially in West Bengal. Live in ponds, rivers, rivulets, tanks etc. grows to 7.5 to 9.5 cm in length.

Genus *Barilius* Hamilton

1822. *Barilius* Hamilton, *Fish Ganges*, p.384 (type *Cyprinus barila* Hamilton).

Key to the species of genus *Barilius*

1. Body without vertical bars, each scale with a black spot, lateral line scales 38 to 43 ..... *B. bendelisis*  
— Body with 15 vertical bars .....2
2. Lateral line scales 39 to 40 .....*B. qatensis*  
— Lateral line scales 88 to 95 .....3
3. Two or more vertical rows of bluish blotches along the sides .....*B. bola*  
— Body uniformly silvery, lateral line scales 40.....*B. evezardi*

12. *Barilius bendelisis* (Ham.)

1807. *Cyprinus bendelisis* Hamilton, *Journey in Mysore*, 3: 345, pl. 32 (type locality- Rivers Of Mysore).

1992. *Barilius bendelisis*, Sen, *Fish Fauna of Assam and the neighbouring NE States of India*, *Rec. Zool. Surv. India*, Occ. Paper No. 64.p.33.

*Meristic counts* : D. 9(2/7), P.15, V.9, A.9-10 (2-3/7-8), C.18, L.I.38-43.

*Material examined* : 22exs., 5.8-12.7cm, Tapi river, Amroli, Surat Dt., 18.3.1992. A.K. Sarkar & Party; 7exs, 4.8-9.8cm, Narmada River, Bhadbhuts, Baruch Dt., 19.3. 1992. A.K.Sarkar & Party; 9exs., 6.3-8.5 cm, Ukai Reservoir, Surat Dt., 11.2.1993, T.K. Sen & Party.

*Diagnostic characters* : Length of head 4.6 to 5.2 in total length, eye diameter 4.2 to 4.6 in head length, maxilla reaches to anterior third of eye, four short barbels, pores on the snout and lower jaw; dorsal origin nearer to caudal base than the snout, silvery shot with purple, slaty descending bars from back to lateral line, each scale with a distinct black spot, fins tinged with orange.

*Distribution*: West Bengal, Gujarat, Assam, Punjab, U.P. Bihar, M.P., S. India : Nepal, Bangladesh, Pakistan, Sri Lanka.

*Remarks* : Mostly remain confined in the hilly regions more particularly in shallow hills with beds beset with rock- boulders, grows to 15.3cm in total length.

13. *Barilius gatensis* (Val.)

1870. *Barilius gatensis*, Gunther, *Catal.* VII. p. 291; Day, *Proc. Zool.Soc.*, p.373.

1981 *Barilius gatensis*, Jayaram, *F.W.Fishes of India*, Handbook No.2, Calcutta, Z.S.I.,p. 89,90.

*Meristic counts* : D.10-12, P.15, V.9, A.15-17, C.18, L.I.39-40

*Material examined* : 6exs. 4.6-7.2 cm, Vatrak River. 50km from Anand Camp, Kheda Dt., 7.2.1992., T.K.Sen & Party.

*Diagnostic characters* : Length of head 4.3 to 4.5 in total length, diameter of eyes 3.0 to 4.5 in head length, pointed mouth, maxilla extending to below the centre of the orbit, body with more than 12 vertical bars, two minute pair of barbels, moderately lobed caudal, silvery grey in colour, dorsal and anals with dark base.

*Distribution* : Western Ghats, Gujarat (Newly recorded from Gujarat).

*Remarks* : The females and youngs generally have smooth scales whereas most of the adult males are with one or more rough spots on each, grows to 15.0cm in length.

14. *Barilius evezardi* Day

1872. *Barilius evezardi* Day, *Journ, Asiatic Soc. of Bengal*, 41 (2), pt.II.p.326. (Type locality Poona, Maharashtra).

1981. *Barilius evezardi*, Jayaram, *F.W. Fishes of India Handbook No.2*, Calcutta, Z.S.I.

*Meristic counts*: D, 9. P.13, V.9. A.14-15, C.19, L.I.40

*Material examined* : 5exs, 4.6-7.2cm, Nirma Dam, Bhuj Dt., 23.1.91., P. Krishnamurthy & Party; 3exs, 4.4-6.4cm, Gajood Reservoir adjacent canal, Bhuj Dt., 24.1.91, P.Krishnamurthy & Party.

*Diagnostic characters* : Length of head 5.5 in total length, eye diameter 3 in head length; compressed snout, lower jaw slightly longer; a well developed knob at the symphysis, suborbital ring of bones rather wide, barbels absent, dorsal fin commences about midway between the hind edge of the orbit and the posterior end of the caudal fin, pectoral as long as the head, caudal forked, the upper lobe the

longer, silvery with a lateral burnished silvery band; fins with orange tinge.

*Remarks* : Greatly resembles with that of a *Rasbora* but can be readily distinguished from it, by the number of rays in the anal fin; it can also be distinguished from *Chela* by its rounded abdomen(not cutting). Grows to about 11.5cm in length.

*Distribution* : India : Maharastra (Poona), Gujarat (Newly recorded from Gujarat).

### 15. *Barilius bola* ( Ham.)

1822. *Cyprinus bola* Hamilton, *Fish, Ganges*, pp.274, 385 (type locality-Brahmputra R.).

1992. *Barilius bola*, Sen, *Freshwater fishes, State Fauna Series 3 : Fauna of west Bengal*, pt.2: 126, Z.S.I.

*Meristic counts* : D.10-11, P.13, V.9, A.13, C.19, L.I.88-94

*Material examined* : 7exs, 5.2-7.9cm, Rajkot village 10 km SE of Dhandhuka, Dt. Ahmedabad, 5.12.92, A.K.Sarkar & Party; 4exs, 4.0-9.4cm, Khareswar village, 10 km from Dhrangadhra, Dt. Surendranagar, 10.12.92. A.K. Sarkar & Party; 3exs, 4.2-6.3 cm, Nikashi canal, 70km from Anand camp, Dt. Kheda, 8.2.93., T.K. Sen & Party.

*Diagnostic characters* : Length of head 4.6 in total length, eyes 4.5 to 7.0 in head length, deeply cleft mouth, a knob above symphysis of the lower jaw, suborbital ring of bones broad, no barbels, dorsal origin midway between preopercular angle and caudal base, silvery with two or more vertical rows of bluish blotches along the sides.

*Distribution* : West Bengal, Gujarat (Newly recorded from Gujarat), Assam, U.P., Bihar, Punjab, Orissa, Bangladesh, Pakistan, Myanmar.

*Remarks* : Live in torrentials like hilly-rivers, streams, tributaries of rivers etc. Mistaken by anglers as trout for its large size (grows to about 30.5cm in length), spots and colouration of its fins.

### Genus *Danio* Hamilton

1822. *Danio* Hamilton, *Fish, Ganges*, pp.321, 390 (type *Cyprinus dangila* Ham.).

### Key to the species of genus *Danio*

1. Barbels absent, lateral line scales 35-38, no spines along anterior margin of orbit .....*D. devario*  
— Barbels present .....2
2. Barbels not well developed, maxillary barbels, if present, rudimentary; rostral barbels short, lateral line scales 37-40 .....*D. fraseri*  
— Barbels well developed, lateral colour bands breaking up anteriorly to form a mottled pattern.....3
3. Both pairs of barbels much longer than eye diameter, lateral line scales 36-42 .....*D. dangila*  
— Both pairs of barbels equal to or shorter than eye diameter, several well marked and uniform lateral bands.....4
4. Lateral line scales 35-37 .....*D. aequipinnatus*  
— Lateral line scales 32-34, 3 or 4 steel blue longitudinal bands, a weak preorbital spine directed backwards, small mouth directed upwards .....*D. malabaricus*

### 16. *Danio fraseri* Hora

1935. *Danio (D) fraseri* Hora, *Rec. Indian Mus.*, 37 (3): 378, fig. 3 (type locality-Deolali, Nasik Dt., Maharashtra).

1991. *Danio fraseri*, Talwar & Jhingran, *Inland Fishes*, Vol.I. p.368.

*Meristic counts* : D.10-11, A.2-3/15-16, P. 11-12, V.1/6, L.I.38-40

*Material examined* : 7 exs. 3.7-7.5 cm, Mahi River, 85 km of Godhara (45 km from Lonavada), Dt. Panchmahal, 29.5.92., A.K. Karmakar & Party.

*Diagnostic characters* : Length of head 3.5 to 4.3 times in standard length, eyes 2.8 to 3.3 in head length, small mouth obliquely directed upwards, lower lip hypertrophied forming a broad loose flap along jaw, the upper lip normal, two pairs of barbels, pectoral fin long extending beyond base of pelvic fin, caudal forked, silvery with a pinkish-blue tinge, three or four longitudinal bands on sides of body.

**Distribtuion** : Maharashtra, Guajrat (Newly recorded from Gujrat).

**Remarks** : This is the only species of *Danio* with a hypertrophied lower lip forming a loose flap along the lower jaw, a typical character which separates it from all other species of the genus. Lives in rivers and streams. No interest to fisheries due to its small size. Grows to 10cm in length.

### 17. *Danio aequipinnatus* (McCllid.)

1839. *Perilampus aequipinnatus* McClland, *Asiat. Res.*, 19(2), P.393.pl.60.fig.1 (type locality; Assam).

1992. *Danio aequipinnatus*, Sen, *Freshwater fishes, State Fauna Series 3: Fauna of West Bengal*, pt.2: 128, Z.S.I.

**Meristic counts** : D.12-14(2/10-12), P.17, V.8, A.14- 16(2/12-14), C.19. L, I.32-36

**Material examined** : 4exs, 4.6-9.5 cm, Lukumar vill., 4km SW of Dahad, Dt. Panchmahals, 27.3.92, A.K.Sarkar & Party; 9exs, Niruma dam, Hakhatrana, Dt. Bhuj, 23.1.91. P. Krishnamurthy & Party, 21exs, 4.0-10.3 cm, Sidpur, Dt. Mahesana, 50km from Dharoi Camp., 31.1.92, P. Krishnamurthy & Party.

**Diagnostic characters**: Length of head 5.0 in total length, eyes 4.0 in head length. cleft of mouth oblique extending to below front margin of eye; two pairs of barbels. origin of dorsal fin midway between centre of eyes and base of caudal, silvery with bluish orange iridescent lateral bands, a wide bluish lateral band extending from centre of eyes to base of caudal.

**Distribution** : Throughout India; Bangladesh, Sri Lanka, Myanmar, Thailand.

**Remarks** : Popularly known as an aquarium fish all over India. Live in lakes pools, rivers, streams and tributaries. Grows to 15.2cm in length. It breeds in plenty in the confined waters of paddy-fields in monsoon months.

### 18. *Danio dangila* (Ham.)

1822. *Cyprinus dangila* Hamilton, *Fish, Ganges*, pp. 321, 390 (type locality-mountain streams of Monghyr).

1992. *Dangila dangila*, Sen, *Freshwater fishes, State Fauna Series 3: Fauna of West Bengal*, pt. 2: 129, Z.S.I.

**Meristic counts** D.11-13. p.13,V.7-8, A.16-18, C.20, L.I.38

**Material examined** : 12exs, 4.5-9.6cm, Sabarmati River, 45km from Anand Camp, Dt. Kheda, 5.2.93, T.K. Sen & Party; 9exs, 3.7-6.3 cm, Ukai Reservoir, Narayanpur, Dt. Surat, 14.2.93, T.K.Sen & Party.

**Diagnostic characters** : Length of head 5.0 in total length, intermediate shaped between *D. devario* and *D.aequipinnatus*, two pairs of barbels rostral barbels, a little shorter than the head; a black spot behind the gills, silvery with 3 parallel longitudinal blue or dark lines running through the mid body half way along the tail.

**Distribution** : West Bengal, Assam, Gujarat, Bihar, U.P., Bangladesh, Myanmar.

**Remarks** : Live in shallow waters and hill-streams, tributaries etc. Commercially less important. Grows to 15cm in length.

### 19. *Danio devario* (Ham.)

1822. *Cyprinus devario* Hamilton, *fish, Ganges*, pp.6. fig.94 (type locality-rivers and ponds of Bengal).

1993. *Danio (D) devario*, Sen, *State Fauna Series 3 : Fauna of West Bengal*, p.129. Z.S.I.

**Meristic counts** : D. 18-19, P. 13, V.8, A.18-19, C.19, L.I.41-48

**Material examined** : 7exs, 4.3-6.5cm, Vatrak River, Anand, Dt. Kheda, 10.2.93., T.K. Sen & Party; 6exs, 4.5-5.7cm, Nagrama tank (Beel), Limbasi village, 35km from Anand camp, Dt. Kheda, 9.2.93, T.K.Sen & Party; 5exs, 3.5-7.5cm, Nikashi canal, 70km from Anand Camp, Dt. Kheda, 8.2.93, T.K.Sen & Party.

**Diagnostic characters** : Length of head 5.0 to 5.2 in total length, eyes 3.0 in head length, lower jaw longer, maxilla reaching below front margin of eye, no barbels, third suborbital broad, dorsal originates in between the anterior margin of orbit and caudal base, caudal lunate, predorsal scales 16, dorsal fin slightly in advance of the anal. Greenish silvery in colour.

**Distribution** : West Bengal. Assam, Gujarat, Eastern Himalayas, U.P., Bihar, Orissa, M.P., Deccan: Bangladesh, Pakistan.

**Remarks** : Commonly used as aquarium fish for its attractive colour pattern due to three horizontal bluish lines bordered by yellow bands extending backwards to caudal, sometimes bluish iridescent band roughly along the lateral line, central reticulation of steel blue lines, grows to 10.5cm in length.

## 20. *Danio malabaricus* (Jerdon)

1849. *Periampus malabaricus* Jerdon, *Madras J. Lit. and Sci.*, 15, p.325 (type locality-Malabar).

1991. *Danio malabaricus*, Talwar & Jhingran, *Inland Fishes*, Vol.1, p.370, fig.131.

**Meristic counts** : D.12-13, A.15-16, P.15, V.8, 32-34, L.I.32-34

**Material examined** : 5exs, 4.0-6.8cm, Sabarmati River, 45km from Anand camp, Dt. Kheda, 5.2.93, T.K.Sen & Party; 4exs, 3.6-5.6 cm, Narmada River, Ghadbhut, 18km West of Bharuch Dt, 20.5.92, T.K.Sen & Party.

**Diagnostic characters** : Length of head 3.8 to 4.3 in standard length, eye diameter 3.3 to 3.8 in head length, mouth small directed upwards; two pairs of barbels, the maxillary pair usually vertical; dorsal fin well in advance of the anal fin, caudal fin forked, lateral line complete, predorsal scales 14 to 15, bright metallic blue, head silvery, belly pale pink, three or four steel blue longitudinal bands along flanks separated by narrow yellow lines, fins yellow to deep orange-red.

**Distribution** : Western coast, Gujarat, Sri Lanka.

**Remarks** : Live in clear flowing waters, pools, streams, ponds and tanks. Grows to 12cm in length.

## Genus *Brachydanio* Weber & Beaufort

1916. *Brachydanio* Weber de Beaufort, *Fishes of Indo. Australian Archipelago*, 3 : 85 (type species *Nuria albolineata* Blyth.).

## 21. *Brachydanio rerio* (Ham.)

1822. *Cyprinus rerio* Hamilton, *Fishes of Ganges*, 323, 390 (type -locality-Kosi River, U.P.).

1991. *Brachydanio rerio*, Talwar & Jhingran, *Inland Fishes.*, Vol.1: 360.

**Meristic counts** : D.2/6-7, P.1/11-12, A. 2-3/12, V.1/6, L.I.28-30

**Material examined** : 3exs, 3.0-4.3cm, Khareswar Village, 10km from Dhrangadhra, Dt. Surendranagar, 10.12.92, A.K.Sarkar & Party; 17exs, 4.1-4.4cm, Rajkot Village, 10km SE of Dhandhuka, Dt. Ahmedabad, 5.12.92, A.K. Sarkar & Party; 9exs, 3.5-4.0 cm, Neja Village, Khambat, Dt. Kheda, 1.12.92; A.K.Sarkar & Party.

**Diagnostic characters** : Length of head 5.0 to 5.2 in total length, eyes 3.0 to 3.5 in head length, mouth small obliquely upwards, two pairs of barbels, well developed; maxillary pair of barbel extend beyond half of pectoral fin, caudal fin forked, lateral line usually absent, often rudimentary or incomplete in which case it often extends up to base of pelvic fins.

**Distribution** : Throughout India: Bangladesh, Pakistan.

**Remarks** : Live in slow-moving to stagnant water bodies, rice-fields, ponds, tanks and irrigation canals (specially in monsoons). Grows to 4.5 to 5.0 cm in length. Popularly used as aquarium fish. It is strikingly and beautifully coloured, easy to feed and hard to face disease. Commercially less important as food due to its small size.

## Genus *Parluciosoma* Howes

1980. *Parluciosoma* Howes, *Bull. Br. Mus. nat. Hist. (Zool.)*, 37(3) : 183 (type species- *Leuciscus argyrotaenia* Bleeker).

## 22. *Parluciosoma daniconius* (Ham.)

1822. *Cyprinus daniconius* Hamilton, *Fishes of Ganges*, 327, 391, pl.15., fig.89 (type locality: rivers of southern Bengal).

1991. *Parluciosoma daniconius* Talwar & Jhingran, *Inland Fishes*, Vol. 1, 382, Fig.136.

**Meristic counts** : D.2/7, P.1/14, V.1/8, A.2/5, C.19, L.I.30-34

**Material examined** : 6exs, 5.5-9.7cm, Andhra Village, 12km of Kheda town, Dt. Kheda, 29.12.92, A.K. Sarkar & Party; 13exs, 4.6-8.5 cm, Sabarmati River, Anand, Dt. Kheda, 5.2.93, T.K.Sen & Party.

**Diagnostic characters:** Length of head 4.5 to 5.0 in total length, eye diameter 3.6 to 4.0 in head length. no barbels, dorsal profile more convex than ventral profile, a lateral blue-black stripe, predorsal scales 14, origin of dorsal fin nearer to caudal fin base, lateral line nearly complete.

**Distribution :** Throughout India: Bangladesh, Pakistan, Myanmar, Sri Lanka, Malay.

**Remarks :** Live in pools, tanks, ditches and streams. Grows to 10.5cm in length. Popularly known as 'Rasbora'

#### Subfamily Cyprininae

#### Genus *Cirrhinus* Cuvier

#### Key to the species of the genus *Cirrhinus*

1. L.I.scales 40-45, thin lips, a pair of small rostral barbels, dorsal rays 15-16  
.....*C. mrigala*
- L.I.scales 35-38, dorsal rays 10, hexagonal scales .....*C. reba*

#### 23. *Cirrhinus reba* (Ham.)

1822. *Cyprinus reba*, Hamilton, *Fish, Ganges*, pp. 280, 386 (type-locality : rivers and ponds of Bengal and Bihar).

1992. *Cirrhinus reba*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal*, 138, fig.14. Z.S.I.,pt.2.

**Meristic counts :** D.2-3/8-9, P.16, V.9, A.3/5, C.19, L.I.35- 38

**Material examined :** 5exs, 7.5-12.6cm, Ukai Reservoir, Dt. Surat, 14.2.93, T.K. Sen & Party; 9exs, 8.3-15.7cm, Nagrama tank(Beel), Limbasi Village, 30km from Anand Camp, Dt. Kheda, 29.12.92, T.K. Sen & Party.

**Diagnostic characters:** Length of head 6.0 to 6.5 in total length, upper lip fringed in the young, often entire in the adults; a thin cartilaginous layer covering lower jaw, a pair of thin short rostral barbels only, origin of dorsal fin nearer to the snout, caudal fin deeply forked; silvery, scales with dark edges forming

longitudinal bands above lateral line; young sometime with a leaden lateral band, fins tipped with orange.

**Distribution :** India, Bangladesh, Pakistan, Myanmar, Thailand.

**Remarks :** Live in rivers, tanks, canals and lakes. A good eating fish. Grows to 30.5cm in length.

#### 24. *Cirrhinus mrigala* (Ham.)

1822. *Cyprinus mrigala* Hamilton *Fish, Ganges*, pp. 279, 389, pl.6. fig.79 (type-locality: rivers and ponds of the Gangetic Provinces).

1992. *Cirrhinus mrigala*, Sen, *Freshwater Fish, State Fauna Series 3: Fauna of West Bengal :* 136, Fig.23,Z.S.I.

**Meristic counts :** D.2/12-13,P.15, V.9, A.3/5, L.I.40-45

**Material examined :** 4exs, 17.6-35.4cm, Kodama Reservoir, Mahi River, 55km NE of Godhara (45 km from Lonavada), Dt. Panchmahal, 29.5.92, A.K.Karmakar & Party; 5 exs, 13.6-19.8cm, Wankaleswar, 55 kms east of Godhra (8kms from Baria), Dt. Panchmahal, 10.5.92, A.K.Karmakar & Party.

**Diagnostic characters :** Length of head 5.0 to 5.2 in total length, eyes 3.6 to 4.0 in head length, upper lip entire, one pair of small rostral barbel within the fold of lip, depth of body less than the length of head, dorsal profile more convex than the ventral, dorsal origin nearer to snout than to caudal fin base, caudal fin sharply forked, dark grey dorsally with coppery tinge, bright golden scales.

**Distribution** Freshwaters throughout India: Bangladesh, Pakistan, Myanmar.

**Remarks :** A popular carp of India and a noted species largely used for stocking tanks and ponds all over the country specially in West Bengal. Live in large rivers in tanks and canals. Offers good sporting to anglers too. Grows to 1m in length.

#### Genus *Crossocheilus* Van Hasselt

1823. *Crossocheilus* Van Hasselt, *Algem. Konst. Letterbode*, 2, p. 132 (type *Crossocheilus oblongus* V.).

25. *Crossocheilus latius latius* (Ham.)

1822. *Cyprinus latius* Hamilton, *Fish, Ganges* pp. 345, 393 (type locality-river Teesta).

1992. *Crossocheilus latius latius*, Sen, *State Fauna Series 3 : Fauna of West Bengal* : 155, Z.S.I. pt.2.

*Meristic counts* : D.3/7-8, P.15, V.9, A.2/5, C.19, L.I.38-40

*Material examined* : 7exs, 6.5-11.4cm, Mahi River at Sindhrat, 18km N.W. of Baroda near Umeta Bridge, Baroda Dt, 25.11.92, A.K.Sarkar & Party; 5exs, 5.2-9.7cm, Purna River, Mahal, Dt. Dangs, 13.3.92, P. Krishnamurthy & Party; 3exs, 5.8- 7.5cm, Tapi River, Dt. Surat, 10.2.93, T.K. Sen & Party.

*Diagnostic characters* : Length of head 6.0 to 6.5 in total length, eyes 3.5 to 5.0 in head length, dorsal profile more convex than ventral, mouth overhanging with a small lateral lobe, two pairs of barbels, upper lip indented on the edge, lower lip with a sharp horny covering, forked caudal.

*Distribution* : All along the Eastern Himalayas, Assam, West Bengal, U.P., Bihar, Gujarat (Newly recorded from Gujarat).

*Remarks* : Live in torrential waters. In behavioural aspects it is very much similar to that of the *Garra* adhering to stones in stream beds.

Genus *Garra* Hamilton

1822. *Garra* Hamilton, *Fish, Ganges* pp. 343, 393 (type- *Cyprinus lamta* Hamilton).

Key to the species of genus *Garra*

- Snout with minute pores, without well developed proboscis, distance of vent from base of anal fin less than 4 times in that between anterior origin of anal and pelvic fins ..... *Garra mulya*
- Short knob like median proboscis in males but smooth without proboscis in females, distinct tubercles on the sides of the snout, distance of vent from base of anal fin more than 4 times, snout either smooth or with a deep transverse depression ..... *Garra lamta*

26. *Garra mullya* Sykes

1841. *Chondrostoma mullya* Sykes, *Trans. Zool. Soc. Lond.*, 2, p.359, pl.62, fig.3 (type locality-Poona waterways).

1992. *Garra mullya*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal* : 158, Z.S.I., pt.2.

*Meristic counts* : D.2-3/8-9, P.15, V.9, A.2/5, C.17, L.I.36

*Material examined*: 5exs, 4.3-7.8cm, Ukai Natural Reservoir, Dt.Surat, 30km from Ukai camp, 10.2.93. T.K.Sen & Party; 3exs, 4.7-6.7cm, Hadaf reservoir on Hadaf River, 44 kms N.E.of Godhra, Dt. Panchmahal, 11.5. 92, A.K.Sarkar & Party.

*Diagnostic characters* : Length of head 5.0 to 5.5 in total length, eyes 5.0 in head length, snout without well developed proboscis, dorsal profiles more arched than ventral, two pairs of barbels, caudal almost truncate, olive green above pale yellow below, fins darker.

*Distribution* : Throughout India: except Assam-Himalayas.

*Remarks* : Live in streams and torrential waters. *G.mullya* and *G.lamta* are similar looking but can be easily separated by its sharply arched dorsal profile, absence of well developed proboscis and almost truncate caudal fin. Attains a length of 17cm.

27. *Garra lamta* (Ham.)

1822. *Cyprinus lamta* Hamilton, *Fish. Ganges*, pp. 343, 393 (type locality- Tinau River, Nepal).

1992. *Garra lamta*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal* : 158, fig. 42, Z.S.I., pt.2.

*Meristic counts* : D.2-3/8-9, P.15, V.9, A.2/5, C.17, L.I.32-36

*Material examined* : 3exs, 6.5-8.2cm, Tapi River near Kakrapar Dam, 82 kms east of Surat Dt. 22.5.92, A.K. Sarkar & Party; 6exs, 5.7-8.5 cm, Kodama Reservoir on Mahi River, 85kms NE of Godhra, Panchmahal Dt. 29.5.92, A.K. Sarkar & Party.

**Diagnostic characters :** Length of head 5.0 to 5.5 in total length, eyes 5.0 to 8.0 in head length, fusiform body, laterally placed eyes almost invisible from below, short knob like proboscis in males but mouth without proboscis in females, tubercles on the sides of snout, two pairs of barbels, distinct mental disc. caudal slightly lobed, head and back dusky dark, belly dirty white.

**Distribution :** Darjeeling and Kumaun Himalayas, Assam, Sikkim, Gujarat. E.Nepal: Pakistan.

**Remarks :** Live in streams and torrential waters. Recorded earlier from Gujarat by M.I. Patel & N.D.Chhaya (Field key to Fishes of Gujarat, Deptt. of Fisheries Govt. of Gujarat, 1979, p.59). Grows to 20.2cm in length. Commercially important due to its oily taste. Snout tip with deep transverse groove and tubercles.

Genus *Labeo* Cuvier

1817. *Labeo* Cuvier, *Regne Animale*, 2,ed.1.p.194, (type-*Cyprinus niloticus* Forskal).

Key to the species of genus *Labeo*

- 1. Lower lip separated from isthmus by a post labial groove, branched dorsal rays 12-18.....2
- Lower lip not separated from isthmus a post labial groove, branched dorsal rays 8-10.....5
- 2. Lateral line scales 71-84 .....*L. gonius*
- Lateral line scales 40-44 .....3
- 3. Branched dorsal rays 12-15, no cartilaginous layer on the inner side of both jaws .....4
- Branched dorsal rays 12-13, lateral line scales 40-42, bluish or brownish above and silvery below .....*L. rohita*
- 4. Lateral line scales 40-44, blackish becoming lighter below.....*L. calbasu*
- Lateral line scales 37-40, a tubercle inside lower jaw above symphysis.....5
- 5. No horny covering inside lower jaw .....*L. bata*

- Horny covering inside lower jaw .....6
- 6. Lateral line scales 44-47, snout with pores, continuous fringed thick lips ..... *L. fimbriatus*
- Lateral line scales 60-65 .....7
- 7. Diameter of eyes 4.5 to 5 times in head length, lower lip fimbriated with a horny covering inside, snout thick with a few tubercles, lower labial fold complete ..... *L. boggot*
- Diameter of eyes 6-9 times in head length lower lip with a fold which is interrupted and joined to isthmus by a narrow bridge .....8
- 8. Lateral line scales 43, tubercles on snout prominent .....*L. dyocheilus*
- Lateral line 39, head length 5.3 times in SL.....9
- 9. Two pairs of barbels, small eyes 5 times in HL, snout slightly projecting over mouth, devoid of lateral lobe .....*L. procellus*
- One pair of barbels, eyes moderate, 4-6 times in HL; mouth small and inferior, a deep groove across the chin .....10
- 10. Dorsal profile slightly convex than the ventral, lateral line scales 39, lower labial fold entire, mouth overhanging, smooth with a poorly developed lateral lobe .....*L. potail*
- Dorsal profile more convex than ventral with a characteristic distinct hump at base of dorsal fin but the profile before eyes rather concave, eyes 4.7-5 in HL, snout very conspicuous and thick, head fairly small, lips thick with a distinct inner fold below, lower lip finely fringed at margin .....*L. knotius*

28. *Labeo rohita* (Ham.)

1822. *Cyprinus rohita* Hamilton, *Fish, Ganges*, pp. 301, 388, pl.36, fig.85 (type locality-Gangetic provinces).

1992. *Labeo rohita*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of west Bengal*: 140, Z.S.I., pt.2.

**Meristic counts :** D.3/12-13, P.17, V.9, C.19, L.I.40-42

*Material examined* : 4exs, 9.8-16.4cm, Niruma Dam, Bhuj Dt., 23.1.91. P. Krishnamurthy & Party; 6exs, 13.8-17.5cm, Rudramata Dam, 15 kms from Bhuj Camp. Dt. Bhuj. 24.1.91, P. Krishnamurthy & Party; 5exs, 7.5-10.6cm, Fish Market at Bhuj near Rly. Stn., 23.1.91, P. Krishnamurthy & Party.

*Diagnostic characters* : Length of head 4.5 to 5.0 in total length, eyes 4.0 to 6.0 in head length, dorsal profile more convex than ventral, snout obtuse, depressed and without labial lobe; thin very short maxillary pair of barbels, dorsal situated in between tip of snout and base of caudal, deeply forked caudal, reddish blue on the back, silvery sides.

*Distribution* : Throughout India : Bangladesh, Pakistan, Myanmar.

*Remarks* : Live in big rivers, reservoirs, dams (introduced), lakes, canals, It is widely cultured and used for stocking tanks all over India. Introduced in S.India, Bombay and Andamans for cultural purposes. It is one of the most esteemed major carps of India more particularly in West Bengal and Assam. A popular game fish and offers very good sports. Grows to a metre in length.

### 29. *Labeo boggut* (Sykes)

1841. *Chondrostoma boggut* Sykes, *Trans. zool. soc. Lond.*, 2, p.359 (type locality-poona waterways).

1991. *Labeo boggut* Talwar & Jhingran, *Inland Fishes*, Vol.1.p.201.

*Meristic counts* : D.3/8-9, A.2/5, P.1/16, V.1/8, L.I.60-65

*Material examined* : 7exs, 6.5-8.4cm, Vatrack River, 40kms from Anand Camp, 7.2.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 5.5 to 6.0 in total length eyes 4.5 to 5.0 in head length, lower lip fimbriated with a horny covering inside, snout thick with a few tubercles, a pair of short maxillary barbels, dorsal origin nearer to snout than to caudal base, silvery, darkest above; fins orange red.

*Distribution* : Freshwaters throughout India down south to the Krishna river; Pakistan, Bangladesh, Myanmar, Sri Lanka.

### 30. *Labeo fimbriatus* (Bloch)

1797. *Cyprinus fimbriatus* Bloch, *Ichth.*, 12, p.50, pl. 409 (type locality-Madras).

1992. *Labeo fimbriatus*, Sen, *Freshwater Fish, State Fauna Series 3; Fauna of West bengal* : 145, Z.S.I.pt.2.

*Meristic counts* : D.3-4/15-18, P.17.V.9. A.2/5, C.19, L.I.44- 47

*Material examined* : 5 exs, 9.7-13.6cm, Sabarmati River, Anand, Dt. Kheda, 7.2.93, T.K. Sen & Party; 2exs, 12.3-16.3cm, Vatrack River, Anand, Dt. Kheda, 5.2.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 6.2 to 6.5 in length, eyes 3.7 to 4.5 in head length, dorsal profile more convex than ventral, obtuse snout, overhung, swollen and beset with pores, no lateral lobe, a horny lining to inside of both the jaws, two pairs of short rostral and maxillary barbels, silvery with blackish tinge, lighter on sides and below.

*Distribution* : West Bengal, Assam, Punjab, U.P., Poona, M.P., Gujarat, S.India (except: W. Ghat); Nepal, Myanmar and Pakistan.

*Remarks* : A good eating but bony minor carp of India lives in semi-torrential rivers and streams. Grows to 45cm in length.

### 31. *Labeo procellus* (Heckel)

1844. *Tylongnathus procellus* Heckel, *Hugel's Kashmir und das Reich der Seikh* 4(2) : 384 (type locality-Bombay).

1991. *Labeo procellus*, Talwar & Jhingran, *Inland Fishes*, Vol.1.p.217.

*Meristic counts* : D.2/13-14, A.2/5, P.1/16, V.1/8, L.I.39

*Material examined* ; 3exs, 7.8-12.6cm, Khareswar Village, 10km from Dhram gadhra, Surendranagar Dt., 10.12.92, A.K. Sarkar & Party.

*Diagnostic characters* : Length of head 5.3 in SL, eyes 5 in head length, small eyes, snout slightly projecting over mouth, devoid of lateral lobe; mouth subinferior, thick lips with a distinct inner fold to both jaws; two pairs of barbels, dorsal fin nearer to snout tip than to caudal fin base, pectoral fin as long as head,

greyish on back, silvery-white on flanks and abdomen, a bluish spot on operculum.

*Distribution* : Western Ghats of the Bombay region, Gujarat, Sri Lanka.

*Remarks* : Live in rivers. Observed wider representation in Maharashtra compared to Gujarat.

### 32. *Labeo bata* (Ham.)

1822. *Cyprinus bata* Hamilton, *Fish ganges*, pp.283, 386 (type locality-rivers and ponds of Bengal).

1922. *Labeo bata*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal*. 141, pt.2, fig.27.

*Meristic counts* : D.2-3/9-10,P.18,V.9, A. 2/5, C.19, L.I.27- 40

*Material examined* : 9exs, 9.5-11.5cm, adjacent canal of Gajood Reservoir, Dt. Bhuj, 24.1.91, P. Krishnamurthy & Party; 6exs, 7.5-12.3cm, Sidpur, Dt.Mahesana,50km from Dhara Camp, 31.1.91,P.Krishnamurthy & Party; 5.4-9.0cm, Mannadi, E.of Dharampur Dt. 9.3.92, A.K.Sarkar & Party.

*Diagnostic characters* : Length of head 5.5 in total length, eyes 4.0 to 4.3 in head length, dorsal profile more convex than ventral, continuous thin lips, a tubercle inside lower jaw above symphysis, a pair of very short maxillary barbels, caudal deeply forked, silvery dark dorsally, stained with orange.

*Distribution* : West Bengal, Orissa, M.P., U.P., Assam, Bihar, Gujarat, Bangladesh S. India (Cauvery, Krishna and Godavari river systems) : Bangladesh, Nepal (Introduced).

*Remarks* : Most popular minor carp of economic importance all over India, particularly in west Bengal, for its oily taste. Grows to 60cm in Length.

### 33. *Labeo Calbasu* (Ham.)

1822. *Cyprinus calbasu* Hamilton, *Fish, Ganges*, pp. 297, 389, pl.2, fig.33 (type locality- Bengal).

1992. *Labeo calbasu*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of west Bengal* 143, fig. 28, pt.2.

*Meristic counts* : D.3/13-15,P.19,V.9, A. 2/5, C.19, L.I.40-44

*Material examined* : 4exs, 13.5-18.5cm, Nagrama village, Dt.Kheda,30.11.92, A.K. Sarkar & Party; 3exs, 12.0-19.3cm, Andhra Village, 12km of Kheda town, Dt. Kheda, 29.11.92, A.K.Sarkar & Paarty.

*Diagnostic characters* : Length of head 5.0 to 6.0 in total length, eyes 4.0 to 5.0 in head length, robust with both the dorsal and ventral profiles equally convex, narrow mouth, snout obtuse, depressed and without lateral lobe; 4 barbels, pores on the upper lip and snout, caudal deeply forked, blackish or metallic grey all over the body, lighter on the sides and below fins black.

*Distribution* : Throughout India: Bangladesh, Pakistan, Thailand, China.

*Remarks* : A popular carp of India. Grows to 92cm in length. Live in big rivers, tributaries and lakes, Also used for stocking tanks for culture all over India.

### 34. *Labeo dyocheilus* (McClland)

1839. *Cyprinus dyocheilus* McClland, *Asiat, Res., Res.*, 19(2): 268,330, pl.37.fig.1 (type locality- Brahmaputra river).

1991. *Labeo dyocheilus*, Talwar & Jhingran, *Inland Fishes*, Vol.1, p.207,fig.75.

*Meristic counts* : D.2-3/10-11, A.2/5, P.1/16, V.1/8,L.I.43

*Material examined* : 6exs, 14.4-17.4cm, Sabarmati river, Anand ,Dt.Kheda, 5.2.93, T. K. Sen & Party; 2exs, 7.5-9.3cm, Stream at Dhandha, 3km away from Himmatnagar, Dt. Sabarkantha, 13.9.93, A.K.Sarkar & Party.

*Diagnostic characters* : Length of head 5.0 to 5.5 in total length, eyes 6 to 9 in head length, conical snout, projecting beyond mouth with a distinct lateral lobe, eyes small, thick lips, not fringed; lower lip with a fold which is interrupted and joined to isthmus by a narrow bridge, one short maxillary pair, dorsal fin equidistant from tip of snout and caudal fin base, caudal fin deeply forked,dull green, darker above.

*Distribution*: All along the Himalayas.

Assam, Orissa, Gujarat, West Bengal, M.P., Bangladesh, Pakistan, (Sind Hilla), Nepal.

*Remarks* : A popular minor carp of economic importance. Grows to 90cm in length. Most commonly found in the Himalayas up to Sikkim and Assam.

### 35. *Labeo gonius* (Ham.)

1822. *Cyprinus gonius* Hamilton, *Fish, Ganges.*, pp. 292, 387 (type locality-Bengal).

1992. *Labeo gonius*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal.* pt.2, p. 144, fig.30.

*Meristic counts* : D.2-3/13-14, P.17, V.9, A. 2/5, C.19, L.I.71- 84

*Material examined* : 7exs, 10.5-17.6cm, stream at Dhandha, 3km away from Himatnagar, Dt. Sabarkantha, 13.9.93, A.K. Sarkar & Party.

*Diagnostic characters* : Length of head 5.0 to 5.5 in total length, eyes 4.5 to 5.0 in head length, snout with distinct pores without lateral lobe, dorsal profile more convex than ventral, thick fringed lips, horny layers to inside of both the jaws, two pairs of short barbels, dorsal origin nearer to snout origin than to caudal base, small scales, caudal deeply forked, greenish black dorsally and dull white on the sides and below.

*Distribution* : West Bengal, Assam, Bihar, U.P., Gujarat, as far as Krishna river in the South : Bangladesh, Pakistan, Nepal and Myanmar.

*Remarks* : Live in rivers, tributaries, lakes and canals. Grows to 1.5 m in length. Easily recognised for its faint longitudinal lines, small scales and deeply forked caudal fin with sharp lobes.

### 36. *Labeo konticus* (Jerdon)

1849. *Cyprinus konticus* Jerdon, *Madras J. Lit. & Sci.* 15: 302 (type locality-Cauvery and its tributaries).

1991. *Labeo konitcus*, Talwar & Jhingran, *Inland Fishes* Vol.1.p.212.

*Meristic counts* : D.3-4/12-13, A.2/5, P.1/14, V.1/9, L.I.38-41

*Material examined* : 6exs, 6.5-8.8cm, Stream at Dhandha, 3km away from Himmatnagar, Dt. Sabarkantha, 13.9.93. A.K. Sarkar & Party; 2exs, 8.3-9.4cm, Gudkar Nabhod Forest area, Bhuj, Dt. Kachchh, 28.9.93, A.K. Sarkar & Party.

*Diagnostic characters*: Length of head 6.0 to 7.0 in total length, dorsal profile more convex than ventral, with a typical hump at base of dorsal fin but the profile before eyes rather concave; head fairly small, snout very conspicuous and thick over hung mouth with a short fleshy lateral projection, beset with pores; eyes 4.7 to 5.0 in head length, mouth subterminal, lips thick with a distinct inner fold below, lower lip finely fringed, two pairs of barbels, reddish or fleshy tinge, darkest along the back, caudal fin deeply forked.

*Distribution* : Tamil Nadu, S.Karnataka (Cauvery river system), Gujarat (Newly recorded).

*Remarks* : Live in big rivers. Important fishery resources of Cauvery river system Stocked in tanks in Karnataka for tank-fisheries. Grows to 61cm in length.

### 37. *Labeo potail* (Sykes)

1841. *Cyprinus potail* Sykes, *Trans,zool. Soc.Lond.*, 2 : 354 (type locality-Bhima river. Maharastra).

1991. *Labeo potail*, Talwar & Jhingran, *Inland Fishes*, Vol.1.p.218.

*Meristic counts* : D.2/11-12, A.2/5, P.1/16, V.1/8, L.I.40

*Material examined* : 4exs, 9.6-12.6cm, Balaram River, near Dharmata temple, 20km N. of Palanpur, Dt. Banaskantha, 18.9.93, A.K. Sarkar & Party; 7exs, 9.5-13.4cm, pools on Harnaber River bed, Khesbrahma, Dt. Sabarkantha, 14.9.93, A.K. Sarkar & Party.

*Diagnostic characters* : Length of head 5.0 in SL, eyes 4.0 to 6.0 in head length, snout overhung the mouth, a poorly developed lateral lobe, often with fine pores; lower labial fold entire, a deep groove across the chin, one pair

of barbels (maxillary). Caudal fin forked, upper lobe longer, greyish. each scale with a red lunule.

*Distribution* : Maharastra, Gujarat, Deccan, Cauvery River System.

*Remarks* : Live in rivers and tributaries. Attains a length of 30cm, of less economic importance.

Genus *Osteobrama* Heckel

1842. *Osteobrama* Heckel, *Russegger's Reisen in Europa, Asien und Africa* etc., 1(1): 1033(type species: *Cyprinus cotio* Hamilton-Buchanan).

Key to the species of genus *Osteobrama*

- 1. Anal fin with 11 branched rays .....2
- Anal fin with 16 to 18 branched rays .....3
- 2. Lateral line scales 44 .....*O. bakeri*
- Lateral line scales 73-85.....4
- 3. Lateral line scales 55 to 59 .....*O. neilli*
- Lateral line scales 65, anal fin with 33 to 38 branched rays .....*O. cotio cotio*
- 4. Anal fin long with 21 to 27 branched rays .....*O. vigorsii*

38. *Osteobrama bakeri* (Day)

1873. *Rohtee bakeri* Day, *Proc.zool.soc.Lond*, 240 (type locality-Kottayam, Kerala).

1991. *Osteobrama bakeri*, Talwar & Jhingran, *Inland Fishes*, Vol.1.p.237.

*Meristic counts* : D.3/8, A.3/11,P.1/12, V.1/10, L.I.44

*Material examined* : 4exs, 4.5-6.3cm, Balaram river, near Dharmata temple, 20km N of Palanpur, Dt. Banaskantha, A.K. Sarkar & Party, 18.9.93.

*Diagnostic characters* : Length of head 5.0 to 6.0 in total length, eyes 3.0 to 3.5 in head length, profile over nape rather concave, a considerable rise to the base of the dorsal fin; mouth small, horseshoe shaped, upper jaw longer, two pairs of barbels, dorsal spine weak

and serrated, small scales, predorsal scales 15, silvery.

*Distribution* : Kerala, Gujarat (New record).

*Remarks* : Live in tributaries. Grows to 11cm in length, of little economic importance.

39. *Osteobrama cotio cotio* (Ham.)

1822. *Cyprinus cotio*, Hamilton, *Fishes, Ganges*. 339, 393, pl.39, fig.93 (type locality-ponds and ditches of Bengal).

1991. *Osteobrama cotio cotio* Talwar & Ghingran, *Inland Fishes*, Vol,1, p.338.

*Meristic counts* : D.3-4/8,A.3/33-38, P.1/12-14, V.1/8,L.I.65

*Material examined* : 12exs,4.5-7.5cm, Bavalkanth River, 22km N of Khedbrahma, Dt., Sabarkantha, 15.9.93,A.K.Sarkar & Party; 13exs,5.3-7.5cm,Vatrack River,Anand, Dt. Kheda,7.2.93,T.K.Sen & Party.

*Diagnostic characters* : Length of head 5.5 to 6.0 in total length, eyes 2.5 to 3.0 in head length, profile over nape concave, upper jaw slightly longer, no barbels,dorsal fin nearer to snout than to caudal fin base, dorsal spine weak and serrated, silvery back with a silvery lateral band.

*Distribution* : All over India except Malabar and south of Krishna river : Bangladesh, Pakistan and Myanmar.

*Remarks* : Live in rivers, tributaries, ponds, tanks, canals, road-side ditches, paddy -fields (during monsoon months). beels (dried up marshy water-bodies). Grows to 15.2 cm in length.

40. *Osteobrama neilli* (Day)

1873. *Rhotee neilli* Day, *Proc, zool, Soc, Lond*; 239 (type-locality: Bhavani river at base of Nilgiri Hills).

1991. *Osteobrama neilli*, Talwar & Ghingran, *Inland Fishes*, P.241,Vol.1.

*Meristic counts* : D.4/8,A.3/16-18,P.1/12, V.1/10, L.I.55-59

*Material examined* : 9exs, 5.6-7.5cm,

Forest around Dhalwani, N of Himatnagar, Dt. Sabarkantha, 11.5.93, A.K.Sarkar & Party; 14exs, 4.5-7.5cm, Tapi river, Dt. Surat, 10.2.93, T.K.Sen & Party.

**Diagnostic characters** : Length of head 5.5 in total length, eyes 3.5 in the head length, abdominal edge sharp and trenchant between bases of pelvic fins and anal fin, but rounded in front of pelvic fins; small mouth, two pairs of well-defined barbels, dorsal spine very strong and serrated, small scales, silvery with golden operculum.

**Distribution** : Maharashtra, Karnataka, Gujarat, Tamil Nadu: Myanmar (New record from Gujarat).

**Remarks** : Live in rivers, tributaries. Grows to 12 cm in length.

#### 41. *Osteobrama vigorsii* (Sykes)

1841. *Rhotee vigorsii* Sykes, *Trans. zool. Soc. Lond.* 2: 364, pl.63, fig.3 (type locality-Bheema river, Maharashtra).

1991. *Osteobrama vigorsii*, Talwar & Ghingran, *Inland Fishes.*, Vol.1.p.242.

**Meristic counts** : D.3/8, A.3/21-27, P.1/18, V.1/9, L.I.73-85

**Material examined** : 6exs, Chhrodia village, Dhandhuka, Ahmedabad Dt. 4.12.92. A. K. Sarkar & Party; 4exs, 9.3- 11.3cm, Vatrack river, Anand, Dt. Kheda, 7.2.93, T.K. Sen & Party.

**Diagnostic characters** : Length of head 5.0 in total length, eyes 3.0 to 3.5 in head length, a cavity over nape, lower jaw somewhat longer, barbels absent, or rudimentary, dorsal origin midway between pelvic and anal origins, dorsal spine strong and serrated, greenish grey above, silvery on sides, black snout.

**Distribution** : Maharashtra, Orissa, Gujarat, Krishna and Godavari river systems (New record from Gujarat).

**Remarks** : Live in rivers and tributaries. This species is confused with *O.cotio*, but, can be easily distinguished by its distinct concavity from the snout to over the nape, while in *O.cotio* the profile is concave just over the nape; the dorsal spine is very strong in *O.vigorsii* while it is weak in *O.cotio*. Grows to

23cm in length. Very common in streams in S. India, of little economic importance.

#### Genus *Puntius* Hamilton

1822. *Puntius* Hamilton, *Fish, Ganges* pp.310, 388, (type-*Cyprinus sophore* Ham.).

#### Key to the species of genus *Puntius*

1. Barbels present .....2
- Barbels absent .....5
2. Two pairs of barbels, L.I.complete .....3
- Single pair of barbels .....4
3. L.I.scales 32-34, height of body 3.5 to 3.6 in T.L. ....*P. sarana sarana*
- Lateral line scales 26-28, height of body 2.8 to 3.0 in SL .....*P. melanostigma*
4. Lateral line scales 23-24, height of body 4.5-5.0 in TL .....*P. amphibius*
- L.I.scales 26-28, predorsal scales 10-12, two distinct dark blotches, one behind operculum, second near the base of caudal fin and the third one on operculum .....*P. chola*
5. L.I.scales 20-23, body with 5 steel-blue transverse bars which usually fade into three black blotches..... *P. phutunio*
- L.I.scales 24-28 .....6
6. A large round black spot on the middle above the anal fin .....*P. conchoniis*
- No round black spot on the middle above the anal fin, a dark band from eye to tip of caudal fin along lateral line.....7
7. Lateral line scales 29-30, last unbranched dorsal fin ray osseous .....*P. pleurotaenia*
- Lateral line scales 22-26 .....8
8. Head length 5.0 in TL, a black spot on the side of the tail before the caudal fin base .....*P. ticto*
- Head length 5.0 in T.L., L.I. scales 23-26 .....9
9. A black blotch at the base of dorsal fin, .....*P. sophore*
- No such black blotch at the base of dorsal fin, height of body 2.8 to 3.2 in S.L. ....10

10. L.I.scales 26, head length 4.2 in SL  
.....*P. parrah*
- L.I.scales 26-32, last unbranched dorsal fin ray non-osseous, weak and articulated  
.....11
11. Head length 4.2 to 5.0 in SL, 2-pairs of barbels, height of body 2.7 to 3.0 in SL  
.....*P. jerdoni*
- Head length 3.7 in SL, height of body 3.3 in SL  
.....12
12. One pair of maxillary barbel only, lateral line complete with 26 scales  
.....*P. arenatus*
- Two pairs of barbels, head length 4.0 in SL, lateral line complete with 24-26 scales  
.....13
13. Last unbranched dorsal fin ray osseous, moderately strong and smooth  
..... *P. bovanicus*
- Last unbranched dorsal fin ray weak and entire  
.....14
14. Lateral line scales 22, no barbels  
.....*P. vittatus*
- Lateral line scales 42 to 47, one short maxillary pair only, last unbranched dorsal fin ray osseous, strong and serrated  
.....*P. fraseri*

**42. *Puntius sophore* (Ham.)**

1822. *Cyprinus sophore* Hamilton, *Fish, Ganges*, pp. 310, 389, pl.19, fig.86 (type locality- ponds and rivers in the Gangetic provinces).

1922. *Puntius sophore*, Sen, *Freshwater fish, State Fauna Series 3 : Fauna of West Bengal*, pt.2. Z.S.I., p.151.

*Meristic counts* : D.3/8-9, P.17, V.9, A.3/5, C.19, L.I.23-26

*Material examined* : 6exs, Kodama reservoir on Mahi river, 85km NE of Godhra, Panchmahal Dt., 29.5.92, A.K.Sarkar & Party; 13exs, 4.2-7.4cm, Mindhola river at Bardoloi, 34km NW of Surat, Dt. Surat, 22.5.92, A.K.Karmakar & Party.

*Diagnostic characters*: Length of head 5.0 in TL, eyes 3.5 to 4.0 in head length, dorsal profile more convex than ventral, incomplete lateral line, barbels absent, a black blotch at the

base of the dorsal fin, silvery, dorsal spine weak and entire

*Distribution* : Throughout India: Bangladesh, Myanmar, Nepal, Pakistan. S. China.

*Remarks* : Live in ponds, tanks and ditches. Grows to 12.7cm in length.

**43. *Puntius parrah* (Day)**

1865. *Puntius parrah* Day, *Procd. zool. Soc.Lond.*, 301 (type-locality : Kuriavanoor near Trichur, Kerala).

1991. *Puntius parrah*, Talwar & Ghingran, *Inland Fishes*, p. 277. Vol. 1.

*Meristic counts* : D.2-3/7-8, A.2-3/5, P.1/14, V.1/8, L.I.25-26

*Material examined* : 3exs, 4.5-7.5cm, Tapi River, Dt. Surat, 10.2.93, T.K. Sen & Party.

*Diagnostic characters* : Length of head about 4.2 in SL, depth of body 2.8 to 3.2 in SL, body fairly deep, a single pair of maxillary barbels, origin of dorsal fin equidistant from tip of snout and base of caudal fin, last unbranched ray osseous and smooth, dark greenish back, lower half silvery; a dark bluish horizontal line on flanks, golden-red checks, golden eyes, a diffused black spot on lateral (12th scale) line.

*Distribution* : Kerala, Karnataka, Tamil Nadu and Gujarat.

*Remarks* : Grows to 15cm in length. Used as aquarium fish all over the country.

**44. *Puntius phutunio* (Ham.)**

1822. *Cyprinus phutunio* Hamilton, *Fishes of Ganges*, pp. 319.390 (type locality-N-E Bengal).

1992. *Puntius phutunio*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal* p. 150, pt.2., fig.34.Z.S.I.

*Meristic counts* : D.2-3/8, P.15, V.9, A.3/5, C.19, L.I.20-23

*Material examined* : 7exs, 3.5-5.6 cm, Ukai Reservoir (natural), Dt.Surat, 11.2.93, T.K. Sen & Party; 4exs, 3.4-6.2cm, Vatrack River, Dt. Kheda, 7.2.93., T.K.Sen & Party.

*Dignostic characters* : Length of head 4.0

to 4.6 in total length, eyes 2.5 in head length, dorsal profile more convex than the ventral, mouth small, barbels absent, dorsal fin midway between tip of snout and caudal fin base, last unbranched dorsal fin ray osseous and serrated, reddish brown with two black bands- one on the middle above caudal fin base and the other below the head, fins pale orange coloured.

*Distribution* : West Bengal, Orissa, Assam, Gujarat (New record): Bangladesh, Myanmar.

*Remarks* : Popularly known as *Dwarf Barb*. The sparkling silver glow or sheen of its scales is remarkable. Very difficult to differentiate between male and female, 'phutuni' means bosting in Bengali (Sen, 1981, p.99). Grows to 7.5cm in length.

#### 45. *Puntius melanostigma* (Day)

1878. *Barbus melanostigma* Day, *Fishes of India*, p. 573, pl. 143, fig.1 (type-locality-Wynad, Kerala).

1991. *Puntius melanostigma*, Talwar & Jhingran, *Inland Fishes*, Vol.1.p.275.

*Meristic counts* : D.2/8, A.2/5, P.1/14, V.1/8, L.I.26-28

*Material examined* : 9exs, 4.5-5.7cm, Nagra village, Dt. Kheda, 30.11.92, A.K. Sarkar & Party; 4exs, 3.6-6.5cm, Tapi River, Dt. Surat, 10.2.93., T.K.Sen & Party.

*Diagnostic characters* : Length of head 3.75 in SL, mouth small and subterminal, one pair of maxillary barble only, dorsal fin equidistant from tip of snout and base of caudal fin, last unbranched dorsal fin ray feebly osseous and smooth. silvery with a light band on flanks, a deep black blotch on base of caudal fin.

#### 46. *Puntius jerdoni* (Day)

1870. *Barbus (Barbodes) jerdoni* Day, *Proc.zool. Soc. Lond.* : 372 (type locality-Mangalore, Karnataka).

1991. *Puntius jerdoni*, Talwar & Jhingran, *Inland Fishes*, Vol.1. p.274

*Meristic counts* : D.3-4/9, A.3-5/6, P.1/13-14, V.1/8, L.I.26- 32

*Material examined* : 6exs, 12.5-20.4cm, stream at Dhandhua, 3km away from Himmatnagar, Sabarkantha Dt. 13.9.93, A.K. Sarkar & Party; 4exs, 9.3-13.7cm, Balaram River, near Dharmata temple, 20K No. of Palanpur, Dt. Banaskantha, 18.9.93, A.K. Sarkar & Party.

*Diagnostic characters* : Length of head 4.2 to 5.0 in SL, narrow mouth, dorsal fin equidistant from tip of snout to caudal fin, two pairs of barbels, last unbranched dorsal fin ray-osseous and weak, complete lateral line, silvery fins with orange tinge.

*Distribution*: Karnataka, Kerala, Tamil Nadu, Maharastra and Gujarat (New record).

*Remarks* : Live in rivers, tributaries, reservoirs (cultured) etc. Grows to 46cm in length. Forms important fishery in Karnataka (Anjanapur Reservoir, Shimoga Dt.) and Tungabhadra subdrainage of the Krishna River (reservoirs).

The catches of this carp have fallen far below the average expectation like the Mahseers (*Tor* sp) of S.India, due to wanton killing and construction of Dams, Barrages, Reservoir etc.

#### 47. *Puntius arenatus* (Day)

1878. *Barbus arenatus* Day, *Fishes of India* p.574, pl.142, fig.7 (type-locality-Madras)

1991. *Puntius arenatus*, Talwar & Jhingran, *Inland Fishes*, Vol.1.p.258.

*Meristic counts* : D.2/8, A.3/5, P.1/14, V.1/8, L.I.26.

*Material examined* : 3exs, 3.0-4.5cm, Khareswar village, 10km from Dhrangadhra, Surendranagar Dt., 10.12.92, A.K. Sarkar & Party; 4exs, 2.7-4.0cm, Nagrama Saravar (beel) at Limbasi village, 30km from Anand camp, Dt. Kheda, 14.2.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 3.7 in SL, one pair of barbels only, dorsal fin equidistant from tip of snout to base of caudal fin, large scales, complete later line, silvery without any prominent marking.

*Distribution* : Tamil Nadu, Karnataka and Gujarat

*Remarks* : Attains 13cm in length. Not

commonly found like other *Puntius* sps, is of economic importance.

#### 48. *Puntius sarana sarana* (Ham.)

1822. *Cyprinus sarana* Hamilton, *Fish, Ganges*, pp. 307, 388 (type locality-ponds and rivers of Bengal).

1992. *Puntius sarana sarana*, Sen, *Freshwater fish, State Fauna Series 3: Fauna of West Bengal Z.S.I.*, p.151, pt.2.

*Meristic counts* : D.3/8, P.15,V.9, A.3/5, C.19, L.I.32-34

*Material examined* : 4exs, 8.5-17.4cm, Wankaleswar River, Godhra (8 kms from Baria), Panchmahal Dt.,10.5.92, A.K. Sarkar & Party; 7exs, 7.8-11.8cm, Narmada River at Sisodra, 15kms N-W of Rajpipla, Dt.Bharuch, 16.5.92., A.K.Karmakar & Party.

*Diagnostic characters* : Length of head 5.0 to 5.2 in total length, eyes 4.2 to 4.7 in head length, dorsal profile more convex than ventral, two pairs of barbels, interorbital space convex, snout without pores, dorsal commences slightly nearer to the snout than to the caudal fin base, lateral line complete, its last unbranched dorsal finray serrated, silvery, darkest dorsally; often a golden blotch on the opercle, greyish white fins.

*Distribution* : Throughout India: Bangladesh, Myanmar, Sri Lanka, Thailand, Pakistan and S.China.

*Remarks* : Most popular species under this genus of high economic importance all over India, particularly in West Bengal, because of its big size and good oily taste. Lives in pools, rivers, tributaries, tanks, beels, streams and lakes; grows to 34.4cm in length.

#### 49. *Puntius bovanicus* (Day)

1878. *Barbus bovanicus* Day, *Fishes of India* p.566, pl. 138, fig.1 (type-locality-Bowani river at base of Nilgiri Hills).

1991. *Puntius bovanicus* Talwar & Jhingran, *Inland Fishes*, Vol.1.p.261.

*Meristic counts* : D.3-4/8-10, A.3/5, P.1/18, V.1/8,L.I.24-26

*Material examined* : 3exs, 4.5-6.2cm, Lukumar Village, 4km S.W. of Dahad, Panchmahal Dt.,27.3.92, A.K.Sarkar & Party.

*Diagnostic characters*: Length of head 4.0 in SL, subterminal mouth, head fairly small, two pairs of barbels, fin equidistant from tip of snout to the base of caudal fin, its last unbranched ray osseous, moderately strong and amooth: lateral line complete, greenish with a golden tinge, darkest dorsally.

*Distribution* : Nilgiri Hills (Bhavani river), Cauvery river system (S.India), Gujarat.

*Remarks* : Attains a length of 12.0cm.

#### 50. *Puntius chola* (Ham.)

1822. *Cyprinus chola* Hamilton, *Fish, Ganges*, pp. 312, 389 (type locality-N.E. of Bengal)

1992. *Puntius chola*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal Z.S.I.*, Pt.2. p.148.

*Meristic counts* : D.3/8, P.15, V.9, A.9, A.2/5, C.19, L.I.26-28

*Material examined*: 7exs, 4.5-6.7cm, Gajood Reservoir and adjacent canal, Dt. Bhuj, 24.1.91, P. Krishnamurthy & Party: 3exs, 3.6-5.5 cm, canals adjacent to Dharoi Dam, Dharoi, 1.2.91, P.Krishnamurthy & Party.

*Diagnostic characters* : Length of head 4.5 to 4.7 in total length, narrow suborbital ring of bones, dorsal profile more convex than ventral, dorsal fin origin midway between tip of snout and caudal fin base, a single pair of maxillary barbels, last undivided dorsal fin ray osseous and smooth, complete lateral line, silvery opercles shot with purple and gold, a dark blotch between 23rd and 25th scales.

*Distribution* : Throughout India: Sri Lanka, Pakistan, Myanmar etc.

*Remarks* : Commonly seen in the ditches, tanks, canals, paddy fields (during monsoons). streams and rivulets, attains 12.5 cm in length.

#### 51. *Puntius vittatus* (Day)

1878. *Barbus vittatus* Day, *Fishes of India*, p.582, pl.144, fig.2.

1991. *Puntius vittatus* Talwar & Jhingran, *Inland Fishes*, p.293, fig.102, Vol.1.

*Meristic counts* : D.2/8, A.2/5, P.1/11, V.1/8, L.I.22

*Material examined* : 6exs, 2.5-3.4cm, Ukai Natural Reservoir, 100km from Surat, Dt. Surat, 10.2.93. T.K.Sen & Party : 3exs, 2.7-3.4 cm, Vatrack River, 70km from Anand camp, Dt. Kheda, 7.2.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 4.0 to 4.5 in total length, eyes 1/2 to 1/3 in the length of head, mouth small and terminal, dorsal fin origin nearer to caudal fin base than to tip of snout, its last unbranched dorsal fin ray weak and entire, incomplete lateral line ceases after three to six scales, yellowish-green back, flanks greenish, belly silvery white, a black blotch with golden border at the base of caudal fin.

*Distribution*: Karnataka, Tamil Nadu, Goa, Kerala, Rajasthan: Sri Lanka.

*Remarks* : One of the smallest barb under this genus, a good breeder and a little fish of strong vitality to withstand all adverse conditions of life.

### 52. *Puntius ticto* (Ham.)

1822. *Cyprinus ticto* Hamilton, *Fishes of Ganges*, p. 314, 398, pl.8. fig.87 (type-locality S.E. Parts of Bengal).

1991. *Puntius ticto*, Talwar & Jhingran, *Inland Fishes*, Vol.1. p.291, fig.101.

*Meristic counts* : D.3/8, P.15, V.2/5, C.19, L.I.23-26

*Material examined* : 17exs, 5.6-8.5 cm, Neja Village, Khambat, Dt. Kheda, 1.12.92, A.K. Sarkar & Party; 13exs, 4.5-6.8cm, Ukai Natural Reservoir, Dt. Surat, 11.2.93, T.K. Sen & party.

*Diagnostic characters* : Length of head 5.0 in total length, eyes 3.0 in head length, strongly compressed and elevated back, dorsal fin ray strong and osseous, incomplete lateral line (ceasing after 6 or 8 scales), no barbels, back grey to grassy green, silvery sides, two lateral spots, during seasonal changes (March to September). This fish often develops bright red colour on the flanks and olive green on the back

(Sen, 1985, P.82). Colour Changes take place in males during breeding season according to Dr.S.L.Hora.

*Distribution* : Throughout India : Bangladesh, Myanmar, Pakistan, Thailand, Sri Lanka.

*Remarks* : Most commonest species under this genus found all over the country. specially in West Bengal. Grows to 10.2cm in length.

### 53. *Puntius amphibius* (Val.)

1878. *Barbus amphibius* Day, *Fishes of India* P.574, p.1. 142, fig.8.

1991. *Puntius amphibius*, Talwar & Jhingran, *Inland Fishes*, P.257, Vol.12.

*Meristic counts* : D.2-3/8. A, 2-3/5, P.1/14, V.1/8, L.I.23-24.

*Material examined* : 4exs, 3.5-5.6cm, Narmada River at Sisodra, 15kms N-W of Rajpipla, Dt. Baruch, 16.5.92, A.K. Karmakar & Party; 3exs, 4.0-5.6cm, Kodama Reservoir on river Mahi, 85kms NE of Godhra (45 kms from Lonavada), Panchmahal Dt. 29.5.92, A.K. Karmakar & Party.

*Diagnostic characters* : Length of head 3.75 in SL, spindle shaped body with both dorsal and ventral sides equally convex, small subterminal mouth, one pair of short maxillary barbel, dorsal fin origin nearer to the tip of the snout than to caudal fin base with last unbranched ray feebly smooth and osseous; steel blue dorsally, fading white with golden tinge on the sides and abdomen; a large distinct black spot on the base of the caudal fin.

*Distribution*: Orissa, M.P., Rajasthan, Assam, Peninsular India : Sri Lanka. Gujarat,

*Remarks* : Inhabits streams and ponds of shallow nature. Grows to a length of 20cm. Regarded as a potential species for larvicideal control.

### 54. *Puntius conchoni* (Ham.)

1822. *Cyprinus conchoni* Hamilton, *Fish Ganges*, pp. 317, 389 (type locality- ponds of N-E Bengal and in the rivers of Koshi and Ami).

1992. *Puntius conchoni*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal*

Z.S.I., p.148, fig.33, pt.2.

*Meristic counts* : D.3/8, P.11, V.9, A.2/5, C.19, L.I.24-28

*Material examined* : 11exs, 5.6-9.8cm, Balaram river, near Dharmata temple, 20kms N. of Palanpur, Dt. Banaskantha, 18.9.93, A.K. Sarkar & party: 9exs, 5.6-8.5cm, Sabarmati River, 45kms from Anand Camp, Dt. Kheda, 5.2.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 5.0 in total length, eyes 3.0 in head length, both dorsal and ventral sides equally convex, mild notch over the nape, no barbels, incomplete lateral line, dorsal fin with moderately strong serrated spine opposite to pelvic fin, predorsal scales 9, greenish grey dorsally, silvery on the sides, a large black blotch on the middle of caudal peduncle.

*Distribution* : Assam, West Bengal, Orissa, Bihar, U.P., Gujarat (New Record), Punjab, Deccan: Bangladesh, Pakistan.

*Remarks* : Commonly found in tanks, beels, canals, paddy-fields (during monsoons), ponds, road-side ditches and small streams. Grows to 12.7cm in length.

### 55. *Puntius fraseri* (Hora & Misra)

1938. *Barbus fraseri*, Hora & Misra, *J. Bombay nat. Hist. Soc.*, 40(1): 29. pl.3. fig.2 (type locality-Dharna river at Deolali, Maharashtra).

1991. *Puntius fraseri*, Talwar & Jhingran, *Inland Fishes*, Vol.1.p.272.

*Meristic counts* : D.2/8, A.3/5, P.1/11-12, V.1/8, L.I.42-47

*Material examined* : 3exs, 2.5-3.0cm, Tapi River, 72kms east of Surat, Dt. Surat, 22.5.92, A.K.Sarkar & Party.

*Diagnostic characters* : Length of head 3.9 in SL, small mouth, one short maxillary pair of barbels, last unbranched dorsal fin ray strong, osseous and serrated, small scales, incomplete lateral line, yellowish-olive with a silvery streak on flanks, a faint golden spot on occiput.

*Distribution* : Western Ghats, Maharashtra (Dharna River), Gujarat.

*Remarks* : Live in rivers, canals etc, Grows to very small size, is of no fisheries importance.

### 56. *Puntius pleurotaenia* Bleeker

1878. *Barbus pleurotaenia* Day, *Fishes of India*, p.562.

1991. *Puntius pleurotaenia*, Talwar & Jhingran, *Inland Fishes*, p.279, Vol.1.

*Meristic counts* : D.4/8, A.2-4/4-5, P.1/15, V.1/8, L.I., 28-30

*Material examined* : 4exs, 6.5-10.4cm, Narmada River at Sisodra, 15kms N.W. of Rajpipla, Dt. Bharuch, 16.5.92, A.K.Karmakar & Party.

*Diagnostic characters* : Length of head 5.2 in total length, eyes 2/7 of head length, dorsal more convex than ventral, subterminal mouth, its cleft extends to anterior edge of orbit, two pairs of barbels, dorsal fin origin slightly nearer to tip of snout than to caudal fin base, last unbranched dorsal fin ray osseous, strong and serrated on its hind edge, greenish brown back, sides and abdomen silvery white.

*Distribution* : Gujarat (Narmada River): Sri Lanka.

*Remarks* : This species was first recorded from Gujarat by Mr.M.I.Patel and Prof.N.D.Chhaya of Gujarat Fisheries Aquatic Research Institute, Deptt. of Fisheries, Govt of Gujarat, in 1979 in *Field key to Fishes of Gujarat*. Grows to 28.0cm in length, is of minor economic importance. Live in rivers, lakes and canals.

### Genus *Cyprinus* Linnaeus

1758. *Cyprinus* Linnaeus, *Systema Naturae*, Ed.10, Vol.1. p.320.

### 57. *Cyprinus carpio carpio* (Lin.)

1970. *Cyprinus carpio*, Holcik and Mihalik, *Freshwater Fishes* (Hamlyn publishing Group).

1992. *Cyprinus carpio carpio* Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal*, pt.2, Z.S.I., p.138, fig.25.

*Meristic counts* : D.3-4/18-20 or 15-22, P.1/15-16, V.2/8-9, C.17-19, L.I.30-40

*Material examined* : 4exs, 12.6-20.4cm, Rajkot Fish market (from freshwater sewage confinements), 10kms from Rajkot camp, Dt.Saurashtra, 31.1.93, T.K.Sen & Party: 3exs,

16.5-22.6 cm, Neja village, Khambat, Dt. Kheda. 1.12.92, A.K.Sarkar & party.

**Diagnostic characters** : Length of head 4.5 in total length, eyes 7.0 to 7.4 in head length, back rises abruptly beyond the head which is small asymmetrically tapered. A small protusible mouth provided with strong lips and four barbels, no teeth, eyes placed relatively high on the head, fins regular and symmetrically arranged in regular rows.

**Distribution** : An exotic fish, first introduced in the plain districts of India in 1959, Now it is introduced and being cultured almost all over the states of India. It is also being cultured all over the world Viz., U.S.S.R, China, Europe, Japan, Indonesia, Thailand, Malaysia etc. The original wild common carp occurs only in the Danube river in Europe. Others believe its original home is China.

**Remarks** : A record growth of 10kg body weight of a 30- month old carp from Barang Fish Farm in Orissa reported. My own field record in Assam being a very fine and large specimen collected from the Tinsukhia Fish Farm, 48kms from Dibrugarh on 5.12.75 weighing 4kgs. and 55 cm in length. Golden-yellow sides with dark back and white belly, smally dark and pink tinged fins, but in the oriiginal common carp, scales are with dark bases or spots.

#### Genus *Tor* Gray

1834. *Tor* Gray, *Ill. Ind. Zool.*, 2. pl.96 (type locality-*Cyprinus tor* Hamilton= *Tor* Hamilton Gray).

#### Key to the species of genus *Tor*

- Head length greater than depth of body, length of head 4.0 to 4.5 in TL, lateral line scales 25 to 28 .....*T. putitora*
- Head length shorter than depth of body, length of head 4.7 to 5.0 in TL, Lateral line scales 22 to 27 .....*T. tor*

#### 58. *Tor putitora* (Ham.)

1822. *Cyprinus putitora* Hamilton, *Fish, Ganges* pp. 303, 308 (type locality-Eastern parts of Bengal).

1982. *Tor putitora*, Sen & Jayaram, *The Mahseer Fishes of India : A Review, Rec. Zool. Surv. India*, Occ. Paper No.39, p.5. fig.3.

**Meristic counts** : D.3/9, P.19, V.9, A.2-3/5, C.19, L.I.25-28

**Material examined** : 5exs, 12.5-19.7cm, Narmada River at Zanor, 20kms N.E.of Bharuch, Bharuch Dt., 19.5.92, A.K.Sarkar & Party.

**Diagnostic characters** : Length of head 4.0 to 4.5 in total length, eyes 3.0 to 5.3 in head length, lips thick with a continuous labial groove, pronounced adipose extention of lips in larger fish present, head length bigger than body depth, two pairs of barbels, as long as eye; predorsal scales 9, dorsal fin origin midway between tip of snout and base of caudal fin, last unbranched dorsal fin spine bony, strong and smooth.

**Distribution** : All along the Himalayas including Kashmir, U.P., Punjab, Gujarat, Assam, West Bengal, (Darjeelin Dt.), Western Himalayas, Eastern Himalayas: Nepal, Bangladesh, Pakistan.

**Remarks** : A popular game fish of India of high economic importance. Its present population status in the country has almost reached to a worried *endangered* condition due to continued onslaught of modern developments throughout the country like Dams, Reservoirs, Barrages, artificial lakes and canals etc., creating tumbling barriers to their ageold migratory routes. Grows to 2.7m in length. Its two prominently distinguishing characters are *bigger scales* and *long barbels*. Dark olive green dorsally and creamy yellowish white on the sides and below.

#### 59. *Tor tor* (Ham.)

1822. *Cyprinus tor* Hamilton, *Fish, Ganges*, pp. 305, 338 (type locality-Mahananda River).

1991. *Tor tor*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal*, pt.2., Z.S.I., p.154, fig.37 & 38 a & b.

**Meristic counts** : D.3/9, P.19, V.9, A.2-3/5, L.I.22-27

**Material examined** : 3exs, 20.4-26.4cm, Narmada River, Zanor, Dt.Bharuch,19.5.92, A.K.Karmakar & party.

**Diagnostic characters** : Length of head 4.7 to 5.0 in total length, eyes 3.0 to 4.0 in head length, fleshy thick lips with uninterrupted labial fold, 2 pairs of barbels dorsal profile more arched than ventral side, bigger scales, dorsal fin with smooth bony spine, predorsal scales 9, caudal deeply forked greyish green dorsally pinkish sides with gold above and light olive green below, lower fins reddish-yellow.

**Distribution** : All along the Himalayas, Punjab, Haryana, U.P., Bihar, Gujarat, West Bengal (Darjeeling Dt), Assam, M.P., Bangladesh, Pakistan, Myanmar and China.

**Remarks** : A popular game fish of high economic importance. Noted for its big scales, big barbels and uninterrupted labial fold.

**Genus : *Ctenopharyngodon* Steindachner**

1866. *Ctenopharyngodon* Steindachner, *Ver. Zool. Bot. Ges. Wien*, 16, p.782 (type-*Ctenopharyngodon laticeps* Steindachner by original designation).

**60. *Ctenopharyngodon idellus* (Val.)**

1975. *Ctenopharyngodon idella*, Jhingran, *Fish and Fisheries of India*, p.708-717.

1985. *Ctenopharyngodon idella*, Sen, *Fish fauna of Assam and the neighbouring N.E. states of India*, Occ. Paper No. 64, P.60.

1992. *Ctenopharyngodon idella*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal*, pt. 2, Z. S. I., p.139.

**Meristic counts** : D.3/7, A.3/8, L.I.43/[(6.5-7)/5] 45, P.1/17, V.1/8.

**Material examined** : 5exs, 19.6-32.4cm, freshwater-cum sewage reservoir, 10 kms from Rajkot, Dt.Saurashtra, 31.1.93, T.K. Sen & Party, 2exs, 18.5-26.7cm, Kheda Fish Market, Dt.Kheda, 7.2.93, T.K.Sen & Party.

**Diagnostic characters** : Length of head 4.0 to 4.5 in total length, elongated body, broad head with short round snout, no barbel, upper jaw slightly longer than lower, subterminal mouth, round dorsal originating slightly in advance of the pelvic base, pelvic not reaching

vent, anal fin rounded, dark grey back, silvery belly, all the fins dark.

**Remarks** : It is now regarded as one of the major carps of India. Originally belong to China and U.S.S.R. rivers. In India first brought from Hongkong in December, 1959 by C.I.F.R.I., Pond Culture Division, Cuttack, Orissa, for raring. Grows to 73.8 to 86.0cm in length and a weight of 4.5 to 7.0kg.

**Genus *Catla* Valenciennes,**

1844. *Catla Valenciennes*, *Hist. Nat. Poss.*, 18, p. 140 (type species- *Catla buchanani* Valenciennes *Cyprinus Catla* Hamilton-Buchanan).

**61. *Catla catla* (Ham.)**

1822. *Cyprinus catla* Hamilton-Buchanan, *Fishes of Ganges*, pp.287, 318, pl.13, fig.81 (type locality- rivers and tanks of Bengal).

1992. *Catla catla*, Sen, *Freshwater fish, State Fauna Series No. 3 : Fauna of West Bengal*, pt.2, Z.S.I., p.136, fig.22.

**Meristic counts** : D.3-4/14-16, P.21, V.9, A.3/5, C.19, L. I.38-43.

**Material examined** : 6exs, 17.5-24.7cm, Tapi River near Tarsada village bridge, 72km east of Surat, Dt Surat, 22.5.92, A.K. Karmakar & party.

**Diagnostic characters** : Length of head 4.2 to 4.7 in total length, eyes 6.0 to 7.0 in head length, big head with wide mouth and big eyes, lower jaw prominent with lip doubled outwards below, depth of body remarkably high, dorsal profile more convex than the ventral side, caudal deeply forked, large scales, silvery with dark grey above and dull whitish on the belly.

**Distribution** : Freshwaters throughout India as far south to the Krishna river: Bangladesh, Pakistan, Sri Lanka, Myanmar.

**Remarks** : Grows to 1.8m in length. Most popular and an esteemed food fish (carp) all over the country. It is largely cultured in tanks, ponds and fisheries farms throughout the country. It also fights well and offers good sport to the anglers.

Subfamily : **Hypophthalmichthyinae**Genus **Hypophthalmichthys** Bleeker

1859. *Hypophthalmichthys* Bleeker, *Nat. Tridscher. Ned. India* 20, p.433 (type- *Leuciscus molitrix* Valenciennes by original designation).

62. ***Hypophthalmichthys molitrix*** (Val.)

1844. *Leuciscus molitrix* Valenciennes, *Hist. nat. poiss.*, 17, p. 360 (type locality-China).

1992. *Hypophthalmichthys molitrix*, Sen, *Freshwater Fish, State Fauna Series 3; Fauna of West Bengal* : pt.2. Z.S.I., p.123.

*Meristic counts* : D.3/7, A.2-3/12-14, P.1/17, L.I.110-115

*Material examined* : 3exs, 18.6-27.6cm, fish Market at Tin Darwaja, Ahmedabad, Dt. Ahmedabad, 18.1.91, P.Krishnamurthy & Party.

*Diagnostic characters* : Length of head 3.3 in SL, abdomen keeled up to vent, oblong body with pointed head, snout bluntly rounded, small eyes and scales, origin of dorsal fin between tip of snout and base of caudal fin, pectoral reaching beyond the pelvic origin.

*Distribution* : Introduced all over India, South and Central China, U.S.S.R., Taiwan, Malayasia, Thailand, Sri Lanka, Japan, Bangladesh, Nepal, Phillipines, Myanmar, Hongkong, Singapore, U.A.R. and Israel.

*Remarks* : An exotic fish cultured all over India. Now it is regarded as one of the major carps of India. Grows to 82cm in length. Silvery body, dark fins with conspicuous blood-red spots on the caudal peduncle region.

## Family HOMALOPTERIDAE

Subfamily **Noemacheilinae**Genus **Noemacheilus**Key to the species of genus **Noemacheilus**

1. Body elongated, large-sized body, long snout .....2

Body spindle, shaped incomplete lateral line ending opposite to posterior end of dorsal fin .....3

2. Long barbels, 10 branched dorsal fin rays, 18-19 brownish vertical bands, complete lateral line, greenish yellow above, white below ..... *N. rupelli*

Well developed short barbels, 9-11 branched dorsal fin rays, 12- 16 cross bars, a round dark spot on upper part of caudal fin base .....4

3. 9-10 branched dorsal fin rays, pale olivaceous to yellowish orange ground colour .....*N. moreh*

4. Complete lateral line, pale olivaceous to yellowish orange ground colour

.....*N. botia*

Lateral line almost complete, well marked up to tip of vertical fin; a black horizontal band running from snout to caudal fin, 8 branched dorsal fin rays, 19-20 saddle shaped vertical bands, long barbels ..... *N. anguilla*

Genus **Noemacheilus** van Hasselt

1823. *Noemacheilus* van Hasselt, *Alg. Konst. Letter- bode* 2(35), 133 (type- *Noemacheilus fasciatus* van Hasselt).

63. ***Noemacheilus botia*** (Ham.)

1822. *Cobitis botia* Hamilton-Buchanan, *Fish-Ganges*, pp.350, 394 (type locality- rivers of north eastern parts of Bengal).

1987. *Noemacheilus botia*, Menon, *The Fauna of India, Pieces, Cobitoidea* Vol. iv, pt.1, *Homalopteridae*, p.141, Z.S.I.

*Meristic counts* : D.3/9-11, P.1/11, V.1/7, A.3/5, C.18

*Material examined* : 4exs, 4.0-6.2cm, Rudranath Dam, 15kms from camp at Bhuj, Dt. Bhuj, 24.1.91, P.Krishnamurthy & Party.

*Diagnostic characters*: Length of head 4.5 to 5.9 in SL, semicircular mouth, fleshy lips, upper lip uninterrupted and with a few papillae lower lip interrupted in middle and with a broad papillose disc on each side, barbels well developed, dorsal fin origin nearer to tip of

snout than to caudal fin base, caudal fin slightly emarginate, scales conspicuous and imbricate, lateral line generally complete, often ending only beyond base of anal fin, olivaceous to yellowish orange colour with 12-16 blackish crossbands, descending lateral line below level.

*Distribution* : Northern India (Brahmputra, Ganges and Indus basins), Gujarat.

*Remarks* : Grows to 7cm in SL, of no fisheries importance.

#### 64. *Noemacheilus anguilla* Annandale

1919. *Noemacheilus anguilla* Annandale, *Rec. Indian Mus.*, 16, p.127, pl.1, fig.3, pl.3, fig.1 (type locality-Yenna river, Krishna drainage at Medha, Satara district, Maharashtra).

1987. *Noemacheilus anguilla*, Menon, *The Fauna of India Pisces, Cobitoidea* Vol. iv, pt.1, *Homalopteridae*, P.154, Z.S.I.

*Meristic counts* : D.3/8, P.14, V.1/7, A.2/4, C.19

*Material examined* : 7exs, 3.4-4.3cm, Ukai Reservoir, 35kms from Ukai Camp, Ukai, Dt. Surat, 10.2.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 5.3 to 5.5 in total length, eyes large, situated in the middle of head, somewhat visible from ventral surface; head conical and narrow, semicircular mouth, lips moderately fleshy, deeply furrowed, upper provided with a pair of barbel-like process, interrupted with a median incision, lower interrupted in the middle; barbels relatively long, thread-like; scales small, imbricate, indistinct in the anterior part; lateral line almost complete, well marked up to tip of ventral fin, head and body dull golden yellow, numerous transverse bars of dark olive green across the back.

*Distribution* : Western Ghats, Maharashtra, Gujarat, Karnataka, Andhra Pradesh (New record from Gujarat).

*Remarks*: Grows to 5.7cm in length of no fisheries importance. *N.anguilla* and *N.monilis* are recognised as forming the *anguilla* species complex because of their similarities. *N.anguilla* can be easily distinguished by its 8 branched dorsal fin rays (in case of *N.monilis* it is 7, and its characteristic black lateral band).

#### 65. *Noemacheilus moreh* (Sykes)

1841. *Cobitis moreh* Sykes, *Trans. Zool. Soc. Lond.*, 2. p. 266 (type locality- Western Ghats).

1991. *Noemacheilus moreh*, Menon, *The Fauna of India, pisces, Cobitoidea* Vol. IV, pt.1, *Homalopteridae*, p.145, Z.S.I.

*Meristic counts* : D.3/9-10, P.1/11, V.1/7, A.3/5, C.18

*Material examined* : 3exs, 3.5-4.2cm, Ukai Natural Reservoir, Dt. Surat, 10.2.93, T.K. Sen & Party.

*Diagnostic characters* : Length of head 3.7 in Standard length, eyes large, not visible from under side of head; semicircular mouth, fleshy lips, upper lip with a few rows of papillae, lower lip interrupted in middle, barbels well developed, dorsal fin origin nearer to the tip of snout than to caudal fin base, caudal fin slightly emarginate, incomplete lateral line, ground colour pale olivaceous to yellowish orange.

*Distribution* : Peninsular India, Gujarat (New record).

*Remarks* : Grows to 4.4cm in SL, of no commercial importance.

#### 66. *Noemacheilus rupelli* (Sykes)

1841. *Cobitis rupelli* Sykes, *Trans. Zool. Soc. Lond.*, 2,p.366, pl.64(type locality-Deccan).

1987. *Noemacheilus rupelli*, Menon, *The fauna of India, Pisces, Cobitoidea* Vol. IV, pt. 1, *Homalopteridae*, P.158, Z.S.I.

*Meristic counts* : D.3/10, P.13, V.1/7, A.2/5, C.19

*Material examined* : 5exs, 4.0-5.2cm, Wankleswar River, 55 kms east of Godhra (8 kms from Baria), Dt.Panchmahal, 10.5.92, A.K. Sarkar & Party.

*Diagnostic characters* : Length of head 3.7 in standard length, prominent eyes, its diameter 5.0 in head length, nostrils close to each other, semicircular mouth, lips moderately fleshy, deeply furrowed; upper uninterrupted, lower interrupted in middle, papillated well developed barbels, caudal deeply forked, complete lateral line, greenish- yellow above, 18-19 brownish vertical bands on body, caudal

fin with 4/5 posteriorly directed V-Shaped bands.

*Distribution* : Western Ghats, Maharashtra, Gujarat (New record) and Karnataka.

*Remarks* : Grows to 7.4cm in SL, of no economic importance.

### Family COBITIDAE

#### Genus *Lepidocephalus* bleeker

1858. *Lepidocephalus* Bleeker, *Nat. Tijdschr. Nederl. Indie.* 16, p. 303 (type *Cobitis macrochir* Bleeker).

#### Key to the species of genus *Lepidocephalus*

- Body depth 5.8 to 6.8 in total length, a patch of scales from below eyes to upper part of operculum, dorsal fin inserted slightly behind pelvic fin origin, a deep black blotch at base of caudal fin, a continuous dark lateral band, caudal and dorsal fins with rows of dark spots, caudal fin convex or cut square .....*L. guntea*
- Body depth 7.5 to 9.7 in total length; only a small patch of scales present behind suborbital spine; dorsal fin inserted somewhat anterior to pelvic fins; caudal fin almost squarely truncate, 8 to 10 irregular blotches along the middle of the body, a small black spot on upper half of base of caudal fin .....*L. thermalis*

#### 67. *Lepidocephalus guntea* (Ham.)

1822. *Cobitis guntea* Hamilton, *Fish, Ganges*, pp. 353, 394 (type locality- ponds and fresh waters of Bengal).

1992. *Lepidocephalus guntea*, Sen, *Freshwater Fish: State Fauna Series 3 ; Fauna of West Bengal* : pt. 2, Z.S.I., p.172.

*Meristic counts* : D.2/6, P.8, A.2/5, C.16.

*Material examined* : 7exs, 4.5-7.3cm, Nikashi canal, 70kms from Anand camp, Dt. Kheda, 8.2.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 6.0 in total length. elongated body, body depressed

in front of dorsal fin, head partly scaled, a large bifid suborbital spine below the eye, 3 pairs of barbels, caudal fin convex or cut square, with rounded corners, dorsal fin nearer to caudal fin base than to tip of snout, dark brown on the dorsal side and yellowish white on the sides and below mixed with blackish specks, a dark median broad line composed of black spots, stretching from gill to caudal fin base.

*Distribution* : All over India except Karnataka, Kerala and South of Krishna : Nepal, Banglaesh.

*Remarks* : Attains a length of 15.0 cm, of no economic importance.

#### 68. *Lepidocephalus thermalis* (Val.)

1846. *Cobitis thermalis* Valenciennes, *Hist. nat. poiss.*, 18 : 78 (type locality-Malabar).

1991. *Lepidocephalus thermalis*, Talwar & Jhingran, *Inland Fishes of India*, Vol. 1.p.527.

*Meristic counts* : D.2-3/6, A.2-3/5, P.1/6-7, V.1/6

*Material examined* : 6exs, 4.5-5.7cm, Nikashi canal, 70 kms from Anand Camp, Dt. Kheda, 7.2.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 7.5 to 9.7 in total length, inferior mouth, three pairs of barbels, mental lobe well developed with small barbel-like prolongations, caudal fin almost squarely truncate, scales very small, grey to delicate greyish-green with more or less 8 to 10 irregular blotches on the middle of the body.

*Distribution* : Maharashtra, Gujarat, Coastal districts of Kerala, Karnataka: Sri Lanka.

*Remarks* : Grows to 8.0 cm in length, of no economic importance.

### Order SILURIFORMES

#### Family SILURIDAE

#### Genus *Ompok* Lacepede

1803. *Ompok* Lacepede, *Hist. Nat. Poiss* 5, p.49 (type- *Ompok siluroides* Lacepede).

Key to the species of the genus *Ompok*

- Anal fin with 57 to 58 branched rays, maxillary barbels extend posteriorly to or slightly beyond anal fin base  
.....*O. bimaculatus*
- Anal fin with 48 to 54 branched rays, maxillary barbels much shorter, extend only to middle or tip of pectoral fin  
.....*O. pabda*

69. *Ompok bimaculatus* (Bloch)

1796. *Silurus bimaculatus* Bloch, *Ichthyol. Hist. nat. des. Poiss.*, 11. p.17, pl.364 (type - locality-Malabar).

1992. *Ompok bimaculatus*, Sen, *Freshwater Fish : State Fauna Series 3 : Fauna of West Bengal*, pt.2, p.184, Z.S.I., fig.62.

*Meristic counts* : D.4, A.2-3/57-58, P.1/12-14, V.8-9, C.17-18

*Material examined* : 5exs, 6.5-13.5cm, Nagrama Saravar (beel) at Limbasi village, 30km from Anand Camp, Dt. Kheda, 9.2.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 5.0 to 7.0 in total length, eyes 4.0 to 4.5 in head length, two pairs of barbels, maxillary pair longer than head; a short dorsal without spine, much nearer to snout; anal rays long continuous, caudal forked with upper lobe longer, silvery shot with purple, dorsally dark, greyish green to brownish with a tinge of gold.

*Distribution* : India, Pakistan, Bangladesh, Myanmar, Sri Lanka, Thailand, China, Java etc.

*Remarks* : Grows to 45.0cm in length, of high economic importance (Butter fish), a large dusky shoulder spot, lives in rivers, lakes, beels and ponds. Regarded as a great delicacy.

70. *Ompok pabda* (Hamilton)

1822. *Silurus pabda* Hamilton, *Fish, Ganges* p.950, pl.25, fig.47 (type locality-Bengal).

1992. *Ompok pabda*, Sen, *Freshwater Fish: State Fauna Series 3 : Fauna of West Bengal* Pt.2, p.185, Z.S.I., Fig.63.

*Meristic counts* : D.4-5, A.2/48-54,

P.1/11-13, V.1/6-7, C.17-19

*Material examined* : 6 exs, 7.6-11.5cm, Chhrodia village, Dhandhuka, Dt. Ahmedabad, 4.12.92, A.K.Sarkar & Party.

*Diagnostic characters* ; Length of head 4.5 to 5.6cm in total length, eyes 5.5 in head length, dorsal fin short, spineless; 2 pairs of barbels-longest maxillary reaches beyond the end of pectoral; caudal fin equally forked with rounded arched lobes, pectoral spine serrated or rarely smooth, silvery; glossed with gold with a shoulder spot in fresh condition.

*Distribution* : India, Pakistan, Bangladesh, Myanmar.

*Remarks* : Grows to 17cm in length, of high economic importance. Lives in rivers, ponds and beels. Also known for its butter like taste.

Genus *Wallago* Bleeker

1851. *Wallago* Bleeker, *Nat. Tijdschr. Nederl. Indie*, 1, p.265 (type *Silurus mulleri* Bleeker).

71. *Wallago attu* (Sch.)

1801. *Silurus attu* Schneider, *Syst. Ichth.*, p.378, pl.75 (type-locality-Malabar).

1992. *Wallago attu*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal*, Pt.2, p.187, Z.S.I., fig.64.

*Meristic counts* : D.5, P.1/13-15, V.8-10, A.4/82-89, C.17

*Material examined* : 4exs, 18.5-22.4cm, Narmada River at Bharuch, adjacent to the town, Dt. Bharuch, 16.5.92, A.K. Karmaka & Party.

*Diagnostic characters* : Length of head 5.0 to 5.5 in total length, eyes 7.0 to 8.0 in head length, large depressed head, snout spatulate, wide mouth, its gape extends posteriorly to beyond eyes, barbels two pairs, maxillary pair long, extend beyond the origin of anal fin, the mandibular much shorter, dorsal fin short, inserted slightly in advance of pelvic fins; weak pectoral fin, caudal fin deeply forked, uniform silvery, dorsally greyish green with a wash of gold and cream.

*Distribution* : India, Bangladesh, Pakistan, Sri Lanka, Myanmar, Thailand, Malaya, Java, China.

*Remarks* : Grows to about 2 m in length and weighs more than 45kg. Due to its oil content it is liked by many, particularly in Bihar. A giant sized voracious predatory cat fish popularly known as *Freshwater Shark*. Mainly taken by the poorer section. These fish should be separated out to ensure a safety and security of the food fishes like carps etc, in tanks or reservoirs.

### Family BAGRIDAE

#### Key to the species of the genus *Mystus*

1. Maxillary barbels reach anal fin, eye diameter 4.0 to 4.5 times in head .....2  
Maxillary barbels reach caudal fin base or beyond, eye diameter 3.2 to 4.0 times in head, a dark spot at base of dorsal fin .....*M. cavasius*
2. Two light longitudinal bands one above and the other below lateral line .....*M. bleekeri*  
Five narrow black bands on the body above and below the lateral line .....3
3. Eye diameter 4.5 to 6.0 times in head length, a dark shoulder spot .....*M. vittatus*  
Eye diameter 3.5 to 4.0 times in head length, a silvery line along the middle terminating in a dark spot at base of caudal fin .....4
4. Body with a bluish shoulder spot .....*M. montanus*  
Body with 10 black rounded spots along the lateral line, eye diameter 5.7 to 7.0 times in head length .....5
5. Maxillary barbels extend posteriorly to middle or end of pelvic fin, dorsal spine moderately strong and serrated in the upper half, adipose dorsal fin broad .....*M. punctatus*  
Maxillary barbels extend posteriorly to end of pelvic fins, dorsal spine strong, serrated on its edge, adipose dorsal fin small .....*Mystus gulio*

#### Key to the species of the genus *Aorichthys*

Snout rounded, maxillary barbels extend to base of caudal fin or even beyond, width of mouth less than half of head length, caudal fin rays 17..... *A. aor*

Snout spatulate, maxillary barbels much of shorter length, extend to further than pelvic fins; width of mouth one third of head length, caudal fin rays 19 to 21

.....*A. seenghala*

#### Key to the species of the genus *Rita*

- Teeth on prevomer mixed, with molari form and villiform; premaxillary tooth-band 3.5 to 4.0 times as long as broad, golden to bright yellow in colour, dorsal spine fairly strong .....*R. pavimenatus*  
Teeth on palate in two elliptical patches, fairly wide apart, lurid green above and on flanks, dull white on abdomen .....*R. rita*

### Genus *Aorichthys*

1939. *Aorichthys* Wu, *Sinensia*, 10, p.131 (Substitute name for *Aoria* Jordan, and therefore with same type species).

#### 72. *Aorichthys seenghala* (Sykes)

1839. *Platystoma seenghala* Sykes, *Trans. Zool. Soc. Lond.*, 2, p. 371, pl. 65, fig. 2 (type locality-Mulla Motha river, Poona).

1992. *Aorichthys seenghala*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal*, pt.2, p.176, Z.S.I., Fig.57.

*Meristic counts* : D.1/7, P.1/9, V.6, A.3/8-9, C.19-21

*Material examined* : 17exs, 12.5-19.7cm, Rajkot Fish Market, 10km from Rajkot Camp., Dt. Saurashtra, 31.1.93, T.K.Sen & Party ; 6exs, 9.6-13.5cm, Balaram River, near Dharmata temple, 20kms, N. of Palanpur, Dt. Banaskantha, 23.9.93, A.K.Sarkar & party.

*Diagnostic characters* : Length of head 4.5 in total length, 7.0 to 8.0 in head length, spatulated snout, elongated body, 4-pairs of

barbels-the longest maxillary pair reaches to the pelvics, upper jaw longer, cleft of mouth shallow, median longitudinal groove on head extends up to base of occipital process, dorsal spine weak, rugose as long as head; pectoral spine strong, serrated; long adipose dorsal fin equals or slightly exceeds rayed dorsal fin base, caudal bilobed with longer upper lobe, brownish along back, silvery on sides and below; a round black spot on the posterior end of adipose fin.

*Distribution* : Large rivers of India up to Krishna river system in the south, Bangladesh, Pakistan, China.

*Remarks*: Grows to 1.5m in length. A giant cat-fish of India of economic importance. Live in large rivers and small tributaries.

### 73. *Aorichthys aor* (Ham.)

1822. *Pimelodus aor* Hamilton, *Fish, Ganges*, pp. 205, 379, pl.20. fig.68 (type locality- Rivers of Bengal and upper parts of Gangetic estuaries).

1992. *Aorichthys aor*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal*, Pt.2, p.177, Z.S.I.

*Meristic counts* : D.1/7, P.1/9-10, V.6, A.11-14. C.17

*Material examined* : 4exs, 19.6-23.4cm, Narmada River, 18kms W. of Bharuch Dt. 20.5.92, A.K.Karmakar & party.

*Diagnostic characters* : Length of head 4.5 to 5.0 in total length, eyes 5.0 to 8.0 in head length, depressed broad snout, upper jaw longer, median longitudinal furrow on head extended up to base of occipital process, 4-pairs of barbels-the longest maxillary barbels reaching caudal base or even beyond; pectoral spine stronger than dorsal, rugose, but shorter; snout rounded, base of adipose dorsal equals the rayed dorsal or even more, pelvic origin below the last dorsal, yellowish fins tinged with grey.

*Distribution* : West Bengal, Assam, Orissa, Punjab, U.P., Gujarat: Bangladesh, Pakistan and Myanmar.

*Remarks* : Grows to about 2m in length, Live in large rivers and small tributaries. Fishing is brisk during the monsoon spates. A

common giant cat fish of India. It is mostly liked in Punjab and U.P. for its oil content and least bones.

### Genus *Mystus* Scopoli

1777. *Mystus* Scopoli, *Introductio ad historiam naturalem*: 451 (type-*Bagrus haplepis* Valenciennes = *Mustus pelusius* (Solander), by subsequent selection).

### 74. *Mystus cavasius* (Ham.)

1822. *Pimelodus cavasius* Hamilton, *Fish. Ganges*. pp. 203, 297, pl. 11, fig. 67 (type locality Gangetic provinces).

1992. *Mystus cavasius*, Sen, *Freshwater Fish, State Fauna Series No. 3 : Fauna of West Bengal Pt.2*, p.180, Z.S.I., fig.58.

*Meristic counts* : D.1/7, P.1/8, V.1/5, A.4/7-9, C.16

*Material examined* : 6exs, 12.0-26.0cm, Balaram River near Dharmata temple, 20kms N. of Palanpur, Dt. Sabarkantha, 18.9.93, A.K. Sarkar & Party: 4exs, 10.5-19.4cm, Dhalwani, 58kms N. of Himatnagar, Dt. Sabarkantha, 11.5.93, A.K.Sarkar & Party.

*Diagnostic characters* : Length of head 6.0 to 6.2 in total length, eyes 3.2 in head length, upper jaw longer with gape of mouth less than half of head length, 4 pairs of barbels-maxillary pair extending beyond caudal base, pectoral spine serrated, adipose dorsal fin long, caudal fin forked with upper lobe longer, dorsally leaden, a black shoulder spot and a dark blotch at the base of dorsal fin, yellowish abdomen.

*Distribution* : India, Pakistan, Bangladesh, Myanmar, Thailand, Malaysia, Sri Lanka, Nepal.

*Remarks* : Live in rivers, lakes and tributaries. Attains a length of 45cm. A common cat-fish of India of economic importance.

### 75. *Mystus bleekeri* (Day)

1846. *Bagrus keletius* (nec Valenciennes) Bleeker, *Nat. Geneesk. Arch. Ned. Indic.* 3(2), P.135, (type locality- Bengal).

1992. *Mystus bleekeri* Sen, Fresh Water Fish, *State Fauna Series 3 : Fauna of West Bengal* pt.2, p.179, Z.S.I.

*Meristic counts* : D.1/7, P.1/9-10, V.1/5, A.3/6-7, C.17

*Material examined* : 7exs, 6.7-9.5cm, stream at Dhandha, 3km away from Himatnagar, Dt. Sabarkantha, 13.9.93, A.K. Sarkar & Party.

*Diagnostic characters* : Length of head 5.2 to 5.5 in total length, eyes 4.5 in head length, gape of mouth equals to half of the head region, median longitudinal groove shallow and reaching to base of occipital process; 4 pairs of barbels- maxillary extending to anal, pectoral spine serrated, stronger than dorsal one; a dipose dorsal fin origin just behind the rayed dorsal, caudal forked with upper lobe longer, brownish grey above, lighter below; 2 light longitudinal bands along the lateral line, a dark shoulder spot present generally.

*Distribution* : Generally confined to North India, the southernmost limit being the Mahanandi headwaters, where it is rare (Jayaram, 1977): Bangladesh, Nepal, Myanmar, Sumatra.

*Remarks* : Live in rivers, lakes, tributaries, tanks etc. Attains a total length of 14.5cm, of secondary economic importance.

#### 76. *Mystus vittatus* (Bloch)

1797. *Silurus vittatus* Bloch, *Ichthyol. Hist. Nat.*, 11, p.40, pl.371, fig.2 (type locality Tranquebar, Tamil Nadu).

1992. *Mystus bleekeri*, Sen, Fresh Water Fish, *State Fauna Series No. 3 : Fauna of West Bengal*, pt.2, Z.S.I., P.181, fig.59.

*Meristic counts* : D.1/7, P.1/9, V.6, A.9-12, C.17

*Material examined*: 9exs, 5.5-9.5 cm, Purana river, Mahal, Dt.Dangs, 13.3.92, A.K. Sarakr & Party ; 9exs, 4.7-10.8cm, Rudranath Dam, 15kms from camp at Bhuj. 24.1.91, P.Krishnamurthy & Party.

*Diagnostic characters* : Length of head 4.7 to 5.0 in total length, eyes 4.5 to 6.0 in head length, median longitudinal groove on head

short, wide, not extending to base of occipital process, 4-pairs of barbels- maxillary pair extending to pelvic, dorsal spine finely serrated, adipose dorsal fin base equal to the interspace between the two fins, pectoral serrated, caudal forked, silvery with bright golden tinge, 5 black stripes on body above and below lateral line.

*Distribution* : Throughout India, Pakistan, Bangladesh, Myanmar, Malaya, Thailand, Sri Lanka.

*Remarks* : Grows to 20.0cm in length. Most widely distributed small sized cat-fish all over India.

#### 77. *Mystus montanus* (Jerdon)

1849. *Bagrus montanus* Jerdon, *Madras J. Lit. Sci.*, 15 (2), P.337 (type locality-Manantoddy, Wynaad).

1977. *Mystus montanus*, Jayaram, *Rec. Zool. Surv. India. Occ. Paper No. 8*, p.34, *Aid to the identification of Siluroids : Bagridae*.

*Meristic counts* : D.1/7, P.1/6, V.1/5, A.3/9, C.19

*Material examined* : 4exs, 4.4-7.3cm, Vatrack River, Anand, Dt.Kheda, 7.2.93, T.K. Sen & party.

*Diagnostic characters* : Length of head 5.0 in total length, eyes 3.5 to 4.0 in head length, upper jaw slightly longer, median longitudinal groove extends to midway between the eye and the base of the occipital process, pectoral spine strong, as long as the head excluding the snout, ventral does not reach anal, upper lobe of caudal longer, a bluish shoulder spot and a dark spot at caudal base, one or two light bands along the side above the lateral line.

*Distribution* : S.India, M.P., Gujarat.

*Remarks* : Grows to 12.0cm in length, of local economic importance only.

#### 78. *Mystus quilo* (Ham.)

1822. *Pimelodus quilo* Hamilton, *Fish, Ganges*, pp.201, 379, pl.23, fig.66 (type locality- upper parts of Gangetic estuaries).

1992. *Mystus quilo*, Sen, Fresh Water Fish, *State Fauna series 3 : Fauna of West Bengal* pt.2, Z.S.I., p.180.

*Meristic counts* : D.1/7, P.1/9, V.1/5, A.13-16, C.17

*Material examined* : 5exs, 7.6-19.4cm, Niruma Dam, Hakhatrana, Dt. Bhuj, 23.1.91, P.Krishnamurthy & Party: 3exs, 9.3-16.5cm, Nikashi canal connected with Sabarmati and Narmada rivers, Anand, Dt.Kheda, 8.2.93, T.K.Sen & party.

*Diagnostic characters* : Length of head 4.2 to 4.6 in total length, eyes 5.0 to 6.0 in head length, snout broad and depressed, median longitudinal groove on head short and not reaching base of occipital process, upper jaw slightly longer, 4- pairs of barbels- maxillary pair extending to middle or end of pelvic, dorsal spine strong and serrated, pectoral spine strong, adipose dorsal fin short, deep bluish brown on head and back with dull white below.

*Distribution* : India, Pakistan, Bangladesh, Myanmar, Sri Lanka, Malayasia, Java, Borneo and Sumatra.

*Remarks* : Grows to 45.7cm in length. Live in estuaries, tidal rivers and seas. A most common gregarious catfish found always in fishing operations in good number, of secondary economic importance.

#### 79. *Mystus punctatus* (Ham.)

1849. *Bagrus punctatus* Jerdon, *Madras J. Lit. Sci.* 15, p.339 (type locality- Cauvery river, W.Ghats).

1977. *Mystus punctatus*, Jayaram, *Aid to the identification of Siluroids : Bagridae, Rec. Zool. Surv. India, Occ. Paper No. 8*, p.36.

*Meristic counts* : D.1/7, P.1/7-8, V.1/5, A.3-4/8-9, C.17

*Material examined* : 6exs, 10.9-18.7cm, Mannadi, E. of Dharampur, Dt. Valsad, 9.3.92, A.K.Sarkar & Party.

*Diagnostic characters* : Length of head 4.5 in total length, eyes 6.0 to 7.0 in head length, upper jaw slightly longer, inter orbital space rather convex, median longitudinal groove very indistinct, lanceolate and extending almost to the base of the occipital process which is narrow, snout not flat, base of adipose dorsal fin short, pectoral spine longer and stronger than that of the dorsal, upper caudal

lobe longer, head and back greyish olive, becoming yellow on abdomen, about ten black rounded spots along the lateral line.

*Distribution* : Karnataka, Kerala, Gujarat, Tamil Nadu (Nilgiri Hills), W.Ghats etc.

*Remarks* : Attains a length of 45.0cm. Mostly caught by rod and line, or by hook and line, of local economic importance only.

#### Genus *Rita* Bleeker

1858. *Rita* Bleeker, *Acta. Soc. Sc. Indo-Neerl*, 4, p.60 (type species *Pimelodus rita* Hamilton-Buchanan).

#### 80. *Rita rita* (Ham.)

1822. *Pimelodus rita* Hamilton, *Fish. Ganges*, pp. 165, 376, pl.124, fig.53 (type locality- Bengal).

1992. *Rita rita*, Sen, *Freshwater Fish, State Fauna Series No. 3; Fauna of West Bengal*, pt.2, Z.S.I., p.183.

*Meristic counts* : D.1/6, P.1/10, V.8, A.4-5/9, C.19

*Material examined* : 4exs, 29.7-41.6cm, Sabarmati River, 45km from Anand Camp, Dt. Kheda, 5.2.93, T.K.Sen & party.

*Diagnostic characters* : Length of head 4.0 to 4.3 in total length, eyes 8.0 to 10.0 in head length, width of mouth about half of the head length, cubito-humeral process about three fourth of head, granulated; a long smooth dorsal spine, occipital process notched in front to accommodate basal bone of dorsal, 3-pairs of barbels, dorsal spine very strong and serrated, greenish grey above and sides, dull below.

*Distribution* : Most rivers of northern India, West Bengal (Mostly N.Bengal), U.P., Bihar, Gujarat.

*Remarks* : A strong bonyfish not much liked locally as food, taken mostly by poorer section, 'It is able to live out of water for sometime because of cutaneous respiration' (Jayaram 1977, p.150), Grows to about 1.2m in length.

#### 81. *Rita pavementatus* (Val.)

1832. *Arius pavementatus* Valenciennes, Jacquemont, *Voy. Ind. Orient. Atlas*, 2, Poiss. : pl.17, fig.2 (type locality- India).

1991. *Rita pavementatus*, Talwar & Jhingran, *Inland Fishes of India*, Vol.2.p.577.

*Meristic counts* : D.1/6, A.3/8-9, P.1/10, V.1/6-7

*Material examined* : 2exs, 9.7-11.0cm, Khareswar village, 10km from Dhrangadhra, Dt. Surendranagar, 10.12.92, A.K.Sarkar & Party.

*Diagnostic characters* : Length of head 3.7 to 4.0 in total length, eyes 5.5 to 6.0 in head length, head depressed, occipital process subcutaneous, extends to predorsal plate; mouth transverse, 3 pairs of barbels- maxillary barbels extend posteriorly to operculum, mandibular barbels to base of pectoral fin, others shorter; dorsal spine fairly strong and finely serrated on its posterior border, golden to bright yellow colour, eyes bright violet.

*Distribution* : Rivers of Deccan up to Krishna river, Andhra Pradesh, Gujarat.

*Remarks* : Grows to 26.0cm in length, It is brought to local markets in live condition more commonly during winter months.

#### Family SCHILBEIDAE

##### Genus *Clupisoma* Swainson

1839. *Clupisoma* Swainson, *Nat. Hist. Fish. Animal.*, 2, P.306 (type *Silurus garua* Hamilton).

##### 82. *Clupisoma garua* (Ham.)

1822. *Silurus garua* Hamilton, *Fish, Ganges.*, pp. 156, 375, pl.21,fig,50 (type locality rivers of Gangetic provinces).

1992. *Clupisoma garua*, Sen, *Freshwater Fish, State Fauna Series No.3: Fauna of West Bengal*, pt.2, p.188, Z.S.I.

*Meristic counts* : D.1/7, P.1/11, V.6, A.3/26-33, C.17

*Material examined* : 6exs, 17.5-22.6cm, Gajood Reservoir and adjacent canal, Dt. Bhuj, 24.1.91, P. Krishnamurthy & Party.

*Diagnostic characters* : Length of head 5.5 to 6.5 in total length, upper jaw longer, barbels

4 pairs-maxillary pair reaching to middle or end of pelvic fin, adipose dorsal fin can be seen only in case of smaller forms and absent in adult forms, pectoral spine stronger and serrated and almost as long as the dorsal spine; abdominal edge keeled between pelvic and vent, dorsally silvery grey. lighter below.

*Distribution* : N.India, West Bengal, Bihar, Gujarat, Assam, Orissa, M.P.: Bangladesh, Pakistan, Myanmar.

*Remarks* : Grows to 60.90cm in length. Lives in rivers, beels,lakes, tributaries etc. Known to be a *foul feeder*. Feeds on carbs, shrimps, small fishes, insects etc.

##### Genus *Eutropiichthys* Bleeker

1862. *Eutropiichthys* Bleeker, *Verh, Akad, Amsterdam*, 14.p.398 (type species *Pimelodus vacha* Hamilton- Buvhanan).

##### 83. *Eutropiichthys vacha* (Ham.)

1822. *Pimelodus vacha* Hamilton, *Fish. Ganges* pp.196, 378, pl. 19, fig.64(type locality-Freshwater of Gangetic Provinces)

1992. *Eutropiichthys vacha*, Sen, *Freshwater Fish, State Fauna Series No. 3: Fauna of West Bengal* pt.2, Z.S.I., p.189.

*Meristic counts* : D.1/7, P.1/13-16, A.3-4/41-47, C.17

*Material examined* : 4exs, 10.4-17.6cm, Nikashi canal, 70 km from Anand Camp, Dt. Kheda, 8.2.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 5.5 to 5.7 in total length, eyes 3.5 to 3.7 in head length, eyes with broad adipose lids, cleft of mouth oblique reaching beyond midorbit, upper jaw longer, snout pointed and compressed, 4-pairs of barbels, reaching beyond eyes or even as long as head, pectoral spine serrated as long as dorsal spine which is thin and serrated, caudal forked, greyish silvery body, darkest back.

*Distribution* : N.India, Orissa, Bihar, Gujarat (New record), U.P., West Bengal (Dareeling Dt.), M.P. : Nepal, Bangladesh, Pakistan and Myanmar.

**Remarks :** Attains a length of 30.5cm. An excellent table fish. Live in rivers, canal and tributaries. A voracious eater feeding on small fishes, aquatic weeds and aquatic insects.

Family SISORIDAE

Key to the species of the genus *Nangra*

- Median longitudinal grooves as two short fontanelles. not reaching base of occipital process; no groove at base of maxillary barbels, a dark blotch on either lobe of caudal and another on dorsal fin  
..... *N. itchkeea*
- Median longitudinal groove on head as a single fontanelle and reaching base of occipital process, maxillary pair lying in a groove with stiff base, a black blotch on occiput, finger like processes between bases of inner mandibular barbels  
..... *N. viridescens*

Key to the species of genus *Glyptothorax*

- Dorsal spine serrated along both margin, adhesive apparatus on thorax well developed, posteriorly without any central pit, body with three vertical bands, greyish yellow in colour .....*G. madraspatanum*
- Dorsal spine smooth, adhesive apparatus on thorax large, horse- shoe shaped, convex in front, with a large smooth space inside; brownish in colour, no vertical bands  
..... *G. conirostrae conirostrae*

Genus *Nangra* Day

1877. *Nangra* Day. *Fish. India* P.493 (type species *Pimelodus nangra* Hamilton, by original designation).

84. *Nangra viridescens* (Ham.)

1822. *Pimelodus viridescens* Hamilton, *Fish. Ganges*, pp.173, 376, pl.11, fig.56 (type locality Northern Bengal).

**Meristic counts :** D.1/6, P.1/8, V.1/5, A.3-4/8, C.18-21

**Material examined :** 6exs, 4.5-7.3cm,

Gudkar Nabhoi forest area, Dt. Bhuj, 28.9.93, A.K. Sarkar & Party.

**Diagnostic characters :** Length of head 4.0 to 4.2 in total length, eyes 4.0 in head length, gill-opening wide, the greatest width of the head equals its length behind the angle of the mouth, snout overhanging the transverse mouth, median longitudinal groove on the head deep, having raised edges, and reaching the base of the occipital process, which is three times as long as wide, and does not quite reach the basal bone; osseous processes from occiput and over base of pectoral fin well developed, three or four black bands descending up to lateral line on body, body coppery glossed with gold colour on sides.

**Distribution :** Bihar, West Bengal, Assam, Gujarat (New record), Yamuna river at Delhi.

**Remarks :** Grows to 8.5cm in length. Commercially less important, generally taken by poorer section.

85. *Nangra itchkeea* (Sykes)

1838. *Phractocephalus itchkeea* Sykes, *Proc. Zool. Soc. Lond.*, pt.6.P.164(type locality Deccan).

1979. *Nangra itchkeea*, Jayaram, *Aid to the identification of Siluroids*, Occ. Paper No. 14. *Rec. Zool. Surv. India*, p.13.

**Meristic counts :** D.1/6, P.1/8, V.1/5, A.2-3/9-10, C.18-19

**Material examined :** 4exs, 2.7-4.3cm, Mahal, Dt. Dangs, 12.3.92, A.K.Sarkar & Party.

**Diagnostic characters :** Length of head 5.0 in total length, eyes 3.0 in head length, median longitudinal process (groove) on the head reaching to the base of the occipital process, snout overhanging the mouth, no groove at the base of the maxillary barbels, yellowish-brown in colour, becoming silvery on sides and abdomen, a black blotch on either lobe of the caudal, and another on the dorsal fin.

**Distribution :** Maharashtra, Gujarat, Karnataka, Deccan, Cauvery river, Coorg.

**Remarks** Grows to 6.0cm in length. It is of only local food importance, being a small sized fish.

Genus *Glyptothorax* Blyth

1861. *Glyptothorax* Blyth, *J. Asiat. Soc., Bengal*, 29.p.154 (type species *Glyptothorax trilineatus* Blyth).

86. *Glyptothorax conirostre* (Steind).

1867. *Glyptothorax conirostre* Steindachner, *S.B.K. Acad, Wiss, Wien.*, 55, pt.1, p.532, pl. 5, fig.2 (type locality- Simla).

1977. *Glyptothorax conirostre conirostre* Jayaram, *Aid to the identification of Siluroids, Rec. Zool. Surv. India.*, Occ. Paper No. 14, p.37.

*Meristic counts* : D.1/6, P.1/9, V.6, A.2/9-10, C.17

*Material examined* : 7exs, 4.5-7.3cm, Nikashi canal, 70km from Anand Camp, Dt. Kheda, 8.2.93, T.K. Sen & Party.

*Diagnostic characters* : Length of head 5.3 to 5.4 in total length, eyes slightly behind the middle of the length of the head, upper jaw longer, adhesive apparatus on throat large, horse-shoe shaped, convex in front, with a large smooth space inside, smooth skin, brownish in colour, fins stained with black.

*Distribution* : Himachal Pradesh (Simla), Kangra Valley, Punjab, Jammu and Kashmir (Poonch Valley), West Bengal Gujarat: China.

*Remarks* : Grows to 14.0cm in length, of minor fisheries importance; a typical torrential fish. These fishes are mostly found confined in the torrential streams of Himachal Pradesh, Jammu and Kashmir.

87. *Glyptothorax madraspatanum* (Day)

1873. *Glyptothorax madraspatanum* Day, *J. Lin. Soc. London.*, 11, p. 526 (type locality- Bhavani river at the base of Nilgiri hills).

1991. *Glyptothorax madraspatanum*, Talwar & Jhingran, *Inland Fishes*, pt.2.p.656.

*Meristic counts* : D.1/6, P.1/9-10, V.1/5, A.2-3/10-11, C.17.

*Material examined* : 3exs, Gajood Reservoir, Dt. Bhuj, 24.1.91, P. Krishnamurthy & Party.

*Diagnostic characters* : Length of head 5.0 to 5.5 times in total length, eyes small situated in the middle of the head, upper surface of head rather rough, upper jaw longer, dorsal spine strong and serrated near the apex, body with three vertical bands; greyish yellow in colour; adhesive apparatus on thorax well developed, vignetted posteriorly without any central pit.

*Distribution* : Western Ghats, Annamalai hills, Nilgiri hills, Gujarat (New record).

*Remarks* : Attains a length of 11.5cm, is of no economic importance.

Genus *Bagarius* Bleeker

1853. *Bagarius* Bleeker, *Verh. Bat. Gen.*, 25,p.121 (type species *Pimelodus bagarius* Hamilton).

88. *Bagarius bagarius* (Ham.)

1822. *Pimelodus bagarius* Hamilton, *Fish. Ganges*, pp. 186, 378, Pl.7, fig.62 (type locality Calcutta).

1991. *Bagarius bagarius*, Talwar & Jhingran, *Inland Fishes*, pt.2.p.622.

*Meristic counts* : D.1/7, A.3/9-12, P.1/9-12, V.1/5

*Material examined* : 4exs, 27.6-36.7cm, Baralkanth River, 22kms N. Khedbramna, Dt. Sabarkantha, 15.9.93, A.K.Sarkar & party.

*Diagnostic characters* : Length of head 2.9 to 3.3 times in standard length, mouth inferior and crescentic, four pairs of barbels, greatly depressed head, pectoral and caudal fins with soft filamentous prolongations, plate edentate, no adhesive apparatus. body generally greenish or ash coloured or deep olive-brown, pale below with many scattered irregularly shaped black marks (in fresh condition).

*Distribution* : India, Bangladesh, Pakistan, Myanmar, Thailand, Malaya, Java, Borneo.

*Remarks* Grows to 1.8 m in length weight over 125kg. one of the largest freshwater fish known popularly as 'Freshwater Shark' Mainly inhabitants of torrential rivers and rocky pools. The flesh is not relished as food. Sluggish in nature and therefore offers no game to the anglers.

Family CLARIIDAE

Genus *Clarias* Scopoli

1777. *Clarias* Scopoli, *Introd. Hist. Nat.*, p.445 (type species- *Clarias orontis* Gunther).

89. *Clarias batrachus* (Lin.)

1758. *Silurus batrachus* Linnaeus, *Syst. Nat. ed.*, 10,p.305 (type locality- Asia, Africa).

1992. *Clarias batrachus*, Sen, *Freshwater Fish, State Fauna Series 3 : Fauna of West Bengal, Pt.2, Z.S.I.*, p.203, fig.75.

*Meristic counts*: D.62-76, P.1/8-11, V.6, A.45-58, C.15-17

*Material examined*: 13exs, 14.4-18.6cm, Dhalwani, 58km North of Himatnagar, Dt. Sabarkantha, A.K.Sarkar & Party.

*Diagnostic characters* : Length of head 5.6 to 6.0 times in total length, eyes small 8.0 times in head length; upper jaw longer, compressed head, a long dorsal fin, four pairs of barbels, maxillary barbels being the longest reaching the base of pectorals, caudal rounded, pectoral spine finely serrated, accessory respiratory organ present, reddish brown or greyish black uniformly, smooth skinned.

*Distribution* : India, Bangladesh, Nepal, Sri Lanka, Myanmar, Thailand, Malaya, Phillipines, Java, and Malayasia.

*Remarks* : One of the most commonly found Siluroids, highly priced for its esteemed rejuvenating vigor and taste. Pectoral fin spine may cause severe pain to the fingers of the holder, if not hold carefully and cautiously. Live in rivers, brackish as well as marshy waters like beels, marshes, tanks, lakes etc.

Family HETEROPNEUSTIDAE

Genus *Heteropneustes* Muller

1840. *Heteropneustes* Muller, *Arch, Anat. Physiol*, p.115 (type- *Silurus fossilis* Bloch, by original designation).

90. *Heteropneustes fossilis* (Bloch)

1794. *Silurus fossilis* Bloch, *Nat. Aust. Fishes* 8, p.46, pl.370, fig.2 (type locality- Tranguebar).

1992. *Heteropneustes fossilis*, Sen, *State Fauna Series No.3 : Fauna of West Bengal, pt.2, Z.S.I.*, p.234, fig.76.

*Meristic counts* : D.6-7, P.1/7, V.6, A.60-79, C.17-23

*Material examined* : 8exs, 12.5-19.7 cm Nikashi canal, 70 km from Anand Camp, Dt. Kheda, 8.2.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 5.5 to 7.0 in total length, eyes small, wide flat head, four pairs of barbels, maxillary pair extending to middle of pectoral or to pelvic base; wide gill-opening, gill-cavity with an accessory respiratory apparatus, dorsal much shorter nearer to snout, pectorals not reaching pelvic, with a strong serrated semi poisonous spine which may cause serious pain if wounded by it on the fingers of the holder, dark purplish brown or leaden brown with two yellowish lateral bands in juveniles.

*Distribution* : India, Bangladesh, Pakistan, Nepal, Sri Lanka, Myanmar, China, and Thailand.

*Remarks* : Grows to 30.5cm, highly esteemed for its nourishing vigor and good taste. Live in freshwater as well as brackish waters, such as, lakes, rivers, tanks, beels, marshes etc.

Order ATHERINIFORMES

Family CYPRINODONTIDAE  
(Aplocheilidae)

Genus *Aplocheilus* McClelland.

1839. *Aplocheilus* McClelland, *Asiat. Res.*, 19(2), P.301 (type species- *Esox panchax* Hamilton-Buchanan).

Key to the species of the genus *Aplocheilus*

1. Eye diameter equal to interorbital width, length of head 4.0 to 4.3 in TL .....2

Eye diameter about half of interorbital width, length of head 4.5 in TL, Lt. line scales 27-29 .....*A. blocki*

2. No vertical black bands on the abdominal sides, anal fin rays 15-17, Lt. line scales 31-34 .....*A. panchax*

Eight to ten vertical black bands on the abdominal sides, anal fin rays 15-16, pelvic fins with a prolonged ray (at least in males) .....*A. lineatus*

### 91. *Aplocheilus blocki* (Arnold)

1911. *Haplocheilus panchax* var. *blocki* Arnold, *Wochenschr. Aquarien und Terrarienkunde*, 8.p.672 (type locality- Ceylon).

1991. *Aplocheilus blocki* (Arnold), Talwar & Jhingran, *Inland Fishes*, Vol.2,p.750.

*Meristic counts* : D.2/6, A.3/11, P.14, V.6

*Material examined* : 9exs, 2.5-3.0cm, Aji-2 F.W. Reservoir, 5km From Rajkot Camp, Dt. Rajkot, 31.1.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 4.5 in total length, eyes 3.7 in head length, no teeth on vomer, dorsal origin above the last anal, pectoral nearly as long as head, small pelvic without any elongated ray, light olive with a black spot extending from the 2nd to the fourth dorsal ray.

*Distribution* Tamil Nadu, Kerala, Gujarat: Sri Lanka.

*Remarks* : Attains a length of 5.0cm. This is the smallest and prettiest known species under this genus. A popular larvivorous fish and its utility for mosquito control has been established. Males are larger and more brightly coloured than the females. Largely used as a popular aquarium ornamental fish all over India.

### 92. *Aplocheilus lineatus* (Val.)

1846. *Panchax lineatus* Valenciennes, *Hist. Nat. Poiss.*, 18, 381 (type- locality- peninsular India).

1991. *Aplocheilus lineatus*, Talwar & Jhingran, *Inland Fishes*, Vol.2.p.751

*Meristic counts* : D.2/6, A.3/12-13, P.14, V.6

*Material examined* : 13exs, 3.5-5.6cm, Aji-2 F.W. Reservoir, 5km from Rajkpt Camp. Dt. Rajkot, 31.1.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 4.2 to 4.7 in total length, eyes 3.2 to 3.5 in head length, anal rays 15-18, pectoral as long as head, pelvics with the second ray prolonged and reaching to middle of anal 8-10 vertical black bands passing down from sides to abdomen, female reddish brown above, yellowish on sides and below.

*Distribution* : Western and southern regions of India.

*Remarks* : Attains 10.2cm in length. Inhabits clear. shallow and brackish waters at low altitudes. A median-sized fish which is easily recognised by the double bordered and oval tail fin of the male. This species is the largest and prettiest of the Asiatic members of the genus. Due to its brilliant hue, it is one of the very popular exotic fishes of American aquaria. The habits of this fish are very similar to those of its north Indian congener, *A. panchax*.

### 93. *Aplocheilus panchax* (Ham.)

1822. *Esox Panchax* Hamilton, *Fishes of Ganges*, pp.211, 380, pl.3, fig.69 (type locality Bengal).

1991. *Aplocheilus panchax* Talwar & Jhingran, *Inland Fishes*, Vol.2. p.752, fig.241.

*Meristic counts* : D.2/6, A.3/12-13, P.14, V.6

*Material examined* : 29exs, 3.5-6.5cm, Aji-2 Reservoir, 5km from Rajkot Camp, Dt. Rajkot, 31.1.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 4.0 to 4.3 in total length, eyes 3.3 in head length, lower jaw oblique, longer; maxilla reaching to below first third of eye, no teeth on vomer, dorsal origin above the last anal rays, pectoral almost as long as head, pelvic small without any elongated ray, anal rays 15-17, caudal rounded, a white occipital spot, greenish above, dull white beneath, fins yellowish.

*Distribution* : Fresh and brackish waters of Punjab, U.P., Gujarat, Bihar, West Bengal, Orissa, M.P., Bangladesh, Pakistan, Myanmar, Sri Lanka, Malaya, Malaya Archipelago, Siam.

*Remarks* : Attains 8.9cm in length. A popular larvivorous fish, inhabits clear, shallow and brackish waters at low altitudes.

### Family ORYZIIDAE

#### Genus *Oryzias* Jordan & Snyder

1906. *Oryzias* Jordan & Snyder, *Proc. U.S. Natn. Mus.*, 31(1486). p.289 (type species *Poecilia latipes* Temminck & Schlegel).

#### 94. *Oryzias melastigma* (McClelland)

1839. *Aplocheilus melastigmus* McClelland, *Asiat. Rec.*, 1.p.301, 427, pl.42, fig.3 (type locality-tanks in Calcutta).

1991. *Oryzias melastigma*, Talwar & Jhingran, *Inland Fishes*, Vol.2.p.745, fig.239.

*Meristic counts* : D.6-7, A.20-24, P.15, V.6

*Material examined* : 12exs, 2.5-3.2cm, Ajii-2 F.W. Reservoir, 5km from Rajkot Camp, Dt. Rajkot, 31.1.93, T.K.Sen and Party.

*Diagnostic characters* : Length of head 4.2 in total length, eyes 3.0 in head length, lower jaw slightly longer, maxilla not reaching to below front edge of eye, no teeth on vomer, pectoral as long as head, pelvic small without any elongated ray, caudal rounded, dull green above, dull white below with a narrow dark line along the middle of side, ending in a dull spot at the centre of caudal base.

*Distribution* : India, Bangladesh, Myanmar, Sri Lanka.

*Remarks* : Attains up to 4.0cm in length. An excellent larvivorous fish (Killifish) largely employed in controlling mosquito larvae. It is a perennial breeder both in fresh and brackish waters, particularly from November to March.

### Family POECILIDAE

#### Genus *Gambusia* Poey

1854. *Gambusia* Poey, *Memorias sobre la historia natural de la Isla de Cuba* 1, pp. 376, 304 (type species *Gambusia punctata* Poey).

#### 95. *Gambusia affinis* (Baird & Girard)

1853. *Heterandria affinis* Baird & Girard, *Proc. Acad. nat. Sci. Philad.*, 6, p.390 (type locality-San Antonio river drainage, Texas).

1991. *Gambusia affinis*, Talwar & Jhingran, *Inland Fishes*, Vol.2, p.756, fig.242.

*Meristic counts* : D.17-8, A.8-10, P.13-14, V.6, Lt.I.32

*Material examined* : 9exs, 3.5-4.6cm, Ajii-2 F.W. Reservoir, 5km from Rajkot Camp, Dt. Rajkot, 31.1.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 3.6 to 4.0 in total length, eyes large, its diameter about three times in head length, gonopodium about as long as head, translucent grey with a bluish sheen on flanks, back olive brown, belly silvery, a dark transverse bar across eye.

*Distribution* : Introduced in India in 1928 from Italy for anti malarial measures and today it is spread all over the states of India: South-eastern United states of America etc.

*Remarks* : Attains 6.2cm in length. This species is hardy one and can withstand all types of foul water conditions, poor food etc. It is predaceous in nature and a live bearer with great appetite for its own young.

### Family BELONIDAE

#### Genus *Xenentodon* Regan

1911. *Xenentodon* Regan, *Ann. Mag. nat. Hist.*, & 7(8), p.382 (type species- *Belone cancila* Hamilton, Orthotypic).

#### 96. *Xenentodon cancila* (Ham.)

1822. *Esox cancila* Hamilton, *Fish Ganges*, pp. 213, 380, pl.27, fig.70 (type locality- Gangetic provinces).

1992. *Xenentodon cancila*, Sen, *Freshwater Fish. State Fauna Series no.3: Fauna of West Bengal* : pt.2, Z.S.I., p.209, fig.79.

*Meristic counts* : D.15-18, P.11, V.6, A.16-18, C.15

*Material examined* : 9exs, 12.5-19.7cm,

Mahi river at Sindhrat, 18km N.W. of Baroda (near Umeta Bridge), Dt. Baroda, 13.5.92, A.K.Sarkar & Party.

*Diagnostic characters* : Length of head 2.6 in total length, both jaws elongated into a long beak, dorsal and anal fins similar looking and arranged symmetrically close to the tail, eyes 3.0 to 3.2 in head length, a deep longitudinal groove on upper surface of head, elongated body, lower jaw longer, caudal fin slightly emarginate, greenish grey above, whitish along the abdomen, a silvery streak with a dark margin extends along the body, upper part of body beset with black spots.

*Distribution* : India, Bangladesh, Pakistan, Nepal, Sri Lanka, Myanmar, Thailand and Malay- Archipelago.

*Remarks* : Attains to 30.5cm in length. Live in rivers, lakes, beels and canals. Commercially less important.

#### Order CHANNIFORMES

#### Family CHANNIDAE

#### Genus *Channa* scopoli

1777. *Channa* Scopoli, *Introd. Hist. Nat.*, p.459 (type species *Channa orientalis* Bloch & Schneider).

#### Key to the species of genus *Channa*

1. Pelvic fin less than half length of pectoral fin, pectoral fins spotted in zones, darker and lighter patches, chin marbled .....2  
Pelvic fin more than half length of pectoral fin, pectoral fins plain .....*C. punctatus*
2. Anal fin with 27 rays, circular black spots, each occupying part of a scale present; base of dorsal iridescent blue in life, dorsal fin with 39 to 40 rays .....*C. stewartii*  
Anal fin with 22 rays, no black spots on scales, dorsal fin with 34 rays .....3
3. Predorsal scales 12, pectoral with a black base transversely barred .....*C. orientalis*  
Predorsal scales 18 to 20, lateral sides with yellowish-cum darker bands.....4

4. Length of head 3.3 to 4 .....*C. striatus*  
Length of head 4 to 5, predorsal scales 16, a black white edged ocellus on basal part of caudal, 4 to 5 rings or blotches on lateral line ..... *C. marulius*

#### 97. *Channa orientalis* Bloch & Sch,

1801. *Channa orientalis* Bloch and Schneider, *Syst. Ichth.*, P.496 pl.90, fig.2 (type locality- India).

1992. *Channa orientalis*, Sen, *Freshwater Fish, State Fauna Series No.3: Fauna of West Bengal*, Z.S.I., Pt.2, p.216.

*Meristic counts* : D.32-37, p.14-15, V.6, A.20-23, C.12, Lt.I.40-45

*Material examined* : 7exs, 14.5-18.5cm, Neja village, Khambat, Dt. Kheda, 1.12.92, A.K.Sarkar & party; 5exs, 11.0- 15.6cm, Gudkar Nabhoi forest area, Dt. Bhuj, 28.9.93, A.K.Sarkar & Party; 5exs; 9.5-12.5cm, Lukumar village, 4km S.W. of Dahad, Dt. Panchmahal, 27.3.92. A.K.Sarkar & Party.

*Diagnostic characters* :Length of head 3.5 to 4.2 in total length, eye diameter 1/6 of head, maxilla reaches to below the hind edge of the orbit, broad and irregular scales on the summit of the head, predorsal scales 12, greenish superiorly with some blackish spots on the body, base of pectoral fin with transverse black bands, dull white or brownish white on the sides and below.

*Distribution* : Throughout India, Pakistan, Bangladesh, Sri Lanka and Myanmar.

*Remarks* : Attains 20.4cm in length. This species includes forms with and without pelvic fins, the latter being known from Sri Lanka, Myanmar and Java. *Channa gachua* is a synonym of this species (Menon 1974). Live in beels, tanks, canals, road- side ditches, marshy water bodies and paddy- fields. Economically less important.

#### 98. *Channa punctatus* (Bloch)

1793. *Ophiocephalus punctatus* Bloch, *Naturges, ausland, Fishes*, (7),p.139, pl.358 (type locality rivers and lakes of Coromandel coast).

1992. *Channa punctatus* Sen, *Freshwater fish, State Fauna Series No.3: Fauna of West Bengal*, Z.S.I., pt.2.p.216.

*Meristic counts* : D. 29-32, P.15-17, A.21-23, C.12, Lt.I.37-40, V.6

*Material examined* : 7exs, 15.5-17.5cm, Vatrack river, 30km from Anand Camp, Dt. Kheda, 7.2.93, T.K.Sen & party.

*Diagnostic characters* : Length of head 3.3 to 3.6 in total length, eyes 7.0 to 8.5 in head length, lower jaw longer, maxillary reaching to below or behind hind border of eyes, predorsal scales 12, cephalic pits simple, five rows of scales between eye and angle of preopercle, greenish grey above becoming yellowish below, a dark stripe or band along the side of head and several short cross-bands descending from back.

*Distribution* : India, Nepal, Sri Lanka, Bangladesh, Pakistan, Myanmar, Malaya, China, Tahiti, Polynesia.

*Remarks* : Grows to 30.4cm in length. Found to live in road-side canals, ditches, beels, paddy-fields (during monsoon season), tanks, bheries, etc. Commercially less important (Mostly taken by poorer section).

#### 99. *Channa stewartii* (Playfair)

1867. *Ophiocephalus stewartii* Playfair, *Proc. Zool. Soc. Lond.*, p.14, pl.77, fig.3 (type locality-Cachar, Assam).

1992. *Channa stewartii*, Sen, *Freshwater Fish, State Fauna Series No. 3 : Fauna of west Bengal*, Z.S.I., pt.2, p. 215, fig.85.

*Meristic counts* : D.39-40, P.17, V.6, A.27 C.14, Lt.I.45-50

*Material examined* : 4exs, 13.5-19.7cm, Khareswar village, 10km from Dhrangadhra, Dt. Surendranagar, 10.12.92, A.K.Sarkar & Party; 12.6-17.5cm, Chhrodia village, Dhadhuka, Dt. Ahmedabad, A.K. Sarkar & Party.

*Diagnostic characters* : Length of head 4.0 in total length, eyes 6.5 in head length, maxilla reaches beyond the hind border of eye, dorsal fin arises above the base of pectoral fin, scales on the upper side of head plate like, caudal roundish, purplish black above becoming

greyish white on sides and below, many scales with black round marks, fins dark, pectoral base yellowish in young ones with a blue basal blotch.

*Distribution* : West Bengal, Eastern Himalayas, Arunachal Pradesh, Meghalaya, Gujarat (New record, range extension).

*Remarks* : Attains to 25.4 cm in total length. This species so far remained confined in Eastern India. But due to its new record from Gujarat. it appears that it has extended its known range of extension from E.India to W. India (Gujarat).

#### 100. *Channa striatus* (Bloch)

1793. *Ophiocephalus striatus* Bloch, *Naturg. ausland. Fishes.*, 2.p.141, pl. 359 (type locality-Malabar).

1992. *Channa ariatus*, Sen, *Freshwater Fish, State Fauna Series No. 3 : Fauna of West Bengal*, Z.S.I.,pt.2, p.215, fig.84

*Meristic counts* : D. 37-45, P.17, V.6, A.23-26, C.13, Lt.I.50-57

*Material examined* : 17exs, 12.6-28.4cm, Sidpur 50 km from Dharoi Camp, Dt. Mahesana, 31.1.91, P.Krishnamurthy & Party.

*Diagnostic characters* : Length of head 3.5 to 4.0 times in total length, eyes 1/6 to 1/7th of length of head, lower jaw longer, 9 rows of scales between eye and angle of opercle, predorsal scales 18 to 20, maxillary reaching to below hind border of eye, no barbels, caudal roundish, dark greyish to black above, yellowish white below, patchy greyish bands descend from side to abdominal region, fins greyish.

*Distribution* : India, Sri Lanka, Bangladesh, Pakistan, Myanmar, Malaya, Archipelago, Thailand, Philippines, China (South).

*Remarks* : Grows to 91.4cm in length. This is the most popular fish under this genus all over india so far concerned its taste and size, Live in rivers, tanks, beels, ditches, lakes etc. A known predatory fish.

#### 101. *Channa marulius* (Ham.)

1822. *Ophiocephalus marulius* Hamilton, *Fish. Ganges*, pp.65, 367, pl.17, fig.19 (type locality Ganges).

1991. *Channa marulius*, Talwar & Jhingran, *Inland Fishes*, Vol.2, p.1017.

*Meristic counts* : D.45-55, P.18, V.6, A.28-36, C.14, Lt.I. 60-70

*Material examined*: 6exs, 15.6-19.8cm, Narmada river at Zenor, 20km N.E. Of Bharuch, Dt. Bharuch, 19.5.92, A.K. Karmakar & Party.

*Diagnostic characters* : Length of head 4.0 to 5.0 times in total length, eyes 1/7 of length of head, maxilla extended to half of eye-diameter behind orbit, predorsal scales 16, no barbels, 10 rows of scales between orbit and angle of preopercle, cephalic pits multiple, caudal rounded, greyish green becoming lighter below, young ones conspicuous with a brilliant orange coloured lateral band, 4 to 5 roundish black blotches on the middle of the body below the lateral line (most significant distinguishing character from all other *Channa* species).

*Distribution* : India, Sri Lanka, Bangladesh, Pakistan, Myanmar, Thailand, China.

*Remarks* : Known for its giant size (largest species of this genus), grows to about 1.2m in total length. Generally taken by the poors.

## Order PERCIFORMES

### Family CENTROPOMIDAE

#### Genus *Lates* Cuvier

1828. *Lates* Cuvier, *Hist. Nat. Poiss.*, 2.p.88 (type species *Perca nilotica* L.).

#### 102. *Lates calcarifer* (Bloch)

1790. *Holocentrus calcarifer* Bloch, *Naturges, ausland. Fische*, (4), p. 100, pl. 244 (type locality-Indonesia).

1991. *Lates calcarifer*, Talwar & Jhingran, *Inland Fishes* Vol.2, p.789, fig.248.

*Meristic counts* : D.7-8/1/11-12, P.17, V.1/5, A.3/8-9, C.17, Lt.I.52-60

*Material examined* : 4exs, 23.6-31.6cm, Fish market at Tin Darwaja, Dt. Ahmedabad, 18.1.91, P. Krishnamurthy & Party.

*Diagnostic characters* : Length of head 3.6 to 4.0 in total length, eyes 5.0 to 6.0 in head length, curved sloping snout, maxilla extends to below hind border of eye, preorbital and preopercle finely serrated, the later denticulated at the angle lower jaw longer, no canines, two dorsals united at their bases, the first one with 7-8 spines; caudal rounded, grey shot with green on back, silvery below; sometimes golden tinge observed on the back when extremely fresh in condition.

*Distribution* : Wide spread in the Indo-Pacific regions.

*Remarks* : Grows to 91.4cm in length. Inhabits coastal waters, estuaries and lagoons including brackish waters : An esteemed fish of high economic importance.

### Family AMBASSIDAE

#### Genus *Chanda*

#### Genus *Chanda* Hamilton-Buchanan

1822. *Chanda* Hamilton-Buchanan, *Fishes of Ganges*, pp.103, 270 (type species *Chanda nama* Hamilton-Buchanan).

#### 103. *Chanda nama* Ham.

1822. *Chanda nama* Hamilton-Buchanan, *Fishes of Ganges*, pp.109, 371, pl.39, fig.37 (type locality- ponds throughout Bengal).

1991. *Chanda nama*, Talwar & Jhingran, *Inland Fishes*, vol.2, p.799, fig.249.

*Meristic counts* : D.7/1/13-17, P.13, V.1/5, A.3/14-17, C.17

*Material examined* : 22exs, 4.6-5.4cm, Ajii-2 Reservoir, 5km from Rajkot Camp, Dt. Rajkot, 31.1.93, T.K.Sen & party.

*Diagnostic characters* : Length of head 4.0 to 4.5 in total length, deep and strongly compressed, laterally flat, dorsal and ventral

profiles equally convex, lower jaw longer, maxilla reaching to below first third of eye, two dorsals united at their base, preorbital slightly serrated, yellowish olive (translucent), covered with minute black dots, fins orange.

**Distribution:** Throughout India, Nepal, Bangladesh and Myanmar.

**Remarks :** Grows to 7.6cm in length. Commercially not important due to strong spines and scanty flesh. These small, bony and fleshless fishes are sold in heaps along with other small fishes in the fish markets. Popularly known as *Glassfishes*.

#### Genus *Pseudambassis* Bleeker

1874. *Pseudambassis* Bleeker, *Nat. Verh. Hool. Maatsch. Wetench.*, 2(2) : 86 (type species : *Chanda lala* Ham.).

#### 104. *Pseudambassis ranga* (Ham.)

1822. *Chanda ranga* Hamilton -Buchanan, *Fishes of Ganges*, pp.113, 371, pl.16, fig. 38 (type locality- freshwaters of Gangetic provinces).

1991. *Pseudambassis ranga*, Talwar & Jhingran, Vol.2, *Inland Fishes* p.805.

**Meristic counts :** D.7/1/13-15, P.11. V.1/5, A.3/13-16, C.17

**Material examined :** 46exs, 4.6-5.7cm, Balaram river, near Dharmata temple, 20km North of Palanpur, Dt. Banaskantha, 18.9.93, A.K.Sarkar & Party.

**Diagnostic characters :** Length of head 3.2 to 4.0 in total length, maxilla reaches to below midorbit, small teeth, 2 dorsals united at their bases, a recumbent dorsal spine present, body more deeper, olive, vertical fins with grey borders.

**Distribution :** Throughout India, Bangladesh, Pakistan, Myanmar, Malaya, Thailand, Nepal.

**Remarks :** Grows to 7.2 cm in length. Commercially not important due to its strong spines and scanty flesh. Both *C.nama* and *P.ranga*, resemble one another but can be distinguished by the presence of 2/3 large canines in the lower jaw in *C.nama* which are

absent in *P.ranga*, more deeper body in *P.ranga* than *C.nama*. The genus *Chanda* is now restricted to its type species *Chanda nama* according to the opinion 121 of the International Commission on Zoological Nomenclature (Talwar, 1971).

#### Family NANDIDAE

#### Genus *Badis* Bleeker

1853. *Badis* Bleeker, *Verh. Batav. Genoot. Wet.*, 25. p.253 (type species- *Badis buchanani* Bleeker).

#### 105. *Badis badis* (Ham.)

1822. *Lalrus badis*, Hamilton-Buchanan, *Fishes of Ganges*, pp.70, 368, pl.25. fig.23 (type locality- Gangetic Provinces).

1992. *Badis badis*, Sen, *Freshwater Fish, State Fauna Series No. 3: Fauna of West Bengal*, pt.2., Z.S.I., p.220.

**Meristic counts :** D.16-17/7-10, P.12. A.3/6-8, C.16, Lt.I.26-33

**Material examined :** 7exs, 4.6-6.5cm, Narmada river at Baruch, adjacent to the town, Dt. Baruch, 19.5.92, A.K.Sarkar & Party.

**Diagnostic characters :** Length of head 4.0 to 4.5 in total length, eyes 3.0 to 3.5 in head length, body elongated, laterally compressed body, head scaled, lateral line placed high on the body, interrupted on 8 or 9 scales from the caudal side; caudal rounded, body dark brown or dark green with a series of dark transverse bands, bluish black spots or blotches on the body on opercle, caudal fin base and shoulder.

**Distribution :** Throughout India, Bangladesh, Pakistan, Nepal, Myanmar.

**Remarks :** Grows to 9.0cm in length. Commercially not important due to its small size and less flesh. Inhabits rivers, ponds and ditches. Noted for its colour changing habits. A beautifully coloured fish of amazing range of pigmentations.

#### Genus *Nandus* Valenciennes

1831. *Nandus* Valenciennes, *Hist. nat. poiss.*, 7, p.481 (type species *Nandus marmoratus* Val.).

106. *Nandus nandus* (Ham.)

1822. *Coius nandus* Hamilton-Buchanan, *Fishes of Ganges*, pp.96,370, pl.30, fig.32 (type locality-Gangetic provinces).

1992. *Nandus nandus*, Sen, *Freshwater Fish, State Fauna Series No.3: Fauna of West Bengal*, pt.2, Z.S.I., p.221, fig.90.

*Meristic counts* : D.12-14/11-13, V.1/5, A.3/7-9, Lt.I.46- 57

*Material examined* : 7exs, 10.4-12.6cm, Tarwa river, village Muzda, Dt.Baruch, 21.3.92, A.K.Sarkar & Party.

*Diagnostic characters* : Length of head 3.0 in total length, body laterally compressed deeper with a nearly straight belly and arched back, snout pointed, mouth very much protractile with deep cleft of mouth, eyes 5.0 to 6.0 in head length, maxilla reaching beyond post orbit, caudal rounded, greenish brown with bronze or brassy reflections (when alive), 3 vertical broad bands or patches on the body, narrow bands or spots across the fins.

*Distribution* : India, Bagladesh, Pakistan, Myanmar, Thailand, Malaya.

*Remarks* : A popular fish of secondary economic importance. Grows to 17.7cm in length. Live in beels, tanks, bheries, ditches, rivers (mainly tributaries), paddy-fields (during rainy season).

## Family MUGILIDAE

Genus *Liza* Jordan and Swain

1884. *Liza* Jordan and Swain, *Proc. U.S. nat. Mis.*, 7.p.261(type species *Mugil capito*).

107. *Liza persia* (Ham.)

1822. *Mugil persia* Hamilton, *Fish. Ganges*, p.215, pl.17, fig.71 (type locality-Hooghly R.).

1992. *Liza persia*, Sen, *Freshwater Fish, State Fauna Series No. 3 ; Fauna of west Bengal*, pt.2, Z.S.I., p.224, fig.93.

*Meristic counts* : D.(1)/4, D.(2)/1/8, A.3/9, P.14, V.1/5 Lt.I.31-36

*Material examined* : 7exs, 6.5-8.2cm, Fish Market near Tin Darwaja, Dt. Ahmedabad, 18.1.91., P. Krishnamurthy & Party; 4exs, 5.7-8.4cm, Tapi river at Amroli, Dt. Surat, 18.3.92, A.K. Sarkar & party.

*Diagnostic characters* : Length of head 5.0 to 5.2 in total length, diameter of eyes 2/7th of length of head with a well developed posterior adipose lid, upper surface of head slightly convex, snout depressed upper lip thin and placed obliquely, first dorsal commences midway between the snout and the base of the caudal, each scale with distinct longitudinal lines, silvery body with a golden spot on the upper portion of the opercles, fins with dark borders.

*Distribution*; Seas and estuaries of India. Enters freshwaters

*Remarks*: Grows to 12.7 to 15.4cm in length. Commercially important fish due to its excellent taste and less bones.

Genus *Mugil* Linnaeus

1758. *Mugil* Linnaeus, *Systema Naturae* ed. 10, 1, p.316 (type species -*Mugil cephalus* ).

108. *Mugil cephalus* Lin.

1758. *Mugil cephalus* Linnaeus, *Systema Naturae* ed. 10, 1. p.316 (type locality-European Seas).

1991. *Mugil cephalus*, Talwar & Jhingran, *Inland Fishes*, Vol. 2. p. 896.

*Meristic counts* : D.(1)/4, D.(2)/1/8, A.3/8, P.15, Lt.I.38-42

*Material examined* : 4exs, 15.4-22-5cm, Ukai open reservoir, Narayanpur, Dt. Surat, 14.2.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 4.5 to 4.6 in total length, eyes with broad adipose lids, interorbital flat, dorsal contour from snout to base of dorsal fin nearly horizontal, maxilla not visible, first dorsal origin midway between snout end and caudal fin base, caudal with pointed lobes, robust body, thin lips, lower lip with a high symphysial knob, greyish along the back, silvery below, a dark line along each row

of scale in upper half of body.

**Distribution:** World wide in temperate and tropical waters. In India it is found in the estuarine and coastal waters of Gujarat. Bombay, West Bengal, Orissa, Malabar, Travancore-cochin and Coromandel.

**Remarks :** Attains 91.4 cm in length, most common and widely distributed mullet species in India. In Chilka lake it is the most common mullet of high economic importance.

#### Genus *Rhinomugil* Gill

1863. *Rhinomugil* Gill, *Proc. Acad. nat. Philad*, 15, p.169 (type species- *Mugil corsula* Hamilton-Buchanan).

#### 109. *Rhinomugil corsula* (Ham.)

1822. *Mugil corsula* Hamilton, *Fish, Ganges*, pp. 221, 381, pl.9, fig.97 (type locality- Rivers of the Gangetic provinces).

1992. *Mugil corsula*, Sen, *Freshwater Fish, State Fauna Series No. 3 : Fauna of West Bengal*, pt.2, Z.S.I., p.222, fig.92.

**Meristic counts :** D.(1) 4/8-9, D.(2)1/8-9, P.15, V.1/5, A.3/9, C.15, Lt.I.48-52

**Material examined :** 5exs, 9.5-18.6cm, Ukai market, Dt. Surat, 11.2.93, T.K.Sen & Party.

**Diagnostic characters :** Length of head 4.5 to 4.7 in total length, eyes without adipose eye-lids, elevated and closed together; mouth distinctly ventral and protrusible, 2 widely separated dorsal fins, first fin with 4 spines and second with 1 spine and 8 to 9 soft rays; head depressed, dorsal profile nearly horizontal, angular mouth the upper jaw the longer and overhung by the snout, caudal fin slightly emarginate type, dull brown above becoming lighter below, dorsal and caudal tinted grey, golden eyes.

**Distribution :** India, Bangladesh and Myanmar.

**Remarks :** Grows to 45.7cm in length. It is most commonly found in the estuaries and freshwaters far above the tidal influence. A fish of good taste and high economic importance.

#### Genus *Sicamugil* Fowler

1939. *Sicamugil* Fowler, *Notul, Nat. Acad, Philad*, 17. p.9 (type species *Mugil hamiltoni* Day).

#### 110. *Sicamugil cascasia* (Ham.)

1822. *Mugil cascasia* Hamilton-Buchanan, *Fishes of Ganges*, pp.217, 380 (type locality-northern rivers of Bengal).

1992. *Sicamugil cascasia*, Sen, *Freshwater fish, State Fauna series No. 3 : Fauna of west Bengal*, Z.S.I., pt. 2.p.224.

**Meristic counts :** D.(1)4, D.(2)1/8, A.3/8-9, P.14-15, V.1/5, Lt. I.36-39

**Material examined :** 17exs, 4.5-6.4cm, Purna river, Mahal, Dt. Dangs, 13.3.92, A.K. Sarkar & Party.

**Diagnostic characters :** Length of head 4.5 in total length, eyes 3.5 to 4.0 in head length, without adipose lids, flattened head, wide mouth, upper lip obliquely placed, cleft of mouth being only one third of the extent of its gape, opercle with a spine, first dorsal nearer to snout than to caudal, lunate; yellowish olive on top of head, greyish on back becoming sivery white below, fins not coloured.

**Distribution** Upper reaches of Brahmaputra, Ganga and Yamuna river systems; Pakistan (Indus river systems), Bangladesh, Sri Lanka, Myanmar. (New record from Gujarat).

**Remarks :** Grows to 10.2cm in length. This is a purely freshwater species. This species has been introduced into the Cauvery river system. This species might have been migrated to Gujarat from Pakistan (Indus river system).

#### Genus *Valamugil* Smith

1948. *Valamugil* Smith, *Ann, Mag, nat. Hist.*, (11) 14.p.841 (type species *Mugil seheli* Forsskal).

#### 111. *Valamugil cunnesius* (Val.)

1836. *Mugil cunnesius* Valenciennes, *Hist, Nat. Poiss*, 11.p.114 (type locality- Malabar and Bombay).

1994. *Valamugil cunnesius*, Sen, *Guide to the identification of the commercially important fin*

fishes of West Bengal Meenbarta, Deptt. of Fisheries, Govt. of West Bengal, p.19, January, 94.

*Meristic counts* : D(1)4/8, D.(2)1/8, A.3/9, Lt.I.30-35

*Material examined* : 5exs, 12.5-18.4cm, Ukai natural reservoir, Dt. Surat, 10.2.93, T.K. Sen & Party.

*Diagnostic characters* : Length of head 5.0 in total length, body moderately robust, head wide, flattened above; lips thin, lower lip with high symphysial knob, 2 widely separated dorsal fins, first fin with 4 spines and second fin with 1 spine and 8 soft rays, anal fin with 3 spines and 9 soft rays, pectoral fin long, equal to or slightly shorter than head length; caudal fin forked, back dark grey and belly silvery, a dark spot on the base of pectoral fin.

*Distribution* : India, Sri Lanka, Bangladesh, East Indies to Western Pacific.

*Remarks* : Attains to 30.5cm in length. Inhabits shallow coastal waters, estuaries and backwaters; frequently entering freshwaters. This species contributes to a minor fishery in West Bengal, Orissa, Gujarat and Kerala estuaries.

## Family CICHLIDAE

### Genus *Oreochromis* Gunther

1889. *Oreochromis* Gunther, *Ann. Mag. nat. Hist.*, (6), 4, p.70 (type species *Oreochromis hunteri* Gunther); Trewaves, 1983, *Tilapiine Fishes* : 139-373 (Revision).

#### 112. *Oreochromis mossambica* (Peters)

1852. *Chromis (Tilapia) mossambicus* Peters, *Montab. Akad. Wiss., Berlin*, p.681 (type locality Mozambique).

1992. *Oreochromis mossambica*, Sen, *Freshwater Fish, State Fauna Series No.3: Fauna of West Bengal*, pt.2, Z.S.I., p.221, fig.91.

*Meristic counts* : D.14-15/11-12, P.12-13, V.1/5, A.2/11, C.17

*Material examined* : 17exs, 8.6-19.5cm, Badi Bazdi Village, 8km south of Rajkot, Dt.

Rajkot, 8.9.92, A.K.Sarkar & Party; 14exs, 6.5-15.5cm, Ajii-2 F.W reservoir, 5km from Rajkot camp, Dt. Rajkot, 31.1.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 4.0 in total length, deeper body with arched back, snout with a sloping curve, maxilla short, eye diameter 5.0 in head length. Lower jaw slightly longer, cleft of mouth short, incomplete lateral line, subtruncate caudal olive green with golden tinge (coppery) on each scale with a dark centre, vertical fins blackish with indistinct white spots.

*Distribution* : Fresh and brackish waters of India. Thailand, Bangladesh, Malayasia, Phillines, Sri Lanka, S.Africa, U.A.R., Vietnam, Congo, Madagascar, Rhodesia, Tanzania, Uganda, Zambia etc.

*Remarks* : Grows to 23.0cm in length. An introduced fish in India (August, 1952) and now it is cultured in freshwater ponds in the country. *Tilapia* (previous genus) is a hardy fish and a prolific breeder. Unsuitable for culture along with Indian major carps because of its predatory nature (destroys carp fries). It is now an important food fish all over the country with moderately cheaper rates. Mostly taken by the larger section of poor people of India.

## Family GOBIIDAE

### Genus *Awaous* Valenciennes

1837. *Awaous* Valenciennes, *Hist. Nat. poiss.*, 12.p.97 (type species *Gobius ocellaris* Valenciennes).

#### 113. *Awaous qutum* (Ham.)

1822. *Gobius qutum* Hamilton, *Fishes of Ganges* pp.50, 366 (type locality- Padam river).

1991. *Awaous qutum*, Talwar & Jhingran, *Inland fishes*, Vol.2, p.928.

*Meristic counts* : D.6+1/10, A.1/10, P.1/15-17, Lt.I.51-58

*Material examined* : 3exs, 5.5-8.4cm Sabarmati river, Anand camp, Dt. Kheda, 5.2.93, T.K.Sen & Party.

**Diagnostic characters** : Elongated body, eyes fairly small, its diameter 4.5 to 5.0 in head length; scales on operculum, breast and belly cycloid, on occiput ctenoid; predorsal scales 17 to 24, olive green, belly yellowish; head with scattered spot on base of caudal fin and also on base of pectoral fin.

**Distribution** : India and Bangladesh.

**Remarks** : Grows to 15cm in length. Inhabits rivers and estuaries and of no economic importance.

#### Genus *Glossogobius* Gill

1862. *Glossogobius* Gill, *Ann, Nat. Hist. New York*, 7.p. 46 (type species *Gobius platycephalus* Peters = *Gobius giuris* Hamilton-Buchanan).

#### 114. *Glossogobius giuris* (Ham.)

1822. *Gobius giuris* Hamilton-Buchanan, *Fish, Ganges*, pp.51, 366, pl.33, fig.15 (type locality- Gangetic provinces).

1991. *Glossogobius giuris*, Talwar & Jhingran, *Inland Fishes*, Vol.2, p.936, fig.274.

**Meristic counts** : D.6+1/8-9, A.1/7-8, P.1/16-21, Lt. I.30- 34

**Material examined** : 7exs, 7.8-12.8cm, Mathal village, 55km from Bhuj Camp., Dt. Bhuj, 25.1.91, P. Krishnamurthy & Party.

**Diagnostic characters** : Length of head 3.5 to 4.0 in total length, eyes 4.0 to 8.0 in head length, a long tapering fish with somewhat vertically compressed, pointed head, lower jaw prominent, two dorsals placed closely, pelvics united forming a disc, olive to dusky green above lighter below; 4 to 6 black blotches on body along the lateral line.

**Distribution** : India, Bangladesh, Pakistan, Sri Lanka, E.Africa, Malaya peninsula, China, Japan, Philippines, Australia, Indo-Australian-Archipelago and S. Pacific Island.

**Remarks** : Grows to 30.5cm in length. Commonly found in rivers, ponds ditches, paddy fields (during rainy season), beels, bheries etc. Commercially not important due to 'tasteless' and bloodless flesh.

#### Family ANABANTIDAE

#### Genus *Anabas* Cuvier

1817. *Anabas* Cuvier, *Regne Animal*, 2. ed.1.p.339 (type species *Perca scandens* Daldorf).

#### 115. *Anabas testudineus* (Bloch)

1795. *Anabas testudineus* Bloch, *Naturg. Ausland. Fische*. 6. p. 121, pl.322 (type locality, Java, 'East Indies).

1992. *Anabas testudineus*, Sen, *Freshwater fish, State Fauna Series No. 3: Fauna of West Bengal*, pt.2, Z.S.I., p.226, fig.96.

**Meristic counts** : D.17-18/8-10, A.9-10/9-11, Lt.I.28-32

**Material examined** : 6exs, 7.5-9.4cm, Nagrama tank, 30km from Anand camp, Limbassi village, Dt. Kheda, 9.2.93, T.K.Sen & Party.

**Diagnostic characters** : Length of head 3.5 to 3.6 in total length, eyes 4.5 to 5.0 in head length, lower jaw slightly longer, opercle and preorbital serrated, a single dorsal longer than anal with 17 to 18 spines, lateral line interrupted, caudal rounded, greyish green above, yellow or reddish yellow below, 4 wide cross bands on body.

**Distribution** : India, Pakistan, Bangladesh, Sri Lanka, Myanmar, Malaya, Archipelago, Singapore, Philippines, etc.

**Remarks** : Grows to 20.5cm in length. Traditionally known for its excellent taste.

#### Family BELONTIDAE

#### Genus *Colisa* Cuvier,

1831. *Colisa* Cuvier, *Hist. Nat. Poiss.*, 7, p.359 (type species *Colisa vulgaris* Cuvier).

#### 116. *Colisa fasciatus* (Sch.)

1801. *Trichogaster fasciatus* Schneider, *Syst. Ichth. Bloch.*, p.164, pl.36 (type locality- Tranguebar).

1992. *Colisa fasciatus*, Sen, *Freshwater Fish, State Fauna Series No. 3: Fauna of West Bengal*, pt.2, Z.S.I., p.228, fig.97.

*Meristic counts* : D.15-17/9-13, P.10, V.1, A.15-18, Lt.I.29-31

*Material examined* : 23exs, 6.5-9.3cm, Ukai natural reservoir, 35km from Ukai Camp, Dt. Surat, 10.2.93, T.K.Sen & Party.

*Diagnostic characters* : Length of head 3.7 to 4.2 in total length, deep body and laterally compressed, cleft of mouth, dorsal and pelvic fins elongated; pelvic fin is a single filiform ray reaching at least to the base of caudal fin which is of semimarginate type, lateral line interrupted, greenish or bluish above, dirty white below; 14 or more orange (mixed with red) coloured vertical bands descend obliquely downwards from back to belly and bordered by blue bands, red eyes, ventral fins edged with red.

*Distribution* : The estuaries of the Ganges, Assam, Punjab, N.India, Gujarat, West Bengal, Nepal, Bangladesh, Pakistan, Myanmar.

*Remarks* : Grows to 12.6cm in length. Live in tanks, ponds, ditches, tributaries, paddy-fields, commercially less important due to spinous body and less flesh.

## Order MASTACEMBELIFORMES

### Family MASTACEMBELIDAE

#### Genus *Mastacemelus* Scopoli

1777. *Mastacemelus* Scopoli, *Introd, Hist. Nat.*, p.458 (type species- *Ophidium mastacemelus* Solander).

#### 117. *Mastacemelus armatus* (Lac.)

1800. *Macrogathus armatus* Lacepede, *Hist, Nat. Poiss.*, 2, p. 286 (type locality- not known).

1991. *Mastacemelus armatus*, Talwar & Jhingran, *Inland Fishes*, Vol.2.p. 1031.

*Meristic counts* : D. 35-37/75-80, A.3/70-83, P.22-24, C.21

*Material examined* : 6exs, 16.4-19.8cm, Narmada river at Bhadbhut, 18km West of Baruch Camp. Dt.Bharuch, 20.5.92, A.K. Sarkar & Party.

*Diagnostic characters*: Length of head 6.5 to 7.5 in total length, an eel shaped and elongated fish, trilobed snout with a fleshy prolonged projections, cleft of mouth narrow, a preorbital spine present, single long dorsal fin with 35-37 free spines, no pelvic fin, caudal united with dorsal and anal, brownish on back and lighter below with a row of black spots with an undulating pattern of dark bands and blotches on the body.

*Distribution* : Fresh and brackish waters of India; Bangladesh, Pakistan, Myanmar, Sri Lanka, Malaya, Thailand, S.China, Cambodia, Sumatra, Java, Vietnam, etc.

*Remarks* Most popular species under the genus *Mastacemelus* all over India for its long size, good girth and tasty oily body of economic importance. Live in beels, bheries, tanks, canals, tributaries etc. Can thrive well inside dried up tank beds during summer days.

#### Genus *Macrogathus* Lacepede

1800. *Macrogathus lacepede*, *Hist. Nat. Poiss*, 2, p. 283 (type species *Ophidium aculeatum* Bloch).

#### Key to the species of genus *Macrogathus*

- 16-20 dorsal fin spines, 44-54 dorsal fin rays, 4 to 9 large black ocelli at the base of dorsal fin .....*M. aculeatus*
- 14-26 dorsal fin spines, 30-42 dorsal fin rays, no black ocelli at the base of dorsal fin, white spots on the body .....*M. pancalus*

#### 118. *Macrogathus pancalus* Ham.

1822. *Macrogathus pancalus* Hamilton- Buchanan, *Fishes of Ganges*, pp.30, 364, pl.22, fig.7 (type locality- tanks of Gangetic provinces).

1991. *Macrogathus pancalus*, Talwar & Jhingran, *Inland Fishes*. Vol.2, p. 1027, fig.292.

*Meristic counts* : D.14-26/30-42, A.3/31-46, P.17-19, C.12

*Material examined* : 7exs, 10.5-15.6cm, Par river at Noami- bohiard village, 9km S.E. of Dharampur, Dt. Valsad, 10.3.92, A.K. Sarkar & Party.

*Diagnostic characters* : Length of head 5.0 to 5.5 in total length, small eyes, cylindrical, eel shaped, elongated body, cleft of mouth narrow, a long fleshy snout with a trilobed extremity, first dorsal with free spines, the soft dorsal and anal are separated from the caudal by a small notch, no pelvic fins, greenish olive along the back, yellowish beneath; fins yellowish with black spots, white spots on the body.

*Distribution*: India, Pakistan, Bangladesh.

*Remarks* : Grows to 18.0 cm in length. Inhabits rivers of pailns and estuaries. Generally prefer slow and sluggish waters. Commercially less important.

### 119. *Macrogathus aculeatus* (Bloch)

1887. *Ophidium aculeatum* Bloch, *Naturges, Ausland Fische*, 11, p.72, pl.159, fig.2 (type locality- East Indies).

1992. *Macrogathus aculeatus* Sen, *Freshwater fish, State Fauna Series No. 3 : Fauna of West Bengal*, pt.2, Z.S.I., p.229, fig.98.

*Meristic counts* : D.16-20/44-54, P.23, A.23, A.2-3/44-52, C.15

*Material examined* : 9 exs, 17.5-22.7cm, Vatrack river, Anand, Dt. Kheda, 7.2.93, T.K. Sen & party.

*Diagnostic characters* : Length of head 5.0 to 6.0 in total length, an eel shaped fish with tapering head and tail, narrow cleft of mouth, distinct lateral line, elongated fleshy snout, lower jaw much shortened, a single dorsal with 16 to 20 free spines, caudal not united with dorsal and anal fins, greenish or brownish above fading to yellowish below; smaller ones with 4 to 9 large black ocelli along the base of the dorsal.

*Distribution*: India, Bangladesh, Pakistan, Nepal, Myanmar, Sri Lanka, Malay-

Archipelago, China, Thailand, Vietnam, etc.

*Remarks* : Grows to 38.0cm in length. Commercially not important. Live in ditches tanks, beels, bheries, ponds, tributaries.

## SUMMARY

This report includes freshwater fishes collected from around 15 districts of Gujarat (Kheda, Bhuj, Baruch, Mahesana, Baroda, Rajkot, Surat, Panchmahal, Godhra, Valsad, Ahmedabad, Surendranagar, Dangs, Sabarkantha and Banaskantha) by the Z.S.I. field-survey parties including the author. It reveals interesting freshwater fish faunal aspects with special refrence to large number of new records and range-extensions due to the reasons probably Gujarat freshwater fish-fauna remained unexplored scientifically for many years, except a few small obscured publications. The entire comprehensive work reveals altogether 8-orders, 24- families, 119-species and 25 new records. Each species has been dealt with in detail with their latest scientific names, earliest and latest references, meristic counts, diagnostic characters, material examined, size-ranges, colour- patterns, distributions and special scientific remarks.

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