



**Fauna of
WESTERN HIMALAYA (U.P.)**

HIMALAYAN ECOSYSTEM SERIES : PART I

**ZOOLOGICAL SURVEY OF INDIA
1995**

HIMALAYAN ECOSYSTEM SERIES

FAUNA OF WESTERN HIMALAYA
Part 1
UTTAR PRADESH

Edited by
The Director, Zoological Survey of India

ZOOLOGICAL SURVEY OF INDIA
CALCUTTA

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Published : March, 1995

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Price

India : Rs 360.00

Foreign £ 15.00 ; \$ 25.00 ;

Printed by Computer World, CF-55, Salt Lake, Calcutta-64 and
published by the Director, Zoological Survey of India, Calcutta-700 020

FOREWORD

The Himalayan region is one of the richest area of biodiversity in India. The Zoological Survey of India under its programme of "Ecosystem Survey" identified the major ecosystems for survey, exploration, analysis and documentation upto 2000 A.D. The present document is a contribution from the same programme and covers the "Uttar Pradesh" part of Western Himalaya. The faunal analysis shows a significant assemblage of 2,200 vertebrate and invertebrates species. The extensive collections from eight districts and 266 localities of U.P., both within and outside protected areas, show that Western Himalaya possess a number of rare and endangered vertebrate species, enlisted in the Indian Wildlife Protection Act., as also a number of endemic species of invertebrates. The distribution features of this region and details of the faunal references belonging to seven groups of invertebrates and five classes of vertebrates, would undoubtedly provide a database for regional action plan for conservation of biodiversity and future exploration.

I would like to put on record my deep sense of appreciation to all my colleagues in Northern Regional Station, Dehra Dun and scientists at Head Quarters, who have collaborated in this programme. My sincere thanks are also extended to the Co-ordinator, Dr. G.S. Arora (since retired) and Dr. Arun Kumar of Northern Regional Station, Dehradun and to Shri G. S. Angurunathan, Publication Consultant for bringing out this in a published form.

January, 1995
Calcutta

A.K. GHOSH
Director
Zoological Survey of India

FAUNA OF WESTERN HIMALAYA
PART 1

UTTAR PRADESH

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INTRODUCTION

G.S.ARORA, ARUN KUMAR & P.C.TAK

Northern Regional Station, Zoological Survey of India, Dehra Dun 248 195

The Western Himalaya presents a unique ecosystem in the Indian sub-continent. The terrain comprises deeply forked hill- ranges, criss-crossed by a large number of major rivers of the subcontinent like Yamuna, Ganga, Ramganga, Kosi, Sharda, Saryu, etc. The climate ranges from hot, dry subtropical in the river valleys to cool, moist temperate in the higher hills. These hills, because of their varied physiographic and climatic conditions, possess very rich flora & fauna, including many commercially important timbers and a large variety of game animals. Though during the last two centuries or so, the fauna of Western Himalaya has been observed and reported by a number of naturalists and Zoologists of our country and from abroad, enriching our knowledge about the faunal composition of these hills to a considerable extent, large gaps still existed. It was therefore felt worthwhile to undertake systematic faunistic surveys of each and every district of Garhwal and Kumaon hills, to collect, identify and prepare an inventory, incorporating the earlier records wherever available, of the fauna from this region. Hence, an endeavour has been made to provide, in the present document, annotated lists of the Western Himalayan fauna of the various groups, namely:-

I. INVERTEBRATA

Phylum MOLLUSCA
Phylum ANNELIDA
Class OLIGOCHAETA
Phylum ARTHROPODA
Class CRUSTACEA
Class INSECTA
Order ODONATA
PLECOPTERA
ORTHOPTERA
DERMAPTERA
ISOPTERA
HEMIPTERA
COLEOPTERA
LEPIDOPTERA
TRICHOPTERA
HYMENOPTERA
Class ARACHNIDA
Class MYRIAPODA
Subclass CHILOPODA

II. VERTEBRATA

Class PISCES
Class AMPHIBIA
Class REPTILIA
Class AVES
Class MAMMALIA

PHYSIOGRAPHY

The Himalaya extends between latitudes 27° and 36° N and longitudes 70° and 96° E; it is approximately 2200 km long and its total width varies between 140-400 km.

2.1 *Range* : The ranges of the Himalaya fall under two major groups, viz., the Cis-Himalayan and the Trans-Himalayan. The former group of ranges lie south of the Great Himalaya (the main range) and comprise the Siwalik and Lesser Himalayan ranges. The Trans-Himalayan ranges lie north of the main range and include Zaskar, Ladak and Karakoram ranges.

The Siwalik range separates the Himalaya proper from the Indo- Gangetic plain and is in reality the southern border-range of the Himalayan system. It is of more recent origin than the great mountains in the north. At some places the Siwalik range is pressed against the outer Himalayan ranges and at other places it is separated from these ranges by distances of 30 to 80 km, to enclose the characteristically shaped longitudinal valleys called "duns", filled with deposits of rounded stones, gravel and sand, brought down from the Himalaya. The Siwalik range is strongly developed opposite Dehra. Dun, with steep southern slope and gentle northern slope.

The mountain region, about 150 km wide, between Great Himalaya and Siwalik, constitutes an intricate system of the Lesser Himalayan Ranges. It comprises two distinct groups, viz., the ranges that branch off from the great Himalaya proper and the ranges that are separate fold.

2.2 *Geography* : Geographically, the Himalaya is divided into : 1. The eastern or the Assam Himalaya, 2. The central or the Nepal Himalaya, 3. The Kumaon or western Himalaya and 4. The NW or Punjab Himalaya. The Kumaon or the western Himalaya extends for about 320 km between the river Kali and the great defile of the river Sutlej. Naini Tal, Almora, Mussoorie and the Garhwal region of the Uttar Pradesh state are within this region; Nanda Devi, Trisul, Mana, Badrinath, Kedarnath, Gangotri and Bunderpunch are some of the better known high peaks of western Himalaya. Among these mountains rise most of the head streams of river Ganga and Yamuna

2.3 *Climate* : The Himalaya obstruct the moisture-laden wind from the south, causing them to shed their moisture as copious rainfall along the submountain areas, north of Indo-Gangetic plains and as snowfall on the mountains further north. This great mountain barrier is also equally effective in protecting India from the direct invasion of extremely cold winds from the central Asia (*North temperate regions*). Independently of the enormous variety of relief, the altitude of mountains also is sufficient to cause great modification in climate. The mean winter temperature at 2200m is 44°F (7°C) and the summer mean about 65° F (18° C), but in the valley a temperature of 90° to 100° F (32° - 37° C) may be felt during the day in May and June. Rainfall is related to SW monsoon from June to September, and is on an average about 2000mm/annum, 85% of which falls during the months of July, August and September.

2.4 *Administrative Divisions* : The Western Himalaya (U.P.) which consists of two well defined regions, viz., the Kumaon and the Garhwal hills, comprises the following eight administrative districts:-

GARHWAL HILLS

1. Dehra Dun (3,111 sq km)
2. Tehri (4,519 sq km)
3. Pauri (5,455 sq km)
4. Uttarkashi (7,816 sq km)
5. Chamoli (9,128 sq km)

KUMAON HILLS

1. Naini Tal (6,824 sq km)
2. Almora (7,004 sq km)
3. Pithoragarh (7,234 sq km)

Fauna of Western Himalaya



1. A view of Devprayag. A typical biotope at altitude *ca* 1000 m.



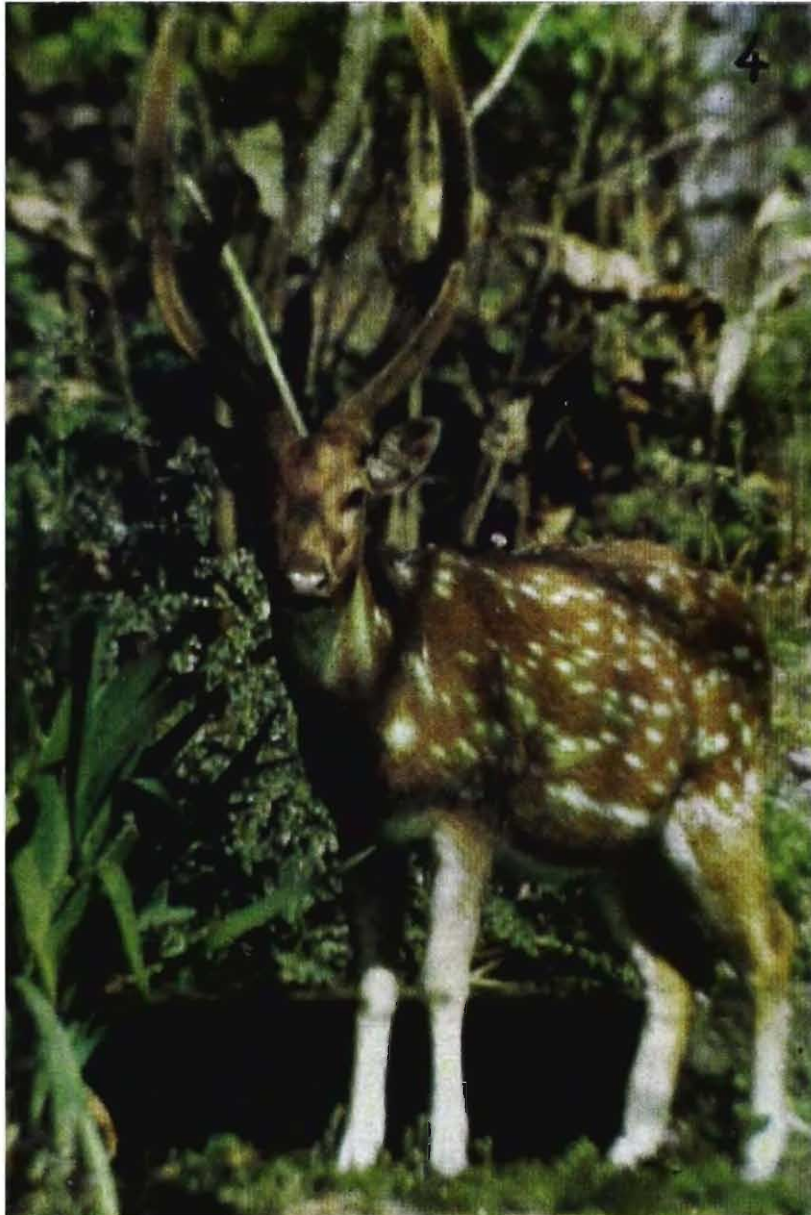
2. A typical hill-stream at Nandhaur in West Himalaya.

Fauna of Western Himalaya



3. A nest of an Indian Baya or Weaver bird, *Ploceus philippinus philippinus* (Linn.),

Fauna of Western Himalaya



4. *Axis axis axis* (Erxleben)
(Chital or Spotted Deer)

Fauna of Western Himalaya

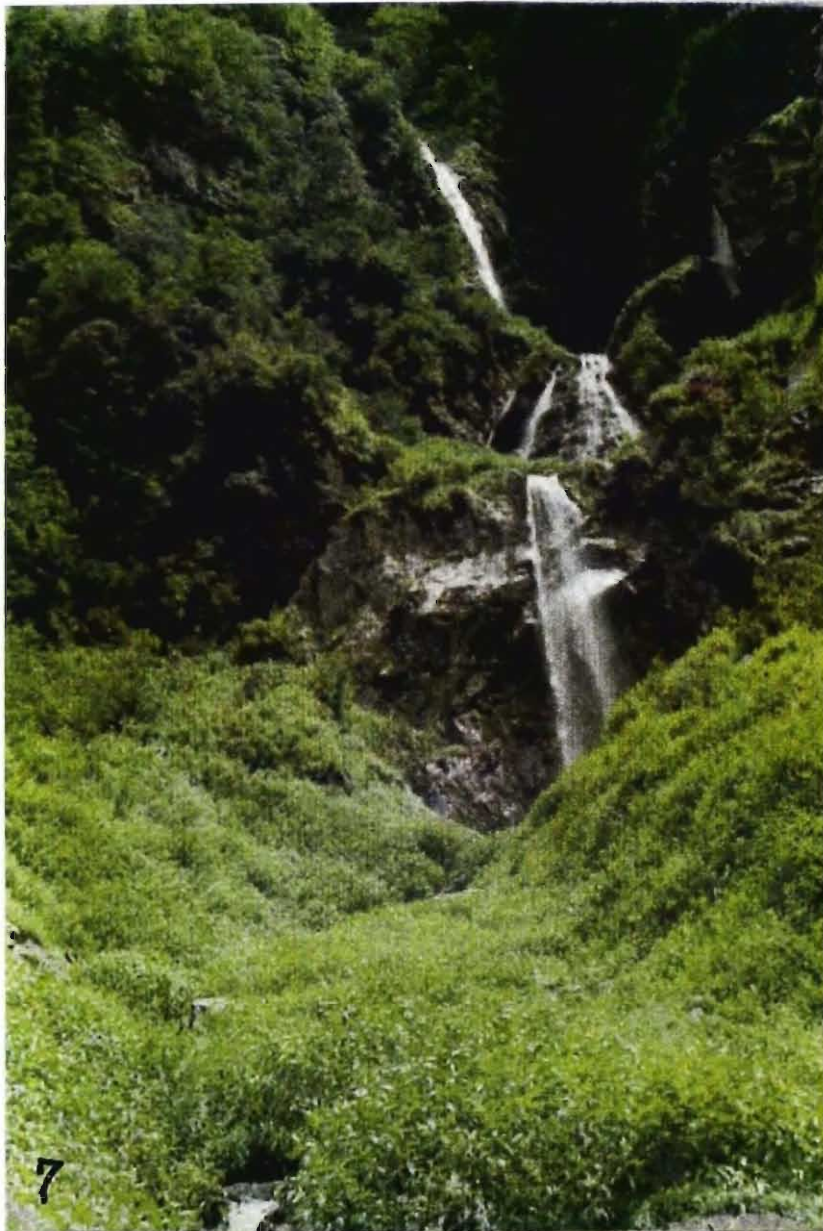


5. *Cedrus deodara* (Deodar) Forest occurring in between 2000 and 3000 m.



6. A typical rocky hill top with conifer forest at altitude *ca* 3000 m.

Fauna of Western Himalaya



7. A view of water fall with thick ground vegetation cover—at altitude *ca* 3000 m.

Fauna of Western Himalaya



8. *Sturnus malabaricus malabaricus* (Gmelin) Greyheaded Myna.



9. The Musk Deer, *Moschus moschiferus* (Linn.) (Kastura)—A rare and endangered endemic species generally met within birch forest above the zone of the pines.

Fauna of Western Himalaya



10. A general panoramic view of snow clad himalaya above timber zone.



11. *Mustela sibirica* Pallas (The Himalayan Weasel)—lives in temperate and alpine forests and in open grass and scrub above the tree-li at altitude ca 1525-4880 m.

BIOGEOGRAPHY

Biogeographically, the defile of river Sutlej is the most important land mark, to the east of it the Himalaya forms a zoogeographical unit that is distinct and fundamentally different from the NW Himalaya to the west of the defile.

The most peculiar ecological conditions of the Himalaya are likely to be due to its enormous size, great elevations of the mountain ranges and their location in the middle of vast continental mass. Due to the above characters in the Himalaya we find a complete range from tropical to the deep arctic conditions, extending nearly 3000 km from E to W. There are profound differences in the ecological conditions in the eastern and western ends of the Himalaya, while in the east they are semi-oceanic, they become more and more continental as we move towards west.

The ecology of the Himalaya is temperature-dominated and outside the general influence of the Indian monsoon, except in the extreme eastern parts. Nevertheless, the Himalaya play a very important role in determining and controlling the monsoon rainfall in the rest of the country. The altitudinal zonation of life, the E-W gradations of ecosystems, and distributional patterns are the peculiarities which determine the wide difference in the ecology and distribution of animals and plants in the eastern and western ends of the Himalaya. There is an abrupt difference in the ecology and the flora and fauna of the Western Himalaya in relation with the altitudinal zonation. The forest line and the snow line present two extremely important ecological and biogeographical zones in the Himalaya. The snow line is on an average about 1000m lower on the south slope of the Great Himalaya than on the north slope. In the north-west Himalaya, the snow line is higher than in the rest of the Himalaya. As we proceed westward from the eastern Himalaya, there is a gradual increase in the general atmospheric aridity and consequently the snow line also rises (Mani, 1974)*.

3.1 Floral Wealth : The submontane region in the area is predominantly forested with *Shorea robusta*, which dominates the Siwaliks and on the slopes of Lesser Himalaya upto an altitude of 1000m. Some fresh-water type of swamp forest also occur in the submontane region, with *Bischofia javanica*, *Salix tetrasperma* and *Pyrus pashia* as the chief components. *Carallia brachiata* is an interesting member of such swamp forest in Dehra Dun. There are also present mixed deciduous forest with *Lagerstromia parviflora*, *Dalbergia sissoo*, *Annogeissus latifolia* and *Terminalia* species. *Pinus roxburghii* form excellent forest cover between the altitude of 1200-2000m on south facing slopes in dry situation and well drained areas. Towards its upper limit, the *Pinus* may occur in association with *Quercus incana* and *Rhododendron arboreum* especially in cooler habitats, northern and sheltered slopes. These forests are densely populated and rich in epiphytes, large variety of orchids, ferns and aroids. On altitudes around 2800/3000m characteristic oak-conifer forests occur, in which the dominant species are *Q. semicarpifolia*, *Abies pindrow*, alongwith *R. arboreum*, *Taxus wallichiana* and others. *Cedrus deodara* forests occur between the altitude of 2000-3000m in the inner drier regions of the Western Himalaya. The highest forest ranges in the region between the altitude of 3000-4000m occur either pure or mixed forests of *Betula utilis* and *Abies spectabilis*. Above the tree limit scattered bushes of *Juniperus communis* and *J. wallichiana* occur with species of *Cotoneaster* and *Salix*. At still higher altitudes, the high alpine flora is seen depending upon favourable location and moisture. Scattered bushes of *R. anthopogon*, *Berberis* species are found upto 4800m. The richness of the herbaceous alpine flora in some of the interior valleys of this region is amply demonstrated in the famous Valley of Flowers in the north Himalayan hills.

*MANI, M.S. 1974. *Ecology and Biogeography in India*. Dr. W. Junk b.v. Publishers. The Hague: I-XIX + pp.773.

3.2 *Faunal Wealth* : Factors like rainfall, climate, etc., influence the floristic element of western Himalaya and as a consequence the faunistic element. Mani (1974), while discussing Bio-geography of Himalaya, has demonstrated the presence of distinct geographical distributional pattern in the fauna of Himalaya. He has shown that the Fauna of Western Himalaya is composed partly of Oriental fauna, which has spread westwards from Eastern Himalaya, largely of Palaearctic forms and to some extent Mediterranean and Ethiopian element. He has further demonstrated that although the Indo-Chinese and Malayan genera & species are concentrated largely in Eastern Himalaya, a number of them have thus spread, with decreasing abundance, up to Kumaon and sometimes even as far west as Kashmir. The Palaearctic- Ethiopian genera & species are similarly dominant in North-West Himalaya, but have sparsely spread eastward to Nepal and rarely even around Assam and Burmese mountains

From ecological, biogeographical and evolutionary point of view, it would be worthwhile to consider the fauna of the forest zone and that of the biotic zone above the forest line separately.

3.2.1 *The Fauna of the Forest Zones* : In the Western Himalaya, the forest zones generally extend up to an elevation of 3000-4000m. This area is rather difficult to define biogeographically as it changes from one type to another and is not always sharp. The forest line too sometimes goes up and at other places restricted to lower elevations. A number of tropical low land species occur in these zones.

The palaearctic forms increase towards west; the endemic forms in the forest zones are poor and fauna generally comprises tropical elements derived from the oriental region. The oriental faunal elements disappear gradually towards the west but some of them may still be found in parts of Kashmir. There is more complete intermingling of the Oriental and Palaearctic elements among vertebrates than invertebrates. The gorge of the river Sutlej forms the biogeographical transition between the eastern humid tropical and western largely steppe fauna in the Himalayan forest zones. Thus the Oriental element is generally restricted to the east of this river while the Ethiopian and Mediterranean elements are found west to this. Though, infiltration of these elements on either side are not uncommon.

3.2.2 *The Fauna above the Forest Line* : The fauna above the upper limits of forests is strikingly different from that of the forest zones. Mani (1962 & 1968)* has made an exhaustive studies of the high altitude insect communities in NW Himalaya and has reported that this fauna is relatively sparse, characteristically lacking in tropical Indian, south Chinese, Indo-Chinese and Malayan derivatives, and comprises almost exclusively of endemic cold adapted palaearctic elements. Among the vertebrates, the fishes and the amphibians are almost totally absent, reptiles are present in poor numbers while birds and mammals are moderately abundant

3.2.3 *Conservation Areas*: Within the eight districts of western Himalaya, which have been surveyed extensively, the following Conservation Areas are also located:-

1. Corbett National Park (Dist. Naini Tal and Pauri).
2. Rajaji National Park (Dist. Dehra Dun Part).
3. Nanda Devi Biosphere Reserve (Dist. Chamoli, Almora and Pithoragarh).
4. Valley of Flowers National Park (Dist. Chamoli).
5. Kedarnath Wildlife Sanctuary (Dist. Chamoli)
6. Gobind Pashu Vihar Wildlife Sanctuary (Dist. Uttarkashi).

*Mani, M.S. 1962. *Introduction to High Altitude Entomology*. London: Methuen & Co. pp.306.

Mani, M.S. 1968. *Ecology and Biogeography of High Altitude Insects*. The Hague: Dr. W. Junk Publishers. pp.527

Of the above Conservation Areas, the fauna of Corbett National Park has been extensively surveyed by the scientists of the Northern Regional Station, and various lists and reports have already been published during last decade. Presently the faunal resources of Nanda Devi Biosphere Reserve and Dudhwa National Park are being explored. The lists of the birds and mammals of the Nanda Devi National Park have already been published along with a detailed report on the status of threatened and endangered species. The invertebrate fauna is being studied at present.

**A LIST OF MAJOR COLLECTING LOCALITIES
IN WESTERN HIMALAYA (DISTRICT- WISE)**

D E H R A D U N

- | | |
|-------------------|-------------------|
| 1. ASARORI FOREST | 30. LACHIWALA |
| 2. BARKOT | 31. LAKWAR |
| 3. VEERBHADRA | 32. LANGHA |
| 4. BADRIPUR | 33. MOTICHUR |
| 5. BIBIWALA | 34. MALDEVTA |
| 6. CLEMENTOWN | 35. MUSSOORIE |
| 7. CHANDRABANI | 36. MALSI |
| 8. CHAKRATA | 37. MAJRA |
| 9. DHALIPUR | 38. MIANWALA |
| 10. DHAKRANI | 39. MASONDONWALA |
| 11. DEOBAN | 40. MADHUWALA |
| 12. DOIWALA | 41. PHANDOWALA |
| 13. DAKPATHAR | 42. PASHULOK |
| 14. DOONGA | 43. RAIWALA |
| 15. GOLATAPPAR | 44. RANIPOKHRI |
| 16. HERBERTPUR | 45. RAIPUR |
| 17. HARIPUR | 46. RAJPUR |
| 18. RISHIKESH | 47. ROBER'S CAVE |
| 19. HARRAWALA | 48. SATYANARAIN |
| 20. JHARIPANI | 49. SAHASTRADHARA |
| 21. JHAJRA | 50. SAHIYA |
| 22. JASSOWALA | 51. SAHASPUR |
| 23. JASPUR | 52. SABHAWALA |
| 24. JANTANWALA | 53. TIMLI |
| 25. KOTHALGAON | 54. TIUNI |
| 26. KARUAPANI | 55. TUNWALA |
| 27. KALSI | 56. THANO |
| 28. KULHAL | 57. VIKASNAGAR |
| 29. KUANWALA | |

TEHRI

1. BHOATPUR
2. CHAMBA
3. DEOPRAYAG
4. DUBATA
5. DHANOLTI
6. GADDUGAD
7. GHANSALI
8. JAKHAND
9. JALANGI
10. KHANHRA
11. KADDUKHAL
12. KANATAL
13. KIRTINAGAR
14. KEMPTYFALL
15. KITKILESHWAR
16. MAJRA
17. NARENDRA NAGAR
18. NARKOTA
19. PANTGAON
20. RAMPUR
21. RANICHAURI
22. ŚRIMLASHU
23. SURKANDA DEVI
24. UPPU

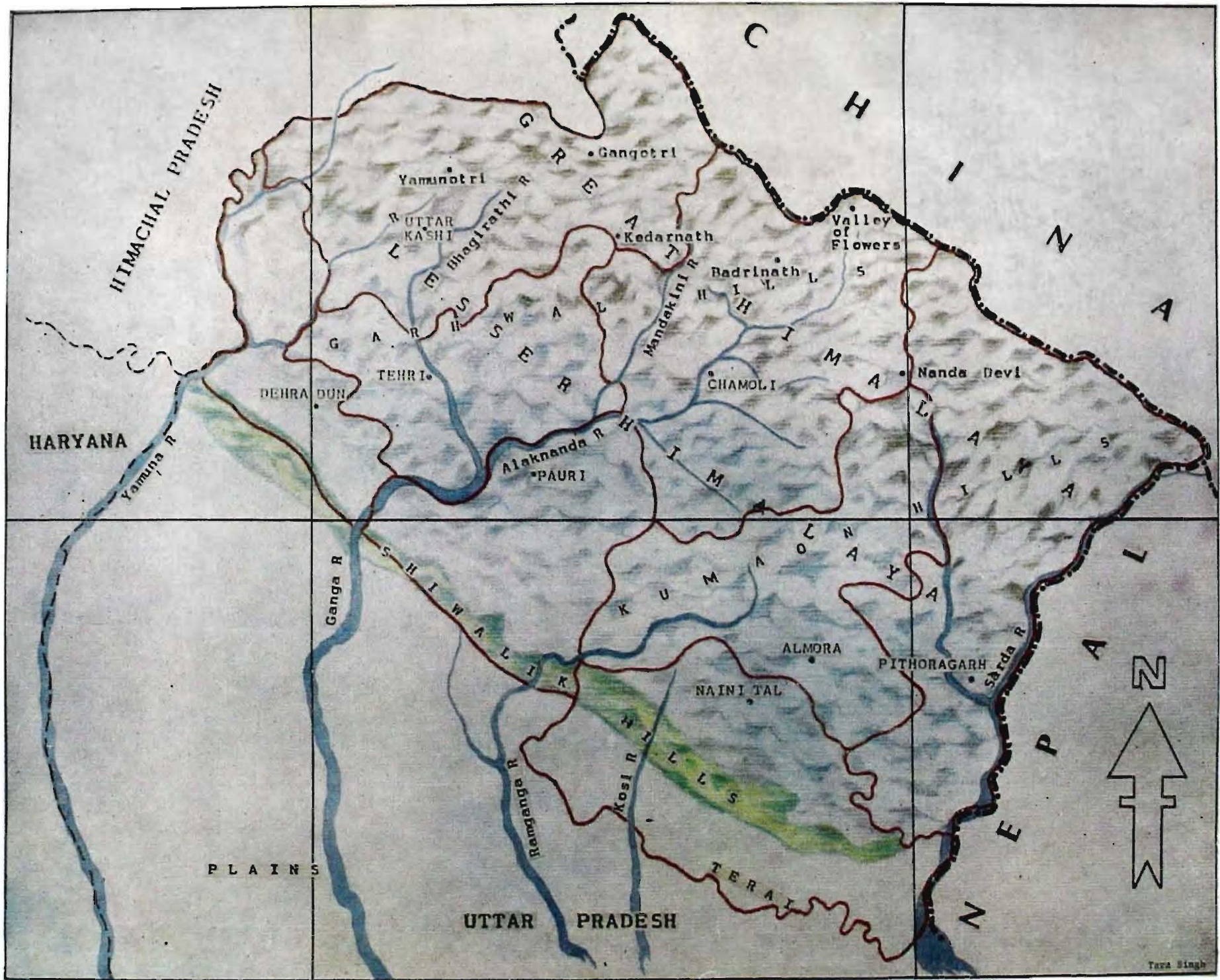
PAURI

1. BOXAR
2. CHAMDHAR
3. DOGADDA
4. DHIKALA
5. DHAULIGHAT
6. FATEHPUR
7. GOOLARJHALA
8. GULABRAI
9. GUMKHAL
10. JHIRNA
11. JAWLPADEVI
12. KHINANAU LI
13. KAUNDA

14. KALIGARH
15. LANDSDOWN
16. MALANG
17. NAOGAKHAL
18. PAURI
19. PATERPANI
20. POKHRO
21. RUDRA PRAYAG
22. RATHUADHAB
23. SATPULI
24. SREENAGAR
25. SARAPDULI
26. SNEH

UTTAR KASHI

1. BARKOT
2. BHATWARI
3. BARETHIKHAL
4. BHAIROGHATI
5. DHARASU
6. GAWAND
7. GANGANI
8. GANGOTRI
9. HARSIL
10. JOSHIARD
11. JALEN
12. JAMUNOTRI
13. JHARMOLA
14. JHALA
15. KHARADI
16. KUTNUR
17. KUWA
18. MITELI



Fauna of Western Himalaya

Fig. 2

19. MALGAD PAROLA
20. MANDRI
21. NAKURI
22. NAGNI
23. NAOGAON
24. RATURISHERA
25. RAJGARHI
26. SHIMLA MAHIDANDA
27. SUKHI
28. SAYANACHATTI
29. PUROLA

C H A M O L I

1. AUGUSTMUNI
2. AULI
3. ANSUIYA DEVI
4. BADRINATH
5. BHIMTOLI
6. BIRHAI
7. BETTA
8. CHOPTA
9. DEVALDHAR
10. DUGALBATA
11. GOPEHWAR
12. GOALDAM
13. GOBINGHAT
14. GHAGARIA
15. GAURIKUND
16. GUPTA KASHI
17. HANUMAN CHATTI
18. HEMKUND
19. HELONG
20. JOSHIMATH
21. KARAN PRAYAG
22. KALIMATH
23. KUND
24. KOTESHWAR
25. LATA
26. MANDAL
27. MANA
28. MALARI

29. NAND PRAYAG
30. NANDA DEVI B. R.
31. NARAYAN NAGAR
32. NARANYAN BAGAR
33. OKHIMATH
34. PANDUKESHWAR
35. PHATA
36. SONEPRAYAG
37. SITAPUR
38. SARGARH
39. SONEGARH
40. SURAITHOTA
41. TAPOVAN
42. TRIYUGI NARAIN

N A I N I T A L

1. AMANGARH
2. AMDANDA
3. BHOWALI
4. BHIMTAL
5. BASTIA
6. CHORGALIYA
7. DHANGARHI
8. DHELA
9. GAIRAL
10. JEOLIKOTE
11. JAMNAGWAR
12. KATHGODAM
13. NAINITAL
14. NAUKUCHEA TAL
15. RAMGARH
16. RANIBAGH
17. ROOPNAGAR
18. SAT TAL
19. SITABANI

ALMORA

1. ALMORA
2. BAGESHWAR
3. BANSALI
4. BAIJNATH
5. BARACHHINA
6. CHUNAUDA
7. CHAUBATIA
8. CHITAI
9. DWARA HAT
10. DEVASTHAL
11. DHAKURI
12. DEOALI
13. GHAT
14. GARUR
15. HAWALBAGH
16. JOGESHWAR
17. JATOLI
18. KAUSANI
19. KATHPURIA
20. KOSI
21. KHAIRND
22. KAPKOTE
23. KATARMAL
24. KALIKA
25. KAPARKHAN
26. KHALI
27. LAXMENESHWAR
28. LOHARKHET
29. MALIADA
30. NANDKESHWAR
31. PITASALI
32. PINDARI
33. PHHALCHINA
34. RANIKHET
35. SOMESHWAR
36. GARAMPANI
37. PHURKIA

PITHORAGARH

1. ASKOT
2. BASTIA
3. BERINAG
4. BHELGAD
5. BUJETI
6. BALU KOTE
7. BHUM
8. CHAMPAWAT
9. CHALTHI
10. CHANDAK
11. DHARCHULA
12. DIDIHAT
13. GAURIGHAT
14. JAULJIBI
15. JHULAGHAT
16. JHARIAGAD
17. KALAPANIGAD
18. LOHAGHAT
19. MUNSHIARI
20. MAYABATI
21. NACHANI
22. NONPOKHRI
23. RAIGARH
24. SEETESHWAR
25. SUKHIDHANG
26. SANDEV
27. THAL
28. TAWAGHAT
29. THULIGAD
30. PUNGIRI
31. SUWALEK
32. BANLEK

FAUNAL COMPONENTS

Explanation to Code Nos. used in the Distribution Charts

District

Code No.	1. Dehra Dun
	2. Tehri
	3. Pauri
	4. Uttarkashi
	5. Chamoli
	6. Naini Tal
	7. Almora
	8. Pithoragarh

MOLLUSCA

N.V.SUBBA RAO & S.C.MITRA
Zoological Survey of India, Calcutta-700 053

Important earlier reports which dealt with the land and freshwater Mollusca of North-Western India in general, include Godwin-Austin (1849), Nevill (1878), Theobald (1878), Rajagopal and Subba Rao (1969, 1972) etc., and also a more recent work by Davis *et. al.*, (1986).

From the molluscan distribution point of view, Western Himalaya form an important Zoogeographical Zone. There are quite a few species of land and freshwater Mollusca which are restricted endemic to the whole of Western Himalaya including Kashmir.

The list of species occurring in the eight districts of Uttar Pradesh, presented here contains 56 (37 land 19 freshwater) species under 28 genera (16 land and 12 freshwater) and 17 families (9 land and 8 freshwater).

Of the 37 species of land Mollusca, as many as 25 are restricted- endemic to the Western Himalaya (six species are restricted- endemic to Uttar Pradesh), seven species are restricted to the Himalayas, both eastern and western and only five species have their ranges extending to the plains. These include such ubiquitous species as *Kaliella barrakporensis*, *Lamellaxis gracile*, *Macrochamys indica*, etc. Perhaps the observation of Hora *et al* (1955) that rigorous climate acts as a natural barrier for many species, has relevance in this respect. It is to be recalled that even a 'globe trotting' species like *Achatina fulica*, introduced nearly a century back failed to survive at Mussouri.

While the slug genus *Aanadenus* is restricted to high altitude, between 2000 - 3000 metre, some of the species like *Macrochlamys vesicula*, *M. glauca*, *Syama splendens*, *Bensonia convexa* are recorded from well above 3000 metre.

The tiny freshwater gastropods *Tricula* belonging to a subfamily, which comprises one of the largest endemic radiations of living freshwater mollusca in the world, abounding in the hill stream of south Asia, is represented by a single species in Naini Tal and Almora. Interestingly owing to some topographical changes, the species *T. montana* does not occur in its type locality at Bhim Tal, at present (Davis *et al* 1986). Earlier Prashad (1921) and Rao (1928) also could not find it. However, the snails were recently collected from several places in Naini Tal district and as it stands now, this species is well distributed in the districts of Naini Tal and Almora.

Two of the freshwater species, *Tricula montana* and *Pisidium clarkeanum* are lotic in habit, occurring in streams and canals with flowing water. Rest of the species are lentic, they occur in lakes, pools, etc., with stagnant water.

The soft lime rock hill range of the Siwalik offers favourable niche for land mollusca and that could be the reason for Dehra Dun recording the highest number of species (22) among the eight districts. However, it is perhaps the intensity of collections which is more reflected by the district wise

distribution chart given here, rather than the actual presence or absence of the species.

While decidedly the towering mountain range of the Himalaya and its foot-hills make a significant impact on the distribution of Mollusca in north India, there is an apparent imbalance in the two projections - that of the Eastern Himalaya on one hand and that of the Western Himalaya on the other. The Eastern Himalaya incidentally accounts for over one third (approx. 500 species under 75 genera) of the total land and freshwater mollusca known from India (Dey *et al*, 1985). Obviously, several factors like higher rainfall, dense evergreen forests, adequate humidity together with warm moist climate, make the eastern part more favourable to Mollusca. The most glaring example which can be cited is that of land operculates. Whereas approximately 250 species under 15 genera of land operculates are represented in the east, merely three species under two genera are known from the west. Interestingly, all the three species are restricted to the Western Himalaya.

List of Mollusca with their distribution

	1	2	3	4	5	6	7	8
CLASS : GASTROPODA								
ORDER : MESOGASTROPODA								
FAMILY : CYCLOPHORIDAE								
<i>Alycaeus strangulatus</i> (Hutton)	+	-	-	-	-	+	-	-
FAMILY : DIPLOMMATINIDAE								
<i>Diplommatina folliculus</i> (Pfeiffer)	-	-	-	-	-	+	-	-
<i>D. huttoni</i> (Pfeiffer)	+	-	-	-	-	-	-	-
FAMILY : VIVIPARIDAE								
<i>Bellamya Bengalensis</i> f. <i>typica</i> (Lamarck)	-	-	-	-	-	+	-	-
<i>B. dissimilis</i> (Mueller)	-	-	-	-	-	+	-	-
FAMILY : BITHYNIIDAE								
<i>Digoniostoma pulchella</i> (Benson)	-	-	-	-	-	+	+	-
FAMILY : POMATIOPSISIDAE								
<i>Tricula montana</i> (Benson)	-	-	-	-	-	+	+	-
FAMILY : THIARIDAE								
<i>Thiara (Melanoides) tuberculata</i> (Mueller)	+				-		-	-
ORDER : BASOMMATOPHORA								
FAMILY : LYMNAEIDAE								
<i>Lymnaea (Pseudosuccinea) biacuminata</i> Annandale & Rao	+	+	-	-	-	-	-	-
<i>L. (Pseudosuccinea) acuminata</i> f. <i>typica</i> Lamarck	+	-	-	-		+	-	-
<i>L. (Pseudosuccinea) acuminata</i> f. <i>patula</i> Troschel	+	-	-	-	-	+	-	-
<i>L. (Pseudosuccinea) acuminata</i> f. <i>rufescens</i> Gray	-	-	-	-	+	-	-	-

	1	2	3	4	5	6	7	8
<i>L. (Pseudosuccinea) luteola f. australis</i> Annandale & Rao	+					+		
<i>L. (Radix) persica</i> Issel		+						
FAMILY : PLANORBIDAE								
<i>Gyraulus barrackporensis</i> (Clessin)				-	-	+		
<i>G. convexiusculus</i> (Hutton)		-	-	-		+	-	
<i>Hippeutis (Helicorbis) umbilicalis umbilicalis</i> (Benson)	+					+		
<i>Indoplanorbis exustus</i> (Deshayes)		+				+		
<i>Segmentina (Polypylis) Calatha</i> (Benson)						+		
ORDER : STYLOMMATOPHORA								
FAMILY : SUCCINEDAE								
<i>Succinea crassinuclea</i> Pfeiffer	+	-	-		-	-		
<i>S. indica</i> Pfeiffer	-	-	-	-	-	+		-
FAMILY : PUPILLIDAE								
<i>Boysidia plicidens</i> (Benson)	+	-	-		-	-	-	
<i>Orcula (Sphyradium) himalayanum</i> (Benson)	+	-	-	-	-	-	-	
<i>Pupoides coenopictus</i> (Hutton)	-	-	-	-	-	-		+
FAMILY : ENIDAE								
<i>Ena (Mirax) ceratina</i> (Reeve)	-	-	-	-	-	+	+	-
<i>E. (Mirax) smithei</i> (Benson)	+	-	-	-	-	+	-	-
<i>E. (Subzebrinus) boysiana</i> (Reeve)	+	-	-	-	-	-	-	-
<i>E. (Subzebrinus) coelebes</i> (Pfeiffer)	+	-	-	-		+	+	-
<i>E. (Subzebrinus) sindica</i> (Reeve)	+					-	-	
<i>E. (Subzebrinus) vibex</i> (Kuster)	+	-	-	-	-	-	-	-
FAMILY : CLUSILIIDAE								
<i>Phaedusa cylindrica</i> Pfeiffer	+	-	-	-	-	+	-	-
FAMILY : SUBULINIDAE								
<i>Lamellaxis gracile</i> (Hutton)	+	-	-	-	-	+	-	
FAMILY : ARIONIDAE								
<i>Anadenus altivaqus</i> (Theobaid)	+			-				
<i>A. beebei</i> Cockerell		+	-			-		
<i>A. giganteus</i> Heynemann	+	+	-		-	+		

	1	2	3	4	5	6	7	8
FAMILY : ARIOPHANTIDAE								
<i>Bensonia convexa</i> (Benson)	-	+	-	-	-	-	-	-
<i>B. monticola</i> (Hutton)	+	+			-	-	-	-
<i>Euaustenia cassida</i> Hutton	+	+			-	-	-	-
<i>E. gurhwalensis</i> (Godwin-Austen)	-		+	-	-	-	-	-
<i>E. monticola</i> (Pfeiffer)	+	-	-	-	-	+	-	-
<i>E. paurhiensis</i> (Godwin-Austen)	-	-	+	-	-	-	-	-
<i>Kaliella barackporensis</i> (Pfeiffer)	+	-	-	-	-	-	-	-
<i>Kaliella bullula</i> (Hutton)	+	+	-	-	-	-	-	-
<i>K. fastigata</i> (Hutton)	+	-	-	-	-	-	-	-
<i>K. nassa</i> (Hutton)	+	-	-	-	-	-	-	-
<i>Macrochlamys glauca</i> (Pfeiffer)	+	-	-	-	-	+	+	-
<i>M. indica</i> Godwin-Austen	+	-	-	-	+	-	-	-
<i>M. nuda</i> (Pfeiffer)	+	+	-	-	+	-	-	-
<i>M. planiuscula</i> (Hutton)	+	-	-	-	-	-	-	-
<i>M. vesicula</i> (Hutton)	+	-	-	-	-	-	-	-
<i>Sitala rimicola</i> (Benson)	+	-	-	-		-	-	-
<i>Syama masuriensis</i> Godwin-Austen	+			-	-	-	-	-
<i>S. splendens</i> (Hutton)	+	-	-	-	-	-	-	-
CLASS : BIVALVIA								
ORDER : UNIONOIDA								
FAMILY : AMBLEMIDAE								
<i>Parreysia (Radiatula) caerulea</i> (Lea)	+	-	-	-	-	-	-	-
ORDER : VENEROIDA								
FAMILY : PISIDIIDAE								
<i>Sphaerium</i> (S.) <i>indicum</i> Deshayes	-	-	-	-	-	+	-	-
<i>Pisidium (Afropisidium) clarkeanum</i> G. & H. Nevill	-	+	-	-	-	-	-	+

REFERENCES

- DAVIS, G.M. SUBBA RAO, N.V. & HOAGLAND, K.E 1986. In search of *Tricula* (Gastropoda; Prosobranchia); *Tricula* defined and a new genus described. *Proc Acad. Nat. Sci. Philad.* 132 (2) :426-442.

- DEY, A. BARUA, S. & MITRA, S.C. 1985. Mollusca of Namdapha. *Rec. zool. Surv. India*, **32** (1-4): 263-274.
- GODWIN-AUSTIN, H. H. 1899. Address of the President. Appendix A. List of shells from Kashmir territory, north of the Pir Panjal and Kajnag ranges including Yarkand. Appendix B. List of shells from Kashmir territory, south of the Pir Panjal and Kajnag ranges including the Murree Hill and Hazara. *Pro. malac. Soc. Lond.*, **3** : 259-262.
- HORA, S.L., MULIK, G.M. AND KHAJURIA, H. 1955. some interesting features of the aquatic fauna of the Kashmir Valley, *J. Bombay nat. Hist. Soc.* **53** (1) : 140-143.
- NEVILL, G : 1878. Mollusca-II: Mollusca from Kashmir and neighbourhood of Mari (Murree) in the Punjab. *Sci. Res. Second Yarkand Mission, Mollusca*, London: 14
- PRASHAD, B: 1921: The Indian Species of the genus *Tricula* Benson. *Rec: Indian Mus.*, **21**: 67-69.
- THEOBALD, W. 1878. Notes on the land and freshwater shells of Kashmir, more particularly of the Jhelum Valley below Srinagar and the hills north of Jammu. *J : Asiat Soc. Beng.*, **47**(2) : 141-149
- RAJAGOPAL, A.S. & SUBBA RAO, N.V. 1969. Aquatic and Amphibious Mollusca of the Kashmir Valley, India, *Proc. Symposium on Mollusca* part- 1 : **95** 120, pl. 1.
- RAJAGOPAL, A.S. & SUBBA RAO, N.V. 1972. Some land Mollusca of Kashmir, *India. Rec. Zool. Surv. India*, **66** (1-4) : 197-212, pl. 1.
- RAO. H.S. 1928. The aquatic and amphibious Mollusca of the northern Shan States, Burma. *Rec. Indian Mus.*, **30** : 399-468.

OLIGOCHAETA

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On the basis of size and habitat, the oligochaetes are often divided into two convenient groups: Microdrili (small, mainly aquatic worms including the terrestrial pot worms of the family Enchytraeidae) and Megadrili (larger, mostly terrestrial forms comprising earthworms and their aquatic representatives). Earthworms are considered as 'friends of farmers' because of their significant contribution in improving soil fertility. They enhance microbial activity during humification of organic matter. A large number of worms die during unfavourable period when nutritional demand in soil is maximum for growing vegetation. Microbial decomposition of dead worm tissue releases considerable amount of nitrogen and other nutrients. Aquatic oligochaetes play an important role in improving the quality of detritus deposited at the bottom of freshwater ecosystems. Some species of aquatic oligochaetes are good indicators of organic pollution.

Because of their economic importance, the oligochaete fauna, particularly earthworms have drawn the attention of several taxonomists in various parts of the world. Templeton (1844) was perhaps the first to undertake systematic collection of oligochaete fauna in the Indian subcontinent, when he described *Megascolex caeruleus* from Sri Lanka. Subsequently, isolated descriptions of several Indian species were published by various oligochaetologists; notable among these were: Beddard (1883), Rosa (1888, 1890), Bourne (1889), Michaelsen (1897) and Fedarb (1898).

In the beginning of this century, Michaelsen (1900) contributed a monograph on the Oligochaeta, which dealt with descriptions of all known species in the world. This work though out-dated, is still considered as a valuable reference guide for oligochaete taxonomy. Michaelsen (1909) also published a consolidated account on the Indian oligochaetes giving descriptions of all known species in our subcontinent. Stephenson (1923) contributed a volume on the Oligochaeta under "*The Fauna of British India, including Ceylon and Burma*" series. The available information on the Burmese earthworms was consolidated by Gates (1972). Recently, Julka (1988) produced a monograph on the family Octochaetidae under the "*Fauna of India*" series.

Taxonomic studies on the oligochaetes of the Western Himalayan region of Uttar Pradesh dates back to the works of Bourne (1889) and Fedarb (1898). Michaelsen (1907) discovered 3 new species of earthworms (*Eutyphoeus annandalei*, *E. nainianus* and *Perionyx nainianus*) from Naini Tal and Bhim Tal in Kumaon region. Michaelsen (1909) listed 7 species of oligochaetes occurring in this area. Significant contributions to the knowledge on the Western Himalayan earthworms was also made by Stephenson (1914, 1916, 1922). In "*The Fauna of British India*" on Oligochaeta, Stephenson (1923) reported 20 species from the Doon, Mussoorie and Kumaon hills. *Metaphire birmanica*, a Burmese species, was recorded for the first time from India and Doon valley by Gates(1945). Further, Gates (1951) observed the occurrence of 15 species in Dehra Dun district and 4 species in Almora district.

This article is based on earlier records and studies on the fresh material in the Northern Regional Station of Zoological Survey of India at Dehra Dun. As a result, 42 species have been recorded from

8 Western Himalayan districts viz., Dehra Dun, Tehri, Pauri, Uttarkashi, Chamoli, Almora, Naini Tal and Pithoragarh. The occurrence of *Eutyphoeus pharpius* Michaelsen in Pithoragarh district is of great interest as it forms the first record from India. This species is so far known from its type locality in Nepal. *Eutyphoeus nainianus* Michaelsen and *Perionyx nainianus* Michaelsen are at present known from their type locality i.e. Naini Tal. The present studies extend their range of distribution to Chamoli and Pithoragarh districts. Significantly, more species are found in Dehra Dun district (28 spp.), followed by Naini Tal district (23 spp.). This is mainly due to extensive sampling in easily accessible Doon valley, and around popular hill resorts of Mussoorie, Naini Tal and Bhim Tal located in these districts. On the contrary, 6 species have been recorded from the district of Uttarkashi, which is of difficult terrain and less explored.

The Western Himalayan region in the Uttar Pradesh forms part of the endemic area of the genera *Perionyx* and *Eutyphoeus*, and also possibly *Plutellus* and *Glyphidrilus*. All aquatic oligochaetes of the Naididae from this region are cosmopolitan. Numerous other species are all well-known peregrine forms, which have been carried mainly in soil around roots of plants from one zoogeographical realm to another, and have successfully colonized in the areas of introduction. Peregrine species have an inherent ability to withstand a wide range of climatic conditions, and to colonize disturbed habitats due to loss of native vegetation and increase in agricultural activity. The parthenogenetic mode of reproduction, especially in the lumbricid peregrines, is advantageous in colonizing new areas.

Earthworms inhabiting different layers of soil are generally categorized into three groups: surface or litter dwellers, topsoil inhabitants and subsoil dwellers. Litter dwelling forms are more active and deeply pigmented than others; represented in the Western Himalaya by *Perionyx excavatus*, *Perionyx bainii*, *Amyntas corticis* and *Eisenia fetida*. These species can profitably be utilized for vermicomposting and vermiculture in this region. Most subsoil species (*Eutyphoeus* spp.) are geophagous and deposit their faecal matter in the form of surface or subsurface castings.

Out of 13 Indian oligochaete families, eight are found in the Western Himalayan region of the Uttar Pradesh. These are: Naididae, Moniligastridae, Almididae, Ocnodrilidae, Acanthodrilidae, Octochaetidae, Megascolecidae and Lumbricidae. Absence of the Tubificidae (a family of aquatic Microdrili) and the Enchytraeidae (pot worms) is possibly due to less exploration of their habitats - aquatic ecosystems for the Tubificidae, and acidic soils for the Enchytraeidae. A brief outline of each family is given below:

NAIDIDAE: All species are aquatic and small in size, seldom exceeding 25 mm in length. The family is of world-wide distribution, occurring throughout India. A number of species are yet to be described from the Western Himalaya. These worms (as well as the tubificids) are rarely collected during general faunistic explorations because of the difficulty to locate them in mud or on aquatic weeds where they dwell.

MONILIGASTRIDAE: A family of primitive earthworms in East and South Asia. A few species are hydrophilous and some are common in arable soils, but most are confined to primary forests. Of the Indian genera viz., *Desmogaster*, *Drawida* and *Moniligaster*, *Drawida* is the largest genus in terms of number of species. Its natural distribution extends from the Indian Peninsula to the Eastern Himalaya through Burma, and as far as Japan and Borneo. Occurrence of *Drawida japonica* and *Drawida nepalensis* in the Western Himalaya is suspected to be due to recent introduction.

ALMIDAE: It is represented in India by a single genus, *Glyphidrilus*, with endemism in northern ranges, Gangetic Plain, Western Ghats and peninsular Plateaus. *Glyphidrilus* is also indigenous to Burma,

Sri Lanka, Africa, Malaysia and Indonesia. Most species of this genus are mud dwellers, and are often overlooked while sampling. On slight disturbance, they usually move deeper into mud.

OCNERODRILIDAE: The ocnero-drilids are small and thread-like worms. They are limicolous, usually found entangled with roots of grasses and herbs growing in marshes and on margins of freshwater bodies. Because of their small size and peculiar habitat, they are usually not collected by explorers. The ocnero-drilid fauna of the Western Himalaya is known by the occurrence of *Ocnero-drilus occidentalis*. Extensive faunistic surveys of semiaquatic habitats are expected to yield species of *Thatonia* and *Malabaria*.

ACANTHODRILIDAE: This family is represented in the Western Himalaya by one or two species of *Plutellus*, generally found in soil or debris deposited between stones in high altitude coldwater streams (usually above 2,500m). They are sluggish and geophagous. The living worm is reddish due to its highly vascularised skin.

OCTOCHAETIDAE: Endemic octochaetids in this region belong to the genus *Eutyphoeus*, represented by fairly large sized geophagous worms of 6 species which are inhabitants of alluvial soil. They form casts on soil surface in the form of coiled towers. *Dichogaster bolau*, a peregrine worm of African origin occurs in rotten wood, dung heaps and soils rich in organic matter.

MEGASCOLECIDAE: Its distributional range extends between warm-temperate Asia and Australasia. Peregrine species of *Amyntas* and *Metaphire* have been recorded from almost all western Himalayan districts in Uttar Pradesh. *Amyntas corticis* and *Amyntas alexandri* are well known inhabitants of litter and organic debris. In response to external stimuli, the former shows serpentine movements while the latter exhibits death-feigning. *Metaphire birmanica* is found in clay soil with high moisture, and *Metaphire houletti* and *Metaphire posthuma* inhabit sandy and gravelly soils near water bodies. Endemic megascolecids in this region belong to the genus *Perionyx*. Most species of this genus are confined to sites with high organic matter and moisture. Species explosion of *Perionyx* seems to have occurred in the Eastern Himalaya, a region with considerable and regular rainfall and high organic matter in the soil.

LUMBRICIDAE: All lumbricids occurring in the Western Himalaya are well-known peregrines which have possibly been transported to this region in soil around roots of exotic plants. They have successfully colonized certain areas, and at some places they are now dominant over native worms.

ACKNOWLEDGEMENT

The author is grateful to the Director, Zoological Survey of India for providing necessary facilities and to the Officer-in-Charge, Northern Regional Station, ZSI, Dehra Dun for lending collection of earthworms for the present studies.

FAUNA OF WESTERN HIMALAYA ECOSYSTEM (U.P. : INDIA)

PHYLUM : ANNELIDA

CLASS : OLIGOCHAETA

FAUNA	1	2	3	4	5	6	7	8
FAMILY : NAIDIDAE								
<i>Dero (Aulophorus) tonkinensis</i> (Vejdovsky)	-	-	-	-	-	+	-	-
<i>Chaetogaster limnaei limnaei</i> von Baer	-	-	-	-	-	+	-	-
<i>Salvina appendiculata</i> d'Udekem	-	-	-	-	-	+	-	-
<i>Stylaria fossularis</i> Leidy	-	-	-	-	-	+	-	-
FAMILY : MONILIGASTRIDAE								
<i>Drawida japonica</i> Michaelsen	+	-	-	-	-	-	-	-
<i>Drawida nepalensis</i> Michaelsen	+	-	-	-	-	+	+	-
FAMILY : ALMIDAE								
<i>Glyphidrilus</i> sp.				-	-	+	-	-
FAMILY : OCNERODRILIDAE								
<i>Ocnerodrilus occidentalis</i> Eisen	+	-	-	-	-	-	-	-
FAMILY : ACANTHODRILIDAE								
<i>Plutellus</i> sp.	-	-	-	-	+	-	-	-
FAMILY : OCTOCHAETIDAE								
<i>Dichogaster bolau</i> (Michaelsen)	+	+	-	-	-	-	-	-
<i>Eutyphoeus annandalei</i> Michaelsen	-	-	-	-	-	+	-	-
<i>Eutyphoeus incommodus</i> (Beddard)	+	-	+	-	-	-	+	-
<i>Eutyphoeus nainianus</i> Michaelsen	-	-	-	-	+	+	-	+
<i>Eutyphoeus nicholsoni</i> (Beddard)	+	-	+	-	-	-	-	-
<i>Eutyphoeus orientalis</i> (Beddard)	+	-	-	-	-	-	-	-
<i>Eutyphoeus pharpingianus</i> Michaelsen			-			-	-	+
<i>Eutyphoeus waltoni</i> Michaelsen	+	+	+				-	-
<i>Lenogaster parvus</i> (Fedarb)	+	-	-	-	-	-	-	-
<i>Lenogaster pusillus</i> (Stephenson)			+	-	-		+	-
<i>Octochaetona beatrix</i> (Beddard)	+	-	+	-		+		-

	1	2	3	4	5	6	7	8
FAMILY : MEGASCOLECIDAE								
<i>Amyntas alexandri</i> (Beddard)	+	-	+	-	-	+		-
<i>Amyntas corticis</i> (Kinberg)	+	+	+	+	+	+	+	+
<i>Amyntas gracilis</i> (Kinberg)	-	-		-	+	-	-	-
<i>Amyntas morrisi</i> (Beddard)	+	-	-	-	-		-	-
<i>Metaphire anomala</i> (Michaelsen)	+	-	+	-	+	+	-	-
<i>Metaphire birmanica</i> (Rosa)	+	-	+	-	+	+	+	-
<i>Metaphire houlleti</i> (Perrier)	+	+	+	-	+	+	+	+
<i>Metaphire posthuma</i> (Vaillant)	+	+	-	-	-	-	-	-
<i>Perionyx bainii</i> Stephenson	+			+	+		+	+
<i>Perionyx excavatus</i> Perrier	+	-	+	+	+	+	+	+
<i>Perionyx nainianus</i> Michaelsen	-	-	-		+	+	-	+
<i>Perionyx sansibaricus</i> Michaelsen	+	-	-		-	-	-	-
<i>Perionyx simlaensis</i> (Michaelsen)	+	-	-	-	-	-	-	-
FAMILY : LUMBRICIDAE								
<i>Allolobophora eiseni</i> (Levinsen)	-	-	-	-	-	+	-	-
<i>Allolobophora parva</i> (Eisen)	+		+	+	-	+	-	+
<i>Aporrectodea rosea</i> (Savigny)	+	+	-		+	+	-	-
<i>Aporrectodea trapezoides</i> species- group, Gates	+	+	-	+	+	+	+	+
<i>Dendrodrilus rubidus</i> (Savigny)	+	+	-	+	+	+	+	-
<i>Eisenia fetida</i> (Savigny)	+	+	-	-	+	-	-	-
<i>Eiseniella tetraedra</i> (Savigny)	-	-	-		-	+	-	-
<i>Octolasion cyaneum</i> (Savigny)	+					-	-	-
<i>Octolasion tyrtaeum</i> (Savigny)	+	+			+	+	+	

REFERENCES

- BEDDARD, F.E. 1883. Note on some earthworms from India. *Ann. Mag. nat. Hist. (ser.5)*, 12 : 213-224.
- BOURNE, A.G. 1889. On certain earthworms from the Western Himalayas and Dehra Dun. *J. Asiat. Soc. Beng.*, 58: 110-117.
- FEDARB, S.M. 1898. On some earthworms from British India. *Proc. zool. Soc. Lond.*, 1898: 445-450.
- GATES, G.E. 1945. Another species of *Pheretima* from India. *Sci. & Cult., Calcutta*, 10(9): 403.

- GATES, G.E. 1951. On the earthworms of Sharanpur, Dehra Dun and some Himalayan hill stations. *Proc. natn. Acad. Sci. India (B)* 21: 16-22.
- GATES, G.E. 1972. Burmese earthworms. An introduction to the systematics and biology of megadrile oligochaetes with special reference to southeast Asia. *Trans. Am. phil. Soc.*, 62(7) : 1- 326.
- JULKA, J.M. 1988. *The Fauna of India and the adjacent countries, Megadrile Oligochaeta, Octochaetidae*, xiv+392 pp. Zoological Survey of India, Calcutta.
- MICHAELSEN, W. 1897. Terricolofauna Ceylons. *Jb. hamb. wiss. Anst.*, 14(2) : 159-250.
- MICHAELSEN, W. 1900. Oligochaeta. *Das Tierreich*, 10: 1-575.
- MICHAELSEN, W. 1907. Neue Oligochaten von Vorder Indien, Ceylon, Birma und den Andaman-Inseln. *Jb. hamb. wiss. Anst.*, 24: 143-188.
- MICHAELSEN, W. 1909. The Oligochaeta of India, Nepal, Ceylon, Burma and the Andaman Islands. *Mem. Indian Mus.*, 1: 103-253.
- ROSA, D. 1888. Viaggio di Leonardo Fea in Birmanica e regioni vicine, V. Perichetidae. *Annali Mus. civ. Stor. nat. Giacomo Doria*, 6: 155-167.
- ROSA, D. 1890. Viaggio di Leonardo Fea in Birmanica e regioni vicine, XXVI. Perichetidae. *Annali Mus. civ. Stor. nat. Giacomo Doria*, 10: 107-122.
- STEPHENSON, J. 1914. On a collection of Oligochaeta, mainly from Northern India. *Rec. Indian Mus.*, 10: 321-365.
- STEPHENSON, J. 1916. On a collection of Oligochaeta belonging to the Indian Museum. *Rec. Indian Mus.*, 12: 299-354.
- STEPHENSON, J. 1922. Some earthworms from Kashmir, Bombay and other parts of India. *Rec. Indian Mus.*, 24: 427-443.
- STEPHENSON, J. 1923. *Oligochaeta. The Fauna of British India, including Ceylon and Burma*, xxiv+518 pp. Taylor and Francis Ltd., London.
- TEMPLETON, R. 1844. Description of *Megascolex caeruleus*. *Proc. zool. Soc. Lond.*, 12 (1844): 89-91.

CRUSTACEA: DECAPODA

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The earliest reference to the freshwater Decapods of the Himalayan region is by Henderson (1893), Alcock (1910) and Kemp (1924). The present paper is a report on a collection of freshwater prawns and crabs collected from different districts of Uttar Pradesh. It includes four species of freshwater prawns belonging to families Palaemonidae and Atyidae and three species of freshwater crabs of the family Potamonidae. Among the freshwater prawns the record of Eastern Himalayan species namely *Macrobrachium hendersoni* and *M. (H). platyrostris* from this region is worth mentioning.

	1	2	3	4	5	6	7	8
CLASS : CRUSTACEA								
ORDER : DECAPODA								
FAMILY : PALAEMONIDAE								
<i>Macrobrachium dayanicus</i> Hende	+	-	+	-	-	-	-	-
<i>M. hendersonii</i> De Man	+	-	-	-	-	-	-	-
<i>M. (H) platyrostris</i> de Man	+	-	+	-	-	+		
FAMILY : ATYIDAE								
<i>Cardina weberi</i> De Man	+	-	-	-	-	-	-	
FAMILY: POTAMONIDAE								
<i>Paratelphusa (Berytelphusa) mesoniana</i> Anderson	+	-	-	-	-	-	-	-
<i>P. (B.) jacquemontii</i> Rathbun	-	+	+	-		-	-	
<i>Potaman (P.) koolooensis</i> Rath.	+	+	+		-	+		

ODONATA

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The Odonata fauna of Himalaya, within the India subregion, has been studied most extensively. In about three decades a number of Odonatologists have studied the dragonflies of this region. Consequently, about 240 species (out of approximately 600 known species of Odonata recorded from India) have been reported from the Himalayan region alone (i.e., Western, Central and Eastern Himalaya). These include a considerable number of new species and a large number of new records made from this region since the publication of *Fauna of British India, Odonata* (1-3). Following the above treatise, Bhasin (1953); Kumar (1970, 1971, 1973a, 1973b, 1973c, 1982 & 1985); Kumar and Khanna (1984); Kumar and Prasad (1977a, 1977b, 1977c, 1978 & 1981); Mani, *et. al.* (1955), Mitra (1973, 1975); Prasad & Singh (1976); Sahni (1964a, 1964b, 1965a, 1965b, 1970 & 1972); Singh & Prasad (1974, 1976a, 1976b); Singh, S. (1955, 1963); Singh & Baijal (1954); and Tyagi, *et. al.* (1986) have made valuable contributions to the faunal studies, bionomics, ecology and larval taxonomy of the Odonata of Western Himalaya. Kumar and Prasad (1981) in their major contribution on the Odonata fauna of Western Himalaya (U.P., Himachal Pradesh and J & K.) reported 162 specific and interspecific taxa, which form about 25% of total dragonfly fauna known from India. Subsequently, Kumar and Khanna (1984) reported larval studies on about 103 taxa, along with their identification key, from this region.

ALTITUDINAL DISTRIBUTION OF ODONATA IN WESTERN HIMALAYA :

Dragonflies are true amphibiotic insects; eggs and larvae are aquatic, while imagos are aerial. Thus the spatial and seasonal distribution of imagos is determined to a large extent on the presence of the types of aquatic habitat. Kumar and Prasad (1981) made a brief description of the typical aquatic biotopes in Western Himalaya at different altitudes and general list of the dragonfly genera which may be found around them. These are namely:

Perennial aquatic habitats:

The perennial habitats in the area are in the form of rivers, torrential hill streams in the mountains, slow running marshy streams in the flatter valleys, fresh water lakes in lesser Himalaya and perennial ponds in the foothills. In the upper reaches of the mountains (around 2000m) the streams are usually isolated in gorges and the gradient is high. The water is permanent and its flow is very swift (about 2m/sec.); temperature is low and steady and saturated with oxygen, the pH fluctuate little (*ca.* 9.5). Though the gradient is very steep, the bed is stable because large stones and boulders are jammed and form the floor of the channel which the water has carved through the rocks; a number of side pools are found but submerged aquatic vegetation is scarce. Common dragonflies around these biotopes are of the genera, *Drepanosticta*, *Calicnemia*, *Coeliccia*, *Bayadera*, *Anisopleura*, *Anisogomphus*, *Lamelligomphus*, *Gynacanthaeschna* and *Zygonyx*.

As these streams move into the flatter valleys (500-1500m) the gradient becomes less, the surrounding area is open and the climate becomes warmer and the water temperature varies appreciably during the day and through the year; the current velocity is less (30 to 100 cm/sec), the streams are about 5-8m wide with water depth of about 30-50 cm, submerged and bank vegetation is plentiful. Common dragonfly genera are *Caconeura*, *Disparoneura*, *Megalestes*, *Rhinocypha*, *Anormogomphus*, *Burmogomphus*, *Anax*, *Macromia*, *Orthetrum*, *Crocothemis*, *Sympetrum* and *Trithemis*.

In the flatter heart of the valleys, like Dehra Dun valley, large number of slow running streams are present. These generally form a net work of distributories of the larger streams. Though the water is present in them round the year a number of them still dry up in summers. The water velocity is low (20 cm to 50 cm/sec) and have plenty of aquatic vegetation, muddy substratum and contain a large number of decaying vegetation and debris. These streams hold a very rich population of dragonflies and the imagos are of *Copera*, *Pseudagrion*, *Ceriagrion*, *Ischnura*, *Enallagma*, *Agriocnemis*, *Rhodischnura*, *Neurobasis*, *Tetrathemis*, *Potomarcha*, *Orthetrum*, *Palpopleura*, *Brachydiplax*, *Crocothemis* and *Trithemis*.

Within the forest line in Western Himalaya, there are present a number of fresh water lakes. Odonata fauna of at least a few of these viz., Nainital (U.P) and Renuka lake (District Sirmour, Himachal Pradesh) has been studied adequately. These lakes hold a rich population of dragonflies and the common genera present around them are *Copera*, *Pseudagrion*, *Ceriagrion*, *Ischnura*, *Aeschna*, *Anax*, *Orthetrum*, *Acisoma*, *Crocothemis*, *Diplacodes*, *Neurothemis*, *Trihemis* and *Tamea*.

In the foothills and valleys are also present a large number of ponds, which are much smaller than the lakes and have stagnant turbid water and both floating and rooted vegetation. These ponds have a rich assembly of dragonflies around them almost throughout the year. The common genera are *Copera*, *Pseudagrion*, *Enallagma*, *Agriocnemis*, *Ictnogomphus*, *Anax*, *Potamarcha*, *Diplacodes*, *Neurothemis*, *Tholymis*, *Pantala* and *Tamea*.

Seasonal aquatic habitats:

During south west monsoon, the whole range of Western Himalaya get dotted with ephemeral rainy ponds, formed due to filling of rain water in hollow depressions. These ponds are very restricted in space and the water is warm and stagnant and form peculiar biotopes. Nevertheless a large number of dragonflies aggregate around them during June to September, namely species of the genus *Pseudagrion*, *Ceriagrion*, *Ischnura*, *Agriocnemis*, *Lestes*, *Anax*, *Potamarcha*, *Orthetrum*, *Crocothemis*, *Trithemis*, *Tholymis*, *Pantala* and *Tamea*.

ZOOGEOGRAPHY OF THE ODONATA OF WESTERN HIMALAYA

Mani (1974), while discussing the bio-geography of Himalaya, has demonstrated the presence of distinct geographical pattern in the fauna of Himalaya. He has shown that the fauna of Western Himalaya is composed partly of oriental fauna, which has spread westward from Eastern Himalaya; largely of palaearctic forms and to some extent mediteranean, ethiopian element. He has further demonstrated that although the Indo-Chinese and Malayan genera and species are concentrated largely in Eastern Himalaya, a number of them have thus spread, with decreasing abundance, upto Kumaon and sometimes even as far west as Kashmir. The palaearcticethiopian genera and species are similarly abundant in North West Himalaya, but have sparsely spread eastward to Nepal and rarely even around Assam and Burmese

	1	2	3	4	5	6	7	8
<i>C. kumaonensis</i> Singh & Baijal	-	-	-	-	-	+	-	-
FAMILY : COENAGRIIDAE								
<i>Pseudagrion rubriceps</i> Selys	+	+	+	-	-	+	-	-
<i>P. decorum</i> (Ramb.)	+	-	-	-	-	+	-	-
<i>P. laidlawi</i> Fraser	+	-	-	-	-	-	-	-
<i>P. spencei</i> Fraser	-	-	-	-	-	+	-	-
<i>Ceriagrion coromandelianum</i> (Fabr.)	+	-	-	+	+	+	-	-
<i>C. cerinorubellum</i> (Brauer)	+	-	-	-	-	-	-	-
<i>C. dyeri</i> (Fraser)	+	-	-	-	-	-	-	-
<i>Himalagrion pithoragarhicus</i> Sahni	-	-	-	-	-	-	-	+
<i>Ischnura forcipata</i> Morton	+	-	+	+	+	+	+	+
<i>I. bhimalensis</i> Sahni	-	-	-	-	-	+	-	-
<i>I. aurora aurora</i> Brauer	+	+	-	-	-	+	-	+
<i>I. rufostigma</i> Selys	-	-	-	-	-	+	-	-
<i>I. senegalensis</i> (Rmb.)	+	+	-	-	-	-	-	-
<i>Aciagrion pallidum</i> Selys	-	-	-	-	-	+	-	+
<i>Rhodischnura nursei</i> (Morton)	+	-	+	-	-	+	-	-
<i>Enallagma parvum</i> Selys	+	-	-	-	-	+	-	-
<i>Agriocnemis pygmaea</i> (Rmb.)	+	-	+	-	-	+	-	-
<i>A. clauseni</i> Fraser	+	-	-	-	-	+	-	-
<i>A. nainitalensis</i> Sahni	-	-	-	-	-	+	-	+
<i>A. corbeti</i> Kumar & Prasad	+	-	-	-	-	-	-	-
<i>Onychargia indica</i> Sahni	-	-	-	-	-	+	-	-
FAMILY : SYNLESTIDAE								
<i>Megalestes major</i> Selys	+	-	-	-	+	+	+	+
FAMILY : LESTIDAE								
<i>Lestes viridula</i> Rmb.	+	-	+	-	-	+	-	-
<i>L. praemorsa praemorsa</i> Selys	+	-	-	-	-	+	-	-
<i>L. thoracia</i> Laid.	+	-	-	-	-	-	-	-
<i>Ceylonolestes cyanea</i> (Selys)	+	-	-	-	-	+	-	-
<i>C. davenporti</i> Fraser	+	-	-	-	-	-	-	-
FAMILY : CHLOROCYPHIDAE								
<i>Rhinocypha quadrimaculata</i> Selys	+	+	+	+	-	+	+	-
<i>R. unimaculata</i> Selys	+	+	+	+	+	+	+	+
<i>R. t. trifasciata</i> Selys	+	+	+	-	-	+	-	+

	1	2	3	4	5	6	7	8
<i>R. biforata beelsoni</i> Fraser	+	-	-		-	-	-	-
<i>R. spuria</i> Selys	-		-	-	-	+	-	-
<i>R. immaculata</i> Selys			-	-	-	+	-	-
<i>Libellago lineata lineata</i> (Burm.)	+		+	-	-	+	-	-
FAMILY : EPALLAGIDAE								
<i>Bayadera indica</i> Selys	+	+	+	+	+	+	+	-
<i>Anisopleura lestoides</i> Selys	+		+	-	+	+	-	-
<i>A. comes</i> Selys	+	+	-	-	+	-	-	+
<i>A. kusumi</i> Sahni	-	-	-	-	-	+	-	-
FAMILY : CALOPTERYGIDAE								
<i>Neurobasis c. chinensis</i> (Linn.)	+	+	+	+	-	+		+
SUBORDER : ANISOPTERA								
FAMILY : GOMPHIDAE								
<i>Anisogomphus occipitalis</i> (Selys)	+	+	+	+	+	-	-	+
<i>A. bivittatus</i> (Selys)	-	-	+	-	+	-	-	+
<i>Onychogomphus M. flavum</i> Selys	+	-	-	+	+	-	-	+
<i>O. cerastes</i> (Selys)	+	-	-	-	-	-	-	-
<i>O. bistrigatus</i> (Selys)	+	+	-	-	-	-	-	-
<i>O. duaricus</i> Fraser	+	-	-	-	-	-	+	-
<i>O. garhwalicus</i> Singh & Baijal	+	-	-	-	-	-	-	-
<i>O. cuadalis</i> Fraser	-	-	-	-	-	-	-	+
<i>Lamelligomphus biforceps</i> (Selys)	-	-	-	+	-	-	-	
<i>L. risi</i> Fraser	+	-	-	-	-	-	-	-
<i>Nepogomphus modestus</i> (Selys)	+	+	+	-	-		-	+
<i>Mesogomphus lineatus</i> (Selys)	+	-	-	-	-	+	-	
<i>Anormogomphus kiritschenkoi</i> Bast.	+		-	-	-			
<i>A. heteropterus</i> Selys	+							
<i>Acrogomphus mohani</i> Sahni						+		
<i>Platygomphus attenuatus</i> Fraser	+							
<i>Davidius aberrans aberrans</i> (Selys)			-	-	-	-	+	
<i>Burmogomphus sivalikensis</i> Laid.	+	-	-		-		-	-
<i>B. hasimaricus</i> Fraser	+	-	-	-	-	-		
<i>B. pyramidalis</i> Laid.	+		-	-	-			
<i>Ictigomphus rapax</i> (Rmb.)	+							

	1	2	3	4	5	6	7	8
FAMILY : AESCHNIDAE								
<i>Gynacanthaeschna sikkima</i> (K.)	+	-	-	-	-	-	-	-
<i>G. khasiaca</i> MacLac.		-	-	-	-	+	-	-
<i>Anax imperator</i> Leach	+	-	-	-	-	-	-	-
<i>Anax immaculifrons</i> Rmb.	+	-	+	-	-	-	-	-
<i>A. guttatus</i> (Burm.)	+	-	-	-	-	-	-	-
<i>A. nigrofasciatus nigrolineatus</i> Fraser	-	-	-	+	-	+	+	+
<i>A. parthenope parthenope</i> (Selys)	-	-	-	-	-	+	-	
<i>Anotogaster b. basalis</i> Selys	-	-	-	+	-	+	+	+
<i>Cordulegaster brevistigma</i> (Selys)								
<i>C. b. folia</i> Fraser	-	-	-	-	-	+	-	-
<i>Cholorogomplus atkinsoni</i> (Selys)	-	-	-	-	-	+	-	-
<i>Macromia moorei</i> Selys	+	-	-	-	-	+	+	+
<i>Epophthalmia vittata</i> Burm.	-		-	-	-	-	+	-
FAMILY : LIBELLULLIDAE								
<i>Tetrathemis platyptera</i> Selys	+	-		-	-	+	-	-
<i>Hylaeothemis gardeneri</i> Fraser	+	-	-	-	-	-	-	-
<i>Cratilla lineata calverti</i> For.	+	-	+	-	-	+	-	-
<i>Potamarcha obscura</i> (Rmb.)	+	-	-	-	-	-	-	-
<i>Orthretrum b. brunneum</i> (Fonsc.)	+	+	-	+	-	-	+	-
<i>O. taeniolatum</i> (Schn.)	+	+	+	+	+	+	-	+
<i>O. chrysostigma luzonicum</i> (Br.)	+	+	+	+	-	+	-	+
<i>O. japonicum interum</i> MacLac.	+	-	+	-	-	+	-	-
<i>O. garhwalicum</i> Singh & Baijal	+		-	-	-	-		-
<i>O. glaucum</i> (Br.)	+	+	+	-	+	+	-	+
<i>O. s.sabina</i> (Drury)	+		+	-	-	+	-	-
<i>O. fraseri</i> Sahnii		-	-	-		+	-	-
<i>O. mathewi</i> S. & B.	+	-	-	-	-		-	-
<i>O. pruinatum neglectum</i> (Rmb.)	+	+	+	+	+	+	-	+
<i>O. gangi</i> Sahnii		-	-			-	-	+
<i>O. triangulare triangulare</i> (Selys)	+	+	+	+	+	+	-	+
<i>Palpopleura s. sexmaculata</i> (Fb.)	+	+	+	+	+	+	-	+
<i>Brachydiplax sobrina</i> (Rmb.)	+							-
<i>Acisoma panrpoides</i> Rmb.	+	-	+	+		+	-	-
<i>Crocothemis s. servilia</i> (Drury)	+	-	+	+		+	-	+
<i>C. indica</i> Sahnii	-	-	-	-	-	+	-	-

	1	2	3	4	5	6	7	8
<i>B. contaminata</i> (Fb.)	+	-	+		-	+	-	-
<i>Diplacodes nebulosa</i> (Fb.)	+	-			-	+		
<i>D. trivialis</i> (Rmb.)	+	-	-			+		
<i>Neurothemis fulvia</i> (Drury)	+		-	-	-	+		
<i>N. i. intermedia</i> (Rmb.)	+	-	-	-	-	-	-	-
<i>N. t. tulia</i> (Drury)	+	-		-	-	-		
<i>Bradinopyga geminata</i> (Rmb.)	+	-	-			+	-	-
<i>Sympetrum commixtum</i> (Selys)	+	-	+	-	-	+	-	+
<i>S. haematoneura</i> Fraser	-	-	-		-	+		-
<i>S. hypomelas</i> (Selys)	-		-	+		-		
<i>Trithemis aurora</i> (Burm.)	+	+	+			+		+
<i>T. festiva</i> Rmb.	+	+	+	+	+	+		+
<i>T. pallidenervis</i> (K)	+		+			+		-
<i>T. kirbyi kirbyi</i> Selys	+	-	-				-	-
<i>Zygonyx torridasis</i> Fraser.	+	-	-	-		-	-	-
<i>Rhyothemis v. variegata</i> (Linn.)	+	-	-	-	-	-	-	
<i>Zyxomma petiolatum</i> Rmb.	+	-	-	-	-	-	-	-
<i>Tholymis tillarga</i> (Fb.)	+	-	-	-			-	-
<i>Pantala flavescens</i> (Fb.)	+		+		-	+	-	+

R E F E R E N C E S

- BHASIN, G.D. 1953. A systematic catalogue of main identified collection at Forest Research, Institute, Dehra Dun. Pt. 12 Order Odonata. *Indian Forest Leaflet*. (N.S.), 121 (3): 63-78.
- FRASER, F.C. 1933. The Fauna of British India including Ceylon and Burma, Odonata. 1. Taylor & Francis Ltd., London.
- FRASER, F.C. 1934. Ibid 2.
- FRASER, F.C. 1936. Ibid 3.
- KIAUTA, B. 1975. Cytotaxonomy of dragonflies with special reference to Nepalese fauna II. *Lectures delivered at the Tribhuvan University, Kathmandu, Nepal Res. Centre, Kathmandu*, x+77.
- KUMAR, A. 1970. Bionomics of *Orthetrum pruinosum neglectum* (Rmb.) (Odonata : Libellulidae). *Bull. Ent.*, 11(1): 85-95.
- KUMAR, A. 1971. The larval stages of *Orthetrum brunneum brunneum* (Fonscolombe) with a description of the last instar larva of *O.taeniolum* (Schneider) (Odonata : Libellulidae). *J. nat. Hist.*, 5: 121-132.

- KUMAR, A. 1971b. *Taxonomic studies of the last instar larvae of Odonata from the Dehra Dun valley, India*. Ph.D. thesis, University of Meerut.
- KUMAR, A. 1973a. Description of the last instar larva of *Anax nigrofasciatus nigrolineatus* Fraser, 1935 and *A.parthenope parthenope* (Selys, 1839) from India, with a key to the known larvae of the Indian representatives of the genus *Anax* Leach, 1815 (Anisoptera: Aeshnidae). *Odonatologica*, 2(2): 83-90.
- KUMAR, A. 1973b. Description of the last instar larvae of the Odonata from the Dehra Dun valley (India), with notes on biology I. Suborder Zygoptera. *Oriental Ins.*, 7(1):83-118.
- KUMAR, A. 1973c. Ibid 2, Suborder Anisoptera. *Oriental Ins.*, 7(2): 291-331.
- KUMAR, A. 1982. An annotated list of Odonata from the Pithoragarh district, Western Himalaya, Uttar Pradesh, India. *Notul. Odonatol.*, 9:145-147.
- KUMAR, A. 1985. A review on the bio-ecology of Indian dragonflies. *Proc. First Indian Symp. Odonatol.*,:73-92.
- KUMAR, A. & KHANNA, V. 1984. A review of the taxonomy and ecology of Odonata larvae from India. *Oriental Ins.*, 17:127-157.
- KUMAR, A. & PRASAD, M. 1977a. On the larva of *Tamea virginia* (Rambur, 1842) from India, with notes on the larvae of Indian representatives of genus *Tamea* Hagen, 1861 (Libellulidae : Odonata). *J. Bombay nat. Hist. soc.*, 74 (1):199-202.
- KUMAR, A. & PRASAD, M. 1977b. On the larvae of *Rhinonypha* (Odonata: Chlorocyphidae) from Garhwal hills. *Oriental Ins.*, 11(4):547-554.
- KUMAR, A. & PRASAD, M. 1977c. Odonata of ponds, tanks and paddy fields at and around the Dehra Dun valley (Western Himalaya). *Newsl. zool. Surv. India*, 3(5): 270-273.
- KUMAR, A. & PRASAD, M. 1978. On a new species of *Agriocnemis* Selys, 1869 with description of its larva from Dehra Dun valley, India. *J. Bombay nat. Hist. Soc.*, 75:174-179.
- KUMAR, A. & PRASAD, M. 1981. Field ecology, Zoogeography and taxonomy of Odonata of Western Himalaya. *Rec. zool. Surv. India*, Occ. Publ., 20:1-118.
- MANI, M. S. et al. 1955. Entomological survey of the Himalaya. pt.IX. First annotated check list of insects from the North West (Punjab) Himalayas. *Agra Univ. J. Res. (Sci)*, 4(2):471-512.
- MITRA, T.R. 1973. *Sympetrum tandicola* Singh, 1955, a synonymy of *Pantala flavescens* (Fabr.) (Odonata: Libellulidae). *Ent. Res. J. Var.*, 85 (1) : 30-31.
- PRASAD, M. 1974. Studies on the Odonata of Garhwal hills. *Bull. Ent.*, 15 :41-55.
- PRASAD, M & KUMAR, A. 1977a. Extension of distribution of some dragonflies (Odonata) in Western Himalaya (U.P.). *Newsl. zool. Surv. India*, 3 (6) : 433-435.
- PRASAD, M. & KUMAR, A. 1977b. On the occurrence of *Gynacantha khasiaca* MacLac. (Odonata: Aeshnidae) from Kumaon hills (Western Himalaya). *Newsl. zool. Surv. India*, 3 (6) : 340.
- PRASAD, M. & KUMAR, A. 1980. A review of the dragonflies of Western Himalaya. *Prani Jagat*, 1:69-81 (In Hindi).

- PRASAD, M. & SINGH, A. 1976. Odonata of Doon valley. 2. Zygoptera. *Rec. Zool. Surv. India*, **70**:121-131.
- SAHNI, D. N. 1964a. Survey of the Insect Fauna of Nainital, Odonata (Anisoptera). *Agra Univ. J. Res. (Sci.)* **13**(2) : 89-98.
- SAHNI, D. N. 1964b. Some new species of Odonata from Kumaon hills (India). *Agra Univ. J. Res. (Sci.)* **13**(3): 79-86.
- SHANI, D. N. 1965a. Studies on the Odonata (Anisoptera) of Nainital. *Indian J. Ent.*, **27**(2) : 205-216.
- SAHNI, D. N. 1965b. Studies on the Odonata (Anisoptera) of Nainital *Indian J. Ent.*, **27**(2) : 277-289.
- SAHNI, D. N. 1971. Studies on the Odonata of Kumaon pt.II. Suborder Anisoptera, family Libellulidae (contd.), Gomphidae and Aeshnidae. *Bull. Ent.*, **11**(2): 121-131.
- SAHNI, D. N. 1972. Studies on Odonata of Kumaon pt III. Suborder Zygoptera. *Bull.Ent.*, **12**(2) : 69-84.
- SANGAL, S. K. & TAYGI, B. K. 1985. *Calicnemia miniata doonensis*, a new subspecies from the Dehra Dun valley (Dehra Dun, India) (Zygoptera : Platycnemidae). *Proc. Ist Indian Symp. Odonatol.*, Madurai : 193-197.
- SINGH, A.& PRASAD, M. 1974. New records of Odonata from North West India. *J. Bombay nat. Hist. Soc.*, **70**(2):403-405.
- SINGH, A. & PRASAD, M. 1976a. On the indentity of *Rhinocypha trifasciata* and *R. bifasciata* (Odonata : Zygoptera : Cholorocyphidae). *Oriental Ins.*, **10**(4) : 553-556.
- SINGH, A. & PRASAD, M. 1976b. Odonata of Doon Valley I. Anisoptera. *Rec. zool. Surv. India*, **70**:21-38.
- SINGH, S. 1955. Entomological survey of the Himalayas. Pt. V. On two new species of Odonata. *Agra Univ. J. Res. (Sci.)* **4**(1):171- 174.
- SINGH, S. 1963. Entomological survey of the Himalayas. Pt. XXIV. Fourth and final annotated check list of insects from North-West (Punjab) Himalayas. *Agra Univ. J. Res. (Sci.)*. **12**(1) : 363-393
- SINGH, S. & BAIJLAL, H. N. 1954. Entomological survey of Himalayas.Pt.II. on a collection of Odonata. *Agra Univ. J. Res. (Sci.)*, **3**(2) : 385-400.
- TYAGI, B. K, TYAGI, A. & SANGAL, S. K. 1986. An up-to-date catalogue and bibliography of dragonfly fauna of the Dehra Dun valley (India). *Occ. Publ. SIO (India)*, **2**: 1-14.

PLECOPTERA (Stone flies)

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The stoneflies are a small group of insects found mainly in the streams of high altitude region. The nymphs of this group are found under the stones of these streams, hence the name stoneflies. The adults are mostly weak fluttery fliers and are found on stones or vegetations near the streams. Most stoneflies are diurnal but a few are nocturnal. Food consists of algae, lichen and foliages but many species appear not to take food.

In India about 102 species of Plecoptera distributed in 7 families have been recorded so far. Among these about 20 species distributed in five families have been recorded so far from Garhwal and Kumaon range of Uttar Pradesh. A list of these species is given below.

	1	2	3	4	5	6	7	8
ORDER : PLECOPTERA								
FAMILY : TAENIOPTERYGIDAE								
<i>Mesyatsia karakorum</i> (SameI)		+			-	-	-	-
FAMILY : NEMOURIDAE								
<i>Amphinemoura talungdzongi</i> Aubert	-	+	-	-	-		-	-
<i>A. vaillanti</i> (Navas)	-	+	-	-	-	-	-	-
<i>Indonemoura assami</i> (Aubert)		+			-		-	
<i>I. indica</i> (Kimmins)							+	-
<i>I. loebli</i> Zwick		+						
<i>I. kamengi</i> (Aubert)	-	+	-	-			-	-
<i>I. quadridentata</i> (kimmins)	-	+		-	+			-
<i>Mesonemoura metafilifera</i> (Aubert)	-	-	-		-		+	
<i>M. paraproctalis</i> (Aubert)		+	-	-	-			-
<i>M. skardui</i> (Aubert)	-	-	-	-	+		+	-
<i>Illiesonemoura lilami</i> (Aubert)	-	-	-		+	-	-	-

	1	2	3	4	5	6	7	8
<i>Nemoura ampula</i> Jewelt	-		-	-	+	-	-	-
<i>N. punctata</i> Jewlet	-	-	-	-	+	-	-	-
FAMILY: CAPNIDAE								
<i>Capnia manii</i> Jewelt	-	-	-	-	+	-	-	-
FAMILY : PERLODIDAE								
<i>Skobeleva amabilis</i> (Jewlt)			-	-	+	-	-	-
<i>Perlodes shobhae</i> Singh & Gosh	-		-	-	+	-	-	-
FAMILY : PERLIDAE								
<i>Neoparla tortipenis</i> Zwick		-	-	-	-	+	-	-
<i>Phenoparla limosa</i> (Hagen)	-	+	-	-	+	-	+	-
<i>Parla carletoni</i> Banks	-	-	-	-	-	-	+	-

REFERENCES

- AUBERT, J. 1959. Plecopteres du Pakistan. *Mem. Soc. Vaudoise. Sci. Nat.*, **12** : 5-91.
- AUBERT, J. 1967. Les Nemouridae de l' Assam (Plecopterers). *Mitt. Schwaiz. Ent. Ges.*, **39** : 209-253.
- BAUMANN, R. W. 1975. Revision of the stonefly Family Nemouridae (Plecoptera): A study of the World Fauna at the Generic level. *Smiths. Contr. Zool.*, **211** : 3 + 74 pp.
- JEWETT, S. G. 1958. Entomological Survey of the Himalaya. Part XXIII. Stoneflies (Plecoptera) from from the north West (Punjab) Himalaya. *Proc. nat. Acad. Sci.*, **28 B** (IV): 320-329.
- JEWETT, S. G. 1975. Records and description of stoneflies from northwest (Punjab) Himalaya and Mt. Makalu, Nepal Himalaya, *Oriental Ins.*, **9** (1) :1-7.
- KIMMINS, D. E. 1946. New species of Himalayan Plecoptera. *Ann. Mag. nat. Hist.*, **13** (11) : 721-740.
- KIMMINS, D. E. 1950. Some Assamese Plecoptera, with description of new species of Nemouridae. *Ann. Mag. nat. Hist.*, **3** (12) : 194-209.
- SINGH, R. K. and GHOSH, S.K. 1969. On a new species of the genus *Perlodes* (Plecoptera : Perlodidae) from India. *Zool. Anz. Leipzig*, **182** (1-2) : 134-136.
- ZWICK, P. and SIVAC, I. 1980. Beitrage zur Kenntnis der Plecoptera des Himalaya. *Entomologica Basiliensia*, **5** : 59-138.

ORTHOPTERA

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A number of remarkable endemic genera and species of Orthopterans, particularly the acridids occur in Himalaya. In the North West Himalaya, the highest elevation at which these insects have been found is between 4775 and 4875m. (Mani, 1968).

The important contribution on Himalayan Orthoptera may be found in Kirby (1914), Uvarov (1914, 1921, 1927, 1936, 1939 and 1942), Chopard (1969), Tandon & Shishodia (1972, 1976), Tandon (1973, 1975), Tandon *et al* (1976 and 1978), Kevan & Tandon (1976), and Julka *et al* (1982).

The Himalaya is divided into four principal geographical subdivisions as follows (Mani, 1978) :

- i. The eastern or the Assam Himalaya,
- ii. The central or Nepal Himalaya,
- iii. The Kumaon or the western Himalaya,
- iv. The north west or the Punjab Himalaya.

The present study is confined to Kumaon in Himalaya and is based on the material collected by various survey parties of ZSI and on information abstracted from literature. The list deals with 97 species distributed over 11 families of Acridoidea, Grylloidea, Tetrigoidea, Tettigonioidea and Tridactyloidea. Majority of records are from Dehra Dun district followed by Nainital, Tehri, Almora, Pauri, Chamoli and Uttarkashi districts. However, there are no records from Pithoragarh district but this does not reflect non-availability of Orthopterans but probably due to deficiency in our collections. Although this account is far from complete, it certainly provides base line data for further studies.

FAUNA OF WESTERN HIMALAYAN ECOSYSTEM (U.P. : INDIA)

	1	2	3	4	5	6	7	8
CLASS : INSECTA								
ORDER : ORTHOPTERA								
FAMILY 1 : ACRIDIDAE								
SUBFAMILY : ACRIDINAE								
<i>Acrida exaltata</i> (Walker)	+	+	+	+	-	-	+	
<i>Acrida gigantea</i> (Herbst)	+		-	-	-	-		
<i>Ceracris nigricornis</i> (Walker)	+	+	+	-	-	-	-	

	1	2	3	4	5	6	7	8
<i>Holopercna darjeelingensis</i> (Bolivar)	-	-	-	-	-	+	-	-
<i>Perella insignis</i> Bolivar	+	-	-	-	-	-	-	-
<i>Phlaeoba panteli</i> Bolivar	+	+	+			-	-	-
SUBFAMILY : GOMPHOCERINAE								
<i>Aulacobothrus luteipes</i> (Walker)	+	-	-	-	-	-	-	-
<i>Leva apicalis</i> (Walker)	-	-	-	-	-	+	-	-
SUBFAMILY : OEDIPODINAE								
<i>Acrotylus humbertianus</i> (Saussure)	+	-	-	-	-	-	-	-
<i>Aiolopus thalassinus tamulus</i> (Fabricius)	+	-	-	-	-	-	-	-
<i>Gastrimargus africanus orientalis</i> (Sjostedt)	-	+	+	-	+	-	-	-
<i>Gastrimargus marmoratus</i> (Thunberg)	+	-	-	-	-	-	+	-
<i>Heteropternis respondens</i> (Walker)	-	+	+	-	-	-	-	-
<i>Locusta</i> sp.	-	+	+	-	-	-	-	-
<i>Oedaleus abruptus</i> (Thunberg)	-	-	-	-	+	+	-	-
<i>Oedaleus senegalensis</i> (Krauss)	+		-	-	-	-	-	-
<i>Odeipoda himalayana</i> Uvarov	-	+	+	-	-	-	-	-
<i>Pusana rugulosa</i> (Uvarov)	+				-		-	-
<i>Pternoscirta cinctifemur</i> (Walker)	+				-	-	-	-
<i>Sphingonotus longipennis</i> Saussure	+	+	+	-	-	-	-	-
<i>Trilophidia annulata</i> (Thunberg)	+	+	+	-	+	-	-	-
SUBFAMILY : HEMIACRIDINAE								
<i>Clonacris finoti</i> (Kirby)	+	-	-	-	-	-	-	-
<i>Hieroglyphus banian</i> (Fabricius)	+	-	-	-	-	-	-	-
<i>Parahieroglyphus bilineatus</i> (Bolivar)	+	-	-	-	-	-	-	-
<i>Spathosternum pr. prasiniferum</i> (Walker)	+	-	-	-	-	+	-	-
SUBFAMILY : OXYINAE								
<i>Oxya h. hyla</i> Serville	+	-	+	-	+	-	-	-
<i>Oxya fuscovittata</i> (Marschall)	+	+	+	-	-	-	-	-
SUBFAMILY : COPTACRIDINAE								
<i>Coptacra ensifera</i> Bolivar	-	-	-	-	-	+	-	-
<i>Eucoptacra praemorsa</i> (Stal)	+			-	-	+	-	-

	1	2	3	4	5	6	7	8
SUBFAMILY : TROPIDOPOLINAE								
<i>Oxyrrhepes obtusa</i> (De Haan)	+					+	-	
SUBFAMILY : CALLIPTAMINAE								
<i>Caloptenopsis glaucopsis collina</i> (Uvarov)	+	-	-	-	-	-	+	-
<i>Caloptenopsis g. glaucopsis</i> (Walker)	+	-	-	-	-	-	-	-
<i>Peripolus pedarius</i> (Stal)	-	-	+	-	+		-	-
SUBFAMILY : EYPREPOCNEMIDINAE								
<i>Choroedocus capensis</i> (Stal)	+	-	-		-	-	-	
<i>Choroedocus illustris</i> (Walker)	-	-	-	+	-		-	-
<i>Eyprepocnemis a. alacris</i> (Serville)	+	+	+		-	-		-
<i>Eyprepocnemis rosea</i> Uvarov	+	-	-	-	-			
<i>Heteracris littoralis</i> (Rambur)	+	-	-		-	-	-	-
<i>Heteracris pulcher</i> (Bolivar)	+	-	-	-	-		-	-
<i>Tylotropidius varicornis</i> (Walker)	+	-	+			+	-	
SUBFAMILY : CATANTOPINAE								
<i>Catantops acuticerus</i> Bolivar	+							
<i>Catantops karnyi</i> Kirby	+	+	+			-		
<i>Catantops pinguis innotabilis</i> (Walker)	+	+	+		+	-	-	
<i>Paraconophyma scabra</i> (Walker)	+	+	+		+	+		
<i>Xenocatantops h. humilis</i> (Serville)	+	+	+	-		-		
SUBFAMILY : CYRTACANTHACRIDINAE								
<i>Chondracris rosea</i> (De Geer)	+		-	-	-			
<i>Pachyacris vinosa</i> (Walker)	+		-	-	-		+	
<i>Patanga japonica</i> (Bolivar)	+			-	-			
<i>Patanga succincta</i> (Johansson)	+		-		+			
FAMILY 2 : PYRGOMORPHIDAE								
<i>Atractomorpha c. crenulata</i> (Fabricius)	+					+	+	
<i>Aularches milliaris</i> (Linnaeus)	+		+		+			
<i>Chrotogonus</i> (Ch.) <i>tr. trachypterus</i> (Blanchard)	+			+		+		
FAMILY 3 : TETRIGIDAE								
<i>Criotettix exertus</i> (Bolivar)	+							

	1	2	3	4	5	6	7	8
<i>Ergatettix dorsifera</i> (Walker)	+	-	-	-	-	-	-	-
<i>Hedotettix gracilis</i> (De Haan)	+		-		-	-	-	-
FAMILY 4: TETTIGONIIDAE								
<i>Conocephalus pallidus</i> Redt.	+	-		-	-	-	-	-
<i>Sathophyllia rugosa</i> Linnaeus	+		-	-	-	-	-	-
FAMILY 5 : TRIDACTYLIDAE								
<i>Tridactylus thoracicus</i> Guerin	+	-	-	-	-	-	-	-
<i>Xya marmorata</i> (Chopard)	-	-		-	-	+	-	-
FAMILY 6 : GRYLLIDAE								
<i>Brachytrypes portentosus</i> (Licht.)	+					-	-	-
<i>Gryllopsis falconneti</i> (Saussure)	+					+		
<i>Gryllopsis furcata</i> (Saussure)	+	-	-	-	-	+	-	-
<i>Grylloides sigillatus</i> (Walker)	+	-	-	-	+	-	-	-
<i>Gryllus bimaculatus</i> De Geer	+	+	-	-	+	+	-	-
<i>Gymnogryllus Kashmirensis</i> Bhowmik	+	-	-	-	-	-	-	-
<i>Itaropsis tenella</i> (Walker)	+	-	-	-	-	-	-	-
<i>Loxoblemmus detectus</i>	+	-	-	-	-	-	-	-
<i>Loxoblemmus hamulifer</i> Chopard	+	+	-	-	-	-	-	-
<i>Loxoblemmus</i> sp.	-	-	-	-	+	-	-	-
<i>Modicogryllus blennus</i> (Saussure)	-	-	-	-	-	+	-	-
<i>Modicogryllus confirmatus</i> (Walker)	+	-	-	-	-	-	-	-
<i>Platygryllus lineaticeps</i> (Walker)	+	-	-	-	-	-	-	-
<i>Platygryllus melanocephalus</i> (Serville)	+	-	-	-	-	-	-	-
<i>Plebeiogryllus guttiventris</i> (Walker)	+	-	-	-	-	-	-	-
<i>Pteronemobius concolor</i> (Walker)	+				-		+	-
<i>Pteronemobius fascipes</i> (Walker)	+	+	-	-	-	+	-	-
<i>Pteronemobius strigipennis</i> (Chopard)	+	-	-	-	-	-	-	-
<i>Pteronemobius taprobanensis</i> (Walker)	-	-	+	-	-	+	-	-
<i>Teleogryllus himalayanus</i> (Chopard)	+	-	-	-	-	-	-	-
<i>Telegryllus mitrarius</i> (Brum.)	+	+	-	-	-	+	-	-
<i>Teleogryllus testaceus</i> (Walker)	+	+	-	-	-	-	-	-

	1	2	3	4	5	6	7	8
<i>Turanogryllus babaulti</i> (Chopard)	+	-			-			
<i>Turanogryllus dahradunensis</i> Bhowmik	+			-	-	-	-	-
<i>Turanogryllus quadrilineatus</i> Bhowmik	+	-	-	-	-	-		-
<i>Turanogryllus rufoniger</i> (Chopard)	+			-		+		-
<i>Velarifictorus aspersus</i> (Walker)	+	-	-			-		-
<i>Velarifictorus bhadurii</i> Bhowmik	+	-	-	-				-
<i>Velarifictorus dehradunensis</i> Tandon & Shishodia	+		-	-	-	-	-	
<i>Velarifictorus indicus</i> Tandon & Shishodia			-		+	-	-	-
<i>Velarifictorus raychaudhurii</i> Bhowmik	+	-	-	-	-	-	-	-
<i>Velarifictorus sukhadae</i> Bhowmik	+	-	-	-	-	-		-
FAMILY 7 : TRIGONIDIIDAE								
<i>Trigonidium cicindeloides</i> Rambur		+		-		+	+	
FAMILY 8 : SCLEROPTERIDAE								
<i>Acanthoplistus birmanus</i> Sausseure	+			-	-	-		-
FAMILY 9 : MOGOPLISTIDAE								
<i>Ornebius nigripalpis</i> Guerin	+	-		-	-	-	-	-
FAMILY 10 : ENEOPTERIDAE								
<i>Euscyrtus hemelytrus</i> (Haan)	+	-		-	-	+	-	
<i>Madasumma marginipennis</i> (Guerin)		-	-		-	-	+	
FAMILY 11 : GRYLLOTALPIDAE								
<i>Gryllotalpa africana</i> Beauvois	+	-		-	-	-	-	-

REFERENCES

- CHOPARD, L. 1969. *The Fauna of India and adjacent countries*. Orthoptera, 2, Grylloidea. The Manager of Publications, Delhi, pp. 421.
- KEVAN, D. K. McE. AND TANDON, S.K. 1976. On the occurrence of subtribe Mekongeanina Kevan & Akbar (Orthoptera : Acridoidea : Pyrgomorphidae), in *India Oriental Insects*. Delhi, 10(4) : 589 - 592.
- KIRBY, W. F. 1914. *The Fauna of British India including Ceylon and Burma*. Orthoptera (Acridiidae), ix + 276 pp. London.

- MANI, M. S. 1968 Ecology and Biogeography of High altitude insects. Series entomologica vol. 4. The Huague.
- TANDON, S. K. AND SHISHODIA, M.S. 1972. Notes on the collection of Grylloidea (Orthoptera) from NEFA, India. *Oriental Insects, Delhi*, **6** (3) :281-292.
- TANDON, S. K. 1973. The Identity and distribution of the genus *Xenocatantops* Dirsh & Uvarov. (Orthoptera : Acridoidea : acrididae) *Rec. zool. Surv. India*, **67** (1-4) : 59 - 64.
- TANDON, S. K. 1975. On the genus *Chondracris* Uvarov (Orthoptera : Achridoidea : Acrididae) *Dr. B. S. Chauhan comm. Zool. Soc. India, Calcutta* : 395 402.
- TANDON, S. K., SRIVASTAVA, G. K. AND SHISHODIA, M.S. 1976a. On a collection of Orthoptera and Dermaptera from the Tons Valley. (Utar Pradesh). *Newsl. zool. Surv. India*, **2** (1):13 15.
- TANDON, S. K. AND SHISHODIA, M. S. 1976b. On a collection of Acridoidea (Orthoptera : Insecta)from Garhwal Uttar Pradesh, India. *Newsl. zool. Surv. India*, **2** (6) : 269-271.
- TANDON, S. K. and KHERA, S. 1978. Ecology and distribution of grasshoppers (Orthoptera : Acridoidea) in Arunachal Pradesh, India and impact of human activities on their ecology and distribution. *Proceedings seminar on impact of Man on the Mauntain Ecosysem, School of Entomology, St. John's college, Agra. Mem. School. Ent.*, **6** : 73 91.
- UVAROV, B. P. 1914. Orthoptera recueillis par M. A. N. Avinov dans les plateau de karakoram. *Rev. russe Ent.*, **14** : 231-234.
- UVAROV, B. P. 1921. *Conophyma mitchelli* sp. n. a new alpine grasshopper from Kashmir. *Ent. mon. Mag.*, **7** (3) : 268-270.
- UVAROV, B. P. 1927. Die Acridiiden Zentralasiens. Taschkent. pp. 215. (In Russian). *Ann. Mag. nat Hist.*, (9) **16** :165-173.
- UVAROV, B. P. 1936. Some Orthoptera from Kashmir. *Opusc. ent. Soc. Lund*, **1** (I) : 17-20
- UVAROV, B. P. 1939. Some Acrididae from south-eastern Tibet. *J. Linn. Soc. London (Zool.)* **40** : 561-574.
- UVAROV, B. P. 1942. Palaearctic Acrididae new to Indian fauna (Orthoptera). *Eos*, **18** : 97-103.

DERMAPTERA

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Altogether 43 species belonging to genera are known to occur in Western Himalaya covering portion of Garhwal and Kumaon Himalaya. The preponderance of the species, generally above 5000, belonging to genera *Isolaboides* Brindle, *Anechura* Scudder, *Allodahilia* Verhoeff and *Forficula* L. clearly exhibit Palaearctic affinities. The presence of *Diplatys* Serville and *Echinosoma* Serville, though primarily tropical in distribution, are to establish secondarily in the sclerophyl forested zones of Himalaya by a few representatives.

It is likely, that further studies on the material from the area may lead to addition of a few more species.

FAUNA	1	2	3	4	5	6	7	8
INSECTA : DERMAPTERA								
FAMILY: PYGIDICRANIDAE								
SUBFAMILY: DIPLATYNAE								
<i>Diplatys adjacens</i> Hincks	+		+	-				-
<i>Haptodiplatys chinensis</i> (Hincks)	+			+		-	-	
<i>H. brancuccii</i> Srivastava	-			+		-		-
<i>H. rufescens</i> (Kirby)	-	-	-	-	+	+		
<i>H. niger</i> Hincks						+		-
SUBFAMILY : ECHINOSOMATINAE								
<i>Echinosoma parvulum</i> Dohrn	+				-			-
<i>E. dentiferum</i> Borelli	+	-	-	-	-	+	-	
FAMILY : ANISOLABIDIDAE								
SUBFAMILY : ISOLABOIDINAE								
<i>Isolaboides rimosus</i> Steinmann	+	-	-	-	-	-	-	-
SUBFAMILY : CARCINOPHORINAE								
<i>Euborellia annulipes</i> (Lucas)	+	-	-	-		+	+	+
<i>E. kumaoensis</i> Gangola	-		-	-		+		

	1	2	3	4	5	6	7	8
<i>E. askotensis</i> Gangola	-	-	-	-	-	-	-	+
<i>E. femoralis</i> (Dohrn)	-	-	-	-	-	+	-	-
FAMILY : LABIDURIDAE								
SUBFAMILY : NALINAE								
<i>Nala lividipes</i> (Dufor)	+	-	-	-	-	-	-	-
<i>N. nepalensis</i> (Burr)	+	-	-	-	-	+	-	+
SUBFAMILY : LABIDURINAE								
<i>Labidura riparia</i> (Pallas)	-	+	-	-	-	+	+	-
<i>L. dharchulensis</i> Gangola	-	-	-	-	-	-	-	+
<i>Forcipula trispinosa</i> (Dohrn)	+	-	-	-	-	+	-	-
<i>F. indica</i> Brindle	+	-	-	-	+	-	-	-
<i>F. quadrispinosa</i> Dohrn	+	-	-	-	-	+	-	+
<i>F. lurida</i> Bolivar	+	-	-	-	-	-	-	-
FAMILY : SPONGIPHORIDAE								
SUBFAMILY : HOMOTAGINAE								
<i>Homotages feae</i> (Bormans)	+	-	-	-	-	+	-	-
SUBFAMILY : LABIINAE								
<i>Labia minor</i> (L.)	+	-	-	-	-	-	-	-
<i>L. phanduwalensis</i> Kapoor, Bhardwaj & Banerjee	+	-	-	-	-	-	-	-
<i>Chaetospanis lakhanmdicnsis</i> Kapoor, Bharadwaj and Banerjee	-	-	-	-	-	-	-	+
FAMILY : CHELISOCHIDAE								
SUBFAMILY : CHELISOCELLINAE								
<i>Hamaxus bidentatus</i> Ramamurthi	+	-	-	-	-	-	-	-
FAMILY : FORFICULIDAE								
SUBFAMILY : OPISTHOCOSMIINAE								
<i>Eparchus insignis</i> (Haan)	-	-	-	-	-	+	+	+
SUBFAMILY : EUDOHRNIINAE								
<i>Eudhornia metallica</i> (Dohrn)	+	-	-	+	-	-	-	-
SUBFAMILY : ANECHURINAE								
<i>Anechura stoliczkae</i> Burr	+	-	-	-	+	-	-	-
<i>A. jubovskii</i> Semenov	-	-	-	-	+	-	-	-
<i>A. filchneri</i> (Burr)	-	-	-	+	-	-	-	+

	1	2	3	4	5	6	7	8
<i>A. svenhedni</i> Bcy-Bienko			-		-	-	+	-
SUBFAMILY : ALLODAHLINAE								
<i>Allodahlia macropyga</i> (Westwood)	+	-			-	-		
<i>A. dineshi</i> Gangola	-		-	-	-	+	-	
SUBFAMILY : FORFICULINAE								
<i>Elaunon bipartitus</i> (Kirby)	+	-	-	-	+	-	-	-
<i>E. gangoli</i> Gangola					-	-	+	-
<i>Forficula kumaoniensis</i> Kapoor							+	-
<i>F. beelzebub</i> (Burr)		-		+	+	-		-
<i>F. planicollis</i> Kirby	-	-	-	-	+	+	-	-
<i>F. acris</i> Burr	+	-	-	-	+	+	-	-
<i>F. lucasi</i> Dohrn	-	-	-	-	-	+	-	
<i>F. interrogans</i> (Burr)	-	-	-	-	-	+	-	-
<i>F. schlagintweiti</i> (Burr)	-	-	-	-	+	+	-	-
<i>Hypurgus humeralis</i> (Kirby)	+	-	-	-	-	-	-	-

ISOPTERA

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Termites (Isoptera) are social insects. They are well known destroyers of all types of cellulose material and are serious pests of agriculture, forestry, constructional timbers in buildings and stored products and are of considerable economic importance.

The termite fauna of Western Himalaya, Uttar Pradesh, has been very inadequately known. The earlier information on termite fauna was available of Dehra Dun district and Kumaon hills by Chatterjee & Thakur, 1966 a,b,c; 1969; Mathur & Sen-Sarma 1959, 1960, 1962 a; Mathur & Thapa 1962; Roonwal & Sen-Sarma, 1960; Sen-Sarma et al, 1975, Sen Sarma & Thakur, 1980; Snyder, 1933 a,b, 1934; Thakur, 1974, 1975, 1978 b; Thakur & Chatterjee, 1970; Verma, 1980, 1984, 1986, 1987, 1989, 1993; Verma & Bhargava, 1976; Verma & Purohit, 1993; Verma & Thakur, 1975, 1976 a, b, 1978.

The present list is based on the collections brought by various survey parties of Zoological Survey of India, Dehradun from eight hill districts of western Himalaya since 1960 to 1989 and published records of this region by various scientists of Forest Research Institute & College, Dehradun.

Fortynine species belonging to twenty genera, six subfamilies, and five families presented in the list comprises the first ever comprehensive list of termites from the region.

	1	2	3	4	5	6	7	8
FAMILY : TERMOPSIDAE								
<i>Archotermopsis wroughtoni</i> (Desneux)	+	+	+	+	+	+	+	-
FAMILY : KALOTERMITIDAE								
<i>Neotermes bosei</i> Snyder	+	-	-		-	+	+	-
<i>Neotermes megaoculatus megaoculatus</i> Roonwal & Sen Sarma	+	-	+	-	-	-	-	
<i>Neotermes microculatus</i> Roonwal & Sen Sarma	+		-	-	-	-	-	-
<i>Glyptotermes almoraensis</i> Gardner		-	+	-	-	-	+	-
<i>Bifiditermes beelsoni</i> (Gardner)	-	-	-	-	-	+	-	-
<i>Cryptotermes bengalensis</i> Snyder		-	-	-	-	+	-	-
FAMILY : STYLOTERMITIDAE								
<i>Stylotermes bengalensis</i> Mathur & Chhotani	+			-		+		
<i>Stylotermes chakratensis</i> Mathur & Thapa	+							
<i>Stylotermes dunensis</i> Thakur	+							
FAMILY : RHINOTERMITIDAE								
SUBFAMILY : COPTOTERMITINAE								
<i>Coptotermes heimi</i> (Wasmann)	+	+	+	-	+	+	-	

	1	2	3	4	5	6	7	8
SUBFAMILY : HETEROTERMITINAE								
<i>Heterotermes balwanti</i> Mathur & Chhotani			-	+	-	-	-	-
<i>Heterotermes gertrudae</i> Roonwal	+	+	+		+	+	+	+
<i>Heterotermes indicola</i> (Wasmann)	+		+		+	+	+	+
FAMILY : TERMITIDAE								
SUBFAMILY : AMITERMITINAE								
<i>Synhamitermes quadriceps</i> (Wasmann)		-	+	-	-	-	-	-
<i>Euhamitermes lighti</i> Snyder	+	-	+	-	-	+	+	-
<i>Doonitermes capillosus</i> Chatterjee & Thakur	+	-	+	-	+	+	+	-
<i>Microcerotermes beelsoni</i> Snyder	+	+	+	-	+	+	-	+
<i>Microcerotermes fletcheri</i> Holmgren & Holmgren	-	-	-	-	-	-	+	-
<i>Microcerotermes labioangulatus</i> Sen Sarma & Thakur		-	-	-	-	+	-	-
<i>Speculitermes cyclops cyclops</i> Wasmann	+		+	-	-	+	+	-
<i>Speculitermes triangularis</i> Roonwal & Sen Sarma	+	+	-	+	+	+	+	+
<i>Eremotermes dehraduni</i> Roonwal & Sen Sarma	+	-	-	-	-	-	+	-
SUBFAMILY : TERMITINAE								
<i>Pericapritermes dunensis</i> Roonwal & Sen Sarma	+	-	+	-	-	-	-	+
<i>Angulitermes acutus</i> Mathur & Sen Sarma	-	-	-	-	-	+	-	-
<i>Angulitermes akhorisainensis</i> Chatterjee & Thakur		+	+	-	+	+	+	-
<i>Angulitermes dehraensis</i> (Gardner)	+					-	-	-
SUBFAMILY : MACROTERMITINAE								
<i>Odontotermes assmuthi</i> Holmgren	+	-	-	-	+	+	-	-
<i>Odontotermes bellahunisensis</i> Holmgren & Holmgren	-	-	+	+	-	+	+	-
<i>Odontotermes bhagwati</i> Chatterjee & Thakur	+	-	+	-	+	+	+	-
<i>Odontotermes boveni</i> Thakur	-	-	-	-	+	+	+	+
<i>Odontotermes brunneus</i> (Hgen)	+	-	+	-	-	+	-	-
<i>Odontotermes dehraduni</i> Snyder	+	-	+	+	-	+	-	+
<i>Odontotermes feae</i> (Wasmann)	+	-	+	-	-	+	+	+
<i>Odontotermes giriensis</i> Roonwal & Chhotani	+	-	+	-	+	+	-	+
<i>Odontotermes guptai</i> Roonwal & Bose	+	-	+	-	+	+	-	+
<i>Odontotermes gurdaspurensis</i> Holmgren & Holmgren	+	-	+	-	-	+	+	+
<i>Odontotermes horai</i> Roonwal & Chhotani	+	-	+	-	+	+	+	-
<i>Odontotermes microdentatus</i> Roonwal & Sen Sarma	+	+	+	-	+	+	-	+
<i>Odontotermes obesus</i> (Rambur)	+	+	+	+	+	+	+	+
<i>Odontotermes parvidens</i> Holmgren & Holmgren	+	+	+	+	+	+	+	+
<i>Odontotermes redemanni</i> (Wasmann)	+		+		+	+	+	+

	1	2	3	4	5	6	7	8
<i>Microtermes obesi</i> Holmgren	+		+		+	+		
<i>Microtermes unicolor</i> Snyder	+	+	+	-	+	+	+	
SUBFAMILY : NASUTITERMITINAE								
<i>Trinervitermes biformis</i> (Wasmann)	-	-	+	-	-	+	-	-
<i>Nasutitermes dunensis</i> Chatterjee & Thakur	+	-	-	-	-	-	-	-
<i>Nasutitermes guptai</i> Sen Sarma & Thakur	-	-	-	-	-	-	+	+
<i>Nasutitermes lambai</i> Verma & Thakur	-	-	+	-	-	+	-	-
<i>Nasutitermes thanensis</i> Prasad & Sen Sarma	+	-	-	-	-	-	-	-

R E F E R E N C E S

- CHATTERJEE, P.N. AND THAKUR, M.L. 1966 a. Biology and ecology of of Oriental termites (Isoptera). Observations on the habits and biology of some termites of the Doon Valley. *Indian Forester*, Dehra Dun, **92** (2), pp. 139-142
- CHATTERJEE, P.N. AND THAKUR M.L. 1966 b Description of the hitherto unknown imago caste of *Eulamitermes lighti* Snyder with description of other castes. *Indian Forest Bull (N.S.) Ent.*, Delhi, No. 256. pp, 1-11
- CHATTERJEE, P.N. AND THAKUR, M.L. 1966 c. *Doonitermes capillosus* gen. et sp. nov. from Doon Valley (Uttar Pradesh, India), Isoptera : Termitidae : Amitermitinae. *Zool. Anz. Leipzig*, **176** (5) pp. 349-357.
- CHATTERJEE, P.N. AND THAKUR., M.L. 1969. A new species of *Nasutitermes* (Isoptera : Termitidae : Nasutitermitinae) from Doon Valley, India. *Bull Syst. Zool.*, Calcutta, **1**(2), pp.57-65.
- MATHUR, R.N. AND SEN-SARMA, P.K. 1959. Notes on the habits and biology of Dehra Dun termites (Part I) *J. Timbers Dryers and Preserv. Assoc. India*, Dehra Dun, **5** (3) pp. 3-9, 2pls.
- MATHUR, R.N. AND SEN-SARMA, P.K. 1960. Notes on the habits and biology of Dehra Dun termites (Part 2). *J. Timbers Dryers & Preserv. Assoc. India*, Dehra Dun **6** (2), 23-27.
- MATHUR, R.N. AND SEN-SARMA, P.K. 1962 a. Notes on the habits and biology of Dehra Dun termites (Part 3). *J. Timbers Dryers & Preserv. Assoc. India*, Dehra Dun **8** (1), pp.1-18, 2 pls.
- MATHUR, R.N. AND THAPA, R.S. 1962. A new species of *Styloitermes* (Isoptera : Rhinotermitidae : Styloitermitinae) from India. *J. Timbers Dryers & Preserv. Assoc. India*, Dehra Dun, **8** (4), pp, 4-8.
- ROONWAL, M.L. AND SEN-SARMA, P.K. 1960. Contributions to the systematics of Oriental Termites. *I.C.A.R. Ent. Monograph* No; 1. pp. 1-407. - New Delhi (Manager of Publication, Govt. of India).
- SEN SARMA P.K. AND THAKUR, M.L. 1980. On the Collection of termites of Kumaon hills, Uttar Pradesh, India (Insecta : Isoptera). *Indian Forest Rec. (N.S) Ent.*, Dehra Dun, **14** (1), pp.1-30.
- SEN SARMA P.K. AND THAKUR, M.L.; MISRA, S.C. AND GUPTA, B.K. 1975. *Studies on Wood destroying Termites in relation to Natural termite resistance of Timber* (Final Technical Report) pp. 1-187. -Dehra Dun (Forest REsearch Institute).
- SNYDER, T.E. 1933 a. New termites from India. *Proc. U.S.nat. Mus.*, Washington, **82** (16), pp. 1-15.
- SNYDER, T.E. 1933 b Two new termites from India. *Proc. Biol. Soc. Wash.*, Washington, **46**, pp. 91-94.

- SNYDER, T.E. 1934, New termites from India. *Indian Forest Records (Ent.)* Delhi, **20** (11) pp.1-28
- THAKUR, M.L. 1974, Hitherto unknown imago caste of *Styloterme bengalensis* Mathur et Chhotani (Isoptera : Stylotermitidae). *Indian Forester*, Dehra Dun, **100** (11) pp. 629-695.
- THAKUR, M.L. 1975. Two new species of termite genus *Styloterme* Holmgren et Holmgren (Isoptera : Stylotermitidae) from the Indian Region. *J.Indian Acad. Wood Sci.*, Bangalore, **6** (2), pp. 94-105.
- THAKUR, M.L. 1978 b Imago caste of *Neoterme megaoculatus megaoculatus* Roonwal et Sen-Sarma (Isoptera : Kalotermitidae) from Kumaon Hills, Uttar Pradesh. *J. Bombay nat. Hist. Soc.* Bombay, **75** pp. 143-147.
- THAKUR M.L. AND CHATTERJEE, P.N. 1970. The imago caste of *Dooniterme capillosus* Chatterjee & Thakur (Isoptera : Termitidae : Amitermitinae). *Oriental Insects*, Delhi, **4** (2) pp. 159-163.
- VERMA, S.C. 1980. Fauna of Corbett National Park. *d* Termites. (Insecta: Isoptera). *Cheetal*, Dehra Dun, **21** (2&3), pp. 45-46.
- VERMA. S.C. 1984. Association of eight species of termites (Isoptera) in a small log in India. *Ann. Entomol.*, Dehra Dun, **2**(2). pp.45-48.
- VERMA, S.C. 1986. The mound of the termite *Odontoterme parvidens*, with associated nest of *Euhamiterme lighui* and *Microterme unicolor* (Isoptera : Termitidae) in the Doon Valley, Uttar Pradesh, India. *Indian J. Forestry*, Dehra Dun, **9**(3), pp. 241-244.
- VERMA, S.C. 1987. Swarming behaviou of the termite *Odontoterme feae* (Termitidae : Macrotermitinae) in Dehra Dun (N.W.India). *Indian J. Forestry*, Dehra Dun, **10** (1) pp. 13-15.
- VERMA, S.C. 1989. Highterto unknown queen, solider and worker caste of *Odontoterme dehraduni* (Snyder) from Uttar Pradesh, India (Termitidae). *Indian J. Forestry*, Dehra Dun, **11** (4), pp. 310-315.
- VERMA, S.C. 1993. Termite pests of *Eucalyptus* from Rajaji National Partk, Uttar Pradesh, India. *Indian J. Forestry*, Dehra Dun, **16** (4), pp.328-335.
- VERMA, S.C. AND BHARGAVA, R.N. 1976. Extension of range of the termite *Odontoterme guptai* Roonwal & Bose (Isoptera : Termitidae : Macrotermitinae). *J. Bombay nat. Hist. Soc.*, Bombay, **73**,pp. 229-230.
- VERMA, S.C. AND PUROHIT, G.L. 1993. Termites (Insecta : Isoptera) of Rajaji National Park, Uttar Pradesh, India. *Zoology* (Journal of Pure and Applies Zoology), New Delhi, **3**(3), pp. 195-210.
- VERMA, S.C. AND THAKUR, R.K. 1975. New records of distribution of termite species *Odontoterme liorai* Roonwal and Chhotani and *Odontoterme redemanni* (Wasmann) from Doon Valley, Uttar Pradesh, India. *Labdev J.Sci. & Tech.* (Life Sciences), Kanpur, **13**(3), pp.225-226.
- VERMA, S.C. AND THAKUR, R.K. 1976 a. On the occurrence of *Heteroterme gertrudae* Roonwal (Isoptera : Rhinotermitidae : Heterotermitinae) in Dehra Dun Valley, Uttar Pradesh, India. *Newl. Zool. Surv. India*, Calcutta. **2**(4). p.140.
- VERMA, S.C. AND THAKUR, R.K. 1976 b. New records of distribution of termite *Odontoterme gurdaspurensis* Holmgren & Holmgren (Isoptera : Temitidae : Macrotermitinae) from Madhya Praesh and Uttar Pradesh, India. *J. Indian Acad. Wood Sci.*, Bangalore, **71** (1) : 36-37.
- VERMA, S.C. AND THAKUR, R.K. 1978. A new species of *Nasutiterme* Dubley (Isoptera : Nasutitermitinae) from Corbett National Park, Uttar pradesh, *J. Indian Acad. Wood Sci.*, Bangalore, **9** (1), pp. 50-55.

HEMIPTERA

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Hemiptera comprises all kind of bugs, mostly terrestrial but some aquatic, and all of them are phytophagous sap suckers. A few bugs are, however, predaceous on other insects (Capsidae, Reduviidae, Pentatomidae) and one family (Cimicidae) is blood sucker of the mammals. Nevertheless, many bugs are famous pests of some economic crops. Among the beneficial bugs, some species of aquatic families (Nepidae, Corixidae, Belostomidae) are enemies of the mosquito larvae. The commercial shellac is produced by the lac insect (Tachardiidae). Two bugs, *Teleonema scrupulosa* and *Orthezia insignis*, are used in the biological control of the weed *Lantana camara*.

Methods of collection and preservation of Hemiptera are given elsewhere (Varshney, 1990). India has about 6,500 species in 77 families of Hemiptera. Progress on their species, family-wise, has been evaluated recently (Director ZSI, 1991). Earlier, Distant (1902-1918) published 7 volumes on this insect group in the 'Fauna of British India' series. Beeson (1941) had dealt with all forest insects including the bugs, in a monumental book, which contains many studies carried out in the Western Himalayan region and their materials are deposited in the Forest Research Institute, Dehra Dun. Varshney (1984) has reported 16 species of coccids from NW Himalaya alone, besides many other species sharing their range with other regions of India.

Some bugs are very common. Woolly aphis, *Eriosoma lanigerum*, and the San Jose scale, *Quadraspidiotus perniciosus*, are common in apple orchards and on some other fruit trees all over Western Himalayan range. In lower areas *Drosicha stebbingii* and *Idiocerus* spp. are common on mango trees. Spit bug (Cercopidae) is also common in lower reaches.

The following list of species is just a token list. Undoubtedly there are large number of other hemipteran species which occur in the Western Himalayan region. To sort out and facilitate work on them, some major Indian studies on Hemipteran fauna may be indicated here as follows:

Aleyrodidae	-	Jesudasan & David (1991).
Tachardiidae	-	Varshney (1977).
Psyllidae	-	Mathur (1975).
Aphidoidea	-	Behura (1963); Ghosh (1980-1993).
Adelgidae	-	Ghosh (1983).
Membracidae	-	Ananthasubramanian & Ananthakrishnan (1975).
Cicadellidae:		
Typhlocybinae	-	Sohi & Dworakowska (1983).
Cercopoidea	-	Datta & Ghosh (1981).
Pentatomoidea	-	Datta et al. (1985).
Coccoidea	-	Ali (1969-1974); Varshney (1992).

A volume in the 'Fauna of India' series on Membracidae by Ananthasubramanian and an Occasional Paper on some Heteropteran families by Vasanthi Hegde are under publication by ZSI.

	1	2	3	4	5	6	7	8
CLASS : INSECTA								
ORDER : HEMIPTERA : HOMOPTERA								
FAMILY: CERCOPIIDAE								
<i>Machaerota planitia</i> Distant	+	-	-	-	-	-	-	-
FAMILY : CICADELLIDAE								
<i>Idiocerus</i> spp.	+					+	+	-
<i>Nephotettix virescens</i> (Distant)	+				-	-	-	-
(Syn. <i>N. bipunctatus</i> Fabricius)								
FAMILY : APHIDIDAE								
<i>Eriosoma lanigerum</i> (Hausmann)	-	-	-	-	-	+	-	-
<i>Avicennina indica</i> Chak. & Maity	-	-	-	-	+	-	-	-
<i>Indotuberaphis sorbi</i> Chak. & Maity	-	-	-	-	+	-	-	-
<i>Neoacyrthosiphon dubium</i> Chak. & Maity	-	-	-	-	+	-	-	-
<i>Raychaudhuriella potentillae</i> Chak. & Maity	-	-	-	+	-	-	-	-
FAMILY: MONOPHLEBIDAE								
<i>Drosicha stebbingii</i> (Green)	-	-	-	-	-	+	-	-
FAMILY : TACHARDIIDAE								
<i>Kerria albizziae</i> (Green)	+	-	-	-	-	-	-	-
<i>K. lacca</i> (Kerr) Varshney	+	-	-	-	-	+	+	-
FAMILY : KERMESIDAE								
<i>Kermes himalayensis</i> Green	+	-	-	-	-	-	-	-
FAMILY : DIASPIDIDAE								
<i>Quadraspidotus perniciosus</i> (Comstock)						+	-	-
ORDER : HEMIPTERA: HETEROPTERA								
FAMILY : TINGIDAE								
<i>Teleonema scrupulosa</i> Stal	+	-	-		-	+	+	+
FAMILY : PYRRHOCORIDAE								
<i>Macroceraea grandis</i> (Gray) (Syn. <i>Lolita grandis</i>)	+	-	-	-	-	-	-	-
FAMILY : PENTATOMIDAE								
<i>Canthecona furcellata</i> Wolff.	+	-	-	-		-	-	-
FAMILY : NEPIDAE								
<i>Laccotrephes ruber</i> (Linnaeus)	+	-	+	-	-	+	-	-
<i>Ranatra filiformis</i> (Fabricius)	+	-	+	-	-	-	-	-

	1	2	3	4	5	6	7	8
<i>R. veripes</i> Stal	+	-	+	-	-	+	-	-
FAMILY : NOTONECTIDAE								
<i>Enitheres indica</i> Fabricius	+	-	-	-	-	-	-	-
<i>Anisops sardea</i> Herr. & Schaffer	+		-	-	-	-		-
<i>A. bouveri</i> Kirkaldy	+						-	-
<i>A. niveus</i> Fabricius	+						-	-
<i>Plea pathescens</i> Distant	+		-	-	-		-	-
FAMILY : BELOSTOMIDAE								
<i>Lethocerus indicus</i> (Lep. & Serv.)	+	-	-	-	-	-	-	-
(Syn. <i>Belostoma indicum</i>)								
<i>Sphaerodema annulatum</i> (Fabricius)	+		-	-	-	-	-	-
<i>S. rusticum</i> (Fabricius)	+	-	-	-	-	-	-	-
FAMILY : NAUCORIDAE								
<i>Heleocaris oreatus</i> (Mont.)	+	-	+		-	+	-	-
<i>H. obliquatus</i> (Spin.)	+	-	-	-	-	+	-	-
FAMILY : CORIXIDAE								
<i>Corixa hieroglyphica</i> Duf.	+	-	-	-	-	-	-	-
FAMILY : HYDROMETRIDAE								
<i>Culindrostethus productus</i> Spin.	-	+	-	-	-		-	-
<i>Gerris scahlbergi</i> (Distant)		-	-	-	-	+	-	
<i>Metrocoris stali</i> (Dohrn.)	+		+			+	-	-
<i>Philamera laticaudata</i> (Hard.)	+		+			+		

REFERENCES

- ALI, S.M., 1969-1974. A Catalogue of the Oriental Coccoidea. (Parts I-V). *Indian Mus. Bull.*, 4 (1): 67-83 (1969); 4 (2): 38-73 (1969); 5 (1): 9-94 (1970); 5 (2): 71-150 (1970); 6 (2): 7-82 (1974).
- ANANTHASUBRAMANIAN, K.S. & ANANTHAKRISHNAN, T.N., 1975. Taxonomic, Biological and Ecological studies on some Indian Membracids (Insecta: Homoptera). *Rec. zool. Surv. India*, 68 (1-4): 161-272, 305-340.
- BEHURA, B.K., 1963. Aphids of India: A survey of published information. *Proc. First Summer School of Zoology* (Simla, 1961). Zoological Survey of India, Calcutta: 25-78.
- BEESEON, C.F.C., 1941 (Reprinted 1961). The Ecology and Control of the Forest Insects of India and the neighbouring countries. Govt. of India, Dehra Dun: 767 pp.
- DATTA, B. & GHOSH, L.K., 1981. Studies on Oriental Cercopoidea (Hemiptera: Homoptera). *EOS*, 50: 41-67.

DATTA, B., GHOSH, L.K. & DHAR, MAYA, 1985. Study on Indian Pentatomoidea (Heteroptera: Insecta). *Rec. zool. Surv. India, Occ. Paper*, **80** : 1-43.

DIRECTOR, Z.S.I. (Ed.), 1991. Animal Resources of India Protozoa to Mammalia- State of the Art. Zoological Survey of India, Calcutta: 694 pp.

DISTANT, W.L., 1902-1918. The Fauna of British India, Rhynchota (Vols. 1-7). Taylor & Francis, London: **1** : 1-438 (1902); **2** : 1-503 (1904); **3** : 1-503 (1906); **4** : 1-501 (1908); **5** : 1-362 (1910); **6** : 1- 248 (1916); **7** : 1-210 (1918).

GHOSH, A.K., 1980-1993. The Fauna of India, Aphidoidea (Parts 1- 6). Zoological Survey of India, Calcutta: **1** : 1-124 (1980); **2** : 1- 167 (1982); **3** : 1-429 (1984); **4** : 1-429 (1988); **5** : 1-336 (with F.W. Quednau, 1990); **6** : 1-330 (with B.K. Agarwala, 1993).

GHOSH, A.K., 1983. A review of the family Adelgidae from the Indian subregion (Homoptera: Aphidoidea). *Oriental Ins.*, **17** : 1- 34.

JESUDASAN, R.W.A. & DAVID, B.V., 1991. Taxonomic studies on Indian Aleyrodidae (Insecta: Homoptera). *Oriental Ins.*, **25** : 231-434.

MATHUR, R.N. 1975. Psyllidae of the Indian subcontinent. I.C.A.R., New Delhi: 1-429.

SOHI, A. S. & DWORAKOWSKA, I., 1983. A review of the Indian Typhlocybinae (Homoptera: Cicadellidae) from India. *Oriental Ins.*, **17** : 159-213.

VARSHNEY, R.K., 1977. Taxonomic studies on Lac insects of India (Homoptera: Tachardiidae). *Oriental Ins. Suppl.*, **5** (1976) : 97 pp.

VARSHNEY, R. K. , 1984. Biogeography of the coccids of Indian subcontinent. *Verh. SIEEC X. Budapest, 1983* : 370-371.

VARSHNEY, R.K., 1990. Hemiptera. *In* : Collection and Preservation of Animals. Zoological Survey of India, Calcutta: 119-124.

VARSHNEY, R.K., 1992. A check-list of the Scale insects and mealybugs of South Asia, Part I. *Rec. Zool. Surv. India, Occ. Paper*, **139** : 1-152.

COLEOPTERA

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Coleoptera, commonly known as beetles, constitutes the largest order of all animals. They have been a favourite group for collectors for their versatile habits, marvellous colouration and sculpture as well as for their economic importance. India is well known for richness of coleoptern fauna. The Himalaya down to the Nilgiri hills along with the Vindhyachal and Satpura Ranges give us enormous variety of habitats and innumerable types of beetles.

Hard integument, distinct gular region, modified forewing (elytra) meeting middorsally into a straight line, biting mouth parts and holometabolic life cycle are normally sufficient to distinguish any beetle.

Beetles are of great economic importance, some are beneficials and help in controlling many injurious insects, on the other hand damage caused by Coleoptera is colossal. The major ecological impact of beetles results from their effect on green plants, their contribution to the breakdown of plant and animal debris and their predatory activities.

Out of the four suborders of Coleoptera two major suborders, namely, Adephaga and Polyphaga are represented in India. Members of other two suborders, Archostemata and Myxophaga are yet to be discovered. Against an estimated total of 179 families of Coleoptera, about 103 families are known from India, of the 3,50,000 described species from all over the world and 15,000 species under 2000 genera are known from India.

Our knowledge of Indian Coleoptera is based mainly on Junk's Coleopterous Catalogue (1910-1984) and the 'Fauna of British India' Volume (1906-1984). Of the families dealt with, families Cicindellidae and Carabidae come under suborder Adephaga. Cicindelid beetles, are commonly known as 'Tiger beetles' for their agility and ferocity, and one species of Cicindelid beetle has been dealt with in this paper. Carabids are ground inhabiting insects, generally found under soil, stones, leaves and on dead trees, a few are found under bark in dead trees. They are normally predatory in habits and twenty two species of Carabid beetles are included in this paper from this region. Family Lampyridae include 'Fire flies' which are common in almost all parts of India. They are generally softbodied insects, females sometimes may be larviform and one species of fire flies is treated in this paper. Tenebrionidae is a large family of diverse habit, some are serious pests e.g. *Tribolium*, which belongs to this family. Twenty three species of tenebrionid beetles have been recorded here. Chrysomelids commonly known as 'leaf beetles' are very common in all areas where green vegetation are available, and twenty six species have been listed here from this region. Some of the chrysomelid species are serious pests of cultivated crops, fruit trees and forest plantations, Curculinid beetles commonly known as 'Weevils' are numerous in numbers and classified under 75 subfamilies and only four species have been recorded from this region. Scarabids are commonly known as 'dung beetles' are found in dung, carrion, decaying plant materials. Some members of the family are phytophagous in habits and causes serious damage to plantation crops and

forest trees. Twenty one species of Scarab beetles are included in the present work. Beetles of the family Elateridae are commonly known as 'Click beetles'. About 9000 under 400 genera are known from all over the world. Larvae are sometimes called 'Wire worms' and some of them feed on roots of cultivated plants. Five species of this family are recorded here. Beetles of the family Meloidae are commonly known as 'Blister beetles'. Valuable chemical 'Canthridin' is derived from beetles of this group.

FAUNA	1	2	3	4	5	6	7	8
INSECTA : COLEOPTERA								
FAMILY : CICINDELLIDAE								
<i>Cicindella choris</i> Hope	+	-	-	-	-	-	-	-
FAMILY : CARABIDAE								
<i>Pheropsophus catoiree</i> (Dej.)	+	THROUGHOUT INDIA, WESTWARD AND KASHMIR						
<i>P. hilaris</i> (Fab.)	+	THROUGHOUT INDIA						
<i>Amara batesi</i> Csiki	+	HIMALAYA FROM KASHMIR TO SIKKIM						
<i>Lactia usulcus</i> Chaudhuri	+	-	-	-	-	-	-	-
<i>Megalonydius birmanicus</i> Bates	+	-	-	-	-	-	-	-
<i>Rhopalopalpus jaunthinus</i> (Redt.)	+	-	-	-	-	-	-	-
<i>Nebria cameroni</i> Andr.	+	-	-	-	-	-	+	-
<i>Microheilus trimaculata</i> (Olivaer)	+	-	-	-	-	-	+	-
<i>Galerita ruficeos</i> Chaudhury	+	-	-	-	-	+	+	-
<i>Agonum</i> sp.	+	-	-	-	-	-	-	-
<i>A. predator</i> Aube	+	-	-	-	-	-	-	-
<i>Aronya championi</i> Andrews	+	-	-	-	-	+	+	-
<i>Calathus</i> sp. nr. <i>rubricus</i> Andr.	+	-	-	-	-	-	-	-
<i>Caledissus perluceus</i> Bates	COULD NOT BE TRACED							
<i>Chaenius</i> sp.	+	-	-	-	-	-	-	-
<i>C. agailis</i> Chal.	+	-	-	-	-	-	-	-
<i>C. apocalis</i> (Wied.)	+	-	-	-	-	+	+	-
<i>C. bimaculatus</i> Dej.	+	-	-	-	-	-	+	-
<i>C. laetiussulcus</i> Chal.	THROUGHOUT THE HIMALAYAN TRACT FROM ABBOTABAD TO CACHAR							
<i>C. punctastriatus</i>	+	HIMALAYA TRACT FROM SIMLA TO BHUTAN						
<i>C. pulcher</i> Neetn.	+	THROUGHOUT INDIA						

	1	2	3	4	5	6	7	8
<i>C. circumdaus</i> brindle	+							-
FAMILY : LAMPYRIDAE								
<i>Lampropharus tenebrosus</i> W. & K.	+	-	-		-	-	-	-
FAMILY : ELATERIDAE								
<i>Adelocera pristentrata</i> Cand.	+				-	-		-
<i>Melanotus fuscus</i> ? Fabr.	+			-		-	-	
<i>Adolocera costicallis</i> Cam.	+	-		-	-		-	-
<i>Hemiopus flava</i> Cast.	+	-		-	-	-	-	-
<i>Campablacon sinesis</i> Cam.	+	-	-	-	-	-	-	-
FAMILY : TENEBRIONIDAE								
<i>Gonocephalum simulatrix</i> Fairm.	+	-	-	-	-	-	-	-
<i>G. acuticolla</i> Karzab.	+	-		-				
<i>Gonocephalum</i> sp.		+						
<i>G. tuberculum</i> Hope	+							-
<i>G. depressum</i> Fab.	+	-	-	-		-		-
<i>G. helpioides</i> Fairus.	-	-	+	-	-	-	-	-
<i>G. annanita</i> Chat.	+	-	-	-	-	-	-	-
<i>Haplogaste flabellatus</i> Sharp	+	-	-	-	-	-	-	-
<i>Opatroides vicinus</i> Fair.	+	-	-	-	-	-	-	-
<i>Pachycera indiana</i> Fair.	+	-	-					-
<i>Scleron reitteri</i> Beb.	+	-	-	-	-	-	-	-
<i>Lepidiata</i> sp.	+		-				-	-
<i>Adoratus duvauceli</i> Blanc.	+	-					-	-
<i>Mesomorplus</i> sp.	+	-	-	-	-	-	-	-
<i>Platynotus perforatus</i> Muls.	+	-	-	-	-	-	-	-
<i>Mesomorplus rugulosus</i> Chat.	+		-				-	-
<i>Rhytinota tristis</i>	+			-	-			-
<i>Anthrocophora crocifera</i> Oliv.	+							
<i>Derosphaerus cribrub</i> Fairm.	+							
<i>Opatroides punctulatus</i> Brll.	+	-	-	-	-	-	-	-
<i>Lyprapes indicus</i> Wied.	+	-	-	-	-	-	-	-

	1	2	3	4	5	6	7	8
<i>Stenosida striatopunctata</i> Wieden	-	-	+	-	-	-	-	-
<i>Onthophagus gsgsis</i> Hope	+				-	-	-	-
FAMILY : MELOIDAE								
<i>Mylabris maculata</i> Marscul	+		-	-	-	-	-	-
<i>Epicutia hirticornis</i> (Haag. -Rutenberg)	+	-	-	-	-	-	-	-
<i>Cyaneolytta coerulea</i> (Leuckart)	+	-	-	-	-	-	-	-
FAMILY : CHRYSOMELIDAE								
<i>Maristata quadrifasciata</i> (Hope)	+	-	-	-	-	+	+	-
<i>M. sexmaculata</i> (Kollar & Redtenbacher)	+	-	-	-	-	+	+	-
<i>Platycorynus</i> (<i>Corynodus</i>) <i>deamaculata</i> (Boh.)	+	-	-	-	-	-	-	-
<i>Basiprionota daemmaculata</i> (Boh.)	+	-	-	-	-	-	-	-
<i>Podontia quatuordecimpunctata</i> (Linn.)	+	-	-	-	-	-	-	-
<i>Craspedonta leayana</i> (Latr .)	+	-	-	-	-	-	-	-
<i>Chrysomela populi</i> Linn.	+	-	-	-	-	-	-	-
<i>Chrysolina coelestina</i> (Baly)	+	-	-	-	-	+	+	-
<i>Lema</i> sp.	+		-	-	-	-	-	-
<i>Lema psyche</i> Baly	+						-	-
<i>Xuthea orientalis</i> Baly	+		-	-	-	+	+	-
<i>Cassida</i> sp.	+	-	-	-	-	-	-	-
<i>Anisodera guerini</i> Baly	+	-	-	-	-	-	-	-
<i>Clytrasoma palliata</i> (Fabr.)	+	-	-	-	-	-	-	-
<i>Monolepta signata</i> (Oliver)	+	-	-	-	-	-	-	-
<i>M. trifasciata</i> Jacoby	+		-	-	-	-	-	-
<i>Lilioceris impressa</i> (Fabr.)	+	-	-	-	-	-	-	-
<i>Temnaspus quadripaageatus</i> Bryant	+		-	-	-	-	-	-
<i>Mimastra cynaura</i> (Hope)	+	-	-	-	-	-	-	-
<i>Dactylipsa brevispinosa</i> (Chap.)	+	-	-	-	-	-	-	-
<i>Cleoporus</i> sp.	+	-	-	-	-	-	-	-
<i>C. phyliaanthi</i> Baly	+	-	-	-	-	-	-	-
<i>Altica cyanea</i> (Weber)	+	-	-	-	-	-	-	-
<i>A. caerulescens</i> (Baly)	+		-	-	-	-	-	-
<i>Sphenoraia</i> (<i>Sphenoruaia</i>) sp.	+						-	-

	1	2	3	4	5	6	7	8
FAMILY : CURCULIONIDAE								
<i>Desmidophorus hebes</i> Fabr.	+	-	-	-	-	-	-	-
<i>Pycnodactylus hipocrita</i> Chev.	+	-	-	-	-	-	-	-
<i>Derodus pallinesus</i> Rodten.	+	-	-	-	-	-	-	-
<i>Hatea curculionoides</i> Heresch	+	-	-	-	-	-	-	-
FAMILY : SCARABIDAE								
<i>Xylotrus gideon</i> (Linn.)	+	-	-	-	-	-	-	-
<i>Anomala ruficapilla</i> Burm.	+	-	-	-	-	-	-	-
<i>Brahimina</i> sp.	+	-	-	-	-	-	-	-
<i>Serognatha</i> sp.	+	-	-	-	-	-	-	-
<i>Capris repertus</i> Walker	+	-	-	-	-	-	-	-
<i>Scarabaeus</i> sp.	+	-	-	-	-	-	-	-
<i>Papillia maccalellandi</i> Hope	+	-	-	-	-	-	-	-
<i>Onites philemon</i> Fab.	+	-	-	-	-	-	-	-
<i>O. vereris</i> Lansb.	+	-	-	-	-	-	-	-
<i>Chiloba acuta</i> (Weid .)	+	-	-	-	-	-	-	-
<i>Phyllgnathus dionysius</i> (Fb.)	+	-	-	-	-	-	-	-
<i>Clinteria spilata</i> (Fab.)	+	-	-	-	-	-	-	-
<i>Anomala xanthoptera</i> Blanch.	+	-	-	-	-	-	-	-
<i>Onthophagus catta</i> (Fb.)	+	-	-	-	-	-	-	-
<i>O. danie</i> (Fb.)	+	-	-	-	-	-	-	-
<i>O. gagatus</i> Hope	+	-	-	-	-	-	-	-
<i>Catharsius molossus</i> (Linn.)	+	-	-	-	-	-	-	-
<i>Onticellus cinctus</i> ?	+	-	-	-	-	-	-	-
<i>Oxycentonia jacunda</i> (Foldermann)	+	-	-	-	-	-	-	-
<i>O. albapunctata</i> (Fabr.)	+	-	-	-	-	-	-	-
<i>Geotrypus gideon</i> Linn.	+	-	-	-	-	-	-	-

REFERENCES

BEESON, C.F.C. 1941. (Reprinted 1961). The Ecology and Control of the Forest Insects of Indian and the neighbouring countries. Govt. of India Publication : 767 pp.

FAUNA OF BRITISH INDIA SERIES (NOW FAUNA OF INDIA), 1906-1984. General introduction of Coleoptera, Cicindelidae, Rhysodidae, Paussidae (by Flower, 1912), Carabidae (by Andrews, 1929, 1935), Staphylinidae (by Cameron, 1930-1939), Scarabaeidae (by Arrow 1910, 1917, 1931). Lucanidae and passalidae (by Arrow, 1940), Erotylidae, Languriidae and Endomychidae (by Arrow, 1925), Chrysomelidae (by Jacoby 1908, Maulik 1919, 1926, 1936), Cerambycidae (by Gahan 1906), Curculionidae (by Marshall, 1916) and Gyrinidae and Haliplidae (by Vazirani, 1984).

SCHENKLING, S. (Editor) 1910-1940. Coleopterarum Catalogues, 170 pars, 31 vols. W. Junk. Berlin.

STEBBING, E.P. 1914. Indian forest insects of economic importance. Eyre and Spottiswoode, Ltd. London: xvi + 648 pp.

LEPIDOPTERA : RHOPALOCERA

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The lepidopterous fauna, particularly the Rhopalocera, or the butterflies, attracted attention of both the naturalists and the zoologists for their aesthetic as well as scientific values. As a result, the butterfly-group has been by far the best worked out group from amongst the Insecta. During the eighteenth century, a large number of butterfly-fauna from the Indian region was named and described including those from Western Himalaya region by Linnaeus and Fabricius.

In the nineteenth century, other major contributions on butterflies were by Kollar (1844) from Kashmir; Marshal & de Niceville (1882) and de Niceville (1883-90) from India, Ceylon and Burma; Doherty (1886) from Kumaon; Mackinnon & de Niceville (1897-98) from Mussoorie and Moore (1890-1907) in "Lepidoptera Indica"

At the beginning of 20th century, valuable contributions of Bingham's (1905, 1907) two volumes of "*The Fauna of British India, including Ceylon and Burma*" (Butterflies); and Swinhoe's (1909-13) "*Lepidoptera Indica*" Vol. VII - X are worth mentioning. Although, the sporadic work continued on Lepidoptera, the researches made by the following are worth recording and very valuable as far as the publications on the Indian butterflies with particular reference to the North-West Himalaya (U.P) are concerned: JBNHS, on the "Butterflies of Plains of India"; Evans (1912-26) contributed a series of papers on the "Identification of Indian Butterflies". These were, later, published (1930, 1932) in the form of a book entitled as above, enlisting all the known species upto subspecific level, wherever known, under nine families, viz., PAPILIONIDAE, PIERIDAE, DANAIIDAE, SATYRIDAE, AMATHUSIIDAE, NYMPHALIDAE, (including ACRAEIDAE), ERYCINIDAE, LYCAENIDAE AND HESPERIIDAE.

Subsequently, Talbot contributed another series of *Fauna of British India, including Ceylon and Burma*. Vol. 1 (1939) dealt with Papilionidae and Pieridae and Vol. 2 (1947) with Danaidae, Satyridae and Acraeidae. As a result, other families namely, Amathusiidae, Nymphalidae, Erycinidae, Lycaenidae and Hesperidae were left out. While Evans published (1949) a Catalogue of Hesperidae from Europe, Asia and Australia present in the B.M. (N.H.), Evans (1957) and Cantlie (1962) studied, respectively, the Arhopala Group of Lycaenidae, and the Lycaenidae except Arhopala Group.

The family Nymphalidae may be regarded as the largest family of butterflies considering the number of species and subspecies. It may also be stated that the group has been partially worked out. In fact there is no consolidated work on the Indian fauna, although there are several very valuable contributions on the families, particularly referring to one or the other genus or a group of genera. Reference may be made to Eliot (1969) on Neptini.

Wynter-Blyth (1957) published a book entitled. "*Butterflies of The Indian Region*" (BNHS, Bombay) covering almost all the fauna, upto species level. Though several taxonomic changes have since been made, this compilation of all the major families and species (since 1932 by Evans), including the common, popular english names alongwith coloured and black & white photographs is by far the most valuable book on the Indian fauna.

Besides, publications of the "*Butterflies of Malaya Peninsula*" by Corbet & Pendlebury (1978) and Henning (1976) are also valuable contributions to the Indian fauna.

By a conservative estimate, nearly 1450 species of butterflies are known to occur in India, including over 325 species from Garhwal Himalaya, mainly Doon & Mussoorie hills and about 350 species from Kumaon hills. Although stray accounts of the butterfly-fauna from Western Himalaya, are available by Mackinnon & de Niceville (1898) and Ollenbach (1930-31) from Mussoorie; Hannyngton (1910-11) from Kumaon; Stempffer (1952), Bernardi (1952) and Lesse (1952); Arora & Mandal (1977); Mandal & Chaudhury (1977); Chaturvedi (1981); and Mandal (1984), from Garhwal Himalaya but the present compilation is a consolidated account on the butterfly fauna from the whole of Western Himalaya in the Uttar Pradesh covering eight districts viz., Dehra Dun, Tehri, Pauri, Uttarkashi and Chamoli in Garhwal, and Almora, Nainital and Pithoragarh in Kumaon hills. This account includes the named collections at Z.S.I. headquarters and at Regional Station, Dehra Dun and also the species recorded from the literature.

The Zoological Survey of India participated in a number of expeditions, namely Indo-Swiss Expedition in the year 1958 and surveyed mainly Chamoli district of the Himalaya; in the Indian Tons Valley Expedition, in collaboration with Anthropological Survey of India and Mountaineering Club "Dutagar", Culcutta, in Uttarkashi, in the year 1972; and Indian Kalidhang Expedition-1974 to Western Himalayas, mainly Uttarkashi. The Northern Regional Station, Dehra Dun, further systematically surveyed all the eight districts of U.P. Himalaya, in almost all the seasons of the year. Thus, the collection of butterflies and account thereof, of 223 spp. and subspp. present a very interesting compilation. It may be mentioned here that not much attention has been paid recently to collect the butterfly-fauna from Mussoorie & Doon proper, since these have been extensively surveyed and results are already known. And with a view to fill up the existing gaps, the attention was given for the survey and collection of various species & subspp. from those areas of Western Himalaya where the faunistic surveys were not conducted.

This account not only presents new altitudinal records, morphological variations, etc., but also new period of occurrence. Infact, several species were collected from the freezing cold weather conditions in the month of January from Kumaon hills, and are of ecological interest.

It is not out of place to mention here that the butterfly fauna, depending mainly on the floristic element available in Himalaya, is greatly affected by other important factors like climate, rainfall, temperature, etc. Western Himalaya, including these areas, receive less rainfall during monsoon, compared to that in North Eastern Himalaya which receives a heavy rainfall during each monsoon period. As a result, the vegetation, climate and temperature are quite different in the eastern and western Himalayas. Wynter Blyth (1957) recorded as many as 835 species from eastern Himalaya, and 415 species from Western Himalaya.

The present studies cover only 223 spp. & subspp. distributed over nine families viz., Papilionidae, Pieridae, Danaidae, Satyridae, Acraeidae, Nymphalidae, Erycinidae, Lycaenidae and Hesperidae. The only family which has been left out is Amathusiidae which does not occur in Western Himalaya. Although the account is far from complete, yet it is hoped, further surveys will reveal several additional records

and will help identifying further the Western Himalayan fauna. The brief outlines of each family is given hereunder:

PAPILIONIDAE : Majority of the species are fond of visiting and feeding on flowers : some like sitting on damp ground near puddles and others simply love basking in the sun. The flights are variable but rapid and sudden, if disturbed. They are predominantly black or dark brown in colour, except the species of *Parnassius* which are predominantly white and are found in high altitudes in the Himalaya.

PIERIDAE : Most of the species prefer open places. Males generally prefer sun-shine while the females love shaded areas. They are predominantly yellow and white in colour and they settle on damp ground or near puddles either singly or congregating together often in association with a specimen of Papilionidae. Flights are usually very slow and sluggish, but fast flying species are also met with in the field, and are also seen settling on flowers.

DANAIDAE : All species visit flowers or settle on damp ground including the ground damped with urine. They also have the habit of settling on flowers, over-ripe fruits or congregate on herbs or shrubs. Flights are usually very slow and when caught also feign death. These are among the toughest butterflies and need a very long and persisting pressure at the thorax to be killed. Feigning death also helps them to fly away as soon as these are released from the pressure.

SATYRIDAE : Predominantly brown in colour, the species are weak fliers, with slow, jerky or bouncing movements, rather close to the ground particularly littered with dead and fallen leaves. But there are some species which prefer open meadow and grass lands, abound with small herbs or shrubs. Most of the species do not visit flowers but are attracted to over-ripe fruits.

ACRAEIDAE : The species are fond of settling on flowers and leaves. Predominantly, the species belonging to this family are tawny yellow in colour. Only two species are known to occur in India, out of which, one is occurring in Western Himalaya. The species has evolved a habit of exuding foul smelling oily- yellowish fluid which is distasteful to birds/other predators.

ERYCINIDAE : Generally, all are fond of shady wooded areas, hilly forests and visit areas close to streams or the undergrowth. Flights are very fast and do not like to settle on flowers.

NYMPHALIDAE : Generally, all the species visit flowers, being very fond of sun-shine and basking. Flights are fast and are not easily caught. A large number of them are attracted to over-ripe fruits, dung, or fruit dipped in beer. These species are the most beautiful amongst butterflies.

LYCAENIDAE : Predominantly blue, but other colours like brown, yellow, metallic green or white are not uncommon. The butterflies are very delicate, mainly very slow fliers and found almost everywhere namely, meadow, open grass-lands, shrubs, particularly along paths and clearing in forests. Majority of the species are fond of visiting flowers.

HESPERIIDAE : Predominantly, the species are dark brown with orange, yellow marking or metallic tinge in some species. Generally, all are very tough and fast fliers and cannot be killed by conventional methods of killing but need to be killed in killing Jars. Nearly all the species are small to medium sized, abundant in jungle but are also available in open grass-lands. Some species are crepuscular or even attracted to light at night. Majority of the species are attracted to flowers and feed on them, others settle on ground or in a shaded areas, damp patches or over bird's droppings. Quite a large number of species are fond of basking in sun-shine.

FAUNA OF WESTERN HIMALAYA ECOSYSTEM (U.P.: INDIA)

F A U N A	1	2	3	4	5	6	7	8
CLASS : INSECTA								
ORDER : LEPIDOPTERA								
FAMILY : PAPILIONIDAE								
<i>Pachliopta aristolochiae</i> (Fabr.)	+	-	-	-	-	-	-	+
<i>P.latreillei</i> (Donovan)	-	-	-	-	+	-	-	-
<i>Polydorus dasarada ravana</i> (Moore)	-	+	-	-	-	-	-	-
<i>P.aidoneus</i> (Doubleday)	-	+	-	-	-	-	-	-
<i>P. varuna astorion</i> (Westwood)	-	-	-	-	-	-	+	-
<i>Troides aeacus aeacus</i> (Felder)	-	+	-	-	-	-	-	-
<i>Chilasa agestor govindra</i> (Moore)	-	-	-	-	-	-	+	-
<i>C. clytia clytia</i> (Linn.) form <i>clytia</i>	+	+	-	-	-	-	-	-
<i>Papilio bootes janaka</i> Moore	-	+	-	-	-	-	-	-
<i>P. polytes romulus</i> Cramer	+	+	+	+	+	-	+	-
<i>P. protenor protenor</i> Cramer	-	+	+	+	+	-	-	-
<i>P. rhetenor</i> Westwood							+	-
<i>P. polycctor polycctor</i> Boisduval	+	+		-	-	-	+	-
<i>P. demoleus</i> Linn.	+	+	+	-	-	+	-	-
<i>P. machaon penjabensis</i> Eimer	+	+	-	+	+	+	+	-
<i>P. paris paris</i> Linnaeus	-	-	-	-	-	-	+	-
<i>P. arcturus arius</i> Rothschild	-	-	-	-	-	-	+	-
<i>Graphium nomius nomius</i> (Esper)	+	-	-	-	-	-	-	-
<i>G. cloanthus</i> (Westwood)	+	+	-	-	+	+	-	-
<i>G. eurous caschmirensis</i> (Rothschild)	-	-	-	-	-	-	+	-
<i>G. sarpedon</i> (Linn.)	-	+	-	-	-	-	-	-
<i>G. doson axion</i> (Felder)	-	-	-	-	-	-	+	-
<i>Parnassius charltonius</i> Gray	-	-	-	-	-	-	+	-
<i>P. jacquemontii jacquemontii</i> Boisduval	-	-	-	-	-	-	+	-
<i>P. epaphus cachemirienis</i> Oberthur	-	-	-	-	-	-	+	-
<i>P. hardwickei hardwickei</i> Gray		-	-	-	-	-	+	-
<i>P. stoliczkanus florenciae</i> Tytler		+			-	-	+	-

	1	2	3	4	5	6	7	8
FAMILY : PIERIDAE								
<i>Leptosia nina nina</i> (Fabr.)	+	-	-	-	-	+	-	-
<i>Baltia butleri butleri</i> (Moore)	-	-	-	-	-	-	+	-
<i>Metaporia agathon phryxe</i> (Boisd.)	-	-	-	-	+	-	-	-
<i>M. a. caphusa</i> (Moore)	+	+	-	-	+	+	-	-
<i>M. a. ariaca</i> (Moore)	-	-	-	-	-	-	+	-
<i>M. leucodice soracta</i> Moore	-	-	-	-	-	+	-	-
<i>Mesapia peloria</i> (Hewitson)	-	-	-	-	-	-	+	-
<i>Aporia nabellica</i> (Boisd.)			-		-	-	+	-
<i>Delias belladonna horsfieldi</i> (Gray)	+	+			-		+	-
<i>D. eucharis</i> (Drury)	-	+	-	-	-	+	-	-
<i>D. sanaca sanaca</i> (Moore)	-	+	-	-	-	-	-	-
<i>D. hyparete indica</i> (Wallace)	-	-	-	-	-	-	+	-
<i>Anapheis aurota</i> (Fabr.)	+	-	-	-	-	+	-	-
<i>Cepora nerissa phryne</i> (Fabr.)	+	-	-	-	-	+	-	-
<i>Appias lalage</i> (Doubleday)	-	-	-	-	-	-	-	+
<i>A. libythea</i> (Fabr.)	+	-	-	-	-	-	-	-
<i>Artogeia canidia indica</i> (Evans)	+	+	+	+	+	+	+	+
<i>Pieris brassicae nepalensis</i> Doubleday	+	+	+	-	+	-	-	-
<i>P. callidice kalora</i> (Moore)	-	+	-	-	-	-	-	-
<i>P. napi ajaka</i> Moore	-	-	-	-	-	-	+	-
<i>Pontia daplidice moorei</i> (Rober)	-	+	-	-	-	-	-	-
<i>P. choridice alpina</i> (Verity)		+			-	-		-
<i>Ixias marianne</i> (Cramer)	+	+				+		-
<i>Euchloe ausonia daphalis</i> (Moore)		-	-	-	-	-	+	-
<i>Valeria valeria hippia</i> (Fabr.)	+	+	+	-	-	+	-	-
<i>Catopsilia crocale</i> (Cramer)	+	+	+	-	-	-	-	+
<i>C. pyranthe</i> (Linn.)	+	+	+	-	-	+	+	+
<i>Gonepteryx rhamni nepalensis</i> Doubleday	+	+	+	+	+	+	-	+
<i>G. mahaguru</i> (Gistel)	+	-	-	-	-	-	-	-

	1	2	3	4	5	6	7	8
<i>L. baladeva aisa</i> Fruhstorfer	-	-	-	-	-	-	+	-
<i>L. insana insana</i> (Koll)	-	-		-	-	-	+	-
<i>L. kansa</i> (Moore)	-	-	-		-	-	+	-
<i>L. rohria rohria</i> (Fabr.)	-	+	-	-	-	-	-	-
<i>L. verma verma</i> (Kollar)	+	-	-	-	-	+	-	-
<i>Pararge schakra</i> (Kollar)	+	+	-		+	-	-	-
<i>P. maerula maerula</i> (Felder)	-	-	-	-	-	-	+	-
<i>Rhaphlicera moorei moorei</i> Butler	+	-	-	-	-	-	-	+
<i>Aulocera brahminus</i> (Blanchard)	+	-	-	+	+	-	-	-
<i>A. b. dokwana</i> Evans	-	+	-	-	-	-	+	-
<i>A. padma padma</i> (Kollar)	+	-	-	+	+	-	-	-
<i>A. p. loha</i> Doherty					-		+	-
<i>A. swaha</i> (Kollar)	+			+	+		-	-
<i>A. saraswati</i> (Kollar)	+	-	-	-	+	-	-	-
<i>Callerebia nirmala nirmala</i> (Moore)	+	-	-	-	-	-	+	-
<i>C. kalinda kalinda</i> Moore	-	-	-	-	-	-	+	-
<i>C. shallada shallada</i> Marshall & deN.	-	-	-	-	-	-	+	-
<i>C. scanda scanda</i> (Kollar)	+	+	-	+	+	-	-	-
<i>C. hybrida</i> Butler	+	-	-	-	-	-	-	-
<i>C. annada caeca</i> (Watkins)	+	+	-	-	-	-	-	-
<i>C. hyagriva</i> (Moore)	+	-	-	-	-	-	-	-
<i>Ypthima asterope mahiratta</i> Moore	-	+	-	-	+	-	-	-
<i>Y. sakra nikaea</i> Moore	-	+	-	+	-	+	-	-
<i>Y. ceylonica kasmira</i> Moore	+	+	-	-	-	-	-	-
<i>Y. nareda nareda</i> (Kollar)	-	+	-	-	-	-	+	-
<i>Y. indecora</i> Moore			-	-	-	-	+	-
<i>Y. baldus baldus</i> (Fabr.)		+					-	-
<i>Melanitis leda ismene</i> (Cramer)	+	+	-	-	-	+	-	+
<i>M. phedima galkissa</i> Fruhstorfer	-	-	-	-			+	-
<i>M. zitenius zitenius</i> (Herbst)	-	-	-	-	-	-	+	-
<i>Elymnias hypermnestra undularis</i> (Drury)	+	-	-	-	-	+	-	-

	1	2	3	4	5	6	7	8
<i>E. patna patna</i> (Westwood)	-	-	-	-	-	-	+	-
<i>Maniola pulchra pulchra</i> (Felder)	-	-	-	-	-	-	+	-
<i>M. davendra davendra</i> (Moore)	-	-	-	-	-	-	+	-
<i>Hipparchia parisatis shiva</i> (LeCerf)	-	-	-	-	-	-	+	-
<i>Oeneis buddha garhwalica</i> Tytler	-	+	-	-	-	-	-	-
FAMILY : ERYCINIDAE								
<i>Libythea celtis</i> Fuessly						+	-	-
<i>L. myrrha</i> Godart	+	+	-	-	-	+	-	+
<i>L. lepita</i> Moore	-	+	+	-	-	-	-	-
<i>Dodona durga</i> (Kollar)	+	+	-	-	-	+	+	-
<i>D. dipoea</i> Hewitson	-	-	-	-	-	+	-	-
<i>Zemerus flegyas</i> Cramer	-	+	+	-	-	-	-	+
FAMILY : NYMPHALIDAE								
<i>Sephisia dichroa</i> (Kollar)	-	-	-	-	-	+	-	-
<i>Athyma asura</i> Moore	-	+	-	-	-	-	-	-
<i>A. opalina</i> (Kollar)	+	+	+	-	+	+	-	+
<i>A. perius</i> (Linnaeus)	+	+	-	-	-	-	-	-
<i>A. zeroa</i> (Moore)	-	-	-	-	-	-	+	-
<i>Pantoporia hordonia</i> Stoll	+	-	-	-	-	-	-	-
<i>Neptis hylas astola</i> Moore	+	+	+	-	-	+	-	-
<i>N. mahendra</i> Moore	+	+	+			-	-	-
<i>N. yerburyi</i> Butler	+	+	-	+	-	-	-	-
<i>N. sankara</i> (Kollar)	-	-	-	-	+	-	-	-
<i>N. vikasi pseudovikasi</i> (Moore)	-	-	-	-	-	-	+	-
<i>N. radha</i> Moore		-	-		-	-	+	-
<i>Phaedyma columella</i> Cramer	+	-	-	-	-	-	-	-
<i>Cyrestis thyodamas</i> Boisduval	+	+	-	+	+	+	-	+
<i>Hypolimnias bolina</i> (Linn.)	+	+	-			+	-	+
<i>H. misippus</i> (Linn.)	+	+	-	-	-	-	-	-
<i>Pseudergolis wedah</i> Kollar	-	+	-	-	-	-	-	-
<i>Kallima inachus</i> Boisduval	+	+	-	-	-	-	-	-

	1	2	3	4	5	6	7	8
<i>Lampides boeticus</i> (Linn.)	-	-	-	-	+	-	-	-
<i>Lycaena pavana</i> (Kollar)		+		+	+	+	-	+
<i>L. phlaeas</i> (Linn.)				+	+	-	-	-
<i>Heliophorus sena</i> (Kollar)	+	+	+	+	+	+	-	+
<i>H. androcles coruscans</i> Moore	-	-	-	-	+	-	-	-
<i>H. epicles indicus</i> Fruhstorfer	-	-	-	-	-	-	+	-
<i>H. brahma</i> Moore	-	-	-	-	-	-	+	-
<i>H. tamu</i> Kollar	-	-	-	-	-	-	+	-
<i>Curetis dentata</i> (Moore)	+	-	-	-	-	-	-	-
<i>Arhopala amantes</i> (Hewitson)	+	-	-	-	-	-	-	-
<i>A. dodonea</i> Moore	-	-	-	-	-	-	+	-
<i>Panchala ganesa</i> Moore	-	-	-	-	-	-	+	-
<i>Loxura atymnus</i> (Cramer)	+	-	-	-	+	-	-	-
<i>Albulina pheretes lehanus</i> (Moore)	-	-	-	-	+	-	-	-
<i>A. galathea</i> Blanchard	-	+	-	+	-	-	-	-
<i>Celastrina argiollus kollari</i> Westwood			-	+	-		-	-
<i>C. ladonides gigas</i> Hemming				-	-	+	+	-
<i>C. huegelli</i> (Moore)	+	+	+	-	+	-	-	-
<i>C. marginata</i> deN.	-	-	-	-	-	-	+	-
<i>Polyommatus icarus chitralensis</i> Swinhoe	-	-	-	+	-	-	-	-
<i>P. eros dux</i> Riley	-	-	-	+	-	-	-	-
<i>Aricia astrache</i> Bergs.	-	-	-	-	-	-	+	-
<i>Zizeeria maha</i> (Kollar)	+	+	-	+	-	-	-	-
<i>Poritia hewitsoni</i> Moore	-	-	-	-	-	-	+	-
<i>Allotinus multistrigatus</i> deN.	-	-	-	-	-	-	+	-
<i>Spalgis epius</i> (Westwood)	-	-	-	-	-	-	+	-
<i>Everes argiades</i> (Pallas)	-	-	-	-	-	-	+	-
<i>Megisba malaya</i> (Horsfield)	-	-	-	-	-	-	+	-
<i>Nacaduba aluta coelestis</i> deN.	-	-	-	-	-	-	+	-
<i>N. dana</i> deN.	-	-	-	-	-	-	+	-
<i>Chaetoprocta odata</i> Hewitson			-	-	-	-	+	-

	1	2	3	4	5	6	7	8
<i>Thecla icana</i> Moore							+	-
<i>T. bieti</i> Oberthur			-	-	-	-	+	-
<i>T. ataxus</i> (Doubleday & Hewitson)	-	-	-	-	-	-	+	-
<i>T. birupa</i> Moore	-	-	-	-	-	-	+	-
<i>T. syla</i> Koller	-	-	-	-	-	-	+	-
<i>T. ziha</i> (Hewitson)	-	-	-	-	-	-	+	-
<i>Spindasis elwesi</i> Riley	-	-	-	-	-	-	+	-
<i>Ancema ctesia</i> (Hewitson)	-	-	-	-	-	-	+	-
<i>Tajuria yajna</i> (Doherty)	-	-	-	-	-	-	+	-
<i>T. melastigma</i> deN.	-	-	-	-	-	-	+	-
<i>Cheritra freja</i> (Fabr.)	-	-	-	-	-	-	+	-
<i>Ticherra acte</i> (Moore)	-	-	-	-	-	-	+	-
<i>Rapala selira</i> moore	-	-	-	-	-	-	+	-
<i>R. jarbus sorya</i> Kollar	-	-	-	-	-	-	+	-
FAMILY : HESPERIIDAE								
<i>Potanthus dara</i> Kollar	+	+		-	+	-	-	-
<i>Tagiades atticus</i> (Fabr.)	+	-	-	-	-	-	-	-
<i>Sarangesa purendra</i> (Moore)	-	-	-	-	-	-	+	-
<i>Oriens gola</i> (Moore)	-	-	-	-	-	-	+	-
<i>Gegenes nostradamus</i> (Fabr.)	-	-	-	-	-	-	+	-

REFERENCES

- ARORA, G.S. & MANDAL, D.K., 1977. On scientific results of Swiss Zoological Expedition to India. Part I. Butterflies of Garhwal District (U.P.: India). *Newsl. zool. Surv. India*, 3 (4) : 299-234.
- ARORA, G.S., MANDAL, D.K. & CHAUDHURY, M., 1977. On scientific results of Swiss Zoological Expedition to India. Part II. Moths of Garhwal District (North-Western Himalayas). *Newsl. zool. Surv. India*, 3 (4) : 388-395.
- BELL, T.R. 1909-1914. The common butterflies of the plains of India. *J. Bombay nat. Hist. Soc.*, 19: 16-58; 20: 115-136; 21: 517- 544, 710-760, 1131-1157; 22: 92-100, 320-344, 517-531; 23: 73-103.
- BERNARDI, G. 1952 Lepidopteres recoltés par A. Barbezat au cours de l'expédition Lyonnaise - 1951 au Garhwal. *Bull. mens. Soc. linn. Lyon*, 21 (4) IV. PAPILIONIDAE : 251-256; (5) V. PIERIDAE : 256-258; (6) VI. HESPERIIDAE : 258-259.

- BINGHAM, C.T. 1907. *The Fauna of British India, including Ceylon and Burma (Butterflies)*, 1: xviii+537, 15 pls. (Published by Taylor and Francis Ltd., London).
- BINGHAM, C.T. 1907. *The Fauna of British India, including Ceylon and Burma (Butterflies)*, 2: viii+480 pp, 11-20 pls. (Published by Taylor and Francis Ltd., London).
- CANTILE, K. 1962. *THE Lycaenidae Portion (except the Arhopala Group) of Brigadier Evans. The Identification of Indian Butterflies, 1932.*, vi+156 pp., index+12pp., 5 pls. (Published by the Bombay Natural History Society, Bombay).
- CHATURVEDI, N. 1981. Some entomological notes from a visit to the Valley of Flowers. - *J. Bombay Nat. Hist. Soc.*, 78 (2) : 402-405
- CORBET, A.S. and PENDLEBURY, H.M. 1978. *The Butterflies of the Malay Peninsula*: 3rd edition, x+537 pp., 55 pls. (Published by Oliver and Boyd, Edinburg; Tweeddale Court, London: 39 A Welbeck Street, W.I).
- DOHERTY, W., 1886. A List of butterflies taken in Kumaon. *J. Asiat. Soc. Beng.*, 55 (2) : No. 3, pp. 103-140.
- ELIOT, J.N. 1969. An analysis of the Eurasian and Australian Neptini (Lepidoptera: Nymphalidae). *Bull. Br. Mus. (N.H.) Ent.* 15: 155 pp., 3pls.
- ELIOT, J.N 1973. The higher classification of Lycaenidae. *Bull. Br. Mus. (N.H.) Ent.* 28: 373-505.
- EVANS, W.H. 1932. *The Identification of Indian Butterflies*, 2nd ed: 454 pp., 32 pls. (Published by Bombay Natural History Society, Bombay).
- EVANS, W.H. 1949. *A Catalogue of the Hesperidae from Europe, Asia and Australia in the British Museum (Natural History)*. The British Museum (N.H.), London: 502 pp., 53 pls.
- EVANS, W.H. 1954. A revision of the genus *Curetis*. *Entomologist*, 87: 190-194; 212-216; 241-247.
- EVANS, W.H. 1957. A revision of Arhopala group of Oriental Lycaenids (Lepidoptera: Rhopalocera), *Bull. Br. Mus. (N.H.) Ent.*, 5 : 85-141.
- FABRICIUS, J.C. 1777. *Systema Entomologiae*, Hovinae 832 pp.,
- FIELD, WILLIAM D. 1971. Butterflies of the genus *Vanessa* and of the resurrected Genera *Bassaris* and *Cynthia* (Lepidoptera: Nymphalidae). *Smithson. Contr. Zool.* No. 84 : 105 pp.
- HANNYNGTON, F., 1911. The butterflies of Kumaon. *J. Bombay nat. Hist. Soc.*, 20 (3): 871-872.
- HEMMING, F. 1967. The Generic names of the butterflies and their type-species (Lepidoptera: Rhopalocera). *Bull. Br. Mus. (N. H.) Ent.*, London, Supplement 9 : 509 pp.
- KOLLAR, V. 1844. Lepidoptera in C.F. Von Hugel "Kaschmir Und Das Reich der Siek, Stuttgart, 4(2):
- LANG, A.M. & MOORE, F., 1864. Notes on the diurnal Lepidoptera of North-Western India. *Entomologist's mon. Mag.*, 1: 101-104, 131-133, 181-183.
- LESSE, de, H. 1952. Lepidopteres recoltés par A. Barbezat au Cours de l'expédition Lyonnaise 1951 au Garhwal. III NYMPHALIDAE. - *Bull. mens. Soc. Linn.* 21(3) : 203-206
- LINNAEUS, C. 1758. *Systema Naturae Regnum Animale*, 10th ed. Holmine, London, v+824 pp.; 12th ed. (1967): 833 pp.

- KAWAZOE, A. and WAKABAYASHI, M. 1977. *The Butterflies of Japan*.- vii+422 pp., Japan (Hoikusha Pub. Co.).
- MACKINNON, P.W. and DE NICEVILLE, L., 1897. A list of butterflies of Mussoorie in the Western Himalayas and neighbouring region. *J. Bombay nat. Hist. Soc.* 11 : 205-221.
- MACKINNON, P.W. & de NICEVILLE, L. 1898. A list of butterflies of Mussoorie in the Western Himalayas and neighbouring region. *J. Bombay nat. Hist. Soc.*, 11: 368-389, 585-605, pls.
- MANDAL, D.K. 1984. Account of the Indian Tons Valley Expedition 1972. With an annotated list of species and redescription of *Colias electo* Menetries (Order Lepidoptera) from the Indian Palaearctic Region. - *Rec. zool. Surv. India Occ. Pap.*, 57 : 1-31
- MANDAL, D.K. and CHAUDHURY, M. 1977. On a collection of butterflies (Lepidoptera: Rhopalocera) of the Indian Kalidhang Expedition- 1974. *Newsl. zool. Surv. India*, 3 (6): 341-345.
- MARSHALL, G.F.L. and de NICEVILLE, L. 1882. *The Butterflies of India, Burma and Ceylon*, 1: vii+327 pp., 1-17 pls.
- MOORE, F. 1890-1907. *Lepidoptera Indica* Vol. I-VII.
- NICEVILLE, L.de. 1886. *The butterflies of India, Burma and Ceylon*, 2 : iv+332 pp., pls. xviii-xxiv; 1890, 3: xii+503 pp, pl. XXV-XXIX
- OLLENBACH, O.C. 1930-1931. Butterflies collecting grounds at Mussoorie (U.P.) - *J. Bombay nat. Hist. Soc.*, 34: 836-840.
- NOVAK, I. 1987. *Butterflies and Moths*, Prague, 1-352 pp. (Czechoslovakia)
- STEMPFER, H. 1952, *Lepidopteres recoltés par A. Barbezat au Cours de l'expédition Lyonnaise 1951 au Garhwal. II. LYCAENIDAE.* *Bull. mens. Soc. Lyon*, 21 : 181-184
- SWINHOE, C. 1909-1913. *Lepidoptera Indica*.
- TALBOT, G. 1939. *The Fauna of British India including Ceylon and Burma* (Butterflies), 1: xxix+600 pp., 2 pls., 1 map. (Published by Taylor and Francis, London).
- TALBOT, G. 1947. *The Fauna of British India including Ceylon and Burma* (Butterflies), 2: xv+506 pp., 2 pls., 1 map. (Published by Taylor and Francis, London).
- WYNTER-BLYTH, M.A 1957. *Butterflies of the Indian Region* : xx+523 pp., 72pls. (Published by Bombay Natural History Society, Bombay).
- WYNTER-BLYTH, M.A 1963. Note on the *Curetis* sp. of Kollar. *J. Bombay .nat. Hist. Soc.*, 43: 671-672.
- TITE, G.E. 1959. The genus *Catochrysops*. *Entomologist*, 92 : 201- 212.
- TITE, G.E 1963. A synonymic list of the genus *Nacaduba* and allied genera. *Bull. Br. Mus. (N.H.) Ent.*, 13: 69-116.

TRICHOPTERA

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The Trichoptera or caddis flies, one of the largest groups of aquatic insects are generally aquatic in immature stages and they are abundant in freshwaters. Caddis flies occur in streams, rivers, lakes, ponds, pools, etc. The adults are entirely terrestrial and resemble small moths. The body particularly the wings are covered with short hairs and therefore, the name Trichoptera (trichos, hair, pteron, wing) has been derived. The larvae feed on algae, fungi and bacteria on decaying leaves, fine organic particles and small invertebrates but the adults feed on liquids. The trichopterans are found in all faunal regions except the Antarctic. Though the Trichoptera is generally not recognised as insects of economic importance, they play a very important ecological role in freshwater. Due to the broad trophic habits of the larvae, they take an important part in energy transfer at several levels in aquatic ecosystem and are therefore significant in the nutrition and management of fish, water fowl and other aquatic vertebrates. Amongst a total of more than 7000 species from the whole world and about 812 species known from India, 60 species are known from Western Himalaya under the jurisdiction of Uttar Pradesh. A total of about 38 families have been reported so far from the whole world out of which 18 families are recorded from India. Altogether the material belonging to 13 families of Trichoptera from Western Himalayan belt of U.P. hitherto is known.

Though the work of the Indian Trichoptera started a little before the 19th Century the major work on the group from India was carried out in early and later part of this Century. Some of the important contributions namely, Betten (1909), Martynov (1935- 1936), Schmid (1959, 1965, 1968, 1970, 1972) may be referred to.

They also made valuable contribution on the trichopteran fauna of Western Himalaya. It may be mentioned that the work on this group of insects is far from complete from India as the group has received little attention in the past. Very recently the work has been initiated in the Zoological Survey of India. However, the brief informations on each family known from the Western Himalaya belt of Uttar Pradesh are furnished hereunder:

Rhyacophilidae : It is the most primitive family and found in all Zoogeographical regions of the globe excepting for the Australian, Neotropical and Ethiopian Regions. The larvae are entirely free-living, generally predacious and found in cool running waters. Amongst a total of about 450 species from the whole world, 28 species belonging to two genera, namely, *Rhyacophila* and *Himalopsche* are known from the area under consideration.

Phrygaenidae : It includes the largest trichoptera with a total length of about 40 mm. (Wings in folded condition). The larvae construct the cases with leaf or bark pieces. They are predacious and detritivorous and also found mainly in lakes, streams and temporary pools. This family is confined to the Nearctic, Palaearctic and Oriental regions. Amongst a total of about 70 species hitherto known from the whole world only one species of the genus *Eubasilissa* is recorded from the area.

Calamoceratidae : The larvae are found in the reduced current of streams, lakes and swamps and are generally detritivorous. The larval case consists of leaf or bark pieces or of twigs hollowed out by the larvae.

This family is represented in all the Zoogeographical regions of the globe. Amongst a total of about 100 species from the whole world only one species in the Genus *Ganonema* is so far recorded from U.P. belt of Western Himalaya.

Hydropsychidae : The larvae live in fixed shelters of plant and rock fragments on rocks or logs and construct a selenite net of different mesh sizes of food items. They feed on algae, organic particles and invertebrates. This family occurs in all faunal regions. Amongst a total of about 900 species from the whole world, only 5 species in 4 genera, namely, *Amphipsyche*, *Diplectrona*, *Hydropsyche* and *Cheumatopsyche* are recorded from Western Himalaya belt of U.P.

Sericostomatidae : The larvae are found either in stagnant or flowing waters. They are detritivorous and construct the curved larval cases consisting of fine rock fragments. Excepting for the Australian region, this family is represented in all faunal regions. Amongst a total of 100 species from all over the world, only 2 species belonging to two genera, namely, *Dinarthum* and *Dinarthrodes* are recorded from the area.

Glossosomatidae : The larvae are found in running waters and they construct the domeshaped larval cases resembling the tortoise shells. They feed on algae and fine organic particles. This family is represented in all faunal regions. Amongst a total of about 400 species from the whole world only two species in two genera namely, *Agapetus* and *Glossosoma* are recorded from the Western Himalaya belt of U.P.

Stenopsychidae : The larvae are found in flowing rivers with strong current and live in stout shelters of stones. They feed on insects and algae. This family is represented in Oriental, Australian, Ethiopian and Palaearctic regions of Asia. Amongst a total of about 70 species from all over the world, only one species under the genus *Stenopsyche* is known from the area.

Uenoidea : The larvae are slender, gregarious in habit and scrape algae and fine organic particles. They are found on rocks and their habitat is rapid streams. This family is known from the Himalayas, Japan and Western North America. Amongst a total about 25 species from the whole world, only one species under the genus *Uenoa* is recorded from the concerned area.

Leptoceridae : The larvae are omnivorous and the majority crawl on rock or plant substrates. The larval cases consist of rock or plant materials. They are found in all faunal regions. Amongst a total of 800 species from all over the world, only a single species under the genus *Mystacides* is so far reported from U.P. belt of Western Himalaya.

Limnephilidae : The larvae feed mainly on detritus and their habitat is running or stagnant water of temporary pools or brackish water. This family is reported from Palaearctic, Ethiopian, Oriental, Nearctic, Neotropical and Australian Regions. Amongst a total of about 1000 species from the world only two species under the genus *Apatania* is known from Western Himalayan belt of U.P.

Hydrobasidae : The larvae are predacious and free-living. The habitat is running waters. This family is reported from Palaearctic (Asia) Oriental, Nearctic, Neotropical and Australian regions. Out of a total of about 150 species from the world only one species under the genus *Apsilochorema* is known from the area.

Psychomyiidae : The larvae construct fixed tubes of silk covered with particles of sand and detritus on rocks or logs. The larvae feed mainly on organic particles and their habitat is cool running water. This family is represented in all faunal regions except the Australian and Neotropical. Amongst a total of about 150 species known from the world only 3 species under the genus *Tinodes* are known from Western Himalayan belt of U.P.

Philopotamidae : The larvae live in sea-like silken nets on rock. The habitat is running water. They feed on algae and other organic particles. The family occurs in all Zoo-Geographical regions. There are approximately 400 species known from the world of which 4 species under the genera *Chimarra* and *Dolophilodes* are known from the area.

DISTRICT-WISE LIST OF SPECIES OF TRICHOPTERA (INSECTA)

FAUNA	1	2	3	4	5	6	7	8
Family RHYACOPHILIDAE								
1. <i>*Rhyacophila hobsoni</i> Martynov	-	+	-	-	-	-	-	-
2. <i>*R. ngulpa</i> Schmid	-	-	+	-	-	-	-	-
3. <i>*R. churongpa</i> Schmid	-	-	-	-	-	-	+	-
4. <i>R. chembo</i> Schmid	-	+	-	-	-	-	-	-
4a. <i>*R. chembo lartsepa</i> Schmid	-	-	+	-	-	-	-	-
5. <i>*R. stenostyla</i> Martynov	-	+	-	-	-	-	-	-
6. <i>R. bhotia</i> Schmid	-	+	+	-	-	-	-	-
7. <i>R. tsetangpa</i> Schmid	-	-	+	-	-	-	-	-
8. <i>R. sakyapa</i> Schmid	-	-	+	-	-	-	-	-
9. <i>R. kadaphes</i> Schmid	-	-	+	-	-	-	-	-
10. <i>R. kanichka</i> Schmid	-	-	+	-	-	-	-	-
11. <i>R. kedara</i> Schmid	-	-	+	-	-	-	-	-
12. <i>R. lhakpa</i> Schmid	-	-	+	-	-	-	-	-
13. <i>R. obscura</i> Martynov	-	-	-	-	-	-	-	-
14. <i>R. similis</i> Martynov	-	+	-	-	-	-	-	-
15. <i>R. tungpa</i> Schmid	-	-	+	-	-	-	-	-
16. <i>R. choprai</i> Martynov	+	+	-	-	-	-	-	-
17. <i>R. khasiorum</i> Schmid	-	-	+	-	-	-	-	-
18. <i>R. paurava</i> Schmid	-	-	+	-	-	-	-	-
19. <i>R. shakongpa</i> Schmid	-	-	-	-	-	-	+	-
20. <i>*R. bidens</i> Kimins	-	+	-	-	-	-	-	+
21. <i>*R. sikungpa</i> Schmid	-	-	+	-	-	-	-	-
22. <i>R. zhungpa</i> Schmid	-	+	-	-	-	-	-	-
23. <i>R. trulungpa</i> Schmid	-	-	+	-	-	-	-	-

	1	2	3	4	5	6	7	8
24. <i>R. kando</i> Schmid	-	-	+	-	-	-	-	-
25. <i>R. drokpa gurla</i> Schmid	-	+	-	-	-	-	-	-
26. <i>R. pinalis</i> Martynov	-	+	-	-	-	-	-	-
27. * <i>R. dilatata</i> Martynov	-	+	-	-	-	-	+	-
28. <i>Himalopsyche bhagirathi</i> Schmid	-	-	+	-	-	-	-	-
29. <i>H. lungma</i> Schmid	-	-	+	-	-	-	-	-
30. <i>H. digitata</i> Martynov	-	-	+	-	-	-	-	-
31. <i>H. todma</i> Schmid	-	-	+	-	-	-	-	-
32. <i>H. hierophylax</i> Schmid	-	-	+	-	-	-	-	-
33. <i>H. angnorbui</i> Schmid	-	-	+	-	-	-	-	-
Family : PHILOPOTAMIDAE								
34. <i>Chimarra oberrans</i> Martynov	-	-	-	-	-	-	+	+
35. <i>C. digitata</i> Martynov	-	-	-	-	-	-	-	+
36. <i>C. kumaonensis</i> Martynov	-	-	-	-	-	-	-	+
37. <i>Dolophilodes indicus</i> Martynov	-	-	-	-	-	-	-	+
Family : PHRYGAENIDAE								
38. <i>Eubasilissa wigginsii</i> Ghosh & Ehaudhury	-	+	-	-	-	-	-	-
Family CALMOCERATIDAE								
39. <i>Ganonema salsum</i> Betten	-	-	-	-	-	-	-	+
40. <i>Asotocerus fuscipennis</i> (Albarda)	-	-	-	-	-	-	+	
Family HYDROPSYCHIDAE								
41. <i>Amphipsyche indica</i> Martynov	-	+	-	-	-	-	-	-
42. <i>Diplectrona marginata</i> (Betten)	+	-	-	-	-	-	-	-
43. <i>Hydropsyche pallidipennis</i> Martynov	-	-	-	-	-	-	-	-
44. <i>H. kasanakovi</i> Martynov	+	+	-	-	-	-	-	-
45. <i>Cheumatopsyche truncata</i> Martynov	+	-	-	-	-	-	-	-
Family SERICOSTOMATIDAE								
46. <i>Dinarthrum punjabicum</i> Martynov	+	-	-	-	-	-	-	-
47. <i>Dinarthrodes inequalis</i> Martynov	-	-	-	-	-	-	-	+
Family GLOSSOSOMATIDAE								
48. <i>Agapetus triangularis</i> Martynov	-	-	-	-	-	-	-	+
49. <i>Glossosoma fissum</i> Martynov	+	+	-	-	-	-	-	-
50. <i>Glossosoma (Lipoglossa) abhisares</i> Schmid	-	-	+	-	-	-	-	-
Family STENOPSYCHIDAE								
51. <i>Stenopsyche haimavatika</i> Schmid	-	-	+	-	-	-	-	-

	1	2	3	4	5	6	7	8
Family UENOIDAE								
52. * <i>Uenoa hiberna</i> Kinmins		+	-	-	-	-	-	-
Family LEPTOCERIDAE								
53. * <i>Mystacides indica</i> Martynov	-	-	-	-	-	-	-	+
Family LIMNEPHILIDAE								
54. * <i>Apatania avyddhagada</i> Schmid	-	-	+		-	-	-	-
55. * <i>A. charadija</i> Schmid	-	-	-	-	-	-	+	+
Family HYDROBIOSIDAE								
56. * <i>Apsilochorema tigmate jaman</i> Schmid	-	-	+	-	-	-	-	
Family PSYCHOMYIIDAE								
57. * <i>Tinodes akantaka</i> schmid		+					-	-
58. * <i>T.prithulavi</i> Schmid		+	-		-	-	-	-
59. * <i>T.utchunalinga</i> Schmid	-	-	+	-	-	-	-	-

'+' denotes species known from the district; - species not available; * species recorded from literature.

REFERENCES

- BETTEN, C. 1909. Notes on Trichoptera in the collection of the Indian Museum. *Rec. Indian Mus.*, 3 : 231-242, pls 14-18.
- MARTYNOV, A. V. 1935. On a collection of Trichoptera from the Indian Museum. Part I. Annulipalpia. *-Rec. Indian Mus.*, 37 : 93-209.
- MARTYNOV, A. V. 1936. On a collection of Trichoptera from the Indian Museum, part II. Integrepalpia. *-Rec. Indian Mus.*, 38 : 239-306.
- SCHMID, F. 1959. Trichoptera du Pakistan paras 1 & 2.-*Tijdschr. Ent.*, Amsterdam, 101 : 181-221, 9 figs., 3 maps, 102 : 231-258, 5 pls.
- SCHMID, F. 1965. Quelques *Himalopsyche* Indiennes (Trichopteres, Rhyacophilidae) .- *Bonn. Zool. Beitr.*, 14 (1963): 206-223.
- SCHMID, F. 1968. La sous famille des Apataniines en inde (Trichoptera : Limnephilidae).- *Can. Ent.*, 100 : 1233-1277, 128 figs.
- SCHMID, F. 1970. Le genre *Rhyacophilia* et la famille des *Rhyacophilidae* (Trichoptera)., *Mem. Ent. Soc. Can.*, no. 66 : 1-230, figs. 7 maps, 13 pls.
- SCHMID, F. 1970. Sur Quelques *Apsilochorema Orientaure* (Trichoptera : Hydrobiosiidae).- *Tijdschr. Ent.*, 113 : 261-271.
- SCHMID, F. 1972. Sur Quelques psychomiines tropicaux (Trichoptera:Psychomyiidae) .-*Naturaliste Can.*, 99 : 143-172, 65 figs.

HYMENOPTERA

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First records and descriptions of Fauna of Hymenoptera from India were made by earlier workers like Linnaeus, De Geer, Fabricius and others. Additions to species were also made by Smith and Walker. Bingham (1897) for the first time gave a full account of Wasps and Bees in his *Fauna of British India Hymenoptera*, Vol. 1 and subsequently (1903) contributed another volume on Ants and Cuckoo-Wasps in his *Fauna of British India Hymenoptera*. Cameron (1889-1909) described a number of new genera and species of Hymenoptera from India, which included some taxa described from the material collected by Rothney and others from Western Himalayan (U.P.). Morely (1913) published an account of the family Ichneumonidae in Volume III of *Fauna of British India Hymenoptera*.

Gupta (V.K.) and his students undertook extensive surveys of Indian states and collected several hundred specimens, from areas including Western Himalaya (U.P). This resulted in publication of series of monographs and research papers on the families Ichneumonidae and Braconidae. The Northern Regional Station of Zoological Survey of India systematically surveyed all the eight districts of Western Himalaya (U.P.) and a good collection of Hymenoptera was built up, which represents new distribution records for a number of species and also some undescribed species.

The present account gives district wise distribution of about 200 species of Hymenoptera under superfamilies Vespoidea (five families), Apoidea (one family), Chalcidoidea (one family), and Proctotrupoidea (five families).

FAUNA	1	2	3	4	5	6	7	8
CLASS : INSECTA								
ORDER : HYMENOPTERA								
FAMILY : TIPHIIDAE								
SUBFAMILY : MYZININAE								
<i>Hylomesa dimidiaticornis</i> (Bingham)					-	-	+	
<i>Mesa dimidiata</i> (Guerin)	+	-	-		-	-	-	-
SUBFAMILY : TIPHIINAE								
<i>Tiphia (Tiphia) davarae</i> Allen	+	-	-	-	-		-	-
<i>T. (T.) tegulita</i> Allen	+	-	-	-		-		
<i>T. (T.) implicata</i> Cameron	+		+			+		
<i>T. (T.) incisa</i> Cameron	+							

	1	2	3	4	5	6	7	8
FAMILY : EUMENIDAE								
<i>Eumenes dimidiatipennis</i> Sauss.	+	+	-	-	-	+	-	-
<i>E. petiolata</i> (Fabr.)	+	-	-	-	-	-	-	-
<i>E. conica</i> (Fabr.)		-	-	-	-	+	-	-
<i>E. esuriens</i> (Fabr.)	+		+			-	-	-
<i>E. exigua</i> Sauss.	+		-		-		-	-
<i>E. edwardsii</i> Sauss.	+	-	-	-	-	-	-	-
<i>E. punctata</i> Sauss.	+	-	-	+	-	-	-	-
<i>Labus</i> sp.	-	-	-	-	+	-	-	-
<i>Montezumia burmanica</i> Bingham	+	-	-	-	-	-	-	-
<i>M. impavida</i> Bingham	+	-	-	-	-	-	-	-
<i>Rhynchium argentatum</i> (Fabr.)	+	+	-	-	-	-	-	-
<i>R. brunneum</i> (Fabr.)	+	-	-	-		+	-	-
<i>Odynerus ceylonicus</i> Sauss.	+	-	-	-	-	-	-	-
<i>O. ovalis</i> Sauss.	+	-	-	-	-	-	-	-
<i>O. multipictus</i> Smith	+	-	-	-	-	-	-	-
FAMILY : VESPIDAE								
<i>Polistes (Nygmpolistes) tenebricosus sulcatus</i> Smith	+	-	-	-	-	-	-	-
<i>Polistes (Megapolistes) olivaceus</i> (De Geer)	+	+	+	+	-	-	+	-
<i>Polistes (M.) rothneyi</i> Cameron	+	-	-	-	-	+	+	-
<i>Polistes (M.) wattii</i> Cameron	+		-		-	-	-	-
<i>Polistes (Polistella) adustus</i> Bingham				-	-	-	+	-
<i>Polistes (P.) maculipennis</i> Saussure	+	+	-	+	+	-	+	+
<i>Polistes (P.) sagittarius</i> Saussure	-	-	-	-	-	+	-	-
<i>Polistes (P.) stigma tamula</i> (Fabr.)	+	-	-	-	-	-	-	-
<i>Ropalidia (Anthreneida) brevitata</i> Das & Gupta	+	-	-	-	-	+	-	-
<i>Ropalidia (A.) colorata colorata</i> van der Vecht	+	-	-	+	-	-	-	-
<i>Ropalidia (A.) cyathiformes</i> (Fabr.)	+	-	-	-	-	-	-	-
<i>Ropalidia (A.) fasciata</i> (Fabr.)	+	-	-	-	-	+	+	-
<i>Ropalidia (A.) jacobsoni jacobsoni</i> (Buysson)	+	-	-	-	-	-	-	-
<i>Ropalidia (A.) marginata marginata</i> (Lepeletier)	-	-	+	-	-	-	-	-
<i>Ropalidia (A.) mathematica nigroplagiata</i> (Cameron)	-	-	-	-	-	+	-	-
<i>Ropalidia (A.) artifex</i> Saussure	+	-	-	-	-	-	-	-
<i>Ropalidia (A.) rufocollaris rufocollaris</i> (Cameron)	-	-	-	-	-	+	-	-
<i>Ropalidia (A.) stigma stigma</i> (Smith)	+	-	-	-	-	+	-	-

	1	2	3	4	5	6	7	8
<i>Ropalidia (A.) variegata variegata</i> (Smith)	+	-	-	-	-	-	-	-
<i>Parapolybia varia</i> (Fabr.)	+	-	-	-	+	-	-	-
<i>Provespa anomala</i> (Saussure)	+	-	-	-	-	-	-	-
<i>Vespa (Vespa) mandarinia magnifica</i> Smith	+	-	-	-	-	-	-	-
<i>Vespa (V.) velutina auraria</i> Smith	+	+	+	+	+	-	-	-
<i>Vespa (V.) basalis</i> Smith	+		+	+	-	-	-	+
<i>Vespa (V.) orientalis</i> Linnaeus	+	-	-	-	-	-	-	-
<i>Vespula flaviceps flaviceps</i> (Smith)	+	-	-	+	+	-	+	-
<i>Vespula orbata orbata</i> (Buysson)	+	-	-	-	-	-	-	-
<i>Vespula structor</i> (Smith)	-	-	-	-	-	-	+	-
FAMILY : POMPILIDAE								
<i>Macromeris violacea</i> Lepeletier	-	-	-	-	-	+	-	-
<i>Auplopus albilabris</i> (Bingham)	-	-	-	-	-	+	-	-
<i>A. laeviculus</i> (Bingham)	+	-	-	-	-	-	-	-
<i>A. frauenfeldiana</i> (Sauss.)	-	-	-	+	-	+	-	-
<i>Salius madraspatanus</i> (Smith)	+	-	-	-	-	-	-	-
<i>S. rothneyi</i> Cameron	+	-	-	-	+	-	-	-
<i>S. perplexus</i> (Smith)	-	+	+	-	-	-	-	-
<i>S. nicevillii</i> Bingham	+	-	-	-	-	-	+	-
<i>S. sinensis</i> (Smith)	+	-	-	-	-	-	-	-
<i>S. bipartitus</i> (Lepeletier)	+							
<i>S. flavus</i> (Fabr.)	-	-	-	-	+	-	-	-
<i>S. geminus</i> Bingham	+	-	-	-	-	-	-	-
<i>Pompilus perplexus</i> (Smith)	+	-	-	-	+	-	-	-
<i>P. canifrons</i> (Smith)	+	-	-	-	-	-	-	-
<i>P. subsericeus</i> Sauss.	-	-	+	-	-	-	-	-
<i>P. maculipes</i> Smith	-	-	-	-	+	-	-	-
<i>P. multipictus</i> Smith	+	-	-	-	-	-	-	-
<i>P. analis</i> (Fabr.)		-	-	-	+	-	-	-
<i>P. bioculatus</i> Bingham	+	+	-	-	-	-	-	-
<i>P. reflexus</i> Smith		+	-	-	-	-	-	-
<i>P. arrogans</i> Smith	+	-	-	-		-	-	-
<i>P. brucatus</i> Bingham	+	-	-	-	-	-	-	-
<i>Pompilus</i> sp.	+	-	-	-	-	-	-	-
<i>Aporus orientalis</i> (Cameron)	+	-	-	-	-	-	-	-

	1	2	3	4	5	6	7	8
FAMILY : SPHECIDAE								
SUBFAMILY : AMPULICINAE								
<i>Dolichurus taprobanae</i> Smith	+	-	-	-	-	-	-	-
<i>Dolichurus</i> sp.	-	-	-	-	-	+	-	-
<i>Trirogma caerulea</i> Westwood	+	-	-	-	-	-	-	-
<i>Ampulex compressa</i> (Fabricius)	+	-	-	-	+	-	-	-
<i>Ampulex dissector</i> (Thunberg)	+	-	-	-	-	-	-	-
SUBFAMILY : SPHECINAE								
<i>Chlorion lobatum</i> (Fabricius)	+	+	+	-	-	+	-	-
<i>Chalybion bengalense</i> (Dahlbom)	+	+	-	+	-	-	-	-
<i>Sceliophron m. madraspatanum</i> (Fabricius)	+	-	+	-	-	-	+	-
<i>Sceliophron curvatum</i> (Smith)	+	-	-	-	-	-	-	-
<i>Sphex sericeus fabricii</i> Dahlbom	+	-	-	-	-	+	-	-
<i>Sphex pruinosus</i> Germar	+	-	-	-	-	-	-	-
<i>Sphex praedator melanopoda</i> Strand	+	-	+	-	+	-	-	-
<i>Sphex argentatus</i> Fabricius	+	-	-	-	-	-	+	-
<i>Sphex subtruncatus</i> Dahlbom	+	-	-	-	-	-	+	-
<i>Isodontia nigella</i> (Smith)	-	-	-	+	-	-	-	-
<i>Parapsammophila erythrocephalus</i> (Fabricius)	+	-	+	-	-	-	-	-
<i>Podalonia hirticeps</i> (Cameron)	-	-	-	-	+	-	-	-
<i>Podalonia laeta</i> (Bingham)	-	+	-	-	-	-	-	-
<i>Ammophila atripes</i> Smith	+	+	-	-	+	-	-	+
<i>Ammophila laeviagata</i> Smith	+	+	+	-	-	-	-	-
<i>Ammophila punctata</i> Smith	+	+	-	+	+	-	-	+
SUBFAMILY : PEMPHREDONINAE								
<i>Carionostigmus congruus</i> (Walker)	+	-	-	-	-	-	-	-
<i>Polemistus</i> sp.	+	-	-	-	-	-	-	-
<i>Pemphredon fuscipennis</i> (Cameron)	+	-	-	+	+	-	-	-
<i>Psen orientalis</i> Cameron	-	-	-	+	+	-	-	-
<i>Psen</i> sp.	-	-	-	-	+	-	-	-
SUBFAMILY : ASTATINAE								
<i>Dryudella maculifrons</i> (Cameron)	+	-	-	+	-	-	-	-
SUBFAMILY : LARRINAE								
<i>Larra maura</i> (Fabricius)	-	-	+	-	-	-	-	-

	1	2	3	4	5	6	7	8
<i>Liris deplanata binghami</i> Tsuneki	-	+	-	+	-	-	-	-
<i>Liris nigriventris</i> (Cameron)	+	-	-	-	-	-	-	-
<i>Liris subtessellata</i> (smith)	+		-	-	-	-	-	-
<i>Liris jaculator</i> (smith)	+		-	-	-	-	-	-
<i>Liris laboriosa</i> (Smith)	-	-	-	-	-	-	+	-
<i>Gastrosericus</i> sp.	+	-	-	-	-	-	-	-
<i>Tachytes sinensis</i> (Smith)	+	-	-	-	-	-	-	-
<i>Tachytes modestus</i> (Smith)	+	-	-	-	-	-	-	-
<i>Tachytes argyreus</i> (Smith)	+	-	-	-	-	-	-	-
<i>Tachytes vischnu</i> Cameron	+	-	-	-	-	-	-	-
<i>Parapiagetia erythropoda</i> (Cameron)	+	-	-	-	-	-	-	-
<i>Tachysphex bengalensis</i> Cameron	+	+	-	-	-	-	-	-
<i>Pison striolatum</i> Cameron	+	-	-	-	-	-	-	-
<i>Pison oblitteratum</i> Smith	-	-	-	-	-	+	-	-
<i>Pison</i> sp.	+	+	-	-	-	-	-	-
<i>Trypoxylon canaliculatum</i> Cameron	+	+	-	-	+	-	-	-
<i>Trypoxylon pileatum</i> Smith	+	+	-	-	-	-	-	-
<i>Trypoxylon intrudens</i> Smith	+	-	-	-	-	-	-	-
SUBFAMILY : CRABRONINAE								
<i>Dasyproctus agilis</i> (smith)	+		-		-	-	+	-
<i>Dasyproctus buddha</i> (Cameron)	+	+	+	-	-	-	-	-
<i>Dasyproctus opifex</i> (Bingham)	+	-	-	-	-	-	-	-
<i>Ectemnius palitans</i> (Bingham)	+	-	-	-	-	-	-	-
<i>Lestica quadriceps</i> (Bingham)	-	-	-	-	-	-	+	-
SUBFAMILY : NYSSONINAE								
<i>Ammatomus alipes</i> (Bingham)	+	-	-	-	-	-	-	-
<i>Stizus vespiformis</i> (Fabricius)	+	-	-	-	-	-	-	-
<i>Bembecinus proximus</i> (Handlirsch)	+	-	-	-	-	-	+	-
<i>Bembix latitarsis</i> Handlirsch	+	-	-	-	-	-	-	-
<i>Bembix sulphurescens</i> Dahlbom	+	-	-	-	-	+	-	-
<i>Stizoides blandinus</i> (Smith)	-	-	-	-	-	-	+	-
SUBFAMILY : PHILANTHINAE								
<i>Cerceris pictiventris</i> Dahlbom	+	-	+	-	-	-	-	-
<i>Cerceris vigilans</i> Smith	+	-	-	-	-	-	-	-
<i>Cerceris vischnu</i> Cameron	+	-	-	-	-	-	-	-

	1	2	3	4	5	6	7	8
<i>Cerceris mastogaster</i> Smith	-	-	-	-	-	+	-	
<i>Cerceris instabilis</i> Smith	+	-	+	-	-	-	-	-
FAMILY : CHALCIDIDAE								
<i>Antrocephalus mitys</i> (Walker)	+	-	-	-	-	-	-	-
<i>A. hypsiphylae</i> Narendran	+	-	-	-	-	-	-	-
<i>A. phaeospilus</i> Waterston	-	-	-	-	-	+	-	-
<i>Kriechbaumerella destructor</i> (Waterston)	+	-	-	-	-	-	-	-
<i>Neochalcis</i> sp.	+	-	-	-	-	-	-	-
<i>Hockeria atra</i> Masi	+	-	-	-	-	-	-	-
<i>Uga menoni</i> Kerrich	+	-	-	-	-	-	-	-
<i>Haltichella macrocera</i> Waterston	-	-	-	-		+	-	-
<i>H. nipponensis</i> Habu	-	-	-	-	-	+	-	-
<i>Invreia crassicornis</i> (Masi)	+	-	-	-	-	-	-	-
<i>Trigonura tenuicaudis</i> Waterston	+	-	-	-	-	-	-	-
<i>T. ruficaudis</i> (Cameron)	+				-	-	-	-
<i>Brachymeria dunensis</i> J., N. & Joy	+	-		-	-	-	-	-
<i>B. lasus</i> (Walker)	+	+	-	-	-	-	-	-
<i>B. euploeae</i> (Westwood)	+	-	-	-	-	-	-	-
<i>B. tachardiae</i> (Cameron)	+	-	-	-	-	-	-	-
<i>B. calopeplae</i> J., N. & Joy	+	-	-	-	-	-	-	-
<i>B. atteviae</i> J., N. & Joy	+	-	-	-	-	-	-	-
<i>Dirhinus himalayanus</i> Westwood								
<i>Epitranus ramnathi</i> (Mani & Dubey)	+	-	-	-	-	-	-	-
SUPERFAMILY : PROCTOTRUPOIDEA								
FAMILY : SCELIONIDAE								
<i>Telenomus proditor</i> Nixon	+	-	-	-	-	-	-	-
<i>Sparasion</i> sp.	+	-	-	-	-	-	-	-
<i>Scelio</i> sp.	+	-	-	-	-	-	-	-
<i>Calotelea rufipes</i> Cameron	+	-	-	-	-	-	-	-
<i>Idris dunensis</i> (Mani)	+				-	-		-
FAMILY : PLAYTYGASTRIDAE								
<i>Synopeas</i> sp.	-	-	-	-	-	+		-
FAMILY : DIAPRIIDAE								
<i>Belyta indica</i> Sharma	-	-	-	-	-	+		

	1	2	3	4	5	6	7	8
<i>Psilus saraswati</i> Sharma			-		-	-	+	-
<i>P. bharatvarshus</i> Sharma	-	-	-	-	-	+	-	-
<i>Spilomicrus karnatakensis</i> Sharma	-	-	-	-	+	-	+	-
<i>S. kumaonensis</i> Sharma	-	-	-	-	-	+	-	-
<i>Trichopria montanus</i> Sharma	-	-	-	-	-	+	-	-
FAMILY : PROCTOTRUPIDAE								
<i>Phaenoserphus</i> sp.	+	-	-	-	-	-	+	-
FAMILY : CERAPHRONIDAE								
<i>Ceraphron manilae</i> Ashmead	+	-	-	-	-	-	-	-

REFERENCES

- ALLEN, H.W. 1975. The genus *Tiphia* of the Indian subcontinent. *Tech. Bull. U. S. Dept. Agricul.* No. 1509 : 1-96, 6 plates.
- BETREM, J.G. 1928. Monographie der Indo-Australischen Scoliiden mit zoogeographischen Betrachtungen. *Treubia*, 9 (suppl.) : 1-388, plates.
- BETREM, 1967. The natural groups of *Campsomeriella* Betrem, 1941. *Ent. Ber., Amst.*, 27 : 25-27.
- BETREM, J.G. and J.C. BRADLEY, 1964. Annotations on the genera *Triscolia*, *Megascolia* and *Scolia*. *Zool. Meded*, 39 : 433-444 (first part) : 40 : 89-96 (second part).
- BETREM, J.G. and J.C. BRADLEY, 1972. The African Campsomerinae (Hymenoptera, Scoliidae). *Mon. Ned. Ent. Ver.* No. 6 : 1-326, 6 plates.
- BINGHAM, C.T. 1897. *The Fauna of British India including Ceylon and Burma* : Hymenoptera, 1 (Wasps and Bees). 597 pages, 4 plates, 189 figures.
- BOHART, R.M. and A.S. MENKE, 1976. Sphecoid wasps of the World: A generic revision. *University of California Press, California U.S.A.* : 1-695.
- CAMERON, P. 1897. Hymenoptera orientalia, or contributions to a knowledge of the Hymenoptera of the Oriental Zoological Region, part 5. *Mem. Proc. Manch. Phil. & Lit. Soc.*, 41: 44-51
- DAS B.P. and V.K. GUPTA, 1983. A catalogue of the families Stenogastridae and Vespidae from the Indian subregion (Hymenoptera : Vespoidea). *Oriental Ins.*, 17 : 395-464.
- KROMBEIN, K.V. 1968. Studies in the Tiphidae, X. *Hylomesa*, a new genus of Myziniine Wasp parasitic on larvae of longicorn beetles. *Proc. U.S. Natn. Mus.*, 124 : 1-22.
- KROMBEIN, K.V. 1982. Biosystematic studies of Ceylonese Wasps, IX : A monograph of the Tiphidae (Hymenoptera : Vespoidea). *Smithsonian Contr. Zool.* No. 374 : 1-120.
- MANI, M.S. and SHARMA, S.K. 1982. A Review of the Proctotrupoidea (Hymenoptera) from India. *Oriental Ins.*, 16 (2) : 135-258.

- NARENDRAN, T.C. 1989. Oriental Chalcididae (Hymenoptera : Chalcidoidea). *Zool. Mon. Dept. Zoology, Univ. Calicut*: 1-440, 460 figures.
- PAIVA, C.A. 1907. Records of Hemiptera and Hymenoptera from the Himalayas. *Rec. Indian Mus.*, 1 : 13-20.
- SHARMA, S.K. 1979. Studies on the Indian Diapriidae (Proctotrupoidea : Hymenoptera) *Mem. School. Ent.*, No. 7: 1-87.

HYMENOPTERA : ICHNEUMONIDAE

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The family Ichneumonidae of the order Hymenoptera is one of the largest of all animal groups. Of all the species of insecta known from the world, 5-8% belong to family Ichneumonidae. The ichneumonids are associated with foliage and found mainly in cool, humid and temperate climate. They are parasitic in cocoons, usually of Lepidoptera, but also parasitize cocoons of Symphyta, Braconidae, Ichneumonidae, Neuroptera, Diptera and spiders.

There are about 1200 species known to occur in India. The present study of western Himalayan ecosystem of the state of Uttar Pradesh shows that about 25% of the species recorded from India are distributed in this region. The Western Himalayan region of Uttar Pradesh is broadly divided into Garhwal and Kumaon hills. The ichneumonid species from this region were recorded from altitudes varying from 305m (Ramgarh in Kumaon Hills) to 3050m (Ghangaria in Garhwal Hills). The present paper record 303 species from this region under 15 subfamilies of family Ichneumonides. The districts of Dehra Dun and Nainital were explored extensively showing highest records of taxa, followed by Tehri, Pauri, Almora, Uttar Kashi and Chamoli. Pithoragarh district being so much in the interior of the hills along the borders, very little explorations of ichneumonids has been done here and no taxa of this family has been recorded from this area.

The analysis of the taxa recorded from western Himalayan ecosystem of Kumaon and Garhwal Hills is given below and a detailed list of taxa showing their distribution in various districts of Kumaon and Garhwal hills is given in appendix I.

No. of subfamilies	<i>No. of taxa in Garhwal hills</i>					<i>No. of taxa in Kumaon Hills</i>			
	Dehra Dun	Tehri	Pauri	Uttar Kashi	Chamoli	Nainital	Almora	Pithoragarh	
15	164	73	68	13	10	126	32	00	

Table showing districtwise distribution of species

(CLASS : INSECTA, ORDER : HYMENOPTERA, FAMILY : ICHNEUMONIDAE)

S.No.	Name of the Taxa	1	2	3	4	5	6	7	8
SUBFAMILY : PIMPLINAE									
1.	<i>Dolichomitus melanomerus tinctipennis</i> (Cameron)	+	-	-	-	-	+	-	-

	1	2	3	4	5	6	7	8
19. <i>Coccygomimus bilineatus</i> (Cameron) = <i>Habrocryptus bilineata</i> Cameron, 1900	+	-	-	-	-	-	-	-
20. <i>Coccygomimus cameronii</i> (Dalla Torre) = <i>Pimpla vidua</i> Cameron, 1899 = <i>Pimpla cameroni</i> Dalla Torre, 1901 = <i>Itopectis orientalis</i> Morely, 1913	+	-	-	+	+	+	-	-
21. <i>Coccygomimus carinifrons</i> (Cameron) = <i>Pimpla carinifrons</i> Cameron, 1899 = <i>Ephialtes formosana</i> Cushman, 1922	+	-	-		-	+	-	-
22. <i>Coccygomimus cynator</i> (Morely) = <i>Pimpla cyanea</i> Morely, 1913 = <i>Pimpla cyanator</i> Morely, 1914	-	+	+	-	-	-	-	-
23. <i>Coccygomimus erebus</i> (Cameron) = <i>Pimpla erebus</i> Cameron, 1899		+	+				-	
24. <i>Coccygomimus flavipalpis</i> (Cameron) = <i>Pimpla flavipalpis</i> Cameron, 1899 = <i>Phytodiatoides megaera</i> Morely, 1913	-	-	-	-	-	+	-	-
25. <i>Coccygomimus indra</i> (Cameron) = <i>Pimpla indra</i> Cameron, 1899	+	-	-	-	-	+	+	-
26. <i>Coccygomimus laothoe</i> (Cameron) = <i>Pimpla laothoe</i> Cameron, 1897 = <i>Pimpla nepe</i> Cameron, 1997 = <i>Pimpla poesia</i> Cameron, 1899	+	-	+	+	-	+	+	
27. <i>Xanthopimpla appendicularis appendicularis</i> (Cameron) = <i>Pimpla appendicularis</i> Cameron, 1899 = <i>Xanthopimpla tigris</i> Krieger, 1899	-	-	-	-	-	+		
28. <i>Xanthopimpla decurtata detruncata</i> Krieger = <i>Xanthopimpla detruncata</i> krieger, 1914 = <i>Xanthopimpla decurtata detruncata</i> Townes & Chiu, 1970	-	-	-	-	-	+		
29. <i>Xanthopimpla despinosa leipephelis</i> Townes & Chiu, 1970							+	
30. <i>Xanthopimpla detrita</i> Townes & Chiu, 1970				-		-	+	-
31. <i>Xanthopimpla elegans apicipennis</i> (Cameron) = <i>Pimpla apicipennis</i> Cameron, 1899 = <i>Xanthopimpla fasciata</i> krieger, 1899 = <i>Xanthopimpla elegans apicipennis</i> Townes & Chiu, 1970	+	-				+		
32. <i>Xanthopimpla guptai</i> Guptai Townes & Chiu, 1970	+		-	-		-	-	

	1	2	3	4	5	6	7	8
33. <i>Xanthopimpla honorata honorata</i> (Cameron) = <i>Pimpla honorata</i> Cameron, 1899 = <i>Xanthopimpla cera</i> Cameron, 1908 = <i>Xanthopimpla kriegariana</i> Cameron, 1908 = <i>Xanthopimpla binghami</i> Cameron, 1908 = <i>Xanthopimpla erythoceros</i> kriegar, 1914 = <i>Xanthopimpla eurycephala</i> Var. <i>assamensis</i> kriegar, 1914 = <i>Xanthopimpla honorata</i> Townes & Chiu, 1970	+	-	-	-	-	-	-	-
34. <i>Xanthopimpla lepcha</i> (Cameron) = <i>Pimpla lepcha</i> Cameron, 1899 = <i>Pimpla indubia</i> Cameron, 1899 = <i>Pimpla khasiana</i> Cameron, 1899 = <i>Xanthopimpla soleata</i> kriegar, 1899 = <i>Xanthopimpla pardalis</i> kriegar, 1899 = <i>Xanthopimpla commixta</i> kriegar, 1914 = <i>Xanthopimpla giochiensis</i> Uchida, 1928 = <i>Xanthopimpla lepcha</i> Townes & Chiu, 1970	+				-	-	-	-
35. <i>Xanthopimpla nana nana</i> Schulz = <i>Xanthopimpla parva</i> Cameron, 1905 = <i>Xanthopimpla nana</i> Schulz, 1906 = <i>Xanthopimpla cameroni</i> Schmiedeknecht, 1907 = <i>Xanthopimpla ornata</i> Szepliget, 1908 = <i>Xanthopimpla pulchella</i> Szeliget, 1908 = <i>Xanthopimpla nana nana</i> Townes & Chiu, 1970	+	-	+	-	-	+	-	-
36. <i>Xanthopimpla pedator</i> (Fabricius) = <i>Ichneumon punctator</i> Linnaeus, 1767 = <i>Ichneumon pedator</i> Fabricius, 1775 = <i>Ichneumon multipunctor</i> Thumberg, 1822 = <i>Xanthopimpla scutata</i> kriegar, 1899 = <i>Xanthopimpla punctatrix</i> Schulz, 1906 = <i>Xanthopimpla pedator</i> Morely, 1913	+	-	-	-	-	+	-	-
37. <i>Xanthopimpla polyspila</i> Cameron = <i>Xanthopimpla polyspila</i> Cameron, 1907 = <i>Xanthopimpla lissonota</i> Cameron, 1907 = <i>Xanthopimpla leionota</i> Townes, Townes & Gupta, 1961	+	-	-	-	-	+	-	-
38. <i>Xanthopimpla proximans</i> Townes & Chiu, 1970	-	-	-	-	-	+		-
39. <i>Xanthopimpla punctata</i> (Fabricius) = <i>Ichneumon punctata</i> Fabricius, 1781 = <i>Pimpla transversalis</i> Vollenhoven, 1879 = <i>Xanthopimpla ruficornis</i> Krieger, 1899 = <i>Xanthopimpla</i> (!) <i>appendiculata</i> Cameron, 1902 = <i>Xanthopimpla brunneicornis</i> Cameron, 1902 = <i>Xanthopimpla kandyensis</i> Cameron, 1905 = <i>Xanthopimpla mcculiceps</i> Cameron, 1905	+	-	-	-	-	-	-	-

	1	2	3	4	5	6	7	8
<i>=Phytodietus (Neuchorus) longicanda</i> Kaur & Jonathan, 1979								
54. <i>Phytoditus (Phytodietus) bicolor</i> (Rao) <i>=Stictolissonota bicolor</i> Rao, 1953 <i>=Phytodietus (Phytodietus) bicolor</i> Gupta, 1987	+	-	-	-	-	-	-	-
55. <i>Phytodietus (Weisia) pitambari</i> Kaur & Jonathan, 1979	-			-	-	-	+	-
56. <i>Netelia (Apatagium) inaequalis</i> (Uchida) <i>=Paniscus (Parabates) inaequalis</i> Uchida, 1934 <i>=Netelia (Apalagium) inaequalis</i> Townes, Townes & Gupta, 1961	-	+	+	-	-	-	-	-
57. <i>Netelia (Monomacrodon) biocolor</i> (Cushman) <i>=Monomacrodon bicolor</i> Cushman, 1934				-	-	+	-	-
58. <i>Netelia (Bessobates) virgata</i> (Fourcroy) <i>=Ichneumon virgatus</i> Fourcroy, 1785 <i>=Parabatus amplus</i> Morely, 1913	+	+	+	-		+	-	-
59. <i>Netelia (Longiterebates) himalayensis</i> Kaur & Jonathan, 1976	-		-	+	+	-	-	-
60. <i>Netelia (Taxochiloides) latro latro</i> (Holmgren) <i>=Paniscus latro</i> Holmgren, 1868 <i>=Paniscus ferrugineus</i> Cameron, 1899 <i>=Paniscus cameroni</i> Enderlein, 1912 <i>=Paniscus samoanus</i> Kohl, 1908 <i>=Paniscus javanus</i> Szepligeti, 1908 <i>=Netelia (Netelia) multicolor</i> Nikam & Rao, 1972 <i>=Netelia (Netelia) rugosa</i> Nikam & Rao, 1972 <i>=Netelia (Netelia) carinata</i> Nikam & Rao, 1972	+	-	-	-	-	+	-	-
61. <i>Netelia (Netelia) corrugata</i> kaur & Jonathan, 1979	+	-	-	-	-	+	-	-
62. <i>Netelia (Netelia) dolabra</i> Kaur & Jonathan, 1979	-	-	-	-	-	-	+	-
63. <i>Netelia (Netelia) fumosa</i> kaur & Jonathan, 1979	-		-	-	-	+	-	-
64. <i>Netelia (Netelia) fuscicornis</i> (Holmgren) <i>=Paniscus fuscicornis</i> Holmgren, 1858 <i>=Paniscus quadrilineatus</i> Smith, 1878 <i>=Paniscus unicolor</i> Smith, 1878 <i>=Paniscus longitarsis</i> Cameron, 1899 <i>=Paniscus yarkandensis</i> Dalla Torre, 1901 <i>=Paniscus renovatus</i> Morely, 1913	+					-	-	-
65. <i>Netelia (Netelia) kashmirensis</i> (Cameron) <i>=Paniscus kashmirensis</i> Cameron, 1906	+	+	+	-	-	+	+	-
66. <i>Netelia (Netelia) orientalis</i> (Cameron) <i>=Paniscus orientalis</i> Cameron, 1906	+	+	+	+	-	+	+	-

	1	2	3	4	5	6	7	8
67. <i>Netelia</i> (<i>Netelia</i>) <i>parca</i> Kaur & Jonathan, 1979			-		-	+		
68. <i>Netelia</i> (<i>Netelia</i>) <i>pectinia</i> Kaur & Jonathan, 1979		-			-	+	-	
69. <i>Netelia</i> (<i>Netelia</i>) <i>rimosa</i> (Enderlein) = <i>Paniscus rimosa</i> Enderlein, 1912	-		-	-	-	+		
70. <i>Netelia</i> (<i>Netelia</i>) <i>silantjewi</i> (Kukujco) = <i>Paniscus silantjewi</i> Kukujco, 1899 = <i>Paniscus rossicus</i> Kukujco, 1899	-	+	+	-	-	+	+	-
71. <i>Netelia</i> (<i>Netelia</i>) <i>siva</i> Kaur & Jonathan, 1979	+	+	+	-	+	+	-	
72. <i>Netelia</i> (<i>Netelia</i>) <i>striata</i> Nikam, 1973						+	-	
73. <i>Netelia</i> (<i>Netelia</i>) <i>vinulae</i> (Scopoli) = <i>Ichneumon vinulae</i> Scopoli, 1763 = <i>Paniscus cephalotes</i> Holmgren, 1858						+		
74. <i>Netelia</i> (<i>Paropheltes</i>) <i>guptai</i> , Kaur & Jonathan, 1979	-	-	-	-	-	+	+	-
75. <i>Dyspetes indicus</i> Gupta, 1983	-	+	-	-	-	+	-	-
76. <i>Dyspetes ultra</i> Gupta, 1983	-	-	-	-	-	+	-	-
77. <i>Kristotomus guptai</i> Mason, 1968	-		-	-	-	-	+	-
SUBFAMILY : LABENINAE								
78. <i>Brachycyrtus eublemmae</i> (Rao) = <i>Hemigaster eublemmae</i> Rao, 1953	+	-		-	-	-	-	-
SUBFAMILY : XODIDINAE								
79. <i>Xorides</i> (<i>Macrophora</i>) <i>lissopunctus</i> Gupta & Chandra, 1972	-	+	-	-	-	-	-	-
SUBFAMILY : BANCHINAE								
80. <i>Lissonota albomaculata</i> (Cameron) = <i>Ctenopimpla alobomaculata</i> Cameron, 1899		-	-	-	-	+	-	-
81. <i>Lissonota danialsi</i> Chandra & Gupta, 1977						+		
82. <i>Lissonota kircosa</i> Chandra & Gupta, 1977	+			-		+	-	
83. <i>Alloplasta oblongata</i> Chandra & Gupta, 1977	-	+	+	-	-	-	-	-
84. <i>Cryptopimpla buareoleta</i> Chandra & Gupta, 1977	-	+	+	-	-	+	-	-
85. <i>Cryptopimpla taiwanensis</i> (Monoi) = <i>Fintona taiwanensis</i> Monoi, 1968	-	-	-	-	-	+	+	-
86. <i>Hadrostethus ruficrus</i> Chandra & Gupta, 1977	-	-	-	-	-	-	+	-
87. <i>Amphirhachis rubriventris</i> Chandra & Gupta, 1977	-	+	+	-	-	-	-	-
88. <i>Strictolissonota foveata</i> Cameron, 1905 = <i>Lissonota brevicauda</i> Morely, 1913	+	-	-	-	-	+	-	-

	1	2	3	4	5	6	7	8
89. <i>Syzeuctus leptopunctatus</i> Chandra & Gupta, 1977	-		-	-	-	+	-	-
90. <i>Syzeuctus zanthoria</i> Cameron = <i>Lissonota zanthoria</i> Cameron, 1902 = <i>Paratanera indica</i> Rao, 1953	+	-	-	-	-	+	-	-
91. <i>Leptobatopsis indica</i> (Cameron) = <i>Cryptus indicus</i> Cameron, 1897 = <i>Mesoleptis annulipes</i> Cameron, 1900 = <i>Leptobatopsis australiensis</i> Ashmead, 1900 = <i>Nemeritis albovaria</i> Tosquinet, 1903 = <i>Atropha clypearia</i> Ashmead, 1904 = <i>Tanera annulipes</i> Cameron, 1905 = <i>Syzeuctus javanicus</i> Schmiedeknecht, 1907 = <i>Atropha</i> (?) <i>apicalis</i> Szepliget, 1910	+	-	-	-	-	-	-	-
92. <i>Leptobatopsis V-maculata</i> (Cameron) = <i>Lissonota V-maculata</i> Cameron, 1907 = <i>Lissonota binghami</i> Cameron, 1907 = <i>Leptobatopsis grandicolor</i> Rao, 1953						+	-	-
93. <i>Banchus flavomaculatus</i> (Cameron) = <i>Cidaphurus flavomaculatus</i> Cameron, 1904	-	-	-	-	-	+	-	-
94. <i>Banchus tumidus</i> Chandra & Gupta, 1977	+	-	-		-	+	-	-
95. <i>Banchopsis ruficornis</i> (Cameron) = <i>Ephonites ruficornis</i> Cameron, 1905 = <i>Eponites</i> (!) <i>scutellaris</i> Morely, 1913	+	-	-	-	-	+	-	-
96. <i>Exetastes longipes</i> (Smith) = <i>Campoplex longipes</i> Smith, 1878 = <i>Icyona rufipes</i> Cameron, 1903 = <i>Tegona rufipes</i> Morely, 1913 = <i>Exetastes cameroni</i> Townes, Townes & Gupta, 1961	+	-		-	-	+	+	-
97. <i>Exetastes nigellus</i> Chandra & Gupta, 1977	-	+	+	+	-	-	-	-
98. <i>Exetastes nigriritibialis</i> Chandra & Gupta, 1977	-	-	-	-	-	+	-	-
99. <i>Exetastes vacillans</i> (Cameron) = <i>Ichneumon vacillans</i> Cameron, 1897	+		-	-	-	-	+	-
SUBFAMILY : SCLOBATINI								
100. <i>Neurogenia kapuri</i> Jonathan, 1974		+	-	-	-	-	-	-
SUBFAMILY : PORIZONTINAE								
101. <i>Chriodes utara</i> Gupta & Maheshwary, 1974	-	+	-	-	-	-	-	-
102. <i>Klutiana townesi</i> (Baltazar) = <i>Chriodes (Klutiana) townesi</i> Baltazar, 1961		-	-	-	-	+	-	-
103. <i>Campoplex collinus</i> (Morely) = <i>Sinophorus collenus</i> Morely, 1913		-	-	-	-	-	+	-

	1	2	3	4	5	6	7	8
104. <i>Campoplex indicus</i> Gupta & Maheshwary, 1977	-	-	-	-	-	+	+	-
105. <i>Campoplex maximulus</i> Gupta & Maheshwary, 1977	+	+	+	-	-	-	-	-
106. <i>Campoplex montanus</i> Gupta & Maheshwary 1977	+	-	-		-	-	-	-
107. <i>Campoplex oriens</i> Gupta & Maheshwary, 1977	-	-	-	-	-	+	+	-
108. <i>Campoplex rufigastor</i> Gupta & Maheshwary, 1977	-	-	-	+	-	-	-	-
109. <i>Campoplex septentrionalis tikari</i> Gupta & Maheshwary, 1977	-	-	-	-	-	+	-	-
110. <i>Venturia inclyta</i> (Morely) = <i>Cymodusa inclyta</i> Morely, 1923	+		-	-	-	+	-	-
111. <i>Venturia inquinata</i> (Morely) = <i>Campoplex inquinata</i> Morely, 1913 = <i>Campoplex binghami</i> Morely, 1913 = <i>Rhimphoctona pluto</i> Morely, 1913	+	-				-	-	-
112. <i>Venturia longiterebra</i> (Rao) = <i>Sinophorus longiterebrae</i> Rao, 1953	+	-	-	-	-	-	-	-
113. <i>Venturia montana</i> Maheshwary, 1977	-	-	-	-	-	-	+	-
114. <i>Venturia simillima</i> Maheshwary, 1977	+	-	-	-	-	+	-	-
115. <i>Venturia utara</i> Maheshwary, 1977	+	-		-	-	-	-	-
116. <i>Casinarina ashimae</i> Maheshwary, 1977	+	-	-	-	-	-	-	-
117. <i>Casinarina atrata</i> Morely, 1913	+	-	-	-	-	+	-	-
118. <i>Casinarina elegantula</i> Maheshwary & Gupta, 1979	-	-	-	-	-	+	-	-
119. <i>Casinarina formosana bharata</i> Maheshwary & Gupta, 1977	+	+	+	-	+	+	-	-
120. <i>Casinarina indubia</i> (Morley) = <i>Trophocampa indibia</i> Morely, 1913	+		-	-	-	+		-
121. <i>Casinarina mellaclypea</i> Maheshwary & Gupta 1977					-	+	-	
122. <i>Casinarina pedunculata nepalensis</i> Maheshwary & Gupta, 1977	-	+	+	-	-	-	-	-
123. <i>Casinarina tikari</i> Maheshwary & Gupta, 1977	-	-	-	-	-	+	-	-
124. <i>Charops brachypterum</i> (Cameron) = <i>Anomalon brachypterum</i> Cameron, 1877 = <i>Charops longiventris</i> Asmead, 1905	+	-	-	-	-	-	-	-
125. <i>Charops ganges</i> Cushman, 1927	+	-		-	-	-		-

	1	2	3	4	5	6	7	8
126. <i>Charops obtusus obtusus</i> Morely, 1913	+	-	-	-	-	-	-	-
127. <i>Cymodusa santoshe</i> Gupta & Gupta, 1974	-	+	+	-	-	-	-	-
128. <i>Cymodusas siva</i> Gupta & Gupta, 1974		-	-	-	-	-	+	-
129. <i>Urvashia dentipara</i> Gupta & Gupta, 1974	+	+	+	-	-	-	-	-
130. <i>Menaka brunnea</i> Gupta & Gupta, 1974	-	+	-	-	-	-	-	-
131. <i>Delopia aequorca</i> (Gupta & Gupta) = <i>Dusona aequorea</i> Gupta & Gupta, 1978	+		-		-	-	-	-
132. <i>Delopia aquilonaria</i> (Gupta & Gupta) = <i>Dusona aquilonaria</i> Gupta & Gupta, 1978		+			-		-	-
133. <i>Delopia Buddha</i> (Cameron) = <i>Campoplex buddha</i> Cameron, 1897 = <i>Campoplex opecious</i> Cameron, 1897	+	+	+	+	-	+	+	-
134. <i>Delopia ceylonica borealis</i> (Gupta & Gupta) = <i>Dusona Ceylonica borealis</i> Gupta & Gupta, 1978	-		-	-	-	+	-	-
135. <i>Delopia deodarae</i> (Cushman) = <i>Campoplegidae deodarae</i> Cushman, 1927	+	+	-	-	-	-	-	-
136. <i>Delopia doonensis</i> (Gupta & Gupta) = <i>Disona doonensis</i> Gupta & Gupta, 1978	+	-	-	-	-	-	-	-
137. <i>Delopia ektypha</i> (Gupta & Gupta) = <i>Dusona ektypha</i> Gupta & Gupta, 1978	-	+	-	-	-	-	-	-
138. <i>Delopia epomiata</i> (Gupta & Gupta) = <i>Dusona epomiata</i> Gupta & Gupta, 1978	-	-	-	-	-	+	-	-
139. <i>Delopia erythra</i> (Uchida) = <i>Campoplegidea erythra</i> Uchida, 1932 = <i>Dusona miniata</i> Gupta & Gupta, 1978	+	-		-	-	-	-	-
140. <i>Delopia glabra</i> (Gupta & Gupta) = <i>Dusona glabra</i> Gupta & Gupta, 1978						+	-	-
141. <i>Delopia japonica</i> (Cameron) = <i>Campoplex japonicus</i> Cameron, 1906 = <i>Dusona interima</i> Gupta & Gupta, 1978		+	+	-	-	-	-	-
142. <i>Delopia lajae</i> (Gupta & Gupta) = <i>Dusona lajae</i> Gupta & Gupta, 1978	+	+	+		-	+	-	-
143. <i>Delopia longigenata</i> (Gupta & Gupta) = <i>Dusona longgigenata</i> Gupta & Gupta, 1978	+		+	-	-	+	-	-
144. <i>Delopia novitia</i> (Morely) = <i>Campoplex novitius</i> Morely, 1913 = <i>Campoplex indicus</i> Morely, 1913	+	-	-	+		+	+	-
145. <i>Delopia orientalis</i> (Gupta & Gupta) = <i>Dusona orientalis</i> Gupta & Gupta, 1978	+		-	-	-	+	-	-

	1	2	3	4	5	6	7	8
146. <i>Delopia petiolator</i> (Fabricius) = <i>Ophion petiolator</i> Fabricius, 1804 = <i>Campoplex lapponicus</i> Holmgren, 1858 = <i>Campoplex greeni</i> Cameron, 1905	+	-	-		-	-	-	
147. <i>Delopia prytanes</i> (Gupta & Gupta) = <i>Campoplex prytanes</i> Cameron, 1903	+		-	-		+		-
148. <i>Delopia quadrata</i> Gupta & Gupta, 1978 = <i>Dusona quadrata</i> Gupta & Gupta, 1978	+	-	-	-	-	-	-	-
149. <i>Delopia rufipostpetiola</i> (Gupta & Gupta) = <i>Dusona rufipostpetiola</i> Gupta & Gupta, 1978	+	-	-	-	-	+	-	-
150. <i>Delopia similis</i> (Gupta & Gupta) = <i>Dusona similis</i> Gupta & Gupta, 1978	+	-	-	-	-	-	-	-
151. <i>Delopia simillima</i> (Gupta & Gupta) = <i>Dusona simillima</i> Gupta & Gupta, 1978	+	-	-	-	-	-	-	-
152. <i>Delopia simalaensis</i> (Cameron) = <i>Campoplex similaensis</i> Cameron, 1905	+	+	+	+	-	+	-	-
153. <i>Delopia sparsa</i> (Gupta & Gupta) = <i>Dusona sparsa</i> Gupta & Gupta, 1978	-	-	-	-	+	-	-	-
154. <i>Delopia sumptuosa</i> (Cameron) = <i>Campoplex sumptuosa</i> Cameron 1897	+	+	+	-		-	-	-
155. <i>Delopia tenuis</i> (Foerster) = <i>Campoplex tenuis</i> Foerster, 1868 = <i>Campoplex proximus</i> Foerster, 1868	+					-	-	-
156. <i>Delopia tipari</i> (Gupta & Gupta) = <i>Dusona tipari</i> Gupta & Gupta, 1978	+	+	+	-	-	+	-	-
157. <i>Delopia virgulata</i> (Gupta & Gupta) = <i>Dusona virgulata</i> Gupta & Gupta, 1978	-	-	-	-	-	+	-	-
158. <i>Delopia vitriala</i> (Gupta & Gupta) = <i>Dusona vitriala</i> Gupta & Gupta, 1978	-	-	-	-	-	+	+	-
159. <i>Delopia viveki</i> (Gupta & Gupta) = <i>Dusona viveki</i> Gupta & Gupta, 1978	+	-	-	-	-	+	+	
160. <i>Delopia zonata</i> (Morely) = <i>Campoplex zonatus</i> Morely, 1913			-		-		+	
161. <i>Kartika aspera</i> Gupta & Gupta, 1976	-		-	-		+	-	-
162. <i>Kartika augasma</i> Gupta & Gupta, 1976	-	-	-	-	-	+	-	
163. <i>Kartika dimidiata</i> Gupta & Gupta, 1976	-	-	-	-	-	+		
164. <i>Kartika elongata</i> Gupta & Gupta, 1976	-	+	+					-
165. <i>Kartika garhwalensis</i> Gupta & Gupta, 1976		+	+					

	1	2	3	4	5	6	7	8
166. <i>Kartika heptahamuli</i> Gupta & Gupta, 1976	-	-	-	-	-	+	-	-
167. <i>Kartika mediator</i> Gupta & Gupta, 1976	-		-	-	-	+	-	-
168. <i>Kartika mikroschemos</i> Gupta & Gupta, 1976	-	+	+	-	-	-	-	-
169. <i>Kartika similator</i> Gupta & Gupta, 1976	-	+	+	-	-	-	-	-
170. <i>Campoletis chlorideae</i> Uchida, 1957	+	+	+	-	-	+	+	-
171. <i>Campoletis morosa</i> (Cameron) = <i>Limneria morosa</i> Cameron, 1897	-	-	-	-	-	+	-	-
172. <i>Hyposter ebeninus</i> (Gravenhorst) = <i>Campoplex ebeninus</i> Gravenhorst, 1829 = <i>Nearthula pierisae</i> Rao, 1953	+	-	-	-	-	-	-	-
173. <i>Hyposoter raoi</i> Gupta, 1964 = <i>Mesochoreila indica</i> Rao, 1953	+			-		-	-	-
174. <i>Echthronomas phormionis</i> (Gupta & Gupta) = <i>Xanthocampoplex phormionis</i> Gupta & Gupta, 1971	-	-	-	-	-	+	-	-
SUBFAMILY : CREMASTINAE								
175. <i>Pristomerus marginicollis</i> (Cameron) = <i>Pristomeridia marginicollis</i> Cameron, 1907	+	-	-	-	-	-	-	-
SUBFAMILY : OPHIONINAE								
176. <i>Ophion areolatus</i> Cameron, 1899	-	+	-	-		-	-	-
177. <i>Ophion bicarinatus</i> Cameron, 1905 = <i>Ophion castaneus</i> Uchida, 1928	-	+	+	-	-	-	-	-
178. <i>Ophion contentious</i> Gauld & Mitchell, 1981	+	-	-	-	-	-	-	-
179. <i>Ophion mastrus</i> Gauld & Mitchell, 1981	-	+	+	-	-	-	-	-
180. <i>Ophion repus</i> Gauld & Mitchell, 1981	-	+	+	-	-	-	-	-
181. <i>Leptophion radiatus</i> (Uchida) = <i>Spilophion radiatus</i> Uchida, 1956		+	-	-	-	+	-	-
182. <i>Dicamptus cantoni</i> Gauld & Mitchell, 1981		+	+		-		-	-
183. <i>Dicamptus flavoplagiatus</i> (Cushman) = <i>Enicospilus flavoplagiatus</i> Cushman, 1937	+	-	-	-	-	-	-	-
184. <i>Dicamptus lambai</i> Nikam & Kanhekar, 1984	-	+	+	-	-	-	-	-
185. <i>Enicospilus bharensis</i> Nikam, 1980 = <i>Enicosilus indicus</i> Rao & Grover, 1960	-		-		-	+	+	-
186. <i>Enicospilus biharensis</i> Townes, Townes & Gupta, 1961 = <i>Henicospilus horsfieldi</i> var. <i>glabratus</i> Morely, 1913 = <i>Enicospilus (Bicorniata) bicornis</i> Rao & Nikam, 1971	-	-	+	-	-	-	-	-

	1	2	3	4	5	6	7	8
187. <i>Enicospilus erythrocerus</i> (Cameron) = <i>Pleuroneurophion erythrocerus</i> Cameron, 1905 = <i>Allocamptus orientalis</i> Uchida, 1928 = <i>Anicospilus hirayamai</i> Uchida, 1955	-	-	+	-	-	-	-	-
188. <i>Enicospilus gauldi</i> Nikam, 1980 = <i>Enicospilus geus</i> Gauld & Mitchell, 1981 = <i>Enicospilus gibbus</i> Gauld & Mitchell, 1981 = <i>Henicospilus gracilis</i> Szepligeti, 1906	-	+	+	-		-	-	
189. <i>Enicospilus grammospilus</i> (Enderlein) = <i>Dicamptus grammospilus</i> Enderlein, 1921 = <i>Enicospilus zeugos</i> Chiu, 1954	+				-	-	-	-
190. <i>Enicospilus grandis</i> (Cameron) = <i>Pleuroneurophion grandis</i> Cameron, 1905. = <i>Allocamptus sinuatus</i> Morely, 1912 = <i>Allocamptus inflexus</i> Morely, 1913		-	-	-		-	+	
191. <i>Enicospilus heliothidis</i> Viereck, 1913 = <i>Amesospilus javanus</i> Enderlein, 1921 = <i>Amesospilus interruptus</i> Enderlein, 1921 = <i>Henicospilus roheda</i> Cheesman, 1936 = <i>Enicospilus biconatus</i> Townes, Townes & Gupta, 1961 = <i>Enicospilus neorufus</i> Rao & Nikam In Rao, 1969	-	-	-	-	-	+	-	-
192. <i>Enicospilus insinator</i> (Smith) = <i>Ophion insinator</i> Smith, 1860 = <i>Enicospilus zyzus</i> Chiu, 1954	+	-	-	-	-	-	-	-
193. <i>Enicospilus javanus</i> (Szepligeti) = <i>Henicospilus javanus</i> Szepligeti, 1910 = <i>Enicospilus fulacorensis</i> Brues, 1918 = <i>Enicospilus gephyrus</i> Chiu, 1954 = <i>Enicospilus (Bicorniata) diurnus</i> Nikam, 1975	-	-	-	-	+	-	-	
194. <i>Enicospilus laqueatus</i> (Enderlein) = <i>Henicospilus laqueatus</i> Enderlein, 1921 = <i>Enicospilus leetoni</i> Chiu, 1954	+		+			+	-	
195. <i>Enicospilus lineolatus</i> (Roman) = <i>Enicospilus striatus</i> Cameron, 1899 = <i>Henicospilus lineopatus</i> Roman, 1913 = <i>Enicospilus uniformis</i> Chiu, 1954 = <i>Enicospilus striolatus</i> Townes, Townes & Gupta, 1961 = <i>Enicospilus unicornis</i> Rao & Nikam, 1970	-	+	+		-			
196. <i>Enicospilus melanocarpus</i> Cameron = <i>Enicospilus reticulatus</i> Cameron, 1902 = <i>Enicospilus (!) melanocarpus</i> Cameron, 1905 = <i>Henicospilus nigrinervis</i> Szepligeti, 1906 = <i>Ophion (Henicospilus) nocturnus</i> Kohl, 1908	+		-	-	-	+	+	

	1	2	3	4	5	6	7	8
208. <i>Trichomma nigricans</i> Cameron, 1905	+	-	-	-	-	-	-	-
209. <i>Agrypon nox</i> Morley, 1913 = <i>Dioborus indica</i> Rao, 1953								
210. <i>Agrypon productor</i> (Morley) = <i>Trichomma productor</i> Morley, 1913	+	-	-	-	-	-	-	-
SUBFAMILY : HELICTIINAE								
211. <i>Hyperacmus bicarinatus</i> (Cameron) = <i>Nothuima bicarinata</i> Cameron, 1902	+	-	-	-	-	-	-	-
SUBFAMILY : DIPLAZONTINAE								
212. <i>Diplazon varicoxa</i> (Thomson) = <i>Bassus varicoxa</i> Thomson, 1980		+	+		-	-	-	-
213. <i>Promethes rubepleurator</i> Diller, 1984	+	-	-	-	-	-	-	-
SUBFAMILY : PHYGADEUONTINAE								
214. <i>Diatora lissonota</i> (Viereck) = <i>Microtoridea lissonota</i> Viereck, 1912 = <i>Zaparaphylax perinae</i> Viereck, 1912 = <i>Microtoridea secunda</i> Cushman, 1934 = <i>Memiteles guamensis</i> Fullaway, 1945	+	-	-	-	-	-	-	-
215. <i>Lysibia ceylonensis</i> (Kerrich) = <i>Haplaspis ceylonensis</i> Kerrich, 1956 = <i>Pemon proximum</i> Perkins, 1962	+	-	-	-	-	-	-	-
216. <i>Xenolytus rugatus</i> Townes, 1983	+	+	+	-	-	-	-	-
217. <i>Xenolytus stenus</i> Townes, 1983	-	+	+	-	-	-	-	-
218. <i>Dichrogaster carinata</i> Townes, 1983	+	-	-	-	-	-	-	-
219. <i>Dichrogaster defecta</i> Townes, 1983	-	+	+	-	-	+	-	-
220. <i>Dichrogaster fulvescens seminigra</i> Townes, 1983	+				-	-	-	-
221. <i>Dichrogaster granulata</i> Townes, 1983	-	+	+	-	-	-	-	-
222. <i>Dichrogaster jonathani</i> Townes, 1983	-	+	+	-	-	-	-	-
223. <i>Dichrogaster lateralis</i> Townes, 1983	-	+	+	-	-	-	-	-
224. <i>Dichrogaster tersa</i> Townes, 1983	-	+	+	-	-	-	-	-
225. <i>Charitopes densus</i> Townes, 1983	+	+	+	-	-	-	-	-
226. <i>Charitopes rugatus</i> Townes, 1983	+	+	+	-	-	-	-	-
227. <i>Rotheyia wroughtoni</i> Cameron, 1897	+	-	-	-	-	-	-	-
SUBFAMILY : HEMIGASTERINAE								
228. <i>Mansa fulvipennis</i> (Cameron) = <i>Colganta fulvipennis</i> Cameron, 1902	+	-	-	-	-	-	-	-

	1	2	3	4	5	6	7	8
229. <i>Mansa tarsalis</i> (Cameron) = <i>Colganta tarsalis</i> Cameron, 1902 = <i>Colganta latiscutis</i> , Cameron 1907	+			-	-	-	-	-
230. <i>Aptesis? hypocrita</i> (Cameron) = <i>Ichneumon hypocrita</i> Cameron, 1897	+	-		-	-	-	-	-
SUBFAMILY : MESOSTENINAE								
231. <i>Apocryptus erugatus</i> Gupta & Gupta, 1983		+	+					-
232. <i>Apocryptus garhwalensis</i> Gupta & Gupta, 1983	+	+	+	+	-		-	-
233. <i>Xoridesopus flavispeculum</i> Gupta & Gupta, 1983				-	+	-	-	-
234. <i>Xoridesopus jonathani</i> Gupta & Gupta, 1983	+		-			+	-	-
235. <i>Xoridesopus kamathi</i> Gupta & Gupta, 1983	+	-	-	-	-	-	-	-
236. <i>Xoridesopus orientalis</i> Gupta & Gupta, 1983		-	-		-	+	-	-
237. <i>Schreineria dunensis</i> Gupta & Gupta, 1983	+			-	-	-	-	-
238. <i>Schreineria flavocollaris</i> Gupta & Gupta, 1983	-	-	-			+	-	-
239. <i>Schreineria himalayana</i> Gupta & Jonathan, 1966	+		-	+	-	+	-	-
240. <i>Arhytis maculiscutis</i> (Cameron) = <i>Echthrus maculiscutis</i> Cameron, 1907	+	-		-	-	+	-	-
241. <i>Dihelus granulosa</i> Gupta & Gupta 1979	-			-		+	+	-
242. <i>Dihelus kumaonensis</i> Gupta & Gupta 1979			-	-	-	-	+	-
243. <i>Hedycryptus orientalis</i> (Cameron) = <i>Cryptus orientalis</i> Cameron, 1897 = <i>Hedycryptus filicornis</i> Cameron, 1903 = <i>Cryptus himalayensis</i> Cameron, 1904 = <i>Cryptus bibulus</i> Cameron, 1904 = <i>Distantella pilosella</i> Cameron, 1909	+			-	-			-
245. <i>Gotra hapaliae</i> (Rao) = <i>Mesostenus hapaliae</i> Rao, 1953	+	-			-	-	-	-
246. <i>Gotra marginata</i> (Brulle) = <i>Mesostenus marginatus</i> Brulle, 1846 = <i>Mesostenus himalayensis</i> Cameron, 1897 = <i>Mesostenoides octozonatus</i> Ashmead, 1904 = <i>Mesostenus flarinervis</i> Cameron, 1904 = <i>Stenaraeus rugipes</i> Szepilgeti, 1916	+			-		+	-	-
247. <i>Friona didymata</i> Morely, 1914						+	-	-
248. <i>Listrognathus</i> (<i>Listrognathus</i>) <i>rufipes</i> (Cameron) = <i>Cratocryptus rufipes</i> Cameron, 1907 = <i>Listrognathus</i> (<i>Listrognathus</i>) <i>perfecta</i> Gupta & Kamath, 1967	+		-					

	1	2	3	4	5	6	7	8
249. <i>Listrognathus</i> (<i>Listrognathus</i>) <i>spinifrons</i> (Cameron) = <i>Suvalta spinifrons</i> Cameron, 1905	+	-						
250. <i>Listrognathus</i> (<i>Stivadens</i>) <i>tirkyi</i> Gupta & Kamath, 1967	+							
251. <i>Goryphus</i> <i>apollonis</i> Jonathan & Gupta, 1973	+							
252. <i>Goryphus</i> <i>brahminus</i> (Cameron) = <i>Mesostenus brahminus</i> Cameron, 1904	+				-			
253. <i>Goryphus</i> <i>cestus cestus</i> Jonathan & Gupta, 1973	+		+	-	-	+	-	-
254. <i>Goryphus</i> <i>cinctipes</i> (Cameron) = <i>Melcha maculiceps</i> Cameron, 1905 = <i>Melcha cinctipes</i> Cameron, 1905	-		-		-	+	-	-
255. <i>Goryphus</i> <i>difficilis</i> Jonathan & Gupta, 1973	+							-
256. <i>Goryphus</i> <i>gandhii</i> Jonathan & Gupta, 1973			+			+	-	
257. <i>Goryphus</i> <i>madhulikae</i> Jonathan & Gupta, 1973			-		-	+		-
258. <i>Goryphus</i> <i>nursei</i> (Cameron) = <i>Melcha nursei</i> Cameron, 1907	+		-	-	-		-	-
259. <i>Goryphus</i> <i>rangaparensis</i> Jonathan & Gupta, 1973	-			-	-	+		
260. <i>Goryphus</i> <i>rufobasalis</i> Betrem, 1941								
261. <i>Goryphus</i> <i>sikkimensis</i> Jonathan & Gupta, 1973	+					+		
262. <i>Goryphus</i> <i>villosus</i> Jonathan & Gupta, 1973	-	-		-		+		-
263. <i>Skeatia</i> <i>doonensis</i> Jonathan & Gupta, 1973	+	-	-	-	-	-	-	-
264. <i>Skeatia</i> <i>infernalis</i> (Cameron) = <i>Cryptus infernalis</i> Cameron, 1987 = <i>Neomesostenus indicus</i> Szepligeti, 1916	+	-	-	-	-	-	-	-
265. <i>Skeatia</i> <i>maculifrons</i> Jonathan & Gupta, 1973	-	+	+	-	+	+	-	-
266. <i>Perjiva</i> <i>kamathi</i> Jonathan & Gupta, 1973	-		-			+	-	-
267. <i>Fotsiforia</i> <i>sundrica</i> Jonathan, 1980	-			-	-	+	-	-
268. <i>Isotima</i> <i>punctata</i> Jonathan, 1980	+	-	-	-	-	+	-	-
269. <i>Isotima</i> <i>pusilla</i> (Szepligeti) = <i>Neomesostenus pusillus</i> Szepligeti, 1961 = <i>Neomesostenus minutes</i> Szepligeti, 1916 = <i>Neomesostenus persimilis</i> Szepligeti, 1916	+		-	-	-	+	-	-
270. <i>Isotima</i> <i>ruficollis</i> (Holmgren) = <i>Goryphus ruficollis</i> Holmgren, 1868	+	-	-	-		+	-	-

	1	2	3	4	5	6	7	8
271. <i>Isotima rufipleuralis</i> Jonathan, 1980	+	-	-	-	-	+	-	-
272. <i>Formostenus</i> (<i>Formostenus</i>) <i>flavofasciatus</i> Jonathan, 1980	-		-	-	-	+	+	-
273. <i>Coesula fulvipes septentrionalis</i> Gupta & Jonathan, 1969		-	-	-	-	+	-	-
274. <i>Acromia punctata</i> Kamath, 1972	+	-	-	-	-	-	-	-
275. <i>Fitatsia hypsipylae</i> Kamath, 1972	+	-	-	-	-	-	-	-
276. <i>Fitatsia tuberculata</i> Kamath, 1972	-	-	-	-	+	-	-	-
277. <i>Silsila fulvipes</i> Cameron, 1903	+	-	-	-	-	+	-	-
278. <i>Silsila similis</i> Kamath, 1972	+	-	-	-	-	+	-	-
279. <i>Acroricnus peronatus</i> (Cameron) = <i>Osprynchotus peronatus</i> Cameron, 1902 = <i>Acroricnus peronatus</i> Townes, Townes & Gupta, 1961	+	-	-	-	-	-	-	-
SUBFAMILY : ICHNEUMONINAE								
280. <i>Eccoptosage schizoaspis schizoaspis</i> (Cameron) = <i>Acanthojoppa schizoaspis</i> Cameron, 1902 = <i>Acanthojoppa flavo-orbitalis</i> Cameron, 1902	+	-	-	-	-	-	-	-
281. <i>Pterocormus heinrichi</i> Gupta, 1987 = <i>Ichneumon himalayanus</i> Heinrich, 1974	-	+	+	-	-	-	-	-
282. <i>Stenichneumon appropinquans</i> (Cameron) = <i>Ichneumon appropinquans</i> Cameron, 1897 = <i>Myermo rufipes</i> Cameron, 1901 = <i>Myermo fuispennis</i> Cameron, 1903 = <i>Stenicheumon guttatus</i> Uchida, 1925	+	-	-	-	-	-	-	-
283. <i>Diphyus integratus</i> (Cameron) = <i>Ichneumon integratus</i> Cameron, 1897	+	-	-	-	-	-	-	-
284. <i>Diphyus numericus</i> (Cameron) = <i>Ichneumon numericus</i> Cameron, 1897	+	-	-	-	-	-	-	-
285. <i>Ctenichneumon? rotheneyi</i> (Cameron) = <i>Ichneumon rothneyi</i> Cameron, 1897	+	-	-	-	-	-	-	-
286. <i>Hepiopelmus guptae</i> Heinrich, 1974	-	+	+	-	-	-	-	-
287. <i>Aeneonaenaria occidentalis</i> Heinrich, 1974		+	+	-	-	-	-	-
288. <i>Lareiga clotho</i> (Cameron) = <i>Ichneumon clotho</i> Cameron, 1897 = <i>Lareiga alboannulata</i> Cameron, 1905	+	-	-	-	-	-	-	-
289. <i>Algathia buddha</i> (Cameron) = <i>Ichneumon buddha</i> Cameron, 1897	+		-	-	-	-	-	-

	1	2	3	4	5	6	7	8
290. <i>Barichneumon coxalis</i> (Cameron) = <i>Spilichneumon coxalis</i> Cameron, 1905	+			-	-	-	-	-
291. <i>Barichneumon vishnu</i> (Cameron) = <i>Ichneumon vishnu</i> Cameron, 1897	+	-	-	-	-	-	-	-
292. <i>Barichneumonites?</i> <i>indicus</i> (Rao) = <i>Brachicentrus</i> (!) <i>indica</i> Rao, 1953	+	-	-	-	-	-	-	-
293. <i>Ichneumon</i> (<i>Ichneumon</i>) <i>caerulescens</i> (Morley) = <i>Aglaojoppa caerulescens</i> Morley, 1915	+	-	-	-	-	-	-	-
294. <i>Ichneumon</i> (<i>Ichneumon</i>) <i>cyaniventrops</i> (Heinrich) = <i>Cocelichneumon</i> (<i>Coelichneumon</i>) <i>cyaniventrops</i> Heinrich, 1966	+	-	-	-	-	-	-	-
295. <i>Ichneumon</i> (<i>Ichneumon</i>) <i>iridipennis</i> (Cameron) = <i>Aglaojoppa iridipennis</i> Cameron, 1905	+	-	-	-	-	-	-	-
296. <i>Ichneumon</i> (<i>Ichneumon</i>) <i>rufofemoratus</i> (Cameron) = <i>Cyanojoppa rufofemorata</i> Cameron, 1903 = <i>Cyanojoppa caeruleicaudis</i> Cameron, 1903 = <i>Cyanojoppa nigro-coerulea</i> Cameron, 1903 = <i>Cyanojoppa striata</i> Cameron, 1903	-	-	-	-	-	+	-	-
297. <i>Ichneumon</i> (<i>Ichneumon</i>) <i>taihorinus</i> (Uchida) = <i>Spilojoppa fulvipes</i> Cameron, 1904 = <i>Coelicheumon taihorinus</i> Uchida, 1932 = <i>Ichneumon fluvimanus</i> Townes, Townes & Gupta, 1961	+				-	+	-	-
298. <i>Aglaojoppa lamellata lamellata</i> Heinrich, 1967	-	-	-	-	-	+	+	
299. <i>Aglaojoppa rufofemorata rufofemorata</i> (Cameron) = <i>Aglaojoppa rufofemorata</i> Cameron, 1903 = <i>Ichneumon flavodes assamensis</i> Townes, Townes & Gupta, 1961	-	-	-	-	-	+	-	-
300. <i>Amblyjoppa annulitarsis annulitarsis</i> (Cameron) = <i>Hadrojoppa annulitarsis</i> Cameron, 1902	-	+	+	-	-	+	-	-
301. <i>Cnemojoppa rufipes</i> (Cameron) = <i>Amblyjoppa rufipes</i> Cameron, 1903	+	-	-	-	-	-	-	-
302. <i>Darachosia fulvipes fulvipes</i> Cameron, 1903		+	+	-	-	-	-	-
303. <i>Habrojoppa rufopetiolata</i> Cameron, 1903 = <i>Xenojoppa kali</i> Morely, 1919	+	-	-	-	-	-	-	-

REFERENCES

GAULD, I.D. 1976. The classification of the Anomoloninae (Hymenoptera : Ichneumonidae). *Bul. Brit. Mus. Nat. Hist (Ent.)*, 33 : 1-135.

- GAULD, I.D. & MITCHELL, P.A. 1981. The Taxonomy, Distribution and Host preferences of Indo-Papuan Parasitic Wasps of the Subfamily Ophioninae. CAB : Slough. Commonwealth Institute of Entomology, London. Pp. 1-1611.
- GUPTA, VIRENDRA, 1987. Catalogue of the Indo-Australian Ichneumonidae. Part 1 & 2. *Mem. Amer. Ent. Inst.* 41 : 1-1210.
- GUPTA, SANTOSH, & GUPTA, VIRENDRA. 1983. Ichneumonologia Orientalis, Part IX. *Oriental Ins. Monogr.*, 10 : 1-313.
- GUPTA, V. K. & MAHESHWARY, S. 1977. Ichneumonologia Orientalis, Part IV. The tribe Porizontini (=Campoplegini) (Hymenoptera : Ichneumonidae). *Oriental Ins. Monogr.*, 5 : 1-267.
- GUPTA, V. K. & TIKAR, D.T. 1976. Ichneumonologia Orientalis, Part 1. The tribe Pimplini (Hymenoptera: Ichneumonidae). *Oriental Ins. Monogr.*, 1 : 1-313.
- JONATHAN. J. K. 1980. The Isotina-Complex. *Rec. zool. Surv.*, Occ. Paper No. 17 : 1-146.
- JONATHAN, J. K. & GUPTA, V.K. 1973. Ichneumonologia Orientalis, Part III. The Goryphus-Complex (Hymenoptera : Ichneumonidae). *Oriental Ins. Monogr.*, 3 : 1-203.
- KAMATH, M.K. & GUPTA, V.K. 1972. Ichneumonologia Orientalis, Part II. The tribe Rhyssini (Hymenoptera : Ichneumonidae). *Oriental Ins. Monogr.*, 2 : 1-300.
- KAUR. RAMINDER & JONATHAN, J.K. 1979. Ichneumonologia Orientalis, part VIII. The tribe Phytodictini from India (Hymenoptera : Ichneumonidae). *Oriental Ins. Monogr.*, 9 : 1-276.
- MORLEY, C. 1913. Fauna of British India, including Ceylon and Burma. Hymenoptera Vol. III. Ichneumonidae. London : Taylor & Francis. 1-531.

CHILOPODA : SCOLOPENDROMORPHA : SCOLOPENDRIDAE

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The centipede is called by various vernacular names, viz., 'KANKHAJURA' in U.P., KANSALAVA in Rajasthan: 'KANKOL' in Punjab 'KANSUI' in Maharashtra: 'KENNRI' in Orissa and 'KANNOI' in Bengal.

It is a poisonous, solitary, nocturnal, cannibal and cryptic animal taking refuge under stones, cowdung, flower pots, bark of trees, mosses; in the gardens, cultivated, semi-cultivated land or in wild.

The centipedes belong to the superclass Myriapoda. The myriapods are worm like multilegged, multisegmented tracheate arthropods.

On the basis of their body segmentation and possession of the number of pairs of legs per segment, the myriapods are divided into four classes, viz., Chilopoda, Diplopoda, Pauropoda and Symphyla.

The class Chilopoda includes the 'centipedes' whose bodies are demarcated into two sections, the head and the trunk. The trunk is multisegmented and there is only one pair of legs per segment.

From the times of Linnaeus (1758) till date not much work on the taxonomy of the Indian Scolopendrid Centipedes seems to have been carried out and practically none from the Western Himalaya (U.P.). The very first reference that appeared in print on the Western Himalaya (U.P.) fauna is by Khanna and Kumar (1984), followed by Khanna and Tripathi 1984a, 1984b, 1985 and 1986, 1987a, 1987b and 1987c (in press).

Khanna (1987) has prepared a detailed account of the scolopendrid centipede fauna of Western Himalaya, U.P., including a check-list of the known Indian species.

The scolopendrid centipedes are represented by 94 species including subspecies from India, belonging to seven genera of the family scolopendridae.

Out of these only five genera, viz., *Scolopendra* Linnaeus, *Cormocephalus* Newport, *Asanada* Meinert, *Rhysida* Wood and *Otostigmus* Porath, are represented in Western Himalaya, U.P., by twenty species known as at present, as per the table appended.

Out of the above twenty species, extension of distribution of *Rhysida carinulata* (Haase), *Rhysida afra cuprea* Kraepelin and *Rhysida monalii* Khanna and Kumar, in Western Himalaya, U.P., has been recorded. *Rhysida longicarinulata* Khanna and Tripathi, *Rhysida nuda nuda* (Newport), *Otostigmus poonamae* Khanna and Tripathi and *Otostigmus nudus* Pocock have been recorded for the first time from Uttar Pradesh, India. One species viz. *Rhysida* sp.1 and five subspecies viz., *Rhysida lithobioides* ssp.1 and ssp.2, *Rhysida longipes* ssp.3, *Rhysida stuhlmani* ssp.4. and *Otostigmus politus* ssp.5, have been described as new to science. The descriptions of the new species are being published elsewhere.

Some of the species which were earlier inadequately described and illustrated have been redescribed and fully illustrated.

FAUNA	1	2	3	4	5	6	7	8
CLASS : CHILOPODA								
ORDER : SCOLOPENDROMORPHA								
FAMILY : SCOLOPENDRIDAE								
<i>Scolopendra morsitans</i> Linn.	+	-	+	-	-	+	+	+
<i>Scolopendra subspinipes deltaani</i> Brandt	-	-	-	-	-	+	-	-
<i>Cormocephalus dentipes</i> Pocock	+	-	+	+	-	+	-	+
<i>Cormocephalus pygmaeus</i> Pocock	-	-	-	-	-	+	-	+
<i>Asanada indica</i> Jangi & Dass	+	-	-	-	-	-	-	-
<i>Rhysida monalii</i> Khanna & Kumar	+	+	+	+	+	+	+	+
<i>Rhysida lithobioides</i> ssp .1	-	-	-	-	-	+	-	-
<i>Rhysida lithobioides</i> ssp 2	+	-	-	-	-	-	-	-
<i>Rhysida longipes</i> ssp. 3				-	-	+	-	-
<i>Rhysida longicarinulata</i> Khanna & Tripathi	+	-	-	-	-	-	-	-
<i>Rhysida stuhlmanni</i> ssp. 4	-	-	-	-	-	+	-	-
<i>Rhysida afra cuprea</i> Kraepelin	-	-	-	-	-	-	+	+
<i>Rhysida nuda immarginata</i> Porath	+	-	+	-	+	+	+	-
<i>Rhysida nuda nuda</i> (Porath)	-	-	+	-	+	-	-	-
<i>Rhysida carinulata</i> (Haase)	-	-	-	-	-	+	-	-
<i>Rhysida</i> sp .1	-	-	+	-	-	-	-	-
<i>Otostigmus politus</i> ssp. 5	-	-	-	-	-	+	+	-
<i>Otostigmus amballae</i> Chamberlin	+	+	+	-	+	+	+	+
<i>Otostigmus nudus</i> Pocock	+	-	+	-	-	-	-	-
<i>Otostigmus poonamae</i> Khanna & Tripathi	-	-	-	+	+	-	-	-

REFERENCES

ATTMES, C.1930. SCOLOPENDROMORPHA. *Das Tierr.*, 54(2) : 1-308.

KHANNA, V. 1987. Taxonomic and ecological studies on the scolopendrid centipedes (Chilopoda : Scolopendromorpha: Scolopendridae) from Western Himalaya, U.P., India. *D. Phil Thesis*, Garhwal University, Srinagar, pp.1-203, with 21 pls.

- KHANNA, V. & KUMAR, A. 1984. Scolopendrid centipedes from Western Himalaya, U.P., with an annotated list of Indian species (Chilopoda:Scolopendromorpha:Scolopendridae). *Uttar Pradesh J. Zool.*, 4(1) : 83-98.
- KHANNA, V. & TRIPATHI, J. C. 1984 a. Centipede- A friend and an enemy. *Cheetal*, 25(3) : 37-40.
- KHANNA, V. & TRIPATHI, J. C. 1984 b. Observations on the seasonal incidence within the centipede genus *Cormocephalus* (Chilopoda : Scolopendridae). *Uttar Pradesh J. Zool.*, 4(2) : 217-219.
- KHANNA, V. & TRIPATHI, J. C. 1985. On a new species of the genus *Rhysida* Wood from Himachal Pradesh, India. *Annl. Ent.*, 3(1) : 19-24.
- KHANNA, V. & TRIPATHI, J. C. 1986. On a new species of the genus *Otostigmus* Porath, from Himachal Pradesh, India (Scolopendridae : Otostigmini). *Annl. Ent.*, 4(1) : 35-39.
- KHANNA, V. & TRIPATHI, J. C. (In press). On the centipede fauna of Corbett National Park, U.P. (Chilopoda: Scolopendromorpha: Scolopendridae). *Rec. zool. Surv. India*, mss. pp.1-10. (1987a)
- KHANNA, V. & TRIPATHI, J. C. (in press) Centipede fauna of Rajaji National Park, U.P., India (Chilopoda : Scolopendromorpha : Scolopendridae). *Rec. Zool. Surv. India*, mss. pp.1-11 (1987b)
- KHANNA. V. & TRIPATHI, J. C. (in press). Fauna of Rajaji National Park, U. P.: Some ecological observations on the centipede *Cormocephalus dentipes* Pocock, with remarks on "Sexual dimorphism" in the species and proposed new synonym (Chilopoda : Scolopendromorpha : Scolopendridae). *Rec. Zool. Surv. India*, mss. pp.1-15, with two plates. (1987c)

	1	2	3	4	5	6	7	8
<i>C. truncatus</i> Karsch	+	+	-	+	-	+	-	-
FAMILY : VAEJOVIDAE								
<i>Scorpiops (Scorpiops) hardwickii</i> (Gervais)	+	+	+	+	-	-	-	-
<i>S. (S.) crassimanus</i> pocock	-	-	-	-	-	+	-	-
<i>S. (S.) montanus</i> Karsch	+	+	+	+	+	+	-	+
<i>S. (Euscorpiops) binghamii</i> poc.	+					-	-	-
<i>Scorpios (E.) asthenurus</i> poc.				-	+		-	-
<i>S. (E.) longimanus</i> pocock	+	-		-	-	+	-	-
<i>S. (S.) petersi</i> pocock	+	-	-	-	-	+	-	-
FAMILY : SCORPIONIDAE								
<i>Hetrometrus (H.) bengalensis</i> Koch	+	-	-	-	-	-	-	-
<i>H. (Giganatomentrus) swammerdami</i> Simoin	+			-	-	-	-	-
<i>H. (Chersonometruss) festigosus</i> Couzijin	+		-	-	-		-	-

PISCES

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For a scientific management of the fish resources and a study of biological diversity of an ecosystem, a comprehensive knowledge of its fish fauna is a prerequisite.

The fishes of the Himalayan ecosystem are distinctive in possessing special features for survival in the torrential environment.

The fish fauna of the Western Himalaya (Uttar Pradesh) has attracted the attention of various workers during the past (Gray, 1831; McClelland, 1835; Williams, 1874; Day, 1878; Atkinson, 1884; Walker, 1888; Regan, 1907; Chaudhuri, 1910, 1912; Hora, 1921, 1937; Hora and Mukerji, 1936; Fowler, 1924; Raj, 1945; Menon, 1949, 1954, 1963, 1964, 1971, 1974, 1987; Menon and Sen, 1966; Chaudhry and Khandelwal, 1960; Das, 1960; Das and Pande, 1982; Mainwaring, 1960; Lal and Chatterjee, 1963; Singh, 1963; Singh, 1964; Narain, 1966; Singh and Srivastava, 1967; Banarescu and Nalbant, 1968; Pande and Jain, 1968; Raturi and Joshi, 1968; Grover, 1969, 1970; Grover and Baloni, 1973; Tilak, 1969, 1970; Tilak and Husain, 1973, 1976, 1977a, b, 1978a, b, 1980, 1990; Tilak and Baloni, 1984; Misra and Joshi, 1970; Pant, 1970; Gupta and Joshi, 1971; Badola and Pant, 1973; Badola, 1975; Badola and Singh, 1980, 1984; Bhamri, 1976; Husain, 1976, 1979, 1980, 1986, 1987, in press a, b,; Prasad, 1976; Srivastava and Srivastava, 1977; Dwivedi and Mathur, 1978; Gupta and Chandra, 1978; Singh and Gupta, 1979a, b; Baloni, 1980; Baloni and Grover, 1982; Prasad and Pant, 1980; Prasad and Tilak, 1984; Upadhyaya and Upadhyaya, 1980; Joshi, 1981; Gupta and Pande, 1982; Singh et al., 1982; Singh and Dobriyal, 1983; Sharma, 1984; Bisht and Das, 1985; Dobriyal, 1985; Joshi, 1985; Johri et al., 1988; Joshi and Joshi, 1989; Juyal and Gusain, 1990). Besides general ichthyofauna, several new species have been described from the area by some of these workers.

The knowledge rendered by these workers is generally confined to the streams, valleys, districts, divisions etc. The present study is an analysis of the fish fauna of the Western Himalaya based on extensive surveys of various water courses (streams, lakes, reservoirs) of the area, proper records by earlier workers and the information collected from local fishermen. The species reported by Menon (1954, 1963) from the Ramganga, the Ganga and the Yamuna drainages (except *Glyptothorax conirostris* (Steindachner) and *G. stoliczkae* (Steindachner)) which are found in Himachal Pradesh side of the Western Himalaya) have been included in the list. The species introduced into the area have also been taken into account. The species of doubtful occurrence reported by some earlier workers have been mentioned separately.

Husain (1987, in press) a while dealing with the fishes of Dehra Dun district considered *Barbus garmani* Flower, 1924 conspecific with *Puntius sarana sarana* Hamilton- Buchanan, 1822, *Nemachilus scaturigina* (nec. McClelland, 1839) Hora, 1936 a synonym of *Nemacheilus montanus* (McClelland, 1838) ; *Nemachilus rupecola inglisi* Hora, 1935 identical with *Nemacheilus rupecola* (McClelland, 1838) ; *Glyptothorax brevipinnis alakandii* Tilak, 1969 and *G. brevipinnis brevipinnis* (nec. Hora,

1923) Tilak and Husain, 1973 conspecific with *G. pectinopterus* (McClelland, 1842) and *Glyptothorax gracilis* (*nec.* Gunther, 1864) Tilak and Husain, 1973 relegated to *G. dakpathari* Tilak and Husain, 1976. Husain(*op. cit.*) considered *Ophiocephalus gachua* Hamilton- Buchanan, 1822 (with pelvic fins) as a distinct species and segregated it from the synonymy of *Channa orientalis* Schneider, 1801 (without pelvic fins and girdle). These species have been included accordingly.

There are altogether 124 species/subspecies of fishes belonging to 66 genera, 27 families and 8 orders. The list includes a large number of new records from each district and the Western Himalaya (Uttar Pradesh) as a whole (Table).

FISHES ORIGINALLY DISCOVERED FROM WESTERN HIMALAYA WITH TYPE-LOCALITY AND CURRENT TAXONOMIC STATUS

Eminent Ichthyologists (Gray, 1831; McClelland, 1835; Chaudhuri, 1910, 1912; Hora, 1921; Fowler, 1924; Tilak, 1969; Tilak and Husain, 1976, 1977b, 1978b, 1980, 1990; Menon, 1971, 1987) working on the Western Himalayan Ecosystem have made notable contributions to the fish fauna of the area with the discovery of several fishes, new to the science. A list of such species with their type-localities and the current taxonomic status is provided here:

Original Name and Type-locality

Current Taxonomic Status

ORDER : CYPRINIFORMES

FAMILY : CYPRINIDAE

SUBFAMILY : RASBORINAE

- | | |
|---|--|
| 1. <i>Barilius bonarensis</i> Chaudhuri, 1912
(type-locality : Bonar, Garhwal) | <i>Barilius barila</i> Hamilton - Buchanan, 1822 |
| 2. <i>Barilius corbetti</i> Tilak & Husain, 1980 | — |
| 3. <i>Barilius dimorphicus</i> Tilak & Husain,
1990 | — |

SUBFAMILY : CYPRININAE

- | | |
|--|--|
| 4. <i>Labeo almora</i> Chaudhuri, 1912
(type-locality : Almora) | <i>Labeo dero</i> (Hamilton-Buchanan, 1822) |
| 5. <i>Barbus garmani</i> Flower, 1924
(type-locality : Dehra Dun) | <i>Puntius sarana sarana</i> Hamilton-Buchanan, 1822 |

SUBFAMILY : GARRINAE

- | | |
|--|--|
| 6. <i>Garra prashadi</i> Hora, 1921
(type-locality : Malwa Tal, Nainital) | <i>Garra lamta</i> Hamilton-Buchanan, 1822 |
|--|--|

SUBFAMILY : SCHIZOTHORACINAE

7. *Gonorhynchus petrophilus* McClelland, 1835
(type-locality : Kumaon) *Schizothorax richardsonii* (Gray, 1830-32)
8. *Schizothorax kumaonensis* Menon, 1971
(type-locality : Nainital) —

FAMILY : HOMALOPTERIDAE

SUBFAMILY : NEMACHEILINAE

9. *Noemacheilus doonensis* Tilak & Husain, 1977
(type-locality : Dehra Dun) *Nemacheilus doonensis* (Tilak & Husain, 1977)
10. *Noemacheilus gangeticus* Menon, 1987
(type-locality : Srinagar, Garhwal ; Dehra Dun) *Nemacheilus gangeticus* (Menon, 1987)
11. *Nemacheilus mackenzii* Chaudhuri, 1910
(type-locality : Nainital (U.P.) ; Purnia (Bihar) ; Siripur (W.B.)) *Nemacheilus botia* (Hamilton-Buchanan, 1822)

FAMILY : COBITIDIDAE

SUBFAMILY : COBITIDINAE

12. *Lepidocephalus caudofurcatus* Tilak & Husain, 1978
(type-locality : Dehra Dun) *Lepidocephalus (Lepidocephalichthys) caudofurcatus* Tilak & Husain, 1978

SUBFAMILY : BOTIINAE

13. *Botia almorhae* Gray, 1831
(type-locality : Almora) —

ORDER : SILURIFORMES

FAMILY : SISORIDAE

14. *Glyptothorax brevipinnis alaknandi* Tilak, 1969
(type-locality : Pauri-Garhwal) *Glyptothorax pectinopterus* McClelland, 1842
15. *Glyptothorax dakpathari* Tilak & Husain, 1976
(type-locality : Dehra Dun) —
16. *Glyptothorax garhwali* Tilak, 1969
(type-locality : Pauri-Garhwal) —

The author has described four new species of *Barilius*, *Nemacheilus* and *Glyptothorax* from Dehra Dun which are being published elsewhere.

SPECIES INTRODUCED

A number of Indian (*Catla catla*, *Cirrhinus mrigala*, *C.reba*, *Labeo bata*, *L. calbasu*, *L. gonius*, *L. rohita* and *Aplocheilus panchax*) and the exotic species (*Carassius carassius*, *Cyprinus carpio*, *Ctenopharyngodon idellus*, *Hypophthalmichthys moltrix*, *Salmo gairdnerii gairdnerii*, *S. gairdnerii irideus*, *S. trutta fario*, *Gambusia affinis holbrooki* and *Osphronemus goramy*) have been introduced into the area for various purposes (fishery, game, malaria control, aesthetic value etc.). The report of these species is based on published work and on personal information.

The carps are being cultured by stocking the lakes and reservoirs with fingerlings transported from other areas. The trouts have been introduced in the hill streams and lakes at higher elevation for the purpose of game. The Gold Fishes are generally kept as pet in aquaria and in the tanks of Govt. buildings and private bungalows for their beauty and colour. The Gourami, the *Gambusia* and the Blue Panchax, being the larvicidal fishes, are introduced for the eradication of the mosquito larvae for controlling the malaria.

SPECIES OF DOUBTFUL OCCURRENCE (REPORTED BY EARLIER WORKERS)

The reports of the occurrence of the species, viz., *Anguilla bengalensis* (Gray), *Chela argentea* Day (= *Salmostoma acinaces* (Valenciennes)), *Danio dangila* (Hamilton Buchanan), *Labeo nigripinnis* Day, *L. pangusia* (Hamilton Buchanan), *Oreochthys cosuatis* (Hamilton Buchanan), *Puntius dukai* (Day), *P. phutunio* Hamilton Buchanan, *Tor hexastictus* (McClelland), *T. mosal* (Hamilton Buchanan), *Garra annandalei* Hora, *Nemacheilus boutanensis* (McClelland), *N. denisoni* Day, *N. multifasciatus* Day, *N. zonatus* (McClelland), *Mystus gulio* (Hamilton - Buchanan), *Glyptothorax madraspatanum* (Day) and *G. trilineatus* Blyth by some workers are evidently doubtful, and are probably either misidentifications or based on material procured from fish markets where fishes are also brought from outside places.

DISTRIBUTIONAL PATTERN OF THE SPECIES

The distributional pattern of the fish fauna in relation to the Garhwal and Kumaon Divisions of Western Himalaya is very interesting as the hillstream fauna of Garhwal is more diverse than that in the Kumaon Division. The distributional pattern of other species is just the reverse.

The hillstream fishes, viz. *Barilius barila*, *B. corbetti*, *B. dimorphicus*, *B. shacra*, *Barilius* spp. (two new species), *Schizothoracichthys progastus*, *Nemacheilus gangeticus*, *Nemacheilus* sp. (new species), *Lepidocephalus caudofurcatus*, *Botia rostrata*, *Clupisoma montana*, *Glyptothorax garhwali*, *G. saisii* and *Glyptothorax* sp. (new species) are restricted to the Garhwal Division, whereas *Schizothorax*

kumaonensis, *Psilorhynchus balitora*, *Botia almorhae*, and *Laguvia ribeiroi kapuri* are only confined to the Kumaon Division. Further, the species like *Barilius barna*, *B. bendelisis*, *B. vagra*, *Labeo dero*, *Torchelynoides*, *T. putitora*, *T. tor*, *Garra gotyla gotyla*, *Schizothorax richardsonii*, *Nemacheilus botia*, *N. montanus*, *N. rupecula*, *Glyptothorax pectinopterus*, *Pseudecheneis sulcatus* and *Mastacembelus armatus* are the commonest throughout the eight districts of the Western Himalaya. However, species like *Raiamas bola*, *Labeo dyocheilus*, *Puntius conchoniis*, *P. ticto*, *Crossocheilus latius*, *Garra lamta*, *Nemacheilus beavani*, *N. doonensis*, *Glyptothorax cavia* and *Ophiocephalus gachua* are widespread. There are several hillstream fishes which are specifically confined to Dehra Dun (*Barilius* spp. - two new species, *Nemacheilus* sp. - new species, *Lepidocephalus caudofurcatus*, *Glyptothorax* sp. - new species), Pauri-Garhwal (*Barilius corbetti*, *Glyptothorax saisii*) and Nainital districts (*Schizothorax kumaonensis* and *Psilorhynchus balitora*).

The species of the plains are relatively more diverse in the southern part of Nainital district which is a plain, scattered with a large number of reservoirs such as Baigul, Dhaura, Nanak Sagar, Tumaria etc.).

TABLE SHOWING DISTRICTWISE DISTRIBUTION OF SPECIES

PHYLUM : CHORDATA

SUBPHYLUM : VERTEBRATA

CLASS : OSTEICHTHYES

FAUNA	GARHWAL HILLS				KUMAON HILLS			
	1	2	3	4	5	6	7	8
ORDER : OSTEOGLOSSIFORMES								
SUBORDER : NOTOPTEROIDEI								
FAMILY : NOTOPTERIDAE								
<i>Notopterus chitala</i> (Hamilton-Buchanan)	-	-	-	-	-	+	-	-
<i>N. notopterus</i> (Pallas)	-	-	-	-	-	+	-	-
ORDER : CLUPEIFORMES								
SUBORDER : CLUPEOIDEI								
FAMILY : CLUPEIDAE								
SUBFAMILY : ALOSINAE								
<i>Gudusia chapra</i> (Hamilton - Buchanan)	-	-	-	-	-	+	-	-
ORDER : CYPRINIFORMES								
FAMILY : CYPRINIDAE								
SUBFAMILY : CULTRINAE								
<i>Chela laubuca</i> Hamilton-Buchanan	-	-	+	-	-	+	-	-

	1	2	3	4	5	6	7	8
<i>Salmostoma bacaila</i> (Hamilton-Buchanan)	-	-	-	-	-	+	-	-
<i>S. phulo phulo</i> (Hamilton-Buchanan)		-	-		-	+	-	-
SUBFAMILY : HYPOPHTHALMICHTHYINAE								
<i>Hypophthalmichthys moltrix</i> (Valenciennes), Silver Carp	+	-	-	-	-	+	-	-
SUBFAMILY : RASBORINAE								
<i>Amblypharyngopdon mola</i> (Hamilton-Buchanan)	-	-	-	-	-	+	-	-
<i>Aspidoparia jaya</i> (Hamilton-Buchanan), Fig. 1	+	-	-	-	-	+	-	-
<i>A. morar</i> (Hamilton-Buchanan), Fig. 2	+	-	-	-	-	+	-	-
<i>Barilius barila</i> Hamilton-Buchanan	-	+	+	+	-	-	-	-
<i>B. barna</i> Hamilton-Buchanan, Fig. 3	+	+	+	+	+	+	+	+
<i>B. bendelisis</i> Hamilton-Buchanan, Fig. 4	+	+	+	+	+	+	+	+
<i>B. corbetti</i> Tilak & Husain, Fig. 5	-	-	+	-	-	-	-	-
<i>B. dimorphicus</i> Tilak & Husain, Fig. 6	+	-	+	-	-	-	-	-
<i>B. shacra</i> Hamilton-Buchanan	-	-	+	-	+	-	-	-
<i>B. vagra</i> Hamilton-Buchanan, Fig. 7	+	+	+	+	+	+	+	+
<i>Barilius</i> sp. (new species)	+				-		-	-
<i>Barilius</i> sp. (new species)	+	-		-	-	-	-	-
<i>Brachydanio rerio</i> (Hamilton-Buchanan), Fig. 8	+	-	+	-	-	+	+	-
<i>Danio devario</i> (Hamilton-Buchanan), Fig. 9	+	-	+	-	-	+	-	-
<i>Esomus danricus</i> (Hamilton-Buchanan), Fig. 10	+	-	+	-	-	+	-	-
<i>Parluciosoma daniconius</i> (Hamilton-Buchanan), Fig. 11	+	-	+		-	+	+	-
<i>Raiamas bola</i> (Hamilton-Buchanan), Fig. 12	+	-	+	-	+	+	-	+
SUBFAMILY : CYPRININAE								
<i>Carassius carassius</i> (Linnaeus), Gold Fish	+	-	-	+	+	+	-	-
<i>Catla catla</i> (Hamilton-Buchanan)	+	-	-	-	-	+	-	-
<i>Chagunius chagunio</i> (Hamilton-Buchanan), Fig. 13.	+	-	+	-	-	+	-	-
<i>Cirrhinus mrigala</i> (Hamilton-Buchanan)	+	-	-	-	-	+	+	-
<i>C. reba</i> (Hamilton-Buchanan)	+	-	-	-	-	+	-	-
<i>Cyprinus carpio</i> Linnaeus, Common Carp	+			+	+	+	+	-

	1	2	3	4	5	6	7	8
FAMILY : PSILORHYNCHIDAE								
<i>Psilorhynchus balitora</i> (Hamilton-Buchanan)	-	-	-	-	-	+	-	-
FAMILY : HOMALOPTERIDAE								
SUBFAMILY : HOMALOPTERINAE								
<i>Balitora brucei</i> Gray	-	-	+	-	-	-	+	-
SUBFAMILY : NEMACHEILINAE								
<i>Nemacheilus beavani</i> Gunther	-	+	+	+	+	+	+	+
<i>N. botia</i> (Hamilton-Buchanan), Fig. 29	+	+	+	+	+	+	+	+
<i>N. corica</i> (Hamilton-Buchanan), Fig. 30	+		+		-	+	-	-
<i>N. doonensis</i> (Tilak & Husain), Fig. 31	+	-	+	-	+	+	-	+
<i>N. gangeticus</i> (Menon)	+	-	+	-	-	-	-	-
<i>N. montanus</i> (McClelland), Fig. 32	+	+	+	+	+	+	+	+
<i>N. rupecula</i> (McClelland), Fig. 33	+	+	+	+	+	+	+	+
<i>N. savona</i> (Hamilton-Buchanan), Fig. 34	+	-	-	-	-	+	-	-
<i>Nemacheilus</i> sp. (new species)	+	-	-	-	-	-	-	-
FAMILY : COBITIDIDAE								
SUBFAMILY : COBITIDINAE								
<i>Lepidocephalus annandalei</i> Chaudhuri, Fig. 35	+	-	-	-	-	+	-	-
<i>L. caudofurcatus</i> Tilak & Husain, Fig. 36	+	-	-	-	-	-	-	-
<i>L. guntea</i> (Hamilton-Buchanan), Fig. 37	+	-	+	-	-	+	-	-
SUBFAMILY : BOTIINAE								
<i>Botia alomrhae</i> Gray			-	-	-	+	+	-
<i>B. rostrata</i> Gunther, Fig. 38	+	+	+	-	+	-	-	-
ORDER : SILURIFORMES								
FAMILY : BAGRIDAE								
<i>Lorichthys seenghala</i> (Sykes), Fig. 39	+	-	-	-	-	+	-	-
<i>Mystus bleekeri</i> (Day), Fig. 40	+	-	-	-	-	+	-	-
<i>M. cavasius</i> (Hamilton-Buchanan)	-	-	-	-	-	+	-	-
<i>M. vittatus</i> (Bloch), Fig. 41	+	-	+	-	-	+	-	-
<i>Pseudeutropius atherinoides</i> (Bloch), Fig. 42	+	-	-	-	-	-	-	-

	1	2	3	4	5	6	7	8
FAMILY : CLARIIDAE								
<i>Clarias batrachus</i> (Linnaeus), Fig. 56	+	-	-	-	-	+	-	-
FAMILY : HETEROPNEUSTIDAE								
<i>Heteropneustes fossilis</i> (Bloch), Fig. 57	+					+	-	-
ORDER : SALMONIFORMES								
SUBORDER : SALMONOIDEI								
FAMILY : SALMONIDAE								
SUBFAMILY : SALMONINAE								
<i>Salmo gairdnerii gairdnerii</i> Richardson, Rainbow Trout	+	+	-	+	+	+	-	-
<i>S. gairdnerii irideus</i> Gibbons, Raibow Trout	-	-	-	+	-	-	-	-
<i>S. trutta fario</i> Linnaeus, Brown Trout	+	-	-	+	+	+	-	-
ORDER : CYPRINODONTIFORMES								
SUBORDER : EXOCOETOIDEI								
FAMILY : BELONIDAE								
<i>Xenentodon cancila</i> (Hamilton-Buchann), Fig. 58	+	-	-	-	-	+	-	-
SUBORDER : CYPRINODONTOIDEI								
FAMILY : APLOCHEILIDAE								
<i>Aplocheilus panchax</i> (Hamilton-Buchanan), Blue Panchax	+	-	-	-	-	-	-	-
FAMILY : POECILIIDAE								
SUBFAMILY : POECILIINAE								
<i>Gambusia affinis holbrooki</i> Girard, Mosquito Fish	+	-	-	-	-	-	-	-
ORDER : SYNBRANCHIFORMES								
FAMILY : SYNBRANCHIDAE								
<i>Monopterusuchia</i> (Hamilton-Buchanan)	-	-	-	-	-	+	-	-
ORDER : PERCIFORMES								
SUBORDER : PERCOIDEI								
FAMILY : CENTROPOMIDAE								
<i>Chanda nama</i> Hamilton-Buchanan	-	-	-	-	-	+	-	-

	1	2	3	4	5	6	7	8
<i>C. ranga</i> Hamilton-Buchanan	-	-	-	-	-	+	-	-
FAMILY : NANDIDAE								
SUBFAMILY : NANDINAE								
<i>Nandus nandus</i> (Hamilton-Buchanan)	-	-	-	-	-	+	-	-
SUBFAMILY : BADINAE								
<i>Badis badis</i> (Hamilton-Buchanan), Fig. 59	+	-	+	-	-	+	-	-
SUBORDER : MUGILOIDEI								
FAMILY : MUGILIDAE								
<i>Rhinomugil corsula</i> (Hamilton-Buchanan)	-					+		
<i>Sicamugil cascasia</i> (Hamilton-Buchanan)						+		
SUBORDER : GOBIOIDEI								
FAMILY : GOBIIDAE								
SUBFAMILY : GOBIINAE								
<i>Glossogobius gutum</i> (Hamilton-Buchanan)	-	-	-	-	-	+		-
SUBORDER : ANANBANTOIDEI								
FAMILY : ANABANTIDAE								
<i>Anabas testudineus</i> (Bloch)	-	-	-	-	-	+	-	-
FAMILY : BELONTIIDAE								
SUBFAMILY : TRICHOGASTRINAE								
<i>Colisa fasciata</i> (Schneider)	-	-	-	-	-	+	-	-
<i>C. lalia</i> (Hamilton-Buchanan)	-	-	-	-	-	+	-	-
FAMILY : OSPHRONEMIDAE								
<i>Osphronemus goramy</i> Lacepede, Gorami	+						-	
SUBORDER : CHANNOIDEI								
FAMILY : CHANNIDAE								
<i>Ophiocephalus gachua</i> Hamilton- Buchanan, Fig. 60	+	-	+	-	+	+	+	+
<i>O. marulius</i> Hamilton-Buchanan	-	-	-	-	-	+	-	-
<i>O. punctatus</i> Bloch, Fig. 61	+	-	+	-	-	+	-	-
<i>O. striatus</i> Bloch	-	-	-	-	-	+	-	-
	1	2	3	4	5	6	7	8

SUBORDER : MASTACEMBELOIDEI

FAMILY : MASTACEMBELIDAE

Mastacembelus armatus (Lacepede), Fig. 62

+ + + + + + + +

M. pancalus (Hamilton-Buchanan), Fig. 63

+ - - - - + - -

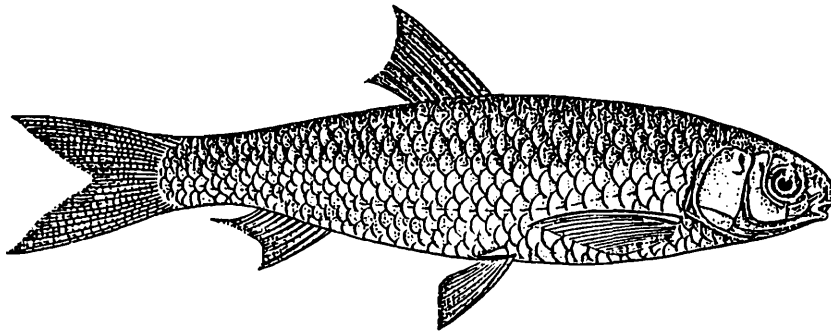


Fig. 1. *Aspidooparia jaya* (Hamilton-Buchanan)

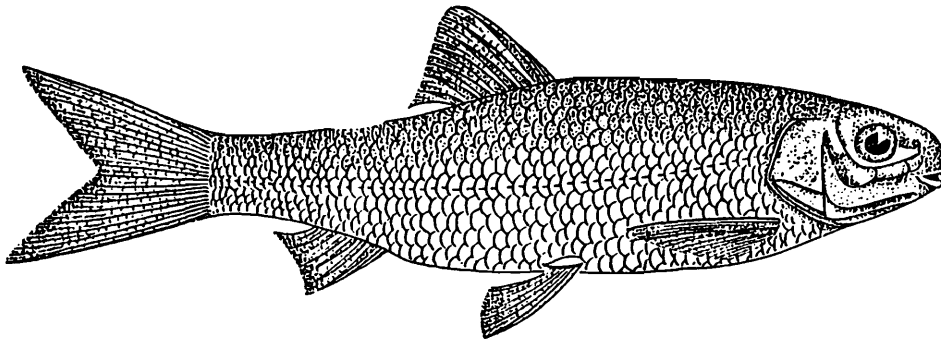


Fig. 2. *Aspidooparia morar* (Hamilton-Buchanan)

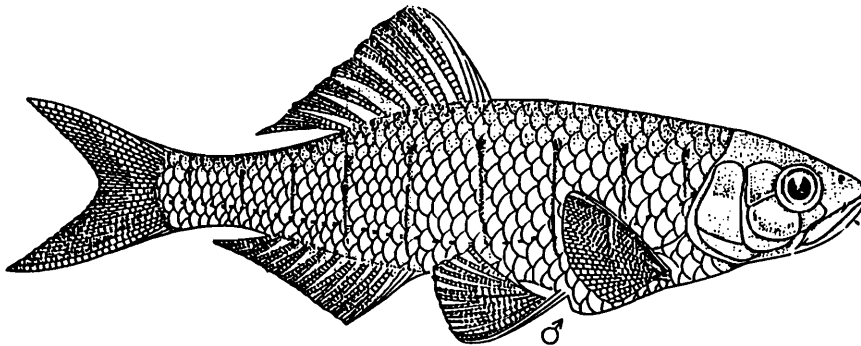


Fig. 3. *Barilius barna* Hamilton-Buchanan

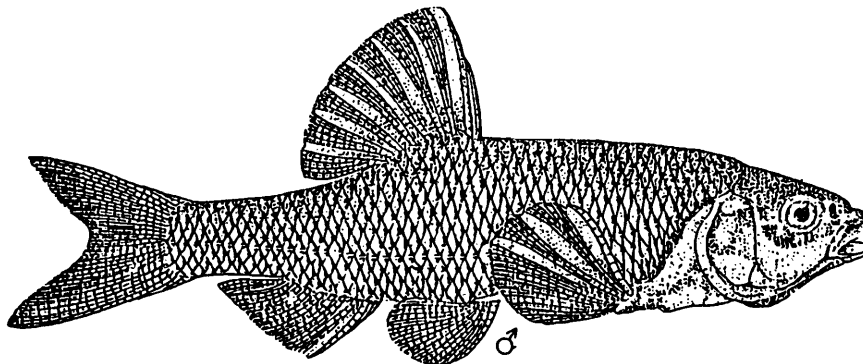


Fig. 4. *Barilius bendilisis* Hamilton-Buchanan

Fig. 1. *Aspidooparia jaya* (Hamilton-Buchanan) Fig. 2. *Aspidooparia morar* (Hamilton-Buchanan)
Fig. 3. *Barilius barna* Hamilton-Buchanan Fig. 4. *Barilius bendilisis* Hamilton-Buchanan

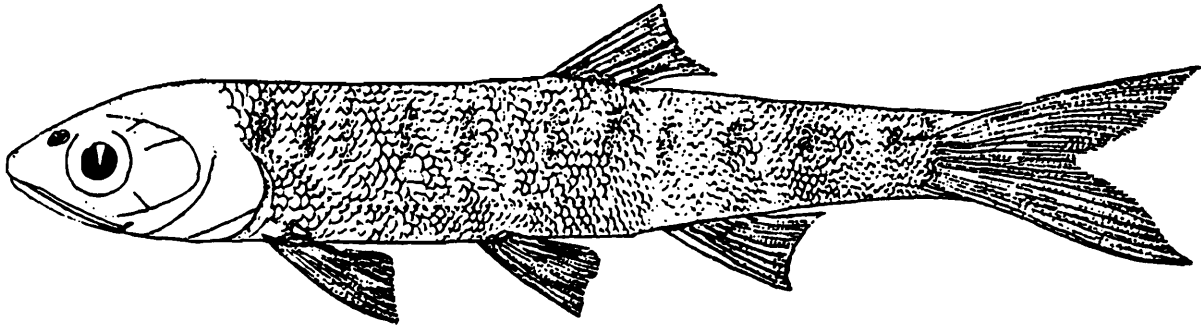


Fig. 5. Barilius corbetti Tilak & Husain

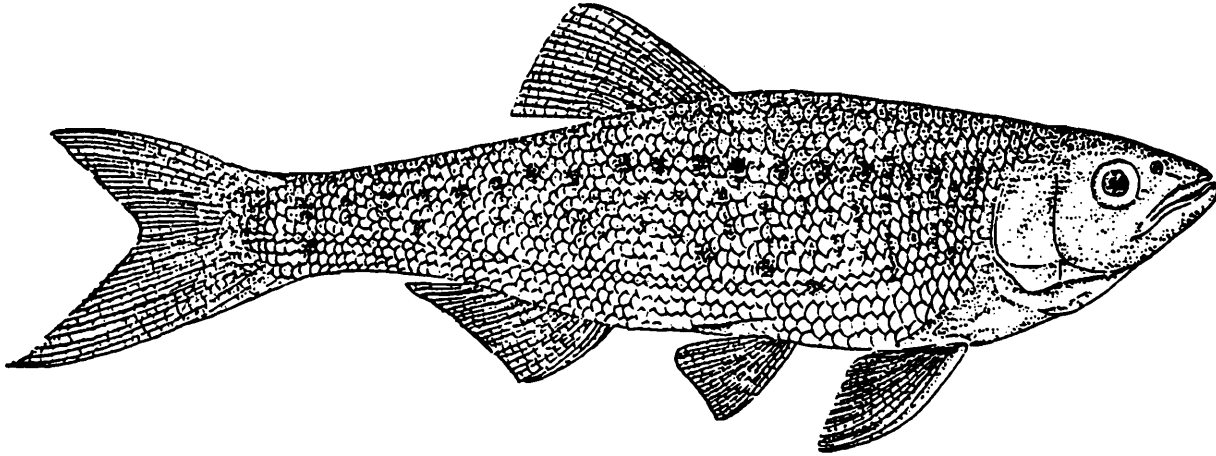


Fig. 6. Barilius dimorphicus Tilak & Husain

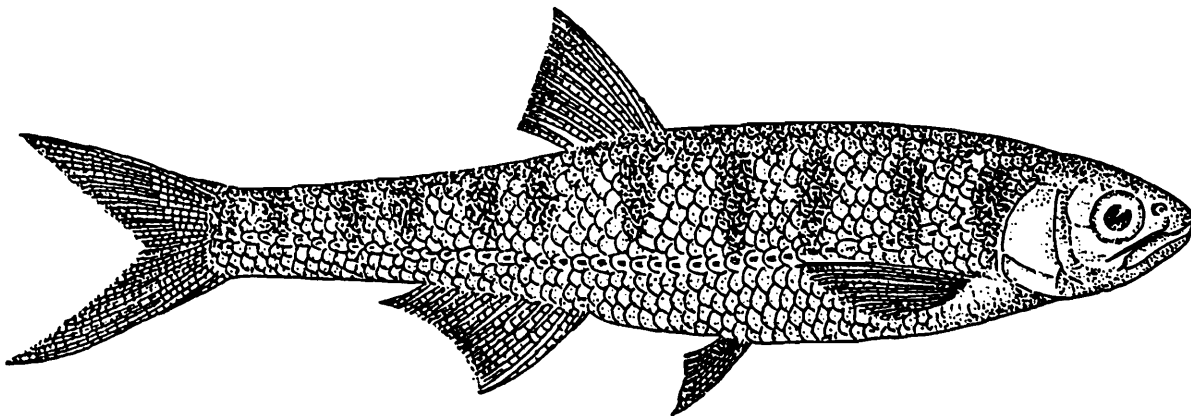


Fig. 7. Barilius vagra Hamilton-Buchanan

Fig. 5. *Barilius corbetti* Tilak & Husain Fig. 6. *Barilius dimorphicus* Tilak & Husain
 Fig. 7. *Barilius vagra* Hamilton-Buchanan

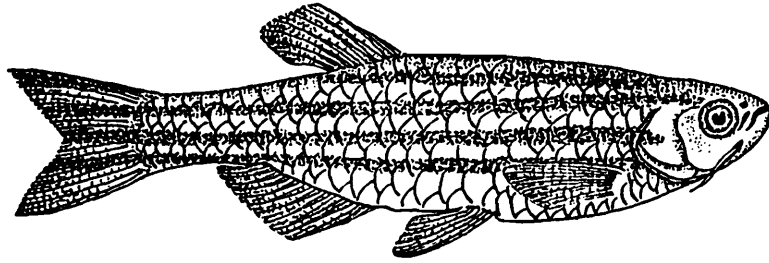


Fig. 8. Brachydanio rerio (Hamilton-Buchanan)

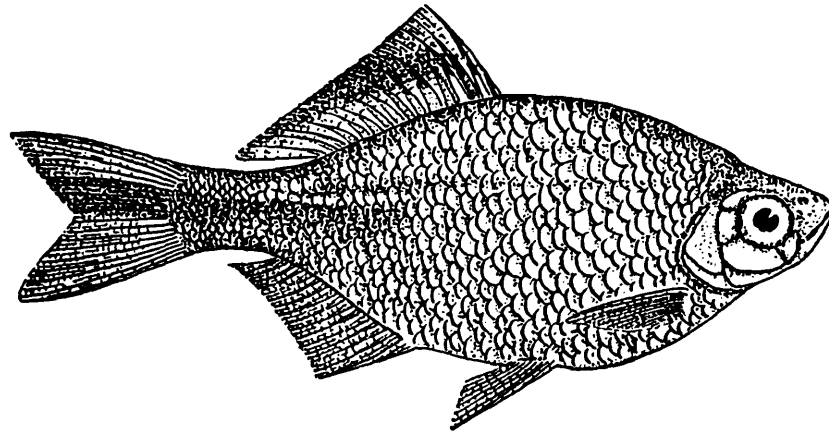


Fig. 9. Danio devario (Hamilton-Buchanan)

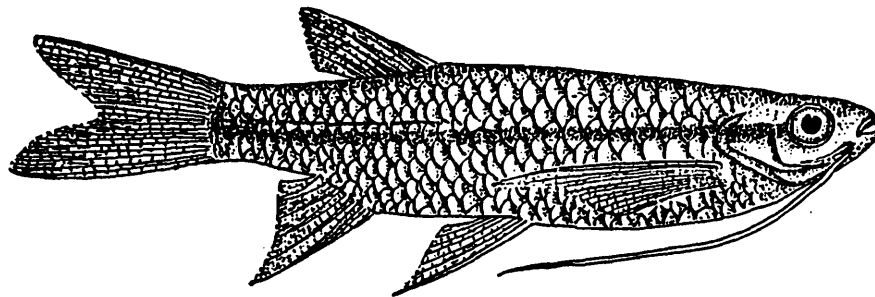


Fig.10. Esomus danricus (Hamilton-Buchanan)

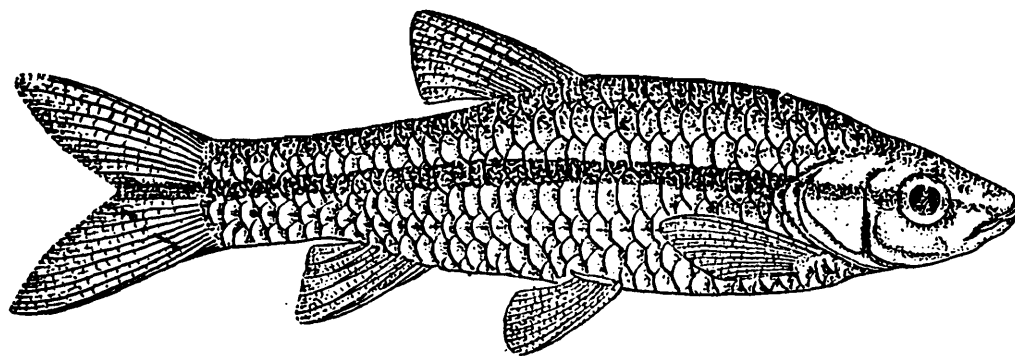


Fig. 11 ParLuciosoma daniconius (Hamilton- Buchanan)

Fig. 8. *Brachydanio rerio* (Hamilton-Buchanan) Fig. 9. *Danio devario* (Hamilton-Buchanan)
Fig. 10. *Esomus danricus* (Hamilton-Buchanan) Fig. 11. *ParLuciosoma daniconius* (Hamilton-Buchanan)

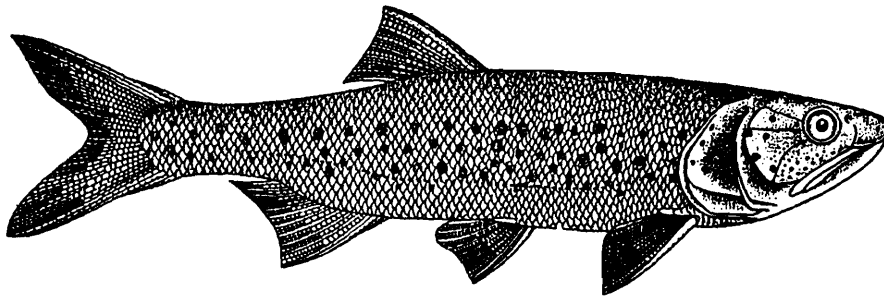


Fig. 12. *Raiamas bola* (Hamilton-Buchanan)

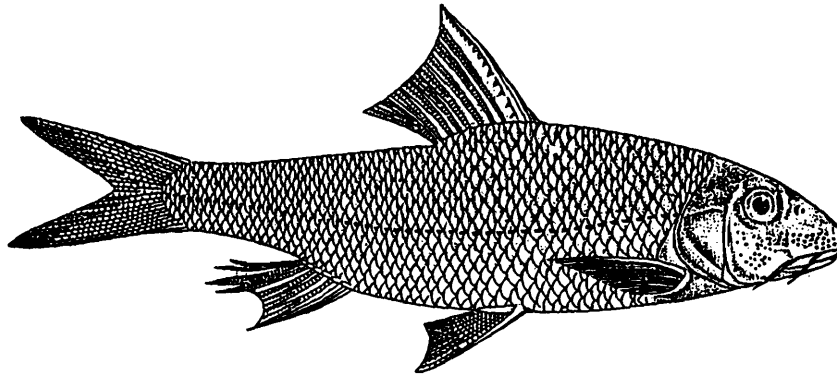


Fig. 13. *Chagunius chagunio* (Hamilton-Buchanan)

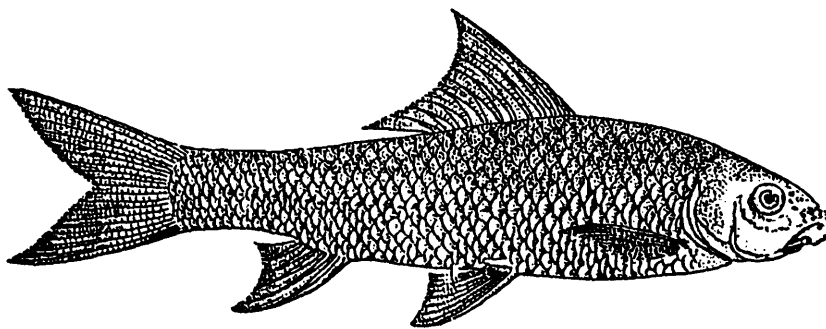


Fig. 14. *Labeo dero* (Hamilton-Buchanan)

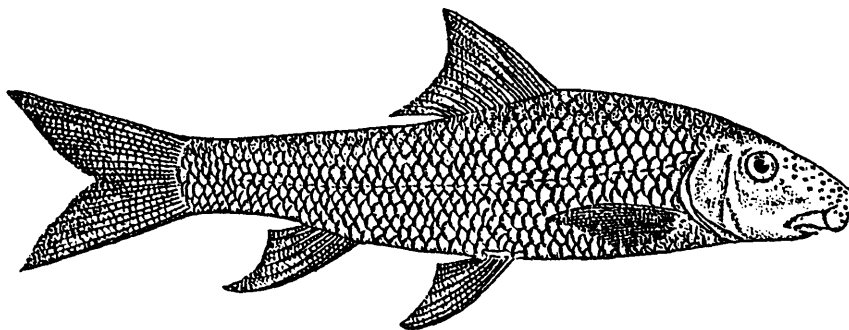


Fig. 15. *Labeo dyocheilus* (McClelland)

Fig. 12. *Raiamas bola* (Hamilton-Buchanan) Fig. 13. *Chagunius chagunio* (Hamilton-Buchanan)
 Fig. 14. *Labeo dero* (Hamilton-Buchanan) Fig. 15. *Labeo dyocheilus* (McClelland)

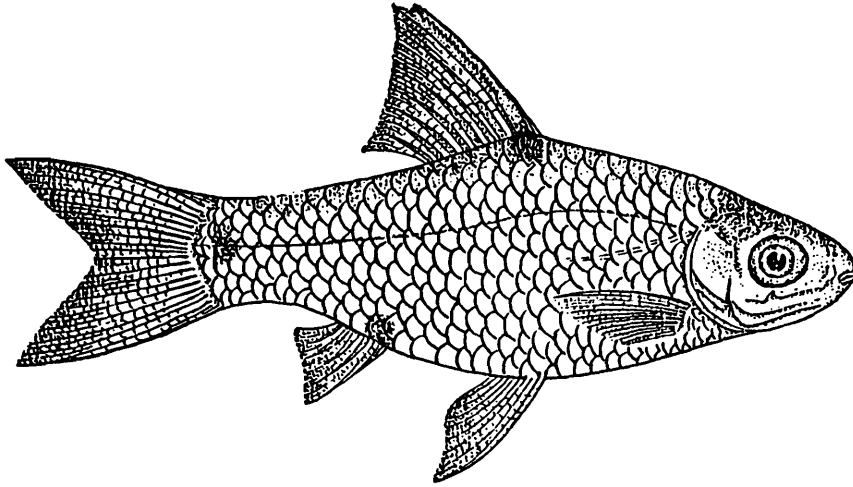


Fig.16. Puntius carletoni (Fowler)

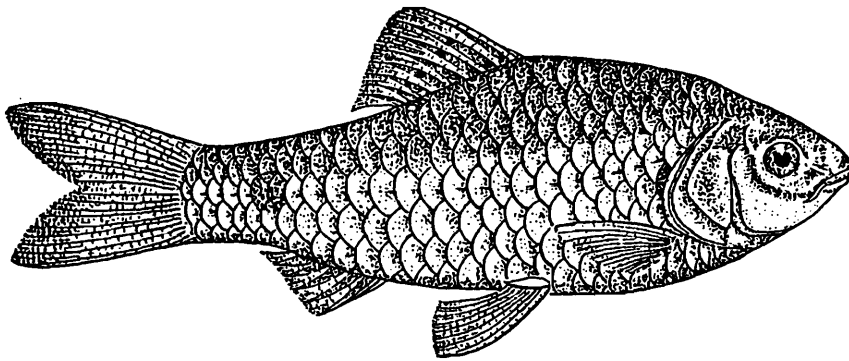


Fig.17. Puntius chola Hamilton-Buchanan

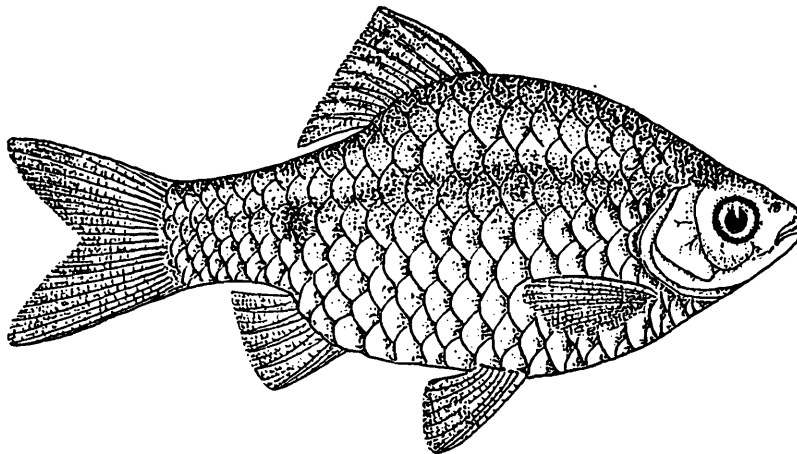


Fig.18. Puntius conchonius Hamilton-Buchanan

Fig. 16. *Puntius carletoni* (Fowler) Fig. 17. *Puntius chola* Hamilton-Buchanan
Fig. 18. *Puntius conchonius* Hamilton-Buchanan

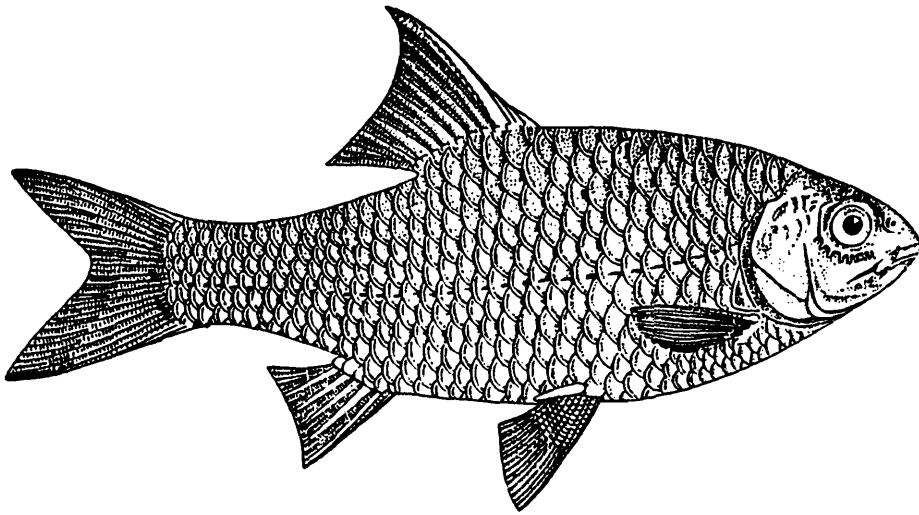


Fig. 19. *Puntius sarana sarana* Hamilton-Buchanan

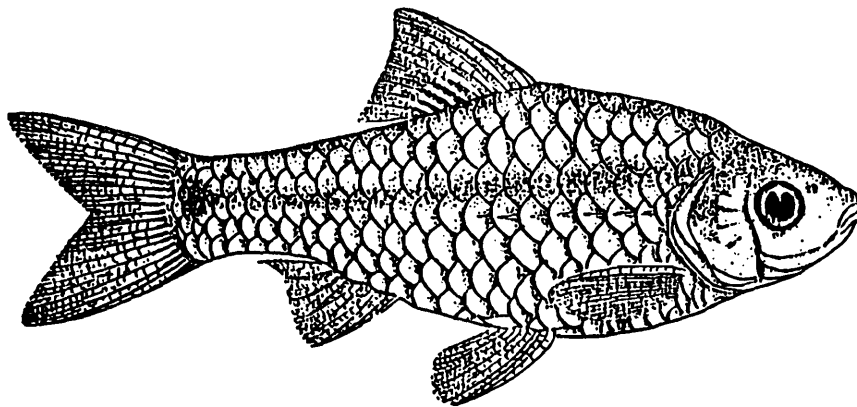


Fig. 20. *Puntius sophore* Hamilton-Buchanan

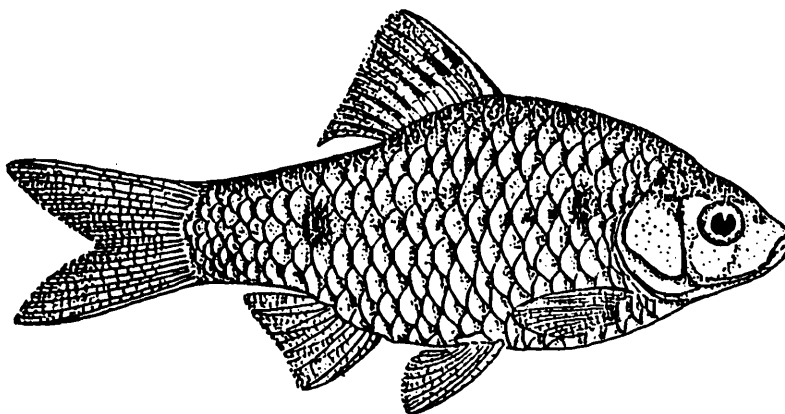


Fig. 21. *Puntius ticto* Hamilton-Buchanan

Fig. 19. *Puntius sarana sarana* Hamilton-Buchanan Fig. 20. *Puntius sophore* Hamilton-Buchanan
Fig. 21. *Puntius ticto* Hamilton-Buchanan

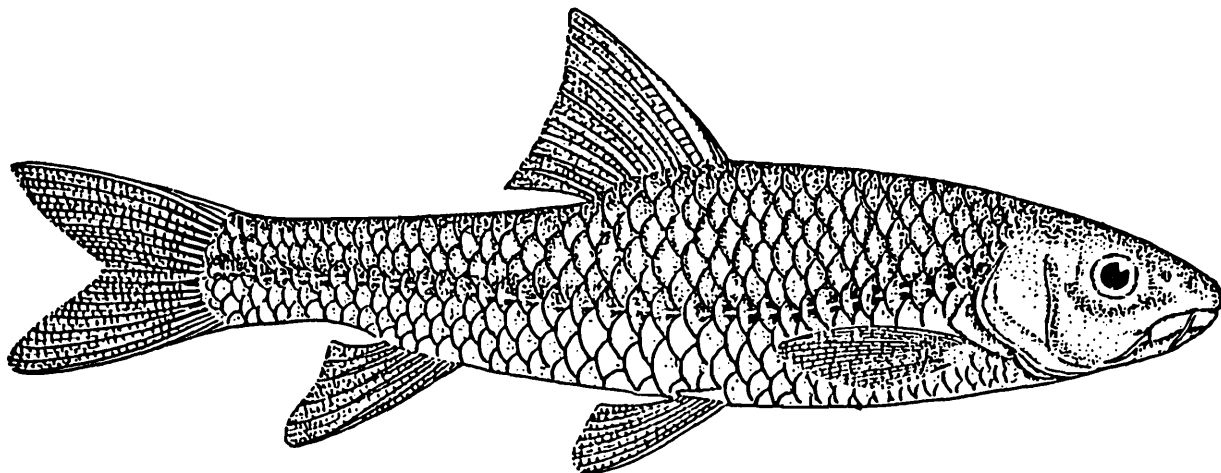


Fig. 22. Tor chelynooides (McClelland)

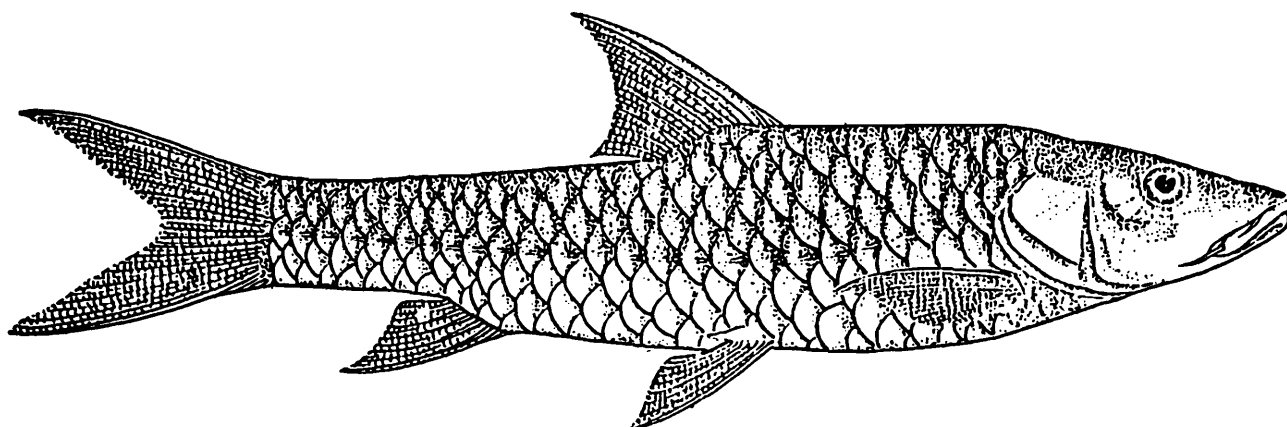


Fig. 23. Tor putitora (Hamilton-Buchanan)

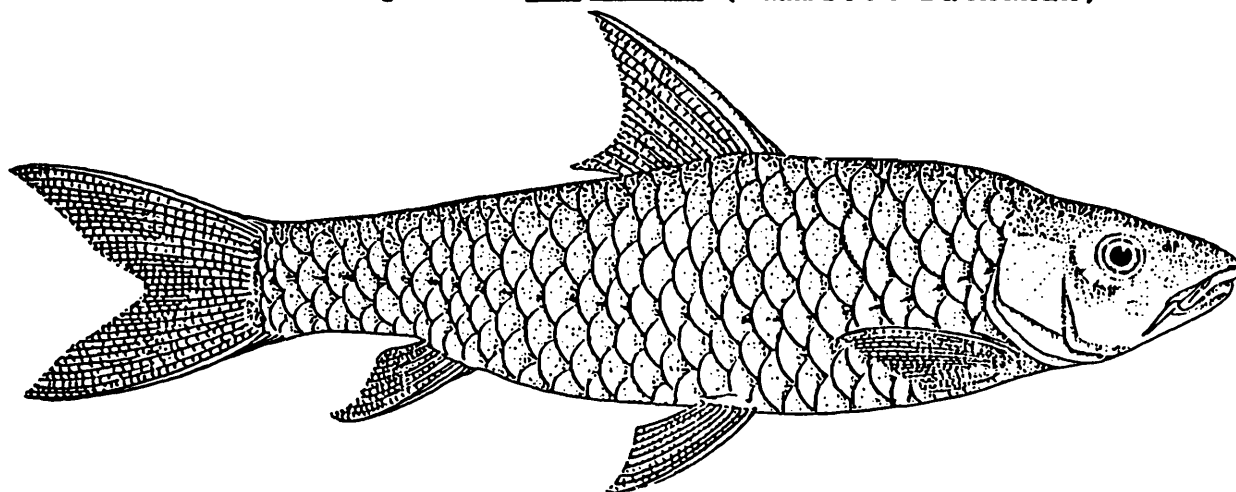


Fig. 24. Tor tor (Hamilton-Buchanan)

Fig. 22. *Tor chelynooides* (McClelland) Fig. 23. *Tor putitora* (Hamilton-Buchanan)
Fig. 24. *Tor tor* (Hamilton-Buchanan)

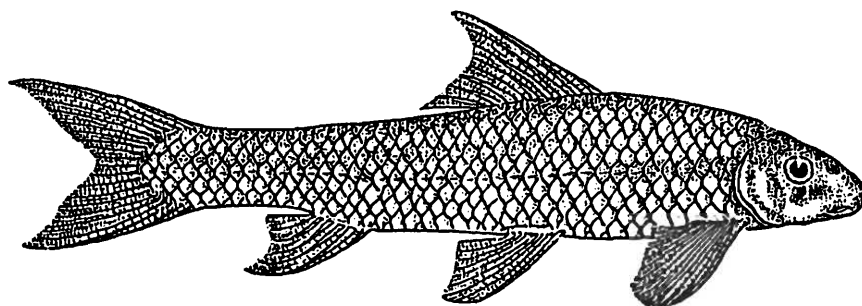


Fig. 25. Crossocheilus latius (Hamilton-Buchanan)

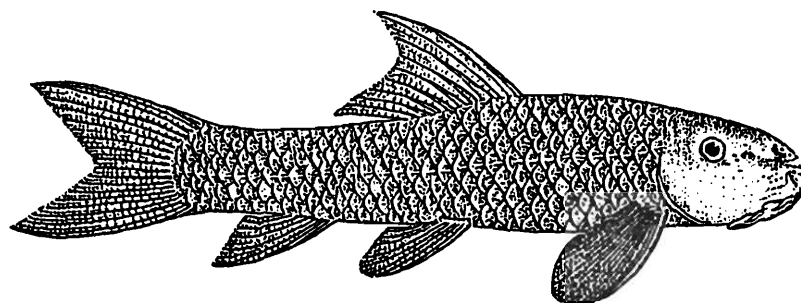


Fig. 26. Garra gotyla gotyla (Gray)

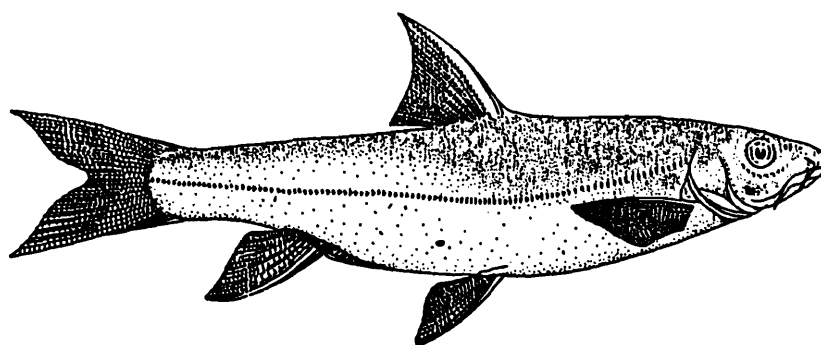


Fig. 27. Schizothoracichthys progastus (McClelland)

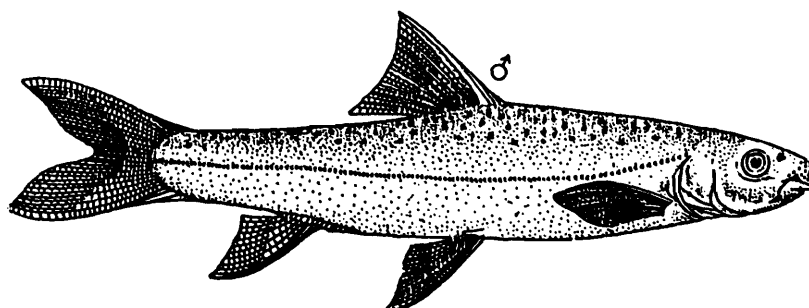


Fig. 28. Schizothorax richardsonii (Gray)

Fig. 25. *Crossocheilus latius* (Hamilton-Buchanan) Fig. 26. *Garra gotyla gotyla* (Gray)
 Fig. 27. *Schizothoracichthys progastus* (McClelland) Fig. 28. *Schizothorax richardsonii* (Gray)

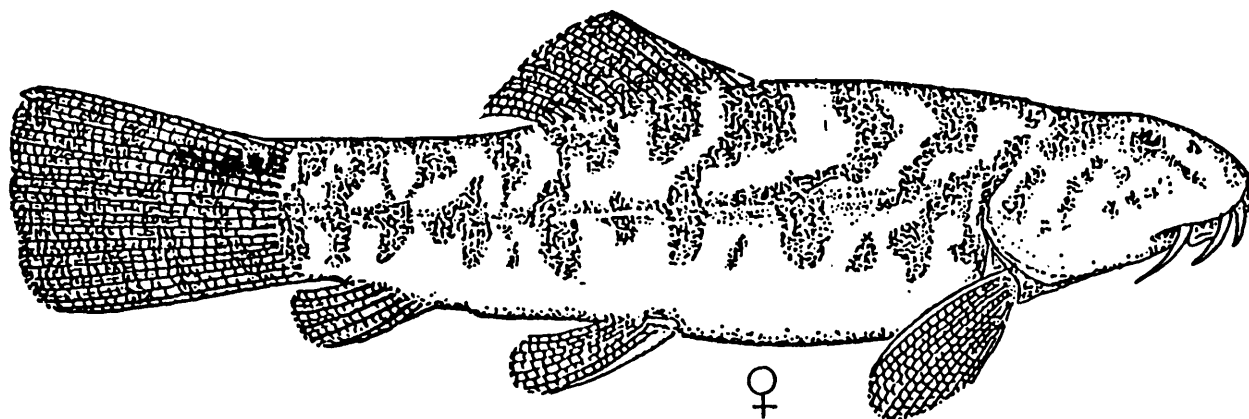


Fig.29. Nemacheilus botia (Hamilton-Buchanan)

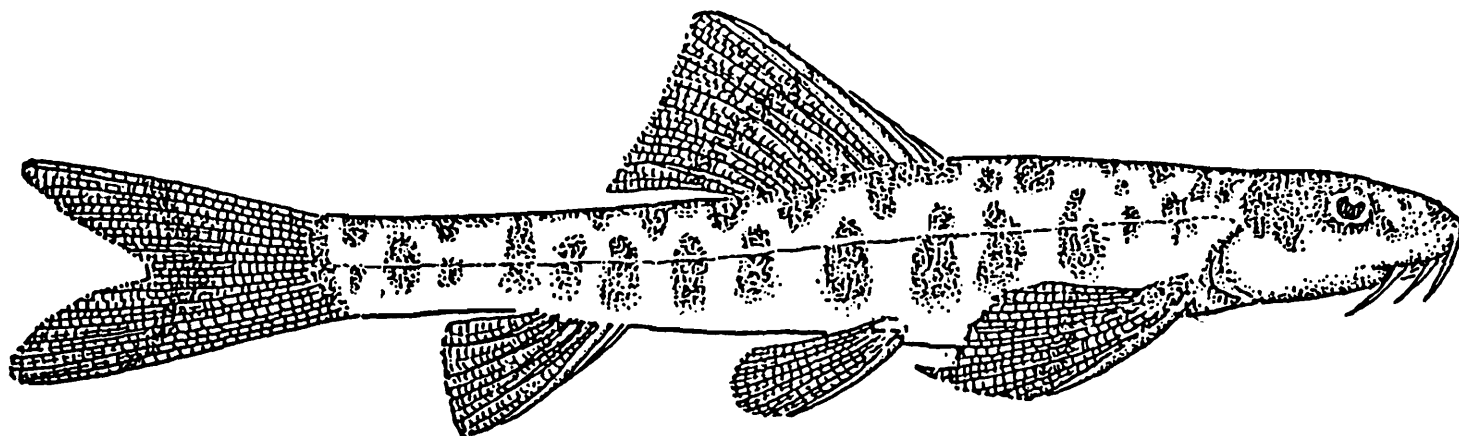


Fig.30. Nemacheilus corica (Hamilton-Buchanan)

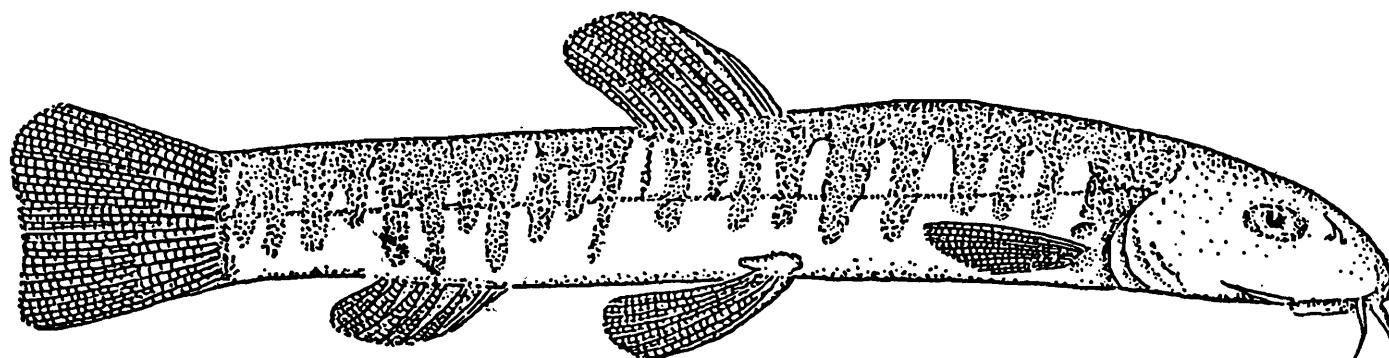


Fig.31. Nemacheilus doonensis Tilak and Husain

Fig. 29. *Nemacheilus botia* (Hamilton-Buchanan) Fig. 30. *Nemacheilus corica* (Hamilton-Buchanan)
Fig. 31. *Nemacheilus doonensis* Tilak and Husain

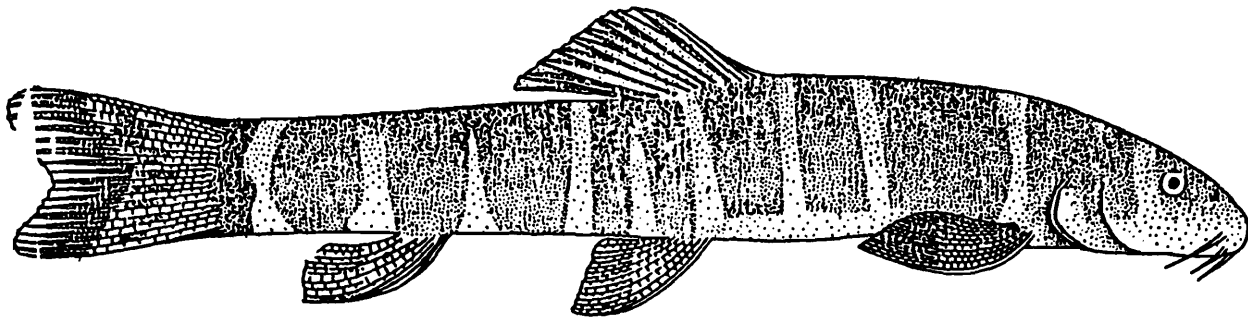


Fig.32. Nemacheilus montanus (McClelland)

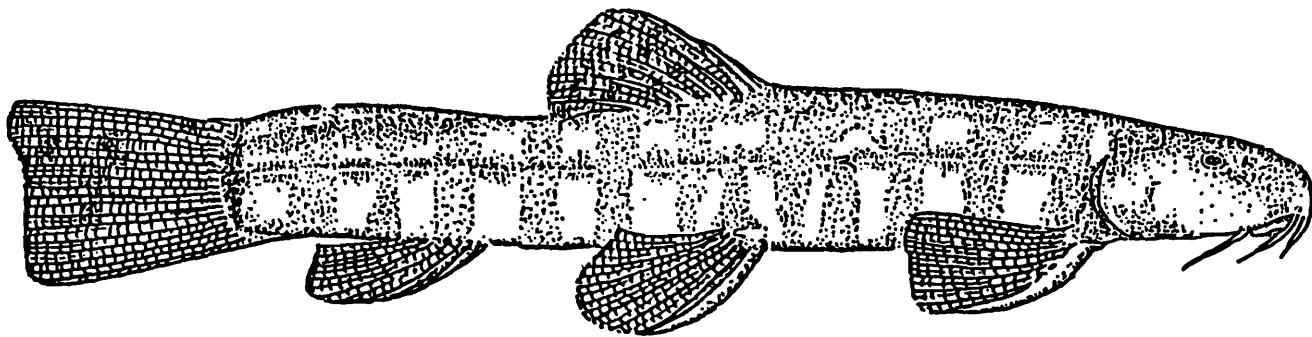


Fig.33. Nemacheilus rupecula (McClelland)

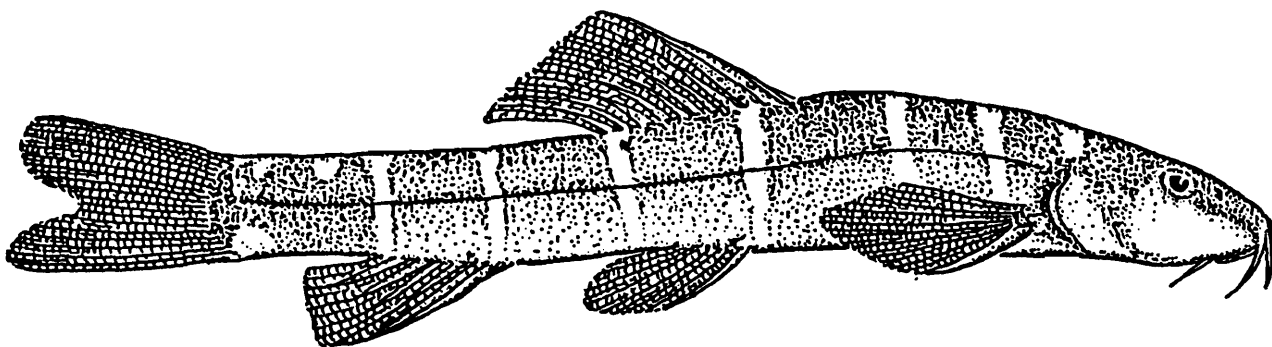


Fig.34. Nemacheilus savona (Hamilton-Buchanan)

Fig. 32. *Nemacheilus montanus* (McClelland) Fig. 33. *Nemacheilus rupecula* (McClelland)
Fig. 34. *Nemacheilus savona* (Hamilton-Buchanan)

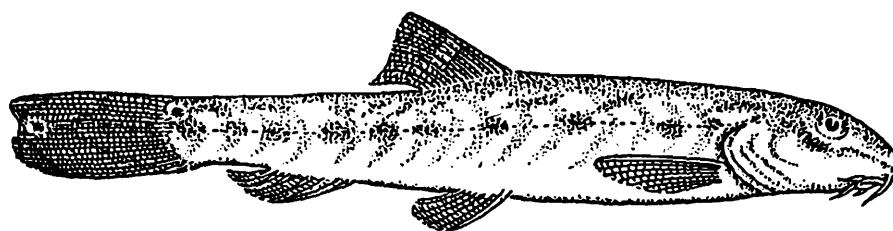


Fig. 35. Lepidocephalus annandalei Chaudhuri

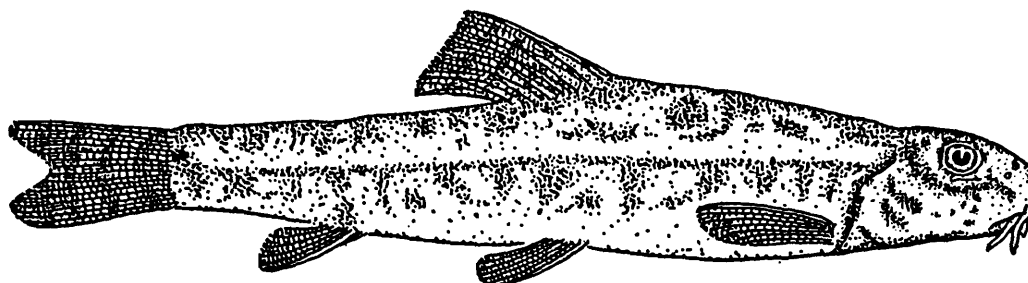


Fig. 36. Lepidocephalus caudofurcatus Tilak & Husain

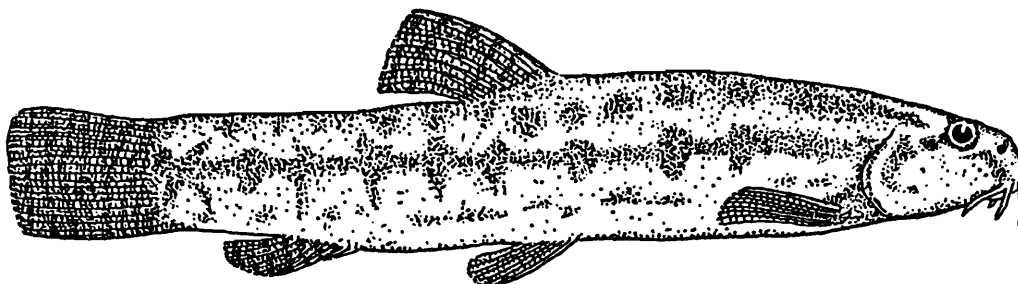


Fig. 37. Lepidocephalus guntea (Hamilton-Buchanan)

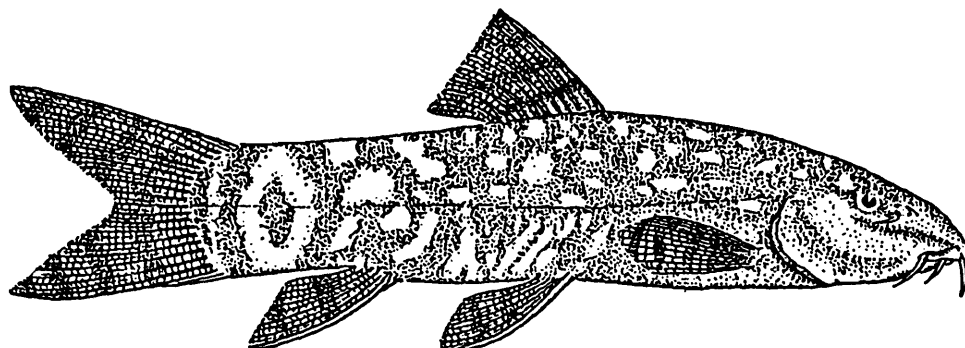


Fig. 38. Botia rostrata Gunther

Fig. 35. *Lepidocephalus annandalei* Chaudhuri Fig. 36. *Lepidocephalus caudofurcatus* Tilak & Husain
Fig. 37. *Lepidocephalus guntea* (Hamilton-Buchanan) Fig. 38. *Botia rostrata* Gunther

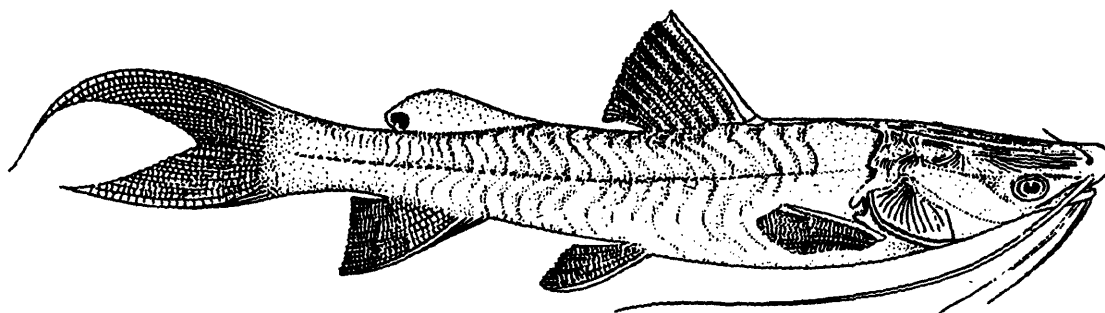


Fig. 39. *Aorichthys seenghala* (Sykes)

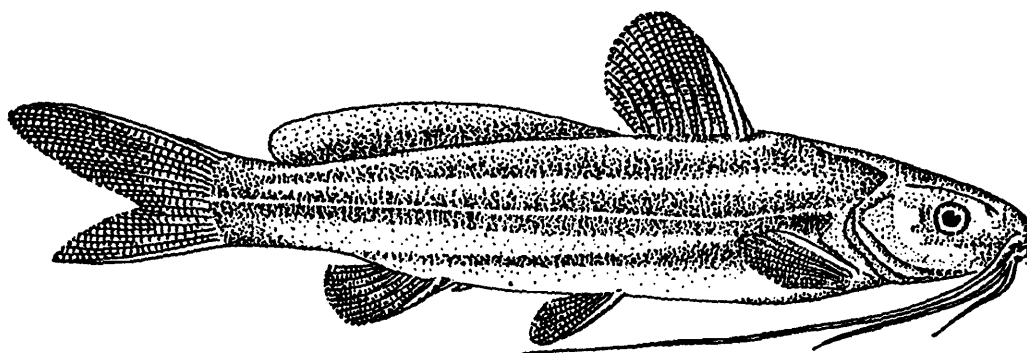


Fig. 40. *Mystus bleekeri* (Day)

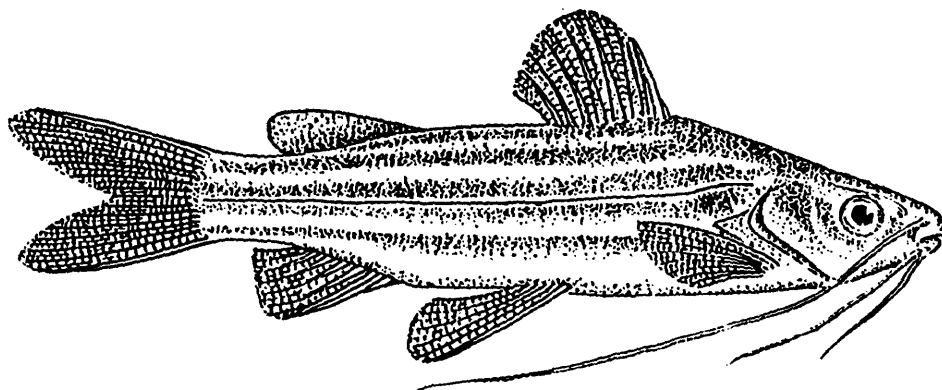


Fig. 41. *Mystus vittatus* (Bloch)

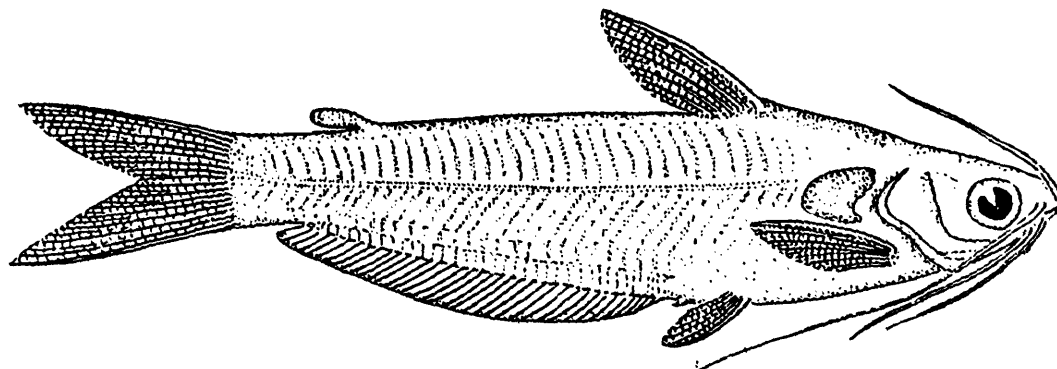


Fig. 39. *Aorichthys seenghala* (Sykes) Fig. 40. *Mystus bleekeri* (Day)
Fig. 41. *Mystus vittatus* (Bloch) Fig. 42. *Pseudeutropius atherinoides* (Bloch)

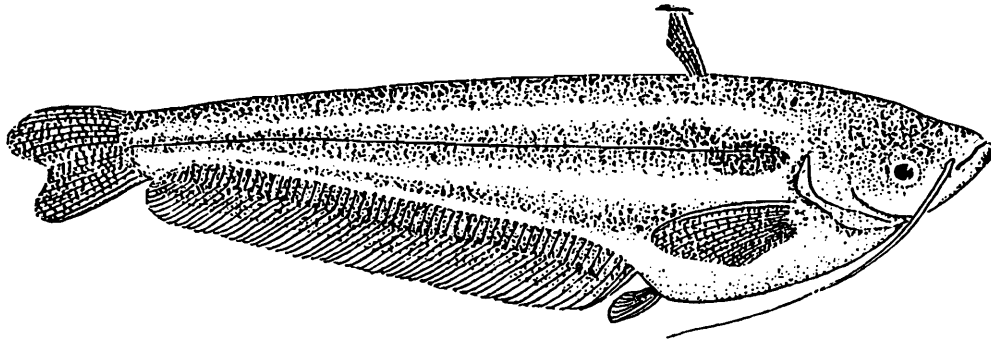


Fig.43. Ompok pabda (Hamilton-Buchanan)

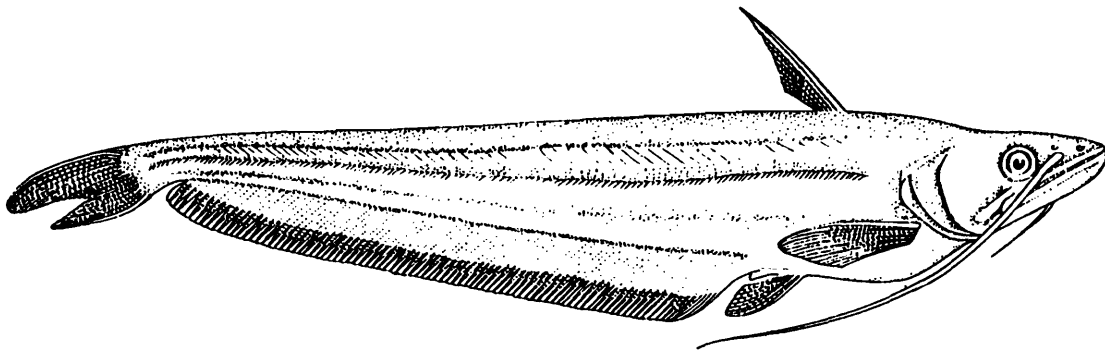


Fig.44. Wallago attu (Schneider)

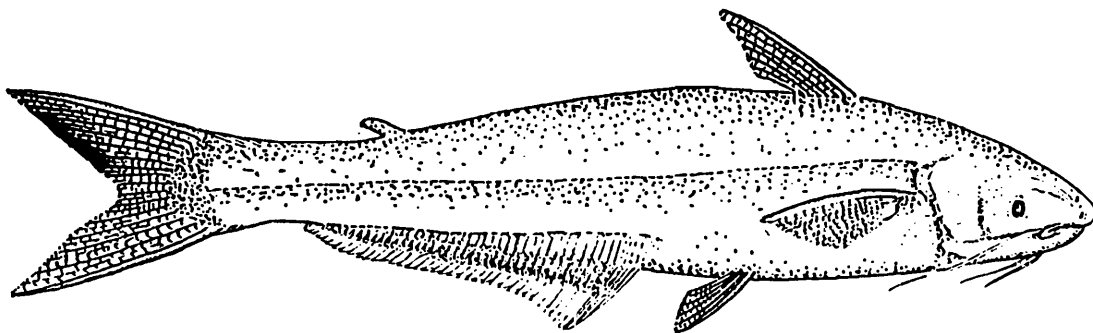


Fig.45. Clupisoma montana Hora

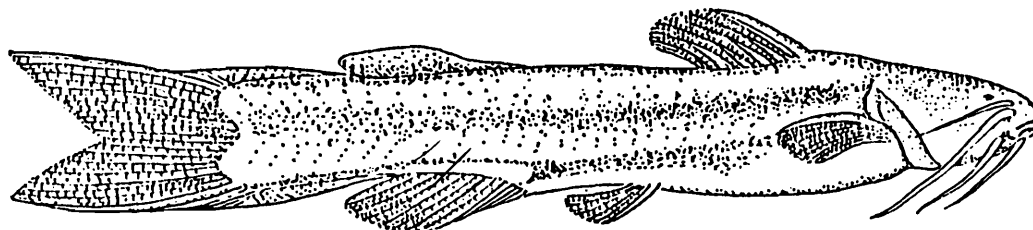


Fig.46. Amblyceps mangois (Hamilton-Buchanan)

Fig. 43. *Ompok pabda* (Hamilton-Buchanan) Fig. 44. *Wallago attu* (Schneider)
Fig. 45. *Clupisoma montana* Hora Fig. 46. *Amblyceps mangois* (Hamilton-Buchanan)

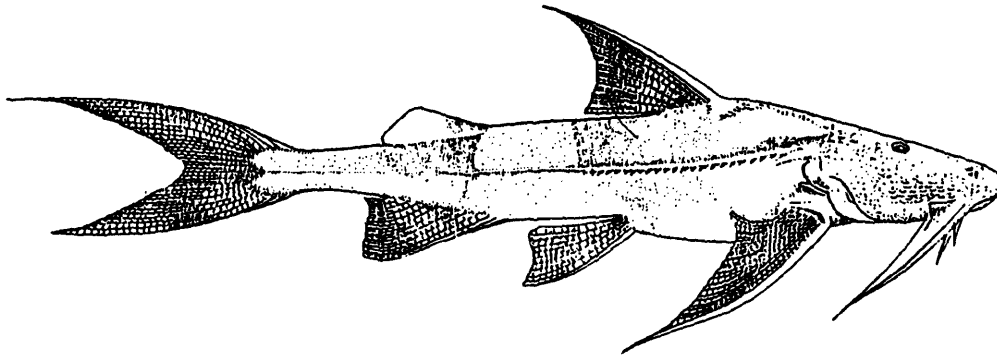


Fig. 47. Bagarius yarrelli Sykes

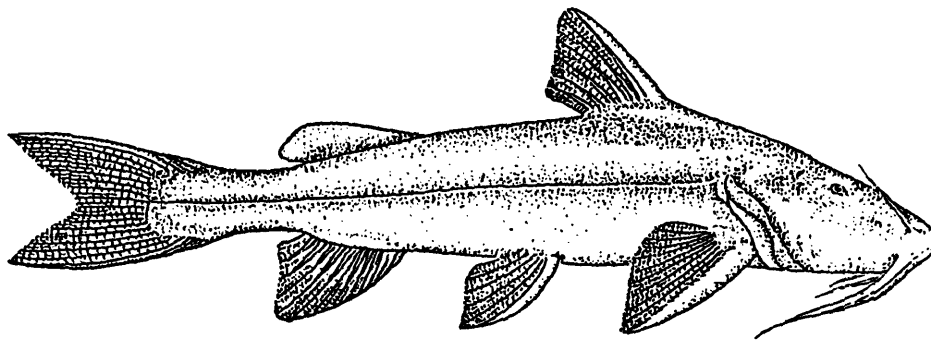


Fig. 48. Glyptothorax cavia (Hamilton-Buchanan)

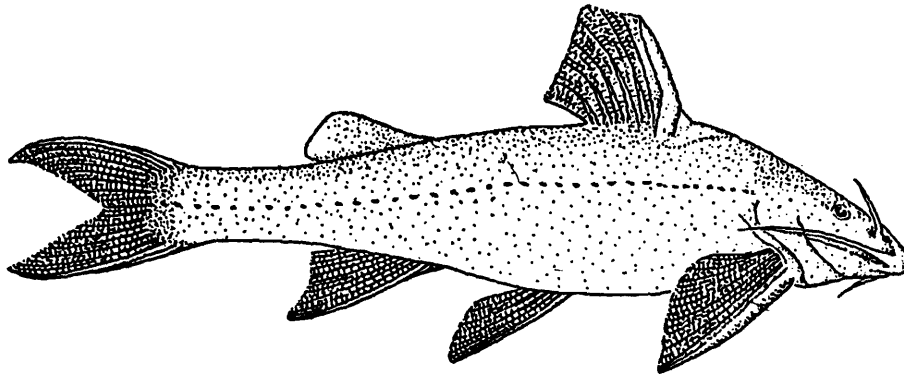


Fig. 49. Glyptothorax dakpathari Tilak and Husain

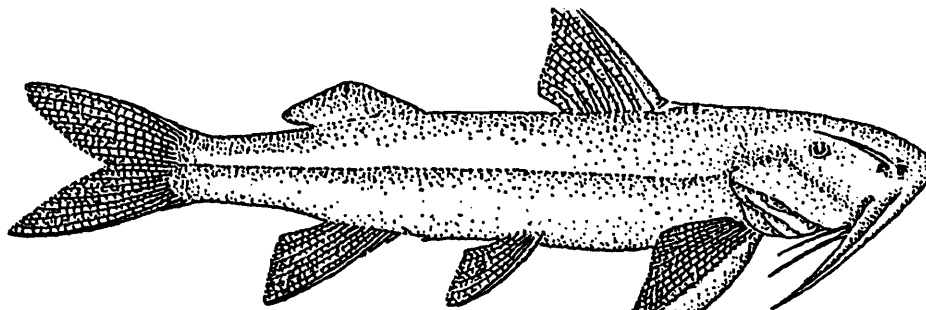


Fig. 50. Glyptothorax garhwali Tilak

Fig. 47. *Bagarius yarrelli* Sykes Fig. 48. *Glyptothorax cavia* (Hamilton-Buchanan) Fig. 49. *Glyptothorax dakpathari* Tilak and Husain Fig. 50. *Glyptothorax garhwali* Tilak

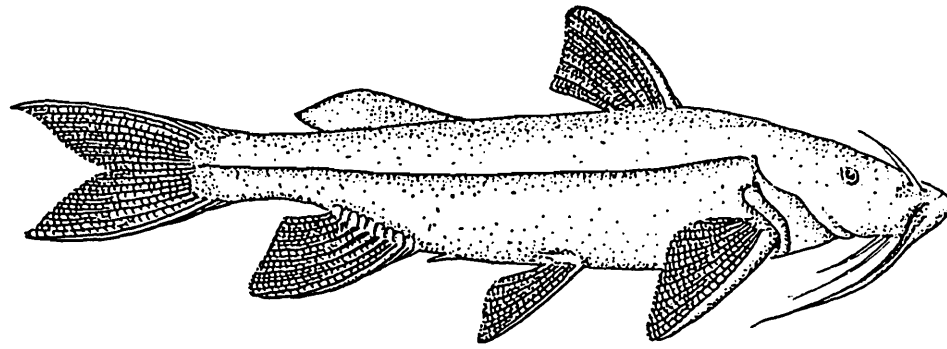


Fig. 51. Glyptothorax horai Shaw and Shebbeare

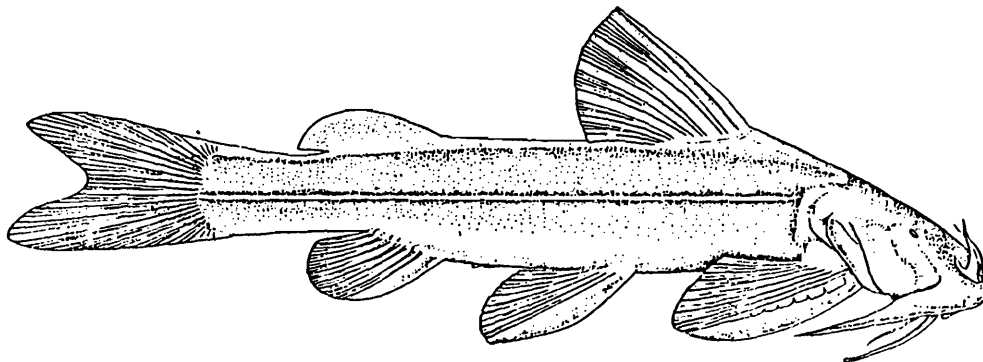


Fig. 52. Glyptothorax pectinopterus (McClelland)

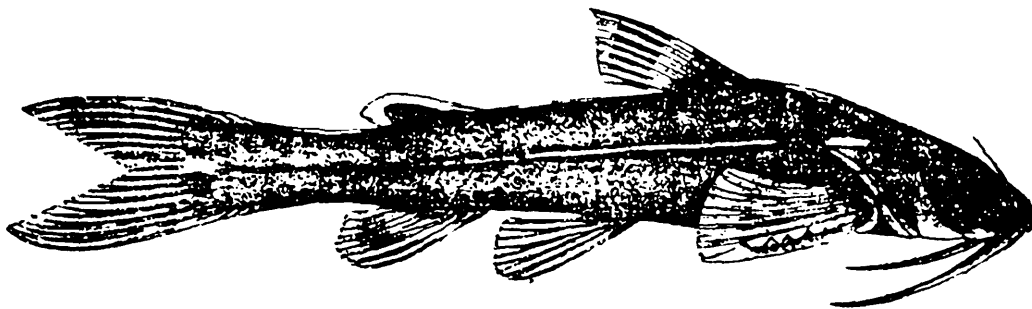


Fig. 53. Glyptothorax saisii (Jenkins)

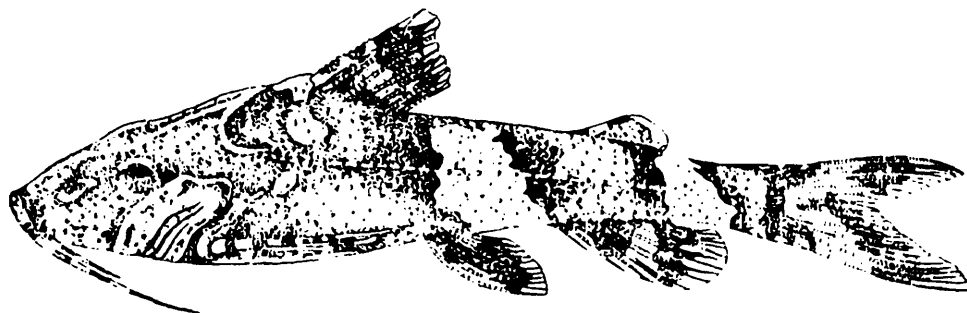


Fig. 54. Laguvia ribeiroi kapuri Tilak and Husain

Fig. 51. *Glyptothorax horai* Shaw and Shebbeare Fig. 52. *Glyptothorax pectinopterus* (McClelland)
Fig. 53. *Glyptothorax saisii* (Jenkins) Fig. 54. *Laguvia ribeiroi kapuri* Tilak and Husain

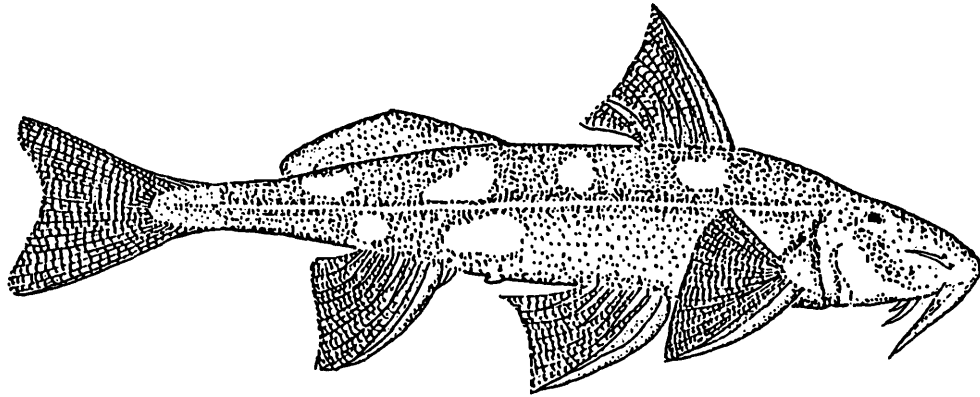


Fig. 55. Pseudecheneis sulcatus (McClelland)

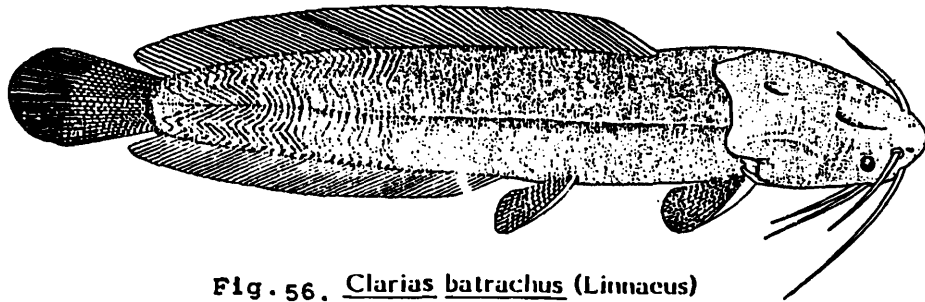


Fig. 56. Clarias batrachus (Linnaeus)

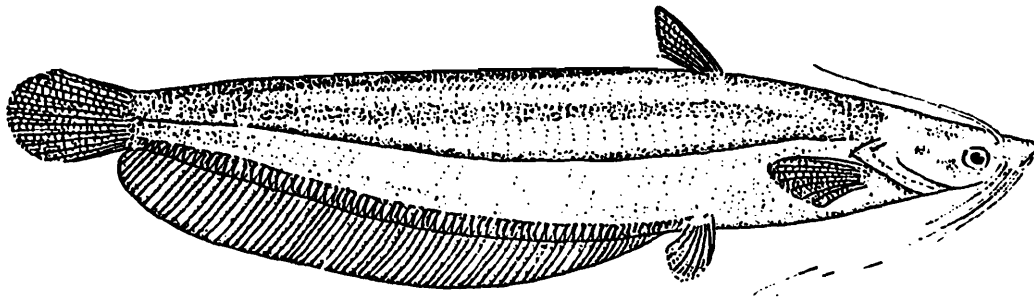


Fig. 57. Heteropneustes fossilis (Bloch)

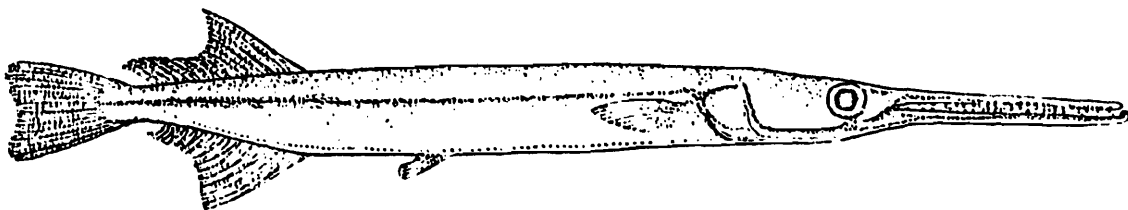


Fig. 58. Xenentodon cancila (Hamilton-Buchanan)

Fig. 55. *Pseudecheneis sulcatus* (McClelland) Fig. 56. *Clarias batrachus* (Linnaeus)
 Fig. 57. *Heteropneustes fossilis* (Bloch) Fig. 58. *Xenentodon cancila* (Hamilton-Buchanan)

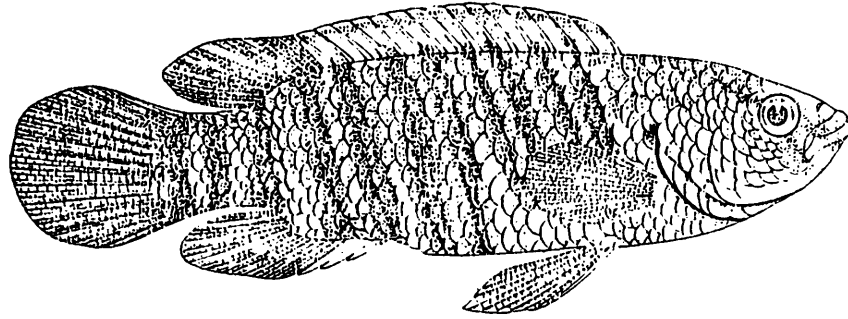


Fig. 59. *Badis badis* (Hamilton-Buchanan)

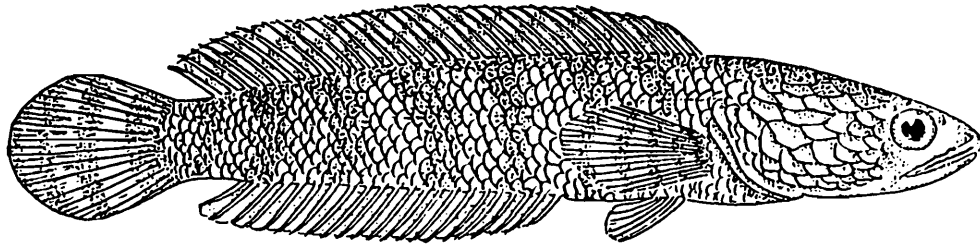


Fig. 60. *Ophiocephalus gachua* Hamilton-Buchanan

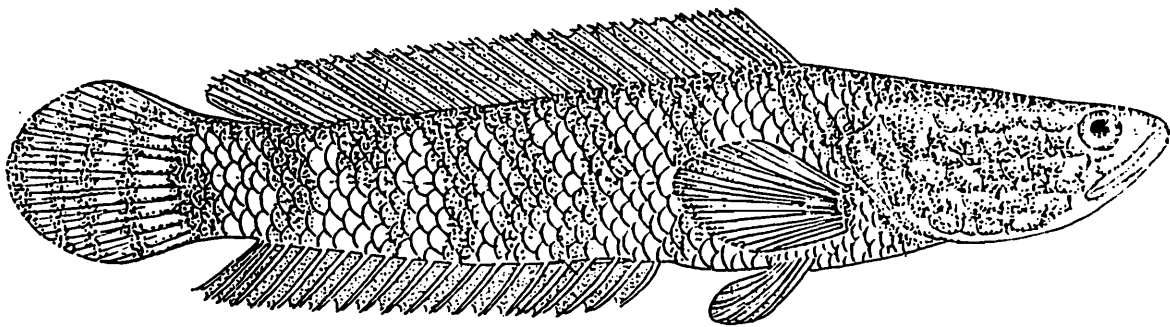


Fig. 61. *Ophiocephalus punctatus* Bloch

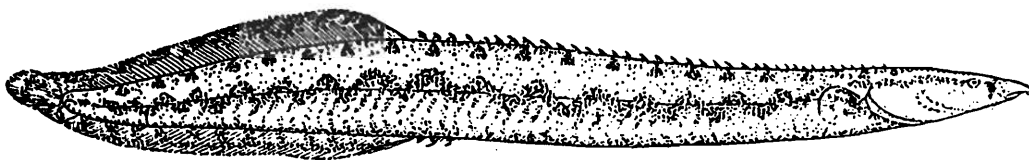


Fig. 62. *Mastacembelus armatus* (Lacepede)

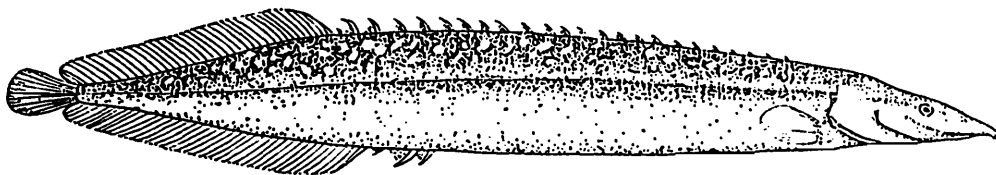


Fig. 63. *Mastacembelus pancalus* (Hamilton-Buchanan)

Fig. 59. *Badis badis* (Hamilton-Buchanan) Fig. 60. *Ophiocephalus gachua* (Hamilton-Buchanan)
Fig. 61 *Ophiocephalus punctatus* Bloch Fig. 62. *Mastacembelus armatus* (Lacepede)
Fig. 63. *Mastacembelus pancalus* (Hamilton-Buchanan)

REFERENCES

- ATKINSON, E.T. 1884. *The Himalayan Districts of the North-Western Provinces of India. Vol. II (forming Vol. XI of the Gazetteer, N.W.P.)*. Allahabad. Fishes : 79-86.
- BADOLA, S.P. 1975. Fish fauna of the Garhwal hills, Par II. Pauri-Garhwal, U.P. *Indian J. Zool.*, **16** (1) : 57-70.
- BADOLA, S.P. AND PANT, M.C. 1973. Fish fauna of Garhwal hills. Part I. *Indian J. Zool.*, **14** (1) : 37-44.
- BADOLA, S.P. AND SINGH. H.R. 1980. Food and feeding habits of fishes of genera *Tor*, *Puntius*, and *Barilius*. *Proc. Indian Natl. Sci. Acad.*, **46 B** (1) : 58-62
- BADOLA, S.P. AND SINGH, H.R. 1984. Spawning of some important cold water fishes of the Garhwal Himalaya. *J. Bombay nat. Hist. Soc.*, **81** (1) : 54-58.
- BALONI, S.P. 1980. Fish fauna of Kedar valley, Chamoli- Garhwal. *Indian J. Fish.*, **27** (1-2) : 10-16.
- BALONI, SP.. AND GROVER, S.P. 1982. Fish fauna of Kedar valley with notes on adaptation and ecology. *Indian J. Forest.*, **5** (2) : 131-137.
- BANARESCU, P. AND NALNBANT, T.T. 1968. Cobitidae (Pisces, Cypriniformes) collected by the German-India Expedition. *Mitt. Hamburg. Zool Mus. Inst.*, **65** : 327-351.
- BHAMRI, M.L. 1976. *Uttarkashi Van Prabhag. Tehri Virat, Uttar Pradesh ki Karya Yojna (1976-77 se 1985-86 tak)*, Nainital. Bhag I-II : 56. (in Hindi).
- BISHT, R.S. AND DAS, S.M. 1985. Observations on aquatic insects as food of fishes and the predatory action of some aquatic insects on fish and fish food. *J. Inland Fish. Soc. India*, **13** (2) : 81-86.
- CHAUDHURI, B.L. 1912. Description of a new-species of *Nemachilus* from Northern India. *Rec. Indian Mus.*, **5** (3) : 183-185.
- CHAUDHURI, B.L. 1912. Description of some new species of freshwater fishes from North India. *Rec. Indian Mus.*, **7** (5) : 437- 444.
- CHAUDHRY, H.S. AND KHANDELWAL, O.P. 1960. Fish survey of Nainital district. *V. P. A. Partika*, **3** : 139-145.
- DAS, S.M. 1960. The fisheries of the Doon Valley, *Uttar Pradesh* : 11-17.
- DAS, S.M. AND PANDE, J. 1982. Pollution, fish mortality and environmental parameters in lake Nainital. *J. Bombay nat. Hist. Soc.*, **79** (1) : 100-109.
- DAY, F. 1878. *The fishes of India, being a natural history of the fishes known to inhabit the seas and fresh waters of India, Burma and Ceylon*. London : 553-778.
- DOBRIYAL, A.K. 1985. Ecology of limnofauna in the small streams and their importance to the village life in Garhwal Himalaya. *Uttar Pradesh J. Zool.*, **5** (2) : 139-144.
- DWIVEDI, B.N. AND MATHUR, R.S. 1978. *Working Plan for Nainital Forest Division, Kumaon Circle, Uttar Pradesh. 1978-79 to 1987- 88*. Nainital. Parts I & II : xiii, 73-74.

- FLOWER, H.W. 1924. Notes and description of Indian fresh water fishes. *Proc. Acad. nat. Sci. Philad.*, **76** : 67-101.
- GRAY, J.E. 1831. Description of twelve new genera of fish, discovered by Gen. Hardwick in India, the greater part in the British Museum. *Zool. Misc.* : 8.
- GROVER, S.P. 1969. Fishing notes from the Doon. *Cheetal*, **11** (2) : 23-24.
- GROVER, S.P. 1970. On the collection of fishes of the Song river in Dun valley, Uttar Pradesh. *Gurukul Kangri Vishwavidyalaya J. Sci. Res.* **2** : 115-118.
- GROVER, S.P. AND BALONI, S.P. 1977. Biological notes on the hill stream fishes of Tehri-Garhwal. *Geobios*, **4** (6) : 248-251.
- GUPTA, D.P. AND PANDE, I.D. 1982. *Purvi Almora Van Prabhag, Kumaon Virat, Uttar Pradesh ki Karya Yojna (1980-81 se 1989-90)*. Nainital. Bhag I-II : 48-50 (in Hindi).
- GUPTA, P.N. AND CHANDRA, S. 1978. *Pithoragarh Van Prabhag, Kumaon Virat, Uttar Pradesh ki Karya Yojna (1978-79 se 1987-88 tak)*. Nainital. Bhag 1 & 2 : XV, XVI, 71 (in Hindi).
- GUPTA, R.D. AND JOSHI, D.P. 1971. *Working Plan for the Pithoragarh Forest Division, Kumaon Circle, Uttar Pradesh (1968-70 to 1977-78)*. Nainital. : X, 55.
- HORA, S. L.. 1921. Indian Cyprinoid fishes belonging to the genus *Garra* with notes on related species from other countries. *Rec. Indian Mus.*, **22** (5) : 633-687.
- HORA, S.L. 1937. Notes on fishes in the Indian Museum, XXXIII. On a collection of fish from Kumaon Himalayas. *Rec. Indian Mus.*, **39** (4) : 338-348.
- HORA, S. L. AND MUKHERJI, D. D. 1936. Fish of the Eastern Doons, United Provinces. *Rec. Indian Mus.*, **38** (2) : 133-146
- HUSAIN, A. 1976. Fish fauna of Corbett National Park, Uttar Pradesh. *Cheetal*, **17** (2) : 39-42.
- HUSAIN, A. 1979, Fauna of Corbett National Park. 5. Fish. *Cheetal*, **21** (1) : 31-32 (contd.).
- HUSAIN, A. 1980. Fauna of Corbett National Park. 5. Fish. *Cheetal*, **21** (2-3) : 43.
- HUSAIN, A. 1986. On a hill stream loach, *Noemacheilus rupecula* (McClelland) with bifurcated rostral barbel and deformed caudal fin. *Bull. zool. Surv. India*, **7** (2-3) : 337-339.
- HUSAIN, A. 1987. *Studies on the fish fauna of some streams of Dehra Dun with notes on systematics, ecology and zoogeography*. Vols. I & II, 1212 pp., 76 plates. (D. Phil. Thesis, Garhwal University, Srinagar).
- HUSAIN, A. (in press, a). Fishes of Dehra Dun. *Rec. zool. Surv. India*, Ms : 1-1212, figs. 140.
- HUSAIN, A. (in press, b). Fauna of Rajaji National Park. Fishes. *Rec. zool. Surv. India*, Ms : 1-73.
- JOHRI, V.K., PRASAD, R. AND SAXENA, M.P. 1988. On the natural occurrence of *Labeo rohita* (Ham.) and *Labeo gonius* (Ham.) hybrid in Dhaura reservoir (Uttar Pradesh) India and its possible role in aquaculture. *Uttar Pradesh J. Zool.*, **8** (1) : 65-70.
- JOSHI, B.D. 1985. On the occurrence of trypanosomes from certain hill stream fishes of Almora and related alterations in some blood values of fish *Nemacheilus rupicola* (Hora), *Uttar Pradesh J. Zool.*, **5** (2) : 199-203.

- JOSHI, K.D. AND JOSHI, P.C. 1989. Seasonal cycle of testicular maturatin and interstitial cell activity in the hill stream teleost, *Puntius dukai* (Day). *Indian J. Fish.*, **36** (1) : 58-64.
- JOSHI, S.N. 1981. Sexual dimorphism in three species of *Labeo* at Nanaksagar reservoir, India. *Geobios*, **8** (4) : 174-175.
- JUYAL, C.P. AND GUSAIN, O.P. 1990. Fish and fisheries of river Khoh (Garhwal Himalaya). *Geobios news Reports*, **9** (2) : 133-135.
- LAL, M.B. AND CHATTERJEE, P. 1963. Survey of Eastern Doon fishes with certain notes on their biology. *J. zool. Soc. India*, **14** (2) : 230-243.
- McCLELLAND, J. 1835. Description of the (so-called) mountain trout of Kumaon. *J. Asiat. Soc. Bengal*, **4** : 39-41.
- MAINWARING, E.G. 1960. The Tons river. *Cheetal*, **3** (1) : 54-56.
- MENON, A.G.K. 1949. Fishes of the Kumaon Himalayas, *J. Bombay nat. Hist. Soc.*, **48** (3) : 535-542.
- MENON, A.G.K. 1954. Fish geography of Himalayas. *Proc. natl. Inst. Sci. India*, **20** (4) : 467-493.
- MENON, A.G.K. 1963. A distributional list of fishes of the Himalayas, *J. zool. Soc. India*, **14** (1) : 23-32.
- MENON, A.G.K. 1964. Monograph of cyprinid fishes of the genus *Garra* Hamilton, *Mem. Indian Mus.*, **14** (4) : 173-260.
- MENON, A.G.K. 1971. Taxonomy of fishes of the genus *Schizothorax* Heckel with the description of a new species from Kumaon Himalayas. *Rec. zool. Surv. India*, **63** (1-4) : 195-208.
- MENON, A.G.K. 1974. *A Check-list of Fishes of the Himalayan and the Indo-Gangetic Plains*. Spl. Pub. No. 1. Inland Fisheries Society of India, Barrackpore : 136 pp.
- MENON, A.G.K. 1987. *Fauna of India and Adjacent Countries. Pisces. Vol 4. Teleostei Cobitoidea. Part I. Homalopteridae*. Zoological Surey of India, Calcutta : 259 pp + plts.
- MENON, A.G.K. AND SEN, T.K. 1966. Extension of the geographical range of *Euchiloglanis hodgarti* (Hora) with certain observations on the zoogeography and evolution of glyptosternoid fishes of the Family Sisoridae. *Sci. & Cult.*, **32** (4) : 211-212.
- MISRA, D.N. AND JOSHI, D.P. 1970. *Working Plan for the West and East Dehra Dun Divisions, Uttar Pradesh*, Part I : 55.
- NARAIN, J. 1966. *Working Plan for the Tehri Forest Division, Tehri Circle, Uttar Pradesh, 1963-64 to 1972-73*. Nainital. Parts I & II : 30.
- PANDE, D.C. AND JAIN, K.C. 1968. *Working Plan for the Haldwani Forest Division, Western Circle, Uttar Pradesh (1966-67 to 1975-76)*. Nainital. Vol. I Parts I & II : 46.
- PANT M.C. 1970. Fish fauna of the Kumaon hills. *Rec. zool. Surv. India*, **64** (1-4) : 85-93.
- PRASAD, J. 1976. *Praschimi Almora Van Prabhag, Kumaon Virat, Uttar Pradesh ki Karya Yojna, 1976-77 se 1985-86 tak*. Nainital. Bhag 1-2 : 53-54 (in Hindi).
- PRASAD, R. AND PANT, B.C. 1980. Propagation of trout in a Garhwal Himalayan district Uttarkashi. *Cheetul*, **22** (1-2) : 33-36.

- PRASAD, R. AND TILAK, R. 1984. On the occurrence of hybrid carp *Labeo calbasu* (Ham.) x *Labeo gonius* (Ham.) from Tumaria reservoir (District Nainital), Uttar Pradesh. *Ichthyology* (in press) (vide Johri et al., 1988).
- RAJ. S.B. 1945. The decline of the Mahseer fisheries of the Kumaon lakes and a possible remedy. *Proc. natl. Inst. Sci. India*, 11 : 341-345.
- RATURI, S.S. AND JOSHI, D.P. 1968. *Working Plan for the Chakrata Forest Division, Tehri-Garhwal Circle, Uttar Pradesh*. Nainital. Parts I-II : xi.
- REGAN, C.T. 1907. Fishes (In : Boulenger, G.A. Annadale, N., Wall, F. and Regan, C.T. Reports on a collection of Batrachia, Reptiles and Fishes from Nepal and Western Himalayas, *Rec. Indian Mus.*, 1 (2) : 149-158.
- SHARMA, R.C. 1984. Ichthyofauna of the snowfed river Bhagirathi of Garhwal Himalaya. *Uttar Pradesh J. Zool.*, 4 (2) : 208-212.
- SINGH, H.R., BADOLA, S.P. AND DOBRIYAL, A.K. 1982. Ecology of the river Nayar of Garhwal Himalaya. *Uttar Pradesh J. Zool.* 2 (2) : 72-76.
- SINGH, H.R. AND DOBRIYAL, A.K. 1983. 1st occurrence of *Botia geto* in the river Alaknanda of Garhwal Himalaya (India). *Proc. natl. Acad. Sci India*, 52 B (2) : 137-139.
- SINGH, K.N. GUPTA, P.N. 1979a, *Working Plan for the East Dehra Dun Forest Division, Uttar Pradesh (1979-80 to 1988-89)*. Nainital. Vol. I.
- SINGH. K.N. AND GUPTA, P. N. 1979b. *Working Plan for the West Dehra Dun Forest Division, Uttar Pradesh (1979-80 to 1988-89)*. Nainital. Vol. I : 64.
- SINGH, P.P. 1964. Fishes of the Doon Valley. *Ichthyologica*, 3 (1-2) : 86-92.
- SINGH, V.B. 1963. *Working Plan for the Uttarkashi Forest Division, Tehri-Garhwal Circle, Uttar Pradesh, 1961-62 to 1975-76*. National. Parts I & II : 70.
- SINGH, V.P. AND SRIVASTAVA, B.P. 1967. *Working Plan for the West Almora Forest Division, Kumaon Circle, Uttar Pradesh, 1966-67 to 1975-76*. Nainital. Parts I & II: 24-25.
- SRIVASTAVA, P.C. AND SRIVASTAVA, S.S. 1977. *Working Plan for the Chakrata Forest Division, Tehri Circle, Uttar Pradesh. (1977-78 to 1986-87)*. Nainital. Parts 1-2 : xxi.
- TILAK, R. 1969. Description of two new sisorids and a hybrid carp from Pauri-Garhwal (Kumaon hills) Uttar Pradesh. *J. Inland Fish. Soc. India.*, 1: 37-48. figs. 1-14.
- TILAK, R. 1970. On a little known cyprinid, *Puntius carletoni* Fowler (Pisces, Cypriniformes). *Sci. & Cult.*, 36 (11) : 613-614.
- TILAK, R. AND BALONI, S.P. 1984. On the fish fauna of Tehri- Garhwal, Uttar Pradesh. *Rec. zool. Surv. India*, 81 (3-4) : 255- 271.
- TILAK, R. AND HUSAIN, A. 1973. Notes on fishes of Doon Valley, Uttar Pradesh. I. Distributional and morphological studies on some glyptothoracoid fishes (Sisoridae). *Rec. zool. Surv. India*, 67 (1-4) : 391-399.
- TILAK, R. AND HUSAIN, A. 1976. Description of a new species of the genus *Glyptothorax* Blyth from river Yamuna, India (Pisces, Siluriformes, Sisoridae). *Ann. Zool. Warszawa*, 33(14) : 229-234, figs. 1-8.

- TILAK, R. AND HUSAIN, A. 1977a. On the systematic status and distribution of *Lepidocephalus annandalei* Chaudhuri in Uttar Pradesh. *Newsl. zool. Surv. India*, **3** (6) : 408-410.
- TILAK, R. AND HUSAIN, A. 1977b. Description of a new species of the genus *Neomacheilus* from district Dehra Dun (U.P.). *Sci. & Cult*, **43** (3) : 133-135, figs. a-c.
- TILAK, R. AND HUSAIN, A. 1978a. Redescription of *Glyptothorax saisii* (Jenkins) (Sisoridae : Siluriformes) with remarks on its discontinuous distribution. *Ann. Zool.*, **14** (1) : 33-40.
- TILAK, R. AND HUSAIN, A. 1978b. Description of a new species of the genus *Lepidocephalus* Bleeker from Uttar Pradesh (Cobitidae : Cypriniformes). *Matysa*, **3** : 60-63, figs. 1-3.
- TILAK, R. AND HUSAIN, A. 1980. Description of a new species of the genus *Barilius* Hamilton (Cyprinidae : Cypriniformes) from Corbett National Park, Uttar Pradesh. *Mitt. Zool.Mus. Berlin*, **56** (1) : 41-44, fig. 1.
- TILAK, R. AND HUSAIN, A. 1990. Description of a new cyprinid, *Barilius dimorphicus* (Subfamily : Rasborinae) from Rajaji National Park, Uttar Pradesh, *J. Bombay nat. Hist. Soc.*, **87** (1) : 102-105, figs. 1-4.
- UPADHYAYA, M.D. AND UPADHYAYA, N.K. 1980. *Garhwal Van Prabhag, Garhwal Virat, Uttar Pradesh ki Karya Yojna (1981-82 se 1990-91 tak)*. Nainital. Khand 1, Bhag 1-2 : 53-54 (in Hindi).
- WALKER, W. 1888. *Angling in Kumaon lakes*. Calcutta.
- WILLIAMS, G.R.C. 1874. *Historical and Statistical Memoir of Dehra Dun*. Roorkee.

AMPHIBIA

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The amphibians form an important link in the evolutionary history of vertebrates. In India, this group is represented by all the three Orders, viz., Gymnophiona/Apoda/Caecilians, Caudata/Urodela and Salientia/Anura. The anurans, to which frogs and toads belong, are the prominent one. Despite of their ecological and economical significance, the Indian amphibians have never received the due attention of Batrachologists probably due to the lack of extensive collection from different habitats, required for their systematic studies.

The last complete work on the amphibia of India was Boulenger's in 1890. Since then many papers have been published describing new species, or listing the species of a particular area. The literature of this century has also added to knowledge on the distribution of Indian amphibians (Inger & Dutta 1987). Yet even a casual examination of Western Himalayan amphibians reveal that in this area too, there is much to be done.

Although Western Himalayan ecosystem, Uttar Pradesh embraces almost all types of amphibian habitats on account of its varied climatic, topographical, altitudinal and vegetational conditions, the amphibian fauna of this area has not been adequately studied. Whatever little information is available at the turn of 20th century, it exists only in the valuable works of Annandale (1906, 1908) and Boulenger (1920). Since then this insufficiently studied, but important, group of animals was left unattended for more than fifty years. Waltner (1974) published a list of amphibians and reptilians inhabiting different altitudes in Western Himalaya as a whole. Chopra (1977) recorded seven common species occurring in Corbett National Park. Considering so many factors composition and distribution of the fauna in Western Himalaya, Uttar Pradesh, a continuous effort has been put for carrying out the faunistic surveys with special reference to the amphibians of this region including the systematic study of material already present in the NRS/ZSI, Dehra Dun. This has resulted one species *Rana (Paa) tuberculata* and two species of the genus *Amolops* new to the science, apart from five species recorded for the first time from this area. (Tilak & Ray, 1985; Ray, 1989).

The faunal list incorporates nineteen species belonging to seven genera and four families under order Anura. Of these, interestingly, 70% are exclusively forest and stream/ditch dwellers while the remainder inhabits near human settlement. A detailed districtwise list of the species with their altitudinal habitat preference is given in the following page.

Table showing districtwise distribution of species

	1	2	3	4	5	6	7	8
PHYLUM : CHORDATA								
SUBPHYLUM : VERTEBRATA								
CLASS : AMPHIBIA								
ORDER : ANURA								
FAMILY : RANIDAE								
<i>Rana annadalei</i> Boulenger	-	-	-		+	-	+	-
<i>R. blandfordii</i> Boulenger	+	+	+	+	+	+	+	+
<i>R. cyanophlyctis</i> Schneider	+	+	+	-		+	+	+
<i>R. leibigii</i> Gunther		-	-	-	+	-	-	-
<i>R. limnocharis</i> Boie	+	+	+	-	-	+	+	
<i>R. minica</i> Dubois			-		+	-	+	-
<i>R. tuberculata</i> Tilak & Ray	+			+	+	-	-	-
<i>R. tigerina</i> Daudin	+	+	-				-	-
<i>Tomopterna breviceps</i> (Schneider)	+	+	+				-	+
<i>Amolops afghanus</i> (Gunther)	+	+	-	+	+	-	-	+
<i>Amolops</i> sp.1 (new species)	+	-	-	-	-	-	-	-
<i>A. formosus</i> (Gunther)	+	-	+	+	-	-	-	-
<i>Amolops</i> sp.2 (new species)	+	-	-	-	-	-	-	
FAMILY : BUFONIDAE								
<i>Bufo himalayanus</i> Gunther	+	+	+	+	+	+	+	+
<i>B. melanostictus</i> Schneider	+	+	+	+	+	+	+	+
<i>B. stomaticus</i> Lutken	+	+	-	-	-	+	+	+
FAMILY : MICROHYLIDAE								
<i>Microhyla ornata</i> Dumeril & Bibron	+	+	-	-	-	+	-	-
<i>Uperodon systoma</i> (Schneider)	+	-	-	-	-	-	-	-
FAMILY : RHACOPHORIDAE								
<i>Polypedates maculatus</i> (Gray)	+		+		-	-	+	-

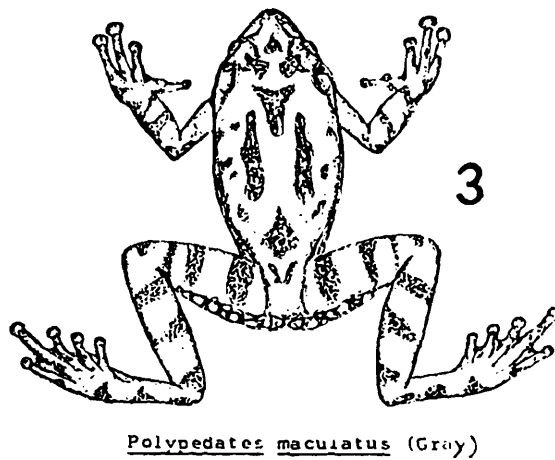
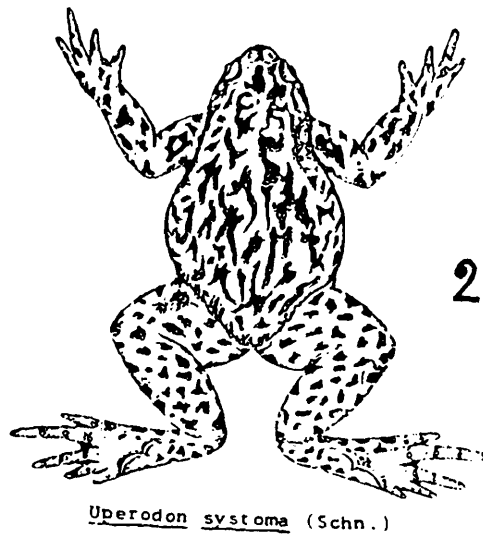
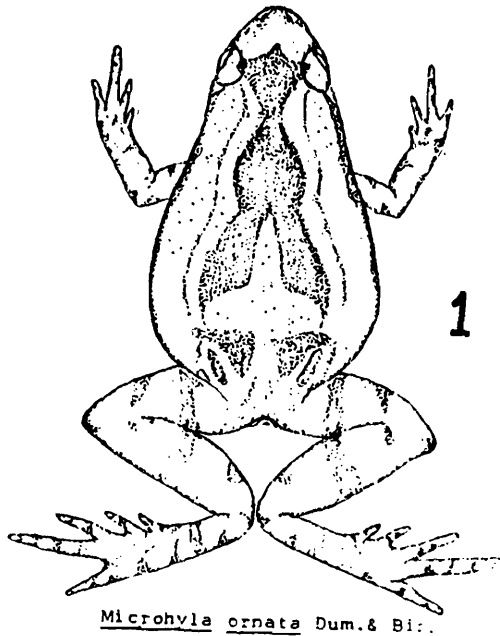
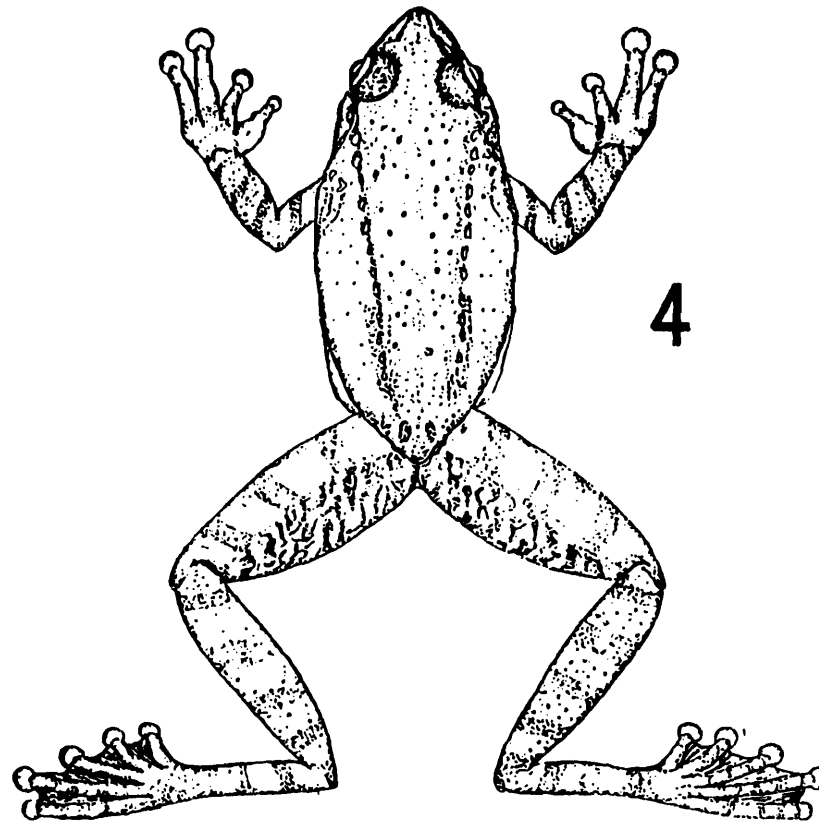
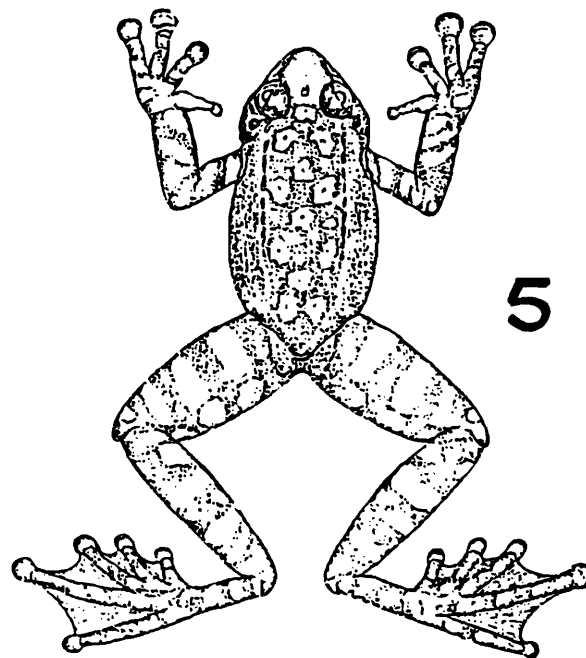


Fig. 1. *Microhyla ornata* Dum. & Bib Fig. 2. *Uperodon systoma* (Schn.)
Fig. 3. *Polypedates maculatus* (Gray)

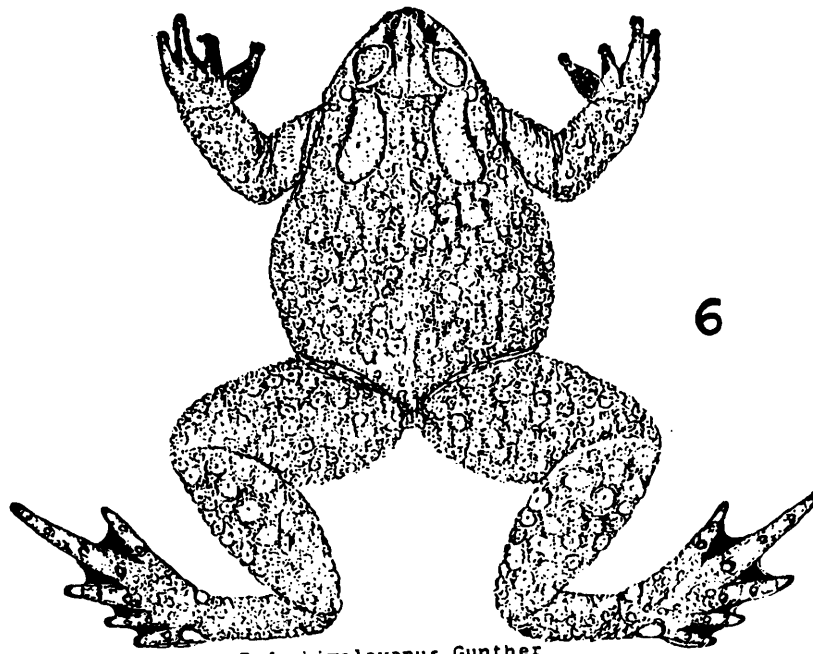


Amolops jaunsari sp.nov



A. formosus (Gunther)

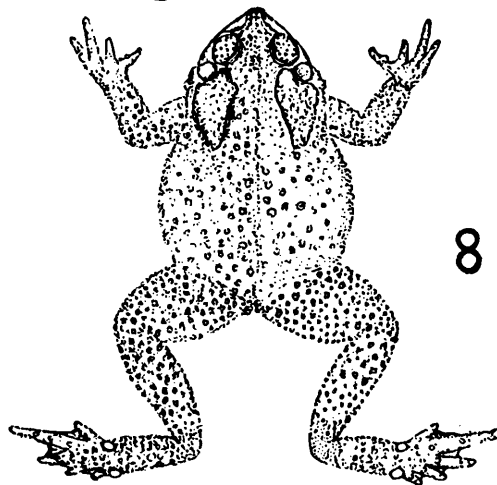
Fig. 4. *Amolops* sp.2 (new species) Fig. 5. *A. formosus* (Gunther)



Bufo himalayanus Gunther



B. melanostictus Schn.



B. stomaticus Lutken

Fig. 6. *Bufo himalayanus* Gunther Fig. 7. *B. melanostictus* Schn. Fig. 8. *B. stomaticus* Lutken

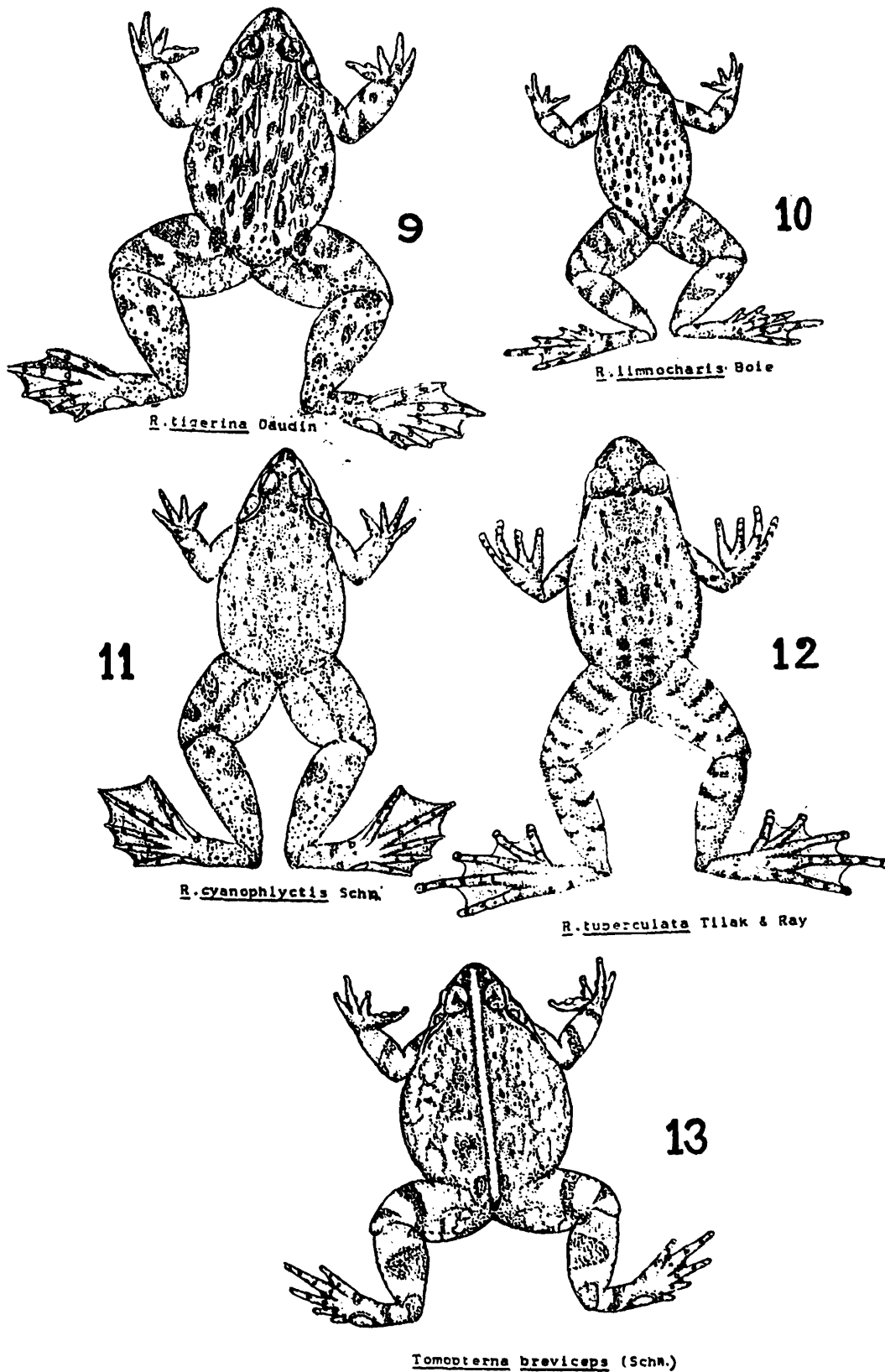


Fig. 9. *R. tigrina* Daudin Fig. 10 *R. limnocharis* Boie Fig. 11. *R. cyanophlyctis* Schn.
 Fig. 12. *R. tuberculata* Tilak & Ray Fig. 13. *Tomopterna breviceps* (Schn.)

REFERENCES

- ANNANDALE, N. 1906. Notes on the freshwater fauna of India. VIII. Some Himalayan Tadpoles. *J. Asiat. Soc. Bengal.*, 2 : 289-292.
- ANNANDALE, N. 1908. Notes on some batrachia recently added to the collection of the Indian Museum. *Rec. Indian. Mus.* 2:304-305.
- BOULENGER, G.A. 1920.. A monograph of South Asian, Papuan, Melanesian and Suctalian frogs of the genus *Rana*. *Rec. Indian. Mus.*, 20 : 84-221.
- CHOPRA, R.N. 1977. Amphibian Fauna of Corbett National Park (U.P.). *Newsl. zool. Surv. India.* 3 (4) : 215-217
- INGER, R. F. AND DUTTA, S.K. 1987. An overview of Amphibian fauna of India. *J. Bombay nat Hist. Soc.*, 87 (Suppl.) : 185-192.
- TILAK, R. AND RAY, P. 1985. Description of a new species of the sub-genus *Rana (Paa)* Dubois, from Chakrata Hills, District Dehradun, Uttar Pradesh, India (Ranidae : Anura). *Zool. Anz. (Jena)* 215, 3/45 : 213-239.
- RAY, P. 1989. Studies on the Amphibian fauna of District Dehradun (U.P.) in relation to systematics (Thesis). University of Garhwal (Srinagar, U.P.)
- WALTNER, R.C. 1974. Geographical and altitudinal distribution of amphibians and reptiles in the Western Himalayas. *Cheetal.*, 16 (1) : 17-25.

REPTILIA

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The Reptiles are an interesting group of animals. Their study has always been a challenge to the herpetologists. The reptilian fauna (Crocodiles, Testudines, Lizards and Snakes) has attracted the attention of various workers during the past. It was Malcom Smith (1931, 1935, 1943) who made outstanding contribution on reptiles in the form of "Fauna of British India". Since then several workers made notable contributions to the herpetology of Western Himalaya (Uttar Pradesh). The reports of these workers (Wall, 1906, 1907; Annandale, 1907, 1914; Bhatnagar, 1967, 1969, 1972 ; Pande and Jain, 1968 ; Bhamri, 1976; Prasad, 1976; Dwivedi and Mathur, 1978; Chopra, 1979; Sanyal and Talukdar, 1979; Singh and Gupta, 1979a, b; Upadhyaya and Upadhyaya, 1980; Gupta and Pande, 1982; Murthy, 1985; Lamba, 1987; Osmaston and Sale, 1989; Husain, in press a, b) are confined to the parks, districts, forest divisions etc. Waltner (1974) gave a general account of geographical and altitudinal distribution of reptiles in the Himalaya. In view of this the latest information on the reptilian fauna of Western Himalaya, U.P. was very much needed and hence the present study was taken up. This work is based on extensive surveys of the area, published records, working plans of concerned forest divisions and the information gathered from various other sources.

There are altogether 70 species of reptiles belonging to 46 genera, 16 families and 3 orders distributed in the area. This report includes several new distributional records out of which *Varanus flavescens* (Hardwicke & Gray), the Barred Yellow Monitor Lizard, *Lycodon jara* (Shaw), the Twin Spotted Wolf Snake, and *Callophis macclellandi* (Reinhardt), the McClelland's Coral Snake are Worth mentioning.

DISTRIBUTIONAL PATTERN OF THE SPECIES

The study reveals that the diversity of species especially lizards and snakes is more up to an elevation of 1800m after which there is a noticeable decrease for each additional elevation of 900m and hence the number of species is relatively less at higher elevations in contrast to that at lower elevations. However, the crocodiles and turtles are found at lower altitude.

CROCODILIANS : *Crocodylus palustris* Lesson, the Snubnosed Crocodile or Mugger and *Gavialis gangeticus* (Gamelin), the Long- snouted Crocodile or Gharial occur in the Ramganga river, passing through the Corbett National Park (Nainital and Pauri Garhwal districts).

TESTUDINES : The turtles and tortoises are generally found at low altitude (150m-900m) in slow moving streams, ponds and reservoirs of Dehra Dun, Pauri-Garhwal and Nainital districts. *Melanochelys tricarinata* (Blyth), the Three-keeled Turtle, *M. trijuga trijuga* (Schweigger), the Indian

Pond Terrapin and *Lessemys punctata punctata* (Bonnaterre), the Indian Flap-shell Turtle are the commonly found species in the area.

SAURIANS : The distribution of the lizards viz. *Hemidactylus flaviviridis* Ruppell, the Yellow-bellied House Gecko, *Varanus flavescens* (Hardwicke & Gray), the Barred Yellow Monitor Lizard, *Mabuya carinata* (Schneider), the Common Skink and *M. macularia* (Blyth), the Little Skink are found to occur from 200m to 900m elevation. A brilliantly coloured young specimen of *Varanus flavescens* was collected from the Chilla Forest (Pauri-Garhwal). *Cryptodactylus lawderanus* (Stoliczka), the Rock Gecko *Hemidactylus brooki* Gray, the Spotted Indian House Gecko, *Calotes versicolor* (Daudin), the Indian Garden Lizard, *Varanus bengalensis* (Daudin), the Indian Monitor, *Eumeces taeniolatus* (Blyth), the Yellow-bellied Mole Skink and *Riopa punctata* (Gmelin), the Dotted Garden Skink occur between 200m and 1800m. *Cyrtodactylus faciolutus* (Blyth), *Japalura kumaonensis* (Annandale) and *J. major* (Jerdon) are found between 900m and 2700m. *Scincella himalayanum* is commonly met between 1500m to 3900m. The gregarious species *Agama tuberculata* Hardwicke & Gray, the Common Rock Lizard inhabits almost through out the area (150m- 3600m.).

SERPENTES : The distribution of snakes in relation to altitude is significant. *Agkistrodon himalayanus* (Gunther), the Himalayan Pit Viper is found up to an elevation of 4875m ranging from 900m. This is the only species which has adapted itself for such high altitude. However, *Ptyas mucosus* (Linn.), the Rat Snake *Callophis macclellandi* Reinhardt, the McClelland's Coral Snake, and *Naja naja naja* (Linn.), the Common or Binocellate Cobra occur up to 3600m from plains. Altitudinal distribution of rest of the species occurring in the area is as under:

Plains to 900m : *Ramphityphlops braminus* (Daudin), the Common Blind Snake and *Typhlops diardi* Schlegel, the Large Blind Snake, *Eryx conicus* (Schneider), the Common Sand Boa, *Lycodon jara* (Shaw), the Twin-spotted Wolf Snake, *Sibynophis sagittarius* (Cantor), the Cantor's Black-headed Snake, *Elaphe helena* (Daudin), the Common Trinket Snake, *Boiga forsteni* (Dumeril & Birbron), *Boiga trigonata* (Schneider), the Common Cat Snake, *Enhydris enhydris* (Schneider), the Smooth Water Snake, *E. sieboldi* (Schlegel), the Siebold's Water Snake, *Elachistodon westermanni*, (Reinhardt), the Indian Egg-eater and *Echis carinatus* (Schneider), the Saw-scaled Viper.

Plains to 1800m : *Typhlops porrectus* Stoliczka, the Slender Blind Snake, *Python molurus molurus* (Linn.), the Indian Python, *Lycodon aulicus* (Linn.), the Common Wolf Snake, *Lycodon striatus* (Shaw), the Barred Wolf Snake, *Oligodon arnensis* (Shaw), the Common Kukri Snake, *Amphiesma stolata* (Linn.), the Striped Keelback, *Argyrogena rhodorhachis* (Jan), *A. ventromaculatus* (Gray & Hardwicke), the Glossy-bellied Racer, *Spalerosophis diadema articeps* (Fisher), the Diadem Snake, *Bungarus caeruleus* (Schneider), the Common Krait, *B. fasciatus* (Schneider), the Banded Krait and *Ophiophagus hanna* (Cantor), the King Cobra (ascends 2200m).

Plains to 2700m : *Xenochrophis piscator* (Schneider), the Checkered Keelback, *Elaphe radiata* (Schlegel), the Copperhead, *Vipera russelli* (Shaw), the Russell's Viper, *Trimeresurus monticola* Gunther, the Blotched Pit Viper and *Naja oxiana* (Eichwald), the Acellate Cobra.

900m to 2700m : *Trachischium fuscum* (Blyth), the Oriental Worm Snake and *Boiga multifasciata* (Blyth), the Himalayan Cat Snake. *Amphiesma platyceps* (Blyth), the Mountain Keelback occurs from 900m to 2100m.

1800m to 2700m : *Lycodon mackinnoni* Wall, the Mussoorie Wolf Snake and *Trichischium laeve* Peracca, the Olive Worm Snake.

VENOMOUS SNAKES

Out of 41 species of snakes distributed in the area 10 are venomous (*Bungarus caeruleus*, the Common Krait ; *B. fasciatus*, the Banded Krait; *Calliophis macclellandi*, the McClelland's Coral Snake; *Ophiophagus hannah*, the King Cobra; *Naja naja*, the Binocellate Cobra; *Naja oxiana*, the Acellate Cobra; *Echis carinatus*, the Sawe-scaled Viper; *Vipera russelli*, the Russell's Viper; *Agkistrodon himalayanus*, the Himalayan Pit Viper and *Trimerisurus monticola*, the Blotched Pit Viper).

TABLE SHOWING DISTRICTWISE DISTRIBUTION OF SPECIES

	1	2	3	4	5	6	7	8
CLASS : REPTILIA								
ORDER : CROCODYLIA								
FAMILY : CROCODYLIDAE								
<i>Crocodylus palustris</i> Lesson, Snub-nosed Crocodile, Mugger			+	-		+		-
FAMILY : GAVIALIDAE								
<i>Gavialis gangeticus</i> (Gmelin), Long-snouted Crocodile, Gharial	-		+	-	-	+	-	-
ORDER : TESTUDINES								
FAMILY : EMYDIDAE								
<i>Geoclemys hamiltoni</i> (Gray), Spotted Pond-Turtle	-	-	-	-	-	+	-	-
<i>Kachuga kachuga</i> (Gray), Sail Terrapin				-	-	+	-	-
<i>Kachuga smithi</i> (Gray), Smith's Terrapin	+				-	+	-	
<i>Kachuga tecta</i> (Gray), North Indian Roofed Turtle	+		-	-	-	+	-	-
<i>Melanochelys tricarinata</i> (Blyth), Three-keeled Turtle	+	-	+		-	+	-	-
<i>Melanochelys trijuga trijuga</i> (Schweigger), Indian Pond Terrapin	+		+			+		
FAMILY : TRIONYCHIDAE								
SUBFAMILY : LISSEMYNINAE								
<i>Lissemys punctata punctata</i> (Bonnaterre), Indian Flap-shell Turtle	+		+	-	-	+	-	

	1	2	3	4	5	6	7	8
SUBFAMILY : TRIONYCHINAE								
<i>Chitra indica</i> (Gray), Narrow-necked Soft-shell Turtle	+		+		-	+	-	-
<i>Trionyx gangeticus</i> Cuvier, Indian Soft-shell Turtle	+		+	-	-	+	-	-
ORDER : SAURIA								
FAMILY : GEKKONIDAE								
SUBFAMILY : GEKKONINAE								
<i>Cryodactylus fasciololatus</i> (Blyth), Rock Gecko		+	+	-	-	+	+	-
<i>Cryodactylus lawderanus</i> (Stolioczka), Bent-toed Gecko		-	+	-	-	-	+	-
<i>Hemidactylus brooki</i> Gray, Spotted Indian House Gecko	+	+	+	+	+	+	+	+
<i>Hemidactylus flaviviridis</i> Ruppell, Yellow-bellied House Gecko	+	+	+	+	+	+	+	+
<i>Hemidactylus leschenaulti</i> Dumeril & Birborn, Bark Gecko	+	-	-	-	-	-	-	-
FAMILY : AGAMIDAE								
<i>Agama tuberculata</i> Hardwicke & Gray, Rock Lizard	+	+	+	+	+	+	+	+
<i>Calotes versicolor</i> (Daudin), Indian Garden Lizard	+	+	+	+	+	+	+	+
<i>Japalura kumaonensis</i> (Annandale), Kumaon Mountain Lizard	+			-	-	+	+	+
<i>Japalura major</i> (Jerdon), Garhwal Mountain Lizard	+	+	+	+	+	-		-
FAMILY : VARANIDAE								
<i>Varanus bengalensis</i> (Daudin), Monitor Lizard	+	-	+	+	-	+	+	+
<i>Varanus flavescens</i> (Hardwick & Gray), Barred Yellow Monitor Lizard	-	-	+	-	-	-	-	-
FAMILY : LACERTIDAE								
<i>Ophisops jerdoni</i> Blyth, Striped Race-runner	+	-	-	-	-	-	-	-

	1	2	3	4	5	6	7	8
FAMILY : SCINCIDAE								
SUNBFAMILY : LYGOSOMINAE								
<i>Eumeces taeniolatus</i> (Blyth), Yellow-bellied Mole Skink	+	-	+	-	-	+	-	-
SUBFAMILY : SCINCINAE								
<i>Mabuya carinata</i> (Schneider), Common Skink	+	-	+	-	-	+	-	-
<i>Mabuya macularia</i> (Blyth), Little Skink	+		+	-	-	+	-	-
<i>Riopa punctata</i> (Gmelin), Dotted Garden Skink	+	-	+	-	-	+	-	-
<i>Scincella himalayana</i> (Gunther), Himalayan Ground Skink	+	+	+	+	+	+	+	+
ORDER : SERPENTES								
FAMILY : TYPHLOPIDAE								
<i>Ramphotyphlops braminus</i> (Daudin), Common Blind Snake	+	-	+	-	-	+	-	-
<i>Typhlops diardi</i> Schlegel, Large Blind Snake	+	-	-	-	-	-	-	-
<i>Typhlops porrectus</i> Stoliczka, Slender Blind Snake	-	-	+	+		+	-	-
FAMILY : BOIDAE								
SUBFAMILY : PYTHONINAE								
<i>Python molurus molurus</i> (Linn.), Asiatic Rock Python	+	-	+	+	-	+	-	-
SUBFAMILY : BOINAE								
<i>Eryx conicus</i> (Schneider), Common Sand Boa	-	-	+	-	-	+	-	-
<i>Eryx Johni johni</i> (Russell), Red Sand Boa			+			+	-	
FAMILY : DIPSADIDAE								
SUBFAMILY : LYCODONTINAE								
<i>Lycodon aulicus</i> (Linnaeus), Common Wolf Snake	+	-	-	-	-	+	+	-
<i>Lycodon jara</i> (Shaw), Twin-spotted Wolf Snake	+	-	-	-	-	-	-	-

	1	2	3	4	5	6	7	8
<i>Spaleorophis diadema ariceps</i> Fisher, Diadem Snake	+		-	-		-	-	-
FAMILY : HOMALOPSIDAE								
SUBFAMILY : BOIGINAE								
<i>Boiga foresteni</i> (Dumeril & Birbron), Cat Snake	+		+			+	-	
<i>Boiga multifasciata</i> (Blyth), Himalayan Cat Snake	+	-	+			+		
<i>Boiga trigonata</i> (Schneider),	+		+	-	-	+		
SUBFAMILY : HOMALOPSINAE								
<i>Enhydris enhydris</i> (Schneider), Smooth Water Snake	+		+		-	+	-	-
<i>Enhydris sieboldi</i> (Schlegel), Siebold's Smooth Water Snake			+		-	+	-	-
SUBFAMILY : DASYPELTINAE								
<i>Elachistodon westermanni</i> Reinhardt, Indian Egg-eater	-	-	+		-	+		
FAMILY : ELAPIDAE								
SUBFAMILY : ELAPINAE								
<i>Bungarus caeruleus</i> (Schneider), Common Krait	+		+	+		+	+	+
<i>Bungarus fasciatus</i> (Schneider), Banded Krait	+	+	+	-	+	+	-	
<i>Calliophis maccllellandi</i> (Reinhardt), McClelland's Coral Snake	-	-	-	-	+	-	-	-
<i>Ophiophagus hannah</i> (Cantor), King Cobra	+		+	-	-	+	-	
<i>Naja naja</i> (Linnaeus), Binocellate Cobra	+		+	+	-	+	+	+
<i>Naja oxiana</i> (Eichwald), Acellate Cobra				+				
FAMILY : VIPERIDAE								
SUBFAMILY : VIPERINAE								
<i>Echis carinatus</i> (Schneider), Saw-scaled Viper	+		+			+		

	1	2	3	4	5	6	7	8
<i>Vipera russelli</i> (Shaw), Russell's Viper	+	-	+	-	-	+	+	+
SUBFAMILY : CROTALINE								
<i>Agkistrodon himalayanus</i> (Gunther), Himalayan Pit Viper	-	-	+	+	-	-	+	+
<i>Trimeresurus montiola</i> Gunther, Blotched Pit Viper	+	-	-	-	-	+	+	-

REFERENCES

- BHAMRI, M. L. 1976. *Uttarkashi Van Prabhad, Tehri Virat, Uttar Pradesh Ki Karya Yojana (1976-1977 se 1985-86 tak)*. Nainital. Bhag 1 va 2 : 55.
- BHATNAGAR, R. K. 1969. Extension of range of Copper-head Snake *Elaphe radiata* Schelagel (Ophidia : Colubridae) to Doon valley and Doon Siwaliks. *J. Bombay nat. Hist. Soc.*, **66**(2) : 383.
- BHATNAGAR, R.K. 1972. Reptile fauna of Dehra Dun district (Uttar Pradesh). Part - I *Cheetal*, **15** (4) : 15-23.
- CHOPRA, R.N. 1979. Fauna of Corbett National Park 3. Reptiles. *Cheetal* , **21** (1) : 30 -31.
- DWIVEDI, B. N. AND MATHUR, R.S. 1978. Working Plan for the Nainital Forest Division, Kumaon Circle, Uttar Pradesh, 1978-79 to 1978-88. Nainital. Part I & II : xii-xiii
- HUSAIN, A. (in press a). Fauna of Rajaji National Park, Uttar Pradesh-Turtles and Tortoises (Reptilia: Testudines). *Rec. zool. Surv. India*, Ms : 1-13.
- HUSAIN, A. (in press b). Fauna of Rajaji National Park, Uttar Pradesh. Snakes (Reptilia : Serpentes). *Rec. zool. Surv. India*, Ms : 1-39.
- LAMBA, B.S. 1987. *Fauna of Corbett National Park*. Fauna of Conservation Areas: 2, Z.S.I., Calcutta.: 82-86. figs.
- MURTHY, T.S.N. 1985. Classification and distribution of the Reptiles of India. *The Snake*. **17** : 48 :71.
- OSMASTON, B.B. AND SALE, J.B. 1989. *Wildlife of Dehra Dun and adjacent hills*. Dehra Dun. : 1-104.
- GUPTA, D.P. AND PANDE, I. D. 1982. *Purvi Almora Van Prabhad, Kumaon Virat, Uttar Pradesh ki Karya Yojana (1980-81 se 1989 90)*. Nainital. Bhag 1 va 2 : 48.
- PANDE, D. C. AND JAIN, K. C. 1968. Working Plan for the Haldwani Forest Division, Western Circle, Uttar Pradesh. 1966-67 to 1975- 76. Nainital. Vol. 1, parts I & II : 445-45
- PRASAD, J. 1976. *Paschimi Almora Van Prabhad, Kumaon Virat Uttar Pradesh ki Karya Yojana. 1976-77 se 1985-86 tak*). Nainital. Bhag 1 va 2 : 52-53.

- SANAYAL, D.P., TALUKDAR, S.K. AND DASGUPTA, G.1979. Two new distributional records of snakes from the Dun valley and the Corbett National Park, Uttar Pradesh. *Cheetal*, 21 (1) : 11-12.
- SINGH, K. N. AND GUPTA, P. N. 1979a. *Working Plan for the East Dehra Dun Forest Division, Uttar Pradesh (1979-80 to 1988-89)*. Nainital. Vol. 1 (I-II) : 65.
- SINGH, K. N. AND GUPTA, P. N. 1979b. *Working Plan for the West Dehra Dun Forest Division, Uttar Pradesh, 1979-80 to 1988-89*. Nainital. Vol. 1 : 63-64.
- SINGH, L. K. 1986. Crocodiles : Status and Management (in Majumuria, T.C. *Wildlife Wealth of India*, Bangkok) : 261-275.
- SMITH, M.A. 1931. *The Fauna of British India, including Ceylon and Burma. Reptilia and Amphibia* Vol. I. - Loricata, Testudines. London. : i - xxviii, 1-185. map, pl. I -II.
- SMITH, M. A. 1935. *The Fauna of British India, including Ceylon and Burma. Reptilia and Amphibia*. Vol. II. - Sauria. London. : i-xiii, 1-440. 2 maps, pl. I.
- SMITH, M.A. 1943. *The Fauna of British India Ceylon and Burma, including the whole of the Indo-Chinese Sub-Region. Reptilia and Amphibia*. Vol. III. Serpentes. London. : i-xii, 1-583, 1 map.
- UPADHYAYA, M. D. AND UPADHYAYA, N.K. 1980. *Garhwal Van Prabhag, Garhwal Virat, Uttar Pradesh ki Karya Yojana (1981-82 se 1990- 91 tak)*. Nainital. Khand I, Bhag 1 va 2 : 53.
- WALL, F. 1906. A new Himalayan snake (*Lycodon mackinnoni*). *J. Bombay nat. Hist. Soc.*, 17 (1) : 29-30.
- WALL, F. 1907. Ophidia (in Boulenger, G. A., Annandale, N. and Regan, C.T. Reports on a collection of Batrachia, Reptiles and Fish from Nepal and the Western Himalayas.). *Rec. Indian Mus.*, 1 (2) : 155-157.
- WALTNER, R.C. 1974. Geographical and altitudinal distribution of Amphibians and reptiles in the Himalayas. *Cheetal*, 16 (1) : 17- 25; 16(2) : 28-36; 16 (3) : 14-19 ; 16 (4) : 12-17.



Fig. 1 : *Cyrtodactylus fasciolatus* (Blyth)

Fig. 2 : *Kachuga smithi* (Gray)

Fig. 3 : *Ptyas mucosus* (Linnaeus)

Fig. 4 : *Xenochrophis piscator* (Schneider)

Fauna of Western Himalaya

HUSAIN & RAY

PLATE II



Fig. 1 : *Agama tuberculata* Hardwicke & Gray

Fig. 2 : *Calotes versicolor* (Daudin)

Fig. 3 : *Rlopa punctata* (Gmelin)

AVES

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Although the scientific descriptions of Indian BIRDS are available in several valuable contributions by the most experienced field ornithologists like Jerdon (1862-64), Baker (1922-31), Ali & Ripley (1968-78), etc., the faunistic surveys and systematic listing of the avi-fauna of West Himalayan Ecosystem, U.P. (WHE, UP) has never been adequately carried out probably on account of the following imperatives.:

(i) The Vastness of the area covering eight administrative districts, viz., Dehra Dun, Tehri, Pauri, Uttarkashi, Chamoli, Naini Tal, Almora and Pithoragarh (the first five being in Garhwal and the remaining three in Kumaon Himalaya), including varied topographical, climatic and altitudinal conditions.

(ii) The regular and prolonged daily field observations, in all types of bird-habitats, winter, summer and monsoon, atleast for two- three successive years.

(iii) The limited number of the scientifically trained, dedicated and devoted field ornithologists and

(iv) The absence of shooting / trapping permits from the competent authorities, especially after 1986, etc.

Despite all these limitations and constraints a number of bird lists have appeared and are scattered all over various zoological and natural history journals referring one or the other part of WHE, UP. Among the more comprehensive and relevant one being by the well known workers such as : Hudson, 1930 (Naini Tal) ; Briggs, 1931 (Ranikhet, dist. Almora); Bhatnagar and Misra, 1971, 1972 incomplete (Dehra Dun); Lavkumar, 1956 (Garhwal); Tak and Kumar, 1987 (Nanda Devi), Lamba, 1987 a & b (Corbett & Nanda Devi National Parks in districts pauri and Naini Tal, and Chamoli respectively); and Kumar, 1985 (Nayyar Valley, dist. Pauri) etc.

As there is no readily available bird list on WHE, UP. and on immediate demand from the Ministry of Environment, Forests and Wildlife, an attempt has been made to compile the above mentioned published information alongwith the personal experience of the compiler gained during the course of his numerous field trips to Nanda Devi Area, dist. Chamoli (1981-85, 89-93); Nayyar Valley, dist. Pauri (1983); Dhokriani glacier, dist. Uttarkashi (1983); Gangotri glacier, dist. Uttarkashi (1987); Pindari glacier, dist. Almora (1990); dist. Pithoragarh (1988); and almost a continuous stay at Corbett National Park, dist. Pauri and Naini Tal (1976- 79). As a result, the following districtwise list of birds on WHE, UP, is made available to be consulted by the future bird-watchers and taxonomists.

This list incorporates 528 species & subspecies of birds, belonging to 17 different orders, from the WHE, UP and it conforms to the nomenclature of Ali & Ripley (1968-78). A reference at the subspecific level is included on the basis of the reported range of the subspecies. In fact, it is not identification at subspecific level. Further, it is trusted that the list, though very preliminary in nature

and incomplete in various respects (on account of the foregoing limitations and constraints), would still meet the needs of the future workers and who would make the required districtwise and/or otherwise additions.

TABLE SHOWING DISTRICTWISE DISTRIBUTION OF SPECIES

FAUNA	1	2	3	4	5	6	7	8
ORDER : PODICIPEDIFORMES								
<i>Podiceps c. cristatus</i> (Linnaeus), Great Crested Grebe	+	-	+	-	-	-	-	-
<i>P. ruficollis capensis</i> Salvadori, Little Gerbe or Dabchick	+	-	+	-		+	-	-
<i>Pelecanus onocrotalus</i> Linnaeus, White or Rosy Pelican	+	-	+	-	-	-	-	-
<i>P. p. philippensis</i> Gmelin, Spotted or Grey Pelican	-	-	+	-	-	-	-	-
ORDER : PELECANIFORMES								
<i>Phalacrocorax carbo sinensis</i> (Shaw), Large Cormorant	+	-	+	-	-	+	-	-
<i>P. fuscicollis</i> Stephens, Indian Shag			+			-	-	-
<i>P. niger</i> (Vieillot), Little Cormorant	+	-	+	-	-	-	-	-
<i>Anhinga rufa melanogaster</i> Pennant, Darter or Snake-bird	+	-	+	-	-	-	-	-
ORDER : CICONIIFORMES								
<i>Ardea cinerea rectirostris</i> Gould, Eastern Grey Heron	+	-	+	-	-	-	-	-
<i>Ardea purpurea manilensis</i> Meyen, Eastern Purple Heron	+	-	+	-	-	-	-	-
<i>Butorides striatus javanicus</i> (Horsfield), Little Green Heron	+	-	-	-	-	-	-	-
<i>Ardeola g. grayii</i> (Skykes), Indian Pond Heron or Paddybird	+	-	+	-	-	-	-	-
<i>Bubulcus ibis coromandus</i> (Boddaert), Cattle Egret	+		+	-	-		-	-
<i>Ardea alba modesta</i> J. E. Gray, Eastern Large Egret	+		+	-	-	-	-	-
<i>Egratta i. intermedia</i> (Wagler), Smaller or Median Egret	+		+				-	-

	1	2	3	4	5	6	7	8
<i>E. g. garzetta</i> (Linnaeus), Little Egret	+	-	+	-	-	-	-	-
<i>Nycticorax n. nycticorax</i> (Linnaeus), Night Heron	+	-	+	-	-	-	-	-
<i>Ixobrychus m. minutus</i> (Linnaeus), Little Bittern	+	-	-	-	-	-	-	-
<i>I. cinnamomeus</i> (Gmelin), Chestnut Bittern	-	+	+	-	-	-	-	-
<i>Mycteria leucocephala</i> (Pennant), Painted Stork		-	+	-	-	-	-	-
<i>Ciconia e. episcopus</i> (Boddaert), Whitenecked Stork	+	-	+	-	-	-	-	-
<i>Ciconia c. ciconia</i> (Linnaeus), White Stork	-	-	+	-	-	-	-	-
<i>C. nigra</i> (Linnaeus), Black Stork	+	-	+	-	-	-	-	-
<i>Ephippiorhynchus a. asiaticus</i> (Latham), Blacknecked Stork	+	-	+	-	-	-	-	-
<i>Plegadis f. falcinellus</i> (Linnaeus), Glossy Ibis			+			-	-	-
ORDER : ANSERIFORMES								
<i>Anser</i> sp., Goose	-	-	-		+	-	-	-
<i>A. anser rubrirostris</i> Swinhoe, Eastern Greylag Goose	+	-	-	-	-	-	-	-
<i>A. indicus</i> (Latham), Barheaded Goose	+	-	+	-	-	-	-	-
<i>Dendrocygna javanica</i> (Horsfield), Lesser Whistling Teal or Tree Duck	+	-	-	-	-	-	-	-
<i>D. bicolor</i> (Vicillot), Large Whistling Teal	-	-	+	-	-	-	-	-
<i>Tadorna ferruginea</i> (Pallas), Ruddy Shelduck or Brahminy Duck	+	-	+	-	-	-	-	-
<i>T. tadorna</i> (Linnaeus), Common Shelduck	-	-	+	-	-	-	-	-
<i>Marmaronetta angustirostris</i> (Menetries), Marbled Teal	-	-	+	-	-	-	-	-
<i>Anas acuta</i> Linnaeus, Pintail	+		+					
<i>A. c. crecca</i> Linnaeus, Common Teal	+		+					
<i>Anas p. poecilorhyncha</i> J. R. Forster, Spotbill Duck	+		+			-		
<i>A. platyrhynchos</i> Linnaeus, Mallard	+		+			+	-	
<i>A. s. strepera</i> Linnaeus, Gadwall	+		+		-	-		
<i>A. penelope</i> Linnaeus, Wigeon	+		+					
<i>A. querquedula</i> Linnaeus, Garganey or Bluewinged Teal	+		+				-	

	1	2	3	4	5	6	7	8
<i>A. clypeata</i> Linnaeus, Shoveller	+	-	+	-	-	-	-	-
<i>Netta rufina</i> (Pallas), Redcrested Pochard	+	-	+	-	-	-	-	-
<i>Aythya ferina</i> (Linnaeus), Common Pochard	+	-	+	-	-	-	-	-
<i>A. nyroca</i> (Guldenstadt), White-eyed Pochard or Ferruginous Duck	+	-	+	-	-	-	-	-
<i>A. fuligula</i> (Linnaeus), Tufted Duck	-	-	+	-	-	-	-	-
<i>A. m. marila</i> Linnaeus, Scaup Duck	-	-	+	-	-	-	-	-
<i>Nettapus c. coromandelianus</i> (Gmelin), Cotton Teal or Quacky -Duck	+	-	+	-	-	-	-	-
<i>Mergus m. merganser</i> Linnaeus, Goosander or Common Merganser	+			-	-	-	-	-
ORDER : FALCONIFORMES								
<i>Elanus caeruleus veciferus</i> (Latham), Blackwinged Kite	+	-	+	-	-	-	-	-
<i>Pernis ptilorhynchus ruficollis</i> Lesson, Crested Honey Buzzard	+	-	+	-	-	-	-	-
<i>Milvus m. migrans</i> (Boddaert), Black Kite	-	-	-	-	+	-	-	-
<i>M. m. govinda</i> Sykes, Pariah Kite	+	+	+	-	-	+	+	+
<i>M. (m.) lineatus</i> (Gray), Blackeared or Large Indian Kite	-	-	+	-	-	-	-	-
<i>Haliastur i. indicus</i> (Boddaert), Brahminy Kite	+	-	+	-	-	+	-	-
<i>Accipiter gentilis schvedowi</i> (Menzbier), Eastern Goshawk	-	-	+	-	-	-	-	-
<i>A. badius dussumieri</i> (Temminck), Indian Shikra	+	-	+	-	-	-	+	-
<i>A. trivirgatus indicus</i> (Hodgson), North Indian Crested Goshawk	-	-	+	-	-	-	-	-
<i>A. nisus nisosimilis</i> (Tickell), Asiatic Sparrow Hawk			+					-
<i>A. n. melaschistos</i> Hume, Indian Sparrow-Hawk	+	+	+	-	-	-	-	-
<i>A. virgatus kashmiriensis</i> Whistler & Kinnear, West Himalayan Besra Sparrow - Hawk	-	-	+	-	-	-	-	-
<i>A. v. affinis</i> Hodgson, East Himalayan Besra Sparrow Hawk	+	-	-	-	-	-	-	-
<i>Buteo r. rufinus</i> (Cretzschmar), Longlegged Buzzard	+		+	-	-	+	-	-

	1	2	3	4	5	6	7	8
<i>Butastur teesa</i> (Franklin), White-eyed Buzzard - Eagle	+	-	+	-	-	-	-	-
<i>Spizaetus n. nipalensis</i> (Hodgson), Hodgson's or Feather-toed Hawk Eagle	+	-	+	-	-	-	-	-
<i>S. (cirrhatus) limnaeetus</i> (Horsfield), Changeable Hawk - Eagle	+	+	+	-	-	-	-	-
<i>S. c. cirrhatus</i> (Gmelin), Indian Crested Hawk-Eagle	+					-	-	-
<i>Hieraaetus f. fasciatus</i> (Vieillot), Bonelli's or Slender Hawk - Eagle	+	-	+	-	-	-		-
<i>H. pinnatus</i> (Gmelin), Booted Hawk-Eagle	-	-	+	-	-	-	-	-
<i>Aquila chrysaetos daphanea</i> Severtzov, Himalayan Golden Eagle	+	-	+	-	+	-	+	-
<i>A. h. heliaca</i> Savigny, Imperial Eagle	+	-	+	-	-	+	-	-
<i>A. rapax vindhiana</i> Franklin, Tawny Eagle	+	-	-	-	-	-	-	-
<i>A. r. nipalensis</i> Hodgson, Eastern Steppe Eagle	+	+	+	-	+	+	-	-
<i>A. claga</i> Pallas, Greater Spotted Eagle	-	-	+	-	-	-	-	-
<i>A pomarina hastata</i> (Lesson), Lesser Spotted Eagle	-	-	+	-	-	-	-	-
<i>Ictinaetus malayensis perniger</i> (Hodgson), Black Eagle	+	-	+	-	+	+	-	-
<i>Haliaeetus leucoryphus</i> (Pallas), Ringtailed or Pallas's Fishing Eagle	+	+	+	-	-	-	-	-
<i>Ichthyophaga nana plumbea</i> (Jeordon), Himalayan Greyheaded Fishing Eagle	+		+			+		+
<i>Sarcogyps calvus</i> (Scopoli), King Vulture	+	+	+	-	-	+	+	+
<i>Aegyptius monachus</i> (Linnaeus), Cinereous Vulture	+	-	+	-	+	-	-	-
<i>Gyps fulvus fulvescens</i> Hume, Indian Griffon Vulture	+	-	+	-	-	-	-	+
<i>G. himalayensis</i> Hume, Himalayan Griffon Vulture	+	+	+	+	+	+	+	+
<i>G. i. indicus</i> (Scopoli), Indian Longbilled Vulture	-	-	-	-	-	-	+	-
<i>G. i. tenuirostris</i> G.R. Gray, Himalayan Longbilled Vulture	-	-	+		-	-	-	+
<i>G. bengalensis</i> (Gmelin), Indian Whitebacked Vulture	+	+	+	-	+	+	+	
<i>Neophron p. percnopterus</i> (Linnaeus), Egyptian Vulture	-	-	-	-	+	+		

	1	2	3	4	5	6	7	8
<i>N. p. ginginianus</i> (Latham), Indian Scavenger Vulture	+	+	+		+	-	+	-
<i>Gypaetus barbatus aureus</i> (Hablizl), Himalayan Bearded Vulture or Lammergeier	+	-	+	+	+	+	+	+
<i>Circus. c. cynaetus</i> (Linnaeus), Hen Harrier	+	-	+	-	-	-	-	-
<i>C. macrourus</i> (S.G. Gmelin), Pale Harrier	+	-	+	-	-	-	-	-
<i>C. pygargus</i> (Linnaeus), Montagu's Harrier	+	-	+	-	-	-	-	-
<i>C. a. aeruginosus</i> (Linnaeus), Marsh Harrier	+	-	+	-	-	-	-	-
<i>Circaetus g. gallicus</i> (Gmelin), Short-toed Eagle	+	-	+	-	-	-	-	-
<i>Spilornis c. cheela</i> (Latham), Crested Serpent Eagle	+	+	+	+	+	+	+	+
<i>Pandion h. haliaetus</i> (Linnaeus), Osprey	+	-	+	-	-	-	-	-
<i>Microhierax c. caerulescens</i> (Linnaeus), Himalayan Redbreasted Falconet	-	-	+	-	-	-	+	-
<i>Falco biarmicus jugger</i> J. E. Gray, Lagger Falcon	+		+			-	-	-
<i>F. peregrinus japonensis</i> Gmelin, Eastern Peregrine Falcon	+		+				-	-
<i>F. p. babylonicus</i> P. L. Sclater, Redcapped Falcon	-	-	+	-	-		-	-
<i>F. p. peregrinator</i> Sundevall, Shaheen Falcon	+	-	-	-	-	-	-	+
<i>F. s. subbuteo</i> Linnaeus, Hobby	+	-	-	-	-	-	-	-
<i>F. s. centralasiae</i> (Buturlin), Central Asian Hobby	-	-	+	-	-	-	-	-
<i>F. severus rufipedoides</i> Hodgson, Indian Hobby	+	-	+		-	-	-	-
<i>F. c. chicquera</i> Daudin, Redheaded Merlin	+		+		-	-	-	-
<i>F. vespertinus amurensis</i> Radde, Eastern Redlegged Falcon		-	+		-	-	-	-
<i>F. t. tinnunculus</i> Linnaeus, European Kestrel	+	+	+	+	+	+	+	-
<i>F. t. objurgatus</i> (Baker), Indian Kestrel	-	-	+		-	-	-	-
ORDER : GALLIFORMES								
<i>Lerwa lerwa</i> (Hodgson), Snow Partridge	+	-	-	+	+	-	-	-
<i>Tetraogallus h. himalayensis</i> G. R. Gray, Himalayan Snowcock	+			+	+	-	-	-
<i>Alectoris c. chukar</i> (J. E. Gray), Chukor Partridge	+	+	+	+	+	-		
<i>Francolinus francolinus asiiae</i> Bonaparte, Indian Black Partridge	+	+	+		-	+	+	+

	1	2	3	4	5	6	7	8
<i>F. pondicerianus interpositus</i> Hatert, North Indian Grey Partridge	+	+	+	-	-	-	-	-
<i>Coturnix c. coturnix</i> (Linnaeus), Grey Quail	+	-	+	-	-	-	-	-
<i>C. coromandelica</i> (Gmelin), Blackbreasted Quail	+	-	-	-	-	-	-	-
<i>C. c. chinensis</i> (Linnaeus), Bluebreasted Quail	+	-	-	-	-	-	-	-
<i>Perdicula asiatica punjaubi</i> Whistler, Punjab Jungle Bush Quail	+	-	+	-	-	-	-	-
<i>Arborophila t. torqueola</i> (Valenciennes), Common Hill Partridge	+	-	+	-	-	+	-	-
<i>Tragopan melanocephalus</i> (JE Gray), Western Horned Pheasant	+	-	-	-	-	-	-	-
<i>Lophophorus impejanus</i> (Latham), Impeyan Pheasant	+		+	+	+	+	+	+
<i>Lophura leucomelana hamiltonii</i> (JE Gray), Whitecrested Kaleej Pheasant	+	+	+	+	+	+	+	+
<i>Gallus gallus murghii</i> Robinson & Kloss, Indian Red Jungle Fowl	+	+	+	+	+	+	+	+
<i>Pucrasia m. macrolopha</i> (Lesson), Koklas Pheasant	+	-	+	+	+	+	+	+
<i>Carteus Wallichii</i> (Hardwicke), Chir Pheasant	+	-	-		-	+	-	-
<i>Pavo cristatus</i> Linnaeus, Indian Peafowl	+	-	+			+	+	+
ORDER : GRUIFORMES								
<i>Turnix sylvatica dussumier</i> (Temminck), Little Bustard-Quail	+	-	-			-		
<i>T. suscitator taigoor</i> (Sykes), Indian Bustard Quail	-	-	+		-			
<i>Grus leucogeranus</i> Pallas, Siberian Crane	+	-					-	
<i>Rallus aquaticus indicus</i> Blyth, Indian Water Rail	+							
<i>R. striatus albiventer</i> Swainson, Indian Blue-breasted Banded Rail			+					
<i>Rallina eurizonoides amauroptera</i> (Jerdon), Indian or Slatylegged Banded Crane	+							
<i>Amaurornis a. akool</i> (sykes), Brown Crane	+							
<i>Gallinula chloropus indica</i> Blyth, Indian Moorhen	+		+					
<i>Porphyrio porphyrio poliocephalus</i> (Latham), Indian Purple Moorhen	+							

	1	2	3	4	5	6	7	8
<i>Fulica a. atra</i> Linnaeus, Coot	+	-	+	-	-	-	-	-
ORDER : CHARADRIIFORMES								
<i>Hydrophasianus chirurgus</i> (Scopoli), Pheasant-tailed Jacana	+	-	+	-	-	-	-	-
<i>Vanellus vanellus</i> (Linnaeus), Peewit, Lapwing or Green Plover	+	-		-	-	-	-	-
<i>V. cinereus</i> (Blyth), Greyheaded Lapwing	+	-	-		-	-	-	-
<i>V. i. indicus</i> (Boddaert), Redwattled Lapwing	+	+	+			-	+	+
<i>V. spinosus duvaucelii</i> (Lesson), Spurwinged Lapwing	+		+		-	-	-	-
<i>V. malabaricus</i> (Boddaert), Yellow-wattled Lapwing	+	-	-	-	-	-	-	-
<i>Charadrius dubius jerdoni</i> (Legge), Indian little Ringed Plover	+	-	+	-	-	+	-	-
<i>C. a. alexandrius</i> Linnaeus, Kentish Plover	+	-	+	-	-	-	-	-
<i>Numenius arquata orientalis</i> C.L. Brehm, Eastern Curlew	-	-	+	-	-	-	-	-
<i>Limosa l. limosa</i> (Linnaeus), Blacktailed Goodwit	-	-	+	-	-	-	-	-
<i>Tringa totanus eurhinus</i> (Oberholser), Eastern Redshank	+	-	+	-	-	-	-	-
<i>T. nebularia</i> (Gunnerus), Greenshank	-	-	+	-	-	-	-	-
<i>T. ochropus</i> Linnaeus, Green Sandpiper	+	-	+	-	-	+	-	-
<i>T. glareola</i> Linnaeus, Spotted Sandpiper	+	-	+	-	-	-	-	-
<i>T. hypoleucos</i> Linnaeus, Common Sandpiper	+		+			-	-	-
<i>Capella s. solitaria</i> (Hodgson), Eastern Solitary Snipe	+						-	-
<i>C. nemoricola</i> (Hodgson), Wood Snipe	+	-	-	-	-	-	-	-
<i>C. stenura</i> (Bonaparte), Pintail Snipe	+	-	-	-	-	-	-	-
<i>C. g. gallinago</i> (Linnaeus), Common Snipe	+	-	+	-	-	-	-	-
<i>C. minima</i> (Brunnich), Jack Snipe	+	-	+	-	-	-	-	-
<i>Scolopax r. rusticola</i> Linnaeus, Woodcock	+	-	-	-	+	+	-	-
<i>Calidris minutus</i> (Leisler), Little Stint	+	-	+	-	-	-	-	-
<i>C. temminckii</i> (Leisler), Temminck's Stint	+	-	-	-	-	-	-	-
<i>Rostratula b. benghalensis</i> (Linnaeus), Painted Snipe	+	-	+	-	-	-	-	-

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<i>Himantopus h. himantopus</i> (Linnaeus), Indian Blackwinged Stilt	-	-	+		-			-
<i>Recurvirostra avosetta</i> Linnaeus., Avocet	-	-	+	-		-		
<i>Ibidorhyncha struthersii</i> Vigors	-		+	-	-	-		-
<i>Burhinus oedicephalus indicus</i> (Salvadori), Indian Stone Curlew	+		+		-			
<i>Esacus magnirostris recurvirostris</i> (Cuvier), Great Stone Plover	+		+					
<i>Glareola lactea</i> Temminck, Small Indian Pratincole	+		+		-			-
<i>Larus f. fuscus</i> Linnaeus, Lesser Blackbacked Gull	-	-	+	-		-		-
<i>L. ichtyaetus</i> Pallas, Great Blackheaded Gull	+	-	+	-	-	-	-	-
<i>L. brunnicephalus</i> Jerdon, Brownheaded Gull	+	-	+	-	-	-	-	-
<i>Chidonias hybrida indica</i> (Stephens), Indian Whiskered Tern	+	-	+			+		
<i>Sterna aurantia</i> J E Gray, Indian River Tern	-	-	+			-		
<i>Rynchops albicollis</i> Swainson, Indian Skimmer	+	-	-		-	-	-	-
ORDER : COLUMBIFORMES								
<i>Treron a. apicauda</i> Blyth, Pintailed Green Pigeon	+	-	+		-			-
<i>T. s. sphenura</i> (Vigors), Wedgetailed Green Pigeon		-	+			+	+	
<i>T. b. bicincta</i> (Jerdon), Indian Orangebreasted Green Pigeon			+					-
<i>T. p. phoenicoptera</i> (Latham), Bengal Green Pigeon	+	-	+	-	-			-
<i>Columba l. leuconota</i> Vigors, West Himalayan Snow Pigeon	+	-	+	+	+	-	-	-
<i>C. rupestris turkestanica</i> Buturlin, Turkestan Hill Pigeon	+	-	-	-	-	-	-	-
<i>C. livia neglecta</i> Hume, Blue Rock Pigeon	-	-	-	-	-	-	-	+
<i>C. l. intermedia</i> Strickland, Indian Blue Rock Pigeon	+	+	+	-	-	-	-	
<i>C. palumbus casiotis</i> (Bonaparte), Eastern Wood Pigeon	+	-	-		-	-		-
<i>C. hodgsonii</i> Vigors, Speckled Wood Pigeon	+	-	+	-	+	-		-

	1	2	3	4	5	6	7	8
<i>Streptopelia o. orientalis</i> (Latham), Rufous Turtle-Dove			+	+	+	+	+	-
<i>S. o. meena</i> (Sykes), Western Turtle Dove	+	-	+	-	-	-	-	-
<i>S. d. decaocto</i> (Frisvaldszky), Indian Ring Dove	+	+	+	-	-	-	+	+
<i>S. t. tranquebarica</i> (Hermann), Indian Red Turtle Dove	+	-	+	-	-	-	-	-
<i>S. chinensis suratensis</i> (Gmelin), Indian spotted Dove	+	+	+	+	+	+	+	+
<i>S. senegalensis cambayensis</i> (Gmelin) Indian Little Brown or Senegal Dove	+	+	+	-	-	+	+	-
<i>Chalcophaps i. indica</i> (Linnaeus), Indian Emerald Dove	+	-	+	-	-	-	-	-
ORDER : PSITTACIFORMES								
<i>Psittacula eupatria nipalensis</i> (Hodgson), Large Indian Parakeet	+	-	+	-	-	-	-	-
<i>P. krameri borealis</i> (Neumann), Northern Roseringed Parakeet	+	-	+	-	-	-	-	-
<i>P. k. manillensis</i> (Bechstein), Roseringed Parakeet	-	-	-	-	-	-	-	+
<i>P. alexandri fusciata</i> (PLS Muller), Indian Redbreasted Parakeet	+	-	+	-	-	-	-	-
<i>P. cyanocephala bengalensis</i> (Forster), Northern Blossomheaded Parakeet	+	+	+	-		+	+	+
<i>P. himalayana</i> (Lesson), Himalayan Slatyheaded Parakeet	+		+			+	+	+
<i>Loriculus beryllinus</i> (J R Forster), Ceylon Lorikeet	-	-	+	-	-	-	-	
ORDER : CUCULIFORMES								
<i>Clamator coromandus</i> (Linnaeus), Redwinged Crested Cuckoo	+	-	+	-	-	-		-
<i>C. jacobinus serratus</i> (Sparman), Pied Crested Cuckoo	+		+	-	+	-	-	-
<i>Cuculus s. sparveriodes</i> Vigors, Large Hawk- Cuckoo	+	-	+	-	-	+	-	-
<i>Cuculus v. varians</i> Vahl, Common Hawk-Cuckoo or Brainfever Bird	+	+	+	-	-	-	-	-
<i>C. m. micropterus</i> Gould, Indian Cuckoo	+	-	+	-	-		+	-

	1	2	3	4	5	6	7	8
<i>C. canorus subtelephonus</i> Zarudny, Asiatic Cuckoo			-		-	+	+	-
<i>C. c. canorus</i> Linnaeus, Cuckoo	+		+	+	+	-	-	-
<i>C. s. saturatus</i> Blyth, Himalayan Cuckoo	+					+	+	
<i>C. p. poliocephalus</i> Latham, Small Cuckoo			+					
<i>Cacomantis s. sonneratii</i> (Latham), Indian Baybanded Cuckoo	+							
<i>C. merulinus passerinus</i> (Vahl), Indian Plaintive Cuckoo	+		+	-	-	-	-	
<i>Serniculus lugubris dicruroides</i> (Hodgson), Indian Drongo- Cuckoo	+		+		-	-		-
<i>Eudynamys s. scolopacea</i> (Linnaeus), Indian Koel	+	+	+			-	+	-
<i>Rhopodytes t. tritis</i> (Lesson), Large Greenbilled Malkoha			+		-	-	-	
<i>Taccocua leschenaultii sirkee</i> (JE Gray), Western Sirkeer Cuckoo	+	-	-		-	-	-	
<i>Centropus s. sinensis</i> (Stephens), Common Crow Pheasant or Coucal	+	-	+			-		
<i>C. toulou bengalensis</i> (Gmelin), Lesser Coucal	+		-	-			-	-
ORDER : STRIGIFORMES								
<i>Tyto alba stertens</i> Hartert, Indian Barn Owl	+		+					
<i>T. capensis longimembris</i> (Jerdon), Grass Owl	+							-
<i>Otus spilocephalus huttoni</i> (Hume), Western Spotted Scops Owl	+					+	+	
<i>O. scops sunia</i> (Hodgson), North Indian Scops Owl	+	-	+	-		-	-	-
<i>O. bakkamoena plumipes</i> (Hume), Punjab Collared Scops Owl	+		-			-		
<i>Bubo bubo bengalensis</i> (Franklin), Indian Great Horned or Eagle-Owl	+		+		+			
<i>B. n. nipalensis</i> Hodgson, Forest Eagle owl			+					
<i>B. zeylonensis leschenault</i> (Temminck), Brown Fish Owl			+					
<i>Glaucidium b. brodiei</i> (Burton), Collared Pygmy Owlet	+		+			+	+	
<i>G. r. radiatum</i> (Tickell), Barred Jungle Owlet	+		+					
<i>G. c. cuculoides</i> (Vigors), West Himalayan Barred Owlet	+		+			+		

	1	2	3	4	5	6	7	8
<i>Ninox scutulata lugubris</i> (Tickell), Indian Brown Hawk-Owl	+	-	+	-	-	-	-	-
<i>N. s. obscura</i> Hume, Hume's Brown Hawk-Owl				-	+	-	-	-
<i>Athene brama indica</i> (Franklin), Northern Spotted Owlet	+	+	+	-	-	-	-	-
<i>Strix leptogrammica newarensis</i> (Hodgson), Himalayan Brown Wood Owl		-	+	-	-	-	-	-
<i>S. aluco nivivola</i> (Blyth), Himalayan Wood Owl		-	+	-	-	+	-	-
<i>Asio flammeus flameus</i> (Pontoppidan), Shorteared Owl			+	-	-		-	-
ORDER : CAPRIMULGIFORMES								
<i>Caprimulgus indicus hazarae</i> Whistler & Kinnear, Himalayan Jungle Nightjar		-	+	-	-	-	-	-
<i>C. i. indicus</i> Latham, Indian Jungle Nightjar	-		+	-	-	-	-	-
<i>C. europaeus unwini</i> Hume, Hume's European Nightjar	+		-	-	-	-	-	-
<i>C. macrurus albonotatus</i> Tickell, Indian Longtailed Nightjar	+	+	+	-	-	-	-	-
<i>C. a. asiaticus</i> Latham, Indian Little Nightjar	+			-	-	-	-	-
<i>C. affinis monticola</i> Franklin, Franklin's or Allied Nightjar	+		-	-	-	-	-	-
ORDER : APODIFORMES								
<i>Collocalia unicolor</i> (Jerdon), Indian Edible-nest Swiftlet	-	-		-	+		-	-
<i>Chaetura candacuta nudipes</i> (Hodgson), Whitethroated Spinetail Swift	+						-	-
<i>C. sylvatica</i> (Tickell), Whiterumped Spinetail Swift			+		+			
<i>Apus m. melba</i> (Linnaeus), Alpine Swift	-		-			+	+	-
<i>A. m. nubifuga</i> koelz, Indian Alpine Swift	+	-	+					-
<i>A. pacificus leuconyx</i> (Blyth), Blyth's or Himalayan White-rumped Swift			+	-			-	-
<i>A. a. affinis</i> (J E Gray), Indian House Swift	+	+	+	-		+	+	-
<i>Cypsiurus parvus batasiensis</i> (JE Gray), Indian Palm Swift			+	-				-
<i>Hemiprocne Longipennis coronata</i> (Tickell), Crested Tree Swift	+		+		-		-	-

	1	2	3	4	5	6	7	8
ORDER : CORACIIFORMES								
<i>Ceryle lugubris continentalis</i> Hartert, West Himalayan Pied Kingfisher	+	+	+			+		+
<i>C. rudis leucomelanura</i> Reichenbach, Indian Pied Kingfisher	+	-	+	-		-	-	
<i>Alcedo atthis bengalensis</i> Gmelin, Indian Small Blue kingfisher	+	+	+	-	-		-	
<i>Pelargopsis c. capensis</i> (Linnaeus), Brownheaded Storkbilled Kingfisher	+	-	+			-	-	
<i>Halcyon s. smyrensis</i> (Linnaeus), Whitebreasted Kingfisher	+		-	-		-		+
<i>Halcyon smyrnensis fusca</i> (Boddaert), Indian Whitebreasted Kingfisher		+	+			+	-	
<i>Merops l. leschenaulti</i> Vieillot, Chestnutheaded Bee-eater	-	-	+	-		-		
<i>M. superciliosus persicus</i> Pallas, Bluecheeked Bee-eater	+	-	-	-	-	-	-	
<i>M. p. philipinus</i> Linnaeus, Bluetailed Bee-eater	-	-	+	-	-	-	-	
<i>M. o. orientalis</i> Latham, Indian Small Green Bee-eater	+	+	+	-	-	-	-	+
<i>Nyctyornis a. athertoni</i> (Jardine & Selby), Blue- eared Bee-eater	+	-	+	-	-		-	-
<i>Coracias b. benghalensis</i> (Linnaeus), Northern Rollar or Blue Jay	+		+	-	-		-	+
<i>Eurystomus orientalis cyanicollis</i> Vieillot Himalayan Broadbilled Roller			+	-	-		-	
<i>Upupa e. epops</i> Linnaeus, European Hoopoe	+	+	+			+	+	
<i>U. e. ceylonensis</i> Reichenbach, Ceylon Hoopoe			+	+	+			
<i>Tockus birostris</i> (Scopoli), Grey Hornbill	+		+					
<i>Aceros nipalensis</i> (Hodgson), Rufousnecked Hornbill	-		+					
<i>Anthracoceros m. malabaricus</i> (Gmelin), Indian Pied Hornbill	+		+	-				
<i>Buceros bicornis homrai</i> Hodgson, Great Pied Hornbill			+					

	1	2	3	4	5	6	7	8
ORDER : PICIFORMES								
<i>Megalaima virens marshallorum</i> Swinhoe, Himalayan Great Barbet	+		+	+	+	+	+	-
<i>M. zeylanica caniceps</i> (Franklin), Northern Green Barbet	+		+		-	-	-	+
<i>M. a. asiatica</i> (Latham), Bluethroated Barbet	+	+	+		-	-	-	-
<i>M. haemacephala indica</i> (Latham), Crimson- breasted Barbet or Coppersmith	+		+		-		-	+
<i>Indicator xanthonotus radecliffi</i> Hume, West Pakistan Orangerumped Honeyguide					+		-	-
<i>Jynx t. torquilla</i> Linnacus, European Wryneck			+				-	-
<i>Sasia o. ochracea</i> Hodgson, Himalayan Rufous Piculet	-		+		-	-	-	-
<i>Micropternus brachyurus humei</i> Kloss, Western Rufous Woodpecker	+	-	-	-		-	-	-
<i>Picus s. squamatus</i> Vigors, Himalayan Scalybellied Green Woodpecker	+	-	+	+	+	+	+	-
<i>P. myrmecophoneus</i> Stressmann, Little Scally- bellied Green Woodpecker	+		+				-	+
<i>P. canus sanguiniceps</i> Backer, Indian Blacknaped Green Woodpecker			+				-	+
<i>P. flavinucha kumaonensis</i> (Koelz), Kumaon Large Yellownaped Woodpecker	+	-	+			-	-	-
<i>P. chlorolophus simlae</i> Meinertzhagen, West Himalayan Small Yellownaped Woodpecker	+		+				-	-
<i>Dinopium benghalense dilutum</i> (Blyth), Sindh Goldenbacked Woodpecker	+		+				-	-
<i>D. b. benghalense</i> (Linnacus), Northern Goldenbacked Woodpecker							-	+
<i>D. s. shorii</i> (Vigors), Himalayan Goldenbacked Threetoed Woodpecker			+				-	-
<i>Mulleripicus pulverulentus mohun</i> Ripley, Nepal Great Slaty Woodpecker			+	-			-	-
<i>Hypopicus hyperythrus marshalli</i> (Hartert), Western Rufousbellied Woodpecker	+		+				-	-

	1	2	3	4	5	6	7	8
<i>Picoides h. himalayensis</i> (Jardine & Selby), Garhwal Pied Woodpecker	+	-	+	+	+	-	+	+
<i>P. a. auriceps</i> (Vigors), West Himalayan Brown- fronted Pied Woodpecker	+		+			+	+	
<i>P. m. macei</i> (Vieillot), Indian Fulvousbreasted Pied Woodpecker	-		+					
<i>P.m. mahrattensis</i> (Latham), Yellowfronted Pied or Mahratta Woodpecker		-	+	-	-	-	+	-
<i>P. canicapillus mitchellii</i> (Malherbe), West Himalayan Greycrowned Pygmy Woodpecker	+	-	-	-	-			+
<i>P. n. nanus</i> (Vigors), Northern browncrowned Pygmy Woodpecker	+		+					
<i>Chrysocolaptes lucidus sultaneus</i> (Hodgson) West Himalayan Larger Goldenbacked Woodpecker	+		+					
ORDER : PASSERIFORMES								
<i>Pitta b. brachyura</i> (Linnaeus), Indian Pitta	-	-	+	-	-	-		
<i>P. sordida cucullata</i> Hartlaub, Hooded or Green- breasted Pitta	-	-	+	-				-
<i>Mirafra javanica cantillans</i> Blyth, Singing Bush Lark -			+					
<i>Eremopterix grisea</i> (Scopoli), Ashycrowned Finch Lark			+		-			
<i>Calandrella cinera dukhunensis</i> (Sykes), Rufous Short-toed Lark			+	-	+			
<i>Galerida cristata chendoola</i> (Franklin), Indian Crested Lark	-		+			-	-	
<i>Alauda gulgula lhamarum</i> R. & A. Meinertzhagen, Kashmir Small Skylark			+					+
<i>Hirundo rupestris</i> Scopoli, Crag Martin			+					
<i>H. c. concolor</i> Sykes, Dusky Crag Martin	-	-	+					
<i>H. r. rustica</i> Linnaeus, Western Swallow			+					
<i>H. smithii filifera</i> Stephens, Indian Wiretailed Swallow			+					
<i>H. fluvicola</i> Blyth, Indian Cliff Swallow		-	+					
<i>H. daurica nipalensis</i> Hodgson, Himalayan Striated or Redrumped Swallow		+	+				+	

	1	2	3	4	5	6	7	8
<i>H. d. erythropygia</i> Sykes, Indian Striated or Redrumped Swallow	-		+	-	-	-	-	-
<i>Delichon urbica cashmeriensis</i> (Gould), Kashmir House Martin				-	+	-	+	-
<i>D. n. nipalensis</i> Moore, Nepal House Martin					+		-	-
<i>Lanius excubitor lahtora</i> (Sykes), Indian Grey Shrike			+				-	-
<i>L. v. vittatus</i> Valenciennes, Indian Baybacked Shrike	-	-	+	-		-	-	-
<i>L. t. tephronotus</i> (Vigors), Eastern Tibet Grey-backed Shrike	-	-	-	-	+	-	-	-
<i>L. schach erythronotus</i> (Vigors), Rufousbacked Shrike	-	+	+	+	+	-	-	+
<i>Oriolus oriolus kundoo</i> Sykes, Indian Golden Oriole	-	+	+	+	+	-	+	-
<i>O. x. xanthornus</i> (Linnaeus), North Indian Blackheaded Oriole	-		+	-	-	-	-	-
<i>O. t. traillii</i> (Vigors), Indian Maroon Oriole	+	-	-		+	-	-	-
<i>Dicrurus adsimilis albirictus</i> (Hodgson), North Indian Black Drongo	-	+	+		-	+	+	+
<i>D. leucophaeus longicaudatus</i> Hay, Indian Grey Drongo		-	-		+	+	+	-
<i>D. c. caerulesces</i> (Linnaeus), Indian White-bellied Drongo			+				-	-
<i>D. a. aeneus</i> Vieillot, Bronzed Drongo	-	-	+	-	-	-	-	-
<i>D. remifer tectirostris</i> (Hodgson), Lesser Racket-tailed Drongo	-	-	-	-	-	-	-	+
<i>D. h. hottentottus</i> (Linnaeus), Haircrested or Spangled Drongo	-	-	+	-	+	-	-	-
<i>Artamus fuscus</i> Vieillot, Ashy Swallow-Shrike	-	-	+	-	-	-	-	-
<i>Surnus m. malabaricus</i> (Gmelin), Greyheaded Myna		+	+	-	-	-	-	-
<i>S. pagodarum</i> (Gmelin), Blackheaded or Brahminy Myna	-	+	+	-	-	-	-	-
<i>S. vulgaris poltaratskyi</i> , Finch, Common Indian Starling	-	-	+	-	-	-	-	-

	1	2	3	4	5	6	7	8
<i>S. c. contra</i> Linnacus, Indian Pied Myna	+	-	+	-	-	-	-	-
<i>Acridotheres t. tristis</i> (Linnaeus), Indian Myna	+	+	+	+	+	+	+	+
<i>A. ginginianus</i> (Latham), Bank Myna	-	-	+	-	-	-	-	-
<i>A. f. fuscus</i> (Wagler), Northern Jungle Myna	+	+	+	-	-	-	+	+
<i>Garrulus glandarius bispecularis</i> Vigors, West Himalayan Redcrowned Jay	-	-	-	-	-	+	+	-
<i>G. lanceolatus</i> Vigors, Blackthroated Jay	-	-	+	-	-	+	+	+
<i>Cissa flavirostris cucullata</i> (Gould), Western Yellowbilled Blue Magpie	-	-	+	-	-	-	+	
<i>Cissa erythrorhyncha occipitalis</i> (Blyth), Himalayan Redbilled Blue Magpie	-	+	+	-	-	+	+	+
<i>Dendrocitta vagabunda bristoli</i> Paynter, North-Western Tree Pie	-	-	+	-	-	-	-	-
<i>D. v. vagabunda</i> (Latham), Northeastern Tree Pie			+					
<i>D. formosae occidentalis</i> Ticehurst, West Himalayan Tree pie		+	+	-	-		-	+
<i>Nucifraga caryocataetes hemispila</i> Vigors, Himalayan Nutcracker	-	-	+	-	+	-	-	
<i>Pyrrhocorax graculus digitatus</i> Hemprich & Ehrenberg, Himalayan Yellowbilled or Alpine Chough	-	-	-	+	+	-	-	-
<i>P. pyrrhocorax centralis</i> Stresemann, West Himalayan Redbilled Chough	-	-	-	+	+	-	-	-
<i>Corvus s. splendens</i> Vieillot, Indian House Crow	+	+	+	+	+	+	+	+
<i>C. macrorhynchos intermedius</i> Adams, Himalayan Jungle Crow	+	+	+	+	+	+	+	+
<i>C. m. Culminatus</i> Sykes, Indian Jungle Crow	-	-	+	-	-	-	-	-
<i>C. corone orientalis</i> Eversmann, Eastern Carrion Crow	-	-	-	-	+	-	-	-
<i>C. corax tibetanus</i> Hodgson, Tibet Raven				-	+	-	-	-
<i>Hemipus picatus capitalis</i> (Horsfield), Brown-backed Pied Flycatcher- Shrike	-	-	-	-			+	-
<i>Tephrodornis pondicerianus pallidus</i> Ticehurst, Sind Wood Shrike	-	-	+	-	-	-	-	-
<i>Coracina novaehollandiae nipalensis</i> (Hodgson), Himalayan Large Cuckoo -Shrike	-	-	+	-	-	-	-	-

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<i>C. m. melaschistos</i> (Hodgson), Dark Grey Cuckoo Shrike	-	-	+	-	-	+	-	-
<i>Pericrocotus flammeus speciosus</i> (Latham), North Indian Sacrlot Minivet	-	-	+	-	-	-	-	-
<i>P. b. brevirostris</i> (Vigros), Shortbilled Minivet	-	-	-	-	-	+	+	-
<i>P. ethologus favillaceus</i> Bangs & Phillips, West Himalayan Longtailed Minivet	-	-	+	+	+	-	-	+
<i>P. r. roseus</i> (Vicillot), Rosy Minivet	-	-	+	-	-	-	-	-
<i>P. c. cinnamomeus</i> (Linnaeus), Southern Small Minivet	-	-	+	-	-	-	-	-
<i>Aegithina t. tiphia</i> (Linnaeus), common Iora	-	-	+	-	-	-	-	-
<i>Chloropsis a. aurifrons</i> (Temminck), Northern Goldfronted Chloropsis	-	-	+	-	-	-	-	-
<i>C. h. hardwickii</i> Jardine & Selby, Orangebellied Chloropsis			+			-	-	-
<i>Pycnonotus priocephalus</i> (Jerdon), Greyheaded Bulbul	-	-	+	-	-	-	-	-
<i>P. melanicterus flaviventris</i> (Tickell), Black Crested Yellow Bulbul	-	-	+	-	-	-	-	-
<i>P. jocosus pyrrhotis</i> (Bonaparte), Kumaon Red-wiskered Bulbul	-	-	+	-	-	-	-	-
<i>P. leucogenys leucotis</i> (Gould), White-cared Bulbul	-	-	+	-	-	-	-	-
<i>P. l. leucogenys</i> (Gray), Whitechecked Bulbul	+	+	+	+	+	+	+	+
<i>P. cafer intermedius</i> Blyth, Punjab Redvented Bulbul	+	+	+	-	-	+	-	+
<i>Hypsipetes m. mccllellandi</i> Horsfield, Rufous-bellied Bulbul	-	-	-	-	-	+	-	-
<i>H. flavalus flavalus</i> (Blyth), Bowneared Bulbul	-	+	-	-	-	-	-	-
<i>H. madagascariensis psaroides</i> Vigors, Himalayan Black Bulbul			+	+	+	+	+	-
<i>Pomatorhinus e. erythrogegens</i> Vigors, West Himalayan Rustychecked Scimitar Babbler			+		+	+	+	-
<i>Stachyris pyrrhopes</i> Blyth, Blackchinned Babbler	-	+	-	-	-	-	-	-
<i>Dumetia h. hyperythra</i> (Franklin), Rufousbellied Babbler	-	-	+	-	-	-	-	-

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<i>Chrysomma sinense hypoleucum</i> (Franklin), Western Yelloweyed Babbler	-	-	+	-	-	-	-	-
<i>Turdoides c. caudatus</i> (Dumont), Common Babbler	-	-	+	-	-	-	-	-
<i>T. s. striatus</i> (Dumont), Bengal Jungle Babbler	-	+	+	-	-	-	-	+
<i>Garrulax albogularis whistleri</i> Baker, Western Whitethroated Laughing Thrush	-	-	+	-	-	+	+	+
<i>G. s. striatus</i> (Vigors), Western Striated Laughing Thrush		-	+	-	-	+	-	-
<i>Garrulax l. leucolophus</i> (Hardwicke), Himalayan Whitecrested Laughing Thrush	-	-	+	-	-	+	-	+
<i>G. variegatus similis</i> (Hume), Western Variegated Laughing Thrush	-	-	-	-	+	-	-	-
<i>G. v. variegatus</i> (Vigors), Eastern Variegated Laughing Thrush	-	-	+	-	-	-	-	-
<i>G. rufogularis occidentalis</i> (Hartert), Western Rufouschinned Laughing Thrush	-	-	+	-	-	-	-	-
<i>G. l. lineatus</i> (Vigors), Simla Streaked Laughing Thrush	-	-	+	+	+	+	+	+
<i>G. e. erythrocephalus</i> (Vigors), Redheaded Laughing Thrush	-	-	+	+	+	+	-	-
<i>Leiothrix lutea kumaiensis</i> Whistler, Western Redbilled Leiothrix	-	-	-	-	-	+	-	-
<i>Pteruthius flaviscapis validirostris</i> Koelz, Red- winged Shrike- Babbler						+	-	-
<i>Minla strigula simlaensis</i> (Meinertzen), Western Barthroated Siva	-	-	+	-	-	-	-	-
<i>M. s. yunnanensis</i> (Rothschild), NEFA Barthroated Siva	-	-	-	-	+	+	-	-
<i>M. c. cyanouoptera</i> (Hodgson), Bluewinged Siva	-	-	-	-	-	+	-	-
<i>Yuhina gularis vivax</i> Koelz, Western Stripe- throated Yuhina		-	+	-	-	-	-	-
<i>Heterophasia c. capistrata</i> (Vigors), Western Blackcapped Sibia	-	-	+	+	+	+	+	+
<i>Musicapa latirostris</i> Raffles, Brown Flycatcher	-		-		+	+	+	-
<i>M. westermanni collini</i> Rothschild, Western Little Pied Flycatcher		-		+	+	-		-

	1	2	3	4	5	6	7	8
<i>M. s. superciliaris</i> Jerdon, Whitebrowed Blue Flycatcher	-	-	-	-	-	+	+	-
<i>M. l. leucomelanura</i> (Hodgson), Western Slaty Blue Flycatcher	-	-	+	-	+	-	+	+
<i>M. m. macgrigoriae</i> (Burton), Western Small Niltava	-	-	-	-	-	-	-	+
<i>M. sundara whistleri</i> (Ticehurst), Western Rufousbellied Niltava	-		+	+	+	+	-	-
<i>M. t. ticklliae</i> (Blyth), Tickell's Redbreasted Blue Flycatcher	-	-	+	-	-	-	-	-
<i>M. t. thalassina</i> Swainson, Verditer Flycatcher	+	+	+	+	+	+	+	+
<i>Culicicapa ceylonensis calochrysea</i> Oberholser, Northern Greyheaded Flycatcher	-	-	+	-	-	+	-	-
<i>Rhipidura hypoxantha</i> Blyth, Yellowbellied Faintail Flycatcher			+	-	+	+	-	-
<i>R. a. aureola</i> Lesson, Northern Whitebrowed Faintail Flycatcher			+					+
<i>R. albicollis canescens</i> (Koelz), Western White-throated Faintail Flycatcher	-	+	+	+	+		-	+
<i>Terpsiphone paradisi leucogaster</i> (Swainson), West Himalayan Paradise Flycatcher	+	+	+	-	-		-	-
<i>Prinia subflava terricolor</i> (Hume), Northwestern Plain Wren- Warbler	-	-	+		-		-	-
<i>P. socialis stewarti</i> Blyth, Northern Ashy Wren-Warbler		-	+	-	-	-	-	-
<i>P. sylvatica gangetica</i> (Blyth), Gangetic Jungle Wren-Warbler	-	-	+	-	-		-	-
<i>P. c. criniger</i> Hodgson, Himalayan Brown Hill Warbler	-			-	-	+		-
<i>Orthotomus sutorius guzuratus</i> (Latham), Indian Tailor Bird	-	-	+	-	-	-	-	-
<i>Phylloscopus a. affinis</i> (Tickell), Tickell's Leaf Warbler	-	+	-	-	+	-	-	-
<i>P. f. fuligiventer</i> (Hodgson), Smoky Leaf Warbler					+			-
<i>P. inornatus humei</i> (Brooks), Hume's Yellow-browed Leaf Warbler				-		+		-
<i>P. proregulus simlaensis</i> Ticehurst Western Pallas's Leaf Warbler	-	+	-	-	-	-	-	-

	1	2	3	4	5	6	7	8
<i>P. maculipennis virens</i> Ticehurst, Western Grey-faced Leaf Warbler	+	-	-	-	-	-	-	-
<i>P. trochiloides viridanus</i> Blyth, Western Greenish Leaf Warbler	-	-	-	+	+	+	-	-
<i>P. o. occipitalis</i> (Blyth), Large Crowned Leaf Warbler	-	-	-	+	+	+	-	-
<i>Seicercus xanthoschistos albosuperciliaris</i> (Jerdon), Western Greyheaded Flycatcher Warbler	-	-	-		+	+	+	+
<i>R. regulus himalayensis</i> Bonaparte, Himalayan Goldeneye				+	+			-
<i>Erithacus s. svecicus</i> (Linnaeus), Northern Bluethroat	-		+		-			
<i>E. p. pectoralis</i> (Gould), West Himalayan Rubythroat		-	+	+	+		-	+
<i>E. cyanurus pallidior</i> (Baker), Kashmir Red-flanked Bush Robin	-	-	+	-	+	+	-	
<i>E. chrysaeus whistleri</i> (Ticehurst), Western Golden Bush Robin	-	-			+			
<i>E. indicus indicus</i> (Vicillot), Whitebrowed Bush Robin	-	+	-		-		-	
<i>Copsychus s. saularis</i> (Linnaeus), Indian Magpie-Robin	-	+	+	+	+	-	+	
<i>Phoenicurus erythronotus</i> (Eversmann), Eversmann's Redstart		-	+	-			-	
<i>P. caeurleocephalus</i> (Vigors), Blueheaded Redstart		-	+	-	+			-
<i>P. ochruros phoenicuroides</i> (Moore), Kashmir Black Redstart			+					
<i>P. o. rufiventris</i> (Vicillot), Eastern Black Redstart		-	-		+	-		
<i>P. frontalis</i> (Vigors), Bluefronted Redstart	-		+	+	+	+		
<i>P. erythrogaster grandis</i> (Gould), Guldenstadt's Redstart		-			+			-
<i>Rhyacornis f. fuliginosus</i> (Vigors), Plumbeous Redstart	+	-	+	+	+	+	+	+
<i>Hogsonius p. phoenicuroides</i> (Gray), Hodgson's Shortwing or Whitebellied Redstart			+	-	+			
<i>Enicurus s. scouleri</i> Vigors, Little Forktail			+	+	+	-	-	
<i>E. schistaceus</i> (Hodgson), Slatybacked Forktail			+		-	-		

	1	2	3	4	5	6	7	8
<i>E. m. maculatus</i> Vigors, Western Spotted Forktail	+	+	+	+	+	+	+	+
<i>Saxicola torquata przewalskii</i> (Pleske), Tibetan Collared Bush Chat	-	-	+	-	+	-	-	-
<i>S. t. indica</i> (Blyth), Indian Collared Bush Chat			+		-	+	+	-
<i>S. caprata bicolor</i> Sykes, Northern Pied Bush Chat	+	+	+	+	+	+	+	+
<i>S. ferra</i> Gray, Dark-grey Bush Chat	-	-	+	-	+	+	+	-
<i>Chaimarrornis leucocephalus</i> (Vigors), Whitecapped Redstart or River Chat	+	-	+	+	+	+	+	+
<i>Saxicoloides fulicata cambaiensis</i> (Latham), Brown-backed Indian Robin	-	+	+	-	-	-	-	-
<i>S. f. fulicata</i> (Linnaeus), Blackbacked Indian Robin	-	-	+	-	-	-	-	-
<i>Monticola cinclorhynchus</i> (Vigors), Blueheaded Rock Thrush	-		-	-	-	+	+	-
<i>M. rufiventris</i> (Jardine & Selby), Chestnutbellied Rock Thrush	-	-	-	+	+	+	-	-
<i>M. solitarius pandoo</i> (Sykes), Indian Blue Rock Thrush		+	+	-	+	-	+	-
<i>Myiophonus caeruleus temminckii</i> (Vigors), Himalayan Whistling Thrush	+	+	+	+	+	+	+	+
<i>Zoothera wardii</i> (Blyth), Pied Ground Thrush					+		-	-
<i>Z. c. citrina</i> (Latham), Orangeheaded Ground Thrush			+		-		-	-
<i>Z. mollissima whiteheadi</i> (Baker), Western Plain-backed Mountain Thrush	-	-	+		+	-	-	-
<i>Z. d. dauma</i> (Latham), Smallbilled Mountain Thrush		-	-	-	-	+	+	-
<i>Turdus albocinctus</i> Royle, Whitecollared Blackbird	-		+	+	+	+	-	-
<i>T. bouboul</i> (Latham), Greywinged Blackbird			+		+	+	+	+
<i>T. merula maximus</i> (Scebohm), Tibetan Blackbird	-		-		+	-	-	-
<i>T. r. rubrocanus</i> G. R. Gray, Western Greyheaded Thrush			+	+	+	+	-	-
<i>T. ruficollis atrogularis</i> Jarocki, Blackthroated Thrush		-	+		-	+	-	-
<i>T. viscivorus bonapartei</i> Cabanis, Missel Thrush	-		+	-	-	+	+	-

	1	2	3	4	5	6	7	8
<i>Troglodytes troglodytes neglectus</i> Brooks, Kashmir Wren	-	-	+	-	-	+	+	-
<i>T. t. nipalensis</i> Blyth, Nepal Wren			+		+	-	-	-
<i>Cinclus pallasii tenuirostris</i> Bonaparte, West Himalayan Brown Dipper		+	+	+	+			+
<i>Prunella collaris whymeri</i> (Baker), Garhwal Alpine Accentor	-	-	-	+	+	-	-	-
<i>P. strophciata jerdoni</i> (Brooks), Western Rufous breasted Accentor	-	-	-	+	+	-	-	-
<i>P. a. atrogularis</i> (Brandt) Ural Blackthroated Accentor	-	-	-	-	+	-	-	-
<i>P. immaculata</i> (Hodgson), Maroonbacked Accentor	-	-	-	-	+	-	-	-
<i>Parus major caschmirensis</i> Hartert, Kashmir Grey Tit	-	-	-	-	-	-	+	-
<i>P. m. nipalensis</i> Hodgson, Nepal Grey Tit	-	+	+	+	+	-	-	-
<i>P. m. tibetanus</i> Hartert, Tibet Grey Tit	-	-	+	-	-	-	-	-
<i>P. m. monticolus</i> Vigors, Greenbacked Tit	-	-	+	-	+	+	+	-
<i>P. melanocephalus</i> Vigors, Crested Black Tit			+	+	+	+	-	+
<i>P. rubidiventris rufonuchalis</i> Blyth, Simla Black Tit			-	+	+	-		+
<i>P. dichrous kangrae</i> (Whistler), Western Brown Crested Tit	-	-	-	-	+	+	-	-
<i>P. x. xanthogenys</i> Vigors, Northern Yellow-checked Tit	-	-	+	-	-	-	+	+
<i>P. s. spilonous</i> Bonaparte, Himalayan Black spotted Yellow Tit	-	-	-	-	-	-	-	+
<i>Sylviparus modestus simlaensis</i> Baker, Simla Yellowbrowed Tit	-	-	-	+	+	-	-	
<i>Aegithalos concinnus iredalei</i> (Baker), Western Redheaded tit		-	+	-	+	+	+	-
<i>Sitta castanea almorae</i> Kinncar & Whistler Western Chestnutbellied Nuthatch	-	-	+		-		-	-
<i>Sitta l. leucopis</i> Gould, Western Whitechecked Nuthatch		-	+		+	-		
<i>S. l. himalayensis</i> Jardine & Selby, Himalayan Whitetailed Nuthatch					-	+		

	1	2	3	4	5	6	7	8
<i>S. f. fontalis</i> Swainson, Velvetfronted Nuthatch		-	+			-	+	-
<i>Tichodroma muraria nepalensis</i> Bonaparte, Wall Creeper			+	+	+		-	+
<i>Certhia familiaris hodgsoni</i> Brooks, Kashmir Tree Creeper			-		+	-	-	-
<i>C. himalayana limes</i> Meinertzhagen, West Himalayan Tree Creeper	-	-	-	+	+	+	-	-
<i>C. h. himalayana</i> Vigors, Himalayan Tree Creeper	-	-	+	+	+	-	+	+
<i>Anthus h. hodgsoni</i> Richmond, Indian Tree Pipit	-	-	-	-	+	+	-	-
<i>A. novaeseelandiae waitei</i> Whistler, Northwestern Paddyfield Pipit	-		-	-	-	-	-	+
<i>A. similis jerdoni</i> Finch, Brown Rock Pipit	-	-	-	-	-	+	-	-
<i>A. sylvanus</i> (Hodgson), Upland Pipit	-	+	-	-	-	-	-	-
<i>Motacilla flava beema</i> (Skyles), Blueheaded Yellow Wagtail	-	-	+	-	-	-	-	+
<i>M. c. citreola</i> Pallas, Northern Yellowheaded Wagtail			+	-	-	-	-	-
<i>M. c. werae</i> (Buturlin), Western Yellowheaded Wagtail			+			-	-	-
<i>M. c. caspica</i> (Gmelin), Grey Wagtail	+		+	-	-	+	-	+
<i>M. alba dukhunensis</i> Sykes, Indian White Wagtail	-	-	+	+	+	+	-	-
<i>M. a. personata</i> Gould, Masked Weagtail	-	-	+	-	-	-	-	-
<i>M. maderaspatensis</i> Gmelin, Large Pied Wagtail	-	+	+	-	-	-	-	-
<i>Dicaeum a. agile</i> (Tickell), Indian Thickbilled Flowerpecker		-	+	-	-	-	-	-
<i>D. e. erythrorhynchos</i> (Latham), Tickell's Flowerpecker	-	-	+		-	-	-	-
<i>D. i. ignipectus</i> (Blyth), Firebreasted Flowerpecker	-	-	+	-	-	-	-	-
<i>Nyctarinia a. asiatica</i> (Latham), Indian Purple Sunbird	+	+	+	-	-	+	+	-
<i>Aethopyga g. gouldiae</i> (Vigors), Mrs Gould's Sunbird	-	-	+	-	-	-	-	-
<i>A. nipalensis horsfieldi</i> (Blyth), Western Yellow-backed Sunbird			-	-	-	+	-	-

	1	2	3	4	5	6	7	8
<i>A. siparaja seheriae</i> (Tickell), Indian Yellowbacked Sunbird	-	-	+	-	-	-	-	-
<i>A. i. ignicauda</i> (Hodgson), Firetailed Yellowbacked Sunbird	-	-	+	-	-	-	-	-
<i>Zosterops p. palpebrosa</i> (Temminck), Indian White-eye	+	+	+	-	-	+	+	+
<i>Passer domesticus indicus</i> Jardine & Selby Indian House Sparrow	+	+	+	+	+	+	+	+
<i>P. montanus tibetanus</i> Baker, Tibetan Tree Sparrow	-	-	-	-	-	-	-	+
<i>P. rutilans cinnamomeus</i> (Gould), Himalayan Cinnamon Tree Sparrow	-	-	+	-	-	+	+	-
<i>Petronia x. xanthocollis</i> (Burton), Indian Yellow-throated Sparrow	-	-	-	-	-	-	+	-
<i>Ploceus p. philippinus</i> (Linnaeus), Indian Baya			+			-	-	-
<i>P. m. megarhynchus</i> Hume, Finn's Baya	-	-	+	-	-	-	-	-
<i>P. benghalensis</i> (Linnaeus), Blackthroated Weaver Bird	-	-	+	-	-	-	-	-
<i>P. manyar flaviceps</i> Lesson, Indian Streaked Weaver Bird	-	-	+	-	-	-	-	-
<i>Estrilda a. amandava</i> (Linnaeus), Red Munia or Avadavat	-	-	+	-	-	-	-	-
<i>Lonchura m. malabarica</i> (Linnaeus), Whitethroated Munia	-	-	+	-	-	-	-	-
<i>L. striata acuticauda</i> (Hodgson), Whitebacked Munia	-	+	-	-	-	-	-	-
<i>L. p. punctulata</i> (Linnaeus), Indian Spotted Munia	-	-	+	-	-	-	-	-
<i>L. malacca rubroniger</i> (Hodgson), Nepal Black-headed Munia	-	-	+	-	-	-	-	-
<i>Mycerobas icterioides</i> (Vigors), Black-and-yellow Grosbeak	-	-	-	-	-	+	-	-
<i>M. affinis</i> (Blyth), Allied Grosbeak		-	+	+	+		-	
<i>M. c. carnipes</i> (Hodgson), Himalayan Whitewinged Grosbeak	-	-	-	-	+	-	-	-
<i>M. melanozanthos</i> (Hodgson), Spottedwinged Grosbeak	-	-	-	-	-	+		-
<i>Carduelis carduelis caniceps</i> Vigors, Greyheaded Goldfinch		-	-	-	-	+	-	-

	1	2	3	4	5	6	7	8
<i>Carduelis s. spinoides</i> Vigors, Himalayan Greenfinch			+	+	+	+	+	+
<i>Callacanthis burtoni</i> (Gould), Redbrowed Finch			-	-	-	+	-	-
<i>Leucosticte nemoricola altaica</i> (Eversmann), Western Plaincoloured Mountain Finch	-		+	-	+	-	-	-
<i>Carpodacus erythrinus roseatus</i> (Blyth), Indian Rosefinch	+	-	+	+	+	+	+	+
<i>C. e. erythrinus</i> (Pallas), Common Rosefinch		+	-	+	+		-	+
<i>C. nipalensis Kangrae</i> (Whistler), Garhwal Dark Rosefinch			+	-		-	-	-
<i>C. n. nipalensis</i> (Hodgson), Nepal Dark Rosefinch			-	-	+	-	-	
<i>C. rhodochrous</i> (Vigors), Pinkbrowed Rosefinch	-		+		+	+	-	
<i>C. p. pulcherrimus</i> (Moore), Himalayan Beautiful Rosefinch	-		+	-	-		-	-
<i>C. rubicilloides lucifer</i> R. & A. Meinertzhagen Eastern Great Rosefinch					+		-	-
<i>C. puniceus humii</i> (Sharpe), Western Redbreasted Rosefinch				+	+			
<i>Pyrrhoptectes epauletta</i> (Hodgson), Goldheaded Black Finch	-	+			-	-	-	-
<i>Pyrrhula erythrocephala</i> Vigors, Redheaded Bullfinch			+	+	+		-	
<i>P. aurantiaca</i> Gould, Orange Bullfinch			+		+			
<i>Emberiza l. leucocephala</i> S. G. Gmelin, Pine Bunting			+	+	+			
<i>E. cia stracheyi</i> Moore, Himalayan Rock Bunting			+	+	+	+		
<i>E. c. khamensis</i> Sushkin, Tibetan Rock Bunting	-	-	-	-	+	-	-	
<i>E. fucata arcuata</i> Sharpe, Indian Greyheaded Bunting	-	-	-	-	+		-	-
<i>Melophus lathamii</i> (Gray), Crested Bunting		+	+	+	+			

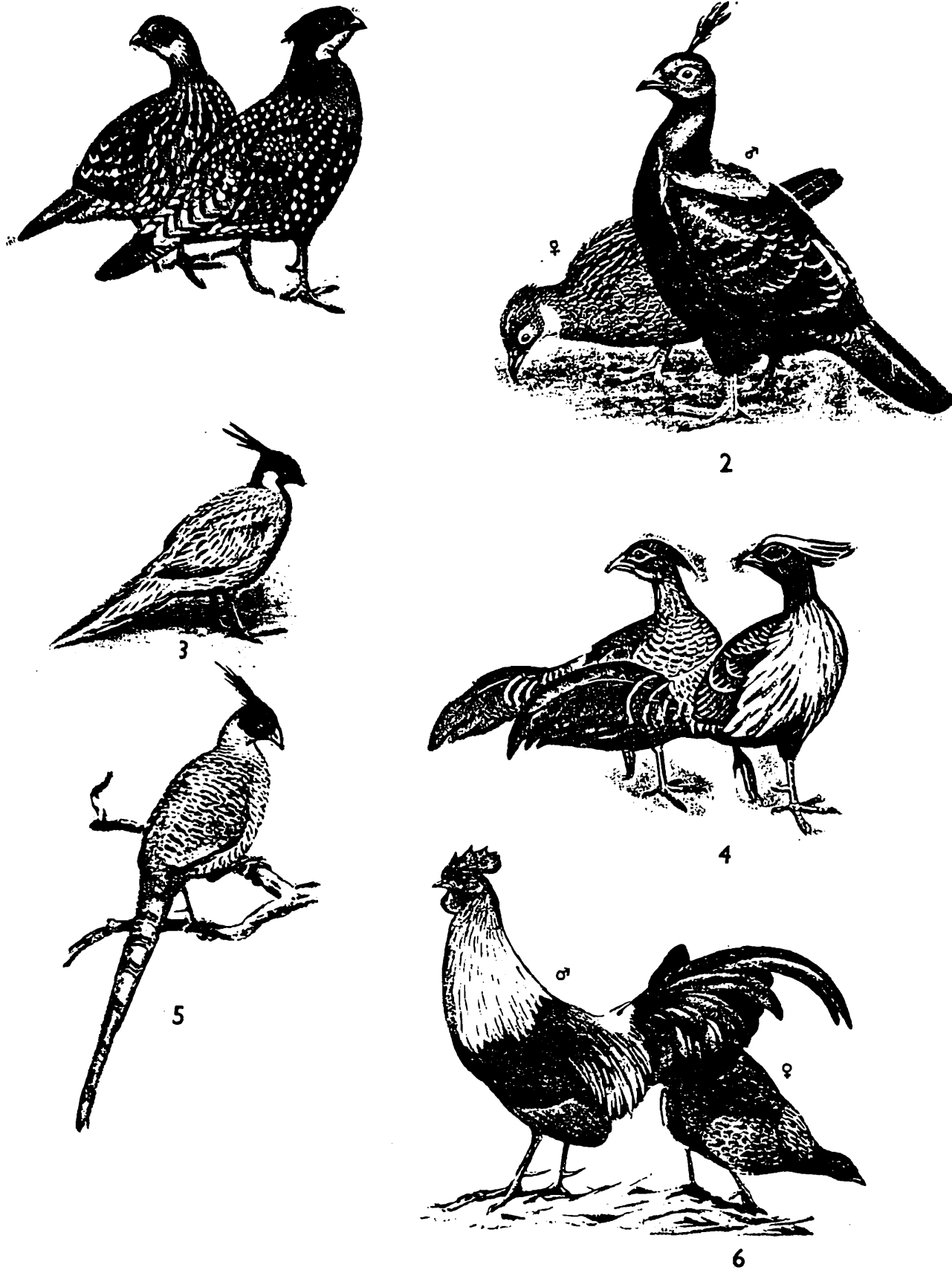


Fig. 1. Western Tragopan, *Tragopan melanocephalus*. Fig. 2. Impeyan or Monal Pheasant, *Lophophorus impejanus*. Fig. 3. Koklas Pheasant, *Pucracia macrolopha*. Fig. 4. Kalij Pheasant, *Lophura leucomelana*. Fig. 5. Chir Pheasant, *Catreus wallichii* Fig. 6. Red Junglefowl, *Gallus gallus*.

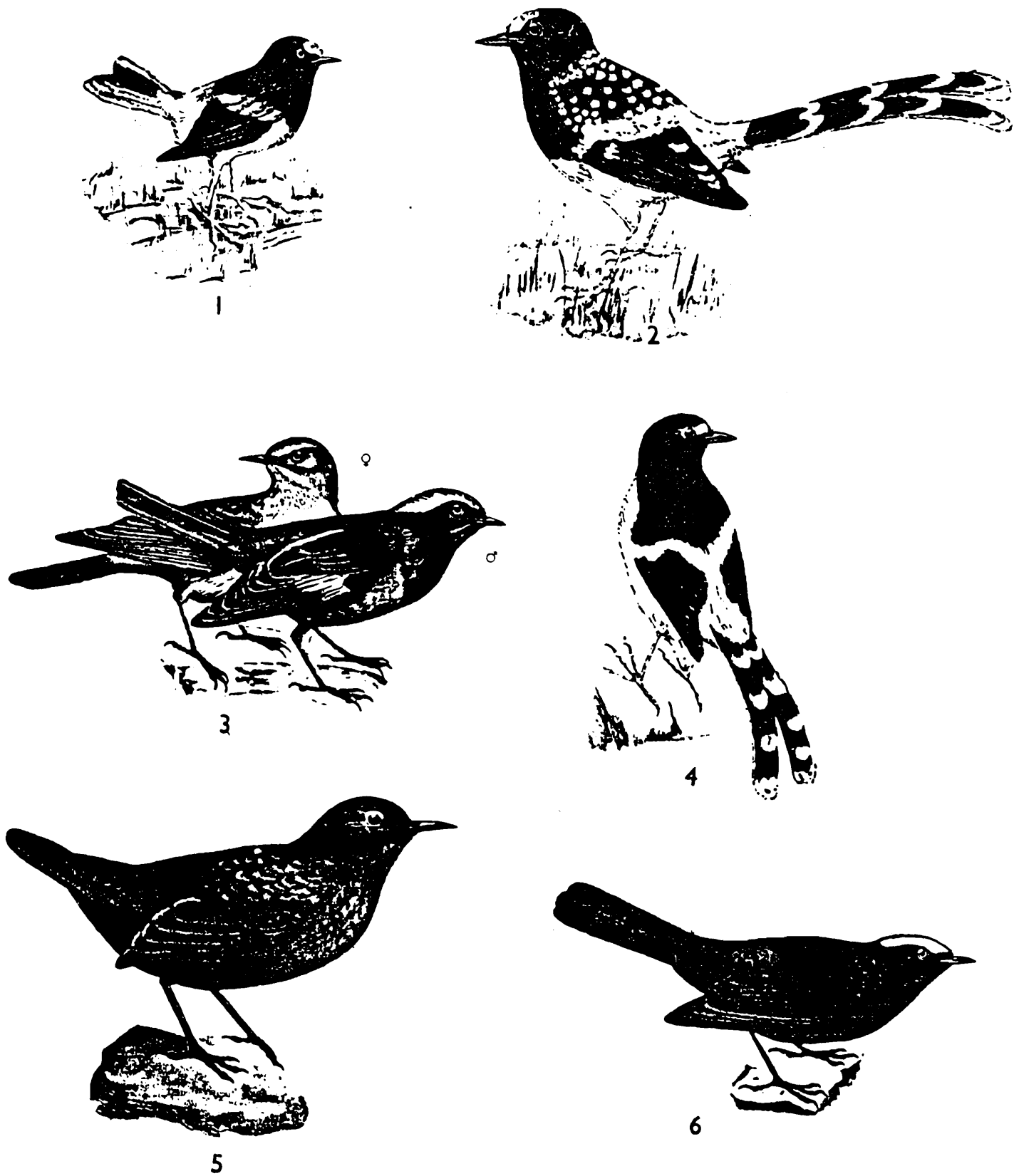
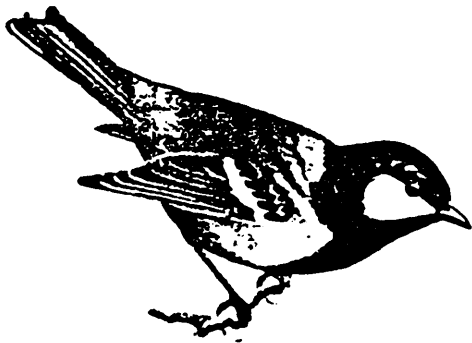


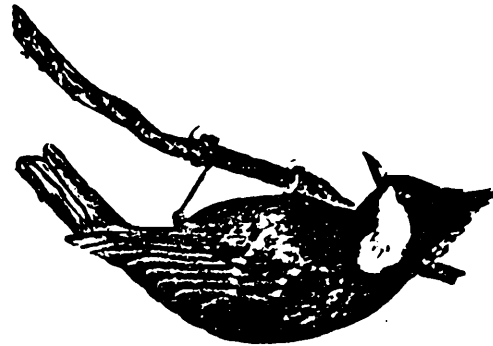
Fig. 1. Little Forktail, *Enicurus scouleri*. Fig. 2. Spotted Forktail, *Enicurus maculatus*. Fig. 3. Guldenstadt's Redstart, *Phoenicurus erythrogaster*. Fig. 4. Black-backed Forktail, *Enicurus immaculatus*. Fig. 5. Brown Dipper, *Cinclus pallasii*. Fig. 6. White-capped River Chat, *Chaimarrornis leucocéphalus*.



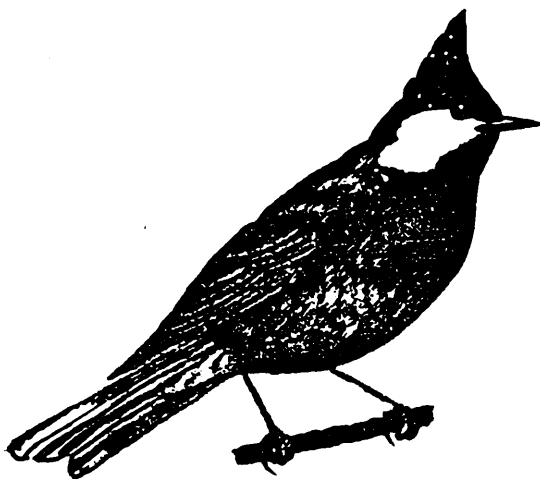
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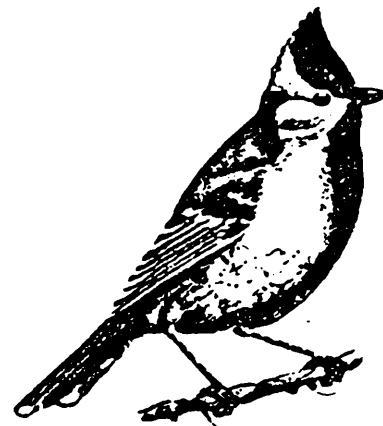
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Fig. 1. Crested Brown Tit, *Parus dichrous*. Fig. 2. Gray Tit, *Parus major*. Fig. 3. Green-backed Tit, *Parus monticolus*. Fig. 4. Spot-winged Black Tit, *Parus melanocephalus*. Fig. 5. Simla Black Tit, *Parus rufonuchalis*. Fig. 6. Yellow Cheeked Tit, *Parus spilonotus*.

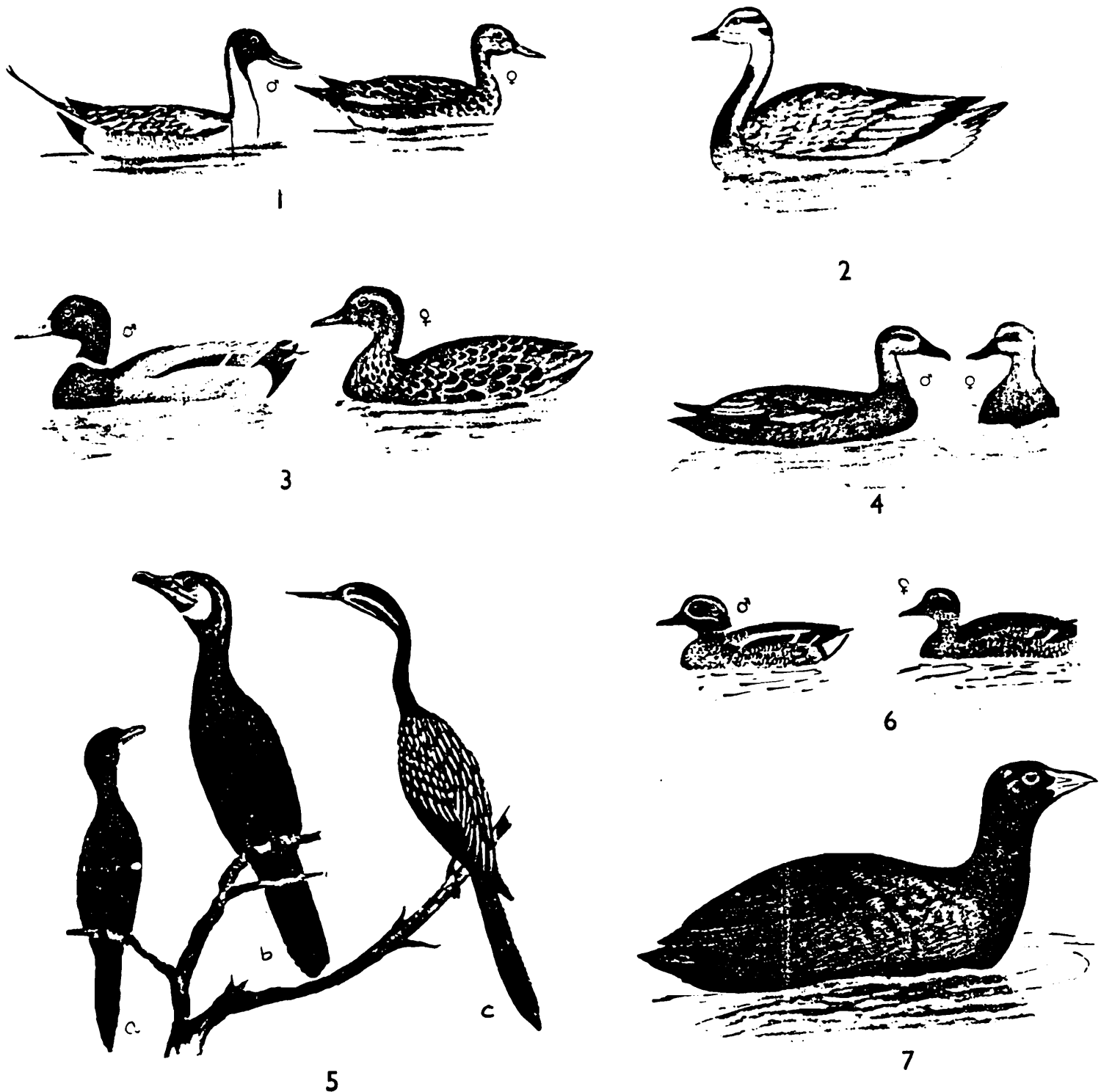


Fig. 1. Pintail, *Anas acuta*. Fig. 2. Bar-headed Goose, *Anser indicus*. Fig. 3. Mallard, *Anas platyrhynchos*. Fig. 4. Ruddy Shelduck, *Tadorna ferruginea*. Fig. 5a. Little Cormorant, *Phalacrocorax niger*. Fig. 5b. Large Cormorant, *Phalacrocorax c*. Fig. 5c. Darter, *Anhinga rufa*. Fig. 6. Common Teal, *Anas crecca*. Fig. 7. Coot, *Fulica atra*.

R E F E R E N C E S

- ALI, SALIM and RIPLEY, S.D. 1983. *A Pictorial Guide to the Birds of the Indian Subcontinent*. Bombay natural History Society, Oxford University Press, Delhi : 177 pp., 106 pls.
- ALI, SALIM and RIPLEY, S.D. 1968-78. *Handbook of the birds of India and Pakistan*, Vols. 1-10. Oxford University Press, Bombay.
- BAKER, E.C. STUART, 1922-31. *Fauna of British India : Birds* Vols. 1-8., Taylor and Francis, London.
- BHATNAGAR, R.K. and MISRA, P. 1971. Revised synopsis of birds of Dehra Dun and adjacent hills - pt. I. (Podicipediformes to Charadriiformes). *Chetel*, Dehra Dun, 14 (2): 41-56.
- BHATNAGAR, R.K. and MISRA, P. 1972. Revised synopsis of birds of Dehra Dun and adjacent hills pt. II. (Columbiformes to Piciformes). *Chetel*, Dehra Dun, 14 (4) : 40-53.
- BRIGGS, F.S. 1931. Birds observed in the neighbourhood of Ranikhet. *J. Bombay nat. Hist. Soc.*, Bombay, 34 : 1072-1079.
- HUDSON, C. 1930. A list of some birds of the seven hills of Naini Tal, U.P. *J. Bombay nat. Hist. Soc.*, Bombay, 34 : 821-827.
- JERDON, T.C. 1862-64. *The Birds of India*. Vols. 1-2 (3 parts) (Published by the author, Calcutta).
- KUMAR, G.1985. In Final Report : National Resources Data Mgmt. System : A DST's subproject II. Wadia Institute of Himalayan Geology, Dehra Dun, Birds on 97-103.
- LAMBA, B.S. 1987a. Fauna of Nanda Devi National Park (Mammals and Birds). Zoological Survey of India. *Fauna of Conservation Area*, 1: i-v + 36 pp., I-XIV pls.
- LAMBA, B.S. 1987b. Fauna of Corbett National Park (Mammals, Birds and Reptiles). Zoological Survey of India. *Fauna of Conservation Areas*, 2 : i-v+86 pp., 14 pls.
- LAVKUMAR, K.S. 1956. A contribution to the ornithology of Garhwal. *J. Bombay nat. Hist Soc.*, Bombay, 53 : 315-329, 2 pls.
- REED, T.M. 1979. A contribution to the ornithology of the Rishiganga valley and the Nanda Devi Sanctuary. *J. Bombay nat. Hist. Soc.*, Bombay : 76 (2) : 275-282.
- TAK, P.C. and KUMAR, G. 1987. Wildlife of Nanda Devi National Park : An Update. *Indian J. Forestry*, 10 (3) : 184-190.

MAMMALIA

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Mammals are the highest evolved group of animals and have always been a special attraction to the mankind. The mammalian fauna of India, particularly of Himalayan ecosystem is most fascinating and diverse. Mammals have adjusted themselves to survive in the varied climatical conditions of the different altitudes of Himalaya by evolving set of characters.

The mammalian fauna of Garhwal and Kumaon Divisions of Western Himalaya (Uttar Pradesh) has attracted the attention of different workers in the past. The Kumaon Division fauna has been studied in more detail among the two. Important workers, who have studied the mammalian fauna of this region are, Ellerman and Morrison- Scott (1951), Prater (1971), Atkinson (1973), Kumar and Chopra (1977), Upadhyaya (1980), Saharia (1982), Anon (1983), Chandola- Saklani *et al* (1987), Joshi (1988), Osmaston and Sale (1989), Walton (1989) and Sinha (in press).

The present list is an analysis of mammalian fauna of Western Himalaya based on observations during various extensive surveys of the area, published records on the mammals of Garhwal and Kumaon hills and the information collected from the forest department personnels and local population. In all, over 100 species belonging to 67 genera, 22 families and nine orders have been reorded from the region (Table...).

Classification has been followed after Simpson (1945).

TABLE SHOWING DISTRICTWISE DISTRIBUTION OF SPECIES

FAUNA	GARHWAL HILS					KUMAON HILLS		
	1	2	3	4	5	6	7	8
PHYLUM : CHORDATA								
CLASS : MAMMALIA								
A. Order : INSECTIVORA								
I. Family : ERINACEIDAE								
1. <i>Hemiechinus auritus</i> (Gmelin) Long-eared Hedgehog	+	-	-	-	-	-	-	-
II. Family : SORICIDAE								
2. <i>Soriculus nigrescens</i> (Gray) Sikkim Large-clawed Shrew	-	-	-	-	-	+	+	+

	1	2	3	4	5	6	7	8
3. <i>Suncus murinus</i> (Linnaeus) House Shrew	+	+	+	+	+	+	+	+
4. <i>S. etruscus</i> Savi Savi's Pygmy Shrew	+	-	-	-	-	+	+	+
5. <i>Crocidura attenuata</i> Milne-Edwards Grey Shrew		-	-	-	-	+	+	+
B. Order : CHIROPTERA								
III. Family : PTEROPIDAE								
6. <i>Rousettus leschenaulti</i> (Desmarest) Fruit Bat	+	-	-	-	+	+	+	+
7. <i>Pteropus giganteus</i> Brunich Indian Flying Fox	+	-	-	+	+	+	+	+
8. <i>Cynopterus sphinx</i> (Vahl) Short-nosed Fruit Bat	-	-	-	-	-	+	+	+
IV. Family : MEGADERMATIDAE								
9. <i>Megaderma lyra</i> Geoffroy Indian False Vampire	+	-	-	-	-	+	+	+
V. Family : RHINOLOPHIDAE								
10. <i>Rhinolophus ferrumequinum</i> (Schreber) Greater Horse-shoe Bat	+	-	-	-	-	+	+	+
11. <i>R. affinis</i> Horsfield Horse-shoe Bat	+	-	-	-	-	+	+	+
12. <i>R. thomasi</i> Anderson Horse-shoe Bat	+				-	-	-	-
13. <i>R. cornutus</i> Temminck Little Japanese Horse-shoe Bat	-	-	-	-	-	-	+	-
14. <i>R. lepidus</i> Blyth	+	-	-	-	-	+	+	+
15. <i>R. luctus</i> Temminck Great Eastern Horse-shoe Bat	+	-	-	-	-	+	+	+
16. <i>R. pearsoni</i> Horsfield Horse-shoe bat	-	-	-	-	-	+	+	+
17. <i>R. macrotis</i> Blyth large-eared Horse-shoe Bat		-	-	-	-	+	+	+
18. <i>Hippocederus cineraceus</i> Blyth Leaf-nosed Bat	+	-		-	-	-	-	-
19. <i>H. armiger</i> Hodgson Great Himalayan Leaf-nosed Bat	+		-	-	-	+	+	+

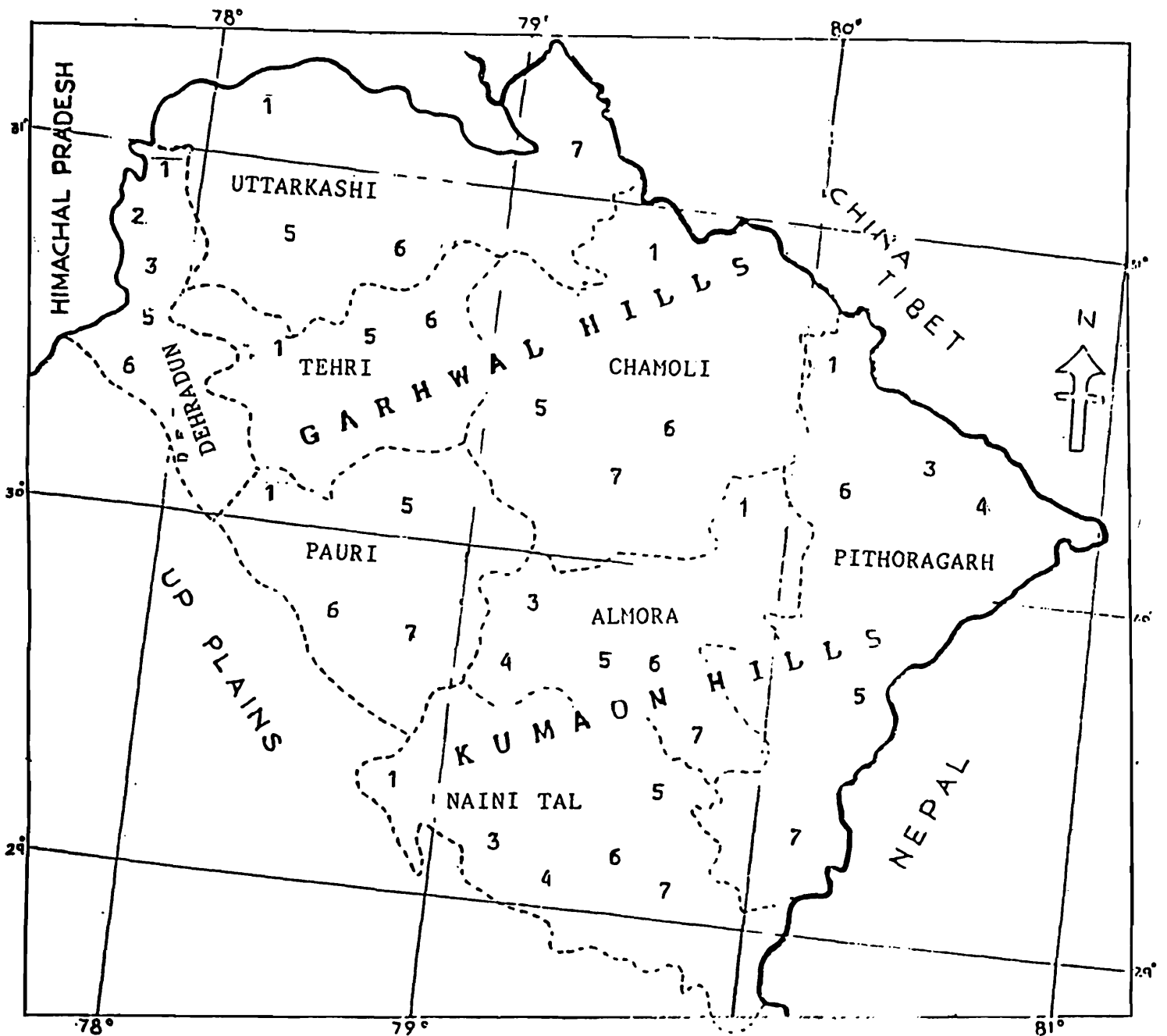
	1	2	3	4	5	6	7	8
VI. Family : VESPERTILIONIDAE								
20. <i>Myotis siligorensis</i> (Horsfield) Horsfield's Bat	-	-	-	-	-	+	+	+
21. <i>M. formosus</i> (Hodgson) Hodgson's Bat	+	-	-	-	-	+	+	+
22. <i>Nyctalus leisleri</i> (Kuhl) Lesser Noctule; Hairy-armed Bat	+	-	-	-	-	+	+	+
23. <i>Pipistrellus coromandra</i> Gray Indian Pipistrelle	+	-	-	-	-	+	+	+
24. <i>P. mimus</i> Wroughton Indian Pygmy Pipistrelle						+	+	+
25. <i>P. babu</i> Thomas Thomas's Pipistrelle	-	-	-	-	-	+	+	+
26. <i>P. mordax</i> Peters Peter's Pipistrelle	-	-	-	-	-	+	+	+
27. <i>Scotophilus temmincki</i> (Horsfield) Lesser Yellow Bat	-	-	-	-	-	+	+	+
28. <i>S. heathi</i> Horsfield Greater Yellow Bat	+	-	-	-	-	+	+	+
29. <i>Placotus aurilus</i> (Linnaeus) Long-eared Bat	-	-	-	-	-	+	+	+
30. <i>Miniopterus sehreibersi</i> (Kuhl) Schreiber's Bat, Long-winged Bat	-	-	-	-	-	+	+	+
31. <i>Murina huttoni</i> Peters Hutton's Bat	+	-	-	-	-	+	+	+
32. <i>M. grisea</i> Peters Peters' Tube-nosed Bat	+	-	-	-	-	+	+	+
C. Order : PRIMATES								
VII. Family : CERCOPITHECIDAE								
33. <i>Macaca mulatta</i> (Zimmermann) Rhesus Macaque	+	+	+	+	+	+	+	+
34. <i>Presbytis entellus</i> (Dufrense) Langur (Entellus Monkey)	+	+	+	+	+	+	+	+
D. Order : PHOLIDAE								
VIII. Family : MANIDAE								
35. <i>Manis crassicaudata</i> (Gray) Indian Pangolin	+	-	-	-	-	-	-	-

	1	2	3	4	5	6	7	8
66. <i>Axis axis</i> Erxleben Chital, Axis Deer, Spotted Deer	+	+	+	-	-	+	+	+
67. <i>A. porcinus</i> (Zimmermann) Hog Deer (Para)	+	-	+	-	-	+	-	-
68. <i>Cervus unicolor</i> (Kerr) Sambar	+	+	+	+	+	+	+	+
69. <i>C. duvauceli</i> Cuvier Swamp Deer, Barasingha	-	-	-	-	-	+(?)	-	-
XVIII. Family : BOVIDAE								
70. <i>Tetraceros quadricornis</i> (Blainville) Four-horned Antelope; Chausingha			+		-	+	+	+
71. <i>Boselaphus tragocamelus</i> (Pallas) Nilgal : Blue Bull	+	+	+	-	-	+	-	-
72. <i>Bos grunniens</i> Linnaeus Yak	-	-	-	+(?)	+(?)	-	-	-
73. <i>Capricornis sumatraensis</i> (Bechstein) Serow	-	+	+	-	-	+	+	+
74. <i>Naemorhedus goral</i> (Hardwicke) Goral	+	+	+	+	+	+	+	+
75. <i>Hemitragus jemlahicus</i> (H.Smith) Himalayan Tahr (or Thar)	-	+	-	-	-	+	+	+
76. <i>Capra ibex</i> Linnaeus Ibex	-	-	-	-	-	+	+	-
77. <i>Pseudois nayaur</i> (Hodgson) Bharal; Blue Sheep	-	+	-	-	-	+	+	+
78. <i>Ovis ammon</i> (Linnaeus) Argali	-	+	+	+	+	+	+	+
H. Order : LAGOMORPHA XIX. Family : LEPORIDAE								
79. <i>Lepus nigricolis</i> Cuvier Indian Hare : Black-naped Hare	+	-	-	-	-	+	+	+
80. <i>Ochotona royalei</i> (Ogilby) Royale's Pika	-	-	-	+	+	+	+	+
I. Order : RODENTIA XX. Family SCIURIDAE								
81. <i>Petaurista petaurista</i> Pallas Common Giant Flying Squirrel	+	-	-	-	-	+	+	+

	1	2	3	4	5	6	7	8
82. <i>Funambulus pennanti</i> Wroughton Northern Palm Squirrel	+	-	-	-	-	+	+	+
83. <i>Marmota bobak</i> (Muller) Bobak Marmot (Himalayan Marmot)				-	-	+	+	+
XXI. Family : HISTRICIDAE								
84. <i>Hystrix indica</i> (Kerr) Indian Crested Porcupine	+	+	+	+	+	+	+	+
XXII. Family : MURIDAE								
85. <i>Vandeleuria oleracea</i> (Bannett) Palm Mouse	-	-		-	-	+	+	-
86. <i>Apodemus flavicollis</i> Melchior Yellow-naked Field Mouse						+	+	+
87. <i>A. sylvaticus</i> (Linnaeus) Common Field Mouse	+	-	-	-	-	-	-	-
88. <i>Rattus rattus</i> (Linnaeus) House Rat : Black Rat	+	+	+	-	-	+	+	+
89. <i>R. nitidus</i> (Hodgson) Himalayan Rat	-	-	-	-	-	+	+	+
90. <i>R. rattoides</i> (Hodgson) Turkestan Rat	-	-	-	-	-	+	+	+
91. <i>R. niviventer</i> (Hodgson) White-bellied Rat	-	-	-	-	-	+	+	+
92. <i>R. fulvescens</i> (Gray) Chestnut Rat	-	-	-	-	-	+	+	+
93. <i>Mus musculus</i> Linnaeus House Mouse	+	+	+	+	+	-	-	-
94. <i>M. buduga</i> Gray Little Indian Field Mouse	+	+	+	+	+	+	+	+
95. <i>M. cervicolor</i> Hodgson Fawn-coloured Mouse	+	+	+	+	+			
96. <i>M. platythrix</i> Bennet Indian Brown Spiny Mouse	-	-	-	-	-	+	+	+
97. <i>Gollunda ellioti</i> Gray Indian Bush Rat	+	-	-	-	-	+	+	+
98. <i>Bandicota bengalensis</i> (Gray & Hardwicke) Lesser Bandicoot Rat "Indian Mole Rat"	+	+	+	-	-	-		-
99. <i>B. indica</i> (Bechstein) Large Bandicoot Rat	+		-	-	-	-		

	1	2	3	4	5	6	7	8
100. <i>Nesokia indica</i> (Gray & Hardwicke) Short-tailed Bandicoot Rat (Short-tailed Mole Rat)	+	+	+			+	+	+
101. <i>Tatera indica</i> (Hardwicke) Indian Gerbil ; Antelope Rat	+	-	-	-	-	+	+	+
102. <i>Alticola roylei</i> Gray Royle's High Mountain Vole	-		-	-	-	+	+	+

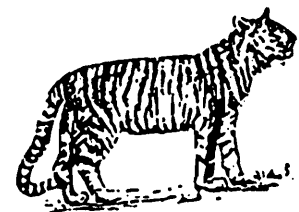
Distribution of Felidae in western Himalaya



Order : CARNIVORA

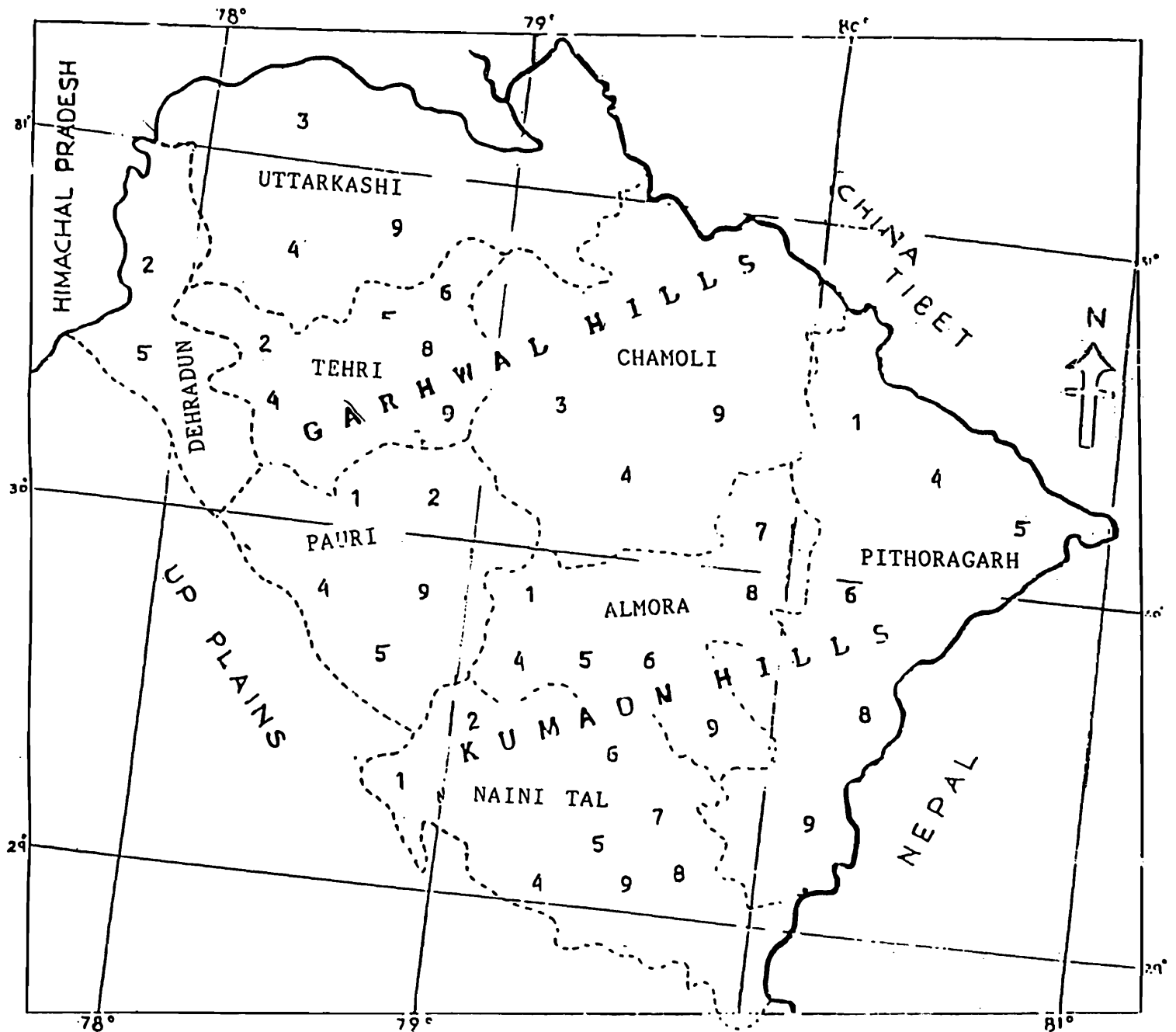
Family : FELIDAE

- 1 Felis chaus Guldenstaedt
2. Felis caracal Schreber
3. Felis bengalensis Kerr
4. Felis viverrina Bennett
5. Panthera pardus (Linnaeus)
6. Panthera tigris (Linnaeus)
- 7 Panthera uncia Schreber



Tiger
(*Panthera tigris*)

Distribution of Bovidae in western Himalaya



Order : ARTIODACTYLA

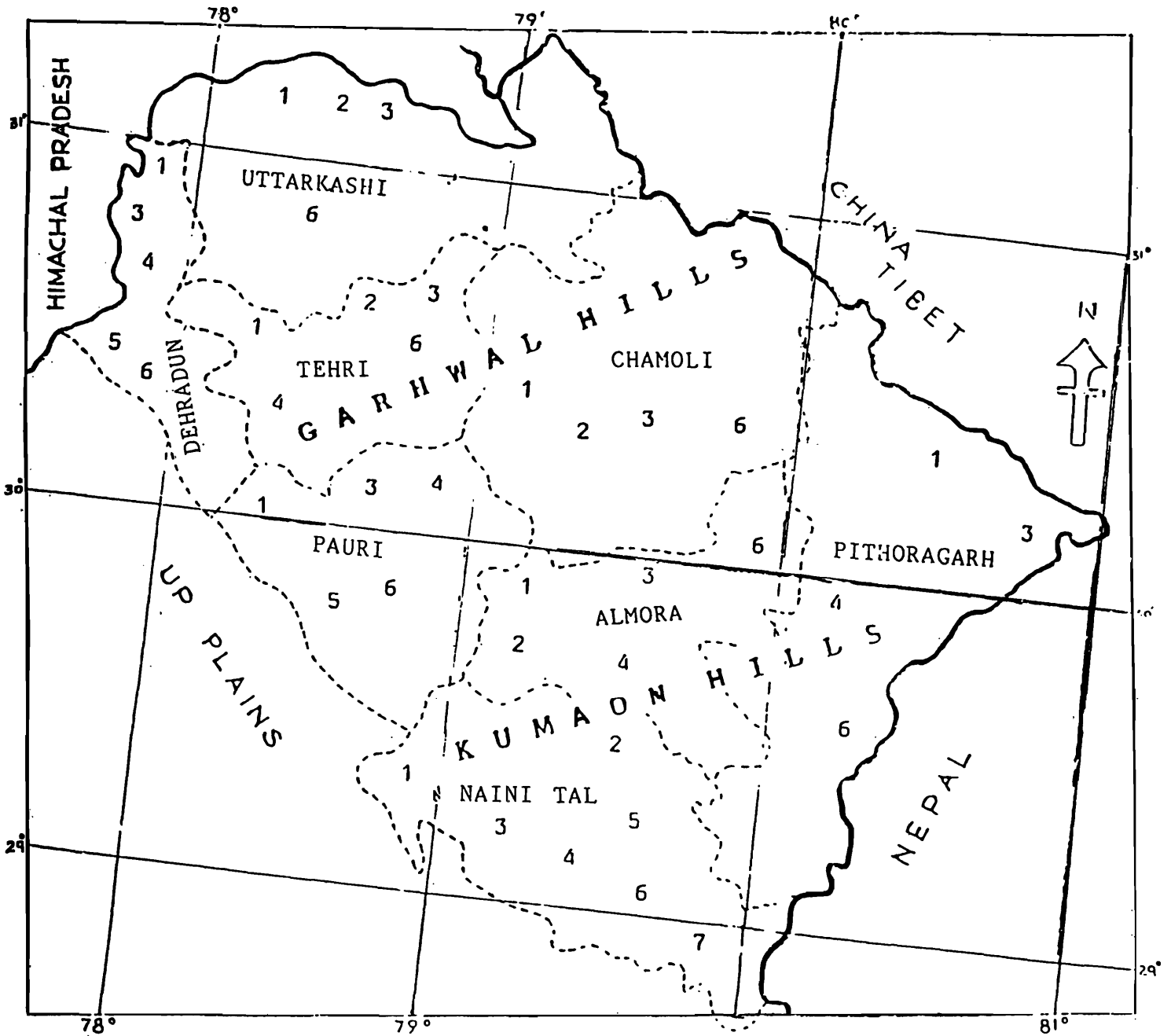
Family : BOVIDAE

- 1 Tetraceros quadricornis (Blainville)
2. Boselaphus tragocamelus (Pallas)
3. Bos grunniens Linnaeus
4. Capricornis sumatraensis (Bechstein)
5. Naemorhedus goral (Hardwicke)
6. Hemitragus jemlahicus (H. Smith)
- 7 Capra ibex Linnaeus
- 8 Pseudois nayaur (Hodgson)
- 9 Ovis ammon (Linnaeus)



Nilgai
(*Boselaphus tragocamelus*)

Distribution of Suidae and Cervidae in western Himalaya



Order : ARTIODACTYLA

Family : SUIDAE

- 1 Sus scrofa Linnaeus

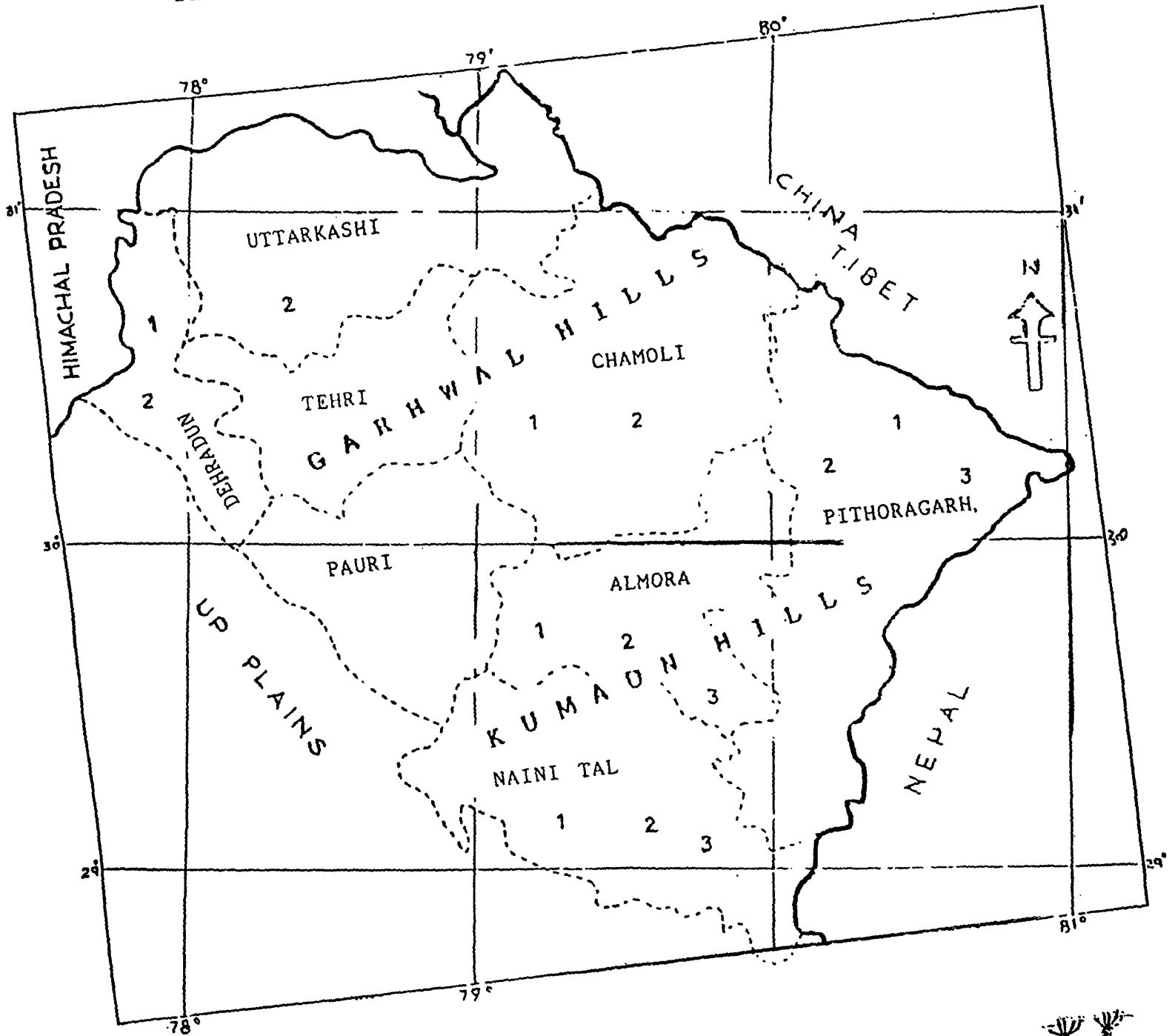
Family : CERVIDAE

- 2 Moschus moschiferus Linnaeus
- 3. Muntiacus muntjak (Zimmermann)
- 4. Axis axis Erxleben
- 5. Axis porcinus (Zimmermann)
- 6. Cervus unicolor (Kerr)
- 7 Cervus duvauceli Cuvier



Hog Deer
(*Axis porcinus*)

Distribution of Fruit Bats in western Himalaya



Order : CHIROPTERA

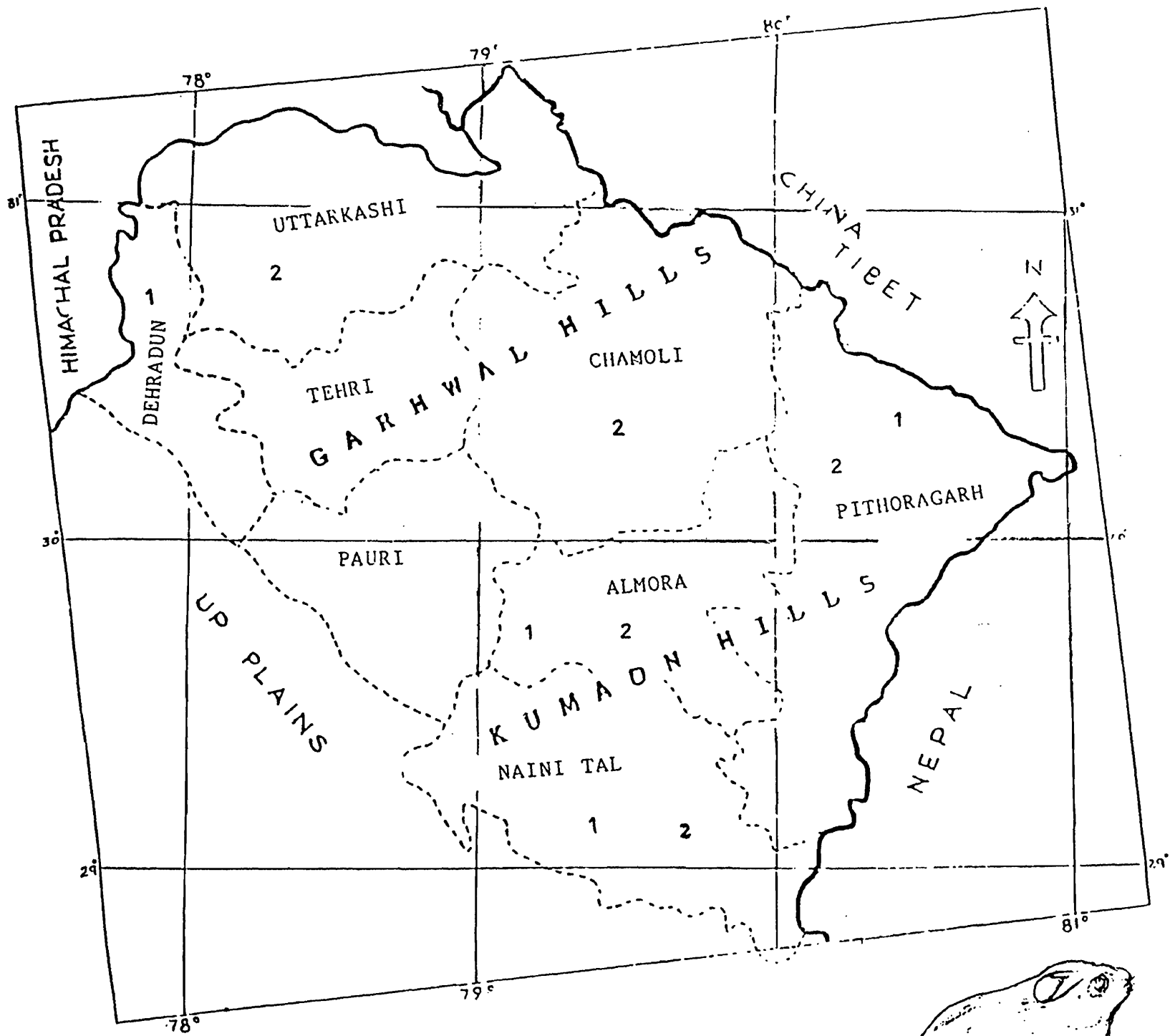
Family : PTEROPIDAE

- 1 Rousettus leschenaulti (Desmarest)
2. Pteropus giganteus Brunich
3. Cynopterus sphinx (Vahl)

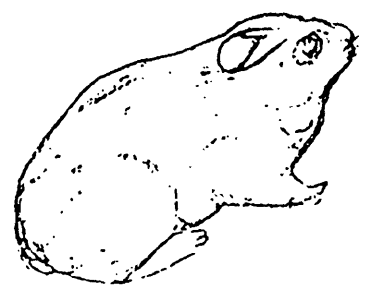


Indian Flying Fox
(*Pteropus giganteus*)

Distribution of Leporidae in western Himalaya



- Order : LAGOMORPHA
 Family : LEPORIDAE
 1. Lepus nigricolis Cuvier
 2. Ochotona roylei (Ogilby)



Royle's Pika
 (Ochotona roylei)

REFERENCES

- ANONYMOUS, 1983. *Forest Statistics of U.P.* Forest Deptt. Lucknow.
- ATKINSON, E.T. 1973. *The Himalayan Gazetteer*, Vol. II Part I, Cosmo Publication, New Delhi.
- CHANDOLA-SAKLANI, A., BIST, M., KAR, A., SEIKHAR, C. and LAKHERA, P. Wildlife in Garhwal Himalaya : Breeding and Behavioural Biology : 242-262. In *Western Himalaya (Environment, Problems and Development)*. Vol. I. Editors Pangtey, Y.P.S. and Joshi, S.C. Gyanodaya Prakashan, Nainital (U.P.) : i-vii + 1-455.
- ELLERMAN, J.R. and MORRISON - SCOTT, T.C.S. 1951. *Checklist of Palaearctic and Indian Mammals, 1758 to 1946*, London : 1-810.
- KUMAR, K. and CHOPRA, R.N. 1977. On the rodents of Dehra Dun and vicinity, *Newsl. zool. Surv. India*, 3 (4) : 184-186.
- OSMASTON, B.B. and SALE, J.B. 1989. *Wildlife of Dehra Dun and Adjacent Hills*. Dehra Dun : 1-104
- PRATER, S.H. 1971. *The Book of Indian Animals*. Bombay : XX+ 1- 324.
- SAHARIA, V.B. 1982. *Wildlife in India*, New Delhi : 1-278.
- UPADHYAYA, M. 1980. *Working Plan of Garhwal Forest Division*, Uttar Pradesh, Allahabad.
- WALTON, H.G. 1989. *Gazetteer of Garhwal Himalaya*, Dehra Dun: 1- 216 + XXVIII.
- SINHA, N.K. (In press). Mammals of Rajaji National Park. *Rec. zool. Surv. India*, MS 29 pp.

SUMMARY OF THE FAUNA

TABLE - I

PHYLUM : MOLLUSCA

CLASS : GASTROPODA

	Species	1	2	3	4	5	6	7	8
ORDER : MESOGATROPODA									
Family : Cyclophoridae	1	1	-	-	-	-	1	-	-
Diplommatinidae	2	1	-	-	-	-	1	-	-
Viviparidae	2	-	-	-	-	-	2	-	-
Bithyniidae	1	-	-	-	-	-	1	1	-
Pomatiosidae	1	-	-	-	-	-	1	1	-
Thiaridae	1	1	-	-	-	-	-	-	-
ORDER : BASOMMATOPHORA									
Lymnaeidae	6	4	2	-	-	1	3		
Planorbidae	5		2				5	-	
ORDER : STYLOMMATOPHORA									
Succineidae	2	1	-	-		-	1	-	-
Pupillidae	3	2	-	-	-	-	-	-	1
Enidae	6	5	-	-	-	-	3	2	-
Clausiliidae	1	1	-	-	-	-	1	-	-
Subulinidae	1	1	-	-	-	-	1	-	-
Arionidae	3	2	2	-	-	-	1	-	-
Ariophantidae	18	15	5	2	-	2	2	1	-
CLASS : BIVALVIA									
ORDER : UNIONOIDA									
Family : Amblemidae	1	1	-	-	-	-	-	-	-
ORDER : VENEROIDA									
Pisidiidae	2	-	1	-	-	-	1	-	1
TOTAL	56	35	12	2	-	3	24	5	2

TABLE - II

OLIGOCHAETA

		Species	1	2	3	4	5	6	7	8
Family :	NAIDIDAE	4	-	-	-	-	-	4	-	-
Family :	MONILIGASTRIDAE	2	2	-	-	-	-	1	1	-
Family :	ALMIDAE	1	-	-	-	-	-	1	-	-
Family :	OCNERODRILIDAE	1	1	-	-	-	-	-	-	-
Family :	ACANTHODRILIDAE	1	-	-	-	-	1	-	-	-
Family :	OCTOCHAETIDAE	11	7	2	5	-	1	3	2	2
Family :	MEGASCOLECIDAE	13	11	3	6	3	8	7	5	5
Family :	LUMBRICIDAE	9	7	5	1	3	5	7	3	2
TOTAL		42	28	10	12	6	15	23	11	9

TABLE - III

PHYLUM : ARTHROPODA

		Species	1	2	3	4	5	6	7	8
CLASS :	CRUSTACEA									
Family :	Palaemonidae	3	3	-	2	-	-	1	-	-
	Atyidae	1	1	-	-	-	-	-	-	-
	Potamonidae	3	2	2	2	-	-	1	-	-
TOTAL		7	6	2	4	-	-	2	-	-

TABLE - IV

CLASS : INSECTA
ORDER : ODONATA

		Species	1	2	3	4	5	6	7	8
SUBORDER : ZYGOPTERA										
Family :	Platystriictidae	1	1	1	1	1	1	1	1	
	Protonuridae	4	2	-	1			2	1	
	Platycnemididae	10	4	2	2	2	1	4	3	1
	Coenoegriidae	21	14	3	4	2	2	15	1	5
	Synlestidae	1	1		-		1	1	1	1
	Lestidae	5	5		1			3		-
	Chlorocyphidae	7	5	3	4	2	1	6	2	2
	Epallagidae	4	3	2	2	1	3	3	1	1
	Calopterygidae	1	1	1	1	1	-	1		1
SUBORDER : ANISOPTERA										
Family :	Gomphidae	21	16	3	3	3	3	2	2	5
	Aeschnidae	13	5	-	1	2		7	4	3
	Libellulidae	40	35	9	17	10	6	25	1	12
TOTAL		128	92	24	37	24	18	70	17	31

TABLE-V

ORDER : PLECOPTERA

		Species	1	2	3	4	5	6	7	8
Family :	Taeniopterygidae	1		1			-			
Family :	Nemouridae	13	-	7	-		5		3	
Family :	Capnidae	1	-	-	-	-	1	-		-
Famili :	Perlodidae	2	-	-	-	-	2			-
Family :	Perlidae	3	-	1	-	-	1	1	2	-
TOTAL		20	-	9	-	-	9	1	5	-

TABLE - VI

ORDER : ORTHOPTERA

Species	1	2	3	4	5	6	7	8	
Family : Acrididae	49	38	15	18	2	8	9	4	-
Family : Pyrgomorphidae	3	3	-	1	1	1	2	1	-
Family : Tetrigidae	3	3	-	-	-	-	-	-	-
Family : Tettigonidae	2	2	-	-	-	-	-	-	-
Family : Tridactylidae	2	1	-	-	-	1	-	-	-
Family : Gryllidae	32	28	5	1	-	4	8	1	-
Family : Trigonidiidae	1	-	1	-	-	-	1	1	-
Family : Scleropteridae	1	1	-	-	-	-	-	-	-
Family : Mogoplistidae	1	1	-	-	-	-	-	-	-
Family : Encopteridae	2	1	-	-	-	-	1	1	-
Family : Gryllotalpidae	1	1	-	-	-	-	-	-	-
TOTAL	97	79	21	20	3	13	22	8	-

TABLE - VII

ORDER : DERMAPTERA

Species	1	2	3	4	5	6	7	8
Family : Pygidicranidae	7	4	1	2	1	3	-	-
Anisolabididae	5	2	-	-	-	3	1	2
Labiduridae	8	6	1		1	4	1	3
Spongiphoridae	4	3	-			1	-	1
Chelisochidae	1	1	-				-	-
Forficulidae	18	6	-	3	7	7	4	2
TOTAL	43	22	1	1	5	18	6	8

TABLE VIII

ORDER : ISOPTERA

Species		1	2	3	4	5	6	7	8
Family :	Termopsidae	1	1	1	1	1	1	1	-
	Kalotermitidae	6	3	2	-	-	3	2	
	Stylotermitidae	3	3	-	-	-	1	-	-
	Rhinotermitidae	4	3	2	3	1	3	2	2
	Termitidae	35	25	7	25	5	16	28	14
	TOTAL	49	35	10	31	7	20	36	19

TABLE - IX

ORDER : HEMIPTERA

Species		1	2	3	4	5	6	7	8
Family :	Cecropidae	1	1					-	-
	Cicadellidae	2	2	-			1	1	
	Aphididae	5		-	1	3	1	-	
	Monophlebidae	1		-	-	-	1	-	-
	Tachardiidae	2	2	-	-	-	1	1	-
	Kermesidae	1	1	-	-		-	-	
	Diapsidae	1		-	-	-	1	-	
	Tingidae	1	1	-		-	1	1	1
	Phrrhocoridae	1	1	-	-	-	-	-	
	Pentatomidae	1	1						
	Nepidae	3	3	3	-		2		
	Notonectidae	5	5				-	-	
	Belostomidae	3	3						
	Naucoridae	2	2	1			2		
	Corixidae	1	1						
	Hydrometridae	4	2	1	2		3		
	TOTAL	34	25	1	6	1	3	13	3

TABLE - X

		Species	1	2	3	4	5	6	7	8
ORDER : COLEOPTERA										
Family :	Cicindellidae	1	1	-	-	-	-	-	-	-
	Carabidae	22	22	-	-	-	-	3	6	-
	Lampyridae	1	1	-	-	-	-	-	-	-
	Elateridae	5	5	-	-	-	-	-	-	-
	Tenebrionidae	23	21	-	2	-	-	-	-	-
	Meloidae	3	3	-	-	-	-	-	-	-
	Chrysomelidae	25	25	-	-	-	-	4	4	-
	Curculionidae	4	4	-	-	-	-	-	-	-
	Scarabidae	21	21	-	-	-	-	-	-	-
TOTAL		105	103	-	2	-	-	7	10	-

TABLE-XI

ORDER : LEPIDOPTERA

		Species	1	2	3	4	5	6	7	8
Family :	Papilionidae	27	8	13	3	3	5	3	15	1
	Pieridae	36	19	19	8	3	6	13	13	7
	Danaidae	9	7	7	3	5	3	4	4	4
	Acreidae	1	1	1		-	1	-	1	
	Satyridae	46	20	16		5	8	6	20	3
	Erycinidae	6	2	4	2	-	-	4	1	2
	Nymphalidae	45	26	28	9	9	12	16	19	12
	Lycaenidae	48	7	5	2	8	8	4	32	2
	Hesperiidae	5	2	1	-	-	1	-	3	-
	TOTAL	223	92	94	27	33	44	50	108	31

TABLE - XII

TABLE : TRICHOPTERA

		Species	1	2	3	4	5	6	7	8
Family :	Rhyacophilidae	34	1	11	21	-	-	-	3	1
	Philopotamidae	4	-	-		-	-	-	1	4
	Phrygaenidae	1	-	1	-	-	-	-	-	-
	Calamoceratidae	2	-		-	-	-	-	-	2
	Hydropsychidae	5	3	2	-	-	-	-	-	-
	Sericostomatidae	2	1	-	-	-	-	-	-	1
	Glossosomatidae	3	1	1	1	-	-	-	-	1
	Stenopsychidae	1			1		-			
	Leptoceridae	1								1
	Uenoidae	1		1						
	Limnephilidae	2		-	1	-	-		1	1
	Hydrobiosidae	1	-	-	1	-	-	-		
	Psychomyiidae	3	-	2	1	-	-	-		-
	TOTAL	60	6	18	26	-	-	-	5	11

TABLE - XIII

ORDER : HYMENOPTERA

		Species	1	2	3	4	5	6	7	8
Family :	Tiphiidae	18	15	1	3	-	-	2	1	-
	Scoliidae	20	11	4	2	7	2	6	9	-
	Eumenidae	15	13	2	1	1	1	3	-	-
	Vespidae	28	22	3	4	6	4	7	7	2
	Pompilidae	24	15	3	2	1	5	3	1	-
	Sphecidae	62	49	12	9	7	9	6	8	2
	Chalcididae	20	16	1				3	-	-
	Scelionidae	5	5	-				-	-	-
	Platygasteridae	1	-	-	-			1	-	-
	Diapriidae	6	-	-	-		1	4	2	-
	Proctotrupidae	1	1	-	-		-	-	1	-
	Ceraphronidae	1	1	-	-	-	-	-	-	-
	TOTAL	201	148	26	21	22	22	35	29	4

TABLE - XIV

ORDER : HYMENOPTERA

		Species	1	2	3	4	5	6	7	8
Family :	Ichneumonidae	303	163	71	67	14	11	129	32	-

TABLE-XV

SUPERCLASS : MYRIAPODA

		Species	1	2	3	4	5	6	7	8
CLASS :	CHILOPODA									
ORDER :	SCOLOPENDROMORPHA									
Family :	Scolopendridae	20	9	2	8	3	6	12	6	6
	TOTAL	20	9	2	8	3	6	12	6	6

TABLE-XVI

		Species	1	2	3	4	5	6	7	8
CLASS :	ARACHNIDA									
ORDER :	SCORPIONES									
Family :	Buthidae	4	2	2	2	-	2	2	2	2
	Chaerilidae	3	2	3	1	2	1	2	2	1
	Vaeijovidae	7	5	2	2	2	2	4		1
	Scorpionidae	3	3	-		-		-		-
	TOTAL	17	12	7	5	4	5	8	4	4

TABLE - XVII

PHYLUM : CHORDATA

		Species	1	2	3	4	5	6	7	8
CLASS : OSTEICHTHYES (PISCES)										
Family :	Notopteridae	2	-	-	-	-	-	2	-	-
	Clupeidae	1	-	-	-	-	-	1	-	-
	Cyprinidae	52	38	14	31	16	18	43	22	18
	Psilorhunchidae	1						1	-	-
	Homalopteridae	10	8	4	8	4	5	7	5	5
	Cobitididae	5	4	1	2		1	3	1	-
	Bagridae	5	4	-	1	-	-	4	-	-
	Siluridae	3	2	-	-	-	-	3	-	-
	Schilbidae	5	1	1	-	-	-	4	-	-
	Amblycipitidae	1	1	-	1	-	-	1	1	-
	Sisoridae	13	8	4	6	3	4	10	3	4
	Clariidae	1	1	-	-	-	-	1	-	-
	Heteropneustidae	1	1	-	-	-	-	1	-	-
	Salmonidae	3	2	1	-	3	2	2	-	-
	Belonidae	1	1	-	-	-	-	1	-	-
	Aplocheilidae	1	1	-	-	-	-	-	-	-
	Poeciliidae	1	1	-	-	-	-	-	-	-
	Synbranchidae	1	-		-	-	-	1	-	-
	Centropomidae	2	-	-	-	-	-	2	-	-
	Nandidae	2	1		1	-	-	2	-	-
	Mugilidae	2						2	-	-
	Gobiidae	1		-				1	-	-
	Anabantidae	1		-	-	-	-	1	-	-
	Belontiidae	2	-	-	-	-	-	2	-	-
	Osphronemidae	1	1	-	-	-	-	-	-	-
	Channidae	4	2	-	2	-	1	4	1	1
	Mastacembelidae	2	2	1	1	1	1	2	1	1
	TOTAL	124	79	26	53	27	32	101	34	29

TABLE - XVIII

		Species								
		1	2	3	4	5	6	7	8	
CLASS :	AMPHIBIA									
Family :	Ranidae	13	10	6	5	4	6	3	5	4
	Bufo	3	3	3	2	2	2	3	3	3
	Microhylidae	2	2	1	-	-	-	1	-	-
	Rhacophoridae	1	1	-	1	-	-	-	+	-
	TOTAL	19	16	10	8	6	8	7	8	7

TABLE-XIX

		Species								
		1	2	3	4	5	6	7	8	
CLASS :	REPTILIA									
ORDER :	CROCODYLIA									
Family :	Crocodylidae	1	-	-	1	-	-	1	-	-
	Gavialidae	1	-	-	1	-	-	1	-	-
ORDER :	TESTUDINES									
Family :	Emydidae	6	4	-	2	-	-	6	-	-
	Trionychidae	3	3	-	3	-	-	3	-	-
ORDER :	SAURIA									
Family :	Gekkonidae	5	3	3	4	2	2	3	4	2
	Agamidae	4	4	3	3	3	3	3	3	3
	Varanidae	2	1	-	2	1	-	1	1	1
	Lacertidae	1	1	-	-	-	-	-	-	-
	Scincidae	5	5	1	5	1	1	5	1	1
ORDER :	SERPENTES									
Family :	Typhlopidae	3	2	-	2	1	-	2	-	-
	Boidae	3	1	-	3	1	-	3	-	-
	Dipsadidae	8	5	-	4	-	-	4	4	1
	Natricidae	3	3	2	2	3	3	2	2	2
	Colubridae	9	5	1	5	2	2	5	4	1
	Homalopsidae	6	4	-	6	-	-	6	-	-
	Elapidae	6	4	1	4	3	2	4	2	2
	Viperidae	4	3	-	3	1	-	3	3	2
	TOTAL	70	48	11	50	18	13	52	24	15

TABLE - XX

Species		1	2	3	4	5	6	7	8	
CLASS :	AVES									
Order :	Podicipediformes	4	3	-	4	-	-	1	-	-
	Pelecaniformes	4	3	-	4	-	-	1	-	-
	Ciconiiformes	17	13	1	15	-	-	-	-	-
	Anseriformes	23	17	-	19	-	1	2	-	-
	Falconiformes	58	41	11	50	4	12	14	12	10
	Galliformes	17	17	4	11	7	7	8	6	6
	Guriformes	10	8	-	4	-	-	-	-	-
	Charadriiformes	36	28	1	27	-	1	3	1	1
	Columbiformes	17	13	4	14	3	4	4	5	3
	Psittaciformes	7	5	1	6	-	-	2	2	2
	Cuculiformes	17	14	2	12	1	2	3	4	-
	Strigiformes	17	11	1	13	-	2	4	2	-
	Caprimulgiformes	6	4	1	3	-	-	-	-	-
	Apodiformes	9	4	1	6		2	2	2	-
	Coraciiformes	19	12	5	17	1	1	4	1	3
	Piciformes	25	16	1	22	3	4	3	5	7
	Passeriformes	242	21	40	166	53	102	77	53	48
	TOTAL	528	230	73	393	72	138	128	93	80

TABLE - XXI

Species		1	2	3	4	5	6	7	8
CLASS :	MAMMALIA								
Family :	Erinaceidae	1	1	-	-	-	-	-	-
	Soricidae	4	2	1	1	1	4	4	4
	Pteropidae	3	2		1	2	3	3	3
	Megadermatidae	1	1			-	1	1	1
	Rhinolophidae	10	7	-	-	-	7	8	7
	Vespertilionidae	13	6	-	-	-	13	13	13
	Cercopithecidae	2	2	2	2	2	2	2	2
	Manidae	1	1	-	-	-	-	-	-
	Canidae	5	5	4	4	4	4	4	4
	Ursidae	3	1	3	3	3	3	3	3
	Mustelidae	5	3	2	3	3	4	4	4
	Viverridae	5	5	3	3	4	4	4	4
	Hyaenidae	1	1	1	1	1	1	1	1
	Felidae	7	5	3	4	4	4	6	6
	Elephantidae	1	1	-	1		-	1	-
	Suidae	1	1	1	1	1	1	1	1
	Cervidae	6	4	3	4	3	3	6	4
	Bovidae	9	2	6	5	3	3	8	7
	Leporidae	2	1			1	1	2	2
	Sciurodae	3	2					3	3
	Histricidae	1	1	1	1	1	1	1	1
	Muridae	18	10	6	6	3	3	13	13
	TOTAL	102	64	36	39	35	36	87	84

TABLE - XXII

CONSOLIDATED SUMMARY OF THE FAUNA OF WESTERN HIMALAYA (U.P.)

(Computed on the basis of Table I - XXI)

I. INVERTEBRATA

SPECIES		1	2	3	4	5	6	7	8
OLIGOCHAETA	42	28	10	12	6	15	23	11	9
MOLLUSCA	56	35	12	2		3	24	5	2
CRUSTACEA	7	6	2	4	-		2	-	-
ARACHNIDA	17	12	7	5	4	5	8	4	4
MYRIAPODA (Chilopoda)	20	9	2	8	3	6	12	6	6
INSECTA									
Odonata	128	92	24	37	24	18	70	17	31
Plecoptera	20		9	-	-	9	1	5	-
Orthoptera	97	79	21	20	3	13	22	8	-
Dermaptera	43	22	1	1	5	9	18	6	8
Isoptera	49	35	10	31	7	20	36	19	16
Hemiptera	34	25	1	6	1	3	13	3	1
Trichoptera	60	6	18	26	-	-	-	5	11
Lepidoptera	223	92	94	27	33	44	50	108	31
Hymenoptera	201	148	26	21	22	22	35	29	4
Ichneumonidae	303	163	71	67	14	11	129	32	-
Colcoptera	105	103		2	-	-	7	10	-
TOTAL	1405	854	308	269	122	178	450	268	123

II. VERTEBRATA

PISCES	124	79	26	53	27	32	101	34	29
AMPHIBIA	19	16	10	8	6	8	7	9	7
REPTILIA	70	48	11	50	18	13	52	24	15
AVES	528	230	73	393	72	138	128	93	80
MAMMALIA	102	64	36	39	35	36	87	84	80
TOTAL	843	437	156	543	158	227	375	244	211

III. (I + II) : GRAND TOTAL	2248	1291	464	812	280	405	825	512	334
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