

Records of the Zoological Survey of India

**Special Issue
Fauna of Silent Valley, Kerala India**

Zoological Survey of India

Records
of the
ZOOLOGICAL SURVEY OF INDIA

Vol. 84 (1-4)

Special Issue
Fauna of Silent Valley, Kerala India.



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FOREWORD

The scientific papers appearing in the following pages are the result of four multidisciplinary expeditions to Silent Valley. The first one was organised by the Geological Survey of India, Kerala Circle where a team from the Southern Regional Station of the Zoological Survey of India also took part. This was in 1979 when Silent Valley was practically unknown. The other three were organised at the instance of the Joint Committee constituted by the Government of India and Government of Kerala for an objective analysis as to whether the hydel project could be implemented without significant ecological damage. The reasons for such a study centered around our concern for conservation of our biological heritage and commitment to integrating ecological considerations with development activities.

Silent Valley and adjoining forests represent "ecological islands" wherein it is possible to observe today the conditions of remote past prevailed in the humid tropical forests of Peninsular India, where the relict characters of the fauna and flora are preserved. The study of the biological resources of such areas would be a very important and fascinating prospect to biologists. The intermingling of Indo-Malayan elements in the fauna and flora of the area is fascinating from the zoo-geographical point of view. Preservation of such heritage areas is very relevant since the demand on forest land for purposes of agriculture, human settlements, construction of roads, hydel power etc. are ever increasing. More than 4.3 million hectares of forest land is estimated to have been lost between 1951 and 1980 for these demands.

The growing concern throughout the world about the need for conservation has arisen out of the indiscriminate exploitation and destruction of habitats as a result of which a number of species have already disappeared and many others await a similar fate. It is estimated that the rate of extinction of birds and mammals alone has been one species per 4 years between 1600 and 1900 AD. This has escalated to one species per year since 1960. The loss of such biological resources has largely been due to destruction of natural forests which are the reservoirs of genetic diversity, the preservation of which is a must for the future of humanity.

Tropical rain forests have a large role to play in human welfare because of the rich natural resources they support per square kilometre. It is estimated that about 2 to 4 million species of plants and animals out of a possible ten million species on earth, live in tropical rain forests. To preserve such biomes should be one of our primary concerns.

Silent Valley is a little different from the other forests in Western Ghats. Together with the surrounding forests, it represents an undisturbed tropical evergreen forest in our country. Other similar areas have been reduced to small pockets which would not be able to withstand the pressure that is brought to bear on them by human agencies.

The multidisciplinary expeditions have established that Silent Valley is a veritable treasure house of plants, animals and micro-organisms which are of paramount importance. Studies carried out by the Zoological Survey of India on the basis of explorations led by Dr R. S. Pillai reveal that the Fauna of the Valley is both unique and rare. Rare, because most of the animals of similar categories which inhabited all over Western Ghats once upon a time have been exterminated due to habitat destruction. They, however, are still available in the valley. It is unique because what little has been collected and studied proves to be of immense scientific interest from the taxonomic, zoogeographic and genetic points of view. Several new species, both vertebrate and invertebrate, have been discovered and published. Many more await discovery.

Construction of the proposed hydel power station would have submerged 830 hectares of pristine riparian forests. This, and the disturbance caused by the construction activities would have inflicted irreparable damage to the area as a whole. Silent Valley with its treasure house of biological wealth is too precious to be sacrificed for a short term gain of generating power. It is not easy in any cost-benefit-analysis to put a value on such resources. The Government of Kerala have done well to respect scientific opinion and declare Silent Valley as a National Park. Thus a unique ecosystem which holds considerable genetic potential has been saved. More gratifying is the environmental awareness that has been kindled and roused by the Silent Valley episode.

B. S. Lamba
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SILENT VALLEY PHYSIOGRAPHY, FAUNAL EXPLORATIONS AND GENERAL OBSERVATIONS ON FAUNA

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A. PHYSIOGRAPHY

Located within the bowels of the Western Ghats in Kerala, Silent Valley, also known as Syrandhri Vanam, is a reserve forest covering an area of 8952 hectares. The Western Ghats mountain range has a broad, saddle-shaped depression near Palghat, constituting the Palghat gap. North of this gap, the ghats rise rather abruptly and the Silent Valley plateau is perched on the western side of this steep slope and is located at 11° 05' N latitude and 76° 26' E longitude. Towards its north, part of the boundary is formed by Nilgiris and part by the vested forests of Nilambur Division which extend slightly on the western side also. The northern side of the range is about 1800 metres above sea level and is fringed by hills such as Anginda, Sispara and Kozhipara rising to 2200 to 2400 metres. On its south, Silent Valley Reserve is about 685 metres high and is bounded by vested forests of Palghat Division. On the east, Attapadi Reserve is contiguous with it and on the west it is shared by the forests of Nilambur.

Silent Valley is roughly a rectangular table land at an elevation of around 1100 metres and is flanked to the south and the west by steep escarpments descending a thousand metres to the plains of Kerala and to the north and east by sheer walls rising another thousand metres to the upper plateau of Nilgiris. The rugged topography, steep slopes, dense forest cover and abundant streams make the area almost impenetrable. This natural inaccessibility was largely responsible for the area to remain very much unknown even to forest officials till lately. Even tribal settlements do not exist in this plateau. The area remains even today as one subject to least disturbance from human agencies in comparison with the rest of the Western Ghat forests.

Kunthipuzha (Kunthi River), a tributary of Bharatha Puzha, takes

its origin from Silent Valley and runs all along the centre of the Silent Valley in a north-south direction. Originating at an elevation of almost 2400 metres on the outer rim of Nilgiris, Kunthipuzha descends rapidly to 1150 metres on the northern edge of the plateau. Thereafter it pursues a gentle southwardly course to cascade down to the plains of Mannarghat through a gorge. All its major tributaries originate from the eastern slopes. The main stream channel is uniformly shallow with vegetation often coming right upto the water's edge indicating absence of water level fluctuations during the heavy monsoon months. The average annual run-off is estimated at 293 million cubic metres. The catchment forests are practically undisturbed, thick and impenetrable. The riparian zones also sustain some of the finest evergreen forests. The Kunthipuzha drainage is separated from the Bhavani drainage to the east by a north-south ridge, starting from Anginda and terminating at Mukkali.

The Silent Valley plateau has an average precipitation of 460 centimetres distributed over the eight months from May to December. There are two monsoon periods ; the principal monsoon is from May to August. Dry season extends usually from January to March/April. The average temperature ranges from 15°C to 25°C. Atmospheric humidity in the dry season varies from 30 – 80%.

Scanty geological data available shows that the Silent Valley forest area is a laterite table land with soil belonging to red ferruginous series with rock formation of gneisses and granites.

Silent Valley forests have been variously designated as Savannah Forest, Monsoon Forest, Tropical evergreens etc. According to the accepted revised survey of forest types in India by Champion & Sethi (1968) Silent Valley forests fall under the tropical wet evergreen forests. The common trees in these forests are *Palanquium ellipticum*, *Mesua nagassarium*, *Poeciloneuron indicum*, *Cullenia exarillata*, *Machilus macrantha*, *Calophyllum elatum* etc. Treeferns belonging to the genus *Alsophila* are also present in this forest.

Silent Valley is very important from the botanical point of view because of the diversified complexity of vegetation and flora. The Botanical Survey of India has so far identified 77 species of lichens, 83 species of mosses, 77 species of pteridophytes and more than 1600 species of angiosperms. Many new species and new additions to India/

South India have been discovered from this area. The diversified complexity of flora and the presence of new, rare, endangered economically important species has been brought out by Nair (1980, 1981).

Silent Valley has attracted more public attention and debate in recent years than any similar region anywhere else in the world in the wake of a hydel project proposed to be constructed across Kunthipuzha. In view of the continuing controversy over the project, a Joint Committee was set up by the Government of India to arrange for studies and to examine all aspects relating to the ecology of the Silent Valley with the specific task of determining as to whether the hydel power project, could be taken up without significant ecological harm. It was at the instance of this committee that the multi-disciplinary field investigations were undertaken in these forests. The Southern Regional Station of the Zoological Survey of India, Madras spearheaded these field studies and the papers appearing in the following pages arose out of these. A report embodying the findings and establishing its faunal uniqueness has already been submitted (Pillai, 1981). A plea for the total preservation of the Valley and abandonment of the project has been made in this report.

B. FAUNAL EXPLORATIONS

Silent Valley forests were totally unexplored from the Zoological point of view. Practically nothing was known in scientific literature on the fauna of the area and this was one of the primary urges for initiating faunal studies in the region by the Zoological Survey of India. The opportunity offered itself in the wake of the controversy over the hydel project.

The tropical rainforests that covered the entire Western Ghats in the past have so much been modified and interfered with, that only few areas now remain which represent the original conditions that prevailed before. Though the stability of such "ecological islands" is fast declining, the relict characters of fauna and flora are largely preserved here. Silent Valley forests represent one such large ecological island in Western Ghats, the faunal features of which was totally unknown.

In anticipation of a unique fauna, the Zoological Survey of India undertook faunal explorations in Silent Valley. The main objective

was to study the fauna which was expected to reveal species hitherto unknown to science, to bring out their Zoogeographical importance and affinities and to catalogue and assess the overall wealth of animal resources available there, particularly in the wake of the possible damages that are likely to be introduced to the ecosystems along with the construction of the hydel project. Accordingly four faunistic explorations were carried out by the Southern Regional Station, Madras as detailed below.

1) A multi-disciplinary expedition organised by the Geological Survey of India, Kerala circle in January-February, 1979 was the first one. The Geological Survey of India provided all infrastructure such as tentages, porters and such other help needed by the other participating departments. The object of our participation was to make general faunal collections. All major groups excepting Birds and Mammals were collected. Special emphasis was given to Amphibia and fishes. The survey was carried out from three camps, the first one at the proposed dam site. The second and third camps were established in the remote, interior areas. Collections from one end to almost the other end of Silent Valley were made along the course of Kunthipuzha. This expedition was before the controversy.

2) The second survey was carried out jointly by the Zoological Survey of India, Madras, Zoological Survey of India, Calcutta (Headquarters Office) and the Botanical Survey of India, Coimbatore in January-February 1980. Two camps were established for collections, one near the damsite and the other at Valiaparathode. General faunistic collections were made as in the earlier survey.

3) A multi-disciplinary study team drawn from Zoological Survey of India, Botanical Survey of India, National Bureau of Plant Genetic Resources, Birbal Sahni Institute of Palaeobotany and Centre for Advanced studies in Botany (University of Madras), visited Silent Valley in April-May 1980. This expedition, undertaken at the instance of the Department of Science and Technology, New Delhi, conducted further surveys with special emphasis on the submergible area and the riparian zone. The study teams addressed themselves to the filling up of a questionnaire earlier prepared, besides collection of information useful to ascertain the ecological importance of the area with reference to the possible impact of the hydel project.

4) The last multi-disciplinary expedition was organised in December, 1980 wherein 5 departments participated.

The faunal collections were made primarily for taxonomic studies. Part of the material was studied by the scientists of the Southern Regional Station, Madras but the bulk of the material was sent to specialists working in Headquarters, Calcutta and other Regional Stations of the Survey.

As a result of these more than 10,000 examples of animals belonging to several groups were collected from a wide variety of ecological niches. Some of these niches are, thickly wooded forests with unbroken canopy, open forests, grasslands along hill slopes and valleys, reed forests, marshes, riparian forests, forest litter, aquatic (main stream, tributaries and stagnant water) and soil. Fauna from inside fallen, rotting timber and those from vegetation was also collected. Light trap collections and nocturnal excursions were also made to collect nocturnal forms.

The following are the more important groups of animals collected from Silent Valley.

INVERTEBRATA : Nemathelminthes, Annelida, Crustacea, Collembola, Diplura, Thysanura, Odonata, Orthoptera, Phasmida, Dermaptera, Isoptera, Hemiptera, Thysanoptera, Neuroptera, Lepidoptera, Diptera, Dictyoptera, Hymenoptera, Coleoptera, Arachnida, Myriapoda and Mollusca.

VERTEBRATA : Pisces, Amphibia and Reptilia.

Visual identification was done for the larger reptiles, birds and mammals. A few small vertebrates were collected.

C. GENERAL OBSERVATIONS ON FAUNA

The faunal explorations made so far in Silent Valley have been far from exhaustive. In fact the collections hitherto made constitute only a very small proportion of its faunal wealth. Even so, it reveals that the animal resources here are both rare and unique. Rare, because many animals of similar kind which originally inhabited the Western Ghats belt in the past have been lost due to habitat destruction. How-

ever, they are available still in this tract which has been relatively free from human intrusion on account of its providential inaccessibility. A number of species which were available in the past and which have not subsequently been collected are still available in Silent Valley. They include insects, arachnids, fishes, amphibians, reptiles and mammals. Type specimens of many of these, described earlier by foreign scientists have been deposited in museums outside our country, even topotypes not available in India for reference studies. It is unique because what has been collected and studied proves to be of immense scientific interest from the taxonomic, zoogeographic and ecological points of view.

A few primitive groups and species of animals which could throw light on phylogenetic relations of higher taxa have been collected. Several endangered and rare species, particularly of higher taxa, are available here. The lion-tailed macaque, *Macaca silenus* and the Nilgiri Tahr, *Hemitragus hylocrius* are already endangered. Some very rare mammals like Peshwa's Bat (*Myotis peshwa*) and Hairy-winged bat (*Harpiocephalus harpia*) have also been recorded. Both these species are represented by only a handful of specimens in the museums all over the world. Five "vulnerable" mammals also live here. Other rare birds such as Ceylon frogmouth, Travancore red spurfowl, Grey jungle fowl, Bush Quail, Black eagle, Blue-winged parakeet and reptiles like the Indian monitor and Rock python and the only endangered species of Amphibia viz. The Malabar Tree toad, *Nectophryne tuberculosa* are also available here. Many new taxa have been published from this area. Some more are being published in this volume. It is quite legitimate to expect that more explorations would unfold more number of new taxa. The material collected so far has yielded very many new records, some for western ghats and some for the country. Zoogeographically this area is very interesting. Close relatives of a number of animals found in Burma, Thailand, Malaya, Philippines, Sri Lanka etc. have been discovered here.

The Valley also presents a wide variety of habitats ; living resources are available here in all their glorious diversity ; populations of globally rare species of animals, both higher and lower groups of vertebrates continue to exist here. In short, Silent valley satisfies all the basic attributes required of a Biosphere Reserve.

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VIEWS OF SILENT VALLEY FROM THE PROPOSED DAM SITE.



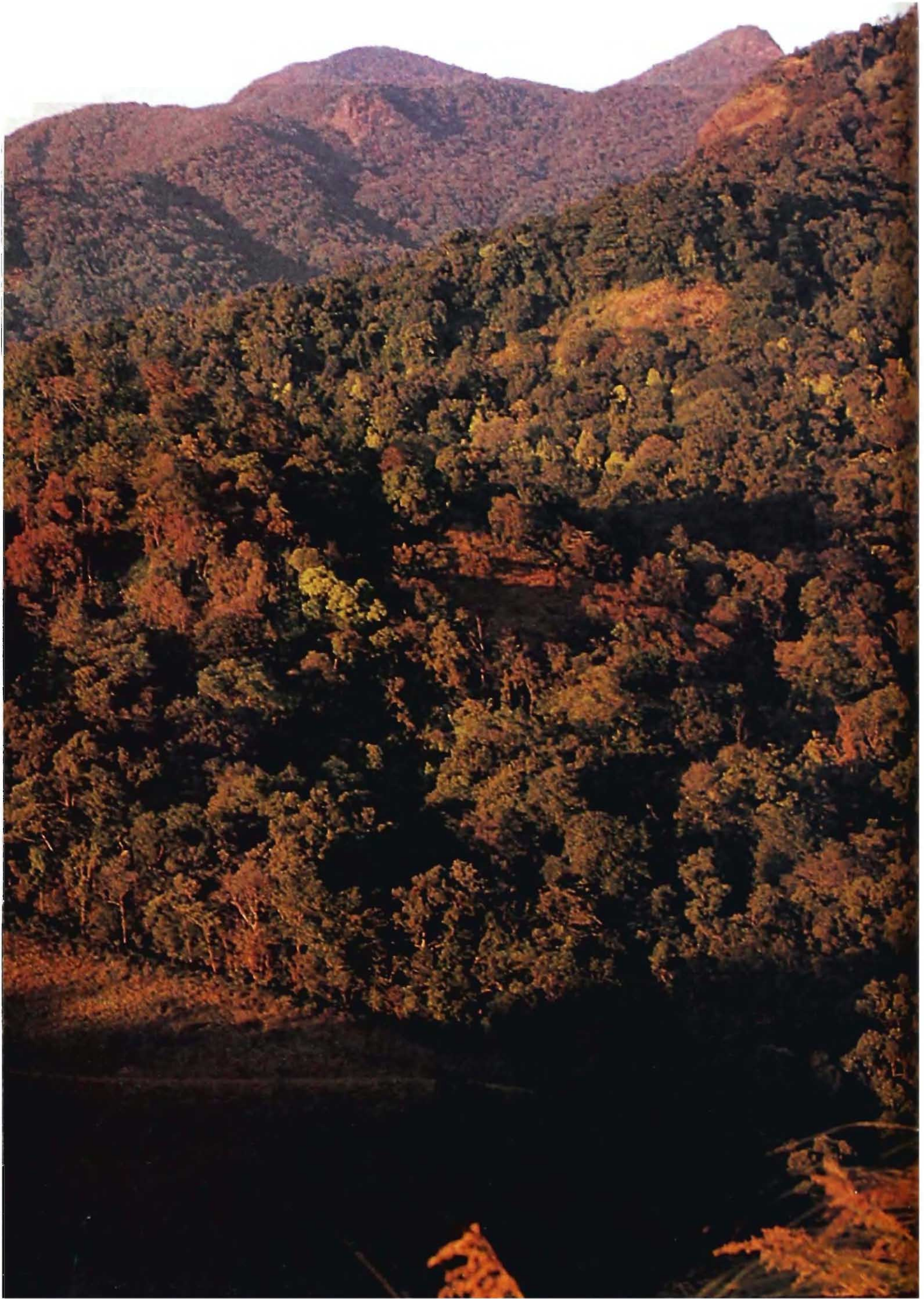
ANOTHER VIEW OF SILENT VALLEY FROM THE PROPOSED DAM SITE





A VIEW OF THE FOREST ADJOINING A GRASSLAND

EVERGREEN FOREST IN SILENT VALLEY



ON GERRIDAE AND NOTONECTIDAE
(HETEROPTERA HEMIPTERA : INSECTA)
FROM THE SILENT VALLEY, KERALA

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(With 6 Text-figures)

INTRODUCTION

The faunistic material involved in the present studies was collected during the multi-disciplinary expeditions to the Silent Velly undertaken in April-May, 1980 and December, 1980. The author was a member of the team on both occasions.

Of the eight families of Gerridae, four namely the Gerrinae, Eotrechinae, Ptilomerinae and Halobatinae were represented in the collections. The study elicited the occurrence of five new species under three new genera, with one genus hitherto unrecorded in the country, namely *Pleciobates* Esaki. The family Notonectidae was represented by two species of the genus *Enithares* Spinola of the sub family Notonectinae.

ABBREVIATION

A.	Anal vein
Ap.	Apical plate
Cu.	Cubitus
Dp.	Dorsal plate.
Ds.	Ductus seminis
L ₁	First pair of lateral plates
L ₂	Second pair of lateral plates
L ₃	Third pair of lateral plates
M.	Median
Ra.	Radius
Sc.	Subcosta
Vp.	Ventral plate

SYSTEMATIC ACCOUNT

Family GERRIDAE

Sub family GERRINAE

Genus *Tenogogonus* Stal

1. *Tenogogonus (Limnometra) anadyomene* (Kirkaldy)
2. *Tenogogonus (Limnometra) longispinulus* sp. nov.

Subfamily EOTRECHINAE

Genus *Onychotrechus* Kirkaldy

3. *Onychotrechus rhexenor* Kirkaldy

Subfamily PTILOMERINAE

Genus *Ptilomera* Amyot and Serville

4. *Ptilomera (Ptilomera) agroides* Schmidt

Genus **Pleciobates* Esaki

5. *Pleciobates indicus* sp. nov.
6. *Pleciobates nostras* sp. nov.

Subfamily HALOBATINAE

Genus *Metrocris* Mayr

7. *Metrocoris malabaricus* sp. nov.
8. *Metrocoris variegans* sp. nov.

Genus *Ventidius* Distant

9. *Ventidius (Ventidius) aquarius* Distant

Family NOTONECTIDAE

Subfamily NOTONECTINAE

Genus *Enithares*

10. *Enithares fusca* Brooks
11. *Enithares hungerfordi* Books

Family GERRIDAE

Subfamily GERRINAE

1. *Tenogogonus (Limnometra) anadyomene* (Kirkaldy)

1901. *Gerris anadyomene* Kirkaldy, *Entomologist*, **34** : 117.
 1903. *G. anadyomene* Kirk., : Distant, *The fauna of British India including Burma and Ceylon*, **2** : 117.
 1915. *Tenogogonus anadyomene* (Kirk.) : Bergroth, *Zool. Meded.*, Leiden, **1** (2) : 122.

* Genus new to the Country. All the measurements are in mm.

1928. *G. anadyomene* Kirk., : Dover : *J. Bombay nat. Hist. Soc.*, **32** (3) : 614.
1934. *Limnometra anadyomene* (Kirk.) : Lundblad, *Arch. Hydrobiol. Suppl.*, **12** : 371.
1958. *Limnometra anadyomene* (Kirk.) : Hungerford and Matsuda, *Kans. Univ. Sci. Bull.*, **39** (9) : 402.
1960. *Tenagogonus anadyomene* (Kirk.) : Hungerford and Matsuda, *Kans. Univ. Sci. Bull.*, **41** (1) : 206.
1969. *Limnometra anadyomene* (Kirk.) : Cheng and Fernando *Oriental Ins.*, **3** (2) : 105.

This species can be easily indentified by the second tarsal segment of front leg longer than first ; middle femur longer than the total body in male and about equal in female ; the abdominal connexival spines in males surpass the first genital segment and not the abdominal tip and never do so in females.

Material examined : Two apterous ♂♂ and one apterous ♀ collected from Valiyaparathodu, alt. 910 metres, coll. *R. S. Pillai* 26. IV 1980 ; one apterous ♀ collected from Karaimalaithodu, alt. 900 metres, coll. *R. S. Pillai* ; 29. IV 1980 ; apterous two ♂♂, seven ♀♀, one macropterous ♀ and four nymphs collected from Damsite, 870 alt. metres, coll. *R. S. Pillai*, 4. XII. 1980.

Distribution : BURMA ; INDIA : Tamilnadu ; Coimbatore, Kerala ; Silent Valley ; PHILIPPINES ; SRI LANKA ; MALAYA and SINGAPORE.

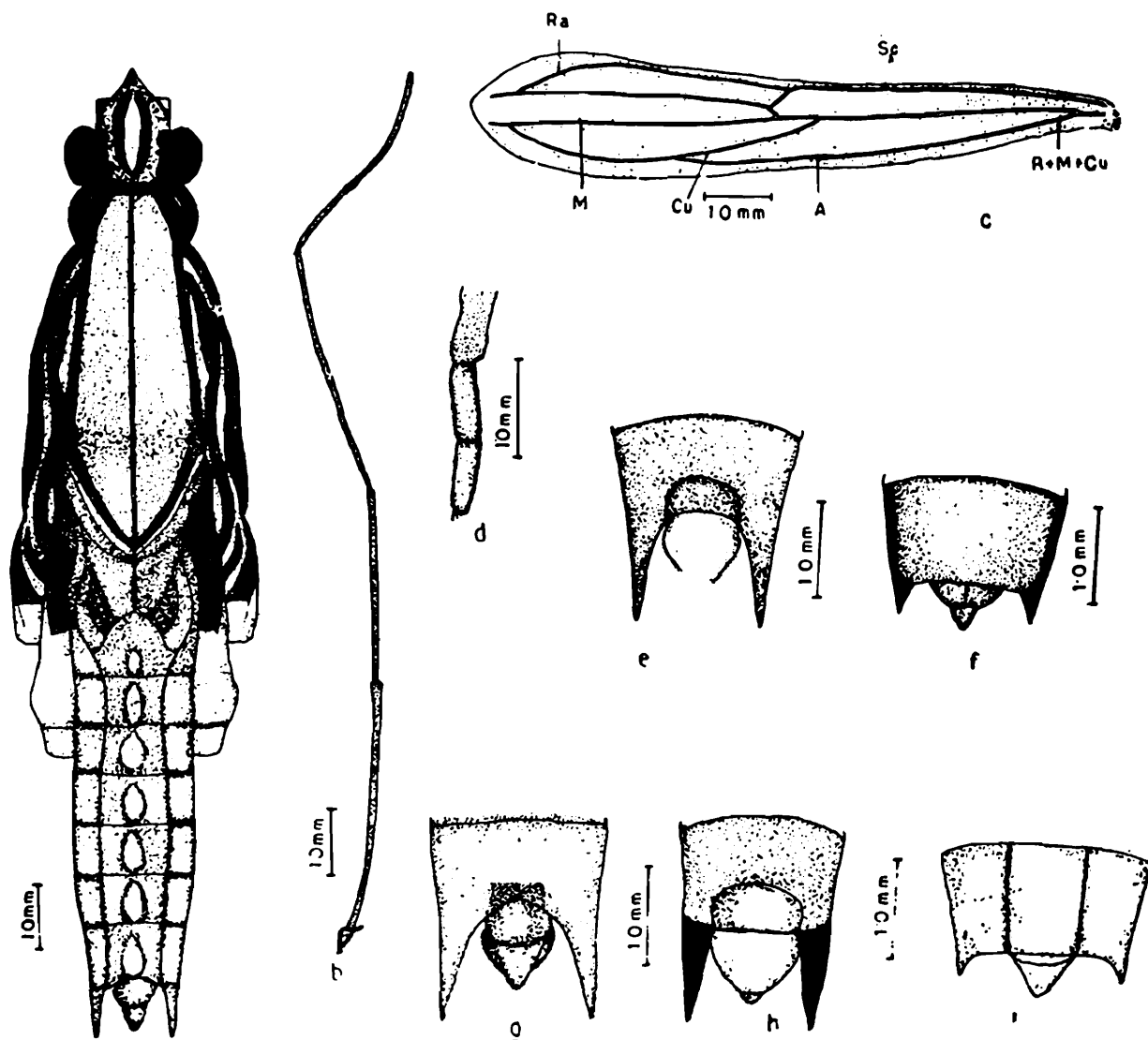
Remarks : *L. anadyomene* was first described from Pundaloya, Sri Lanka (Kirkaldy, 1901) and subsequently recorded from Sri Lanka and Philippine Islands (Distant, 1903), India (Dover, 1928), Sri Lanka (Lundblad, 1934), Sri Lanka and Southers Shan States (Hungerford and Matsuda, 1958) Malayasia and Singapore (Cheng and Fernando, 1969). During the present survey, 14 adults and 4 nymphs were collected, thus reported from Western Ghats after 63 years of gap.

2. *Tenagogonus (Limnometra) longispinulus* sp. nov. (Text-fig. 1, a-i)

Size : Apterous male : 14.6 long ; width across mesoacetabula : 4.2. Apterous female : 11.1 ; width across mesoacetabula : 3.4. Macropterous male : 12.2 ; width across mesoacetabula : 3.97. Macropterous female ; 11.6 ; width across mesoacetabula 3.2.

Colour : Reddish browh. Pronotum dark orange yellow. Antennae and legs uniform in colour. Venter light.

Text Fig.1 *Tenagonus (Limnometra) longispinulus* Sp. nov



Text-fig. 1. *Tenagonus (Limnometra) longispinulus* sp. nov.

a. Apterous male dorsal view. b. Male antenna. c. Fore wing. d. Male fore tarsus. e. Apterous male apical abdominal segments ventral view. f. Female apical abdominal segments ventral view. g. Macropterous male apical abdominal segments dorsal view. h. Macropterous male apical abdominal segments ventral view.

Apterous male : 14.6 long ; width across the mesoacetabula 4.2, brown and black markings (Fig. 1a). Head with an irregular diamond marking and two lateral stripes, the lateral stripes in front of eyes black ; venter pale ; head protruding well beyond the eyes ; anterior lobe of pronotum expanded laterally. Antenna shorter than body, IInd shortest and IVth longest. The relative length of antennal segments I-IV, 3.3 ; 2.3 ; 3.2 ; 3.4. Head including eyes wider than long. Eyes with inner margin emarginate. Rostrum slender, long,

extending anterior one third of mesonotum, third segment five times as long as the last segment.

Thorax : Pronotum a little wider than head including eyes, posterior margin broadly rounded. Pronotum with a dark median and two sublateral lines, the median band continuous over the humeri. Mesonotum about four and half times as long as second sternite. Omphalium distinct. Front leg with femur not stouter than second femur, tarsal segments are equal in length and lined with minute hairs, claws arising near apex of inner side, first tarsus slightly longer than second. Hind leg with first tarsus more than two and half times as long as second. Measurement of leg segments ; Fore leg : 5.4, 4.9, 0.7, 0.7 ; Middle leg : 17.3, 14.8, 2.0, 1.6 ; Hind leg : 16.9, 11.4, 1.8, 0.7. Colour dark brown.

Abdomen : Abdomen elongate, connexival spines well developed, dark brown dorsally, with tips black, posteriorly black, surpassing tip of abdomen and pointed tips (Fig. 1e). Eighth segment well developed with apical margin concave. Each dorsal abdominal segment with crescent shaped dark bands, embracing a paler spot, underside of connexivum dark, venter light.

Apterous female : 11.1 long ; width across mesoacetabula 3.4 ; similar to apterous male in colouration, except connexiva paler with connexival spines not surpassing the abdominal tip. The relative length of antennal segments I-IV, 2.3, 1.5, 2.2, 2.6, shorter than the total body length. Fore tarsal segments equal in length ; second femur shorter than the body. Measurements of leg segments : fore leg : 3.7, 3.3, 0.5, 0.5 ; middle leg : 9.9, 9.1, 2.2, 1.6 ; hind leg : 9.6, 6.2, 0.9, 0.6.

Macropterous male : 12.2 long ; width across the mesoacetabula 3.2 ; similar to apterous male in size and colouration. The relative length of antennal segments I-IV, 2.3, 1.5, 1.9, 2.5. Measurements of leg segments ; fore leg : 3.8, 3.2, 0.5, 0.5 ; middle leg : 10.8, 8.3, 2.9, 0.7 ; hind leg : 9.9, 6.3, 1.1, 0.6.

Macropterous female : 11.6 long ; width across the mesoacetabula 3.2 ; similar to apterous female in colour and size. The relative length of antennal segments I-IV, 2.3, 1.5, 1.9, 2.5. Measure-

ments of leg segments ; fore leg : 3.8, 3.2, 0.5, 0.5 ; middle leg : 10.8, 8.3, 2.9, 0.7 ; hind leg : 9.9, 6.3, 1.1, 0.6.

Material examined : *Holotype*, apterous ♂ on pins, collected from Damsite, alt. 871 metres, *R. S. Pillai* ; 4.xii.1980 ; *paratypes* on pins, one apterous ♂, one macropterous ♂, three macropterous ♀ ♀ and one apterous ♀ collected from Damsite, alt. 871 metres, coll. *R. S. Pillai* ; 4. xii. 1980 ; one macropterous ♂ on pins collected from Kumattamthodu, alt. 871 metres, coll. *R. S. Pillai* ; 3. v. 1980.

Distribution : India : Kerala ; Silent Valley.

Remarks : The species is close to *Tenagogonus anadyomene* (Kirkaldy) but can be readily be differentiated by the male connexival spines surpassing the tip of abdomen, front tarsal segment equal in length, middle femur in female shorter than the body.

Subfamily EOTRECHINAE

3. *Onychotrechus rhexenor* Kirkaldy

1903. *Onychotrechus rhexenor* Kirkaldy, *Entomologist*, 36 : 44.
 1903. *O. rhexenor* Kirk., : Distant, *The Fauna of British India Including Burma and Ceylon*, 2 : 183.
 1919. *O. rhexenor* Kirk., : Annandale, *Rec. Indian Mus.*, 16 (1) : 120.
 1919. *O. rhexenor* Kirk., : Pavia, *Rec. Indian Mus.*, 16 (1) : 154.
 1928. *O. rhexenor* Kirk., : Esaki, *Ann. Mag. nat. Hist.*, 10 : 509,
 1980. *O. rhexenor* Kirk., : Anderson, *Steenstrupia*, 6 (10) : 128.

This species can be differentiated by the presence of short sub-lateral light stripes in mesonotum (in wingless form), usually not surpassing middle of mesonotum. The front femur of male with elongate patch of dark spinules on inferior surface.

O. rhexenor, a hygropetric water stridder, mainly found in Western Ghats, at altitudes between 900 to 1200 metres above sea level (Anderson, 1980). They were found in a spring area an cliffs, resting, running & jumping on rock surface covered by algal growth and a thin sheet of trickling water. The developmental stages of winged and wingless forms were also collected and mating pairs were also seen. This species was also found on wet cliffs much away from the water surface, seemingly a rather ephemeral type of habitat. Anderson (1980) reported that this species has been recorded as taken at light in Southern India. It is also interesting that the record of the

species from the Island of Socotra, just east of the African Continent and the Red Sea, probably due the introduction by man (Anderson, 1980).

Material examined : Macropterous one ♂, two ♀♀ from Valiyaparathodu, alt. 910 metres, coll. R. S. Pillai ; 25. iv. 1980 ; one macropterous ♀ from Valiyaparathodu, alt. 910 metres, coll. R. S. Pillai ; 26. iv. 1980 ; one macropterous ♀ from Kumattamthodu, alt. 871 metres, coll. R. S. Pillai ; 3. v. 1980 ; macropterous four ♂♂, three ♀♀, apterous two ♂♂ and three ♀♀ from Damsite, alt. 870 metres, coll. R. S. Pillai ; 4. xii. 1980, macropterous twenty one ♂♂, four ♀♀, apterous four ♂♂, one ♀ and three nymphs collected from Road to Valiyaparathodu, alt. 1000 metres. coll. R. S. Pillai 10. xii. 1980.

Distribution : INDIA ; Karnataka, Kerala, Maharashtra, Rajasthan and Tamilnadu ; AFRICA ; Socorta.

Subfamily PTILOMERINAE

4. *Ptilomera (Ptilomera) agroides* Schmidt

1926. *Ptilomera agroides* Schmidt, *Ent. Mitt.*, **15** (1) : 63.
 1927. *P. agroides* Schmidt : Esaki, *Eos. Madr.*, **3** (3) : 259.
 1934. *P. agroides* Schmidt : Lundblad, *Arch. Hydrobiol. Suppl.*, **12** : 371, 373, 421.
 1960. *P. agroides* Schmidt : Matsuda, *Kans. Univ. Sci. Bull.*, **41** (1) : 267.
 1965. *P. agroides* Schmidt : Hungerford and Matsuda, *Kans. Univ. Sci. Bull.*, **45** (5) : 431.
 1926. *Ptilomero lachne* Schmidt, *Ent. Mitt.*, **15** (1) : 64.
 1927. *P. lachne* Schmidt : Esaki, *Eos, Madr.*, **3** (3) : 259.
 1934. *P. lachne* Schmidt : Lundblad, *Arch. Hydrobiol. Suppl.*, **12** : 372, 373, 419.
 1960. *P. lachne* Schmidt : Matsuda, *Kans. Univ. Sci. Bull.*, **41** (2) : 267.

The long dorsolateral projection of pygofer which is extending half their length beyond lateral wings of suranal plate as seen from above separates this species from all other known species of this genus (Hungerford and Matsuda, 1965). It has been reported for the first time from Kerala.

Material examined : Apterous two ♂♂, one ♀ from River Kunthipuzha, alt. 870 metres, coll. R. S. Pillai ; 17. i. 1979 ; apterous one ♂, three ♀♀ and one nymph collected from a jungle stream on the way to Mukkali Camp, coll. R. S. Pillai ; 18. i. 1979 ; one apterous ♂ collected from Damsite, alt. 870 metres, coll. R. S. Pillai ;

21 iv. 1980 ; apterous four ♂♂, three ♀♀ from Halfway to Valiyaparathodu, alt. 1060 metres, coll. R. S. Pillai ; 26. iv. 1980 ; macropterous one ♂, one ♀, from Kumattamthodu, alt. 871 metres, coll. R. S. Pillai ; 3. v. 1980 ; apterous three ♂♂ and six ♀♀ from Kumattamthodu, alt. 871 metres, coll. R. S. Pillai ; 7. xii. 1980 ; apterous two ♂♂, eight ♀♀ from Road to Valiyaparathodu, alt. 910 metres, coll. R. S. Pillai ; 10. xii. 1980.

Distribution : INDIA : Tamilnadu, Tiruchy, Tarangambadi (Tranquebar), Shevaroy Hills, Yercaud, Anamalai Hills, Cinchona, Nilgiri Hills ; Kerala : Silent Valley.

Genus *Pleciobates* Esaki

The genus *Pleciobates* Esaki was first described from a single apterous female, *P. tuberculatus* Esaki, collected from Klang River, near Klang Gates, Selangor, Malaya (Esaki, 1930). Later, Cheng and Fernando (1969) while studying the taxonomy of Malayan Gerridae, described apterous and macropterous males. However, in the present study, it is interesting to note that *Pleciobates*, a malayan genus, has been reported from India for the first time and two new species are described.

5. *Pleciobates indicus* sp. nov.

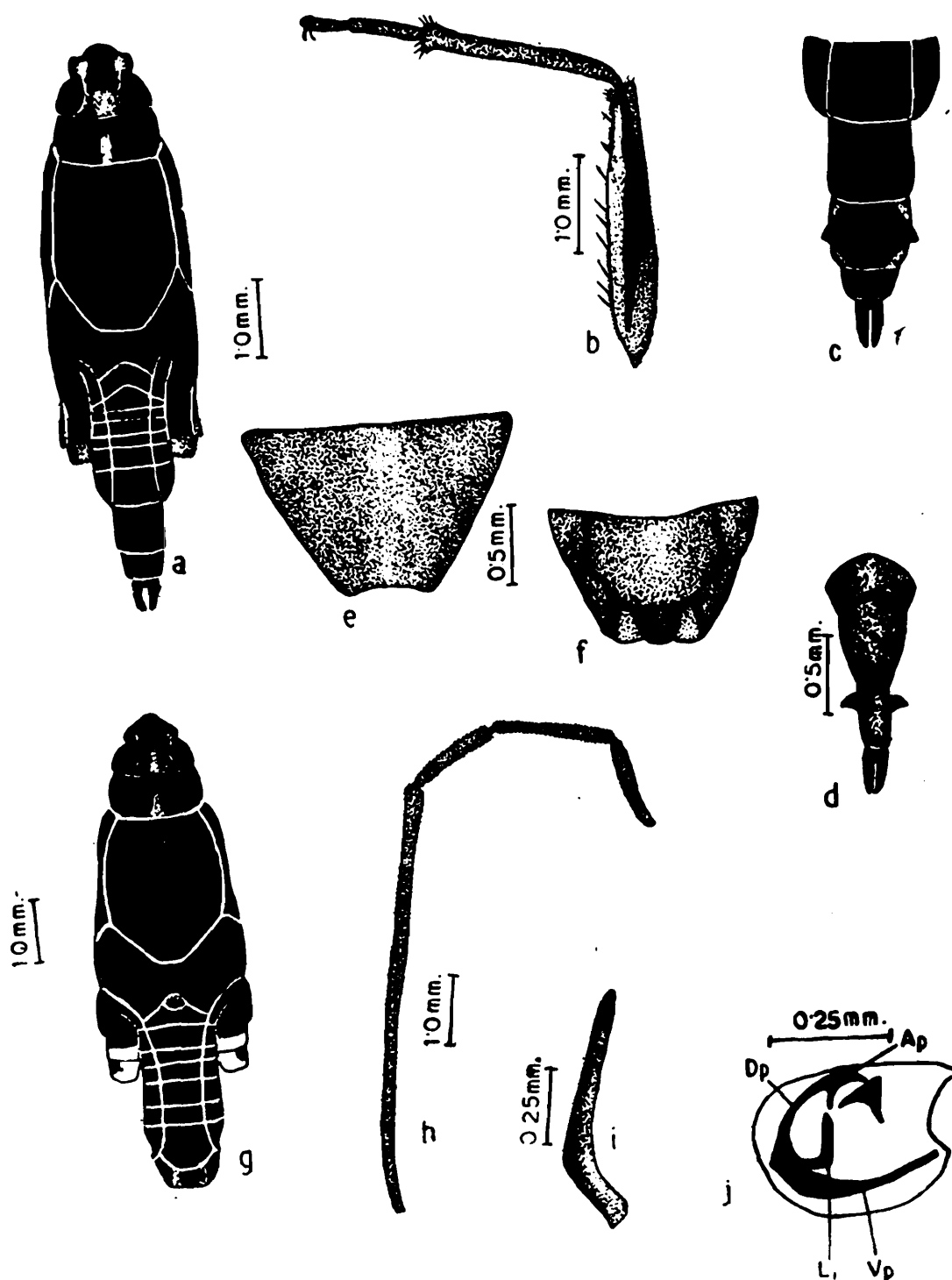
(Text-Fig. 2 a-j)

Size : Apterous male : length 6.31—6.81 ; maximum width across the body 1.63—1.69. Apterous female 6.38—6.81 ; maximum width across the body 2.13—2.19.

Colour : Pitch black, shining with dark brown markings. Antennae and legs black, venter grey with silvery pubescence.

Apterous male : Head brown, a large broad black spot at the anterior part of head, black. Head protruding well beyond the eyes, basal margin of head brown, antenniferous tubercles, extreme apex of frons black, with minute brown pubescence. Head including eyes 1.4 times wider than long. Eyes dark brown, shiny. Antenna black with a brown tinge, longer than body, segment I longest, longer than the rest of antennal segments together. IV shotest, III segment one and half times longer than II, II and IV equal in length, the relative length of antennal segments are 6.0, 1.25, 1.69, 1.25.

Text Fig 2. *Pleciobates indicus* Sp nov



Text-fig. 2. *Pleciobates indicus* sp. nov.

- a. Apterous male dorsal view. b. Fore leg of apterous male. c. Apterous male apical abdominal segments dorsal view. d. Apterous male apical abdominal segments ventral view. e. Apterous female apical abdominal segments ventral view. f. Apterous female apical abdominal segments dorsal view. g. Apterous female dorsal view. h. Male antenna. i. Male paramere. j. Endosoma lateral view.

Rostrum pilose, dark brownish black, IV segment shining black, extending upto the basal portion of prosternum, IVth segment twice as long as the second.

Thorax : Dorsal surface pitch black, shiny, a conspicuous central longitudinal brown marking arising from posterior margin of pronotum, not reaching the anterior part, lateral sutures of meso and meta-nota with silvery pubescence. Pronotum transverse, twice as wide as long, anterior and posterior margins straight, finely pubescent; prosternum brown, adpressed with silvery setae. Mesonotum long, twice as long as pronotum, moderately curved; mesosternum greyish black, adpressed with thick silvery pilosity. Metanotum about one third of mesonotum in length; metasternum very pale brown, thickly covered with silvery setae. Fore leg with two black longitudinal stripes, one on each side, a very short tubercle at apex towards inner margin, a constriction towards the inner margin near the apex on which tubercle is situated, setose; tibia shorter than femur, with a row of minute tubercles towards the inner side; tarsi two segmented, first longest, one and half as long as the second, claws arising near the apex of second. Middle leg long, slender, black, tinged coxae and trochanter brown, femur longer than body, a row of short curved spines on ventral side; tibia thin, half as long as femur, lined with long hair like setae along entire length; tarsi two segmented, brownish black, first very much longer than second. Hind leg with coxae, trochanter brown, femur long, slender, as long as middle femur; tibia short, four times as short as femur; tarsi two segmented, segments very short, first shorter than second. Measurements of leg segments; fore leg : 3.5, 2.5, 1.0, 0.63; middle leg : 9.81, 4.25, 1.69, 0.25; hind leg : 9.81, 2.69, 0.13, 0.19.

Abdomen : Dorsal surface pitch black, shiny covered with minute silvery hair like setae, apex of last genital segment dark brown with a central broad black marking, shorter than thorax; connexivum well developed, without spine. Parameres long, dark brown, curved, hairy, well protruding from IXth segment, tip pointed. Pygofer small (Fig. 2c). Endosoma with tip of apical plate broad, bifid; lateral plates paired, curved 'C' shaped; a small triangular paired plates in between apical part of dorsal plate and lateral plates (Fig. 2j).

Apterous female : General colour pattern and markings same as that of apterous male; differs from male in that the connexival spines

well developed beyond the the VIth abdominal tergum, connexiva black, shiny, spines brown and pointed. The female with a conspicuous tubercle like process in the middle of the ridge at the posterior margin of metanotum ; other structures of female are similar to male. Antennal segments I-IV measure : 3.0, 0.81, 0.88, 0.69. Measurements of leg segments ; fore leg 2.81, 2.34, 0.97, 0.72 ; middle leg : 8.78, 4.72, 1.81, 0.34 ; hind leg : 8.97, 2.59, 0.13, 0.19.

Material examined : *Holotype* apterous ♂ on pin, from a jungle stream of Aravankadu, alt. 860 metres, coll. R. S. Pillai ; 28.iv.1980.

Paratypes : Two apterous ♂ ♂, three ♀ ♀ and one nymph on pins, data same as holotype.

Distribution : INDIA ; Kerala : Silent Valley.

Remarks : This species is quite unique in the presence of the connexival spines not as long as the last two dorsal abdominal segments taken together and not directed inwardly without crossing with each other at apex in the females. The males are also different in the structure of fore femur and by the presence of indistinct connexival spines.

6. *Pleciobates nostras* sp. nov.

(Text-fig. 3 a-g)

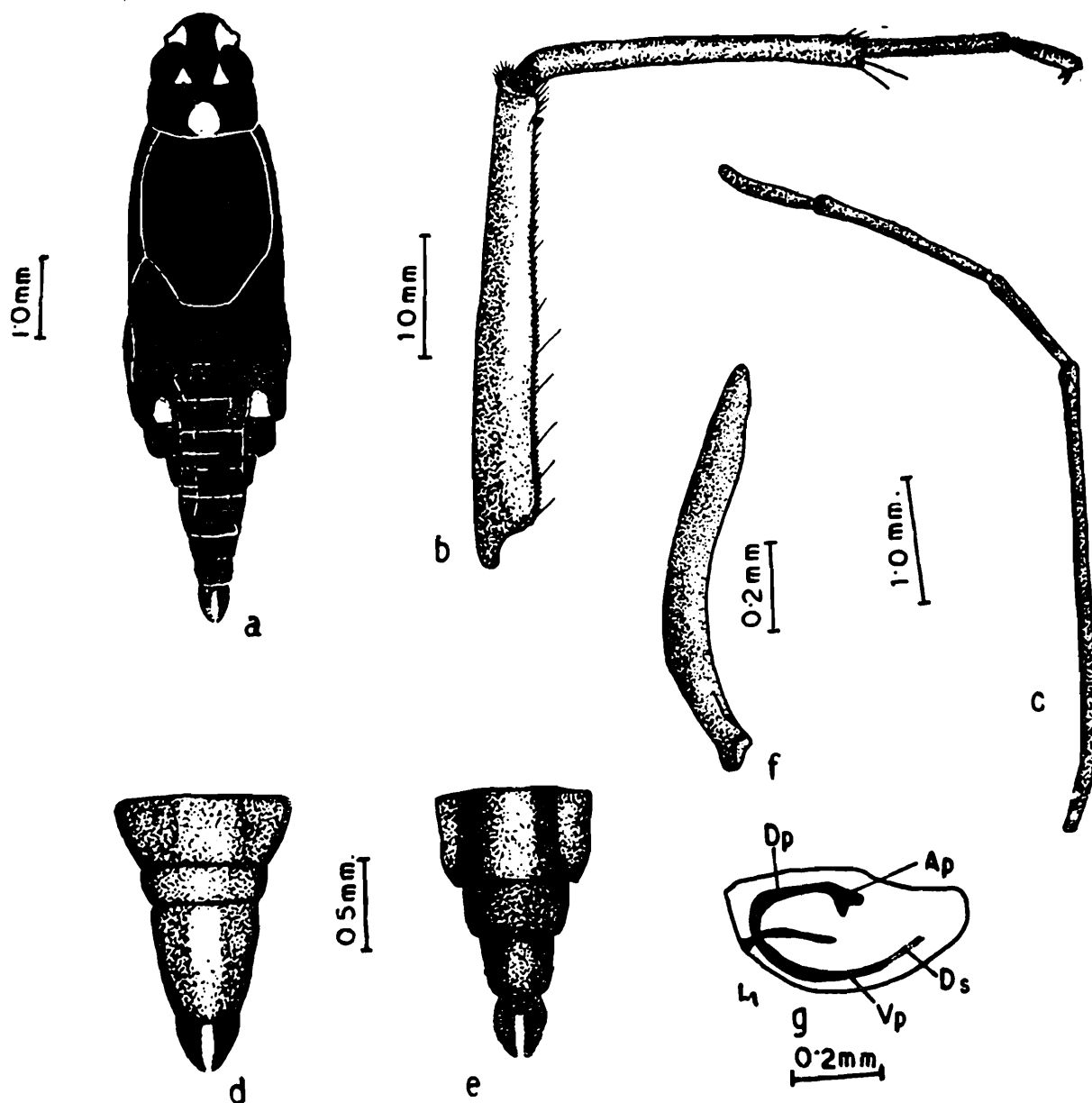
Size : Apterous male : length 7.06 ; maximum width across the body 2.19 ; body fusiform.

Colour : Shining black with light brown markings. Antennae and legs dark brownish black. Venter grey with silver pilosity.

Apterous male : Head brown, a large black fascia in the middle of the vertex anteriorly, a pair of black longitudinal streaks in front of eyes near the inner margin of eyes. Head protruding well beyond eyes. Basal margin of head, antenniferous tubercles, extreme apex of frons black, with brownish pubescence. Head including eyes 1.8 times wider than long. eyes dark brown, shiny. Antenna dark blackish brown, shorter than body, 1st segment longest, longer than the rest of antennal segments together, IVth shortest, IInd segment distinctly shorter than third, IIIrd segment 1.6 times longer than the second, the relative length of antennal segments are, 3.25, 0.88, 1.44,

0.69. Rostrum pilose, brown, not surpassing the prosternum, segment III about three times as long as the IVth, latter black.

Text Fig 3 *Pleciobates nostrus* Sp.nov.



Text-fig. 3 *Pleciobates nostrus* sp. nov.

a. Apterous male dorsal view. b. Male fore leg. c. Male antenna. d. Apterous male apical abdominal segments ventral view. e. Apterous male apical abdominal segments dorsal view. f. Male paramere. g. Endosoma lateral view.

Thorax : Dorsal surface of thorax pitch black, shiny, a conspicuous broad brown marking in the middle of the pronotum, lateral sutures of meso-and meta-nota with silvery pubescence. Pronotum transverse, twice as wide as long, anterior and posterior margins slightly curved, lateral margins concave with greyish pubescence,

prosternum brown, pubescent. Mesonotum very large, about three times as long as the pronotum, moderately convex, a little widened posteriorly ; metasternum grey, covered with silvery pubescence. Front leg brownish black with brown femur, a row of small spines on the inner side to the entire length, a short black pointed tubercle at the inner margin of the apical portion, a pair of black longitudinal stripe along its longitudinal axis, finely setose ; tibia shorter than femur, the apical part slightly enlarged ; tarsi two segmented, first segment one and half times longer than second, claws arising near the apex of the second. Middle leg long, slender, coxae and trochanter pale brown, rest of the leg dark brownish black, femur longer than body, a row of short curved spines on the ventral side towards the inner margin ; tibia thin, lined with long hair like setae along its entire length ; tarsi two segmented, first much longer than second. Hind legs with coxae and trochanter pale brown, rest dark brown with black tinge, femur long, thinner than second femur ; tibia very short, less than one third the length of the femur ; tarsi two segmented, segments very short, not easily separable, first shorter than second. Measurements of leg segments ; fore leg : 3.5, 2.5, 1.0, 0.63 ; middle leg : 9.8, 4.25, 1.69, 0.25 ; hind leg : 9.8, 2.69, 0.13, 0.19.

Abdomen : Dorsal surface of abdomen pitchy black, covered sparsely with silvery pubescence, shorter than thorax, apex of last genital segments dark brown ; connexivum well developed, with an inconspicuous spine. Paramere long, curved, well protruding from ninth segment, tips pointed. Endosoma with tip of apical plate bifid, lateral plates paired, partially sclerotized. Apterous females and macropterous forms are not known.

Material examined : *Holotype* : apterous ♂ on pins, collected from a jungle stream of Aravankadu, alt. 860 metres, coll. R. S. Pillai ; 28. iv. 1980. *Paratypes* : on pins, one apterous ♂ collected from Kariamalaithodu, alt. 871 metres, coll. R. S. Pillai ; 3. v 1980 ; two apterous ♂ ♂ from Kumattamthodu, alt. 871 metres, coll. R. S. Pillai ; 7. xii. 1980.

Distribution : INDIA ; Kerala : Silent Valley.

Remarks : *P. nostrus* is close to *P. indicus* sp. nov. in general appearance, but distinctly differs from it, in the nature of antenna which

is shorter than body ; ornamentation of the fore femora and structure ; the structure of endosoma and parameres and other characters mentioned in the description.

Subfamily : HALOBATINAE

7. **Metrocoris malabaricus** sp. nov.

(Text-fig. 4 a-i)

Size : Apterous male : 5.63—5.75 long ; maximum width across the body 3.19—3.25 ; apterous female : 5.81—6.13 long ; maximum width across the body 3.25—3.38 ; macropterous male ; 6.06 long ; maximum width across the body 3.25 ; macropterous female : 5.25 long ; maximum with across the body 3.0—3 38.

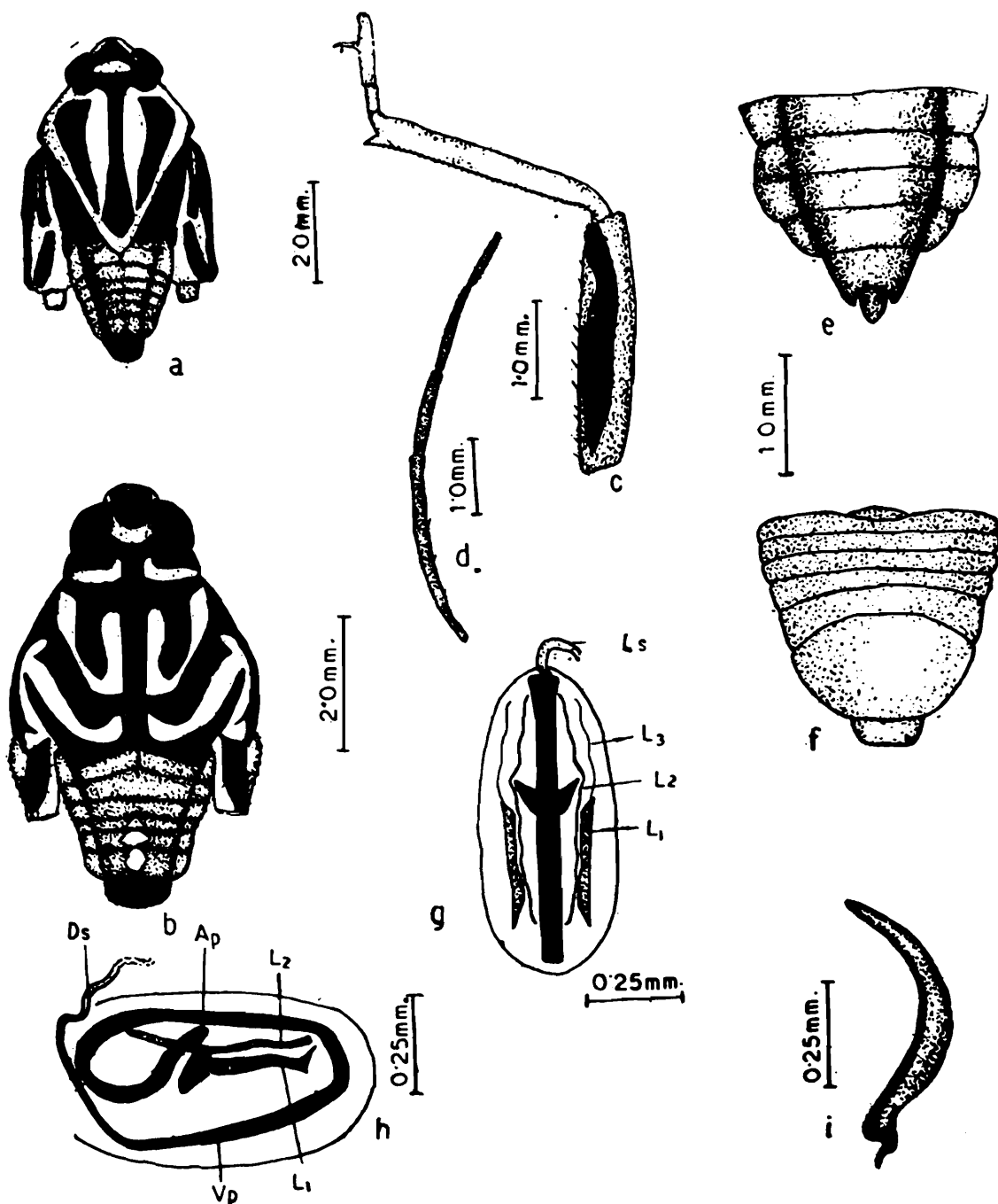
Colour : Dully yellow width black markings. Antennae and legs fuscous. Venter pale.

Apterous male : Head with a central broad black marking, frontal part of face dull yellow with a small thin longitudinal black fascia ; head protruding well beyond the eyes. Antenna shorter than body, black, basal part of Ist segment yellow ; segment I longest, IVth shortest, IIIrd shorter than IInd, Ist about two and half times as long as the IInd ; the relative length of antennal segments are, 2.25, 0.94. 0.88, 0.69. Head including eyes 2.2 times wider than long. Eyes overlapping one third of lateral part of pronotum. Rostrum yellow, apical of third and fourth segments black, short, surpassing slightly prosternum, third segments thrice as long as fourth.

Thorax : Pronotum a little wider than head including eyes, lateral margins concave, width of pronotum 3.2 times longer than its median length, finely setose and with black markings as shown in fig. 4a. Mesonotum yellow, black or brownish markings, adpressed with minute brown setose, about 4.3 times as long as metanotum ; metacetabular suture with black fasciae, covered with brownish hairs. Omphalium distinct. Fore leg with femur twice as stouter as tibia, dark brown and with longitudinal black stripe, base and lateral portions yellow without any prominent theeth or spines along inner margin ; tibia pitch black armed with a conspicuous tooth at distal end ; tarsi black, two segmented, second longest, four times as long as first, claws arising from half of apex of second. Middle leg black or brownish black, femur stouter than tibia ; tarsic urved, first 1.3 times as long as

second. Hind leg black, femur twice as long as tibia ; tarsi short and segments subequal. Measurements of leg segments ; fore leg : 2.44,

Text Fig.4. *Metrocoris malabaricus* Sp.nov.



Text-fig. 4. *Metrocoris malabaricus* sp. nov.

- a. Macropterous male dorsal view (wings removed) b. Apterous male dorsal view. c. Male fore leg. d. Male antenna. e. Apterous female apical abdominal segments dorsal view. f. Apterous female apical abdominal segments ventral view. g. Endosoma dorsal view. h. Endosoma lateral view. i. Male paramere.

2.13, 0.19, 0.81 ; middle leg : 6.69 5.38, 0.44, 0.34 ; hind leg : 6.5, 3.88, 0.38, 0.31.

Abdomen : Abdomen short without connexival spine, black, seventh segment well developed. Endosoma with apical part of dorsal plate curved, with a small extension directed ventrolaterally ; ventral plate with ductus seminicus ; lateral plates paired, first pair distinct, partially sclerotized ; second pair clearly visible, thin and wavy. A small but well developed sclerite present between the apical part of dorsal plate and the first pair of lateral plates. Parameres thin, curved, sickle shaped.

Apterous female : 5.81-6.13 long ; maximum width across the body 3.25 ; similar to apterous male in colouration pattern. Abdominal segments as in fig. 4e & f. Antenna shorter than the body, segment IV shortest, IInd and IIrd equal in length, segments I-IV measure, 2.06, 0.81, 0.81, 0.69. Measurement of leg segments ; front leg : 2.31, 1.94, 0.13, 0.44 ; middle leg : 6.5, 4.5, 1.63, 0.31 ; hind leg : 6.13, 4.06, 0.31, 0.25.

Macropterous male : Length to the tip of abdomen 6.06 ; maximum width across the body 3.25. Colour pattern differs from apterous forms ; head with a central black triangular speck. Pronotum 0.85 times as broad as its median length, markings as shown in fig. 4a, a central broad black fascia extending upto tip, a pair of curved black fasciae on either side of central one. Wings dark brown, extending well beyond the tip of abdomen. Antenna shorter than total body length, IVth segment shortest, segments I-IV measure, 2.25, 0.94, 0.88, 0.69. Measurement of leg segments ; fore leg : 2.44, 2.13, 0.19, 0.81 ; middle leg : 6.63, 5.38, 0.44, 0.38 ; hind leg : 7.25, 3.81, 0.38, 0.31. Endosoma, parameres and other structural details similar to apterous male.

Macropterous female : Length to the tip of abdomen 5.19-5.25 ; maximum width across the body 3.0-3.38. Colour pattern and markings similar to macropterous male. Antenna shorter than body, segments I-IV measure, 1.94, 0.81, 0.88, 0.72. Measurements of leg segments ; fore leg : 2.06, 1.81, 0.13, 0.44 ; middle leg : 6.0, 4.88, 1.56, 0.31 ; hind leg : 6.06, 3.75, 0.31, 0.38.

Material examined : *Holotype* : apterous ♂ on pin (endosoma and parameres on slides) collected from Half way to Valiyaparathodu, alt. 1060 metres, coll. R. S. Pillai ; 26.iv 1980. *Paratypes* : on pins (endosoma and parameres on slides), apterous one ♂, two ♀ ♀ from Road to Valiyaparathodu, alt. 1000 metres, coll. R. S. Pillai ; 23. iv. 1980 ; apterous one ♂, one ♀ and one macropterous ♀ from Half way to Valiyaparathodu, alt. 1060 metres, coll. R. S. Pillai ; 26. iv. 1980 ; one macropterous ♂ from Kumattamthodu, alt. 871 metres, coll. R. S. Pillai ; 30. iv. 1980 ; one apterous ♂ from Kariamalaithodu, alt. 871 metres, coll. R. S. Pillai ; 3. v. 1980 ; apterous two ♂ ♂ and four ♀ ♀ from way to Valiyaparathodu alt. 100 metres, coll. R. S. Pillai ; 5. xii. 1980 ; one macropterous ♀ from Kumattamthodu, alt. 871 metres, coll. R. S. Pillai ; 7. xii. 1980.

Distribution INDIA ; Kerala Silent Valley.

Remarks : The species is close to *M. lituratus* Esaki in the nature of colour markings and in the general appearance. It can be readily differentiated, however, in the markings of macropterous form, in the nature of fore leg and strikingly by the nature of endosoma.

8. *Metrocoris variegans* sp. nov.

(Text-fig. 5 a-h)

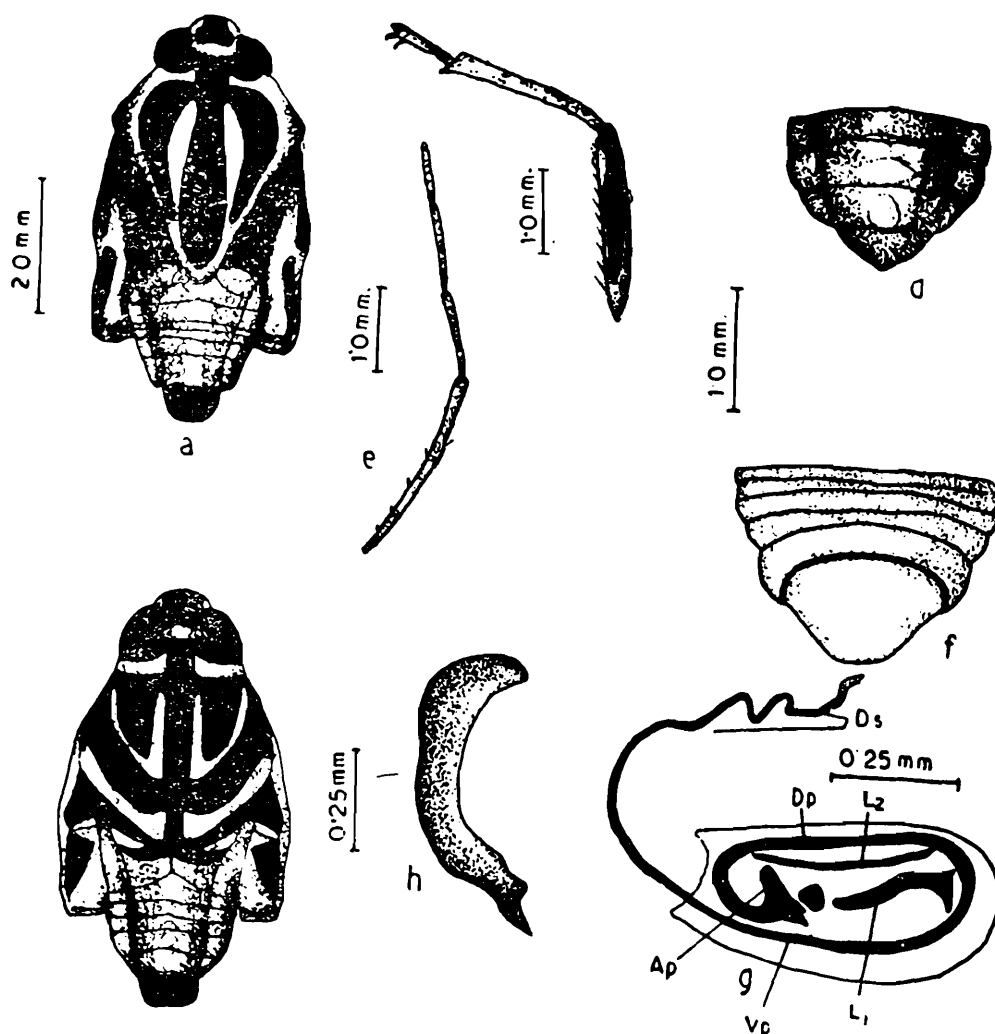
Size : Apterous male ; 6.13 long ; maximum width across the body 2.88 ; apterous female 4.94-5.44 long ; maximum width across the body 2.75-3.31 ; macropterous male 5.38 long ; maximum width across the body 2.81 ; macropterous female 4.56-5.5 ; maximum width across the body 2.88-3.19.

Colour : Dull yellow with black markings. Antennae and legs dark blakish brown. Venter pale.

Apterous male : Head with a central black marking, posteriorly connected with black fasica along the posterior part of the inner margin of eyes ; frontal part of face pale, a narrow longitudinal black fascia continued with central black marking to head ; head protruding well beyond the eyes. Antenna shorter than body, black, base of segment I pale, segment I longest, IVth shortest, IInd and IIIrd equal, segments I—IV measure, 2.31, 1.0, 1.0, 0.69. Head including eyes two and half times wider than long. Eyes overlapping one third of lateral part of pronotum. Rostrum pale yellow with apical part of

third and fourth segments black, short, surpassing posternum, third segment two and half times as long as the last segment.

Text Fig 5 *Metrocoris variegans* Sp nov



Text-fig. 5. *Metrocoris variegans* sp. nov.

- a. Macropterous male dorsal view (wings removed). b. Apterous male dorsal view. c. Male fore femur. d. Apterous female apical abdominal segments dorsal view. e. Male antenna. f. Apterous female apical abdominal segments ventral view. g. Endosoma lateral view. h. Male paramere.

Thorax : Pronotum equal or a little wider than head including eyes, lateral margins concave, thrice wider than long, medianally finely pubescent, with black fascia as shown in Fig. 5b. Mesonotum with black fasciae, adpressed with minute brownish silvery long hairs, six times as long as metanotum, meta-acetabular area with black markings, setose ; omphalium indistinct. Fore leg with femur thrice as stouter as tibia, dark brown with a black longitudinal stripe, basal one third pale yellow, without any prominent teeth or spines, a very shallow

notch without a tooth at the extreme apex towards inner side, tibia brownish black, a small tooth like prolongation at distal end; tarsi two segmented, dark brown, first very short, about six times as short as the second. Second leg black or brownish black, femur stouter than tibia, tarsi two segmented, first longest, five times as long as the second. Hind leg brownish black, femur 1.6 times as long as tibia; tarsi short, two segmented, second a little longer than first. Measurements of leg segments; fore leg : 2.5, 1.94, 0.13, 0.81; second leg : 5.44, 4.25, 1.75, 0.31; hind leg : 6.31, 4.06, 0.25, 0.31.

Abdomen : Short, black with golden pilosity, connexival spines absent, seventh abdominal segment well developed. Endosoma with dorsal portion of apical plate curved inwardly, basically indistinguishably fused with the ventral plate. The apex of apical plate has a pair of extension laterally, sclerotized. The lateral plates are paired, feebly sclerotized to moderately sclerotized. first pair distinct, second pair thin, thread like, less sclerotized, but still visible in permanent (KOH) cleared materials. Parameres short, broad, more wider in the apical half (Fig. 5h).

Apterous female : Similar to apterous male in colouration and markings. Abdominal segments as in Fig. 5d & f. Antenna shorter than body, segment IV shortest, 1st segment longest, IIIrd a little longer than IInd, segments I—IV measure, 1.88, 0.69, 0.79, 0.59. Measurements of leg segments; fore leg 2.13, 1.97, 0.13, 0.72; middle leg : 6.09, 4.38, 1.72, 0.34; hind leg 5.97, 3.72, 0.28, 0.34.

Macropterous male : Colour markings differ from apterous forms; head with a central black marking, expanded posteriorly. Pronotum 0.8 times as broad as its median length, markings as shown in Fig. 5a; with a central broad black fascia to the tip, expanded posteriorly, a pair of curved fasciae joined with central one anteriorly. Wings dark brown, extended well beyond the tip of abdomen. Antenna shorter than body, segment IV shortest, IIIrd and IInd equal, segments I-IV measure, 2.25, 0.94, 0.94, 0.69. Measurements of leg segments; fore leg 2.63, 2.25, 0.19, 0.88; middle leg 6.44, 5.25, 1.75, 0.39; hind leg : 6.44, 3.69, 0.28, 0.38. Other structural details similar to apterous male.

Macropterous female Similar to macropterous male in colouration and markings; antenna shorter than body, segment I-IV measure,

1.88, 0.75, 0.81, 0.63. Measurements of leg segments ; fore leg : 2.06, 1.88, 0.94, 0.63 ; middle leg : 6.0, 4.44, 1.69, 0.31 ; hind leg : 5.69, 3.81, 0.25, 0.31.

Material examined *Holotype* : Macropterous ♂ on pins, from Kariamalaithodu, alt. 871 metres, coll. R. S. Pillai ; 3. v. 1980. *Paratypes* : apterous one ♂, two ♀♀ and one macropterous ♀ on pins, from Valiyaparathodu, alt. 910 metres, coll. R. S. Pillai ; 26. iv. 1980 ; one apterous ♀ from Kumattamthodu, alt. 871 metres, coll. R. S. Pillai ; 30. iv. 1980 ; four macropterous ♀♀ from Kumattamthodu, alt. 871 metres, coll. R. S. Pillai ; 3. v. 1980. (Endosoma and parameres on slides).

Distribution : INDIA ; Kerala : Silent Valley.

Remarks : The species is close to *M. ciliata* Den Boer, but easily distinguished by the structure of endosoma, presence of a small tooth at the apical end of forefemur in males and other structural characters mentioned in the text.

9. *Ventidius (Ventidius) aquarius* Distant (Text-fig. 6a & b)

- 1910a. *Ventidius aquarius* Distant, *Ann. Mag. nat. Hist.*, 5 (8) : 150.
 1910b. *V. aquarius* Distant, *The fauna of British India including Ceylon and Burma*, 5 : 157.
 1928. *V. aquarius* Distant : Esaki. *Ann. Mag. nat. Hist.*, 2 (10) : 572.
 1930. *V. aquarius* Distant : Esaki, *J. Fed. Malay St. Mus.*, 16 : 18 (determined as error ; described as a new species, *V. malayensis* by Hungerford and Matsuda, 1960).
 1960. *V. aquarius* Distant : Hungerford and Matsuda, *Kans. Univ. Sci. Bull.*, 40 (7) : 324.
 1911. *Metrocoris aquarius* Distant : Bergroth, *Annl. Soc. ent. Belg.*, 60 : 186,

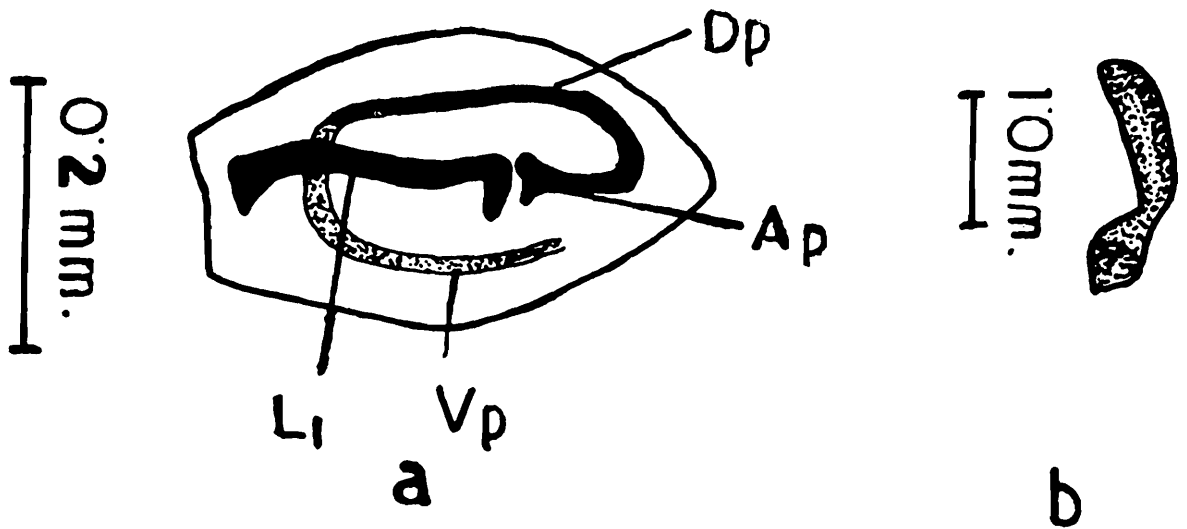
While revising the genus *Ventidius* Distant, Hungerford and Matsuda (1960) considered that a satisfactory description of *V. aquarius* awaits the capture of more specimens from South India. In the present expedition (April-May, 1980) two males, four females and three nymphs were collected from a road side jungle pool from Valiyaparathodu at an altitude of 1000 metres. The following additional descriptions may be further useful in the identification of the species.

Size Macropterous male 4.13 long ; width across the body 3.0. Macropterous female 4.5 long ; width across the body 3.2.

Colour : Ochraceous, with 'T' shaped black marking on the pronotum, hemelytra black, venter pale brown.

Description : Head longer than broad, 1.3 times in male, 1.5 times in female, black markings on base and laterally in front of innerside of eyes ; eyes black. Antenna four segmented, segment I longest, base ochraceous, Ist and IInd segments hirsute, relative length of segments, 1.59, 1.02, 0.63, 0.6 in male ; 1.41, 0.87, 0.84,

Text Fig.6. *Ventidius aquarius* Distant



Text-fig. 6. *Ventidius aquarius* Distant

a. Endosoma lateral view. b. Male paramere.

0.6 in female. Pronotum long, thrice as long as head. Measurements of leg segments ; fore leg : 1.47, 1.35, 0.37, 0.27 ; second leg : 4.05, 2.73, 0.12, 0.21 ; hind leg : 4.35, 2.4, 0.38, 0.88 in males ; fore leg : 1.47, 1.26, 0.1, 0.303 ; middle leg : 4.14, 2.58, 1.0, 0.15 ; hind leg : 4.29, 2.31, 0.29, 0.2 in female. Endosoma with apical and dorsal plates sclerotised, the former bifid at the tip, ventral plate simple, less sclerotized. Lateral plates paired, apical portion curved perpendicularly downwards (Fig. 6a), parameres short, simple as in Fig. 6b.

Material examined : Macropterous two ♂♂, four ♀♀ and three nymphs collected from Valiyaparathodu, alt. 1000 metres, coll. R. S. Pillai ; 26. iv. 1980.

Distribution : INDIA ; Kerala : Pallode, 20 miles Northeast of Trivandrum (Type), Silent Valley.

Family NOTONECTIDAE

Subfamily NOTNECTINAE

10. **Enithares fusca** Brooks

1948. *Enithares fusca* Brooks, *J. Kans. ent. Soc.*, 21 (2) : 46.
 1966. *E. fusca* Brooks : Lansbury, *Bull. zool. Nome*, 23 (4) : 192.
 1968. *E. fusca* Brooks. Lansbury, *Pacif. Insects*, 10 (2) : 412.

Material examined : Three ♂♂ and three ♀♀ collected from Damsite, alt. 871 metres, coll. R. S. Pillai ; 4. xii. 1980 and 9. xii. 1980.

Distribution : INDIA ; Kerala : Cochin, Silent Valley.

11. **Enithares hungerfordi** Brooks

1948. *Enithares hungerfordi* Brooks, *J. Kans. ent. Soc.*, 21 (2) : 41.
 1966. *E. hungerfordi* Brooks : Lansbury, *Bull. zool. Nome.*, 23 (2) : 192.
 1968. *E. hungerfordi* Brooks : Lansbury, *Pacif. Insects*, 10 (2) : 372.

Material examined : Two ♀♀ and three ♂♂ from Half way to Valiyaparathodu, alt. 1000 metres, coll. R. S. Pillai. 26. iv. 1980.

Distribution : INDIA ; Kerala : Nelliampathi Hills, Silent Valley ; Tamilnadu : Kodaikanal, Palani Hills, Nilgiri Hills, Cinchona, Top Slip.

The occurrence of the Malayan element in the fauna and flora of Peninsular India is a widely recognised fact, but how this fauna and flora came to be so dispersed and isolated are the important points that require elucidation. It is interesting to note that in this study, out of nine species of gerrids, the genus *Pleciobates*, a typical Malayan genus, was recorded for the first time from Silent Valley and thereby from India. Similarly, *Limnometra anadyomene* which is known so far from Coimbatore, in South India & Srilanka, Philippine Islands, Malaya and Singapore, has been collected in good numbers from this valley. Thus the presence of Indo-Ceylonese

and Indo-Malayan forms in Silent Valley shows its uniqueness and proves the Valley as an important reservoir harbouring various isolated genera and species which may be truly autochthonous or biogeographical relicts.

All the type-materials are deposited in Zoological Survey of India, Southern Regional Station, Madras. They will be in due course transferred to National Collections of Zoological Survey of India, Calcutta.

SUMMARY

Nine species belonging to six genera of the family Gerridae were studied, of which five new species under three genera are described from Silent Valley. The genus *Pleciobates* Esaki originally described from Burma was recorded for the first time from India. Endosoma and parameres of *Ventidius aquarius* Distant are also studied for the first time. The family Notonectidae is represented by a single genus and two species, belonging to the subfamily Notonectinae.

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ON A COLLECTION OF PENTATOMIDAE (HEMIPTERA) FROM SILENT VALLEY KERALA, INDIA

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(With 3 Text Figures)

This paper is the result of a study carried out on a collection of Pentatomidae from Silent Valley. Nothing was known about the pentatomid bugs of Silent Valley before the expeditions to the Valley during 1979-80. This report deals with 14 species including one new species, which was collected during three extensive surveys conducted by Zoological Survey of India. Although collection of pentatomid bugs from Silent Valley is still far from complete, this can form the basis for further detailed investigation of pentatomid fauna of this area.

Subfamily : PENTATOMINAE

Antestia cruciata (Fabr.)

Cimex cruciata Fabricious, 1775. *Syst. Ent.*, p. 714.

Material examined : 1 ♂, 1 ♀, Silent Valley, 12.xii. 1980.

General Colour : Yellowish green, corium purple.

Head : As long as wide at base ; lobes of equal length ; lateral margins, two longitudinal curved lines on the disc, two large spots behind the eyes and a spot around ocellus, piceous ; lateral margins reflexed ; ocelli black, near to the eyes than to each other ; first three antennal segments green, fourth and fifth piceous ; first segment not reaching the apex of head ; antennal formula $1 < 2 < 3 < 4 = 5$.

Pronotum Broader than long ; chrom yellow, anterior margin concave, reflexed ; two large anterior spots and six large discal spots dark green, the spots, deeply and darkly punctate. *Scutellum* : as long as wide at base, two round basal spots and two elongate angulate spots on disc dark green. Corium with three dark green

spots, darkly punctate ; membrane castaneous, connexivum fuscous, lateral margins yellowish green.

Body beneath and legs flavo-virens ; prosternum carinate ; rostrum light green, with apex piceous, extends upto the second abdominal segment ; thoracic sterna with four series of piceous spots and abdominal sterna with seven series of black spots.

Length : ♂ 12 mm.

Distribution : Sikkim, Calcutta, Bombay, Nilgiri Hills, Karapara, Sabarigiri, Mullaperiyar, Dharmapuri, Sri Lanka.

***Plautia fimbriata* (Fabr.)**

Cimex fimbriata Fabricius, 1787, *Mant. Ins.* 2 : 295.

Material examined : 7 ♂ , 8 ♀ , Silent Valley. 11. xii. 1980.

General Colour : Olivaceous, corium purplish red with the lateral margins green.

Head Green, longer than wide between eyes ; tapering towards apex ; juga laminated, sparingly punctate ; apex and base castaneous, lateral margins piceous ; eyes prominent, bluish-green, ocelli near to the eyes ; first antennal segment not reaching the apex of head ; first two segments and basal half of the third segment green, fourth and fifth segments ochraceous ; antennal formula : $1 < 2 < 3 < 4 < 5$; rostrum reaching third abdominal segment. *Pronotum* : green, twice as wide as long ; finely punctate ; anterior margin concave ; lateral margins entire, straight ; posteriolateral angles subprominent. *Scutellum* : green, as long as wide at base, apex narrow, rounded ; a small spot at each basal angle piceous. Corium extends beyond the apex of scutellum ; inner basal angle piceous ; darkly and thickly punctate ; apices of incisures piceous ; membrane light brown, base dark brown ; extending beyond the posterior extremity of abdomen. Dorsum castaneous, very finely punctate ; abdominal sternites and legs pale green.

Length : ♂ , 5.5 mm.

Host Plant : *Solanum torvum* Sw. (Solanaceae)

Distribution : Khasi Hills (Meghalaya) Naga Hills (Nagaland), Calcutta, Bombay, Nilgiri Hills, Wynad, Sabarigiri, Javadi Hills, Sri Lanka, Burma, Malaya, China, Japan and Madagascar.

***Carbula scutellata* Dist.**

Carbula scutellata Distant, 1887, *Trans. Ent. Soc. London*, p. 347.

Material examined : 5 ♂, 6 ♀, Silent Valley, 5. xii. 1980.

General Colour : Ochraceous.

Head : narrow, elongate, longer than wide between eyes ; lobes of equal length, rounded at the apex ; deeply and darkly punctate, eyes fuscous, ocelli pink ; antenna ochraceous ; first segment short, not reaching the apex of head ; antennal formula : $1 < 2 = 3 < 4 = 5$. **Pronotum :** three times as wide as long, strongly declivent ; anterior margin concave ; anterior angles prominent ; posteriolateral angles acutely produced into black spines ; lateral margins entire, reflexed ; posterior margin straight ; darkly and deeply punctate. **Scutellum :** as long as wide at base, apex rounded ; a large spot at each basal angle and the apex stramineous, impunctate ; disc sparingly and deeply punctate, base and lateral margin densely punctate. **Corium** purplish red, lateral margin ochraceous, thickly and deeply punctate. **Membrane** hyaline with a large dark brownish spot at the basal inner margin. **Connexivum** ochraceous ; very finely punctate ; apices of incisures piceous.

Body beneath and legs ochraceous ; femur and tibia spotted with brown ; abdomen unarmed at base, very sparingly punctate.

Length : ♂, 7.5 mm.

Host Plant : *Plectranthus wightii* Benth. (Labiatae)

Distribution : Khasi Hills, Meghalaya, Bombay, Wynad and Burma.

***Carbula socia* (Walk.)**

Mormidea socia Walker, 1867, *Cat. Het.* 2 : 262.

Material examined 2 ♂, 3 ♀, Silent Valley 5. xii. 1980.

General Colour Ochraceous.

Head twice as long as wide between the eyes ; lobes of equal length, jugam broad, apex rounded ; deeply and blackly punctate ; eyes prominent, fuscous ; ocelli pink, near to the eyes ; antennae ochraceous, first segment not reaching the apex of head ; antennal formula : $1 < 2 = 3 < 4 = 5$; rostrum reaching posterior coxae. *Pronotum* : greenish-yellow, thrice as wide as long ; deeply and darkly punctate ; emarginate, anterior angles acute ; lateral margins strongly raised ; postero-lateral angles produced into moderately long obtuse black spines. *Scutellum* : triangular, as long as wide at base, posterior half narrowed apically, apex rounded ; a large spot at each basal angles and the apex stramineous ; basal one third and lateral border thickly and darkly punctate ; disc sparingly punctate. *Corium* purplish-ochraceous with the lateral margins greenish yellow, densely and darkly punctate. *Connexivum* exposed, ochraceous, finely punctate ; apices of incisures piceous ; membrane hyaline, extending beyond the posterior extremity of abdomen.

Body beneath ochraceous, sparingly punctate, legs ochraceous spotted brown.

Length ♂, 8 mm.

Distribution : Bombay, Wynad, Sri Lanka.

***Carbula insocia* (Walk.)**

Eysarcoris insocia Walker, 1868, *Cat. Het.* 3 : 556.

Material examined 3 ♂, 2 ♀, 5. xii. 1980. Silent Valley.

General colour : Ochraceous.

Head : twice as long as wide between eyes ; lobes of equal length, apex rounded, deeply and darkly punctate ; margins sinuate before the eyes ; brown ; antennae ochraceous ; antennal formula $1 < 2 = 3 < 4 = 5$; rostrum extending upto the second abdominal segment. *Pronotum* : broader than long, deeply and blackly punctate, anterior margin concave ; anterior angles prominent ; lateral angles subprominent, obtuse. *Scutellum* : as long as wide at the base ; apex rounded ; a large spot at each basal angle and apex stramineous, impunctate ; disc sparingly punctate, lateral margins thickly punctate. *Corium* reddish brown, thickly and deeply punctate ; frena extends beyond the middle of scutellum ; a concolourous spot at distal

end impunctate. Connexivum ochraceous, finely punctate ; apices of incisures piceous. Membrane hyaline.

Body above dark brown, finely and sparingly punctate ; body beneath ochraceous ; mesosternum carinate. Legs ochraceous with brown spots.

Length : ♂ , 7.5 mm.

Distribution : N. W. Himalaya, Bombay, Bangalore.

***Placosternum taurus* (Fabr.)**

Cimex taurus Fabricius, 1781, *Spec. Ins.* 2 : 344.

Material examined : 1 ♂ , 4. v. 1980. Silent Valley.

General Colour : Ochraceous.

Head : longer than wide at base ; apex broad, rounded ; juga longer than tylus separate at their apices ; deeply and blackly punctate ; ocelli very close to the eyes ; antenna ochraceous, apical half of third, fourth and fifth segments piceous ; first segment not reaching the apex of head ; antennal formula : $1 < 2 < 3 < 4 = 5$; rostrum passing anterior coxae ; *Pronotum* : broader than long ; anterior margin concave, anterior angles acute ; lateral margins serrate ; postero-lateral angles prominently produced, bisinuate ; darkly and deeply punctate, punctures confluent and form two irregular black patches on the disc. *Scutellum* slightly longer than wide at base, apex rounded ; darkly and deeply punctate. *Corium* finely and darkly punctate ; frena extending the middle of scutellum. Connexivum exposed ; darkly punctate. Membrane light brown.

Length : ♂ , 25 mm.

Distribution : Sikkim, Khasi Hills, Cochin, Iddikki (Kerala) Burma, Siam.

***Nezara viridula* (Linn.)**

Cimex viridula Linne, 1758, *Asst. Nat. ed.* 10, p. 444.

Material examined : 3 ♂ , 7 ♀ , 10. xii. 1980. Silent Valley.

General Colour : Apple green, three small spots at the base of scutellum stramineous (in two specimens anterior two thirds of head and anterior one third of pronotum, stramineous).

Head : slightly longer than wide between eyes ; lobes of equal length ; thickly punctate ; lateral margins dark brown, first three antennal segments green ; fourth and fifth segments ochraceous ; antennal formula : $1 < 2 = 3 \leq 4 = 5$; eyes large, dark brown, ocelli red, near to the eyes than to each other ; rostrum extending to third abdominal segment.

Pronotum : twice as wide as long ; thickly punctate ; anterior margin concave, anterior angles acute ; lateral margins dark brown ; posteriolateral angles rounded ; posterior margin straight.

Scutellum : slightly longer than wide at base ; tapering towards the apex ; finely and thickly punctate ; three spots at base, yellow ; a small spot at each basal angle piceous. Corium finely and thickly punctate, frena extending beyond the middle of scutellum, apices of incisures piceous, membrane hyaline.

Body beneath pale green, convex ; a median longitudinal line stramineous ; very finely punctate ; legs green ; abdominal spine obtuse.

Length : ♂ 15 mm.

Distribution : throughout India, Burma, Sri Lanka, Pakistan, Nearectic, Palearctic Ethiopian Neotropical and Australian region.

***Spermatodes variolosa* (Walk.) Bergrowth**

Caemina variolosa, Walker, 1867, *Cat. Het.*, 1 : 82.

Material examined : 3 ♂, 2 ♀, 21. i. 1980. Silent Valley

General Colour : head except the apex, anterior margin of pronotum, a central basal spot on scutellum, body beneath and coxae piceous ; a spot before the eye, two discal spots and three basal spots on pronotum, antennae, legs and spots around spiracular openings, ochraceous ; eyes dark brown.

Head : longer than wide between eyes ; lobes of equal length ; deeply and darkly punctate ; lateral margins sinuate before the eyes ;

apex rounded, impunctate; eyes prominent, extending beyond the anterior margin of pronotum; first segment of antenna not reaching the apex of head; antennal formula: $1 < 2 < 3 < 4 < 5$. *Pronotum*: three times as wide as long; anterior margin concave, reflexed; lateral angles subprominent; deeply punctate. *Scutellum*: large, extending to the apex of abdomen; deeply punctate.

Body beneath piceous, thickly punctate, lateral margins and a series of segmental spots near the lateral margins luteous.

Length: ♂, 4 mm.

Distribution: Tenmala, Wynad (Kerala), Madras, Shencottah, Pudukotta (Tamil Nadu)

Host Plant: *Mitracarpum scaber* Z. (Rubiaceae)

***Menida formosa* (Westw.)**

Pentatoma formosa Westwood, 1837, *Hope Cat.* 1: 34.

Material examined: 2♂, 5. xii. 1980.

General Colour: dark brown with yellow markings.

Head: as long as wide between eyes; three apical longitudinal lines, two basal longitudinal lines, a large spot before the eye and lateral margins, brassy yellow; sinuate before the eyes; lobes of equal length, apex rounded, eyes dark brown, prominent; ocelli pink, near to the eyes; first three antennal segments ochraceous, fourth and fifth segments fuscous; antennal formula: $1 < 2 < 3 < 4 = 5$. *Pronotum*: castaneous, deeply punctate; thrice as wide as long; anterior margin concave, reflexed; two small spots at the anterior margin, a curved horizontal fascia on the disc, an irregular spot below the posteriolateral angle, anterior and lateral margins stramineous. *Scutellum*: as long as wide at base; a large spot at the basal angle, a small central spot at the base, a large anchorshaped apical spot stramineous, impunctate; rest deeply punctate. *Corium* castaneous, deeply punctate. *Connexivum* exposed, alternately dark brown and stramineous; finely punctate. Body beneath ochraceous, margins punctate; legs ochraceous; rostrum reaching the posterior coxae.

Length : ♂, 7 mm.

Distribution : Sikkim, Bombay, Burma, Malaya.

Eysarcoris montivagus Distant,

Brit. India, Rhynchota 1 : 166.

Material examined : 1 ♂, 10. xii. 1980. Silent Valley.

General Colour : Luteous.

Head : dark brown ; longer than wide between eyes ; lobes of equal length ; lateral margins sinuate before the eyes ; eyes large, dark brown, ocelli nearer to the eyes than to each other, antennae ochraceous ; first segment of antenna short, not reaching the apex of head ; antennal formula : $1 < 2 = 3 < 4 = 5$. *Pronotum* : much wider than long : anterior margin concave, anterior angles acute ; posteriolateral angles bluntly produced. *Scutellum* : dark brown ; as long as wide at base, tapering towards, the apex ; a large spot at each basal angle and apical margins luteous. Corium deeply and thickly punctate. Connexivum not exposed. Membrane hyaline.

Abdomen beneath with a central angulate fascia piceous ; rostrum reaching the posterior coxae.

Length : ♂, 6 mm.

Distribution : Assam, Garo Hills, Naga Hills, Mullaperiyar, Madras.

Subfamily : ASOPINAE

Cazira verrucosa (West)

Pentatoma verrucosa Westwood, 1835, *Zool. Jour.* 5 : 445.

Material examined : 1 ♂, 1 ♀, 26. iv. 1980, Silent Valley.

General Colour : Ochraceous.

Head : longer than wide between the eyes ; lobes of equal length, sinuate before the eyes ; sparingly punctate ; apex rounded ; lateral margins before the eyes, a spot around the ocellus, piceous ; first segment of antenna very short, not reaching the apex of head ; antennal formula ; $1 < 2 = 3 = 4 < 5$; eyes prominent. *Pronotum* :

twice as wide as long ; narrow anteriorly, deeply and densely punctate, anterior margin concave, anterior angles acute ; lateral margins curved and finely serrate ; posteriolateral angles spinously produced, bifid ; posterior margin straight ; *Scutellum* : as long as wide at base ; two small tubercles at the base impunctate ; posterior half of scutellum dark brown, deeply punctate ; posterior half narrow, ochraceous, deeply depressed ; apex rounded, notched, margins strongly raised. *Corium* : lateral margins deeply and sparingly punctate, rest finely punctate ; two large discal spots piceous. *Connexivum* smooth, membrane pale brown, extending beyond the posterior extrimity of abdomen.

Abdomen beneath piceous, deeply punctate ; lateral margins and apex ochraceous ; 4th abdominal segment in male depressed ; abdominal spine reaching posterior coxae ; legs ochraceous, anterior legs with two yellow spots and with a pair of spines one long and acute and the other short and obtuse ; intermediate and posterior femora each with a spine and annulated with yellow ; rostrum just passing intermediate coxae.

Length : ♀ , 9 mm.

Distribution : Sikkim, Assam, Khasi Hills, Naga Hills, Calcutta. The bug is found feeding on the beetle *Aulacophora* sp.

Subfamily CORIDINAE

Coridius singhalanus Distant. 1900, *A.M.N.H.* (7) 6 : 222.

Material examined : 5 ♂ , 2 ♀ , 16. 1. 1980, Silent Valley.

General Colour : Ochraceous.

Head as long as wide between eyes ; juga longer than tylus, cleft between their apices ; lateral margins sinuate before the eyes ; densely punctate ; eyes prominent ; ocelli pink ; antennae piceous, fifth segment ochraceous, first segment incrassate, short, extending upto the apex of the head ; antennal formula : $1 < 2 = 3 < 4 < 5$. *Pronotum* : much wider than long, densely punctate ; posteriolateral angles not prominent. *Scutellum* : as long as wide at base, apex rounded ; membrane brown. *Connexivum* exposed, deeply punctate ; segmental angles acute. Body beneath ochraceous, finely punctate ;

spiracles piceous ; mesosternum sulcate ; metasternum carinate. Hind tibiae of female each with an oval-shaped tympanum.

Length ♂, 18 mm.

Distribution : Sri Lanka (reported for the first time from India).

Subfamily : TESSARATOMINAE

Dalcantha dilatata Amyot & Serville, 1843, Hem. 171 ; Distant. 1900, *A.M.N.H.* (7) 6 : 61.

Material examined : 1 ♀, 4. xii. 1980. Silent Valley.

General Colour fuscous with a tinge of olive green.

Head : short, as long as wide between eyes, juga broad, longer than tylus, meeting at the apex ; anterior angles round ; lateral margins sinuate ; eyes prominent ; ocelli near to the eyes ; antennae piceous ; first segment of antenna extending beyond the apex of head ; second segment longer than third, rest mutilated. *Pronotum* : twice as wide as long, finely punctate ; anterior angles round ; posteriolateral angles broadly and subtruncately produced upwards ; lateral margins serrate. *Scutellum* : wider than long ; strongly concave, ochraceous, finely punctate ; apex narrow, rounded ; *Corium* : distal end extending beyond the apex of scutellum ; anterior lateral margin ochraceous, finely punctate. Membrane brown, extending beyond the posterior extremity of abdomen, connexivum exposed, segmental angles rounded.

Body beneath : aspersus ; spiracles piceous ; legs fuscotestaceous.

Length : ♀, 29 mm.

Distribution : North India, Cachar.

Subfamily : PHYLLOCEPHALINAE

Genus *Gellia* Stal 1864, *Hem. Afr.* 1 : 243.

Type : *G. albivittis* Germ. African species.

Head : large, dilated ; lateral lobe longer than central lobe ; lateral margins incised and amplified before the eyes ; apex rounded, lateral lobes not widely separated ; posterior margin of pronotum not broader than base of scutellum ; anterior angles of pronotum laminately produced.

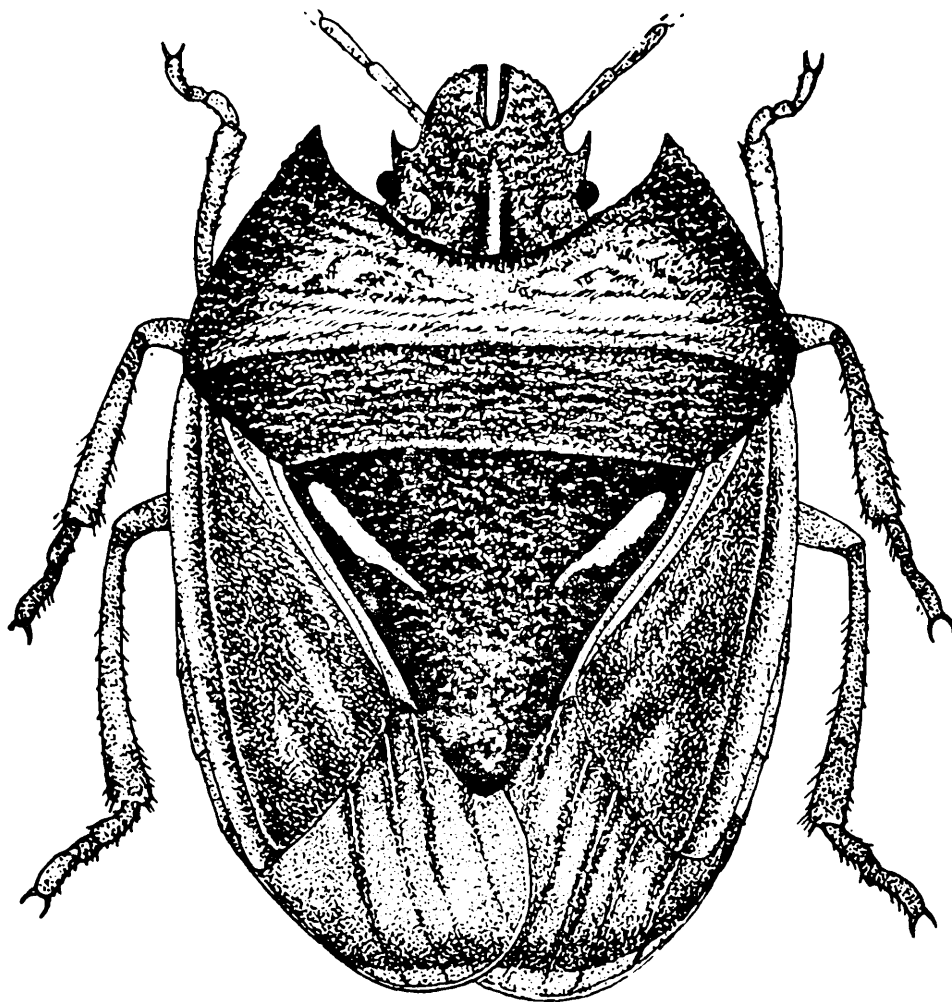
Distribution Ethiopian and Oriental Region.

***Gellia kuntiae* (Sp.n.)**

(Figs. 1—3)

General shape of the body oval, ochraceous, 1.75 times as long as wide ; densely punctate.

Head : as long as wide. between eyes ; jugae surpassing tylus, separate at apices ; margins of tylus blackly punctate ; lateral margins of head, incised in front of the eyes, (Fig. 2B) anteriolateral margins serrate ; a mid-dorsal line pale ochraceous ; first segment of antenna not reaching the apex of head, ochraceous ; first, second and third



0.3mm

Fig-1

Fig. 1. *Gellia kuntiae* Sp. nov., female, Holotype

segments subequal, (Fig. 3B) rest mutilated ; eyes small, ocelli near to the eyes than to each other. *Pronotum* : maximum width of pronotum almost twice its median length ; anteriorly declivent, central disc, arched ; anterior half thickly punctate with brown punctures and posterior half with black punctures ; anterior angles laminately produced forwardly into acute processes ; lateral margins serrate, lateral angles rounded. *Scutellum* : triangular, slightly longer than wide at base ; apex rounded ; darkly and thickly punctate ; two large liner spot at the base stramineous, impunctate. *Corium* : reddish ochraceous, finely punctate ; frena extending beyond the middle of scutellum ; membrane hyaline ; extending slightly beyond the posterior extrimity of abdomen ; veins dark brown. *Connexivum* ochraceous, margins exposed, ventral surface of the body and legs ochraceous ; rostrum dark brown, just passing anterior coxae ;

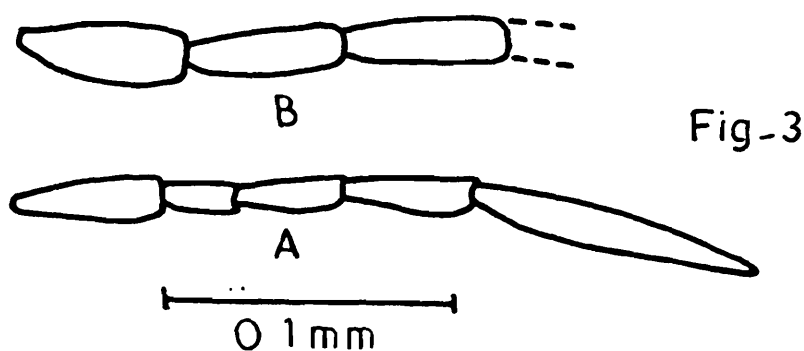
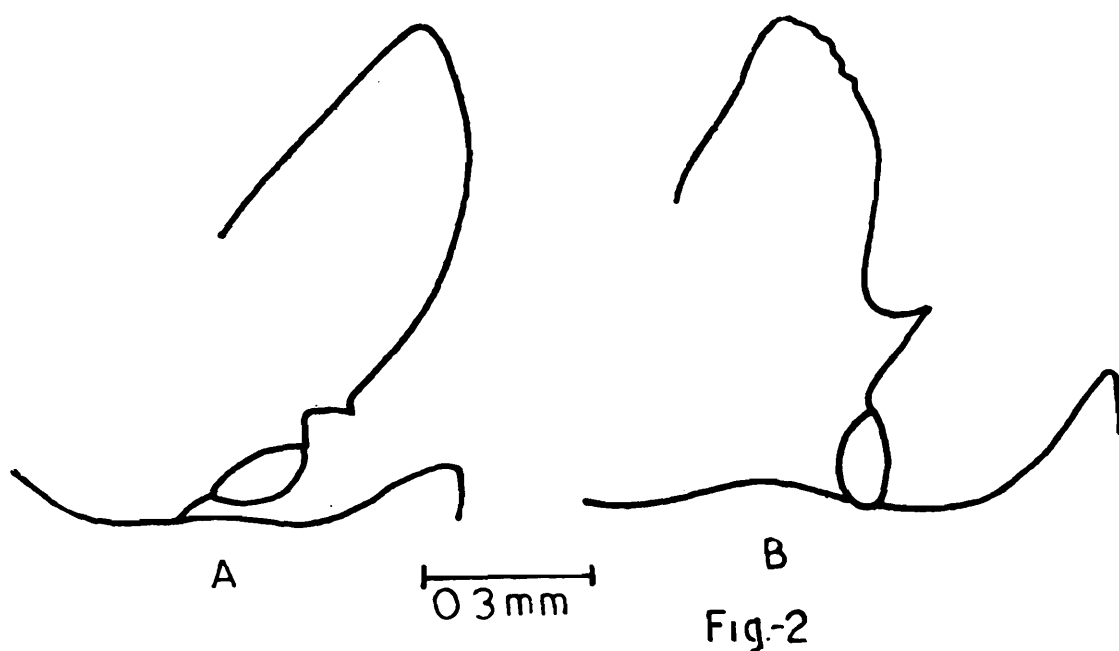


Fig. 2. A. *Gellia nigripennis*, dorsal view of right jugum. B. *Gellia kuntiae* Sp. nov., dorsal view of right jugum.

Fig. 3. A. *Gellia nigripennis*, antenna ; B. *Gellia kuntiae* Sp. nov. antenna.

metasternum carinate ; each spiracular opening bordered by a stramineous spot ; abdomen unarmed at base. Holotype ♀, India, Kerala, Silently Valley, 15. 1. 1980, K. R. Rao, Zoological Survey of India, Southern Regional Station, Madras.

The new species can be separated from *G. nigripennis* Dall., the only other species known from India, by the following characters :—

<i>Gellia kuntiae</i> (Sp.n.)	<i>Gellia nigripennis</i> Dall
1. Anteriolateral margin of head serrate.	Anteriolateral margin of head not serrate.
2. Lateral margins of head before eyes deeply incised.	Lateral margins of head before eyes not deeply incised.
3. Lateral margins of pronotum serrate.	Lateral margins of pronotum not serrate.
4. First and second antennal segments subequal.	First antennal segment twice as long as second segment.
5. Scutellum with two linear stramineous spots at the base.	Scutellum without spots at base.

Length : ♂, 12 mm.

Distribution : Known only from the type locality in Kerala,

ACKNOWLEDGEMENT

I am thankful to the Director, Zoological Survey of India, and the Deputy Director, Southern Regional Station, Madras, for permitting me to study the materials and for facilities. I am also grateful to Shri D. Sengupta, Artist Gr. I for the illustrations and to Kumari J. Lakshmi who typed the manuscript with precision.

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ON A COLLECTION OF LEAFHOPPERS (CICADELLIDAE HEMIPTERA) FROM THE SILENT VALLEY

By

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(With 7 Text-figures)

INTRODUCTION

The present paper deals with the studies on a collection of leafhoppers of Silent Valley collected by Dr. R. S. Pillai, Shri K. R. Rao and parties during the surveys conducted in 1979 and 1980. Lying in the lush green forests of Western Ghats, near Mannarghat of Palghat district of Kerala, Silent Valley constitutes the thickest evergreen tropical forests in the country. Silent Valley which is spread over 8000 hectares is drained by the main river Kuntipuzha which originates at an elevation of 2200 m. in the north and reaches the Mannarghat plains with an average elevation of about 60 m. Area of survey, included grasslands and sholas on valleys and mountain slopes, riverine belts, especially at the areas of proposed dam site which are all of great scenic and aesthetic beauty.

Our knowledge of cicadellid fauna of India is confined to the works of Distant (1908, 1916, 1918) and Pruthi (1936, 1937, 1938), who have worked on the cicadellid fauna of Western Ghats in a general way. No one has however reported so far, any leafhoppers from the Silent Valley.

This paper lists 14 species of Cicadellidae with necessary collection data and taxonomical observations. *Doratulina jacosa* (Melich.) and *Doratulina laetus* (Dist.) are originally recorded from Sri Lanka and they are now reported here for the first time from India. *Doratulina laetus* was originally described by Distant under the genus *Deltocephalus*, but now it is treated in this paper under *Doratulina* by the author.

The classification followed in this paper is after Young (1979) and Oman (1949) who have treated the leafhoppers under a single

family, Cicadellidae, although Metcalf (1962–68) has treated them under the super family Cicadelloidea and considering seventeen different families under it. Metcalf's classification has not found wide acceptance by many workers on cicadellidae.

SYSTEMATIC ACCOUNT

Family : **CICADELLIDAE**

Borthrogonia ferruginea (Fabricious)

Cicada ferruginea Fabricious, 1794, *Ent. syst.* ; 32.

Tettigoniella ferruginea (Fabr.) : Distant, 1908, *Fauna Brit. India*, Rhynchota, **4** : 202 ;
Datta, 1973, *Zool. Anz* ; **191** (5 & 6) : 458.

Borthrogonia ferruginea (Fabr.) : Metcalf, 1965; *General Catalogue of the Homoptera*,
Cicadelloidea, Fasc. vi. i. : 235.

Material : 1 ♂, 1 ♀, Silent Valley, Valiyaparathodu, 22. 1. 80,
Coll. K. R. Rao ; 1 ♀, damsite, Kumatanthodu, Coll. R. S. Pillai.

Distribution : Reported from North India, Assam, Khasi Hills,
Manipur, Burma and Indonesia.

Remarks : The specimens were collected along the river bank
on the grass patches. Vertex with the black spot and face with the
transverse spot seen divided in certain specimens.

Cofana spectra (Distant)

Tettigoniella albida (nec Walker) Signoret, 1853, *Ann. Soc. Ent. Fr.* **21**, 3 : 663.

Tettigoniella spectra (Distant), 1908, *Fauna Brit. India*, Rhynchota, **4** : 211 ; new
name for *Tettigella albida* Signorata, 1853 not *Tettigonia albida* Walker 1851.

Tettigella specta (Distant) : Ishihara, 1953, *Matsuyama Agr. Coll. Sci. Rep.* **11** : 16.

Cofana spectra (Distant) : Young, 1979, *Proc. ent. soc. Wash.* **81** (1) : 21.

Material : 2 ♀ ♀, 2 ♂ ♂, Silent Valley, 18. 1. 79, Coll. R. S.
Pillai ; 1 ♂, 1 ♀, along Kuntipuzha, 19. 1. 80, Coll. K. R. Rao.

Distribution : Reported from India, Sri Lanka, Burma, Philip-
pines, Japan, Australia and Africa.

Remarks : These were found hopping from one blade to the
other in the grasslands. Some specimens were observed to have dark
fuscous markings in scutellum at the basal region.

Hecalus porrectus (Walker)

Accocephalus porrectus Walker, 1858, *List. Hom. suppl.* 232.

Thomsoniella porrecta (Walker) : Distant, 1908, *Fauna Brit. India*, Rhynchota, **4** : 278.

Thomsoniella viridis Distant, 1908 : Morrison, 1973. *Pacif. ins.* ; 15 (3-4) : 421.

Thomsoniella albomaculata Distant, 1908 ; Morrison, 1973, *Pacif. ins.* ; 15 (3-4) : 421.

Parabolocratus porrectus (Walker), Distant, 1918 : Morrison, 1973. *Pacif. ins.* ; 15 (3-4) : 421.

Parabolocratus albomaculatus (Distant), 1918 : Morrison, 1973. *Pacif. ins.* ; 15 (3-4) : 421.

Hecalus porrectus (Walker) : Morrison, 1973, *Pacif. ins.* ; 15 (3-4) : 421.

Material : 1 ♂, Silent Valley, Advance Camp II, 23. 1. 78, Coll. R. S. Pillai, 1 ♂, 1 ♀, base Camp 25. 1. 80 Coll. K. R. Rao.

Distribution Widely distributed in the oriental region and occurring in Australia.

Remarks : The species exhibits sexual dimorphism as noted by Morrison (1973) ; the females have been reported as *Porrectus* and males as *albomaculatus* by Rao (1968) and Morrison (1973).

***Hecalus apicalis* (Matsumura)**

Parabolocratus apicalis Matsumura, 1912, *Sapporo Coll. Agi. J.* 282.

Hecalus apicalis (Matsumura) ; Morrison 1973, *Pacif. ins.* ; 15 (3-4) : 424.

Material : 1 ♂, 1 ♀, Silent Valley, eastern side of advance Camp II, along a tributary of Kunti river. 26. 1. 79 ; Coll. R. S. Pillai.

Distribution : Reported from Sri Lanka, Raipur from India, Formosa and Lappa islands.

Remarks : Ochraceous facsiae on vertex and pronotum not clearly seen.

***Existianus indicus* (Distant)**

Athysanus indicus (Distant), 1908, *Fauna Brit. India*, (Rhynchota) 4 : 344.

Phyrnomorphus indicus (Distant) : Distant, 1918, *Fauna Brit. India*, Rhynchota 7 : 51 ; Rao, 1973, *Ind. Jour. Ent.*, 35 (4) : 350.

Existianus indicus Oman 1938, 383, equals *Athysanus indicus* Distant : Metcalf 1967. *General Catalogue of the Homoptera*, Cicadelloidea, VI, 10 (1) : 323.

Existianus indicus (Distant) : Metcalf, 1967. *General Catalogue of the Homoptera*, Cicadelloidea, VI, 10 (1) : 322.

Material : 1 ♂, Silent Valley, Kuntipuzha, 17. 1. 79, Coll. R. S. Pillai ; 1 ♀, Camp site, 10. 12. 80, Coll. K. R. Rao 1 ♂, 1 ♀, along Kuntipuzha, 17. 1. 80, Coll. K. R. Rao.

Distribution : Reported from India, Nepal, China, Formosa, Philippines and Australia.

Remarks : Transverse fascia between the eyes in the specimens are very dark, face with a feeble central black line, but having dark lateral striae.

Existianus fusconervosus (Motsch)

Athysanus fusconervosus Motsch, 1863, *Bull. soc. Nat. Mose* 36 (3) : 97.

Phyrnomorphus fusconervosus (Motsch) : Distant 1918, *Fauna Brit. India*, Rhynchota, 1 : 51.

Existianus fusconervosus Motsch. Oman, 1938 : 383 equals *Athysanus fusconervosus* (Motsch) : Metcalf, 1967, *General Catalogue of the Homoptera*, Cicadelloidea, VI 10 (1) : 321.

Material : 1 ♂, Silent valley, a tributary of Kunti river, eastern side of advance camp II 26. 1. 79, Coll. R. S. Pillai.

Distribution : Recorded from Bombay, Poona, Madras, U. P., Sri Lanka, Philippines, Java, Bali, Lambok, Flores, Palestine.

Remarks : Face with a central black line well visible.

Thamnotettix paraveinatus Singh-Pruthi

Thamnotettix paraveinatus Singh-Pruthi, 1936, *Mem. Indian Mus.* 11 (3) : 117.

Thamnotettix paraveinatus Singh-Pruthi : Metcalf, *General Catalogue of the Homoptera*, Cicadelloidea VI, 10 (1) : 769.

Material : 1 ♀, Silent Valley, 4 km towards north of Valiyaparthodu, 24. 1. 80, Coll. K. R. Rao.

Distribution : It has so far been reported from Kodaikanal, Mysore, Bengal and Sikkim.

Remarks : Metcalf (l.c.) lists the species as available from Madras alone, where as it is reported from other areas also as indicated above.

Nephotettix virescens (Distant)

Solenoccephalus virescens Distant, 1908, *Fauna Brit. India*. Rhynchota, 4 : 291.

Nephotettix bipunctatus (Fabr.) Distant, 1908, *Fauna Brit. India*, Rhynchota, 4 : 359.

Nephotettix impliciticeps Ishira, 1964, *Trans. Shikoku ent. Soc.* 8 : 42.

Nephotettix impicticeps Ishihara & Kawase, 1968, *Appl. Ent. Zool.* 3 : 123.

Nephotettix virescens (Distant), Ghauri, 1971, *Bull. Ent. Res.* 60 : 484.

Material : 2 ♂ ♂, Silent Vailey, south Kuntipuzha, 25. 1. 79, Coll. R. S. Pillai ; 1 ♂, 1 ♀, Kuntipuzha, 18. 1. 80 Coll. K. R. Rao.

Distribution : India, Sri Lanka, China, Burma, Hongkong, Vietnam, Indonesia, Laos Malaysia and Indochina.

Remarks : This species and the following species are known to be the vectors for transmitting virus diseases in Rice.

***Nephotettix nigropictus* (Stal)**

Thamnotettix nigropicta Stal, 1870, *Obv. Vet. Ak. Jorth* ; 740.

Nephotettix apicalis sensu Distant, 1908, *Fauna Brit. India*, Rhynchota, 4 : 360.

Nephotettix apicalis sensu, Ishihara, 1964, *Trans. Shikoku ent. Soc.* 8 : 42.

Nephotettix apicalis sensu Ishihara, et Kawase, 1968. *Appl. ent. Zool.* 3 : 123.

Nephotettix nigropictus (Stal) Ghauri, 1971, *Bull. ent. Res.* 60 (3) 491.

Material : 1 ♂, 1 ♀, Silent valley, forest, south of camp, across Kunti river, 24. 1. 79, Coll. R. S. Pillai, 2 ♂ ♂, 1 ♀, Silent Valley, dams site and along the Kuntipuzha, 19. 1. 80. Coll. K. R. Rao ; 1 ♀, Valiyaparathodu, 3. 5. 80, Coll. R. S. Pillai ; 1 ♂, 1 ♀, Kumatanthodu, 7. 12. 80, Coll. R. S. Pillai.

Distribution : Widely distributed through New Guinea, Philippines, China, Laos, Indonesia, Hongkong, Vietnam, Thailand, Malaysia, Burma, Nepal, India, Pakistan and Sri Lanka.

Remarks : Metcalf (1968) provides a long list of synonyms for the species and the earlier species, under the name *Nephotettix apicalis* (de Motschlusky), but here the synonymy for *N. nigropictus* (Stal) is followed after Ghauri (1971).

***Cicadula bipunctata* Singh-Pruthi**

Cicadula bipunctatus Singh Pruthi, 1930, *Mem. Indian. Mus.* 11 : 59.

Cicadula bipunctata Singh Pruthi : Metcalf, 1968, *General Catalogue of the Homoptera*, Cicadelloidea, VI, 10, (2) : 1960.

Material : 2 ♀ ♀, Silent valley, dams site, 25. 1. 80, Coll. K. R. Rao.

Distribution This species has so far been reported from Central and Southern India.

Remarks : This a small species with two distinct tiny spots on the vertex. This species although originally described by Singh Pruthi as *Cicadula bipunctatus*, Metcalf has since changed the species ending to *C. bipunctata* in accordance with the suggestions given by Black Welder and the same is retained here.

Balclutha indica (Singh Pruthi)

Eugnathodes indica Singh Pruthi, 1930, *Mem. Indian Mus.* **11** (1) : 48 ; Mathur, 1953, *Indian Forest leaflet* (Ent.) **121** (3) : 162.

Balclutha indica (Singh Pruthi) : Metcalf 1968 *General Catalogue of the Homoptera*, Cicadelloidea, VI **10** (3) : 2407.

Material : 1 ♂, 1 ♀, Silent valley, Panthanthodu, 13. 12. 80, Coll. R. S. Pillai.

Distribution : It has been recorded from Himalay, Punjab, Madhya Pradesh, Central India and Madras.

Recilia dorsalis (de Motschulsky)

Deltocephalus dorsalis de Motschulsky, 1859, *Etud. Ent.* 114.

Deltocephalus dorsalis (de Motschulsky) Distant, 1908, *Fauna Brit. India*, Rhynchota, **4** : 380.

Inazuma dorsalis (de Motschulsky) : Ishihara, 1953, *Shikoku Trans. Ent. Soc.* **3** : 48.

Inazuma dorsalis (de Motschulsky) : Metcalf 1968. *General Catalogue of the Homoptera*, Cicadelloidea, VI. **10** (2) : 1601.

Material : 1 ♂, 1 ♀, Silent valley, 18. 1. 79. Coll. R. S. Pillai, 2 ♂ ♂, 1 ♀, Silent Valley, Kumatanthodu, 15. 1. 80, Coll. R. S. Pillai.

Distribution : The species enjoys a wide distribution India, Bangladesh, Burma, China, Sri Lanka, Indonesia, Formosa, Japan and Philippines.

Doratulina jacosa Melichar

Doratulina jacosa Melichar, 1903, *Hom. Fauna*. Ceylon, 199.

Doratulina jacosa Melichar : Distant, 1908, *Fauna Brit. India*, Rhynchota, **4** : 393.

Doratulina jacosa Melichar : Singh Pruthi, 1936. *Mem. Indian. Mus.* **11** (3) 110.

Doratulina jacosa Distant : Evans, 1947, *Trans. Ent. Soc. Lond.* **98** : 232.

Doratulina jacosa Melichar : Ishihara, 1954, *Dobuksugaku Zasshi*, **63** : 379.

Doratulina, jacosa Melichar : Metcalf, 1968, *General Catalogue of the Homoptera*, Cicadelloidea, VI, **10** (2) : 1584.

Material 1 ♂, Silent Valley, forest camp, 16. 1. 79 Coll. R. S. Pillai, 1 ♂, 1 ♀, along Kuntipuzha, 17. 1. 80, Coll. K. R. Rao.

Distribution : This species is so far recorded from Sri Lanka, and Japan only. It is therefore recorded from India through Silent Valley for the first time.

***Doratulina laetus* (Melichar) Comb. nov.**

Deltocephalus laetus Melichar, 1908, *Fauna Brit. India*, Rhynchota, 4 : 383.

Deltocephalus laetus Distant ; Metcalf, 1968, *General Catalogue of the Homoptera*, Cicadelloidea. VI, (10) (2) : 1152.

Material : 1 ♂, 1 ♀, Silent Valley, damsite, 31. 1. 80. Coll. K. R. Rao, 1 ♂, Silent Valley extensive grass land 29. 4. 80, Coll. R. S. Pillai.

Distribution : This species is so far recorded from Sri Lanka only. From India, it is reported here for the first time through Silent Valley.

Remarks This species is now placed under *Doratulina* considering the shape of head and genital characters which are described here in detail as Distant's description of the species is not quite adequate.

Vertex : (fig. 1) : Longer than breadth between eyes, sanguineous face (fig. 2) longer than broad ; frons long and fairly raised with dark brown striations on the lateral side : genae and lorae dark brown, the latter not reaching the apex of clypeus.

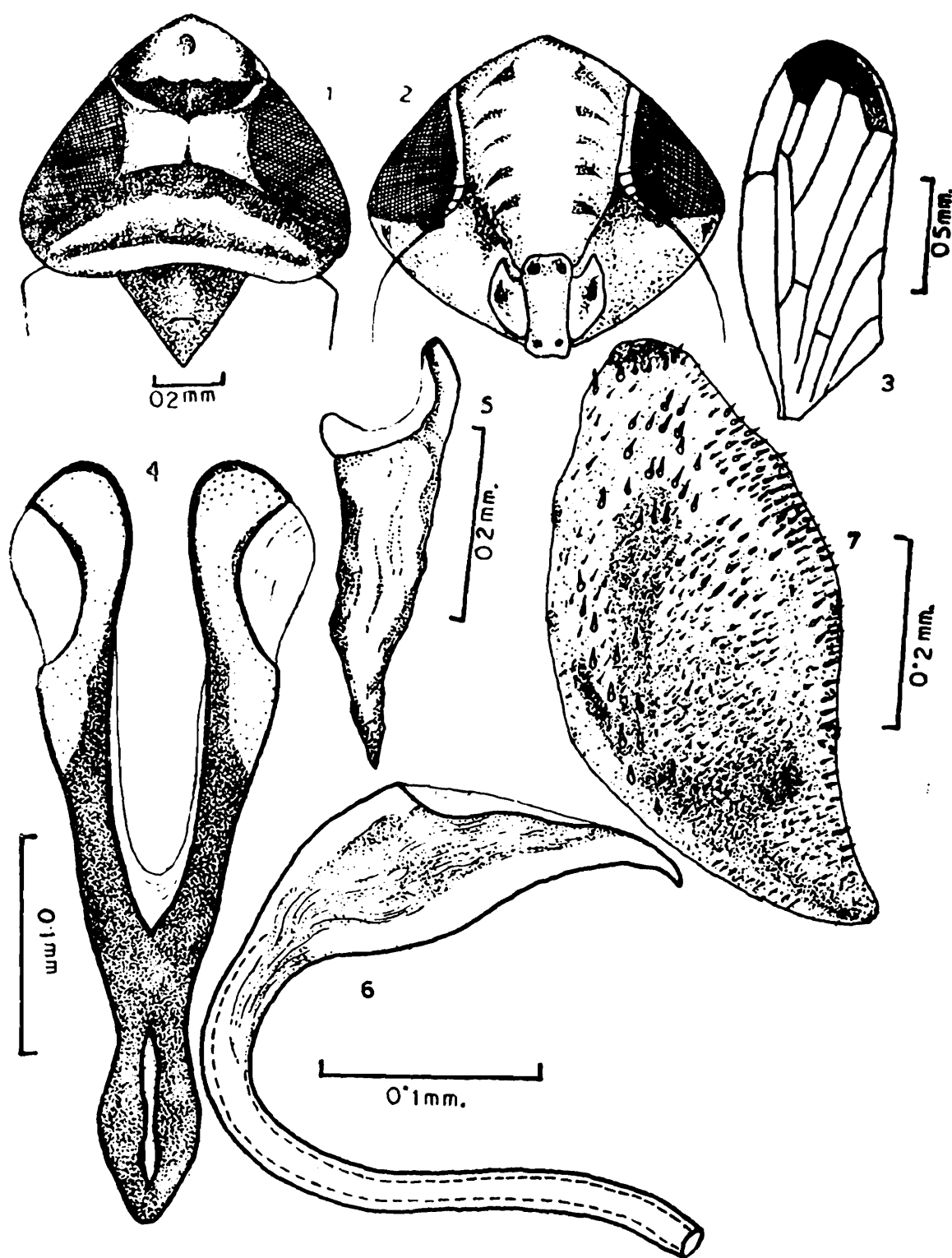
Pronotum : Pale ochraceous, short about one half of vertex, anterior area sanguineous. Scutellum small, about as long as broad and sanguineous.

Tegmen : (Fig. 3) hyaline dirty yellowish brown apical cells in dark suffusions, costal border pale translucent, tegmen not extending to the tip of abdomen.

Abdomen : ochraceous with dark markings above, sterna ventrally sanguineous at the posterior borders.

Male genitalia : Connective (Fig. 4) 'Y' shaped with arms long, slightly divergent, stem short ; styles (Fig. 5) long broad at the cephalad area, narrow and rod like at the caudal region, styles articulating laterally with the connective ; aedeagus (Fig. 6) long styliform, wide at base and curved posterodorsally ; Male plate small subtriangular with a few marginal hair ; Pygofer (Fig. 7) broad flattened with small thin setae at disc and with minute hairs at the margins.

Female genitalia : Valvae concave posteriorly ; Pygofers moderately large ; ovipositor stout, long and protruding beyond the posterior extremity of abdomen.



Doratulina laetus (Melichar)

1. Head and Thorax Dorsal view 2. Head and Thorax Ventral View. 3. Tegment Dorsal View. 4. Connective Dorsal View. 5. Style Dorsal View. 6. Aedeagus lateral view. 7. Pygofer of one side Dorsal View.

SUMMARY

A list of fourteen species of leafhoppers constituting Cicadellid fauna of Silent Valley has been reported here for the first time. Two of them viz. *Doratulina jacosa* (Melich.) and *Doratulina laetus* (Dist.) represent new records for India. The latter species is treated here as a new combination.

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The author thanks Dr. B. K. Tikader, Director, Zoological Survey of India, Calcutta and Dr. R. S. Pillai, Deputy Director, Southern Regional Station, Zoological Survey of India Madras for all the laboratory facilities and encouragment. He is also thankful to Prof. C. A. Virakathamath, Associate Professor of Entomology, University College of Agricultural Sciences, Bangalore for various courtesies and especially for confirming the new combination.

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GYRINIDAE (COLEOPTERA INSECTA) OF SILENT VALLEY, KERALA INDIA

By

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INTRODUCTION

This is small aquatic family commonly known as whirligig beetles and contains eleven genera and about 700 species which are placed in 3 subfamilies, namely, i.e. Enhydrinae, Gyrinae and Orectochilinae. In *Coleopterorum Catalogus*, K. Ahlwarth (1910) listed 35 species in India. Adults are commonly seen skating in circle on the surface of the pond and larvae are bottom-dwellers. The body is 3-15 mm. long, ovate to elongate-elliptical and strongly convex to flatten, usually glabrous with lateral hairs. Eyes are completely divided transversely into two dorsal and ventral eyes. Antennae short, stout and 8-segmented. Maxillae lack a distinct galea. Procoxae slightly transverse and narrow, intercoxal process incomplete, metasternum large with a median longitudinal suture. Elytra usually truncate leaving one or two abdominal tergite exposed. Front legs are long and raptorial while middle and hindlegs short, flatten and paddle-like and fringed with swimming hairs. The distribution of the family is world-wide.

During April, 1979 to May, 1980 four surveys were conducted in the Silent valley. The collection of Gyrinid beetle is fairly good. 7 species under 4 genera were identified and reported in this paper.

The list of species dealt with here is given below :

Family GYRINIDAE

Subfamily ENHYDRINAE

Genus *Dineutus* M'Leay

1. *Dineutus indicus* Aubé

Subfamily ORECTOCHILINAE

Genus *Orectochilus*

2. *Orectochilus discifer* Walker
3. *Orectochilus lucidus* Regimbart
4. *Orectochilus limbatus* Regimbart
5. *Orectochilus semivestitus* Guerin

- I. *Orectochilus* sp. near to *cuneatus* Regimbart
- II. *Orectochilus* sp. near to *oblongiusculus* Regimbart

Subfamily GYRININAE
Genus *Aulonogyrus* Regimbart

- 6. *Aulonogyrus obliquus* Walker

Genus *Gyrinus* Geoffroy

- 7. *Gyrinus convexiculus* Macleay

Family GYRINIDAE
Subfamily ENHYDRINAE

1822. Regimbart *Ann. Soc. Ent. Fr.* (6) II : 391, 392.

This subfamily can be recognised by its outer portion of metasternum in a form of large triangle.

***Dineutus* Macleay**

1825. *Dineutus* Macleay. *Ann. Jav.*, ed. I. p. 30.

The genus can be recognised by its shape being broadly oval, size medium, subdepressed, labrum rounded and ciliated anteriorly, scutellum concealed, elytra with nine slightly impressed striae, sometimes indistinct.

So far, four species namely, *Dineutus indicus* Aubé, *D. marginatus* Sharp, *D. spinosus* Fabricius and *D. unidentatus* Aubé were known from India, but none was recorded from Silent valley.

1. ***Dineutus indicus* Aubé**

1838. *Dineutus indicus* Aubé, *Spec. Col.*, p. 772.

Material examined: 1 ex., Kerala, Silent Valley and Karapara Exped., 1980. Pothamolai base, 880 m, 27.12.1980, R. S. Pillai & party; 11 exs., Silent Valley, 19.1.1980, S. K. Bhattacharyya & party.

Species oval, depressed, blackish bronze; Clypeus bronze and bright; Ventral surface black, elytra with nine visible striae and finely reticulated.

Remarks: *Dineutus indicus* Aubé (Length 12-15 mm.) is smaller in size than *Dineutus politus* Macleay.

The present species, *D. indicus* Aubé was recorded earlier from Darjeeling District of West Bengal and Kodaikenel in Tamil Nadu. For the first time the species is recorded here from Silent Valley.

Subfamily ORECTOCHILINAE Regimbart

1882. Regimbart, *Ann. Soc. Ent. Fr.*, (6) 2 : 301.

Representations of this subfamily can be recognised by its last abdominal segment being elongate, conical and with a median longitudinal row of hairs below. Elytra and pronotum pubescent at least laterally.

Orectochilus Lacordaire

1835. Lacordaire *Fn. Ent.*, Paris, 1 p. 344.

Species small to large in sizes and posterior part of abdomen markedly tapered and forming a triangle.

So far, 25 species were recorded from India and in the present study four species are being recorded here for the first time from Silent Valley, Kerala.

2. **Orectochilus discifer** Walker

1859. *Orectochilus discifer* Walker *Ann. Mag. nat. Hist.*, (3) 4 : 91.

Material examined : 23 exs., Kerala, Silent valley, 29. 1. 1980, S. Biswas & party ; 2 exs., Kerala, Silent Valley, Kukkali, 15. 1. 1980, S. K. Bhattacharyya, & party ; 1 ex., Kerala, Silent Valley & Karapara Expd., 1980, 27. 12. 1980, alt. 880 m. R. S. Pillai & party ; 46 exs., Halfway to Valiayaparathodu, Kerala, Silent Valley, 2. 5. 1980, R. S. Pillai & party.

So far, this species was recorded from Madras, Madura, Bombay and West Bengal ; India ; Sri Lanka ; Malacca. Now, it is being recorded for the first time from Silent Valley in Kerala. This species can be recognised by its elongate, oval and convex shape and black being dorsally and reddish brown ventrally. Eyes white, clypeus little incised in middle with reddish tinge, labrum rounded, fringed with rows of fine cilia. A yellow marginal band extends from apex of pronotum to apex of elytra ; scutellum transverse and triangular. Elytra laterally hairy and disk bright and smooth and its apices truncate obliquely.

Remarks : This species (Length, 8-9 mm.) smaller than *O. semi-vestitus* Guerin.

3. *Orectochilus lucidus* Regimbart

1883. *Orectochilus lucidus* Regimbart *Ann. Soc. Ent. Fr.*, (6) 3 : 425.

Material examined : 1 ex., Kerala, Silent Valley, 29. 1. 1980, S. K. Bhattacharyya & party.

This species was recorded from Kalka and Nainital : India ; Java ; Sumatra and South Burma. In the present study it is being recorded for the first time from Silent Valley in Kerala.

Species black, glossy, smooth, convex, elongate and moderate in size, dorsal and ventral eyes whitish, antennae short, stout and brownish yellow, clypeus little incised in middle, labrum rounded with rows of cilia. Lateral margin of pronotum pubescent, scutellum small, glabrous, glossy, triangular and transverse, elytral apices truncate obliquely, lateral margin of pronotum and elytra yellowish ; ventral surface blackish brown and legs yellow.

Remarks : This species, *O. lucidus* Regimbart, (Length, 6.5 mm.) is larger than *O. limbatus* Reg. and with a distinct scutellum.

4. *Orectochilus limbatus* Regimbart

1883. *Orectochilus limbatus* Regimbart *Ann. Soc. ent. Fr.*, (6) 2 : 424.

Material examined : 2 exs., Kerala, Silent Valley, Karapara expd., 27. 12. 1980., alt. 880 m., R. S. Pillai & Party ; 1 ex., Silent Valley expd., 1980, Kummattathodu, 30. 4. 1980, R. S. Pillai & Party.

So far, this species was recorded from North East India. Now, it is being recorded for the first time from Silent Valley in Kerala.

Species elongate with truncated apices, convex and compressed, dorsally black, smooth with metallic reflection and lateral margin from pronotum to elytra yellowish. Labrum short and its front rounded. Head cupreous and granulated. Lateral margin of pronotum and elytra hairy ; elytra truncated nearly straight. Scutellum very small, glabrous and bright.

Remarks : This species is smaller (Length 6 mm.) than *O. lucidus* Regimbart.

5. *Orectochilus semivestitus* Guerin

1840. *Orectochilus semivestitus* Guerin *Reviue zool.*, p. 38.

1883. *Orectochilus semivestitus* Guerin ; Regimbart. *Ann. Soc. ent. Fr.*, (6) 2 : 413-14.

Material examined : 2 exs., Silent Valley Expd., 1980, Kummatamthodu, 30. 4. 1980, R. S. Pillai & Party ; 1 ex., Halfway to Valiyaparathodu, 2. 5. 1980, R. S. Pillai & Party.

This oriental species was recorded from Madras, Pondicherry and Mount Kodaikanel in India. Now, it is being recorded for first time from Silent Valley in Kerala.

Species ovate, elongate, convex and dorsal surface finely granulated, black and bright, ventral surface black and legs blackish red. Labrum transverse and anteriorly rounded and coarsely punctured with tuft of golden hairs. Clypeus slightly incised in middle, head sparsely and finely punctured, eyes white, antennae short, stout and black, lateral margin of pronotum and elytra pubescent, elytra laterally distinctly margined. Scutellum small, transverse, grabrous and bright ; elytral apices truncate but not obliquely.

Remarks : It (Length, 12 mm.) differs with *O. desgodinsi* Regimbart not possessing pointed spine in the outer angle of elytral apices.

I. *Orectochilus* sp. near to *cuneatus* Regimbart

Material examined : 4 exs., Anakayam, Silent Valley & Karapara expd. 1980., 22. 12. 1980, R. S. Pillai & party.

Species elongate ovate, moderately large, dorsal surface black, smooth but its lateral margins hairy, ventral surface reddish black, antennae short, stout and blackish.

Remarks : Specimens (Length, 9 mm.) differ from *O. oblongiusculus* Reg. in having spine in outer angle of elytral apices and elytral disk smooth, glossy and impunctate.

II. *Orectochilus* sp. near to *oblongiusculus* Reg.

Material examined : 1 ex., Kerala, Silent Valley, 29. 1. 1980, S. K. Bhattacharyya & Party.

Species elongately oblong, black, and glossy dorsally, laterally pubescent from pronotum to elytra, yellow margins of pronotum and elytra distinct, elytral apices truncate.

Remarks : The specimen (Length, 5 mm.) differs from *O. cuneatus* Reg. by its dorsal being not smooth, whereas *oblongiusculus* is smooth.

Subfamily GYRININAE

1882. Regimbart *Ann. Soc. ent. Fr.*, (6) 2 : 391.

This subfamily can be recognised by its absence of hairs on pronotum and elytra and outer portion of metasternum markedly narrow.

Aulonogyrus Regimbart

1883. Regimbart, *Ann. Soc. ent. Fr.*, (6) 2 : 124.

Species elongately oval, prothorax devoid of any impression but finely punctured on the disc, more so with wrinkles on lateral sides. Each elytron with ten furrows and striate-punctate, elytral apices truncate and nearly straight.

K. Ahlwarth (1910) in Junk's *Coleopterorum Catalogus* (1910-1938) listed two species from India, namely, *Aulonogyrus arrowi* Regimbart and *Aulonogyrus obliquus* Walker, of which *Aulonogyrus obliquus* Walker is being recorded for the first time from Silent Valley in Kerala.

6. *Aulonogyrus obliquus* Walker

1858. *Aulonogyrus obliquus* Walker *Ann. Mag. nat. Hist.*, (3) 2 : 205.

Material examined 1 ex., Halfway to Valiyaparathodu, Silent Valley, 2. 5. 1910, R. S. Pillai & Party.

So far, this species was recorded from Eastern Ghat and N. W. Himalaya. Now, it is being recorded for first time from Silent Valley in Kerala. Species elongate-ovate and moderately large, dorsal and ventral surface black. Head finely punctured with fine wrinkles, Clypeus transverse and slightly rounded with a tuft of cilia, eyes moderately large, antennae black, stout and short Pronotum transverse and finely punctured with fine wrinkles and its lateral sides distinctly margined. Elytra apically truncate, striate-punctate with 10 striae and intervals finely and sparsely punctured, lateral sides distinctly margined. Scutellum transverse, pointed posteriorly and finely punctured.

Remarks : *A. obliquus* comes closer to *A. arrowi*, but can be separated by its size being smaller (7 mm.) and lateral margin of pronotum and elytra black instead of reddish yellow as in *A. arrowi*.

Gyrinus Geoffroy

1762. Geoffroy *Ins. Par.*, 1 : 193.

The genus can be recognised by its scutellum being distinct and body length not exceeding 8 mm. So far, K. Ahlwarth (1910) in Junk's *Coleopterorum Catalogus* (1919-1938) listed 3 species namely, *Gyrinus convexiusculus* M'Leay, *Gyrinus nitidulus* F., and *Gyrinus ceylonicus* Regimbart., of which, the species, *G. convexiusculus* Macleay is being recorded here for the first time from Silent Valley in Kerala.

7. *Gyrinus convexiusculus* Macleay

1869. *Gyrinus convexiusculus* Macleay *Trans. ent. Soc. N. S. Wales* 2 : 128.

Material examined: 18 exs., Silent valley, Kerala, 29. 1. 1980, S. K. Bhattacharyya & party; 1 ex., Halfway to Valiyaparathodu, Silent valley, Kerala, 2. 5. 1980, R. S. Pillai & Party; 2 exs., Kummothothodu, Silent valley, Kerala, 30. 4. 1980, R. S. Pillai & party; 1 ex., Silent valley & Karakal expd., 1980, Dam site, 9. 12. 1989. R. S. Pillai & party.

So far, this species was recorded from Madras, Mount Kodaikanel and Bengal in India; China; Tibet; North Caledonia and Australia. Now, it is being recorded for the first time from Silent valley in Kerala.

Species black, spiny, convex and rather elongate. Head with two shallow foveae between the eyes, and the clypeus covered with fine striolae. Prothorax rounded behind the anterior transversal line, well marked and punctured near the sides, and a median transversal line well marked in the centre. Elytra with a broad rounded depression close to apex and with eleven striae which are distinctly punctured.

Remarks: This species is distinctly smaller (Length, 5 mm.) than *Gyrinus smaragdinus* Reg. (Length, 6 mm.).

SUMMARY

7 species under 4 genera, namely, *Dineutus* M'Leay, *Orectochilus* Lacordaire, *Aulonogyus* Regimbart and *Gyrinus* Geoffroy were identified and reported. All of them are being recorded for the first time from Silent Valley in Kerala and the species, *Orectochilus lucidus* Regimbart was known from Northern India and it is being recorded for the first time from South India.

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**GROUND BEETLES (INSECTA . COLEOPTERA :
CARABIDAE) OF SILENT VALLEY
(KERALA, INDIA)**

By

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(With one Text-figure)

INTRODUCTION

The present study is based on a small collection of carabid beetles made by four successive surveys led by Dr. R. S. Pillai (April, 1979), Dr. S. K. Bhattacharya (January-February, 1980), Dr. R. S. Pillai (December, 1980) from the so far unexplored area, the Silent valley, Kerala. The specimens are mainly collected from leaf litter and from foliage where as the majority of the carabid beetles are found under stones and logs. The material comprising of 30 examples belonging to 16 species under 13 genera and nine tribes of the subfamily Carabinae. One species is described as new to science and ten species are first time recorded from Kerala of which three species are first time recorded from South India. Six genera are first time recorded from Kerala of which one genera is first time recorded from South India.

SYSTEMATIC ACCOUNT

Subfamily CARABINAE

Tribe SCARTIINI

Genus *Oxylobus* Chaudoir

1885. *Oxylobus* Chaudoir, *Bull. Soc. Imp. Nat. Moscou*, **1** : 5.

The representatives of this genus are distributed in South India, extending northwards to Maharashtra and eastwards to Orissa and Bihar, and Ceylon. Three species including a new one, of this genus are recorded from Silent Valley. The black colour, oval, convex and subcylindrical body render the genus easily recognizable.

1. *Oxylobus quadricollis* Chaudoir

1855. *Oxylebus quadricollis* Chaudoir, *Bull. Soc. Imp. Nat. Moscou*, **1** : 7.

Material examined : 3 exs., Kerala : Silent Valley, January, 1980, S. K. Bhattacharya.

This species is easily recognised by its head with sinuate frontal impressions reaching the neck constriction which is very faint and the sides behind are distinctly straight and punctate. This species can only be compared with *O. asperulatus* Chadhoir but the latter is distinguished by the head with short diverging frontal impressions, the sides behind the eyes with few coarse punctures and the eyes and genae rather flat, the left mandible in ♂ is strongly dilated at base and sharply bent upwards and inwards.

Distribution : INDIA : TAMILNADU : Nilgiri Hills, Oucherlony valley, Coonoor, Gudalur ; KERALA : Malabar and as above.

2. *Oxylobus monatus* Andrewes

1929. *Oxylobus monatus* Andrewes, *Fauna Brit. India including Ceylon and Burma*, Coleoptera : Carabidae, Vol. 1 - Carabinae, p. 315.

Material examined : 2 exs., KERALA : Silent Valley, Valiapara Thodu, 25. v. 1980, R. S. Pillai ; 1 ex., Silent Valley, Jan.-Feb., 1980, S. K. Bhattacharya.

This species can be recognised by its smaller size (12.5 mm.—14.5 mm.) and the head with frontal impressions deep and diverging posteriorly and reaching the neck constriction which is shallow and the elytra with the striae rather shallowly punctate.

Distribution : INDIA : TAMILNADU : Anaimalai Hills, 4000 ft. (Type-locality) ; KERALA : as above.

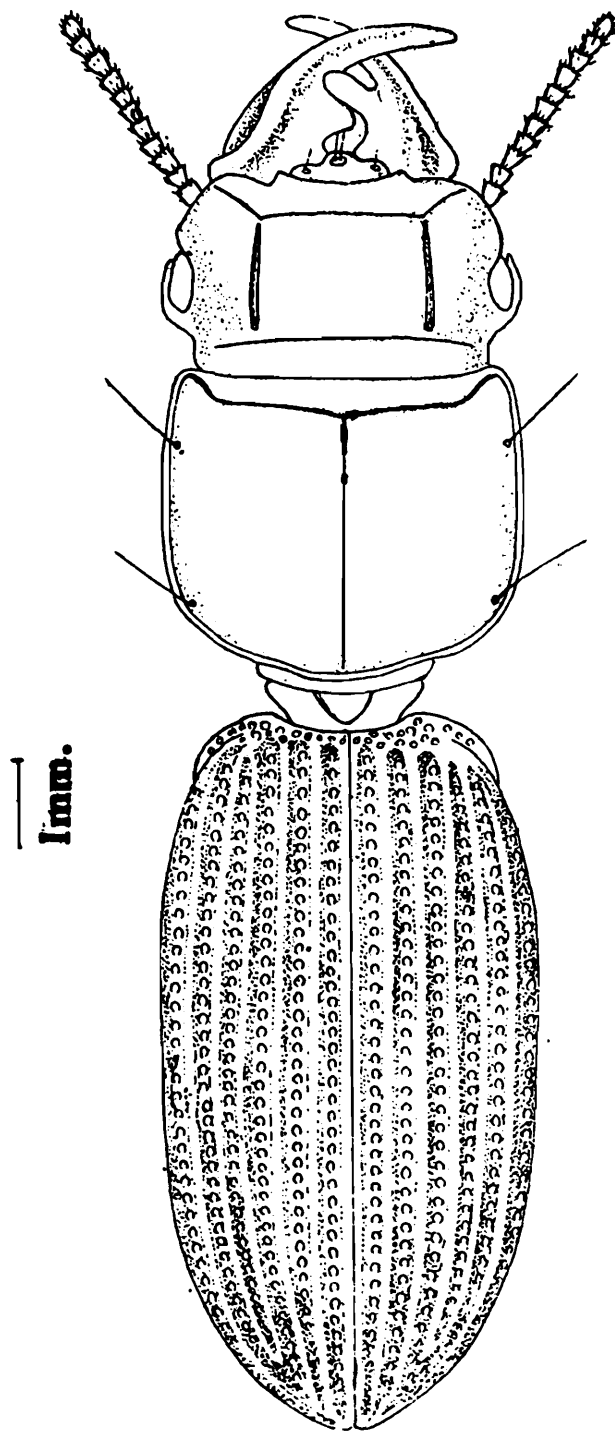
This species was so far known only from its type-locality. Now this is first time recorded since its description.

3. *Oxylobus silenticus* sp. nov.

(Text-figure 1)

Head wide and smooth, a few short and deep striae intermingled with coarse punctures extending along the sides of neck constriction just outside the frontal impressions ; frontal impressions deep and parallel, continued in front to chypeal suture but posteriorly not reaching the neck constriction which is deep and prominent ; labrum with median lobe truncate and well advanced, bearing a single pore ; chypeus with well developed tooth on each side of labrum, clypeal

suture distinct on middle and faint at extreme sides ; left mandible in ♂ dilated at base and little upwards ; eyes flat and conspicuously enclosed in genae. Prothorax (3.25 mm. x 4.50 mm.) a little wider than head and a little more than one and one-third wider than long, sides parallel, a single setae on each side in front placed on inner edge of the border without breaking it ; median line deep, basal favae obsolete, lateral channel deep and moderately rounding the front angles without forming, front angles moderately rounded,



Text-fig 1. Dorsal view of *Oxylobus silenticus* sp. nov., Holotype

transverse impressions rather shallow. Elytra (7.25 mm. x 4.50 mm.) as wide as prothorax and one and three-fifth longer than wide, 7-striate, with trace of another stria within marginal channel near apex, striae deep, strongly punctate, punctures not increasing in size near apex, striae 1, 2 and 5 free at base, 3 joining 4; intervals convex, 5 and 6 carinate on inner margins, 7 fine and strongly carinate, not reaching the base and joining 6 behind, 3 with a setiferous pore near the apex; epipleurae strongly punctate. Prosternum moderately punctate on sides, metepisterna strongly punctate bordered on outer margin; basal abdominal segments with scattered punctures, last three segment with a row of punctures on sides and smooth on middle.

Length : 15.5 mm.

Holotype : ♂, INDIA : KERALA : Silent valley, January-February, 1980, S. K. Bhattacharya, deposited in the National Zoological Collection of Zoological Survey of India, Calcutta,

This species is near to *O. quadricollis* Chaudoir and can be easily separated from the latter by its smaller size and parallel frontal impressions not reaching the neck constriction which is deep throughout.

Tribe CHLAENIINI

Genus *Chlaenius* Bonelli

1809. *Chlaenius* Bonelli, *Mem. Acad. Sci. Torino*, 18 : 21-78.

Representatives of this genus are distributed throughout all zoogeographical regions of the world and most common in India. So far about 125 species have been recorded from India.

4. *Chlaenius luculentus* Andrewes

1919. *Chlaenius apacipennis*, Andrewes (not Chaud.) *Ann. Mag. Nat. Hist. Soc.* (9) 4 : 11.

1920. *Chlaenius luculentus* Andrewes, *Ent. Month. Mag.*, 235 and 236.

Material examined : 1 ex., KERALA : Silent valley, April, 1979, R. S. Pillai.

Distribution : INDIA : W. BENGAL Bankura ; BIHAR :

Chapra ; U. P. : Sitapur ; MAHARASHTRA Nagpur and KERALA : as above.

This species is first time recorded from South India.

5. *Chlaenius bimaculatus* Dejean

1826. *Chlaenius bimaculatus* Dejean, *Spec. Gen. Col.*, 2 : 301. 1856. var. *lynx* Chaudoir, *Bull. Soc. Imp. Nat. Moscou*, (39) 3 : 199. 1887. var. *celebensis* Schaufuss, *Horae Soc. ent. Ross*, 21 : 105.
1891. *Chlaenius rayatus* Bates, *Ann. Soc. ent. Belg.* 35 : 327.
1923. *Chlaenius ocellatus* Andrewes, *Ann. Mag. Nat. Hist. Soc.*, (9) 11 : 339.
1979. *Chlaenius bimaculatus*, Saha and Sengupta, *Proc. Symp. zool. Surv. India*, No. 2 : 28.

Distribution This species is widely distributed throughout India (except northern part of western India) and South East Asia.

This is a common and most variable species. It varies in punctuation of pronotum and colour of palpi, antennae and legs. Saha and Sengupta (1979) enumerated in details the intra-specific variation in population of different regions of this species.

Tribe PTEROSTICHINI

Genus *Diceromerus* Chaudoir

1872. *Diceromerus* Chaudoir, *Ann. Soc. ent. Belgique*, 15 : 15.

6. *Diceromerus orientalis* (Motchulsky)

1859. *Siomonaxus orientalis* Motch. *Etud. Ent.* ; 36.
1872. *Diceromerus orientalis*, Chaudoir, *Ann. Soc. ent. Belgique*, 15 : 15.

Material examined 1 ex., KERALA : Silent valley, April, 1979, R. S. Pillai.

Distribution : INDIA, SRILANKA, BURMA, SINGAPORE, KUALALAMPUR, JAVA, SUMATRA, LAOS and HONGKONG.

Genus *Marion* Latreille

1810. *Morion* Latreille, *Tab. meth.*, 159.
1825. *Morion* Dejean, *Spec. Gen. Col.*, 1 : 429.

This genus, represented by nine species, is distributed in South East Asia including Australia and New Guinea. Three species have been recorded from India.

7. *Morion orientale* Dejean

1825. *Morio orientale* Dejean, *Spec. Gen. Col.*, 1 : 432.

1831. *Morion orientale* Dejean, *Spec. Gen. Col.*, 5 : 511.

Material examined: 1 ex., KERALA : Silent valley 34 Km. N. W. of Mukhali, 29. i. 1980, S. K. Bhattacharya.

This is a common species and is near to another common species *M. cucujoides* Walker distributed throughout India, Ceylon and Burma.

Tribe HARPALINI

Genus *Gnathaphanus* Macleay 1

1825. *Gnathaphanus* Macleay, *Ann. Jav.*, 20.

This genus is represented by 11 species and is distributed in South East Asia and Australia and New Guinea (one species). Six species are represented in India.

8. *Gnathaphanus* sp.

Material examined: 4 exs., KERALA : Silent valley, 3 Km. E. of Valiapara Thodu, 930 m., 26. i. 1980, S. K. Rao ; 2 exs., Silent Valley, April, 1980, S. Biswas.

Tribe TETRAGONODERINI

Genus *Tetragonoderus* Dejean

1829. *Tetragonoderus* Dejean, *Spec. Gen. Col.*, 4 : 485.

This genus is represented by ten species and is distributed throughout South East Asia. One Species, *T. arcuatus* Dejean, is extended westwards to Egypt. All the species except *T. cursor* Bates (Burma) are represented in India.

9. *Tetragonoderous* Sp.

Material examined: 1 ex., KERALA : Silent Valley, 4. v. 1980, S. Biswas.

This is probably a new species but it is not described here as I have not yet seen two out of all described species.

Tribe LEBIINI

Genus *Microlestes* Schmdt - Goebel

1846. *Microlestes* Schm. - Goeb. *Faun. Col. Birm.*, 41.

1847. *Blechnus* Motschulsky, *Bull. Soc. Imp. Nat. Moscou.*, 2 : 219.

The representatives of this genus are distributed in most of the Zoogeographical regions. Eight species are distributed in South Asia of which five species have been recorded from India. This genus is first time recorded from the state of Kerala.

10. *Microlestes inconspicuus* Schmidt-Goebel

1846. *Microlestes Inconspicuus* Schm.-Goeb., *Faun. Col Birm.*, 41.

Material examined : 2 exs., KERALA : Silent Valley, 4. v. 1980, S. Biswas.

Distribution : INDIA : BIHAR : Chotanagpur ; BURMA Rangoon and (?) Bhamo.

Genus *Dromius* Bonelli

1810. *Dromius* Bonelli, *Mem. Acad. Sci. Terine*, 18 : 21-78.

This is a cosmopolitan genus. This genus is first time recorded from Kerala.

11. *Dromius orthogonoides* Bates

1886. *Dromius orthogonoides* Bates, *Ann. Mag. Nat. Hist. Soc.*, 205.

Material examined : 2 exs., KERALA : Silent Valley, May, 1980, S. Biswas.

Distribution : INDIA : TAMILNADU : Nilgiri Hills ; KERALA : as above ; SRILANKA : Dikoya.

This species is first time recorded from Kerala.

Genus *Coptodera* Dejean

1825. *Coptodera* Dejean, *Spec. Gen. Col.*, 1 : 273.

1843. *Belonogatha* Chaudoir., *Bull. Soc. Imp. Nat. Moscou*, 2 : 383.

This genus is represented by fourteen species distributed in South East Asia of which nine species are recorded from India.

This genus is first time recorded from Kerala.

12. *Coptodera interrupta* Schmidt-Goebel

1846. *Coptodera interrupta* Schmidt - Goebel, *Faun Col. Birm.*, 53.

1846. *Coptodera elegantula* Schmidt - Goebel, *Faun. Col. Birm.*, 54

Material examined : 2 exs., KERALA : Silent Valley, 4. v. 1980, S. Biswas.

Distribution : INDIA : WEST BENGAL : Poshok, Numsoo, Nurbong and Mirik ; U. P. Dehra Dun, Kalivalley (Almora) ; TAMILNADU : Nilgiri Hills ; KERALA : As above. SRILANKA. BURMA, MALAYA PENINSULA, LAOS and SARWAK.

This species is first time recorded from Kerala.

Genus *Cymindoidea* Castlenau

1832. *Cymindoidea* Castlenau, *Ann. Soc. ent. France*, 390.

1837. *Philoticnus* Mann, *Bull. Soc. Imp. Nat. Moscou*, 1 : 42.

This genus represented by six species, is distributed in India, Srilanka and Burma. All the six species are recorded from India. This genus is first time recorded from Kerala.

13. *Cymindoidea* Sp.

Material examined : 1 ex., KERALA : Silent Valley, January, 1980, S. K. Bhattacharya.

This species is near to *C. indica* (Schm-Goeb.) but it could not be determined as I was not able to compare all the species.

Tribe MASOREINI

Genus *Aephnidius* Macleay

1825. *Aephnidius* Macleay, *Ann. Jav.*, 23.

This genus is represented by seven species, of these one species, *ruficornis* (Chaud.) is recorded from West Asia (Arabia : Syria and Kurdistan), other six species are distributed in South East Asia of which five species are recorded from India. One species, *adeloides* Macleay is extended to Japan and Austria.

14. *Aephnidius rubidus* Andrewes

1922. *Aephnidius rubidus* Andrewes, *Ann. Mag. Nat. Hist. Soc.*, (9) 10 : 169.

Material examined : 1 ex., KERALA : Silent Valley, April 1980, S. Biswas.

Distribution : INDIA : MAHARASHTRA Nagpur, Khandesh, Belgaum ; TAMILNADU : Madura : KERALA : as above.

Tribe PHYSOCRATINI

Genus *Pogonoglossus* Chaudoir

1862. *Pogonoglossus* Chaudoir, *Bull. Soc. Imp. Moscou*, 2 : 304.

1846. *Liberesthis* Schm. Goeb., *Fauna Col. Birm.* (Cover), in litt.

1904. *Carpaulum* Sloane, *Proc. zool. Soc.*, NSW., 536.

This genus, represented by 12 species, is distributed in South East Asia including New Guinea (2 species) of these only one species is recorded from India.

This genus is first time recorded from India.

15. *Pogonoglossus truncatus* Andrewes

1921. *Pogonoglossus truncatus* Andrewes, *Trans. ent. Soc. London.*, 183.

1892. *Pogonoglossus validicornis* Bates (not Chaud.) *Ann. Mus. Civ. Stor. Nat. Genova*, 32 ; Andrewes, *Loc. cit.*, 148.

Material examined : 1 ex., KERALA : Silent Valley, April, 1980, S. Biswas.

Distribution : INDIA : U. P. : Kumaon (River Sarda George) ; ASSAM ; BURMA : Shewgu, Meetan ; LAOS, TONKIN and SARWAK.

The record of this species from South India is of great interest.

Tribe GRAGERINI

Genus *Melaenus* Dejean

1831. *Melaenus* Dejean, *Spec. Gen. Col.* 5 481.

This is a monotypic genus and is first time recorded from Kerala.

16. *Melaenus piger* (F.)

1801. *Brachinus piger* Fabr., *Syst. Elenth.*, 1 : 219.

Material examined : 1 ex., KERALA : Silent Valley, Road to Valiapara Thodu, 23. iv. 1980, R. S. Pillai.

Distribution : INDIA "Bengal" ; MAHARASHTRA Nagpur, Igatpuri, Begaum, Bandra ; M. P. : Chanda, Hoshangabad, Bilashpur, Balgahat ; TAMILNADU : Tinnevalley, Kunavaram, Kurnol, Madras, Chatrapur, Notkamond ; KERALA as above. SRILANKA : Horawupotana.

SUMMARY

16, Species are recorded from the Silent Valley. One species *Oxylobus silenticus* sp. nov. is described as new to Science. Six genera viz ; *Microlestes* Schmidt - Goebel, *Dromius* Bonelli, *Cymindoidea* Castlenau, *Coptodera* Dejean *Aephnidus* Macleay and *Pogonoglossus* Chaudoir are first time recorded from Kerala, of which *Pogonoglossus* Chaudoir is first time recorded from South India.

Ten species, viz. *Oxylobus monatus* Andrewes, *Chlaenius luculentus* Andrewes, *Morion orientale* Dejean, *Microlestes inconspicuus* Schm. - Goeb., *Dromius. orthogonoides* Bates, *Coptodera interrupta* Schm. - Goeb, *Aephriduis rubidens* Andrewes, *Pogonoglossus truncatus* Andrewes, *Melaenus piger* (F.) and *Aephnidus rubidus* Andrewes are first time recorded from Kerala of which three species, viz., *Chalaenius luculentus* Andrewes, *Microlestes inconspicuus* Schm. - Goeb. and *Pogonoglossus truncatus* Andrewes are first time recorded from South India.

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The author is grateful to the Director, Zoological Survey of India, Calcutta for providing laboratory facilities. The author is also grateful to Dr. T. Sengupta, Superintending Zoologist and Dr. Shyamrup Biswas, Zoologist and Officer-in-Charge, Coleoptera Section for their encouragement and going through the manuscript.

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SCARABAEIDAE (INDIA COLEOPTERA) OF SILENT VALLEY, KERALA, INDIA WITH DESCRIPTIONS OF THREE NEW SPECIES

By

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(With 4 Text-figures)

INTRODUCTION

This paper deals with the material collected from Silent Valley, Kerala by Dr. S. K. Bhattacharjee and party and Dr. R. S. Pillai and party of Zoological Survey of India during 1979-80. One of the authors (S.B.) happened to be one of the members in the second team.

Most of the species, collected are coprophagus in nature and the others phytophagus. Coprophagus species were collected from dung of elephant and faecal matter of carnivorous animals, non human primates and human faeces. Phytophagus species were collected from flower of wild *Solanum* sp. and other unidentified wild plant species.

Altogether 30 species under 13 genera belonging to 5 subfamilies are dealt with in this paper. Illustrations and detail descriptions of the new species have been provided. Synonymies for the species have been cited wherever necessary. Types of the species described here have been deposited in the Zoological Survey of India, Calcutta.

LIST OF SPECIES OF SCARABAEIDAE OF SILENT VALLEY

Subfamily CETONIINAE

Genus *Mycteristes* Castelnau

1. *Mycteristes auritus* Arrow

Genus *Macronota* Hoffmansegg

2. *Macronota bufo* Arrow
3. *M. flavosparsa* Waterhouse
4. *M. perraudieri* (Fairmaire)
5. *M. sannio* (Janson)

Genus *Trigonophorus* Hope

6. *Trigonophorus delesserti* (Guérin)

Subfamily DYNASTINAE
Genus **Xylotrupes** Hope

7. *Xylotrupes gideon* (Linnaeus)

Subfamily RUTELINAE
Genus **Popillia** Serville

8. *Popillia lucida* Newman

Genus **Anomala** Samouelle

9. *Anomala armata* Arrow
10. *Anomala vittilatera* Arrow

Subfamily MELOLONTHINAE
Genus **Autoserica** Brenske

11. *Autoserica atratula* Dalla Torre
12. *Autoserica brevis* Blanchard
13. *Autoserica mutabilis* Olivier
14. *Autoserica tranquebarica* Brenske

Subfamily COPRINAE
Genus **Catharsius** Geoffroy

15. *Catharsius granulatus* Sharp
16. *Catharsius molossus* (Linnaeus)

Genus **Copris** Geoffroy

17. *Copris indicus* Gillet

Genus **Caccobius** Thomson

18. *Caccobius meridionalis* Boucomont
19. *Caccobius unicornis* (Fabricius)

Genus **Onthophagus** Latreille

20. *Onthophagus andrewesi* Arrow
21. *Onthophagus bifasciatus* (Fabricius)
22. *Onthophagus castetsi* Lansberge
23. *Onthophagus ensifer* Boucomont
24. *Onthophagus fasciatus* Boucomont
25. *Onthophagus keralicus* sp. nov.
26. *Onthophagus sahai* sp. nov.
27. *Onthophagus taruni* sp. nov.

28. *Onthophagus unifasciatus* (Schaller)

Genus **Phacosoma** Boucomont

29. *Phacosoma triste* Arrow

Genus **Onitis** Fabricius

30. *Onitis singhalensis* Lansberge

SYSTEMATIC ACCOUNT

Family SCARABAEIDAE

Subfamily CETONIINAE

1 **Mycteristes auritus** Arrow

(Text Fig. 1)

1910. *Mycteristes auritus* Arrow. *Fauna Brit. India*, (Coleoptera : Lamellicornia), 1 : 39.

Material examined: 2 exs. (1 ♂, 1 ♀), Kerala, Silent Valley, 24. iii. '80, S. Biswas.

Description: ♀ Moderately long, depressed, tapering posteriorly; coppery or dark reddish, covered with minute yellowish hairs. Head coarsely and rugosely punctured, clypeal margin rounded and produced in front. Pronotum flat, strongly deeply punctured. Elytra broad at the base and tapering towards apex, sinuated at the shoulders, each elytron has a strong median costa, punctures moderately strong (and gradually transfer to longitudinal striae). Pygidium finely, transversely rugose and covered with long setae. Legs slender, front tibiae curved, with three strong external teeth and long erect hairs. Female larger than male, without cephalic horn.

Distribution: INDIA Tamilnadu, Kerala (Silent Valley).

Remarks Arrow (1910) described *M. auritus* on a single male specimen from south India (Nilgiri Hills) and the species was so long known by male sex only. This is the first time the female of *M. auritus* is being described.

2. **Macronota bufo** Arrow

1910. *Macronota bufo* Arrow, *Fauna Brit. India*, (Coleoptera : Lamellicornia), 1 : 54.

Material examined: 1 ex., Kerala, Silent Valley, Half way to Valiyaparathodu, 2. v. 1980, R. S. Pillai.

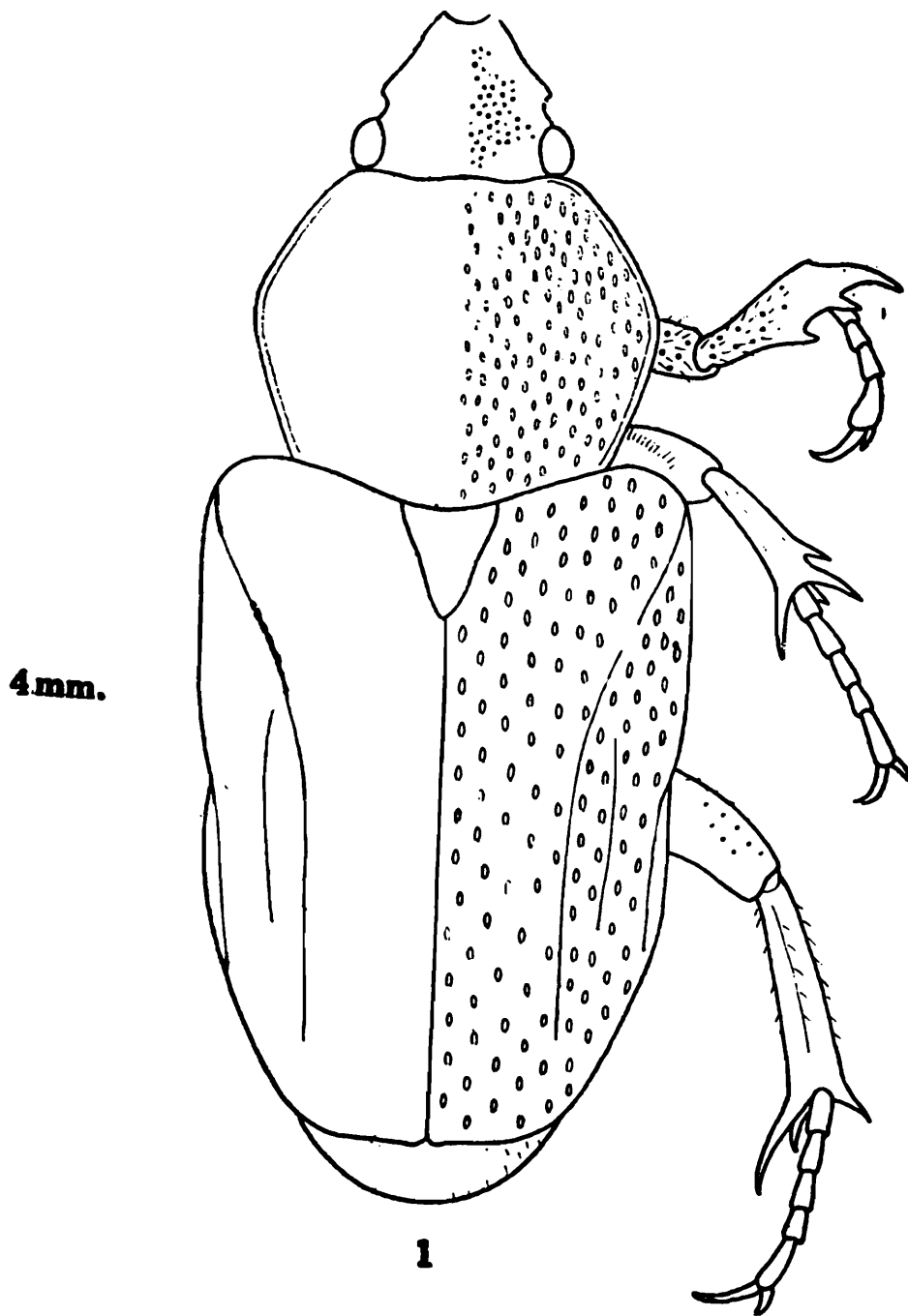


Fig. 1. *Mycteristes auritus* Arrow, dorsal view of female.

Distribution : INDIA : Tamilnadu, Kerala, (Tranvancore, Silent Valley).

Remarks : Specimen was collected from wild *solanum* sp.

3. *Macronota flavosparsa* Waterhouse

1888. *Macronota flavosparsa* Waterhouse, *Ann. Mag. nat. Hist.* (6) 1 : 262.

1910. *Macronota waterhousei* Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), 1 : 56-57.

1921. *Macronota flavosparsa* Waterhouse : Schenkling, *Coleopt. Cat., Berl.*, (72) 138.

Material examined : 2 ex., Kerala, Silent Valley, Half way to Valiyaparathodu, 2. v. 1980, R. S. Pillai and party.

Distribution : INDIA : Tamilnadu, Kerala (Silent Valley).

4. *Macronota perraudieri* (Fairmaire)

1893. *Taeniodera perraudieri* Fairmaire, *Ann. Soc. ent. Belg.* p. 294.

1910, *Macronota perraudieri* Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), 1 : 61-62.

Material examined 1 ex., Kerala, Silent Valley, Half way to Valiyaparathodu, 2. v. 1980, R. S. Pillai.

Distribution CHINA ; INDIA : Nagaland, Manipur, Kerala (Silent Valley).

Remarks : The species was known in India only from North-Eastern part (Nagaland and Manipur). This is for the first time the species is being recorded from South India. The specimen agrees with the description of the species.

5. *Macronota sannio* (Janson)

1883. *Taeniodera sannio* Janson, *Cist. Ent.*, 3 : 64.

1910. *Macronota sannio*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), 1 : 57-58.

Material examined : 1 ex., Kerala, Silent Valley, Half way to Valiyaparathodu, 2. v. 1980, R. S. Pillai and party.

Distribution : INDIA : Tamilnadu, Maharashtra, Kerala (Travancore, Silent Valley).

6. *Trigonophorus delesserti* (Guérin)

1839. *Goliathus delesserti* Guérin, *Rev. Zool.*, p 229.

1842. *Trigonophorus delesserti* Westwood, *Arc. Ent.*, 1 : 122, pl. 29, fig. 4.

1910. *Trigonophorus delesserti*, Arrow, *Fauna Brit., India* (Coleoptera : Lamellicornia), 1 : 107-108.

Material examined : 1 ex., Kerala, Silent Valley, Base Camp, 24 Km. North East of Mukkali, Palghat, 18. i. 1980, S. K. Bhattacharjee and party.

Distribution : INDIA : Tamilnadu, Kerala (Silent Valley).

Subfamily DYNASTINAE

7. *Xylotrupes gideon* (Linnaeus)

1767. *Scarabaeus gideon* Linnaeus, *Syst. Nat* 12th ed 1 (2) : 541.
 1789. *Scarabaeus phorbanta* Olivier, *Ent* , 1 (3) : 17, pl. 1, fig. 6
 1770. *Scarabaeus oromeron* Drury, *Ill. Nat. Hist.*, p. 81, pl. 36, fig. 5.
 1859. *Xylotrupes mnischechi* Thomson, *Arcana Nat.*, p. 18.
 1859. *Xylotrupes australicus* Thomson, *Arcana Nat.*, p. 18.
 1885. *Xylotrupes socrates* Schauffuss, *Hor. Ent. Soc. Ross.*, p. 192.
 1910. *Xylotrupes gideon*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), 1 : 262-265.

Material examined: 3 exs., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution: SRILANKA ; INDIA : Assam, Meghalaya, Maharashtra, West Bengal, Kerala (Silent Valley).

Remarks: This is one of the widely distributed species of Indian Dynastinae.

Subfamily RUTELINAE

8. *Popillia lucida* Newman

1838. *Popillia lucida* Newman, *Ann. Mag. nat. Hist.*, (2) 2 : 377.
 1917. *Popillia lucida*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), 2 : 81-82.

Material examined: 2 exs., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution INDIA : Tamilnadu, Kerala (Silent Valley).

Remarks: Specimens were collected from the flowers of an unidentified wild plant grown on the cleared area.

9. *Anomala armata* Arrow

1911. *Anomala (Spilota) armata* Arrow, *Ann. Mag. nat. Hist.*, (8) 8 : 474.
 1917. *Anomala armata* Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), 2 : 255-256.

Material examined: 1 ex., Kerala, Silent Valley, Kummattanthodu Dam site, 22. iv. 1980, R. S. Pillai and party.

Distribution INDIA : Tamilnadu, Kerala (Silent Valley).

10. *Anomala vittilatera* Arrow

1917. *Anomala vittilatera* Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), 2 : 256-257, p 13, figs. 39-40.

Material examined : 1 ex., Kerala, Silent Valley, iv. 1980, R. S. Pillai and party.

Distribution : INDIA : Tamilnadu, Kerala (Silent Valley).

Subfamily MELOLONTHINAE

11. *Autoserica atratula* Dalla Torre

1855. *Serica atrata* Burmister, *Handb. Ent.*, (4) 2 : 167. (nec. Reiche, 1847).
1898. *Autoserica atrata* Brenske, *Berl. Ent. Zeitschr.*, 63 : 263.
1912. *Autoserica atratula* Dalla Torre, *Coleopt. Cat. Berl.*, 20 (45) : 20.

Material examined : 1 ex., Kerala, Silent Valley, iv. 1980, R. S. Pillai and party.

Distribution : INDIA : Tamilnadu, Kerala (Silent Valley).

12. *Autoserica brevis* (Blanchard)

1850. *Omaloplia brevis* Blanchard, *Cat. Col. Ent.*, 1 : 78.
1898. *Autoserica brevis* Brenske, *Berl. Ent. Zeitschr.*, 63 : 263.

Material examined : 1 ex., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution : INDIA : Tamilnadu, Kerala (Silent Valley).

13. *Autoserica mutabilis* (Olivier)

1789. *Melolontha mutabilis* Olivier, *Entom.*, 1 : 51, pl. 3, fig. 24.
1898. *Autoserica mutabilis* Brenske, *Berl. Ent. Zeitschr.*, 63 : 227.

Material examined : 1 ex., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution : INDIA : Kerala, (Silent Valley).

14. *Autoserica tranquebarica* Brenske

1898. *Autoserica tranquebarica* Brenske, *Berl. Ent. Zeitschr.*, 63 : 272.

Material examined : 1 ex., Kerala, Silent Valley, iv. 1980, R. S. Pillai and party.

Distribution : INDIA : Kerala (Silent Valley).

Subfamily COPRINAE

15. *Catharsius granulatus* Sharp

1875. *Catharsius granulatus* Sharp, *Col. Hefte*, 13 : 41.

1931. *Catharsius granulatus*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), 3 : 95-96.

Material examined : 3 exs., Kerala, Silent Valley, 15. i. 1980, S. K. Bhattacharjee and party.

Distribution : SRILANKA ; PAKISTAN ; INDIA : Bihar, Uttar Pradesh, Sikkim, Kerala (Silent Valley).

Remarks : Specimens were collected from elephant dung and the species was found together with closely related and more common species. *Catharsius molossus* (L.)

16. *Catharsius molossus* (Linnaeus)

1758. *Scarabaeus molossus* Linnaeus, *Syst. Nat.*, 10 : 347.

1801. *Copris ursus* Fabricius, *Syst. Eleuth.*, 1 : 43.

1931. *Catharsius molossus*, Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), 3 : 94-95.

Material examined : 2 ex., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution : SRILANKA ; INDIA : West Bengal, Sikkim, Assam, Meghalaya, Orissa, Bihar, Uttar Pradesh, Himachal Pradesh, Maharashtra, Karnataka, Kerala (Silent Valley) and Andaman Island

Remarks This species is widely distributed in India and found both in hills and plains.

17. *Copris indicus* Gillet,

1910. *Copris indicus* Gillet, *Notes Leyd. Mus.*, 32 : 5.

1931. *Copris indicus*, Arrow, *Fauna Brit. India*, (Coleoptera : Lamellicornia), 3 : 106-107.

Material examined : 1 ex., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution : SRILANKA ; INDIA : Tamilnadu, Karnataka, Kerala (Silent Valley).

18. *Caccobius meridionalis* Boucomont

1914. *Caccobius meridionalis* Boucomont, *Annali Mus. Civ. Stor. nat. Giacoma Doria*, 67 : 239.

Material examined : 1 ex., Kerala, Silent Valley, i. 1980, S. Biswas.

Distribution : SRILANKA ; INDIA : Maharashtra, Karnataka, Tamilnadu, Kerala (Silent Valley).

19. *Caccobius unicornis* (Fabricius)

1798. *Copris unicornu* Fabricius, *Supp. Ent. Syst.*, p. 33.

1801. *Copris unicornis* Fabricius, *Syst. Eleut.*, 1 : 52.

1893. *Onthophagus nitidiceps* Fairman, *Ann. Soc. ent. Belg*, 37 : 304.

1931. *Caccobius unicornis*, Arrow, *Fauna Brit. India*, (Coleoptera : Lamellicornia) 3 : 145-146.

Material examined : 2 exs., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution : CHINA ; TONKIN ; JAVA ; BORNEO ; PHILIPPINE ISLAND ; MALAYPENINSULA ; SRILANKA ; BANGLADESH ; INDIA : Assam, Uttar Pradesh, Madhya Pradesh, Kerala (Silent Valley).

Remarks : The specimens were collected from the elephant dung along with *Catharsius* spp. and *Ontis shinghalensis*.

20. *Onthophagus andrewesi* Arrow

1931. *Onthophagus andrewesi* Arrow. *Fauna Brit. India*, (Coleoptera : Lamellicornia) 3 : 324.

Material examined : 2 exs., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution : INDIA : Tamilnadu, Kerala (Silent Valley).

Remarks : Specimens were collected from Human faeces. Arrow (1931) described this species from South India and specimens under report agree well with his description.

21. *Onthophagus bifasciatus* (Fabricius)

1781. *Scarabaeus bifasciatus* Fabricius, *Spec. Ins.*, 1 : 25.
1879. *Onthopoagus birmanicus* Harold, *Col. Hefte*, 16 : 226.
1931. *Onthophagus bifasciatus*, Arrow, *Fauna Brit. India*, (Coleoptera : Lamellicornia), 3 : 339-340.

Material examined 4 exs., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution : BURMA ; INDIA : West Bengal, Assam, Sikkim, Bihar, Tamilnadu, Kerala (Silent Valley).

Remarks : This is one of the species which was been reported to be associated with Scarabiasis. Specimens were collected from human faeces.

22. *Onthophagus castetsi* Lansberge

1887. *Onthophagus castetsi*, Lansberg, *Notes Leyd. Mus.*, 9 : 163.
1931. *Onthophagus castetsi*, Arrow, *Fauna Brit. India*, (Coleoptera : Lamellicornia), 3 : 215-216.

Material examined : 4 exs., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution : INDIA : Tamilnadu, Kerala (Trivandrum, Silent Valley).

Remarks Specimens collected from Silent Valley slightly differ in puncturation and rows of hairs bordering on each side of elytron otherwise agrees well with *O. castetsi*.

23. *Onthophagus ensifer* Boucomont

1914. *Onthophagus ensifer* Boucomont, *Annali. Mus. civ. stor. nat. Giacoma. Doria*, 66 : 220.
1931. *Onthophagus ensifer* Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), 3 : 334-335.

Material examined 9 exs., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution : INDIA : Tamilnadu, Kerala (Silent Valley).

Remarks : The species was common in human faeces and shows considerable intraspecific variations.

24. *Onthophagus fasciatus* Boucomont

1914. *Onthophagus fasciatus* Boucomont, *Annali. Mus. civ. stor. nat. Giacoma Doria* 66 : 231.
 1931. *Onthophagus fasciatus* Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), 3 : 311-312.

Material examined : 5 ex., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution : BANGLADESH ; INDIA : Uttar Pradesh, Madhya Pradesh, Maharashtra, Tamilnadu, Kerala (Silent Valley).

Remarks : The species was known to occur in fungus. Specimens under report have been collected from human faeces.

25. *Onthophagus keralicus* sp. nov.

(Text Fig. 2)

Male : Length 8.16 mm. Breadth 4.4 mm.

Black, shining and smooth above, antennae, mouth parts and legs brownish, under surface covered with scanty hairs.

Broadly oval and compact. Head semicircular, clypeofrontal carina absent ; strongly punctured in the middle, slightly rugosely at the sides. Vertex with two tubercles between the eyes. Eyes narrowed posteriorly. Pronotum strongly punctured ; little less strongly in the middle, lateral margin almost straight in front, rounded behind and behind the middle of front margin with a feeble depression. Elytra moderately striate and strongly punctured, intervals slightly convexed and feebly but uniformly punctured. Pygidium covered with very short, erect hairs margined at base, moderately strongly punctured. Hind tibiae short, broad at apex. Metasternum smooth and with a feeble impressed line in the middle, covered with setigerous punctures at the sides.

♀ clypeus more strongly, rugosely punctured. Pronotal tubercles more strongly developed.

This species is closely related to *O. laevis* Harold but differs in (I) absence of clypeofrontal carina in both sexes (II) presence of two tubercles between the eyes and (III) punctures on pronotum is stronger than that of the later.

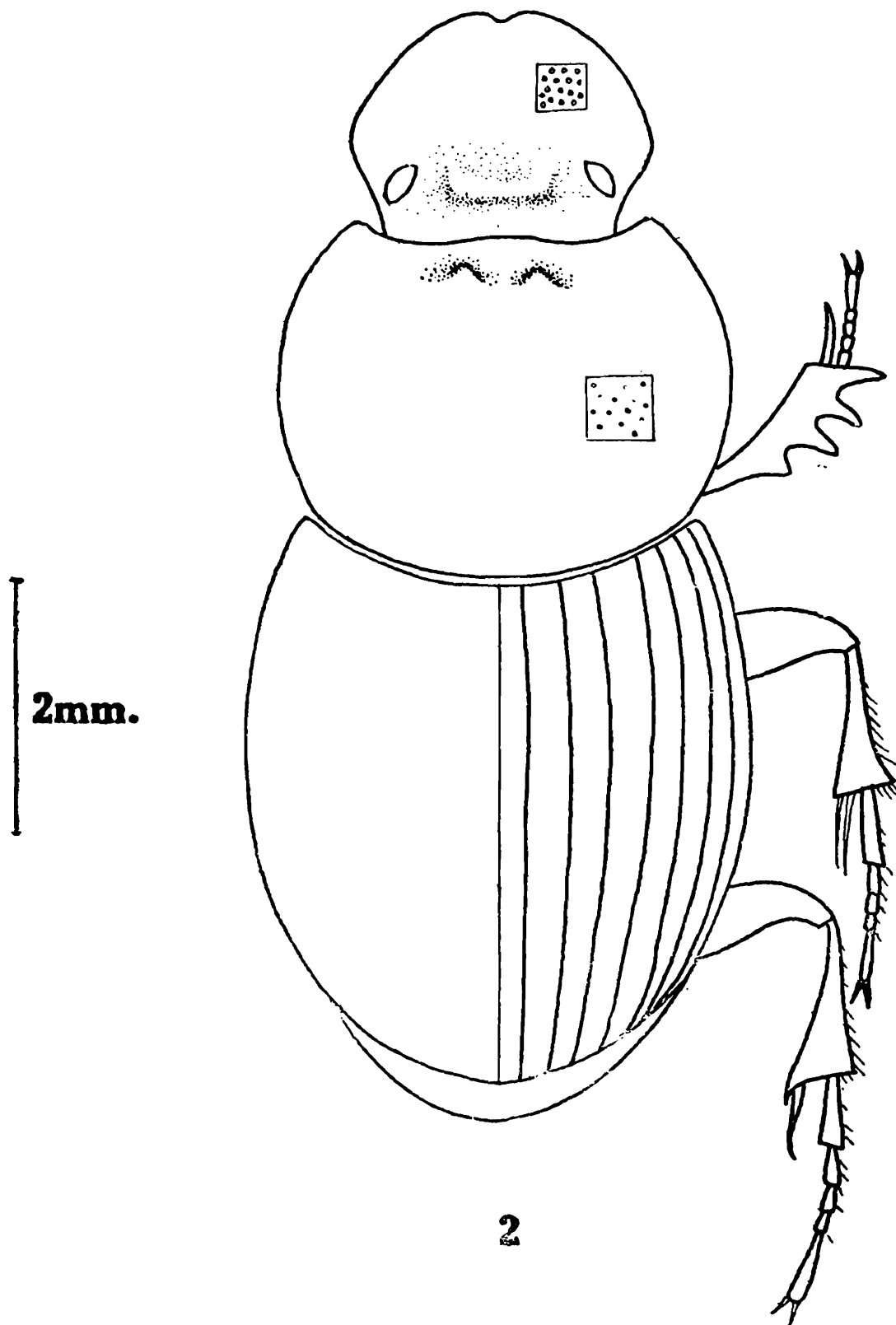


Fig. 2. *Onthophagus keralicus* sp. nov., dorsal view of male.

Holotype : ♂, INDIA : Kerala, Silent Valley, 2. v. 80, S. Biswas.

Paratype : 1 ♂, 1 ♀, INDIA, Kerala, Silent Valley, 2. v. 80, S. Biswas.

26. *Onthophagus sahai* sp. nov.

(Text Fig. 3)

Male : Length 5.2 mm. Breadth 3.2 mm.

Dark brown and shining with mouth parts, femora tibiae, tarsi, light brown, base of elytra reddish. Broadly oval and compact not

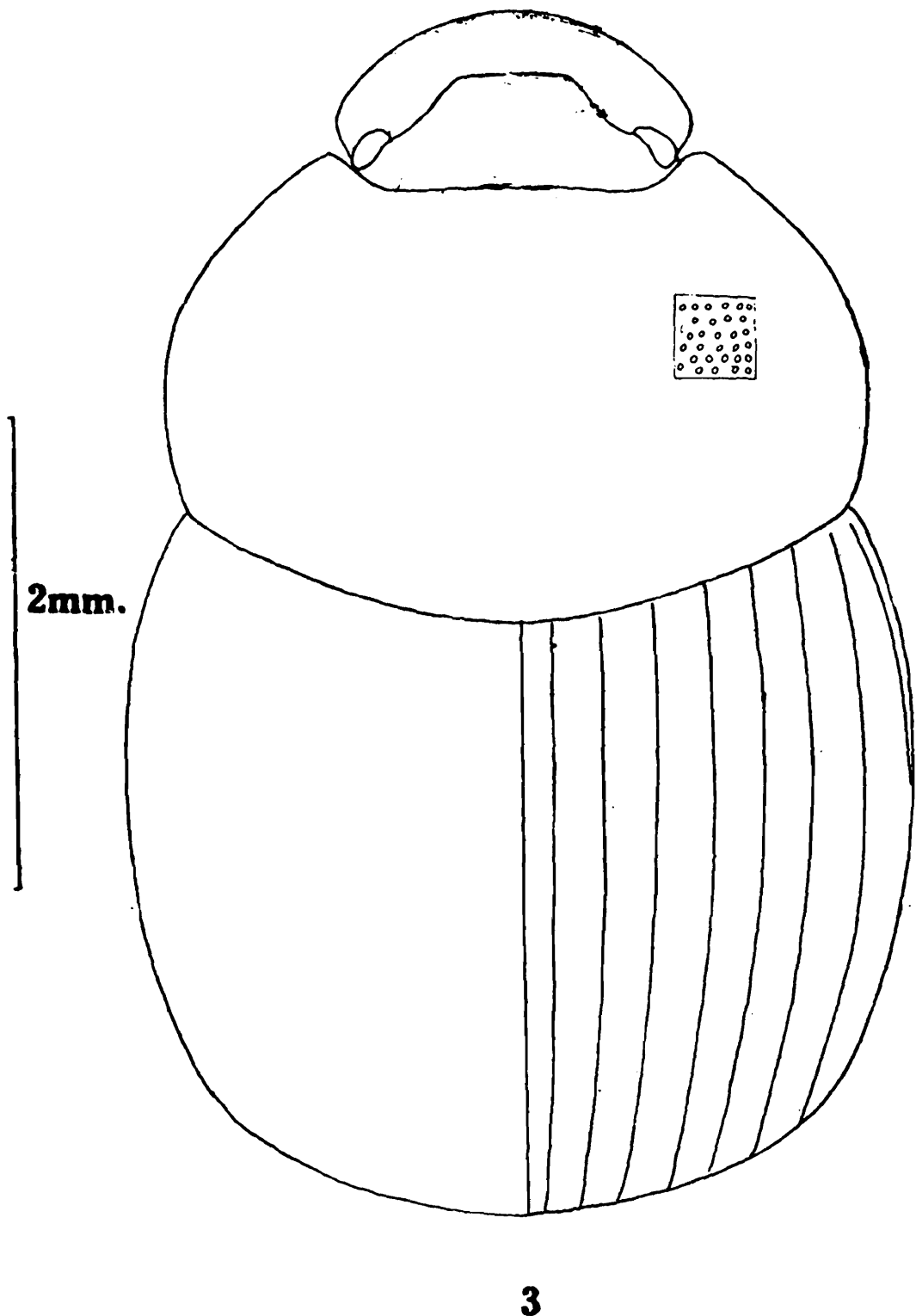


Fig. 3. *Onthophagus sahai* sp. nov., dorsal view of male.

very convex. Head nearly semicircular, middle of the front margin more or less straight with a short straight and strong clypeofrontal carina. Vertex with a feebly bicuspid prominence, surface behind the prominence almost smooth. Clypeus and frons finely and uniformly punctured, ocular lobe a little strongly punctured. Lateral margin of pronotum rounded in front and feebly sinuate behind, front angle blunt, hind angle obsolete, pronotum gradually sloping in front and uniformly punctured except the upper margin of declivity. Elytra moderately strongly striate, striae sparsely punctured, interval almost imperceptibly punctured. Pygidium margined at the base and very finely punctured. Metasternum smooth and with a longitudinal groove in the middle, covered with setigerous punctures at sides.

This species is closely related to *O. lapillus* Arrow but can be differentiated by the cephalic armature in male and female and by having an extra carina on clypeus.

Holotype : ♂ INDIA, Kerala, Silent Valley, 22. iv. 80, S. Biswas.

Paratype : 1 ♂, 1 ♀ exs., INDIA, Kerala, Silent Valley, 22.iv.80, S. Biswas.

27. *Onthophagus taruni* sp. nov.

(Text Fig. 4)

Male : Length 6.64 mm Breadth 3.52 mm.

Brownish, with anterior and lateral margin of pronotum, irregular markings on elytra, pygidium, ventral sides of metasternal shield and antennal club pale; elongated oval, moderately convex, clypeo-frontal carina absent and with two conical prominences between the eyes. Anterior margin of head truncated in the middle and reflexed giving rise to a long vertical process rounded at tip, clypeus uniformly punctured and stronger at sides. Pronotum with long process in the middle, a little behind the front margin, declivity at the middle on each side of the process; front angles produced, hind angles obtuse base somewhat produced, lateral margin straight in front, feebly bisinuate behind, strongly and uniformly punctured except the anterior declivity. Elytra finely striate, striae not very closely and strongly punctured, intervals flat, covered with small granules and short pale setae. Pygidium margined at base covered with moderate

punctures. Metasternum with a longitudinal groove in the middle with fairly strong punctures at sides ; a prominence in the middle a little behind the anterior margin, almost smooth along the mid ventral line. Anterior tibiae narrow, with four external teeth, apical spine bent downwards, basal half with tubercles.

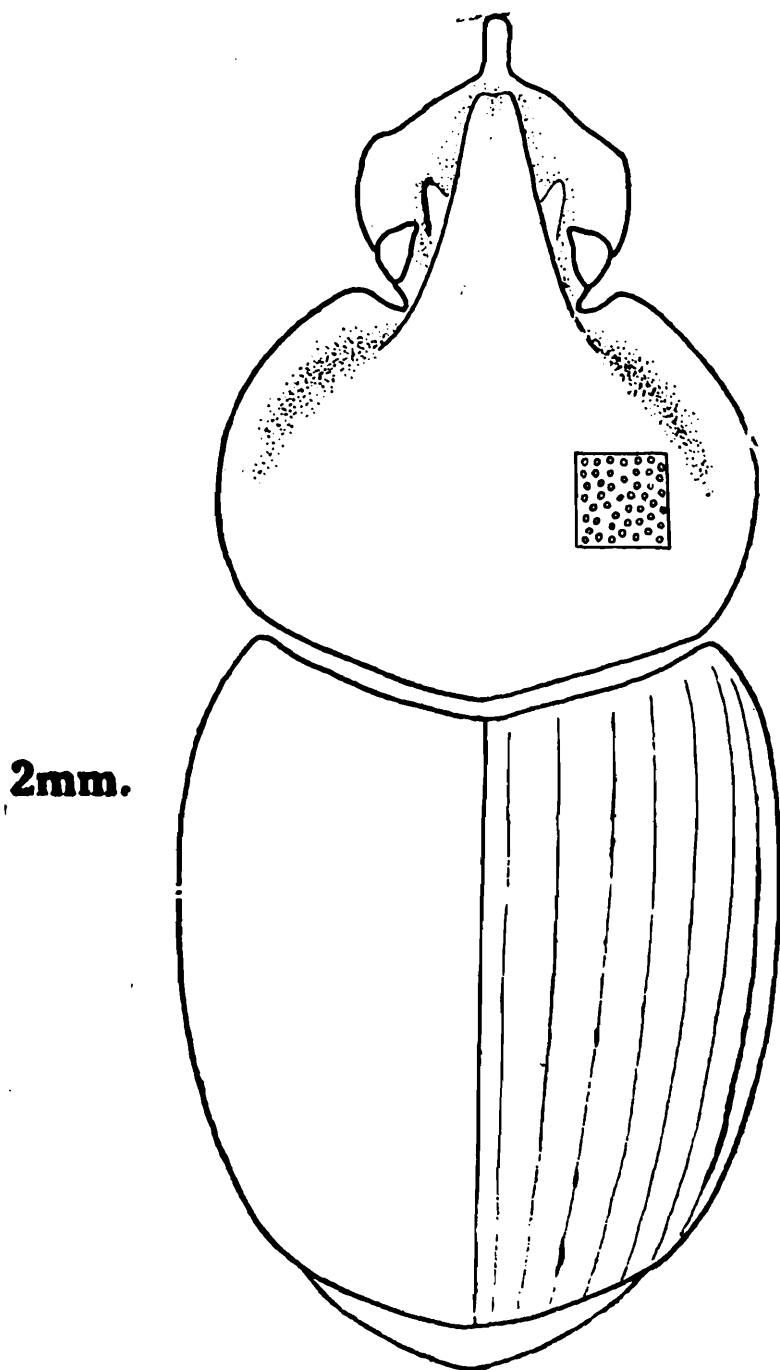


Fig. 4. *Onthophagus taruni* sp. nov., dorsal view of male.

♀ Pronotum with a carina just behind the front margin, clypeo-frontal carina long and extending throughout the breadth, clypeus more strongly punctured.

Holotype : ♂, INDIA, Kerala, Silent Valley, 28.iv.80, S. Biswas.

Paratype : 1 ♂, 2 ♀ ♀, INDIA, Kerala, Silent Valley, 28. iv. 80, S. Biswas.

28. *Onthophagus unifasciatus* (Schaller)

1783. *Scarabaeus unifasciatus* Schaller, *Abh. Hall. Nat. Ges.*, 1 : 240.

1858. *Onthophagus prolixus* Walker, *Ann. Mag. nat. Hist.*, (2) 3 : 208.

1931. *Onthophagus unifasciatus* Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia) 3 : 341.

Material examined : 1 ex., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution : SRILANKA ; BANGLADESH ; INDIA : West Bengal, Bihar, Uttar Pradesh, Maharashtra, Tamilnadu, Kerala (Silent Valley).

Remarks : This is one of the species of *Onthophagus*, responsible for a disease known as "scarabiasis", a disorder in young children, in which the beetles make their way into the intestinal tract.

29. *Phacosoma triste* Arrow

1931. *Phacosma triste* Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia), 3 : 355.

Material examined : 2 exs., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution : INDIA : Tamilnadu, Kerala (Silent Valley).

Remarks : Specimens were collected from the faeces of non-human primate species.

30. *Onitis singhalensis* Lansberge

1875. *Onitis singhalensis* Lansberge, *Ann. Soc. ent. Belg.*, 18 : 140.

1931. *Onitis singhalensis* : Arrow, *Fauna Brit. India*, (Coleoptera : Lamellicornia), 3 : 394-395.

Material examined 14 ex., Kerala, Silent Valley, iv. 1980, S. Biswas.

Distribution : INDIA : Tamilnadu, Kerala (Silent Valley).

Remarks Specimens were collected from elephant dung from grassland near stream.

SUMMARY

This paper records 30 species belonging to 13 genera and 5 sub-families of Lamellicorn beetles from Silent valley, Kerala. Three species namely *Onthophagus keralicus*, *O. sahai* and *O. taruni* are described as new to science. Female of *Mycteristes auritus* Arrow is described for the first time. Distributional records of all the species included in the paper have been provided on the basis of literature and collections present in Zoological Survey of India.

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FURTHER STUDIES ON THE MEMBRACIDS FROM SILENT VALLEY, KERALA (INSECTA HOMOPTERA)

G. THIRUMALAI

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(With 3 Text-figures and 2 Plates)

INTRODUCTION

Recently membracids from Silent Valley were studied by Thirumalai and Ananthasubramanian (1981). The membracids included in the present paper are those collected subsequently during a multi-disciplinary expedition to Silent Valley (December, 1980), in which the author also was a participant. Two new species are described in the present paper and male of *Parayasa variegata* Thirumalai and Ananthasubramanian is also described for the first time. Besides *Tricentrus horizontalis* Distant described from Burma (Distant, 1916) has been recorded during the present expedition.

SYSTEMATIC ACCOUNT

Subfamily : CENTROTINAE

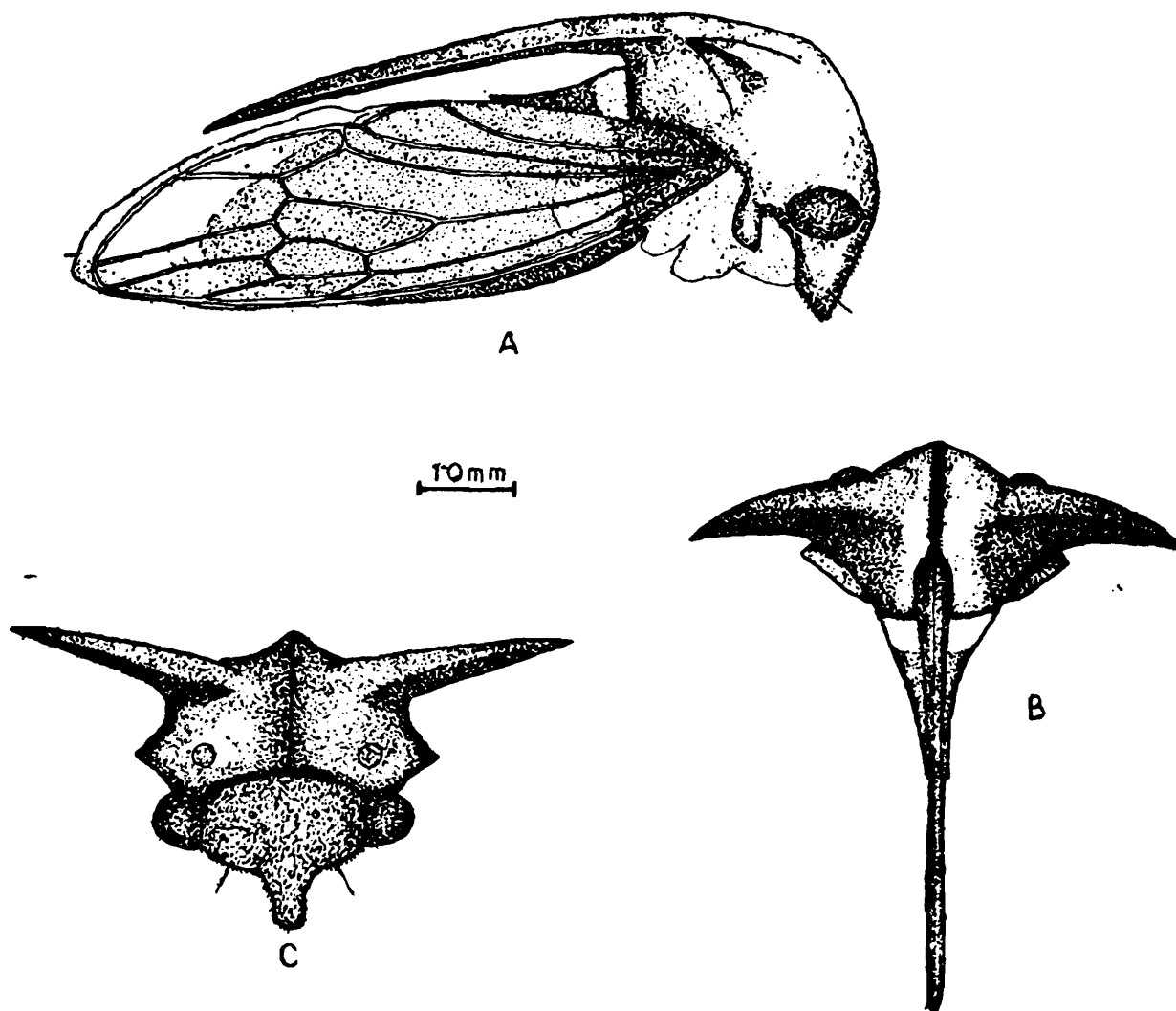
Tribe : LEPTOCENTRINI Distant 1908

1. *Lanceonotus mukkaliensis* sp. nov.

(Text-fig. 1, Plate I A)

Female : General colour shining black, about twice as wide as long, finely punctate with silvery hairs, upper margin arcuate, lower margins obliquely curving to frontoclypeus ; eyes large, subglobose, reddish ; ocelli silvery white, small, nearer to eyes than to each other and situated slightly above the centro-ocular line ; frontoclypeus dark brownish-black extending to three-fourths of its length beyond the lower margins of vertex, pubescent, tip rounded. Pronotum shining black, strongly punctate with long sparse hairs, metopidium slightly oblique from its base about 1.7 times as wide as high, supra-ocular callosities black, prominent, nearly rounded, humeral angles dark brownish-black, prominent ; supra humeral horns jet black, broad-based, tricarinate, about 1.6 times as long as distance between their bases, sparsely pilose with silvery hairs, laterally strongly curved back, directed straight and then backwards, viewed from above laterad and

then turned backwards, viewed from front directed obliquely outwards, and almost straight; posterior process emerging from the posterior region of disc, remote from scutellum, a little arched about its middle and tapering gradually to the tip, very nearly impinging on the margins of the tegmina and passing beyond the anal angles as far as the end of the fifth apical cell, tip acute, ventral carinae pitch black; scutellum twice longer than wide, basal one third white tomentose, tip emarginate, black; lateral aspects of pterothorax cretaceously sericeous. Tegmina light brown, 3.3 times as long as wide, basal fifth black and coriaceous, apical limbus moderately wide, first apical cell wedge-shaped, nearly three times as long as its greatest width, second discoidal cell larger than first. Abdomen black. legs thickly covered with white hairs. Tarsi brown, tibiae dark brown, rest black.



Text-fig. 1. *Lanceonotus mukkaliensis* sp. nov.

A. Lateral view of female.

B. Dorsal view of Pronotum of female.

C. Frontal view of female.

Measurements : Length from frontal margin to the tips of tegmina 8.6 mm., to the tip of the posterior process 6.9 mm., width across tip of supra humeral horns 5.9 mm., at humeral angles 3.2 mm., at eyes 1.8 mm.

Male : Not known.

Material examined : HOLOTYPE female collected from 2 Kms towards Mukkali, Silent Valley, Kerala, 860 metres elevation ; coll. R. S. Pillai ; 6. xii. 1980. ZSI/SRS Reg. No. I/HM 13.

Remarks : *L. mukkaliensis* is close to *Lanceonotus malabaricus* Thirumalai and Ananthasubramanian in the general colouration of the body, eyes and in the position of the ocelli but differs in the nature of the lateral pronotal processes, the more broader fourth apical cell of tegmina, tip of the posterior process reaching upto the fifth apical cell of tegmina and in the nature of scutellum which is twice as long as wide.

2. *Lanceonotus malabaricus* Thirumalai and Ananthasubramanian 1981

One female, from Road to Cardomom Estate, Silent Valley, Kerala, 940 metres elevation, coll. R. S. Pillai ; 11. xii. 1980. ZSI/SRS. Reg. No. I/HM 14.

3. *Hemicentrus suffulta* (Distant) 1906 (Plate II A)

One female collected from 5 Kms towards Mukkali, Silent Valley, Kerala, 860 metres elevation, coll. R. S. Pillai ; 12. xii. 1980. ZSI/SRS Reg. No. I/HM 15.

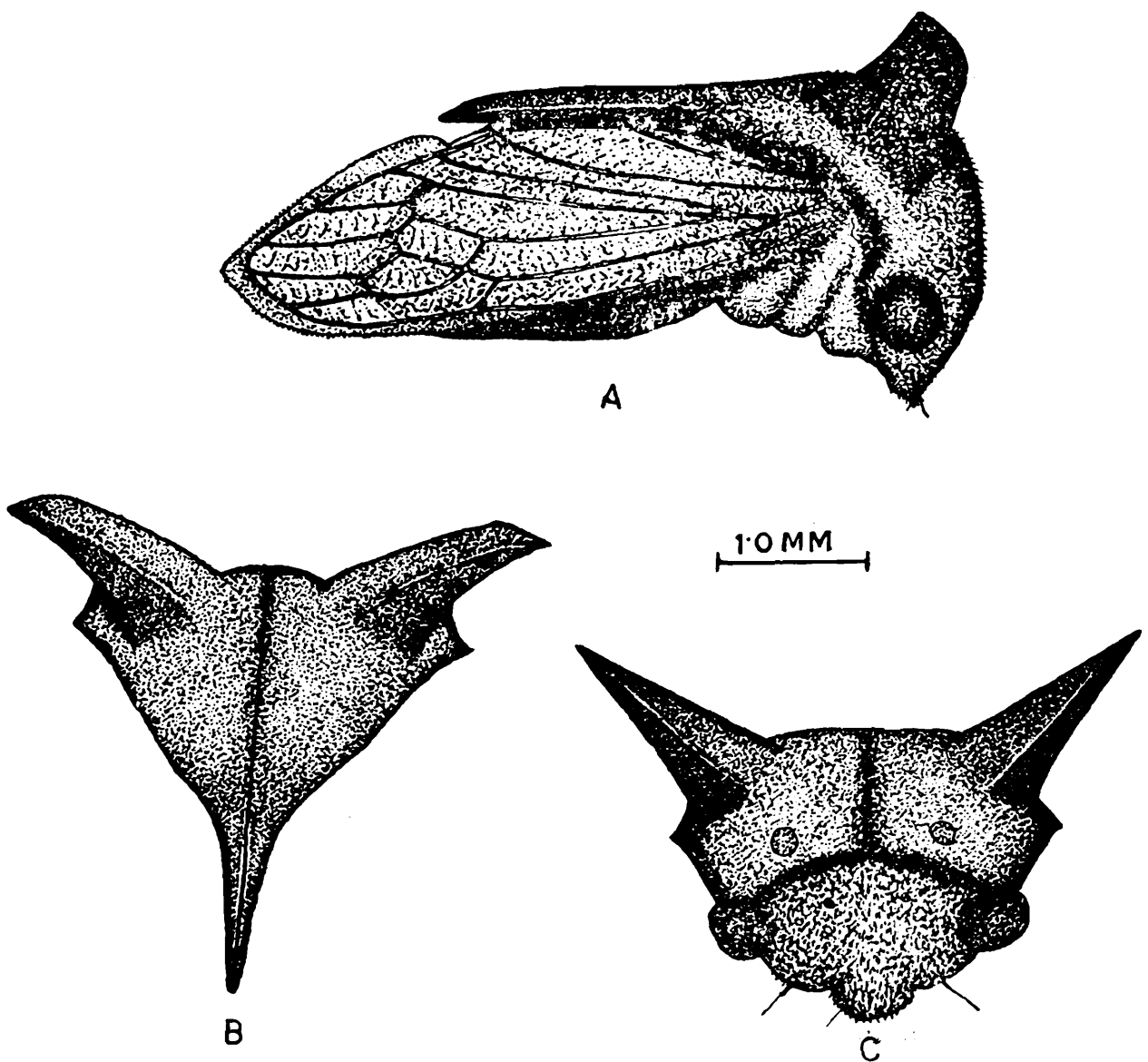
Tribe : Tricentrini Ahmad and Yasmeen 1974.

4. *Tricentrus erectus* sp. nov. (Text-fig. 2, A-C ; Plate I B)

Female : General colour black shaded with brown, head black almost vertical, vertex about one and half times wider than long, finely punctate with short thick adpressed silvery pilosity, upper margin strongly arcuate and sinuate, lower margins obliquely curved to frontoclypeus ; eyes subglobose, brown ; ocelli dark brown, closer to eyes than to each other and situated well above the centro-ocular line ; frontoclypeus extending half of its length beyond lower margin of

vertex and covered with long silvery pilosity. Pronotum black, finely punctate with short suberect silvery pilosity, median carina percurrent, metopidium slightly obumbrant and vertical, more than three times as wide as high, humeral angles prominent, supraocular callosities divided and blunt; disc brown; supra humeral horns robust and broad based, nearly twice longer than distance between their bases, strongly ridged centrally; viewed from lateral aspects projecting obliquely forwards with the apices curved backwards, lateral area sharply depressed, viewed from above moderately broad, apices subobliquely subacute, posterior carination subprominent, viewed from front extending

Text-Fig 2

Text-fig. 2. *Tricentrus erectus* sp. nov.

A. Lateral view of female.

B. Dorsal view of Pronotum of female.

C. Frontal view of female.

outward and upward ; posterior process robust, contiguous with scutellum, basal part reddish brown, tip black tricarinate, just reaching the posterior angle of the inner margin of tegmina, dorsal carina percurrent through metopidium. Tegmina pale brown, thrice as long as wide, basal fourth coriaceous, veins dark brown, adpressed with golden hairs, first apical cell about six times as long as its greatest width, first discoidal cell not petiolate, nearly as long as the second, lateral areas of thorax white tomentose ; femora black, their apices and tibiae dark brown, tarsi ochraceous. Abdomen dark brown with white pubescence, ovipositor pitch black.

Measurements : Length from frontal margin to tips of tegmina 5.2 mm., to tip of posterior process 3.03 mm., width across tips of supra humeral horns 3.8 mm., at eyes 2.2 mm.

Male : Not known.

Material examined : HOLOTYPE female, collected from 5 Kms towards Mukkali, Silent valley, Kerala, 860 metres elevation, coll. R. S. Pillai ; 12. xii. 1980. ZSI/SRS Reg. No. I/H M 16.

Remarks : *Tricentrus erectus* sp. nov. is coming close to *Tricentrus projectus* Distant in the general colouration and in the nature of tegmina, but differs from it in the nature of lateral pronotal process which is not porrect and subobliquely subacute tip and in the nature of posterior pronotal process which is straight and not arched in the middle.

5. *Tricentrus horizontalis* Distant 1916 (Plate II B)

One female from Road to Cardomom Estate, Silent Valley, Kerala, 1005 metres elevation, coll. R. S. Pillai ; 11.xii. 1980. ZSI/SRS Reg. No. I/HM 17.

Remarks : It is of interest that *Tricentrus horizontalis* has been recorded for the first time from India. Distant (1916) described the species from Burma.

6. *Tricentrus purpureus* Ananthasubramanian and Ananthakrishnan 1975

Two females and two males from Road to Cardomom Estate, Silent Valley, Kerala, 940 metres elevation, coll. R. S. Pillai ; 11. xii. 1980. ZSI/SRS Reg. No. I/H 18.

**7. *Tricentrus syrandriks* Thirumalai
and Ananthasubramanian 1981**

Eight females and eight males from 2 kms towards Mukkali, Silent Valley, Kerala, 860 metres elevation, coll. R. S. Pillai ; 6. xii. 1980. ZSI/SRS Reg. No. I/HM 19.

Three females and five males from Road to Mukkali, Silent Valley, Kerala, 890 metres elevation, coll. R. S. Pillai ; 8. xii. 1980. ZSI/SRS. Reg. No. I/HM 20.

Three females and six males from 5 Kms towards Mukkali, Silent Valley, Kerala, 860 metres elevation, coll. R. S. Pillai ; 12. xii. 1980. ZSI/SRS Reg. No. I/HM 21.

One female from Panthanthodu, Silent Valley, Kerala, 860 metres elevation, coll. R. S. Pillai ; 13. xii. 1980. ZSI/SRS Reg. No. I/HM 22.

Three females and four males collected from Road to Estate, Silent Valley, Kerala, 860 metres elevation, coll. R. S. Pillai ; 14. xii. 1980. ZSI/SRS Reg. No. I/HM 23.

Tribe : Coccosterphini Distant 1908.

**8. *Parayasa variegata* Thirumalai
and Ananthasubramanian 1981**

(Text-fig. 3, A-C ; Plate II C)

Male : Similar to female in general colouration and measurements but differs from it in the nature of metopidium which is twice as wide as high and strongly obliquely directed to disc. The tegmina has three round transparent fasciae at about two-thirds distance from base and a distinct brown patch at half of the first and second apical cells, on the second discoidal cell, of tegmina. Rest of the wing pale virescent.

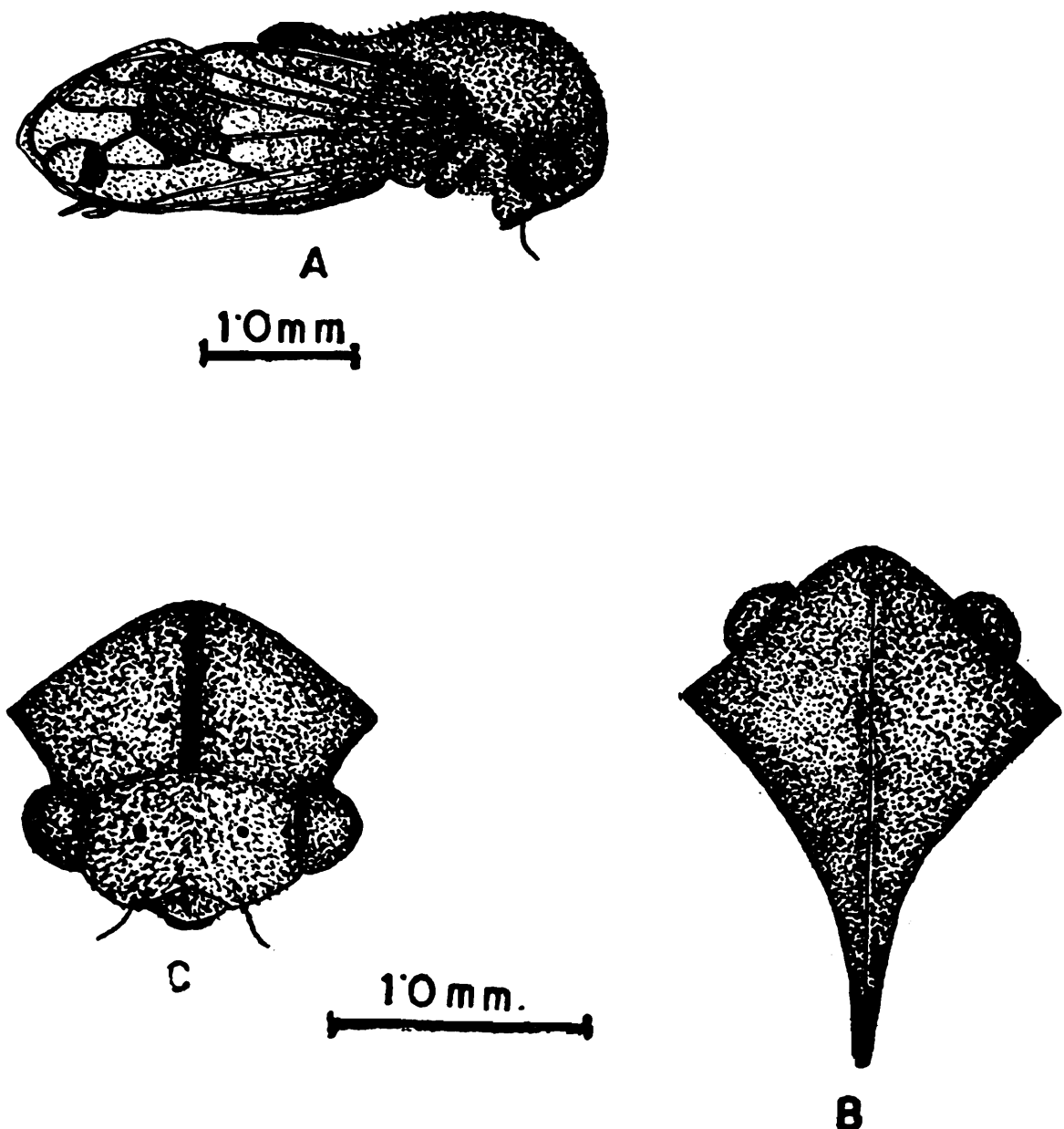
Measurements : Length from frontal margin to tips of tegmina 3.85 mm., to tip of posterior process 2.3 mm., width across tips of humeral angles 1.4 mm., at eyes 1.3 mm.

Material examined : Topotype two males and three females collected from 2 kms towards Mukkali, Silent-Valley, Kerala, 860 metres elevation, coll. R. S. Pillai ; 6. xii. 1980. ZSI/SRS Reg. No. I/HM 24.

One female from Kumattamthodu, Silent Valley, Kerala, 870 metres elevation, coll. R. S. Pillai ; 7. xii. 1980, ZSI/SRS. Reg. No. I/HM 25.

Five females and one male collected Road to Mukkali, Silent Valley, Kerala, 890 metres elevation, coll. R. S. Pillai ; 8. xii. 1980. ZSI/SRS Reg. No. I/HM 26.

Text-Fig 3



Text-fig. 3. *Parayasa variegata* Thirumalai & Ananthasubramanian.

- A. Lateral view of male.
- B. Dorsal view of Pronotum of male.
- C. Frontal view of male.

Two females and four males collected from Road to Cardomom Estate, Silent Valley, Kerala, 1005 metres elevation, coll. R. S. Pillai ; 11. xii. 1980. ZSI/SRS Reg. No. I/HM 27.

Four females collected from 5 kms. towards Mukkali, Silent Valley, Kerala, 860 metres elevation. coll. R. S. Pillai ; 12. xii. 1980. ZSI/SRS Reg. No. I/HM 28.

One female and three males collected from Road to Cardomom Estate, Silent Valley, Kerala, 860 metres elevation, coll. R. S. Pillai ; 14. xii. 1980. ZSI/SRS Reg. No. I/HM 29.

All the type-materials are deposited in Zoological Survey of India, Southern Regional Station, Madras. They will be in due course transferred to National Collections of Zoological Survey of India.

SUMMARY

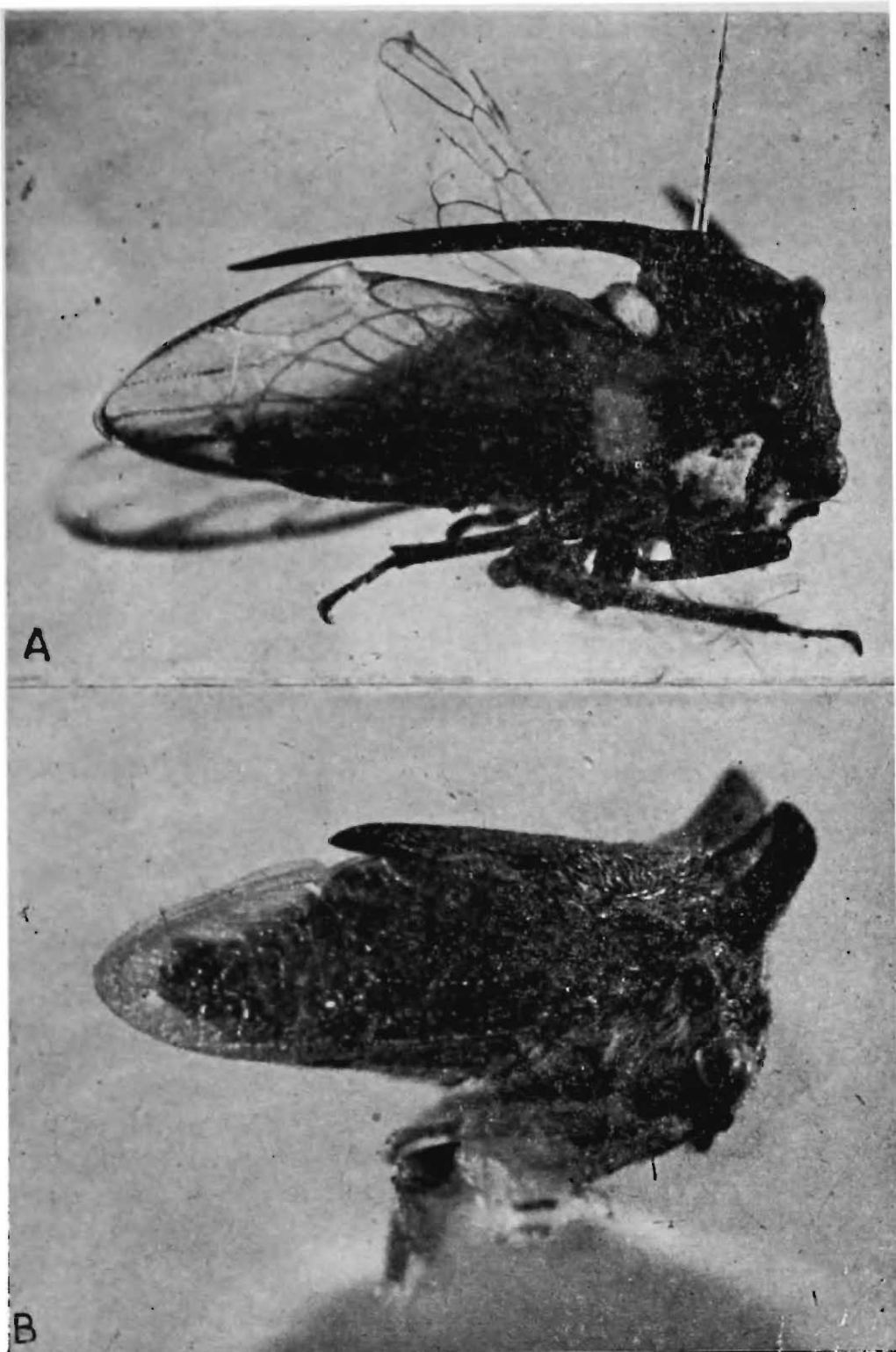
The paper deals with 8 species of membracids from Silent Valley. Two of the species dealt with here are new and one species *Tricentrus* forms new locality record. Besides male of *Parayasa variegata* described for the first time.

ACKNOWLEDGEMENTS

Grateful thanks are due to Dr. B. K. Tikader, Director, Zoological Survey of India, Calcutta and Dr. R. S. Pillai, Deputy Director, Zoological Survey of India, Southern Regional Station, Madras for the facilities provided. The author express his sincere thanks to Dr. K. S. Ananthasubramanian, Department of Zoology, Loyola College, Madras for confirming the identity of new species and offering useful comments. The help of Shri S. Vijayaraghavan, Photographer, Zoological Survey of India, Southern Regional Station, Madras in preparing photographic plates is also gratefully acknowledged.

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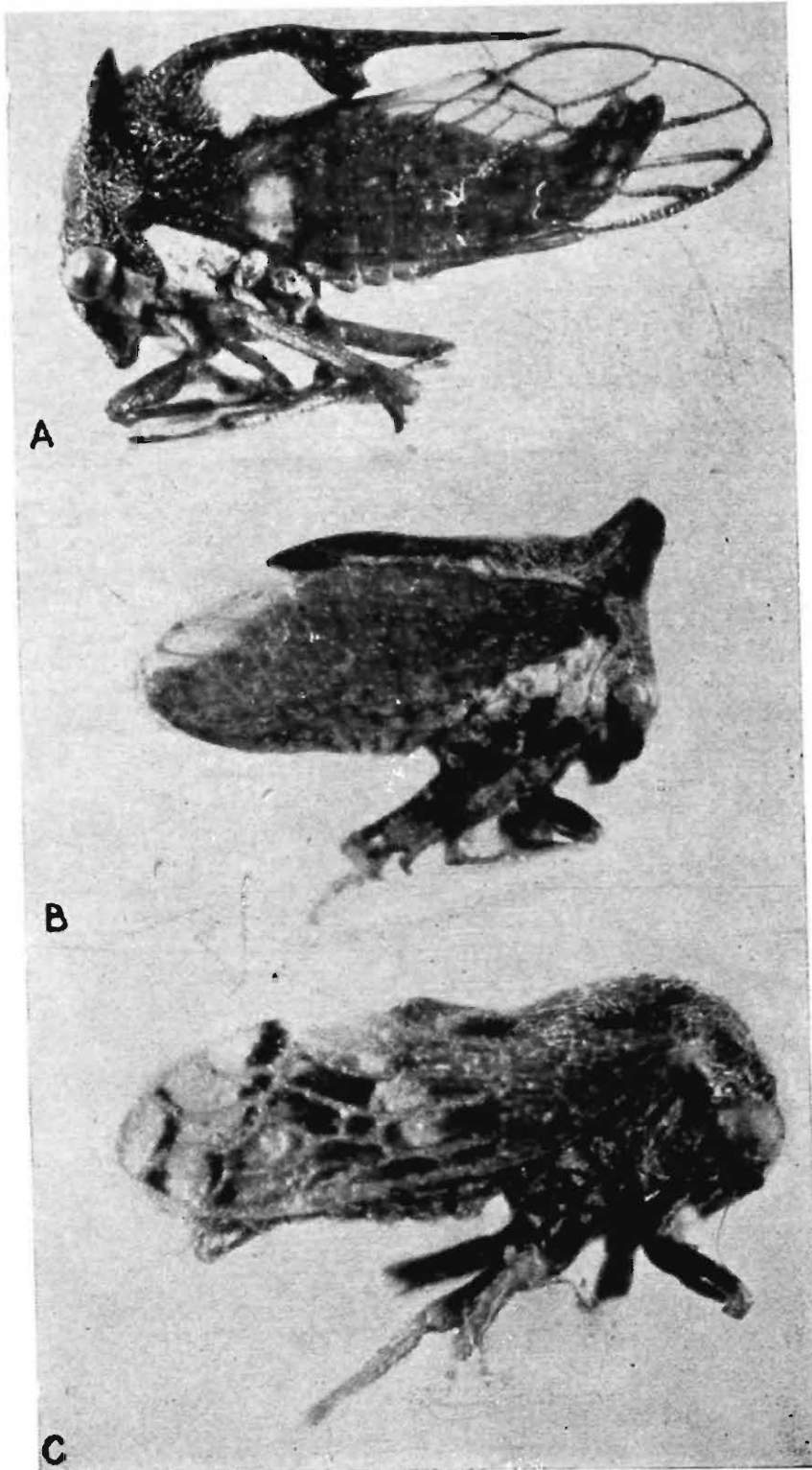
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A. *LANCEONOTUS MUKKALIENSIS* sp. nov. ♀ X14.

B. *TRICENTRUS ERECTUS* sp. nov. ♀ X22.

PLATE -II



- A. *HEMICENTRUS SUFFULTA* (Distant) ♀ X20.
B. *TRICENTRUS HORIZONTALIS* (Distant) ♀ X20.
C. *PARAYASA VARIEGATA* Thirumalai &
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ON THE COLLECTIONS OF LEPIDOPTERA FROM THE SILENT VALLEY, KERALA

By

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INTRODUCTION

The Zoological Survey of India conducted several faunistic surveys in the unexplored areas of Silent Valley. Fairly good collections of lepidoptera have been brought to the Z.S.I. so as to give the authors an opportunity for their taxonomical studies. The paper deals with 27 species in 19 genera under 6 families of Rhopalocera and 2 species in 2 genera under a couple of families of Heterocera. All the species are for the first time recorded from the concerned area. Their original and current references, and also geographical distribution have been given.

SYSTEMATIC ACCOUNT

Family DANAIDAE

1. *Idea lynceus* (Drury)

1773. *Papilio lynceus* Drury, *III. Exot. Ins.*, 2 : 12, pl. 7, fig. 1.

1941. *Idea lynceus*, Talbot, *Trans. R. ent. Soc. Lond.*, 91 (4) : 105—117.

Material examined : 1 ex., Kerala ; Silent Valley, on the left bank of the river Kunti about 5 kms. away from the Dam site, 24. iv. 1980 (R. S. Pillai Coll.).

Length of forewing 56 mm.

Distribution : India : Sunderbans, Western ghats, Kerala ; Sri-Lanka ; Burma ; Malaya ; Sumatra ; Borneo.

Remarks : Wynter-Blyth (1957) has referred to this species, popularly called “the Tree Nymph”, under the genus *Hestia* and, erroneously cited Moore & de Niceville as the authors of the species. However, following Talbot (1947), the authors have retained the species under the genus *Idea* Fabricius.

2. *Danaus aglea* (Stoll)

1781. *Papilio aglea* Stoll, In Cramer, *Pap. Exot.*, 4 : pl. 377.

1939. *Danaus aglea*, Talbot, *Fauna Brit. India, Butterflies*, 1 : 37.

Material examined: 1 ex., Kerala, Silent Valley, near river bridge, 16. i. 1980 (S. K. Bhattacharya & Party coll.) ; 1 ex., Dam site, along Kumatanthodu, 960 m., 19. i. 1980 (K. R. Rao & Party Coll.).

Length of forewing: 30 mm.

Distribution: India: Southern to Western Peninsula, the Himalayas east from Kashmir, Assam, West Bengal, the Andaman and Nicobar Islands; South China: Taiwan, Hainan; Vietnam: Tonkin, Annam; Thailand and Malaya.

Remarks: The species, popularly known as "The Glassy Tiger", is fairly common in the Indian subregion.

3. *Danaus limniace* (Cramer)

1775. *Papilio limniace* Cramer, *Pap. Exot.*, 1: pl. 59.

1947. *Danaus limniace*, Talbot, *Fauna Brit. India*, Butterflies, 2: 30.

Material examined: 2 exs., Kerala, Palghat, 24 kms. N. W. of Mukkali, project site, base camp, 15. i. 1980; 2 exs., 30 kms. N. W. of Mukkali, 25. i. 1980 (S. K. Bhattacharya Coll.); 2 exs., Valiyaparthodu, 4 kms. from camp 2, 24. i. 1980—26. i. 1980 (K. R. Rao & Party Coll.).

Length of forewing: 38—46 mm.

Distribution: South China: Taiwan; India; Sri Lanka; Burma; Malaysia; Sula Islands; Java; the Philippines; Luzon; Sulawesi; Moluccus.

Remarks: The species, popularly known as "the Blue Tiger", is found throughout the plains and hills of India and also the Andaman and Nicobar groups of Islands.

4. *Euploea core* (Cramer)

1780. *Papilio core* Cramer, *Pap. Exot.*, 3: 133, pl. 267, figs E-F.

1857. *Euploea core*, Horsfield & Moore, *Cat. Lep. Mus. E. I. C.*, 1: 131, pl. 4, figs. 9-9a.

Material examined: 1 ex., Kerala, Silent Valley, Kunthi River vicinity near Hydro-Electric Project-site, 16. i. 1980 (S. K. Bhattacharya & Party Coll.).

Length of forewing : 44 mm.

Distribution : India ; Sri Lanka ; Sumatra ; Java and eastwards.

Remarks : The species, popularly known as "the Common India Crow", is very common in India.

Family SATYRIDAE

5. *Melanitis leda* (Linnaeus)

1758. *Papilio leda* Linnaeus, *Syst. Nat.*, 1 (2) : 773.

1927. *Melanitis leda*, Fruhstorfer, In Seitz, *The Macrolepidoptera of the World, the Indo-Australian Rhopalocera*, 9 : 362.

Material examined : 1 ex., Kerala, Silent Valley, 3 kms. N. W. of Mukkali, 25. i. 1980 (S. K. Bhattacharya & Party Coll.) ; 1 ex., Valiyaparathodu camp, 26. i. 1980 (K. R. Rao Coll.) ; 1 ex., 100 m. beyond Karimalaithodu, 960 m., 29. iv. 1980, 1 ex., Karimalaithodu, 900 m. 29. iv. 1980 (R. S. Pillai Coll.).

Length of forewing : 28—40 mm.

Distribution : Southern China ; Indo-Australia ; Korea ; South Japan and Ethiopian region.

Remarks : The species, popularly known as the "Common Evening Brown", is very common in India.

Family NYMPHALIDAE

6. *Euthalia lepidea* (Butler)

1868. *Adolias lepidea* Butler, *Ann. Mag. nat. Hist.*, (4) 1 : 71.

1905. *Euthalia lepidea*, Bingham, *Fauna Brit. India, Butterflies*, 1 : 272.

Material examined : 1 ex., Kerala, Silent Valley, 4 kms. towards Kummattanthodu ; 960 m., 18. i. 1980 (K. R. Rao & Party Coll.).

Length of forewing : 30 mm.

Distribution : India : Kumaon, Assam, Orissa, Kerala ; Burma ; Vietnam : Tonkin ; Malaya Peninsula.

Remarks : The species, popularly known as the "the Gray Count", is not common in south India.

7. *Pantoporia* sp.

Material examined : 1 ex., Kerala, Silent Valley, 4 kms. N. E. of Valiyaparathodu, 940 m., 23. i. 1980 (S. K. Bhattacharya & Party Coll.).

Length of forewing 30 mm.

Remarks : The specimen could not be identified upto species due to the badly damaged condition. However, the genus, popularly known as “the Sergeants”, is confined to Asia only.

8. *Neptis hylas* (Linnaeus)

1758. *Papilio hylas* Linnaeus, *Syst. Nat.*, Ed. 10 : 486.

1927. *Neptis hylas*, Fruhstorfer, In Seitz, *The Macrolepidoptera of the World, the Indo-Australian Rhopalocera*, 9 : 101.

Material examined : 1 ex., Kerala, Silent Valley, 5 kms. away from Dam-site, 15. i. 1980 ; 1 ex., 8 kms. away from Silent Valley, 15. i. 1980, 1 ex., Dam-site, 880—980 m, 16. i. 1980 (K. R. Rao Coll.) ; 1 ex., 4 kms. N. E. of Valiyaparathodu, 940 m., 23. i. 1980 (S. K. Bhattacharya & Party Coll.) ; Valiyaparakummathanthodu, 870 m., 3. v. 1980 (R. S. Pillai Coll.).

Length of forewing : 24 mm.

Distribution : India ; Sri Lanka ; Burma ; Malayan subregion including the Lesser Sunda Islands ; Palaearctic Asia and Europe.

Remarks : The species, popularly known as “the Common Sailor”, is very common in India.

9. *Neptis jumbah* Moore

1857. *Neptis jumbah* Moore, *Cat. Lep. E.I.C. Mus.*, 1 : 167.

Material examined : 1 ex., Kerala, Silent Valley, 8 kms. away from Mukkali, 15. i. 1980 (K. R. Rao & Party Coll.).

Length of forewing : 28 mm.

Distribution : India : Eastern (West Bengal) and Southern peninsula, the Andaman Islands ; Burma (Rangoon).

Remarks : The species, popularly known as “the Chestnut-streaked Sailor”, is common in India.

10. *Hypolimnias misippus* (Linnaeus)

1764. *Papilio misippus* Linnaeus, *Mus. Ulric.*, p. 264.

1905. *Hypolimnias misippus*, Bingham, *Fauna Brit. India, Butterflies*, 1 : 388.

Material examined 1 ex., Kerala, Silent Valley, 8 kms. west of Valiyaparathodu camp, 26. i. 1980 (S. K. Bhattacharya & Party Coll.).

Length of forewing : 36 mm.

Distribution : China ; Pakistan : Baluchistan ; India including the Andaman & Car Nicobar Islands ; Sri Lanka ; Burma ; Malayan Subregion ; Ethiopian and Neotropical regions.

Remarks : The species, popularly known as “the Danaid Eggfly”, is abundant in South India. The female of this species is a very good mimic of “the Plain Tiger”, *Danaus chrysippus* Linn.

11. *Precis hierta* (Fabricius)

1798. *Papilio hierta* Fabricius, *Ent. Syst. Suppl.*, p. 424.

1927. *Precis hierta*, Fruhstorfer, in Seitz, *The Macrolepidoptera of the World, the Indo-Australian Rhopalocera*, 9 : 524.

Material examined 1 ex., Ca. 8 kms. west of Valiyaparathodu camp, 26. i. 1980 (S. K. Bhattacharya Coll.); 1 ex., Kerala, Silent Valley, Valiyaparathodu, 1005 m., 25. i. 1980 ; 1 ex. ; Kummathanthodu area, 890 m., 22. iv. 1980 ; 2 exs., about 2 kms. from camp site along the road leading to Mukkali, 1000 m., 4. v. 1980 (R. S. Pillai & Party Coll.).

Length of forewing : 22—24 mm.

Distribution : South China ; Pakistan : Baluchistan ; India including the Andaman Islands ; Sri Lanka ; Burma.

Remarks : The species, popularly known as “the Yellow Pansy”, is very common in India. It is interesting to note that the colour of the underside of both wings resembles dry grass. This resemblance affords protection to the concerned species.

12. *Precis lemonias* (Linnaeus)

1758. *Papilio lemonias* Linnaeus, *Syst. Nat.*, Ed. 10 : p. 473.

1927. *Precis lemonias*, Fruhstorfer, In Seitz, *The Macrolepidoptera of the World, the Indo-Australian Rhopalocera*, 9 : 520.

Material examined : 2 ex., along Valiyaparathodu and Kunti river, 940 m., 22. i. 1980 (K. R. Rao & Party Coll.) ; 2 exs., 4 kms. N. E. of Valiyaparathodu, 940 m., 23. i. 1980 (S. K. Bhattacharya & Party Coll.).

Length of forewing : 14–25 mm.

Distribution : South China : Taiwan ; India ; Bhutan ; Sri Lanka ; Burma ; the Philippines.

Remarks : The species, popularly known as “the Lemon Pansy”, is common in India.

13. *Precis atlites* (Linnaeus)

1764. *Papilio atlites* Linnaeus, *Mus. Ulric.*, p. 273.

1927. *Precis atlites* Fruhstorfer, In Seitz., *The Macrolepidoptera of the World, the Indo-Australian Rhopalocera*, 9 : 519.

Material examined : 1 ex., Kerala, Silent Valley, Valiyaparathodu camp, 26. i. 1980 (K. R. Rao & Party Coll.).

Length of forewing : 31 mm.

Distribution : South China ; Vietnam ; Annam ; Tonkin ; India including the Andaman and Central Nicobar Islands ; Burma ; Sri Lanka ; Thailand ; Java ; Kangean ; Lombok ; Sulawesi.

Remarks The species, popularly known as “the Grey Pansy”, is locally common.

14. *Precis iphita* (Cramer)

1779. *Papilio iphita* Cramer, *Pap. Exot.*, 3 : pl. 209, figs. C-D.

1927. *Precis iphita* Fruhstorfer, In Seitz, *The Macrolepidoptera of the World, the Indo-Australian Rhopalocera*, 9 : 517.

Material examined : 1 ex., Kerala, Silent Valley, Ptera, 8 kms. West of Valiyaparathodu camp, 26. i. 1980 (S. K. Bhattacharya Coll.) ; 2 exs., road to Valiyaparathodu, 920m., 23. iv. 1980 ; 2 exs., Dam site, 890 m., 27. iv. 1980 (R. S. Pillai & Party Coll.).

Length of forewing : 25 mm.

Distribution : Central and South China (Taiwan) ; India ; Sri Lanka ; Burma.

Remarks : The species, popularly known as “the Chocolate Pansy”, is common in India.

15. *Atella phalantha* (Drury)

1770. *Papilio phalantha*, Drury, *III. Exot. Ins.*, 1 : pl. 21, figs. 1-2.

1905. *Atella phalantha*, Bingham, *Fauna Brit. India, Butterflies*, 1 : 412.

Material examined : 1 ex., Kerala, Silent Valley, 20. i. 1979. (R. S. Pillai & party Coll.); 1 ex., 4 kms. north of Valiyaparathodu 980 m., 28. i. 1980 (K. R. Rao Coll.).

Length of forewing : 24—27 mm.

Distribution : China ; Pakistan (Baluchistan) ; India including the central Nicobar Island ; Sri Lanka ; Burma ; Malayan subregion ; Japan.

Remarks : The species, popularly known as “the Common Leopard”, is widely distributed and common in India.

Family LYCAENIDAE

16. *Zizeeria* sp.

Material examined : 1 ex., Kerala, Silent Valley, 5 kms. east of the camp, Valiyaparathodu, 940 m., 23. i. 1980 (K. R. Rao & party Coll.).

Length of forewing : 11 mm.

Remarks : The species could not be determined due to the paucity and damaged condition of material.

Family PAPILIONIDAE

17. *Troides helenae* (Linnaeus)

1758. *Papilio helenae* Linnaeus, *Syst. Nat.*, Ed. 10 : p. 461.

1939. *Troides helenae*, Talbot, *Fauna Brit. India, Butterflies*, 1 : 62.

Material examined : 1 ex., Kerala, Silent Valley, 30 kms., N. W. of Mukkali, Palghat, 30. i. 1980 (S. K. Bhattacharya & party Coll.).

Length of forewing : 79 mm.

Distribution : India Sikkim, Assam, Orissa, Kerala, Bombay, the Andaman & South Nicobar Islands ; Sri Lanka ; Burma.

Remarks : The species, popularly known as “the Birdwing” is the largest of all Indian butterflies and not rare in the Indian subregion.

18. *Parides (Atrophoneura) varuna* (White)

1842. *Papilio varuna* White, *Entom.*, 1 (17) : 280.

1961. *Parides (Atrophoneura) varuna*, Munroe, *Canad. Ent. Suppl.*, 71 : 46.

Material examined : 1 ex., Kerala, Silent Valley, Dam site, Kummathanthodu, 840 m., 22. iv. 1980 (R. S. Pillai & party Coll.).

Length of forewing : 52 mm.

Distribution : Vietnam : Tonkin ; India : Sikkim, Assam, Arunachal Pradesh, Kerala ; Burma ; Mergui Archipelago ; Tavoy ; Thailand ; Malaya Peninsula.

Remarks : The species, popularly known as "the Common Batwing," is recorded for the first time from Kerala.

19. *Pachliopta aristolochiae* (Fabricius)

1755. *Papilio aristolochiae* Fabricius, *Syst. Ent.*, p. 443.

1961. *Pachliopta aristolochiae*, Munroe, *Canad. Ent. Suppl.*, 17 : 46

Material examined : 1 ex., Kerala, Silent Valley, Dam site, 17. i. 1980 (S. K. Bhattacharya Coll.) ; 1 ex., 4 kms. towards north from camp II, Valiyaparathodu, 980 m., 25. i. 1980 (K. R. Rao & party Coll.).

Length of forewing : 47—50 mm.

Distribution : West, Central and South China ; India ; Sri Lanka ; Burma ; the Philippines ; Sundaland ; the Lesser Sunda Islands.

Remarks : The species, popularly known as "the Common Rose", is very common almost all over the plains of India.

20. *Papilio clytia* Linnaeus

1768. *Papilio clytia* Linnaeus, *Syst. Nat.*, Ed. 10 : p. 479.

Material examined : 1 ex., Kerala, Silent Valley, Valiyaparathodu, 900 m., 26. iv. 1980 (R. S. Pillai & Party Coll.).

Length of forewing : 42 mm.

Distribution : South China ; Vietnam : Tonkin ; India : Kangra to Sikkim, Assam, Arunachal Pradesh, Northern (Madhya Pradesh), Southern and Western (Bombay) peninsulas ; Sri Lanka ; Burma ; Sunda land ; Timor ; the Philippines.

Remarks : The species, popularly known as the "Common Mime", is a good mimic of *Danaus limniace* (Cramer),

21. *Graphium* (*Graphium*) *sarpedon* (Linn.)

1758. *Papilio sarpedon* Linnaeus, *Syst. Nat.*, Ed. 10 : p. 461.

1961. *Graphium* (*Graphium*) *sarpedon* Munroe, *Canad. Ent. Suppl.*, 17 : 19.

Material examined : 1 ex., Valiyaparathoda, 21. i. 1980 (S. K. Bhattacharya and party Coll.) ; 1 ex., half way to Valiyaparathoda, 1005 m., 25. i. 1980 ; 1 ex., Kummattanthodu, 870 m., 23. iv. 1980 ; 3 exs., Valiyaparathodu, 910 m., 25-26. iv. 1980, (R. S. Pillai & Party Coll.) ; 1 ex., along Kuntipuzha, 900 m., 17. i. 1980 ; 2 exs., 5 km, east from Camp. II., Valiyaparathodu, 940 m., 23. i. 1980 (K. R. Rao & Party Coll.).

Length of forewing : 34—40 mm.

Distribution China ; India : Kashmir, West Bengal, Assam, Arunachal Pradesh, Kerala ; Burma ; Malayan subregion ; the Australian region ; South Japan.

Remarks : The species, popularly known as "the Common Blue-bottle", is common in India proper.

22. *Graphium* (*Graphium*) *doson* (C. & R. Felder)

1864. *Papilio doson* C. & R. Felder, *Verh. zool.-bot. Ges. Wien.*, 14 : 305.

1961. *Graphium* (*Graphium*) *doson*, Munroe, *Canad. Ent. Suppl.*, 17 : 19.

Material examined : 1 ex., 5 kms. East from camp II., Valiyaparathodu, 940 m., 23. i. 1980 (K. R. Rao & Party Coll.).

Length of forewing : 38 mm.

Distribution : South China ; India : North-Western and North-Eastern Himalayas, Kerala ; Sri Lanka ; Burma ; Sunda Islands ; South Japan.

Remarks : The species, popularly known as "the Common Jay", is common in India proper.

Family PIERIDAE

23. *Appias indra* (Moore)1857. (a) *Pieris indra* Moore. *Cat. Lep. Mus. E.I.C.*, 1 : 74.1939. *Appias indra*, Talbot, *Fauna Brit. India, Butterflies*, 1 : 390.

Material examined : 16 exs., Damsite, Silent Valley, 17. i. 1980 (S. K. Bhattacharya & Party Coll.) ; 25. exs., along Kuntipuzha, 900m., 17. i. 1980 ; 3 exs., Dam site, Kuntipuzha river, 960 m., 19. i. 1980 ; 1 ex., Valiyaparathodu camp, tributary of Kunti river, 960 m., 21. i. 1980 ; 4 exs., 5 kms., east from camp II, Valiyaparathodu, 23. i. 1980 (K. R. Rao & Party Coll.).

Length of forewing : 23—27 mm.

Distribution South China : Taiwan, Hainan ; Sri Lanka ; Burma ; Malaya ; Borneo ; Palawan.

Remarks : The species, popularly known as “the Plain Puffin”, is rare in South India and Sri Lanka but common in North India.

24. *Appias albina* (Boisduval)1838. *Pieris albina* Boisduval, *Sp. Gen. Lep.*, 1 : 480.1907. *Appias albina*, Bingham, *Fauna Brit. India, Butterflies*, 2 : 212.

Material examined : 18 exs., Dam site, 17. 1. 1980 (S. K. Bhattacharya & Party Coll.) ; 2 exs., along Kuntipuzha, 900 m., 17. i. 1980 ; 1 ex., within 4 kms. from Kumattanthodu, 960 m., 18. i. 1980 ; 1 ex., Dam site, Kuntipuzha river, 960 m., 19. i. 1980 ; 1 ex., 5 kms. east from camp II, Valiyaparathodu, 940 m., 23. i. 1980 ; 3 exs., 1 km. west from the Base Camp, 1040 m., 25. i. 1980 (K. R. Rao & Party Coll.).

Length of forewing : 26—30 mm.

Distribution China ; India ; the Philippines ; Papuan region ; Moluccas ; Australia.

Remarks : The species, popularly known as “the Common Albatross”, is common in South India.

25. *Ixias marianne* (Cramer)1779. *Papilio marianne* Cramer, *Pap. Exot.*, 111 : 41, pl. 217, figs. C-D (Female), E (Male).1939. *Ixias marianne*, Talbot, *Fauna Brit. India, Butterflies*, 1 : 440.

Material examined: 1 ex., 3 kms. away from Valiyaparathodu camp, 26. i. 1980 (K. R. Rao & Party Coll.).

Length of forewing: 23—25 mm.

Distribution: India Kumaon, Punjab, Himachal Pradesh, West Bengal, Saurashtra, Southern Peninsula ; Sri Lanka.

Remarks: The species, popularly known as “the White Orange Tip”, is common in India proper.

26. *Eurema laeta* (Boisduval)

1836. *Terias laeta* Boisduval, *Sp. Gen. Lep.*, 1 : 674.

1939. *Eurema laeta*, Talbot, *Fauna Brit. India*, Butterflies, 1 : 517.

Material examined: 1 ex., 4 kms. South-West of Valiyaparathodu, 24. i. 1980 ; 1 ex., Kunthi River, near Hydro-electric project site, 16. i. 1980 (S. K. Bhattacharya & Party Coll.) ; 2 exs., near Dam site, Silent Valley, 880--980 m., 16. i. 1980 ; 2 exs., Karimalaithodu, 29. iv. 1980 (K. R. Rao & Party Coll.) ; 1 ex., 2 kms., from camp site along the road leading to Mukkali, 1000 m., 4. v. 1980 (R. S. Pillai & Party Coll.).

Length of forewing: 13—20 mm.

Distribution: U.S.S.R. (Amur) ; North & South China ; Vietnam, (Tonkin, Annam) ; India ; Burma ; Java ; Kei Islands ; the Philippines ; Timor ; Japan.

Remarks: The species, popularly known as “the Spotless Grass yellow”, is very common throughout the plains and hills of India.

27. *Eurema hecabe* (Linnaeus)

1758. *Papilio hecabe* Linnaeus, *Syst. Nat.*, Ed., 10 : p. 470.

1939. *Eurema hecabe*, Talbot, *Fauna Brit. India*, Butterflies, 1 : 526.

Material examined: 1 ex., Valiyaparathodu, 26. iv. 1980 ; 1 ex., 8 kms. away from Dam site, 15. i. 1980 (K. R. Rao & Party Coll.) ! 1 ex., about 2 kms. away from the camp site along the road leading to Mukkali, 1000 m., 4. v. 1980 (S. K. Bhattacharya & Party Coll.).

Length of forewing: 19—22 mm.

Distribution Ethiopian ; Oriental, Australian and Palaearctic regions as far as upto Korea and Japan.

Remarks The species, popularly known as "the Common Grass Yellow", is very common in India proper.

Family ARCTIIDAE

28. *Phissama transiens* (Walker)

1855. *Spilosoma transiens* Walker, *List Lep. Insects Br. Mus.*, 3 : 675.

1894. *Phissama transiens*, Hampson, *Fauna Brit. India, Moths*, 2 : 29-30.

Material examined : 1 ex., Karimalaithodu, 29. iv. 1980. (K. R. Rao & Party Coll.).

Length of forewing : 21 mm.

Distribution : China ; India ; Burma ; Borneo ; Sulawesi ; the Philippines ; Moluccus.

Remarks : The species, is variable in colouration specially of the wings in males and females.

Family SPHINGIDAE

29. *Macroglossum* sp.

Material examined : 1 ex., Valiyaparathodu, 910 m , 25. iv. 1980 (R. S. Pillai & Party Coll.).

Length of forewing : 22 mm.

Remarks : Due to the paucity and damaged condition of the material, it is not possible by the authors to identify the specimen upto the specific level.

SUMMARY

The communication highlights an interesting account on the systematics including the biogeography of the lepidopterous material collected during all the seasons between 1979 and 1980 by the parties from the Zoological Survey of India including one of its Southern Regional Station, Tamil Nadu, from the unexplored forests of Silent Valley, Kerala, whence all the elements constitute new locality records. Presently, 29 species in 21 genera of 8 families under both suborders

Rhopalo-and **Heterocera** of the concerned order have been incorporated. Only two species of the former and one of the latter suborder, which are poorly represented in the available collections on one hand and badly damaged on the other, could not, however, be authentically determined.

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STAPHYLINIDAE (COLEOPTERA) OF SILENT VALLEY, KERALA, INDIA.

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INTRODUCTION

During April, 1979 to May, 1980 Zoological Survey of India conducted four faunistic surveys in Silent Valley of Kerala State. The present study based on a collection comprising 41 examples belonging to 21 species under 12 genera of the 5 subfamilies. Two species viz., *Stenus* (*Hypostenus*) *decanus* and *Cryptobium bhattacharyyai* are described as new to Science and *Paragonus birmanus* Fauvel is recorded for the first time from India.

Family STAPHYLINIDAE

Subfamily OXYTELINAE

Tribe Piestini

1. *Holosus longipennis* Cameron

1925. *Holosus longipennis* Cameron, *E. M. M.* **61** : 235.

1930. *Holosus longipennis* Cameron, *Fauna of British India*, **1** : 49-50

Material : Silent Valley, Kerala, 4 exs., 16. i. 1980, S. K. Bhattacharyya Collection.

Distribution : Nilgiri Hills and Annamalai Hills (Tamil Nadu) and Kerala.

Remarks : This species is recorded for the first time from Kerala.

Tribe Osoriini

2. *Paragonus birmanus* Fauvel

1895. *Paragonus birmanus* Fauvel, *R. d'Ent.* **14** : 197

1930. *Paragonus birmanus* : Cameron, *Fauna of British India*, **1** : 306.

Material : Silent Valley, Valiaparathadu, Kerala, 3 exs. 27. i. 1980 S. K. Bhattacharyya Collection.

Distribution : Burma ; India (Kerala)

Remarks : This species is recorded for the first time from India (Silent valley : Kerala)

Subfamily STENINAE

3. *Stenus (Hypostenus) pulcher* Motschulsky

1895. *Stenus pulcher* Motschulsky, *Et. Ent.* : 71

1930. *Stenus (H.) pulcher* : Cameron, *Fauna of British India* 1 : 350-351.

Material : India, Kerala, Silent Valley, 2 exs., 17. i. 1980, S. K. Bhattacharyya Collection ; Silent Valley, Project site, 24 km. N. of Munkali, 1 ex., 19. i. 1980, S. K. Bhattacharyya Collection.

Distribution : India (Tamil Nadu, Kerala) ; Sri Lanka and Java.

Remarks : This species is recorded for the first time from Kerala.

4. *Stenus (Hypostenus) angusticollis* Eppelsheim

1895. *Stenus angusticollis* Eppelsheim, *D. E. Z.* : 405

1930. *Stenus (H.) angusticollis* : Cameron, *Fauna of British India*, 1 : 371-372.

Material : India, Kerala, Silent Valley, Valiaparathadu, 1 ex., 26. i. 1980, S. K. Bhattacharyya collection.

Distribution : India (Nagaland, U. P., Kerala) ; Burma.

Remarks : This species is recorded for the first time from Kerala.

5. *Stenus (Hypostenus) decanus*, sp. nov.

This new species is closely related to *Stenus (Hypostenus) monomerus* Fauvel but can be easily separated from the latter species by the posterior margin of sixth sternite of male slightly emarginate at the middle ; posterior margin of fifth sternite of male slightly emarginate, in front of emargination deeply and broadly impressed about the half length of the segment ; fourth sternite

of male slightly flattened behind the middle ; antennal segments 9 and 10 slightly transverse ; elytra at the base of suture slightly longer than thorax.

General appearance rather short and narrow, black and shining, palpi yellowish, legs testaceous and apex of femora broadly infusate.

Head small and transverse, dorsum of head broadly excavated, coarsely and closely punctured, behind the base of antennae with a smooth space. Antennae short and testaceous, segment 1 pitchy, segment 2 slightly broader and longer than segment 1, segments 3-6 slender and distinctly longer than broad, segment 8 as long as broad, segments 9-10 slightly transverse. Thorax longer than broad and shorter than elytra, widest at the middle, sides rather rounded, puncturation same as on the head. Elytra broader than long, puncturation coarser than that of head and thorax. Abdomen little narrowed behind, puncturations on segments 1-4 same as on head and elevated at the base, segments 5-6 finely and closely punctured, segment 7 impunctate, apex distinctly emarginate and its angles prominent.

Measurements of holotype : Total length 3.24 mm ; width of head across the eyes 0.60 mm ; length of thorax 0.60 mm. and width of thorax 0.50 mm ; length of elytra 0.70 mm. and width of elytra 0.75 mm.

Holotype : ♂, India : Kerala, Silent Valley, 24. i. 1980, S. K. Bhattacharyya collection. Paratype ♀, collection data same as on holotype (Materials are deposited in the collection of Zoological Survey of India, Calcutta).

Distribution : India (Kerala).

6. *Stenus* (*Hypostenus*) *albidicornis* Bernhauer

1915. *Stenus albidicornis* Bernhauer, *Ent. Blatt.* : 252

1930. *Stenus* (*H.*) *albidicornis* : Cameron, *Fauna of British India*, 1 : 369.

Material : India, Kerala, Silent Valley, 2 exs., 19. i. 1980. S. K. Bhattacharyya Collection.

Distribution : India (Tamil Nadu, Kerala)

Remarks : This species is recorded for the first time from Kerala.

Subfamily PAEDERINAE

Tribe Pinophilini

7. *Palaminus* sp.

Material : India, Kerala, Silent Valley, 1 ex., S. K. Bhattacharyya Collection.

Remarks : This species is closely related to *Palaminus indicus* Kraatz but differs from the latter species by its head being brown, surface of head finely and less closely punctured, puncturations of thorax less strong and dense, posterior margin of sixth sternite of male slightly emarginate.

Tribe Paederini

8. *Paederus Variicornis* Fauvel

1903. *Paederus variicornis* Fauvel, *Rev. d'Ent.* 22 : 154

1931. *Paederus variicornis* : Cameron, *Fauna of British India*, 2 : 49-50.

Material : India, Kerala, Silent Valley, Project site, 24 Km. N. W. of Munkali, 5 exs., 17. i. 1980, S. K. Bhattacharyya Collection ; Silent Valley, 6 Km. W. of Valiaparathadu, 6 exs., 27. i. 1980, S. K. Bhattacharyya collection ; 10 km. N. W. of Valiaparathadu, 1 ex., 24. i. 1980, S. K. Bhattacharyya collection.

Distribution : India (Tamil Nadu, Kerala).

Remarks : This species is recorded for the first time from Kerala.

9. *Paederus (Pseudopaederus) mussardi* Biswas & Sengupta

1982. *Paederus (P.) mussardi* Biswas & Sengupta, *Revue Suisse Zool.*, Tome 89, Fasc. 1 : 135-154.

Material : India, Kerala, Silent Valley, 1 ex., 26. i. 1980, S. K. Bhattacharyya collection.

Distribution : India (Kerala).

10. *Paederus sondaicus* Fauvel

1859. *Paederus javanus* Erichson, *Gen. Spec. Staph.* : 654

1859. *Paederus javanus* Kraatz, *Arch. Naturg.* 25(1) : 150

1895. *Paederus sondaicus* Fauvel, *Rev. d'Ent.* 14 : 232

1931. *Paederus sondaicus* : Cameron, *Fauna of British India*, 2 : 37-38.

Material : India, Kerala, Silent Valley, Valiaparathadu, 1 ex., 22. i. 1980, S. K. Bhattacharyya Collection.

Distribution : India (Tamil Nadu, Maharashtra, Meghalaya, Kerala) ; Burma ; Sumatra ; Java and Tonkin.

Remarks : This species is recorded for the first time from Kerala.

11. Paederus Kuluensis Bernhauer

1914. *Paederus kuluensis* Bernhauer, *W. Z. B.* 64 : 90

1931. *Paederus kuluensis* : Cameron, *Fauna of British India*, 2 : 55.

Material : India, Kerala, Silent Valley, 1 ex., S. Biswas Collection.

Distribution : India, (Himachal Pradesh, Kerala)

Remarks : This species is recorded for the first time from Kerala.

12. Scopaeus andrewesi Cameron

1931. *Scopaeus andrewesi* Cameron, *Fauna of British India*, 2 : 172.

Material : India, Kerala, Silent Valley, Base Camp, Project site, 24 km. from North of Munkali, 1 ex., 17. i. 1980, S. K. Bhattacharyya Collection.

Distribution : India (Tamil Nadu, Kerala).

Remarks : This species is recorded for the first time from Kerala.

13. Cryptobium elephas Fauvel

1904. *Cryptobium elephas* Fauvel, *Rev. d'Ent.* 23 : 54.

1931. *Cryptobium elephas* : Cameron. *Fauna of British India*, 2 : 230.

Material : India, Kerala, Silent Valley, 1 ex., 19. i. 1980, S. K. Bhattacharyya Collection.

Distribution : India (Tamil Nadu, Kerala).

Remarks : This species is recorded for the first time from Kerala.

14. Cryptobium bhattacharyyai sp. nov.

This new species is closely related to *Cryptobium elephas* Fauvel but can be easily separated from the latter species by its punc-

turations of head coarser, finely and less closely on thorax, posterior angles of head briefly rounded, anterior angles of thorax distinctly angulate, along the middle thorax broadly smooth, elytra distinctly longer than thorax, antennal segments 8-10 slightly longer than broad.

General appearance rather broad, robust, reddish brown, palpi and antennae reddish brown (except antennal segments 8-11 reddish yellow), legs testaceous.

Head rather oval, widened behind, longer and broader than thorax, posterior angles briefly rounded, front margin smooth, dorsum of head densely and more coarsely umblicate punctures. Eyes small. Antennae short and stout, segment 1 moderately long, segment 2 slightly shorter than segment 3, segments 4-7 equal, segments 8-10 slightly longer than broad. Thorax slightly longer than broad, parallel-sided, posterior margin slightly retracted, along the middle with a distinct broad smooth space, less closely and finely umblicate punctures. Elytra one and half times longer than thorax, densely, coarsely and subrugosely punctured. Abdominal segments finely and closely punctured. Posterior margin of sixth sternite of male rather broad and with a deep triangular excision and its sides finely bevelled and apex rounded; posterior margin of fifth sternite of male slightly emarginate at the middle, in front of emargination slightly impressed along the half length of the segment and covered with thickly setiferous punctures.

Measurements of holotype: Total length 11.50 mm, width of head across the eyes 2.00 mm; length of thorax 2.00 mm and width of thorax 1.70 mm; length of elytra 2.65 mm and width of elytra 2.00 mm.

Holotype: ♂, India: Kerala, Silent Valley, 19.i.1980, S. K. Bhattacharyya Collection (Materials are deposited in the collection of Zoological Survey of India, Calcutta).

Distribution: India (Kerala).

Subfamily STAPHYLININAE

Tribe Xantholinini

15. *Leptacinus* sp.

Material: India, Kerala, Silent Valley, 1 ex., 16.i.1980, S. K. Bhattacharyya Collection.

Distribution : India (Kerala)

Remarks ; This species is closely related to *Leptacinus parumpunctatus* (Gyll.) but differs from the latter species by the following characters : head parallel and not widened behind, lateral sulci indistinct, median sulci parallel and distinct, the sides of head finely punctured which are not elongate umblicate punctures, antennae testaceous with segments 1-3 reddish, elytra broader than thorax, abdomen distinctly punctured.

16. Indoscitalinus anachoreta (Erichson)

1840. *Xantholinus anachoreta* Erichson, *Gen. Spec. Staph.* : 316.
 1859. *Xantholinus anachoreta* Kraatz, *Arch. Naturg.* 25(1) : 102.
 1867. *Xantholinus hongkongensis* Redtb., *Reise Novara* 2 : 28
 1858. *Xantholinus morio* Motschulsky, *Bull. Mosc.* 31(3) : 207.
 1932. *Indoscitalinus anachoreta* : Cameron, *Fauna of British India*, 3 : 37

Material ; India, Kerala, Silent valley, 1 ex, S. Biswas collection

Distribution India (Kerala); Sri Lanka; S. China; Mauritius ; Reunion and Madagascar.

Tribe Staphylinini

17. Philonthus castaneus Gemm.

1868. *Philonthus castaneus* Gemm. et Har., *Cat. Col.* 2 : 586
 1858. *Philonthus badius* Motschulsky, *Bull. Mosc.* 31(1) : 661
 1932. *Philonthus castaneus* : Cameron, *Fauna of British of India* 3 : 99-100.

Material : India, Kerala, Silent Valley, 1 ex., S. Biswas collection.

Distribution : India (Kerala).

18. Philonthus sp.

Material : India, Kerala, Silent Valley, Project site, 24 Km. North west of Munkali, 1 ex., S. K. Bhattacharyya Collection.

Remarks ; This species is closely related to *Philonthus poephagus* Cameron but differs from the latter species by its antennal segments 1-3 being reddish brown and segment 10-11 reddish yellow, elytral suture and its posterior margin reddish, near post ocular region distinctly punctured, elytra slightly longer than thorax, more densely punctured but devoid of any traces of two rows of larger punctured, posterior margin of fifth sternite of male feeble emarginate.

Distribution ; India (Kerala).

Tribe Quediini

19. *Cyrtothorax vulneratus* Fauvel

1878. *Cyrtothorax vulneratus* Fauvel, *Bull. Soc. Linn. Norm.* 3(2) : 165.

1932. *Cyrtothorax vulneratus* : Cameron, *Fauna of British India* 3 : 277-278.

Material ; India, Kerala, Silent Valley, Valiaparathadu, 1 ex.,

18. i. 1980, S. K. Bhattacharyya collection.

Distribution ; India (Kerala); Burma; China.

Remarks ; This species is recorded for the first time from Kerala.

Subfamily ALEOCHARINAE

Tribe Myrmedoniini

20. *Zyras (Rhynchodonia) waageni* (Eppelsheim)

1895. *Myrmedonia waageni* Eppelsheim, *D. E. Z.* : 386.

1939. *Zyras (R.) waageni* : Cameron, *Fauna of British India* 4(2) : 511-512,

Material ; India, Kerala, Silent Valley, 6 Km. west of Valiaparathadu, 1 ex., 27. 1. 1980, S. K. Bhattacharyya collection.

Distribution ; India (West Bengal, Kerala); Burma.

Remarks : This species is recorded for the first time from Kerala.

21. *Zyras (Crateodonia) Sp.*

Material : India, Kerala, Silent Valley, Project site, 24 Km. North west of Munkali, 1 ex., 17.1.1980, S. K. Bhattacharyya Collection.

Remarks ; This species is closely related to *Zyras (Crateodonia) serraticornis* (Kraatz) but differs from the latter species by the following characters : head broader than thorax, head moderate densely and distinctly punctured but along middle line devoid of any punctures, antennal segment 11 shorter than segments 9 and 10 together, thorax with a distinct median impressed line, on either side of mid-line two large punctures present and rest of the surface moderately densely punctured, abdomen yellowish and posterior margin of last two

segments broadly infusate, impunctate, lateral margin of 3rd abdominal segment of male armed with a long incurved sharp spine.

Distribution : India (Kerala).

SUMMARY

The paper deals with 41 examples of Staphylinidae from Silent valley, Kerala State, India consists of 21 species under 12 genera of 5 subfamilies of which 2 species viz., *Stenus (Hypostenus) decanus* and *Cryptobium bhattacharyyai* are described as new to science and *Paragonus birmanus* Fauvel is recorded for the first time from India.

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ON A NEW SPECIES OF *ICHTHYURUS* (CHAULIOGNATHIDAE : COLEOPTERA) FROM SILENT VALLEY

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(With 10 Text-figures)*

INTRODUCTION

During the course of an expedition to the Silent Valley an unexplored area of Western Ghats, in April/May 1980 under the leadership of Dr. R. S. Pillai, an interesting group of beetles belonging to the genus *Ichthyurus* was collected. The beetles of *Ichthyurus* are known as one of the primitive beetles in Coleoptera, Gahan (1918). The genus was till recently included in Cantharidae but Miskimen (1961) erected a new family Chauliognathidae and transferred several genera including *Ichthyurus* from Cantharidae to Chauliognathidae. The genus *Ichthyurus* enjoys a wide range of world wide distribution and is represented by 181 species from all over the world out of which 30 species are known from India.

Ichthyurus silentvalleyensis sp. nov. (figs. 1-10).

Male : Ochraceous, with sides of head, basal half of thorax, three fourths of elytra, tip of abdomen, castaneous ; body elongate and narrow ; beneath thorax black, abdomen light brown.

Head (fig. 1) : Vertex ochraceous, sides of head and area below the eyes castaneous and glabrous ; eyes large and brown ; antennae (fig. 10) long with eleven segments, first and second segments ochraceous, rest brown and all setose ; first segment narrow, clavate and edentate ; second to fifth irregularly serrate and outwardly dentate, third and fourth segments ochraceous except serrations which are brown.

Thorax (fig. 1) : Anterior margin convex and raised slightly ; anterior half and basal region ochraceous ; disc brown with a transverse fascia fuscous ; densely and finely punctate ; base of thorax broader than anterior region.

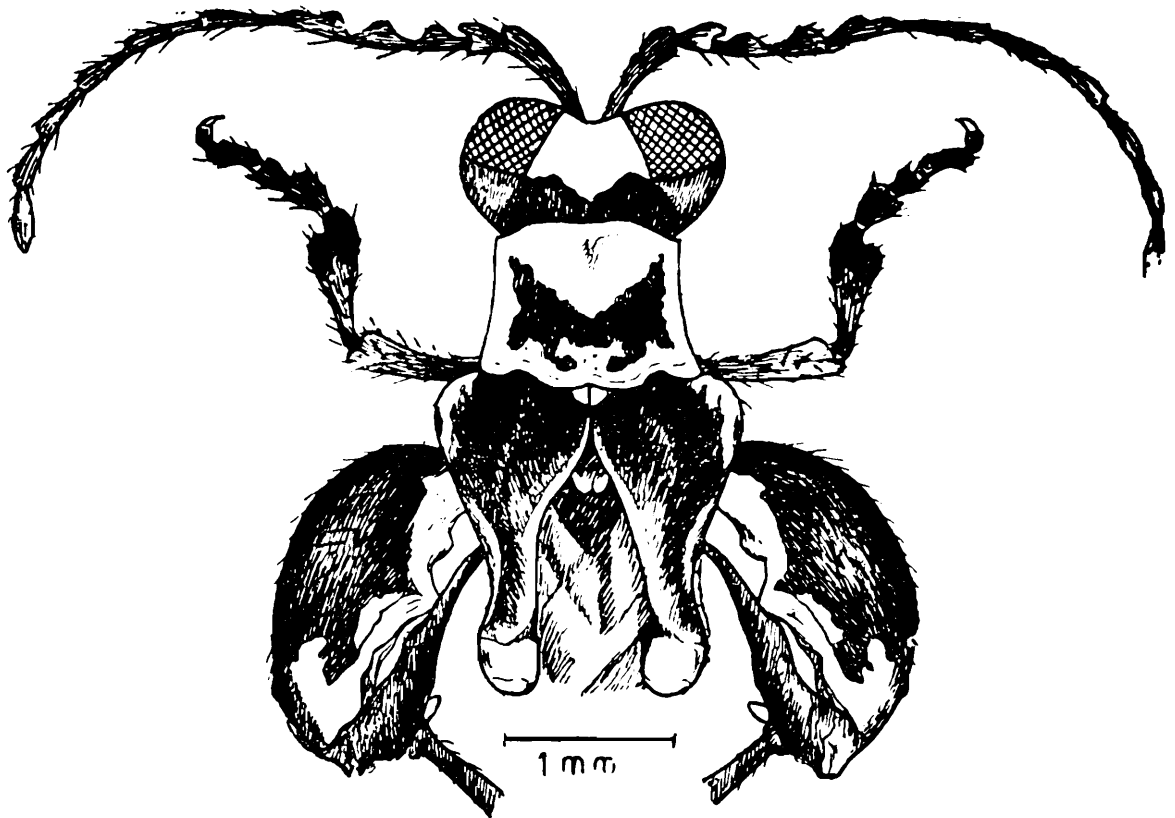


Fig. 1. *Ichthyurus silentvalleyensis* sp. nov. Male dorsal view of head and thorax.

Elytra (fig. 1) : Broad at base and narrow at distal end., apex rounded and ochraceous, rest brown ; anterior and inner margins sinuate ; distal ends widely separated, both the margins beset with short bristles ; elytra extends to one fourth of abdomen. Wings long transparent reaching apex of abdomen.

Legs : Ochraceous, apical halves of tibia and tarsi of front legs black ; tarsi of intermediate legs, anterior part of femur and hind legs brown ; intermediate femora strongly incrassated (figs 3 & 4) and arched, all legs sericeous, dorsal side of middle femora of dark, with two dentitionst on the inner side and with two teeth beneath,

a central triangular one and a narrow one at the post-ventral side (fig. 5) ; posterior base strongly elbowed into a long process ; posterior process with a broad plate on the ventral side (fig. 5)

Abdomen : Above ochraceous, anterior corners fuscous brown ; beneath light brown ; terminal segments large, robust and sharp at the apex (figs. 6 & 7).

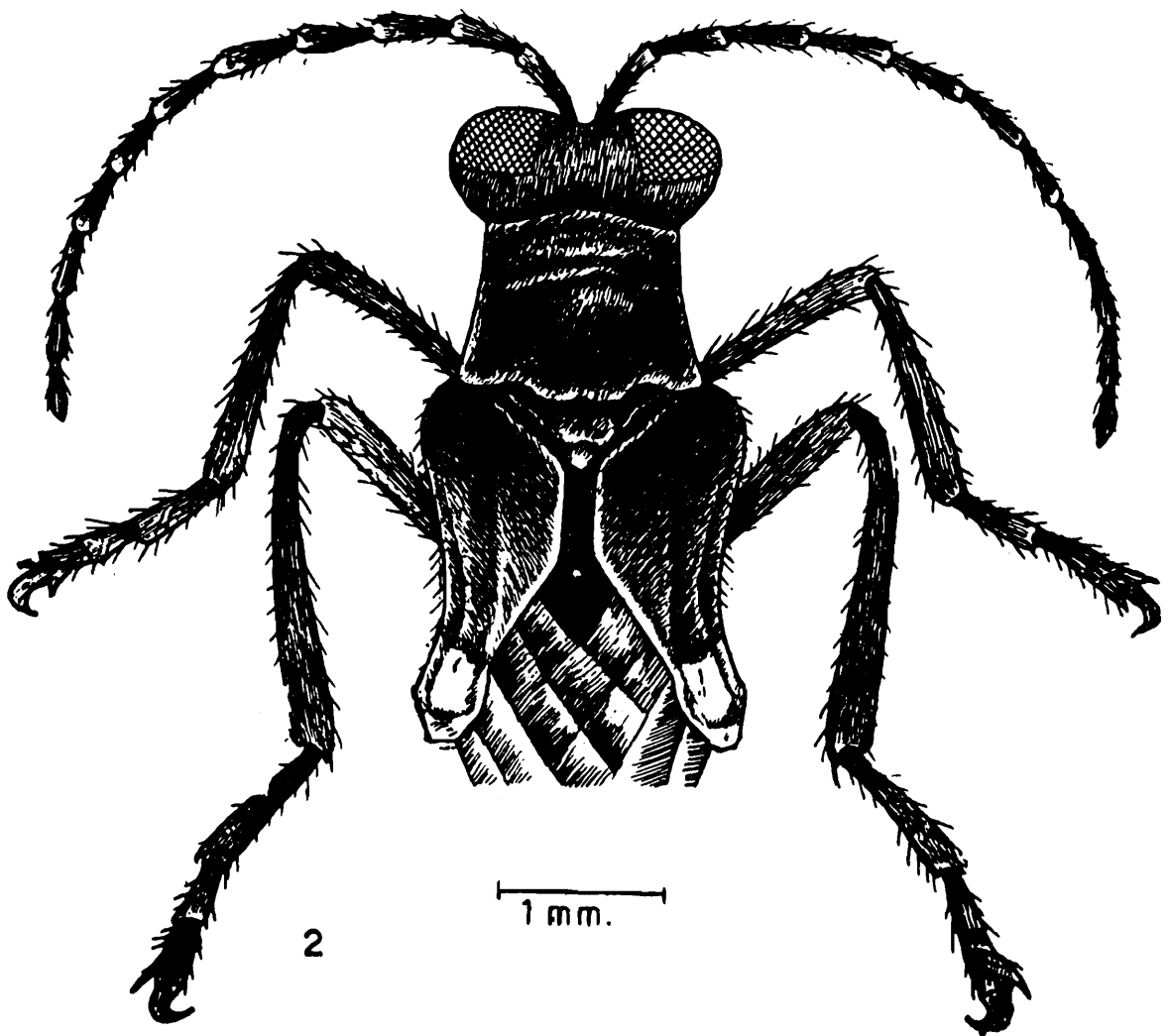
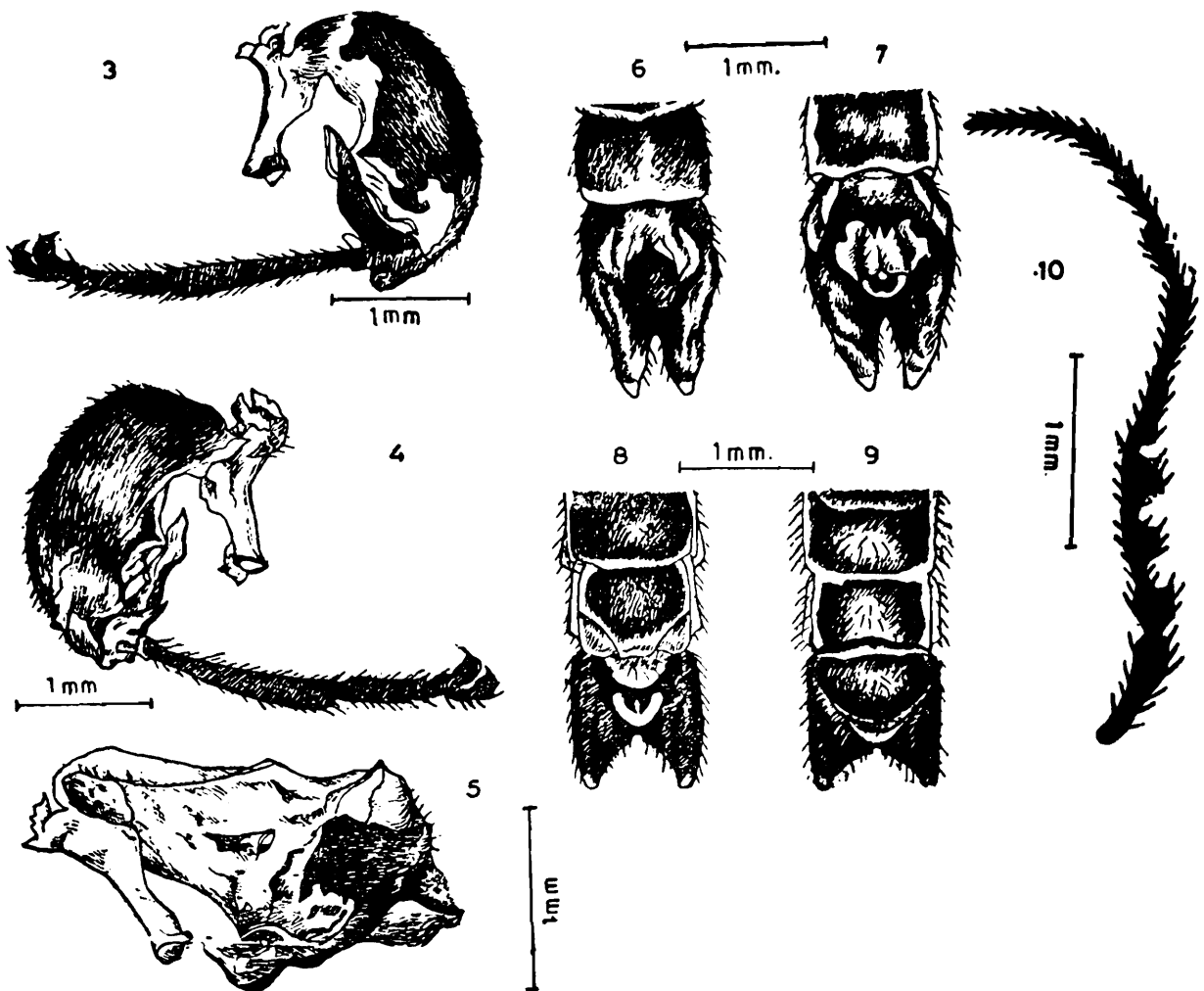


Fig. 2. *Ichthyurus silentvalleyensis* Female dorsal view of head & thorax.

The female differs from the male, in the following characters : antennae ; first segment long, remaining segments uniformly shaped without dentitions (fig. 2) ; thorax piceous without discal transverse fascia (fig. 2) ; legs simple, intermediate femora not incrassated ; posterior legs long and slender ; terminal segments of abdomen widely separated (figs. 8 & 9).

Habitat : The beetles were collected between 850m and 950m. They were not found beyond this level. They rest on leaves with their abdomen curled up and forward. They move very fast on leaves in search of food which consists of insect eggs and larvae. The beetles are seasonal in occurrence. They were collected in the month of April, but they could not be found in December, when a subsequent survey was made in the same area.



Ichthyurus silentvalleyensis

Figs. 3 & 4 Dorsal and ventral views of Intermediate Femora in male. Fig. 5 Latero-ventral view of male intermediate femora in male. Figs. 6 & 7 Posterior abdominal segments in male, dorsal and ventral view. Figs. 8 & 9 Posterior abdominal segment in female; dorsal and ventral view. Fig. 10 Male antenna-dorsal view.

Measurements : in mm — (range in parentheses)

Holotype ♂ : length 9.40, width 1.60, elytral length 2.04

Paratypes 3 ♂ ♂ : length (9.08-9.42), width (1.60-1.64) elytral length (2.04-2.40)

Paratypes 3 ♀ ♀ : length (9-9.80), width (1.60-1.80), elytral length (2.08-2.32).

Holotype ♂, *Paratype* : 3 ♂ ♂, 3 ♀ ♀ INDIA, KERALA, Silent Valley 22.iv.80, Koshy Mathew. In Zoological Survey of India, Calcutta.

Remarks : In India, the genus *Ichthyurus* is represented by 30 species from Karnataka, Kerala, Tamil Nadu, Assam, Uttar Pradesh, Manipur and Sikkim. Gestro (1888-1911), Pic (1916-1922) and Champion (1920-1927).

The new species is very close to the species *Ichthyurus andrewesii* Gestro from which it is distinguished by the following characters : second segment of the male antennae with a denticle at the apex, third and fourth segments are entirely dentated and not truncated, fifth segment dentate basally and narrowed at apex ; interspace between second and third segments very wide. The intermediate femora (fig. 3 & 4) with a long posterior process, elbowed laterally with dentations on the inner margin, a triangular tooth at the mid ventral and a long narrow one at the post ventral side (fig. 5) all the prolongations of the same shape in all the specimens.

SUMMARY

A new species *Ichthyurus silentvalleyensis* is described from Western Ghats, Kerala.

ACKNOWLEDGEMENT

The authors thank Dr. B. K. Tikader, Director, Zoological Survey of India, Calcutta and Dr. R. S. Pillai, Deputy Director, Southern Regional Station, Zoological Survey of India, Madras for the laboratory facilities, and encouragements. They also thank Dr. (Mrs.) E. Peacock of British Museum, (Natural History) Department of Entomology, London for kindly confirming the new species. Thanks are also due to Rev. Fr. Joseph Comandu, Rector, Don Bosco Matriculation Higher Secondary School, Egmore, Madras for having kindly translated original descriptions from Italian into English.

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TIGER BEETLES (COLEOPTERA, CICINDELIDAE) OF SILENT VALLEY (KERALA, INDIA)

By

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(With one Text-figure)

Since the work of Fowler (1972), little importance has been given to the Cicindelid fauna of India. Dover and Ribeiro (1923) listed Indian species of Cicindelidae with localities. Heyneswood and Dover (1928) published a Catalogue of Indian Cicindelidae, Pajni and Bedi (1973) made a preliminary survey of the Cicindelid fauna of Chandigarh (Punjab). Recently Mandal (1969, 1970 and 1978) Mandal and Wiesner (1975) published a few papers on the Cicindelid fauna of India and other Asiatic Countries.

The present study is based on a small collection of Cicindelidae made by four successive surveys during 1980 led by Dr. R. S. Pillai (April-1979), Dr. S. K. Bhattacharya (January-February, 1980), Dr. R. S. Pillai (December, 1980) and again by Dr. R. S. Pillai (April-May 1980). The material comprising a total of 13 examples belongs to six species under three genera including a new species which is described and illustrated.

Dr. S. Biswas who participated one of the survey parties (April-May, 1980) collected *Neocollyris* specimens collected from green vegetation of the forest and the *Cicindela* specimens from the road-side rocks enlightened by sunshine.

Subfamily COLLEYRINAE

Genus *Neocollyris* Horn

1901. *Neocollyris* W. Horn, *Dentsche Ent. Zeitschr* : 45.

Neocollyris andrewesi (W. Horn)

1894. *Collyris andrewesi* (W. Horn) *Denteschi Ent. Zeitschr* : 170.

1912. *Neocollyris andrewesi* Fowler : 270.

Material examined : 1 o, iv. 1980, R. S. Pillai ; 2 oo, May, 1981, S. Biswas.

This is a large (20-22 mm.) and distinct species. Head and pronotum shining blue-black, the latter with greenish or coppery reflection ; elytra rather dull, dark olivaceous; antennae black, apex of joints 3 and 4 middle of 5 and 6 or 7 joints red ; femora red, front and middle tibiae and tarsi blue-black, hind tibiae blue-black with apex reddish yellow, hind tarsal joints 1-3 except apex yellowish, joints 4 and 5 and claws black.

This species is nearest to *N. arnoldi* Macleay and *N. horsfieldi* Chaudoir but both are rather common Javanese species, but they are much smaller and with the eyes more prominent.

Distribution : This species was previously recorded from TAMIL NADU : Nilgiri Hills, Anamalai Hills ; KERALA : Trivandrum, Travancore ; MAHARASHTRA : North Kanara.

***Neocollyris shyamrupi** n. sp.**

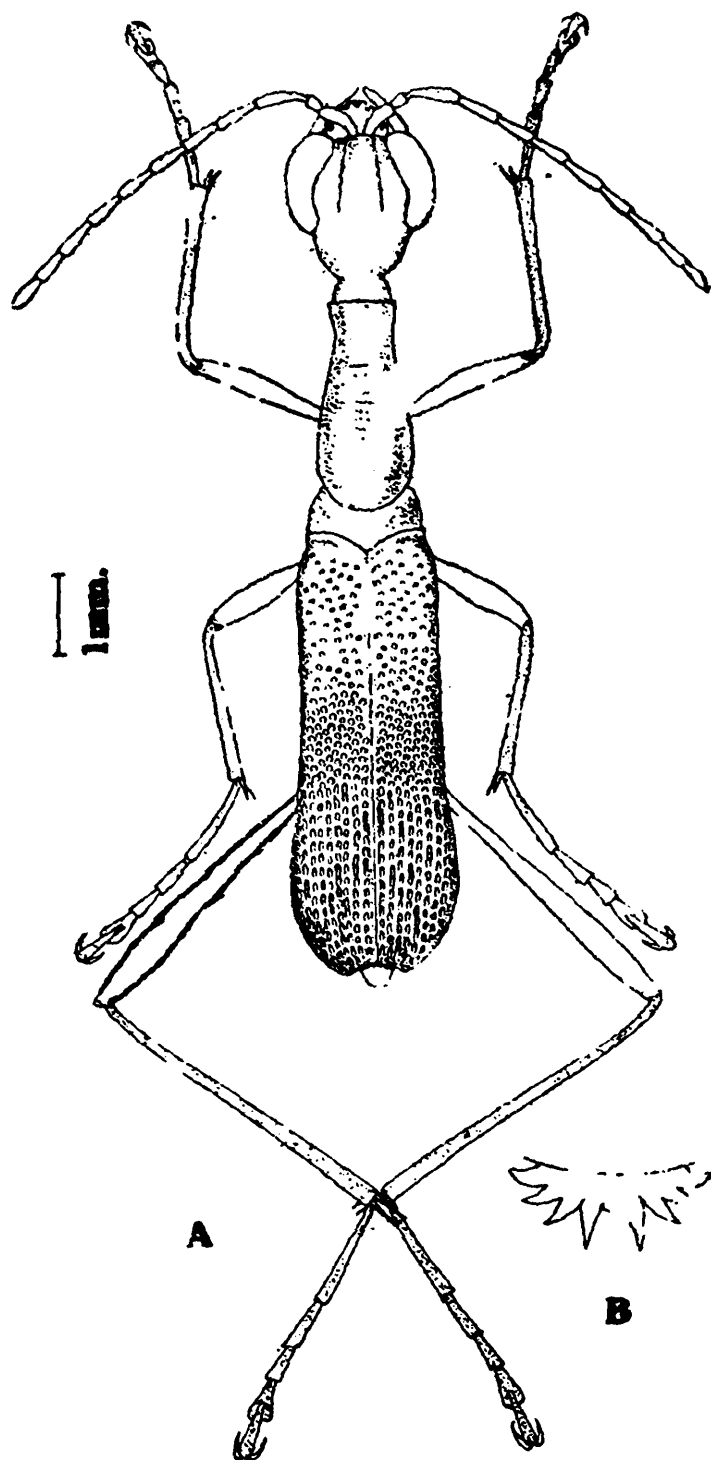
Form elongate ; head shining dark blue, long and narrowed behind ; forehead moderately excavate between the eyes, sulci almost parallel and not strongly marked, space between the sulci slightly raised on front only and flat behind ; eyes rather prominent ; labrum dark blue, large and semicircular with three central tooth wide and blunt, lateral pairs sharp : antennae thickened towards apex, pitchy, joints 3 and 4 faintly ringed with red at apex ; pronotum long, not strongly constricted before the base, intermediate portion moderately dilated and then gradually passing into a somewhat distinct pronotal column, anterior margin moderately reflexed ; dorsal surface rather strongly and transversely strigose with faint scattered punctures, underside strongly punctured and pilose ; elytra long and narrow, slightly dilated near apex and with a distinct brownish yellow transverse band of anterior two-fifth, anterior two-fifth before the transverse band shining green with coppery reflection posteriorly and posterior three-fifth after the band rather dull green, surface strongly and closely punctate, punctures coarser and denser on middle than on apical area and longitudinal before apex ; metasternum impunctate ; legs slender. Femora mostly red except apex, apex of femora, tibiae and tarsi pitchy black.

Females are slightly wider than male and with the pronotum column more distinct ; female apophysis consists of two sharp and straight processes.

* Named after Dr. Shyamrup Biswas, Zoologist, ZSI, who has collected the valuable specimens.

Length : 12.0 mm.

Holotype ♂, Kerala Silent Valley, May 1981, S. Biswas ; Paratypes 1 ♀, same data as Holotype (head damaged), 1 ♀, Silent Valley, April 1880, R. S. Pillai. All are deposited in the National Zoological Collection, Zoological Survey of India, Calcutta.



Dorsal View of *Neocollyris shyamrupi* n. sp.

Discussion : This is one of the most distinct species of the genus *Neocollyris*. This is closely related to *N. cylendripennis* Chaudoir by its elytra having transverse band and longitudinal punctures before apex, but can be easily distinguished from the latter by its smaller size. shape of pronotum and colour of tibiae and tarsi being entirely pitchy black. By the shape of pronotum it approaches *parvula* Chaudoir which is also of almost equal size but various from the latter by the present of transverse band, longitudinal punctures of elytra.

Genus *Derocrania* Chaudoir

1860. *Derocrania* Chaudoir *Bull. Soc. Muscou* : 284 and 297.

1904. *Derocrania* W. Horn, *Spol Zelyl* : 39.

Derocrania brevicollis Chaudoir

1905. *Derocrania brevicollis* W. Horn ; *Deutsche. Ent. Zeitchr* : 15.

1912. *Derocrania brevicollis* Fowler : 285.

Material examined : 1 ex., December 1980. R. S. Pillai.

Dorsal surface shining blue-black, elytra with violet reflection ; femora and chief part of the tibiae reddish, tarsi and antennae pitchy black ; this species is easily recognised by the much shorter pronotum having no distinct column, elytra widest at middle and inflated part longitudinally and markedly impressed. The individual elongate impression unite in the form of a chain and do not form any regular sulci.

Distribution : This species was described and known from Trichinopoly (Tamilnadu) only. This is second record of the species.

Subfamily CICINDILINAE

Genus *Cicindela* Linnaeus

1935. *Cicindela* Linn., *Syst. Nat.* 2 : 657.

1854. *Cicindela* Lacordaire, *Gen. Col.* 1 : 17.

Cicindela tetragrammica Chaudoir

1865. *Cicindela tetragrammica* Chaudoir, *Cat. Coll.*, : 58.

1912. *Cicindela tetragrammica* Fowler : 331.

Material examined : 3 exs., Silent Valley, May 1981, S. Biswas.

This species is recognised by its dark colour, the front part black with coppery reflections ; labrum metallic ; legs black, femora coppery. This species is easily recognised by its dull velvety black elytra with two whitish yellow spots along the middle of each side one on middle

and another on posterior fourth, and the surface irregularly sprinkled with small greenish or obscurely aeneous ocelloid spots.

Distribution : TAMIL NADU : Trichinopali ; Nilgiri Hills, Anamalai Hills, Ramnand and Shembognur ; KERALA : Malabar Coast and as above.

***Cicindela viridilabris severini* W. Horn**

1852. *Cicindela viridilabris* Chaudoir, *Bull. Soc. Moscou.* : 14.

1892. *Cicindela severini* W. Horn. *Ann. Soc. Ent. Belgiques* : 537.

1912. *Cicindela viridilabris* var *severini* W. Horn, Fowler : 350.

Material examined : 1 ex., Silent Valley, May 1981, S. Biswas.

This subspecies varies from *viridilabris* (s. str.) Chaudoir by its large size, finer sculpture of head and pronotum, less distinct median line of pronotum, and the second elytral spots not approaching to join the third ones. This is close to *viridilabris labioaena* Horn but can be distinguished from the latter by the less projecting eyes, finer sculpture of the orbital plates and pronotum and the more distinctly defined metallic band at the shoulder of elytra. But this differences are very minute and the scanty material renders difficult to determine the true value of these varieties

Distribution : TAMILNADU : Travancore, Nilgiri Hills ; KERALA : as above ; MAHARASHTRA Kanara ; BENGAL ; BURMA : Teinzo ; TONKIN.

***Cicindela umbropolila* W Horn**

1905. *Cicindela belli* W. Horn. sub. sp. *Umbropolita* W. Horn, *Denteché, Ent. Zeit.* : 61.

1912. *Cicindela umbropolila* W. Horn., Fowler : 345.

Material examined 2 exs., May 1981, S. Biswas.

Horn described this as subspecies of *C. belli*. Horn Fowler (1912) regarded this as a distinct species. This is closely allied to *C. belli* Horn, but can be distinguished by its larger size, more projecting eyes, longer and less convex elytra, clear red trochanters, more sparser pubescence of ventral side and almost impunctate proepisterna.

Distribution : TAMILNADU, Madras ; Nilgiri Hills ; KERALA : as above.

SUMMARY

Six species of Cicindelidae under three genera are recorded from Silent Valley (Kerala) one of which *i.e.* *Neocollyris shyamrupi* is described as pertaining to a new species.

ACKNOWLEDGEMENTS

The authors are grateful to the Director, Zoological Survey of India, for providing laboratory facilities and Dr. T. Sengupta, Superintending Zoologist, Coleoptera Section, for encourage and help in preparation of this manuscript.

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CHRYSOMELIDAE (COLEOPTERA) OF SILENT VALLEY, KERALA

By

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INTRODUCTION

During April 1979 to May 1980 Zoological Survey of India conducted four surveys in Silent Valley of Kerala State. The present study based on a collection comprising of 125 examples belonging to 40 species under 25 genera of the family Chrysomelidae. This is a very large and economically important family of the order Coleoptera and has been extensively dealt by Maulik (1919, 1926, 1936) and also by Jacoby (1908) and Scherer (1969). Chrysomelidae recorded so far from Southern India has been known mostly from Tamil Nadu (=Madras State) which includes Nilgiri Hills. Practically, very little or nothing is available in the published record on Chrysomelidae of Kerala State including Silent Valley. Therefore, all the species dealt in this paper are new record to Silent Valley as well as to the Kerala State, and also some of them have been recorded here for the first time from Southern India. Out of 40 species dealt in this paper, 21 species are only known from Southern India, 8 species extended to North East India, 1 species to Anadman and 8 species distributed almost to all over India.

LIST OF THE SPECIES OF CHRYSOMELIDAE OF SILENT VALLEY

Subfamily CRIOCERINAE

1. *Lema* sp.

Subfamily CRYPTOCEPHALINAE

2. *Cryptocephalus lefevrei* Jacoby
3. *Cryptocephalus* sp.

Subfamily EUMOLPINAE

4. *Basilepta fulvicorne* (Jacoby)
5. *Basilepta* sp. 1

6. *Basilepta* sp. 2
7. *Colasposoma robustum* Jacoby
8. *Triclinea picea* Jacoby

Subfamily GALERUCINAE

9. *Hoplasoma nilgiriensis* Jacoby
10. *Hoplasoma unicolor* (Illiger)
11. *Hoplasoma dilaticornis* Jacoby
12. *Aulacophora nilgiriensis* Jacoby
13. *Aulacophora lewisi* Baly
14. *Aulocophora cincta* (Fabricius)
15. *Aulacophora cruenta* (Fabricius)
16. *Mimastracella hirsuta* Jacoby
17. *Dercetina* sp.
18. *Monolepta signata* (Olivier)

Subfamily CHRYSOMELINAE

19. *Plagioderia divisa* Jacoby

Subfamily ALTICINAE

20. *Nonarthra birmanica* (Jacoby)
21. *Psylliodes viridana* Motschulsky
22. *Huphasis intermedia* Jacoby
23. *Euphitrea indica* Jacoby
24. *Chlaenosoma metallica* Jacoby
25. *Chaetocnema* (*Chaetocnema*) *pusaensis* Maulik
26. *Chaetocnema* (*Chaetocnema*) *bretinghami* Baly
27. *Chaetocnema* (*Tlanoma*) *basalis* (Baly)
28. *Elytropachys* ? *sandalensis* Bryant
29. *Nisotra madurensis* Jacoby
30. *Nisotra apicefulva* (Bryant)
31. *Longitarsus belgaumensis* Jacoby
32. *Luperomorpha vittata* Duvivier
33. *Sebaethe pallidicincta* Jacoby
34. *Sebaethe nigratarsis* Jacoby
35. *Phygasia silacea* (Illiger)
36. *Schenklingia keralaensis* Basu & Sengupta

Subfamily HISPINAE

- 37. *Hispa andrewesi* (Weise)
- 38. *Dactylispa krishna* Maulik
- 39. *Dactylispa spinipes* Weise
- 40. *Dactylispa pitapada* Maulik

SYSTEMATIC ACCOUNT

Order COLEOPTERA

Family CHRYSOMELIDAE

Subfamily CRIOCERINAE

1. *Lema* sp.

Material : 1 ex., Kerala, Silent Valley, 2. iv. 1980, R. S. Pillai.

Remarks : As the specimen was badly damaged, further identification was not possible.

Subfamily CRYPTOCEPHALINAE

2. *Cryptocephalus lefevrei* Jacoby

1895. *Cryptocephalus lefevrei* Jacoby, *Ann. Soc. Ent. Belg.*, 30 : 268.

1908. *Cryptocephalus lefevrei* : Jacoby, *Fauna Brit. India, Coleoptera : Chrysomelidae*, 1 : 224.

Material : 1 ex., Kerala, Silent Valley, 2. iv. 1980. R. S. Pillai.

Distribution : India Maharashtra and Kerala.

Remarks This species was recorded from Maharashtra, it is new recorded here from Kerala.

3. *Cryptocephalus* sp.

Material : 1 ex., Kerala, Silent Valley, 2. iv. 1980. R. S. Pillai.

Remarks : This species is near *C. lucifer* Saffrian but differs in its colour pattern, basal transverse depression on elytra almost absent and smaller size (4.00 mm).

The specific identity could not be ascertained with the literature available to the author.

Subfamily EUMOLPINAE

4. **Basilepta fulvicorne** (Jacoby) Comb. nov.

1904. *Nodostoma fulvicorne* Jacoby, *Ann. Soc. Ent. Belg.*, 48 : 387.

1908. *Nodostoma fulvicorne* : Jacoby, *Fauna Brit. India, Coleoptera : Chrysomelidae*, 1 : 303.

Material : 2 exs., Kerala, Silent Valley, 3 iv. 1980, S. Biswas.

Distribution : India : Tamil Nadu and Kerala.

5. **Basilepta** sp. 1

Material : 1 ex., Kerala, Silent Valley, 2. iv. 1980, R. S. Pillai.

Remarks : This species is near *B. fulvicorne* (Jacoby) but differs in having strong and close punctures on head and clypeus.

The specific identity could not be ascertained from the literature available to the author.

6. **Basilepta** sp. 2

Material : 2 exs., Kerala, Silent Valley, 3. iv. 1980, S. Biswas.

Remarks : This species is near *B. dormeri* Baly but its prothorax not angulated and one and half times broader than long, and all the femora armed with teeth.

The specific identity could not be ascertained with the literature available to the author.

7. **Colasposoma robustum** Jacoby

1881. *Colasposoma robustum* Jacoby, *Proceedings of the Scientific Meetings of the Zoological Society of London (1830—1907)* : 446.

1908. *Colasposoma robustum* : Jacoby, *Fauna Brit. India, Coleoptera : Chrysomelidae*, 1 : 450.

Material : 1 ex., Kerala, Silent Valley, 2. v. 1980. R. S. Pillai.

Distribution : India : Tamil Nadu and Kerala.

8. *Tricliona picea* Jacoby

1895. *Tricliona picea* Jacoby, *Ann. Soc. Ent. Belg.*, **39** : 284.

1908. *Tricliona picea* : Jacoby, *Fauna Brit. India, Coleoptera : Chrysomelidae*, **1** : 475.

Material : 2 exs., Kerala, Silent Vally, 2. iv. 1980, S. Biswas.

Distribution India : Maharashtra and Kerala

Remarks : This species was recorded from Maharashtra, it is now reported from Kerala.

Subfamily GALERUCINAE

9. *Hoplasoma nilgiriensis* Jacoby

1904. *Hoplasoma nilgiriensis* Jacoby, *Ann. Soc. Ent. Belg.* **48** : 396.

1936. *Hoplasoma nilgiriensis* : Maulik, *Fauna. Brit. India, Coleoptra : Chrysomelidae (Galerucinae)* : 160-161.

Material : 9 exs., Kerala, Silent Valley, 5. iv. 1980, S. Biswas ; 12 exs., 25. iv. 1980, R. S. Pillai.

Distribution : India Tamil Nadu, Kerala and Tripura.

10. *Hoplasoma unicolor* (Illiger)

1800. *Galeruca unicolor* Illiger, In Wiedemann, *Arch. fuer Zool. u. Zoot.*, **1** (2) : 135.

1889. *Hoplasoma unicolor* : Allard, *Ann. Soc. Ent. France*, **8** (6) : 327.

1963. *Hoplasoma unicolor* : Gressitt & Kimoto, *Pacif. Ins. Monogr.* **18** : 499.

Material : 1 ex., Kerala, Silent Valley, 6. iv. 1980, S. Biswas.

Distribution : India : Tripura, Arunachal Pradesh, Meghalaya, Assam, Sikkim, West Bengal, Bihar, Orissa, Uttar Pradesh, Maharashtra, Karnataka, Kerala, Tamil Nadu and Andaman Island.

11. *Hoplasoma dilaticornis* Jacoby

1900. *Hoplasoma dilaticornis* Jacoby, *Mem. Soc. Ent. Belg.*, **7** : 128.

1936. *Hoplasoma dilaticornis* : Maulik, *Fauna Brit. India, Coleoptera : Chrysomelidae (Galerucinae)* : 172-173.

Material : 2 ex., Kerala, Silent Valley, 26. iv. 1980, R. S. Pillai ;
1 ex., 4. iv. 1980, S. Biswas.

Distribution : India : Bihar and Kerala.

Remarks : This species was recorded from N. E. India (Bihar) and now it is reported here for the first time from S. India (Kerala).

12. *Aulacophora nilgiriensis* Jacoby

1903. *Aulacophora (Orthaulaca) nilgiriensis* Jacoby, *Ann. Soc. Ent. Belg.*, **47** : 116.
1936. *Aulacophora nilgiriensis* : Maulik, *Fauna Brit. India, Coleoptera : Chrysomelidae (Galerucinae)* : 172-173.

Material : 2 exs., Kerala, Silent Valley, 6. iv. 1980, S. Biswas.

Distribution : India : Karnataka, Kerala and Tamil Nadu.

13. *Aulacophora lewisi* Baly

1886. *Aulaeophora lewisi* Baly, *J. Linn. Soc. London*, **20** : 5, 24.
1963. *Aulacophora lewisi* : Gressitt & Kimoto, *Pacif. Ins. Monogr.*, **1B** : 488-489.

Material : 1 ex., Kerala, Silent Valley, 22. iv. 1980, R. S. Pillai.

Distribution : India : Meghalaya, Assam, Bihar, Punjab, Uttar Pradesh, Maharashtra, Karnataka, Kerala and Tamil Nadu.

14. *Aulacophora cincta* (Fabricius)

1775. *Crioceris cincta* Fabricius, *Syst. Ent.*, : 119.
1936. *Aulacophora cincta* : Maulik, *Fauna Brit. India, Coleoptera, Chrysomelidae (Galerucinae)* : 189-190.

Material : 1 ex., Kerala, Silent Valley, 22. iv. 1980, R. S. Pillai.

Distribution : India : Kerala and Tamil Nadu.

15. *Aulacophora cruenta* (Fabricius)

1792. *Galleruca cruenta* Fabricius, *Syst. Ent.* **1** (2) : 19.
1936. *Aulacophora cruenta* : Maulik, *Fauna Brit. India, Coleoptera : Chrysomelidae (Galerucinae)* 194-195.
1963. *Aulacophora cruenta* : Gressitt and Kimoto, *Pacif. Ins. Monogr.* **1B** : 486.

Material : 9 exs., Kerala, Silent Valley, 22. iv. 1980, R. S. Pillai.

Distribution : India Kerala and Tamil Nadu.

16. Mimastracella hirsuta Jacoby

1903. *Mimastracella hirsuta*, Jacoby, *Ann. Soc. Ent. Belg.*, **47** : 120.

1936. *Mimastracella hirsuta* : Maulik, *Fauna Brit. India, Coleoptera : Chrysomelidae (Galerucinae)* 208-209.

Material : 1 ex., Kerala, Silent Valley, 21. iv. 1980, R. S. Pillai.

Distribution : India : Kerala and Tamil Nadu.

17. Decretina sp.

Material : 1 ex., Kerala, Silent Valley, 21. iv. 1980, R. S. Pillai.

Remarks : As the specimen was badly damaged, specific identification was not possible.

18. Monolepta signata (Olivier)

1808. *Galeruca signata* Oliver, *Entomologie*, **6** : 665.

1889. *Monolepta signata* : Jacoby, *Ann. Mus. Civ. Genova*, **27** : 229.

1963. *Monolepta signata* : Gressitt and Kimoto, *Pacif. Ins. Monogr.*, **1B** : 633-634.

Material : 1 ex., Kerala, Silent Valley, 21. iv. 1980, R. S. Pillai.

Distribution India Assam, Kerala and Tamil Nadu.

Subfamily CHRYSOMELINAE

19. Plagioderma divisa Jacoby

1887. *Melasoma divisa* Jacoby, *Proc. Zool. Soc. London*, : 83.

1926. *Plagioderma divisa* : Maulik, *Fauna Brit. India, Coleoptera : Chrysomelidae (Chrysomelinae & Halticinae)* : 66.

Material 1 ex., Kerala, Silent Valley, 22. iv. 1980, R. S. Pillai.

Distribution : India Karnataka and Kerala.

subfamily ALTICINAE

20. *Nonarthra birmanica* (Jacoby)

1892. *Enneamera birmanica* Jacoby, *Ann. Mus. Civ. Genova* ser. 2, **12** (32) : 935.
 1926. *Nonarthra birmanica* : Maulik, *Fauna Brit. India, Coleoptera : Chrysomelidae* (Chrysomelinae & Halticinae) : 122.
 1969. *Nonarthra birmanica* : Scherer, *Pacif. Ins. Monogr.*, **22** : 239.

Material 8 exs., Kerala, Silent Valley, 22. iv. 1980, R. S. Pillai.

Distribution : India Tamil Nadu, Kerala and Andaman Island.

21. *Psylliodes viridana* Motschulsky

1858. *Psylliodes viridana* Motschulsky, *Etud. Ent.*, **7** : 108.
 1969. *Psylliodes viridana* : Scherer, *Pacif. Ins. Monogr.*, **22** : 237.

Material : 1 ex., Kerala, Silent Valley, 21. iv. 1980. R. S. Pillai

Distribution : India : Kerala and Tamil Nadu.

22. *Hyphasis intermedia* Jacoby

1892. *Hyphasis intermedia* Jacoby, *Ann. Mus. Civ. Genova*, ser. 2, **12** (32) : 937.
 1969. *Hyphasis intermedia* : Scherer, *Pacif. Ins. Monogr.* **22** : 183.

Material : 1 ex., Kerala, Silent Valley, 22. iv. 1980, R. S. Pillai ;
 4 exs., 2. vi. 1980, S. Biswas.

Distribution : India Kerala.

Remarks : This species was recorded from Burma and now it is recorded here for the first time from India (Kerala)

23. *Euphitrea indica* Jacoby

1904. *Euphitrea indica* Jacoby, *Ann. Soc. Ent. Belg.* **48** : 301.
 1969. *Euphitrea indica* : Sceerer, *Pacif. Ins. Monogr.*, **22** : 223.

Material 6 exs., Kerala, Silent Valley, 2. iv. 1980, S. Biswas ;
 2 exs., 21. iv. 1980, R. S. Pillai.

Distribution : India : Kerala and Tamil Nadu.

24. Chalaenosoma metallica Jacoby

1893. *Chalaenosoma metallicum* Jacoby, *Trans. Ent. Soc. London*, : 157.

1969. *Chalaenosoma metallica* : Scherer, *Pacif. Ins. Monogr.*, **22** : 28.

Material 10 exs., Kerala, Silent Valley, Valiyaparathodu, 2. v. 1980, R. S. Pillai ; 3 exs., 5. iv. 1980, S. Biswas.

Distribution India : Kerala and Tamil Nadu.

25. Chaetocnema (Chaetocnema) pusaensis Maulik

1926. *Chaetocnema pusaensis* Maulik, *Fauna Brit. India, Coleoptera : Chrysomelidae* (Chrysomelinae & Halticinae) : 205-206.

1969. *Chaetocnema (Chaetocnema) pusaensis* : Scherer, *Pacif. Ins. Monogr.*, **22** : 161.

Material : 1 ex., Kerala, Silent Valley, 2. v. 1980, R. S. Pillai.

Distribution : India : Bihar, Kerala and Tamil Nadu.

26. Chaetocnema (Chaetocnema) bretinghami Baly

1877. *Chaetocnema bretinghami* Baly, *Trans. Ent. Soc. London*, : 170.

1969. *Chaetocnema (Chaetocnema) bretinghami* : Scherer, *Pacif. Ins. Monogr.*, **22** : 160.

Material : 6 exs., Kerala, Silent Valley, 5. iv. 1980, R. S. Pillai.

Distribution India : Bihar and Kerala.

Remarks This species was recorded from Bihar, it is now recorded here for the first time from Southern India (Kerala).

27. Chaetocnema (Tlanoma) basalis Baly

1877. *Plectroscelis basalis* Baly, *Trans. Ent. Soc. London*, **1877** : 310.

1889. *Chaetocnema basalis* : Shipley, *Proc. Cambridge Phil. Soc*, **6** : 338.

1969. *Chaetocnema (Tlanoma) basalis* : Scherer, *Pacif. Ins. Monogr.*, **22** : 164-165.

Material : 1 ex., Kerala, Silent Valley, 3. iv. 1980, S. Biswas.

Distribution : India : Assam, Maharashtra, Kerala and Tamil Nadu.

28. Elytropachys ? sandalensis Bryant

1941. *Elytropachys sandalensis* Bryant, *Ann. Mag. Nat. Hist. Ser. 11, 8* : 413.

1969. *Elytropachys sandalensis* : Scherer, *Pacif. Ius. Monogr* , **22** : 93-94.

Material : 4 exs., Kerala, Silent Valley, 26. iv. 1980, R. S. Pillai.

Distribution : India : Kerala and Tamil Nadu.

Remarks : The specific identity could not be confirmed due to the non-availability of the required literature.

29. Nisotra madurensis Jacoby

1896. *Nisotra madurensis* Jacoby, *Ann. Soc. Ent. Belg.*, **40** : 267.

1969. *Nisotra madurensis* : Scherer, *Pacif. Ins. Monogr.*, **22** : 148.

Material : 8 exs., Kerala, Silent Valley, 26. iv. 1980, R. S. Pillai ;
7 exs., 7. iv. 1980, S. Biswas.

Distribution : India : Kerala and Tamil Nadu.

30. Nisotra apicefulva (Bryant)

1941. *Podagrica apicefulva* Bryant, *Ann. Mag. Nat. Hist. Ser. 11, 8* : 410.

1969. *Nisotra apicefulva* Scherer, *Pacif. Ins. Monogr.*, **22** : 149.

Material : 1 ex., Kerala, Silent Valley, 25. iv. 1980, R. S. Pillai.

Distribution : India : Kerala and Tamil Nadu.

31. Longitarsus belgaumensis Jacoby

1896. *Longitarsus belgaumensis* Jacoby, *Ann. Soc. Ent. Belg.*, **40** : 260.

1969. *Longitarsus belgaumensis* Scherer, *Pacif. Ins. Monogr.*, **22** : 64-65.

Material : 1 ex., Kerala, Silent Valley, 1140m., 21. i. 1980, K. R. Rao.

Distribution India : Manipur, Meghalaya, Sikkim, Bihar, Uttar Pradesh, Maharashtra, Kerala and Tamil Nadu.

32. Luperomorpha vittata Duviver

1892. *Luperomorpha vittata* Duvivier, *Ann. Soc. Ent. Belg.*, **36** : 427.

1969. *Luperomorpha vittata* : Scherer, *Pacif. Ins. Monogr.*, **22** : 53.

Material : 1 ex., Kerala, Silent Valley, 25. iv. 1980, R. S. Pillai.

Distribution : India : West Bengal, Bihar and Kerala.

Remarks : This species was recorded from North East India, it is now recorded for the first time from Southern India (Kerala).

33. Sebaethe pallidicincta Jacoby

1904. *Sebaethe pallidicincta* Jacoby, *Ann. Soc. Ent. Belg.*, **48** : 390.

1969. *Sebaethe pallidicincta* : Scherer, *Pacif. Ins. Monogr.*, **22** : 188.

Material : 2 exs., Kerala, Silent Valley, 2. v. 1980, R. S. Pillai.

Distribution : India : Kerala and Tamil Nadu.

34. Sebaethe nigratarsis Jacoby

1903. *Sebaethe nigratarsis* Jacoby, *Ann. Soc. Ent. Belg.*, **47** : 106.

1969. *Sebaethe nigratarsis* : Scherer, *Pacif. Ins. Monogr.*, **22** : 191.

Material : 1 ex., Kerala, Silent Valley, 23. i. 1980, S. K. Bhattacharyya.

Distribution : India : Kerala and Tamil Nadu.

35. Phygasia silacea (Illiger)

1807. *Haltica silacea* Illiger, *Mag. Insektenkunde*, **6** : 121.

1969. *Phygasia silacea* : Scherer, *Pacif. Ins. Monogr.*, **22** : 113-114.

Material : 2 exs., Kerala, Silent Valley, 2. v. 1980, S. Biswas.

Distribution : India West Bengal, Karnataka, Kerala and Tamil Nadu.

36. Schenklingia keralaensis Basu & Sengupta (Nom. nov.)

1981. *Schenklingia heteropunctata* Basu & Sengupta, *Oriental Ins.*, **15(3)** : 269—271.

Remarks *Schenklingia heteropunctata* Basu & Sengupta, 1981 is a Junior homonymy of *S. heteropunctata* Samuelson, 1969, *Pacif. Ins.* **11**(1) : 38, hence the name is replaced by *S. keralaensis*.

Subfamily HISPINAE

37. *Hispa andrewesi* (Weise)

1897. *Hispella andrewesi* Weise, *Deut. Ent. Zeits.*, : 126.

1958. *Hispa andrewesi* : Uhmman, *Col. Cat. Suppl.*, **35**(2) : 269.

Material : 1 ex., Kerala, Silent Valley, 6. v. 1980, R. S. Pillai, 1 ex., 3.iv.1980, S. Biswas.

Distribution : India Karnataka, Kerala and Tamil Nadu.

38. *Dactylispa krishna* Maulik

1919. *Dactylispa krishna* Maulik, *Fauna Brit. India, Coleoptera : Chrysomelidae (Hispinae & Cassidinae)* : 181-182.

Material : 1 ex., Kerala, Silent Valley, 6. v. 1980, R. S. Pillai

Distribution India : Karnataka, Kerala and Tamil Nadu.

39. *Dactylispa spinipes* Maulik

1905. *Dactylispa spinipes* Weise, *Deut. Ent. Zeits.*, : 119.

1919. *Dactylispa spinipes* : Maulik, *Fauna Brit. India, Coleoptera : Chrysomelidae (Hispinae and Cassidinae)* : 182.

Material : 1 ex., Kerala, Silent Valley, 24.i.1980, S. K. Bhattacharyya ; 1 ex., 6.v.1980, R. S. Pillai ; 3 exs., 18.i.1980, K. R. Rao.

Distribution : India : Kerala and Tamil Nadu.

40. *Dactylispa pitapada* Maulik

1819. *Dactylispa pitapada* Maulik, *Fauna Brit. India, Coleoptera : Chrysomelidae (Hispinae and Cassidinae)* : 212-213.

Material : 1 ex., Kerala, Silent Valley, 23.i.1980, S. K. Bhattacharyya ; 3 exs., 6.v.1980, R. S. Pillai.

Distribution : India : Kerala and Tamil Nadu.

SUMMARY

This paper records 40 species of Chrysomelidae belonging to 7 subfamilies. Of these *Hyphasis intermedia* Jacoby is new to India and other 5 species are first record from the area.

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DIPTERA FROM SILENT VALLEY

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[With one Text-figure]

ABSTRACT. This paper deals with 15 species of Diptera from Silent Valley, Kerala. belonging to as many as 7 families. Of these, 1 species is new (Asilidae), 4 are new to South India and another 6 are new to Kerala. It also includes other 6 species, which cannot be identified beyond the generic level because they are badly damaged.

Family TIPULIDAE

Limonia (*Bhipidia*) *antennata* (Brunetti)

Ceratostephanus antennatus Brunetti, 1911, *Rec. Indian. Mus.* 6 : 272.

Limonia (*Rhipidia*) *antennata* (Brunetti) : Alexander and Alexander, 1973, *A Catalog of Diptera of the Oriental Region* 1 : 113 ; Joseph, 1976, *Oriental Ins.* 10(2) : 236.

Material : 1 ex., 5 km. towards Mukkali, 12. xii. 1980, Coll. R. S. Pillai.

Remarks : The species has characteristically elongate antennae with each flagellar segment bearing a pair of strong diverging bristles above and an elongate palp-like process below. It is recorded for the first time from South India. It is a rare species and this is the third specimen so far collected.

Tipula sp.

Material : 1 ex., Kariamala Thodu, 29. iv. 1980, Coll. R. S. Pillai.

Dicranomyia sp.

Material : 1 ex., Valiapara Thodu, 2. v. 1980, Coll. R. S. Pillai.

Limnophila sp.

Material : 1 ex., Kariamala Thodu, 29. iv. 1980, Coll. R. S. Pillai.

Styringomyia sp.

Material : 1 ex., way to Valiapara Thodu, 5. xii. 1980, Coll. R. S. Pillai.

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Family THEREVIDAE

Psilocephala sequa (Walker)

Thereva sequa Walker, 1852, *Ins. Saund.* Diptera : 157 ; *Psilocephala sequa* (Walker) : Brunetti, 1923, *Fauna Brit. India*, Diptera, 3 : 305-306 ; Lyneborg, 1975, *A Catalog of Diptera of the Oriental Region* 2 : 92.

Material : 1 ex. Road to Mukkali, 8. xii. 1980, Coll. R. S. Pillai

Remarks : This is the first record of the species from South India.

Family ASILIDAE

Microstylum ananthakrishnani Joseph & Parui

Microstylum ananthakrishnani Joseph and Parui, *Ent. Scand.* 1 : 449—420

Material : 2 exs., Dam site, 27. iv. 1980, Coll. R. S. Pillai.

Remarks : This species is described from Kerala.

Ommatius pillaii n.sp. (Fig. 1.)

A small black species with concolourous legs marked with a little yellowish-brown, and infuscated wings.

Male : Length 7-8 mm, wing 6 mm ; **Female :** length 7 mm, wing 6 mm.

Males : Head black infuscated with grey tomentum ; mystax black above and pale below ; bristles of front and ocellarium black ; occiput sparsely grey tomentose with black bristles and hairs above and white hairs below. Antenna black, bristles of the basal two segments 1 and 2 nearly equal, 3 longer. Palpi and proboscis black, the former with black and the latter with pale hairs.

Thorax black with greyish-yellow to grey tomentum ; pronotum pale haired ; mediolongitudinal stripe of mesonotum indistinct ; pleuron sparsely grey tomentose ; scutellum also sparsely grey tomentose, disc bears sparse pale hairs and the hind border a pair of pale bristles ; bristles of metapleuron pale. Halteres light yellowish-brown.

Legs black ; tibia basally light yellowish-brown, more so in the foreleg so much so for considerable part of it is light yellowish-brown, basitarsus of foreleg yellowish-brown but in paratype male yellowish-brown basally and black distally, in the mid and hind legs basitarsi lighter coloured but not yellowish-brown ; hindfemur with

a ventral row of pale bristles, clothing hairs and bristles black and pale, basitarsi of all the legs ventrally bear dense golden yellow clothing hairs.



Fig. 1. Lateral view of male terminalia of *Ommatius pillaii* n. sp

Wings infuscated except for the extreme base which is hyaline.

Abdomen black, posterolateral sides of tergite 1 and to a lesser extent the succeeding tergite bear long pale hairs, clothing hairs pale. Male terminalia (Fig.) black to dark brown with concolovrous and pale hairs.

Female : Similar, but the mediolongitudinal stripe of mesonotum faintly marked and the hind basitarsi black.

Material : Holotype ♂, Reg. No. 6625/H6, S. India : Kerala State : Silent Valley, 5 kms. towards Mukkali, 12. xii. 1980, Coll. R. S. Pillai. Paratypes 1 ♂, Reg. No. 6626/H6, 2 kms. towards Mukkali, 6. xii. 1980, rest of data as in the preceeding. 1, Reg. No ♀, 6627/H6, details as in holotype.

There are a number of similarly coloured, apparently looking alike, species of *Ommatius* Wiedemann, all of which can be recognised mainly by the structural details of male terminalia. *O. pillaii* n. sp. is quite distinct in the details of male terminalia from all the other known species under the genus. It shows some similarity to *O. nanus* Walker in this character. This species is named in honour of Dr. R. S. Pillai, who explored the little known, difficult, Silent Valley.

Machimus sp.

Material : 2 exs., River Kunti, 24. iv. 1980, Coll. R. S. Pillai, 1 ex., Aruvenkadu, 28. iv. 1980, Coll. R. S. Pillai.

Xenomyza sp.

Material : 1 ex., Valiapara Thodu, 2. v. 1980, Coll. R. S. Pillai.

Family BOMBYLIIDAE

Anthrax distigma Wiedemann

Anthrax distigma Wiedemann, 1928, *Auss. Zweifl. Insekt.* 1 : 309.

Argyromoeba distigma (Wiedemann) : Brunetti, 1923, *Fauna Brit. India, Diptera*, 3 : 218.

Anthrax distigma Wiedemann : Bowden, 1975, *A Catalog of Diptera of the Oriental Region* 2 : 175.

Material : 1 ex., site on the left of River Kunti, 24. iv. 1980 Coll. R. S. Pillai.

Remarks : This is the first record of the species from Kerala.

Family SYRPHIDAE

Melanostoma univittatum (Wiedemann)

Syrphus univittatus Wiedemann, 1824, *Analecta Ent.* : 36

Melanostoma univittatum (Wiedemann) : Brunetti, 1923, *Fauna Brit. India* Diptera, 3 : 50-51 ; Knutson, 1975, *A Catalog of Diptera of the Oriental Region* 2 : 325.

Material : 1 ex., towards Mukkali, 6. xii. 1980, Coll. R. S. Pillai.

Remarks : This species enjoys wide distribution all over India.

Melanostoma orientale (Wiedemann)

Syrphus orientale Wiedemann, 1924, *Analecta Ent.* : 36.

Melanostoma orientale (Wiedemann) : Brunetti, 1923, *Fauna Brit. India* Diptera 3 : 48-50 ; Knutson, 1975, *A Catalog of Diptera of the Oriental Region* 2 : 325.

Material : 1 ex., road to Cardamam estate, 11 xii. 1980, Coll. R. S. Pillai.

Remarks : This is the first record of the species from Kerala.

Eristalinus arvorum (Fabricius)

Syrphus arvorum Fabricius, 1787, *Mantissa Insect.* 2 : 335.

Eristalis arvorum (Fabricius) : Brunetti, 1923, *Fauna Brit. India* Diptera, 3 : 181-183.

Eristalinus arvorum (Fabricius) : Knutson, 1975, *A Catalog of Diptera of the Oriental Region* 2 : 347.

Material : 1 ex., towards Mukkali, 6. xii. 1980, Coll. R.S. Pillai.

Remarks : This species is very common all over India.

Phytomia (Dolichomerus) crassa (Fabricius)

Syrphus crassus Fabricius, 1787, *Mantissa Insect.* 2 : 334.

Megaspis crassus [Fabricius] : Brunetti, 1923, *Fauna Brit. India*, Diptera, 3 : 197-199.

Phytomia (Dolichomerus) crassa [Fabricius] : Knutson, 1975, *A Catalog of Diptera of the Oriental Region* 2 : 368.

Material : 1 ex., Kumattan Thodu, 7.xii. 1980, Coll. R. S. Pillai.

Remarks : This species is well distributed in India.

Paragus (Paragus) serratus (Fabricius)

Mulio serratus Fabricius, 1805, *Syst. Antliat.* : 186.

Paragus serratus (Fabricius) : Brunetti, 1923, *Fauna Brit. India*, Diptera, 3 : 31-32.

Paragus (Paragus) serratus (Fabricius) : Knutson, 1975, *A Catalog of Diptera of the Oriental Region* 2 : 327.

Material : 1 ex., Dam Site, 9 .xii. 1980, Coll. R. S. Pillai.

Remarks : The species has characteristic serration on scutellum and is widely distributed in India.

Family MUSCIDAE**Musca (Viviparomusca) bezzii Patton and Cragg**

Musca bezzii Patton and Cragg, 1913, *Indian J. Med. Res.* 1 : 19.

Musca (Viviparomusca) bezzii Patton and Crag : Emden, 1965, *Fauna India*, Muscidae, 7 (1) : 83-84 ; Pont, 1977, *A Catalog of Diptera of the Oriental Region* 3 : 461.

Material : 2 exs., 2 km. towards Mukkali, 6. xii. 1980, Coll. R. S. Pillai.

Remarks : In South India the species is so far recorded only from Tamil Nadu.

Orthellia claripennis Malloch

Orthellia claripennis Malloch, 1923, *Ann. Mag. nat. Hist.* (9) 12 : 515 ; Pont, 1977, *A Catalog of Diptera of the Oriental Region* 3 : 463.

Material : 2 exs., road to Mukkali, 9. xii. 1980, Coll. R. S. Pillai.

Remarks : Though the species is widely distributed in India, it is the first record from Kerala.

Orthellia timorensis (Robineau-Desvoidy)

Musca coerulea Wiedemann, 1830, *Zool. Mag.* 3 : 23.

Orthellia coerulea (Wiedemann) : Emden, 1965, *Fauna India*, Muscidae, 7 (1) : 124-125.

Orthellia timorensis (Robineau-Desvoidy) : Pont, 1977 *A Catalog of Diptera of the Oriental Region* 3 : 465-466.

Material : 1 ex., road to Cardamam estate, 11.xii. 1980, Coll. R. S. Pillai.

Remarks : The species has been recorded from different places of South India.

Family CALLIPHORIDAE

***Stomorphina discolor* (Fabricius)**

Musca discolor Fabricius 1794, *Ent. Syst.* 4 : 320.

Stomorphina discolor (Fabricius) : Senior-white, Aubertin and Smart, 1940, *Fauna Brit. India*, Diptera, 6 : 192-194 ; James, 1977, *A Catalog of Diptera of the Oriental Region* 3 : 554-555.

Material : 1 ex., road to Cardamam estate, 11. xii. 1980, Coll. R. S. Pillai.

Remarks : It is the first record of the species from South India.

***Idiella euidielloides* Senior-white**

Stomorphina euidielloides Senior-white 1923, *Mem. Deptt. Agric. India* (ent. ser) 7 : 166.

Idiella euidielloides (Senior-white) : James, 1977, *A Catalog of Diptera of the Oriental Region* 3 : 545.

Material : 1 ex., road to Cardamam estate, 11. xii. 1980, Coll. R. S. Pillai.

Remarks : This is the first record of the species from South India.

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ON A SMALL COLLECTION OF EARTHWORMS AND LEECHES (ANNELIDA) FROM THE SILENT VALLEY, KERALA, INDIA

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(With 9 Text-figures)

INTRODUCTION

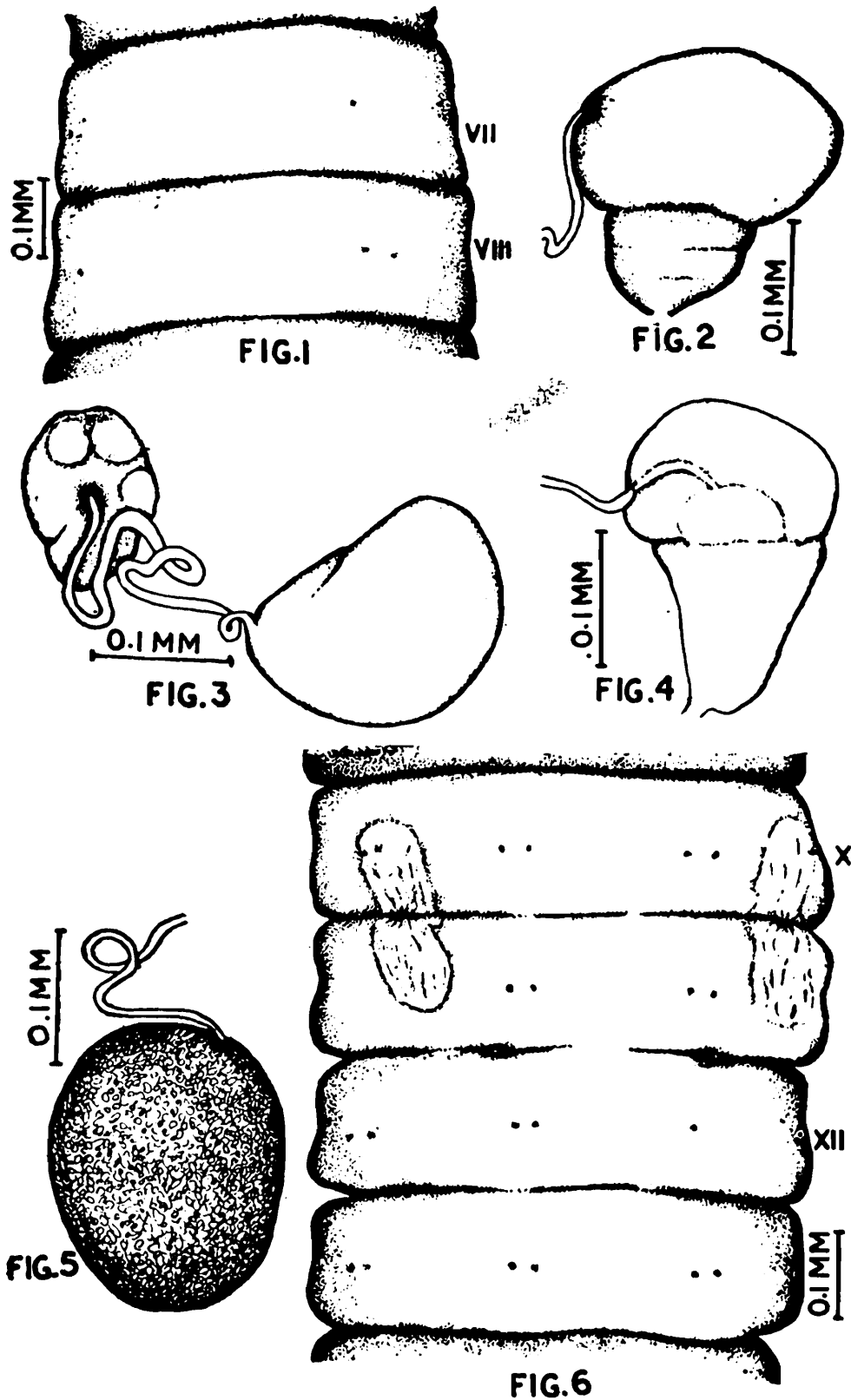
Earthworms and leeches are known from some areas of Kerala, South India through the works of Stephenson(1923) and Aiyer (1929), and Harding and Moore (1927) respectively. This article deals with the systematics of these groups collected by Drs. R.S. Pillai and K. R. Rao of Zoological Survey of India, Madras during the expeditions in 1980 to assess the faunal wealth of hitherto unexplored Silent Valley in Kerala. Included among this material are *Drawida ghatensis* Michaelsen and *D. grandis* (Bourne), the earthworm species, in which confirmation of some characters and information about others has been needed.

SYSTEMATIC ACCOUNT
Class OLIGOCHAETAE
Order MONILIGASTRIDA
Family MONILIGASTRIDAE
Drawida ghatensis Michaelsen
(Figs. 1-3, 5-6)

1910. *Drawidag hatensis* Michaelsen, *Abh. Geb. Naturw., Hamburg*, 19 [5] : 52 ; Michaelsen, 1913, *Jb. hamb. Wiss. Anst.*, 30 : 77 ; Stephenson, 1915, *Mem. Indian Mus.*, 6 : 49 Stephenson, 1923, *Fauna Br. India, Oligochaeta* : 138 ; Aiyer, 1929, *Rec. Indian Mus.*, 31 : 48.

Description. External characters : Length 177 mm, diameter 5 mm, 182 segments. Prostomium prolobic. Dorsal pores absent. Clitellum x-xiii. Setae lumbricine, $aa=7ab=1$. $1bc=7-10$. $5cd=0.25-0.30$ dd on ix, $aa=7.3-7.7ab=0.82-0.98bc=7.7-11cd=0.25-0.26dd$ on xv, $aa=9-11ab=0.88-0.93bc=9-14.7cd=0.29-0.30dd$ at middle of body.

Male pores paired, large transverse slits in 10/11, at *bc*, slightly median to *c* (Fig. 6). Female pores paired, minute, in



Figs. 1-3, 5-6. *Drawida ghatensis* Michaelsen, 1, spermathecal pore area ; 2, lateral view of prostatic capsule ; 3, spermatheca ; 5, dorsal view of prostate ; 6, male genital area. Fig. 4. *Drawida grandis* (Bourne), lateral view of prostatic capsule.

11/12, at *b*. Spermathecal pores paired, large transverse slits in 7/8, at *c* (Fig. 1). Nephridiopores minute, slightly dorsal to *d* lines on *ii-viii*, at *d* lines on *ix* and posterial segments. Paired tumescences on *x* and *xi* slightly anterior and posterior to male pores. Genital markings absent.

Internal characters : Septa 5/6-8/9 muscular. Gizzards 5 in *xv-xix*, intestine begins in *xxii*, typhlosome absent. Paired commissures from extra-oesophageal vessels to the dorsal vessel on posterior face of septum 8/9, subneural vessel extending anterior to *ii*.

Testis sacs paired, in *xii-xvi*, each connected to septum 9/10 through a narrow neck. Vas deferens coiled in a mass of hairpin loops, when stretched about 110 mm long, opening directly at the dorso-anterior face of prostotectate. Prostates paired, glandular (Fig. 5) shortly stalked, ovoidal, prostatic capsule (Fig. 2) oval, erect. Ovarian chamber complete, ovisacs paired extending posterior to *xvi*. Spermathecae (Fig. 3) paired in *viii*, adiverticulate ampulla pear-shaped, duct sinuous, 7.2 mm long, pierces through septum 7/8 to enter on the dorsal surface at about centre of atrium in *vii*, atrium oval, sessile, slightly projecting into *viii*, atrial cavity with 6 longitudinal ridges.

Distribution, INDIA, Kerala : Tenmalai, Maddathoray, Kullattupuzha, Kottayam, Ponnudi, Bonaccord, Kavalai, Mukkunni Reserve Forest, Thiruvella, Silent Valley (present record).

Specimens examined. Coll. R.S. Pillai, Silent Valley, Kerala : 1 aclitellate, road to Valiaparathodu, 23. iv. 1980 ; 1 clitellate, 5 km down stream from dam site on left bank, 24. iv. 1980.

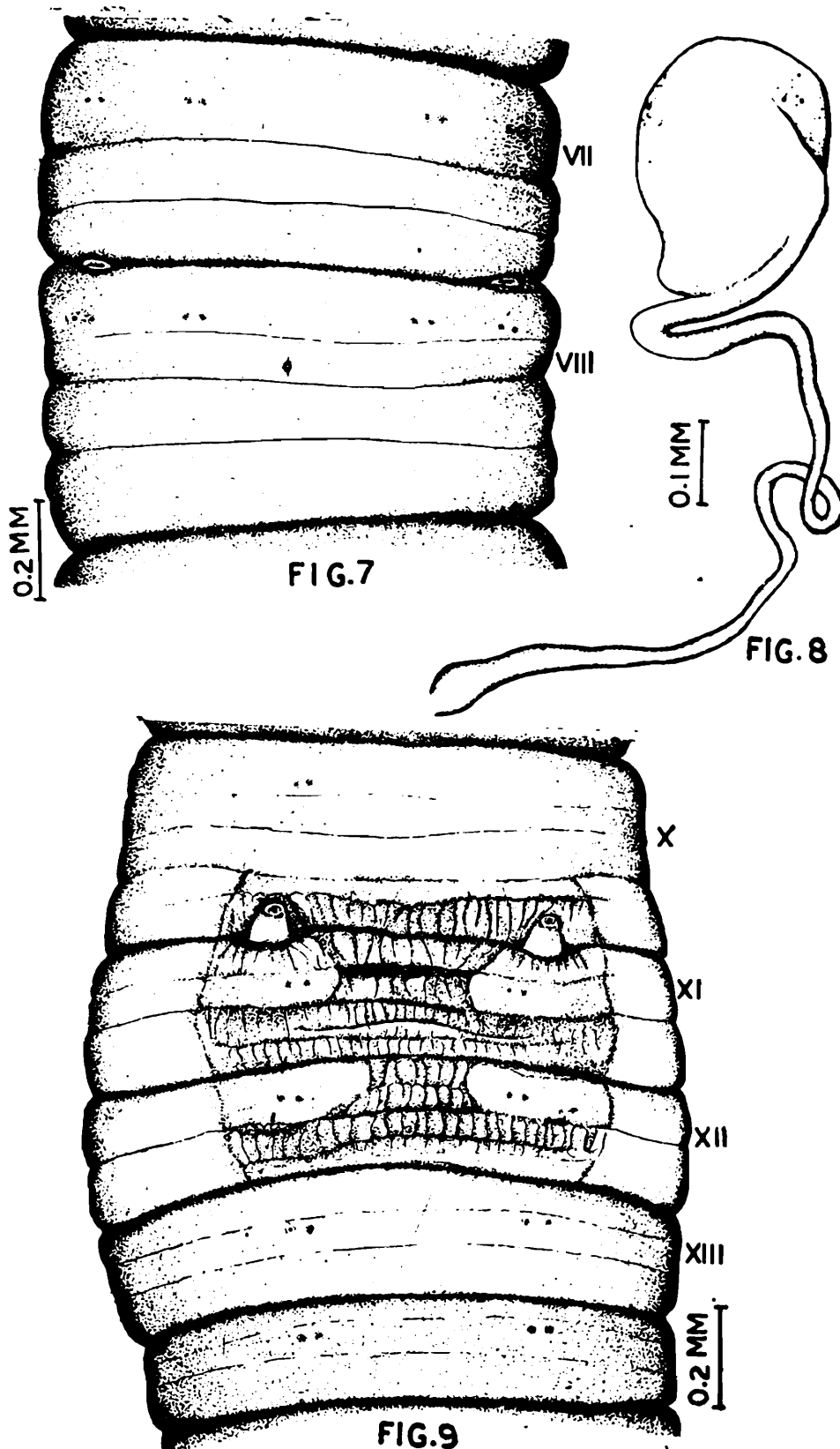
***Drawida grandis* (Bourne)**

(Figs. 4, 7-9)

1886. *Moniligaster grandis* Bourne, *Proc. zool. Soc. Lond.*, 1886 : 671 ; Bourne, 1894, *Q Jl microsc. Sci.*, 36 : 307 ; Beddard, 1895, *A monograph of the order Oligochaeta* : 198.
1900. *Drawida grandis*, Michaelsen, *Tierreich*, 10 : 117 ; Michaelsen, 1910, *Abh. Geb. Naturw., Hamburg*, 19 [5] : 48 ; Stephenson, 1923, *Fauna Br. India, Oligochaeta* : 139 ; Gates, 1943, *Ohio J. Sci.*, 43 : 88.

Description. External characters : Length 234-396 mm, diameter 9-11.5 mm, 337-478 segments. Prostomium prolobic. Dorsal pores

absent. Clitellum $x-xiii$. lacking ventrally on $1/3x-xii$. Setae lumbricine, $aa=8.3-10.2ab=1-1.8bc=8.3-10.2cd=0.25-0.29dd$ on ix, $aa=11-15ab=0.7-1.1bc=11-15cd=0.26-0.31dd$ on xv, $aa=15.6-19ab=0.9bc=15.6-19cd=0.25-0.32dd$ at middle of body.



Figs. 7-9, *Drawida grandis* (Bourne), 7, spermathecal pore area ; 8, spermatheca ; 9, male genital area.

Male pores paired, minute, at the centre of distal ends of conical porophores eversible through large, transverse, secondary male pores in 10/11, slightly lateral to *b* (Fig. 9). Female pores paired, small transverse slits, in 11/12, at *b*. Spermathecal pores paired, transverse slits, at the centre of oval porophores in 7/8, at *c* (Fig. 7). Nephridiopores minute, presetal, slightly dorsal to *d* lines on *iii-viii*, at or close to *d* lines on *ix* and posteriad segments (not recognized on *x*). Paired, slight tumescences surrounding setae *ab* on *xi* and *xii*. Genital markings absent.

Internal characters : Septa 5/6-8/9 muscular, 9/10 delicate and displaced posteriorly. Gizzards 6 in *xvi-xxi*, intestine begins in *xxxi* (± 1), typhlosole absent. Paired commissures from extraoesophageal vessels to the dorsal vessel within septum 8/9, subneural vessel not recognized anterior to *x*.

Testis sacs paired, extending equally into *ix* and *x*. Vas deferens coiled in the form of a small mass of hairpin loops, when stretched about 170 mm long, opening directly at the antero-median face of prostate. Prostates (Fig. 4) paired, muscular, sessile, spheroidal, diameter 2.5 mm, prostatic capsule sessile, spheroidal, embedded in a glandular mass beneath the outer muscular layer of the prostates. Ovarian chamber horseshoe-shaped, ovisacs tubular, extending posterior to *xv*. Spermathecae paired, duct 19 mm long, ectal half within septum 7/8, slightly enlarged ectally beneath longitudinal muscle layer of the body wall.

Distribution. INDIA, Tamil Nadu : Widely spread on the Nilgiri Hills; Kerala : Silent Valley (present record).

Specimens examined. Coll. K.R. Rao, Silent Valley, Kerala : 1 clitellate, along Valiaparathodu and Kunti rivers, alt. 940 m, 22.i.1980. 1 clitellate, Mukkali Base Camp, alt. 1040 m, 27.i.1980.

Remarks. Stephenson (1923) gave altitudinal range for this species at 5000-8000 ft. (1524-2438 m). The present record at an altitude of 940-1040 m extends its range to lower elevations.

Order HAPLOTAXIDA

Suborder LUMBRICINA

Family MEGASCOLECIDAE

Megascolex sp.

Specimens examined. Coll. R.S. Pillai, Silent Valley, Kerala :

5 km from dam site down river Kunti on left bank, 24.iv. 1980.

Remarks. According to Stephenson's (1923) key of the Indian species of *Megascolex*, specimens from the Silent Valley come near to *Megascolex ratus* Cognetti. The specific identity is not possible due to paucity of the material. Moreover, *Megascolex* Templeton, 1895 with species in Sri Lanka, India, Australia, New Caledonia, New Zealand, Norfolk Island and Annam is a polyphyletic congeneries and requires extensive revision.

Class HIRUDINEA

Order ARHYNCHOBDELLAE

Family HAEMADIPSIDAE

Haemadipsa zeylanica cochiniiana Moore

1927. *Haemadipsa zeylanica cochiniiana* Moore, *Fauna Br. India, Hirudinea* : 266 ; Soos, 1967, *Acta zool. Hung.*, 13 (3-4) : 426 ; Chandra, *Rec. zool. Surv. India*, 80 : 286.

Specimens examined. Coll. R.S. Pillai, Silent Valley, Kerala : 1 ex, Dam site, 21.iv. 1980; 12 ex, road to Valiyaparathodu, 23.iv. 1980; 3 ex, Valiyaparathodu, 25.iv. 1980; 10 ex, halfway to Valiyaparathodu, 2.v. 1980.

ACKNOWLEDGEMENTS

The authors are grateful to the Director, Zoological Survey of India, Calcutta and the Officer-in-Charge, High Altitude Zoology Field Station, Z.S.I., Solan for providing necessary facilities. Thanks are also due to Shri Anil Gupta, Artist, Z.S.I., Solan for the help in preparing the illustrations.

SUMMARY

This paper deals with a small collection of earthworms and leeches from the Silent Valley, Kerala, India. Earthworm species, *Drawida ghatensis* Michaelsen and *D. grandis* (Bourne) are described in detail.

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REPTILES OF SILENT VALLEY

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INTRODUCTION

Included herein are 9 species of Lizards and 11 species of snakes collected from the Silent Valley by the scientists of the Southern Regional Station during 1979-1981. Besides the diagnostic characters and colour pattern, the total range of each species is provided. This paper supplements the report published earlier (Murthy, 1981).

The classification adopted here is broadly that of Smith (1935, 1943) but with certain modifications by Mittleman (1952) and Underwood (1967).

The entire collection excepting the single uropeltid studied is deposited in the reptile collections of the Southern Regional Station.

A SYSTEMATIC INDEX TO THE REPTILES OF THE SILENT VALLEY

Suborder SAURIA

Family GEKKONIDAE

Genus *Cnemaspis* Strauch

1. *C. sisparjnsis* (Theobald)
2. *C. wynadensis* (Beddome)

Family AGAMIDAE

Genus *Calotes* Rafinesque

3. *C. calotes* (Linn.)
4. *C. elliotti* (Gunther)
5. *C. versicolor* (Daudin)

Genus *Draco* Linnaeus

6. *D. dussumieri* (Dumeril & Bibron)

Genus *Pseudomorphus* Fitzinger

7. *P. blanfordianus* (Stoliczka)

Family SCINCIDAE

Genus **Mabuya** Fitzinger

8. *M. beddomii* (Jerdon)

Genus **Sphenomorphus** Fitzinger

9. *S. dussumietii* (Dum. & Bibr.)

Suborder SERPENTES

Family UROELIIDAE

Genus **Melanophidium** Gunther

10. *M. punctatum* Beddome

Family COLUBRIDAE

Genus **Ahaetulla** Link

11. *A. nasuta* (Lacepede)

Genus **Amphiesma** Dumeril & Bibron

12. *A. beddomei* (Gunther)

Genus **Denbrelaphis** Blgr.

13. *D. grandoculis* (Blgr.)

Genus **Lycodon** Boie

14. *L. aulicus* (Linn.)

15. *L. travanconicus* (Beddome)

Genus **Macropisthodon** Boulenger

16. *M. plumbicolor* (Cantor)

Genus **Ptyas** Fitzinger

17. *P. mucosus* (Linn.)

Genus **Xenochrophis** Gunther

18. *X. piscator* (Schneider)

Family ELAPIDAE

Genus **Bungarus** Daudin

19. *B. caeruleus* (Schneider)

Family VIPERIDAE

Subfamily CROTALINAE

Genus *Trimeresurus* Lacepede

20. *T. malabaricus* Jerdon

21. *T. strigatus* Gray

ACCOUNTS OF SPECIES

LIZARDS

1 *Cnemaspis sisparensis* (Theobald)

Material : 1 ex., 32mm. (tail damaged), Silent Valley, 27. i. 1979, Coll. R. S. Pillai.

Description : Back with larger, rounded or pointed and keeled tubercles ; ventrals as large as the dorsals. Digits longer. Males with 7 to 8 femoral pores.

Colour pattern : Brown above. Back with a series of dark brown oblong spots arranged in three longitudinal lines, a dark streak through eye. Tail with alternating lighter and darker bars above.

Distribution : Known hitherto only from the three types picked up from the Sispara Ghat, Nilgiris and Kavalai of Cochin, Kerala.

Remarks : The example under study is an interesting addition to the reptile fauna of Silent Valley.

2. *Cnemaspis wynadensis* (Beddome)

Material : 1 ex., Snout to vent, 40 mm. ; tail 42 mm. ; Silent Valley, 22. i. 1979, Coll. R. S. Pillai.

Description : Back as in *sisparensis*. Digits elongate. Tail cylindrical. Male with 4 to 9 femoral pores on each side.

Colour pattern : Brown above and pale brownish below. Throat darker and white spotted. Tail with lighter darker markings.

Distribution : Wynaad and hill ranges farther south (Kerala)

Family AGAMIDAE

3. *Calotes calotes* (Linn.)

Green Lizard

Material : 1 ex., (juv.), Snout to vent 93mm.; Tail 319 mm., Silent Valley, 17. x. 1974, *Coll.* G. U. Kurup.

Description : Body compressed and covered with equal sized scales which are not larger than the ventrals. A distinguishing feature of this lizard is the presence of a row of 9 compressed spines above the tympanum. The gular sac and the dorsal crest are well developed. Tympanum naked. Tail very long and slender.

Colour Pattern : The colouration (in life) is bright green dorsally and pale green ventrally. The dorsum is characterised by 6 whitish stripes transversely arranged and extending on to the tail. The specimen under study is an immature example with a dorso-lateral stripe running along each of the flanks.

Distribution Eastern Ghats — Sheavaroy Hills, Tamil Nadu ; Western Ghats — Anaimalais and Hills of South Kerala ; Nicobar Islands ; Sri Lanka.

4. *Calotes elliotti* Gunther

White-spotted Tree Lizard

Material : 1 ex., Snout to vent 83 mm., Tail 187 mm. ; Mukkali, Silent Valley, 16. i. 1980, *Coll.* K. R. Rao.

Description : A dwarfed arboreal species, characterised by a complete fold extending across the throat, two spines on the back of the head and a white spot below the eye.

Colour pattern : The ground colouration is olive above and whitish below. The back is characterised by the presence of angular dark-brown cross bars. A white spot below the eye on each side is another unfailing character of this tree lizard.

Distribution : Western Ghats.

5. ***Calotes versicolor*** (Daudin)

Indian Garden Lizard

Material 1 ex., Snout to vent 90 mm., Tail 222 mm. ; Nella-para, Silent Valley, 19. i. 1979, *Coll.* R. S. Pillai.

Description : Head large and markedly swollen. No fold or pit in front of the shoulder. The spines above the tympanum, two in number, are separated from each other. Males with gular sac.

Colour pattern : The dorsal colour is brown but is variable depending on weather and climate. The juveniles are characterised by light dorsolateral stripes. The head and shoulders of males are suffused with red. The undersides are whitish with dark streaks.

Distribution : The whole of India ; Pakistan ; Sri Lanka ; Indo-China.

6. ***Draco dussumieri*** Dumeril & Bibron

Flying Lizard

Material 1 ex., Snout to vent 95 mm. ; tail 135 mm., Dam site, Silent Valley, 5. xii. 1980, *Coll.* C. S. Rao.

Description : Body with a large, lateral, wing-like membrane supported by the last five ribs, which are much produced. A gular appendage and a lateral flap on either side of the throat. Tympanum distinct. Tail long. No femoral or preanal pores.

Colour pattern : The colour (in life) of the dorsum is greyish brown with darker markings and a series of dark circles. The wing membranes are purplish black with light, rounded, yellowish spots and grey below. The throat is suffused with black.

Distribution : Tamil Nadu ; Kerala ; Coorg, Karnataka ; Karwar, Maharashtra ; Goa.

7. ***Psammophilus blanfordianus*** (Stoliczka)

Rock-Lizard

Material : 1 ex., Snout to vent 56 mm., Tail 119 mm., Mukkali, Silent Valley , 18. i. 1979, *Coll.* R. S. Pillai.

Description : Body depressed and covered with uniform carinate scales. Tympanum distinct. No gular sac, preanal or femoral pores. Tail long and slender.

Colour pattern : The specimen under study is a juvenile and is marbled brownish in colour with a series of lozenge-shaped spots on the back and the tail. The underside is pale yellowish.

Distribution : Eastern & Western Ghats ; Bihar ; Orissa ; Madhya Pradesh.

Family SCINCIDAE

8. *Maluya beddomii* (Jerdon)

Material : 1 ex., Snout to vent 45 mm. , Tail 95 mm., Dam site, Silent Valley, 21. vi. 1980, *Coll.* R. S. Pillai.

Description : Lower eyelid scaly. Dorsal scales with 3 or 4 feeble keels. The subdigital lamellae are strongly keeled. The back is characterised by four conspicuous dark stripes arranged longitudinally.

Colour pattern : Brown above and whitish below. The young invariably are characterised by 4 dark brown stripes extending on to the tail. The top of the head is marked by longitudinal markings.

Distribution Berar, Karnataka ; Salem, Tirunelveli, Tamil Nadu ; Anaimalais and Sivagiris, Western Ghats ; North Kerala.

9. *Sphenomorphus dussumieri* (Dum. & Bibr.)

Material : 1 ex., Snout to vent 42 mm., Tail 54 mm., Dam site, Silent Valley, 21. iv. 1980 , *Coll.* R. S. Pillai.

Description : Body not elongate ; 40 scales round the body. Limbs well developed. Rostral concave.

Colour pattern : Bronzy green above and white below. The back is characterised by two stripes—a dorso-lateral and a dark brown lateral. The tail (in life) of the male is scarlet red while that of the female is brownish.

Distribution : Hills of south-western India and plains of South Kerala. A single specimen from Sri Lanka.

SNAKES

Family UROPELTIDAE

10. *Melanophidium punctatum* Beddome

Pied-Belly Uropelt

Material : 1 ex., 487 mm., Silent Valley, 27. iii 1. 1978, *Coll.* Romulus Whitaker.

Description : A mental groove present. Body scales in 15 rows, ventrals 189, caudals, 14. Tail feebly compressed ; terminal scute with two ridges forming two to four points at the top.

Colour pattern : The ground colouration is iridescent black while the belly and the outer 2-3 scale rows are marked by black centres.

Distribution : From Goa to the hills of South Kerala.

Remarks : This example is the only uropeltid snake recorded from the Silent Valley so far.

Family COLUBRIDAE

11. *Ahaetulla nasuta* (Lacepede)

Common Green Whip Snake

Material : 1 ex., 1075 mm., Dam site, Silent Valley, 4. xii. 1980, *Coll.* R. S. Pillai.

Description : Snout extending in a pointed dermal appendage usually formed only of the rostral shield which extends far beyond the lower jaw. Pupil horizontal. Body scales in 15 oblique rows ; ventrals 187, caudals 173, Anals 2.

Colour pattern : Parrot-green above and pale greenish beneath. The back is criss-crossed by black and white lines more prominent in the anterior half.

Distribution : Throughout India barring the Ganges Valley west of Patna, Bihar, Sri Lanka, Burma, Thailand and Kampuchea.

12. *Amphiesma beddomei* (Günther)

Beddome's Keelback

Material : 1 ex., 593 mm., Dam site, Silent Valley, 5. xii. 1980, *Coll.* C. S. Rao.

Description : Nuchal groove absent. Body scales in 19 rows, ventrals 147, caudals 59, Anals 2. One anterior temporal.

Colour pattern Olive-brown above and whitish below. The back is dotted with a series of yellow spots arranged between two black spots along the flanks. An oblique streak, yellow in colour, runs from the eye to the gape.

Distribution : Throughout the Western Ghats.

13. *Dendrelaphis grandoculis* (Boulenger)

Large-eyed Bronzeback

Material : 1 ex., 695 mm., Valiparathodu, Silent Valley, 22.i.1980, Coll. K. R. Rao.

Description : Body scales in 15 rows, oblique and the vertebrae enlarged; ventrals 174, caudals 119, Anals 2 ; ventrals and caudals with a suture-like keel.

Colour pattern : Olive-brown above and darker below. The back is traversed by a series of small black spots and the tail is bordered by three black lines, one on each side and one below.

Distribution : Nilgiris and hills of Thirunelveli and South Kerala.

14. *Lycodon aulicus* (Linn.)

Common Wolf Snake

Material : 1 ex., 715 mm., Dam site, Silent Valley, 5. xii. 1980 Coll. K. R. Rao.

Description : Head elongate and depressed. Habitus slender. Body scales smooth and shiny in 17 rows ; ventrals 205 angulate laterally, caudals 59, Anals 2. Eyes protruding.

Colour pattern : The general ground colour is black or brownish. The under sides are whitish. The back is characterised by 10 to 12 white or yellow bands which commence at the nape.

Distribution : Throughout India.

15. *Lycodon travancoricus* (Beddome)

Travancore Wolf Snake

Material : 1 ex., 282 mm., Silent Valley, 24. i. 1979, *Coll.* R. S. Pillai.

Description : Body scales in 17 rows, ventrals 182, angulate laterally ; caudals 52, Anal single. Back with lightish bars.

Colour pattern : Dark or blackish above and white below. The cross-bars on the back are faint, and never pure white. Sometimes the cross-bars bifurcate on the sides and enclose triangular patches.

Distribution Western Ghats as far as Matheran, Maharashtra ; South Arcot, Tamil Nadu ; Visakhapatnam, Andhara ; Ganjam, Orissa and Jubbalpore, Madhya Pradesh.

16. *Macropisthodon plumbicolor* (Cantor)

Green Keelback

Material : 1 ex., juvenile 265 mm., Valiparathodu, Silent Valley, *Coll.* K. R. Rao.

Description : Head distinct from neck. Pupil of the eye round. Habitus rather stout. Scales strongly keeled in 25 rows, ventrals rounded 154, caudals 38.

Colour pattern : Grass-green (in life) and whitish beneath. The specimen under study is a juvenile with a conspicuous inverted V-shaped mark on the head. The back and tail are marked by light black spots or cross-bars.

Distribution : Throughout India (generally in the forested areas upto 1500 M.).

17. *Ptyas mucosus* (Linn.)

Rat Snake

Material : 1 ex., 1150 mm., Dam site, Silent Valley, 4. xii. 1980, *Coll.* R. S. Pillai.

Description : Size large with a streamlined contour. Scales shiny and in 17 rows, ventrals 195, caudals 179, anals 2. Neckn arrow and eyes large.

Colour pattern : Black or olive-green above and yellowish-white below. Strongly marked black cross bars are prominently seen on the posterior half of the back. The lower lip is generally dotted with black horizontal streaks.

Distribution : From South China and Vietnam through all of India and westward into Iran and Southern Afghanistan to Transcaspia.

18. *Xenochrophis piscator* (Schneider)

Checkered Keelbark

Material 1 ex., 685 mm., Valiparathodu, Silent Valley, 22. i. 1980, Coll. K. R. Rao.

Description : Body stout. Scales keeled and in 19 rows, ventrals 145, caudals 75, Anals 2. Eye large. Head pointed and separated from the neck.

Colour pattern : The ground colouration is black with the characteristic and conspicuous black with checkered pattern on the back. Head with one or two black streaks.

Distribution : The whole of India ; Upper Burma ; China.

Family ELAPIDAE

19. *Bungarus caeruleus* (Schnieder)

Material : 1 ex., 1088 mm., Kummanthodu, Silent Valley, 7. xii. 1910, Coll. R. S. Pillai.

Description : Scales on the body smooth and in 17 rows ; the vertebrae strongly enlarged ; ventrals, 197, caudals, 47 and undivided.

Colour pattern Jet black above and white beneath. The back is characterised by distinct white cross-bars arranged in pairs. There are no vertebral spots in the specimen under study.

Distribution : The whole of India ; Sri Lanka.

Family VIPERIDAE

Sub Family CROTALINAE

20 *Trimeresurus malabaricus* Jerdon

Malabar Rock Pit Viper

Material : 4 exs.—2 juveniles (285—315 mm.) and 2 subadults (415—485mm.) from several localities in the Silent Valley, 1980-81, Coll. R. S. Pillai.

Description : Top of head covered with minute scales. Head very distinct from neck. A deep pit between the nose and the eye. Tail prehensile. Scales in 24 rows, ventrals 149, caudals 59, paired.

Colour pattern : The juveniles are brownish while the subadults are greenish in colour. A distinct pattern of blackish spots confluent in a xig-zag fashion is invariably seen both in the young and subadults under study.

Distribution : Hills of South — Western India.

21 *Trimeresurus strigatus* Gray

Horse-shoe Pit Viper

Material : 1 ex., 250 mm., Silent Valley, 20. i .1979, Coll. R. S. Pillai.

Description : General characters as for *T. malabaricus*. Scales in 21 rows, ventrals, 150, caudals 52, Anal single. It is distinguished from its ally, *malabaricus* in having internasals undistinguishable from the adjacent scales on the head.

Colour pattern : Brown above and whitish below. The back is characterised by a series of large brown spots which merge into a zig-zag stripe dorsally. The ventrals are dotted heavily with brown. A distinct inverted V-shaped mark on the nape present.

Disiribution : Southwestern Ghats.

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MOLLUSCS OF THE SILENT VALLEY

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INTRODUCTION

Land molluscs of India are a fairly worked-out group. But the present collection is important as it comes from a hitherto unexplored area. The semievergreen forests with moist and shady places offer ideal ecosystem for several species of molluscs to flourish. The collection includes 17 examples identified into 5 species, and most of the species are represented by a single individual each. As the collection was made in the course of a general faunistic survey without paying any special attention to mollusca the true character of the malacofauna of the Silent Valley cannot be brought out in this report. However the collection is interesting as it throws some light on the distribution of certain species. More vigorous search for molluscs will definitely add some more species to the present list.

Key to families

- | | |
|--|----------------------|
| 1. Shell operculate, depressed, widely umbilicated | <i>Cyclophoridae</i> |
| Shell non-operculate | 2 |
| 2. Shell small, elongately turreted, columella | |
| arched | <i>Glessulidae</i> |
| Shell small, plate-like to depressedly conoid, | |
| thin to moderately thick | <i>Ariophantidae</i> |

SYSTEMATIC ACCOUNT

Order MESOGASTROPODA

Family CYCLOPHORIDAE

Genus *Theobaldius* Nevill, 1878

Theabaldius deplanatus (Pfeiffer)

Cyclostoma deplanatum Pfeiffer, 1854, *Proc. Zool. Soc.*, London, p, 301.

Theobaldius deplauatus, Pfeiffer : Gude, 1921, *Fauna Brit. India*, Mollusca, III : 35.

Shell widely umbilicated, depressed, brown with paler splashes here and there ; sculpture restricted to close-set growth markings, whorls 5

rapidly increasing, body whorl perfectly rounded, spire scarcely raised. Aperture circular, oblique, peristome double, the outer slightly reflected. Operculum thin, horny, multispiral but not very closely wound, edges of the whorls rather keeled.

Material : One ex., 10 kms. S W. of Valiyaparathodu, 29. 1. 80. (Coll. Dr. S.K. Bhattacharya).

Distribution : Tamil Nadu : Koondah hills, Anamullays, Sispara ghat, Alagarkoil hills ; Kerala : Travancore.

Remarks : The keeled edges of the operculum in this species and also in a few other allied species are very typical. This character, together with the very slight notch (reminiscent of the 'wing like process' of the genus *Pterocyclus*) in the outer margin of the peristome in a few species like *T nivicola*, and *T orites*, provides a transition to the genus *Pterocyclus*.

Order STYLOMMATOPHORA

Family GLESSULIDAE

Genus *Glessula* von Martens, 1850.

Glessula dikrangense Godwin-Austen

Glessula illustris G.A. : Godwin-Austen, 1876, *J. Asiat. Soc. Beng.*, 45(2) : 315.

Glessula dikrangense Godwin-Austen, 1920, *Land and Freshwater Molluscs of India*, 3(1) : 26, pl. 160, fig. 7.

Shell elongate, glossy, thick ochraceous with a slight greenish tinge, sculptured with very fine, close microscopic longitudinal striae, spire turreted, apex obtuse. whorls 8.5, slightly convex, sutures impressed. Aperture vertical, rather oval, columella arched.

Material : i) Two exs., Road to Valiyaparathodu, 10. 12. 80. (Coll. Dr. R. S. Pillai). ii) 3 exs., Uku, S. E. of Valiyaparathodu, 29.1.80 (Coll. Dr. S. K. Bhattacharya).

Distribution : Arunachal Pradesh, Maharashtra, Karnataka, and Kerala.

Remarks : While working out a collection of terrestrial molluscs from Daffa hills, Godwin-Austen (1876), had mistakenly placed a few shells of *Glessula* collected at Naga hills under *G. illustris*. But a

thorough reexamination of the material prompted him to erect a new species and include it under this at a later date. (1920).

Family ARIOPHANTIDAE

Genus *Mariaella* Gray, 1855.

Mariaella dussumieri Gray

Mariaella dussumieri Gray, 1855, *Cat. Pulm. B.M.* : 63.

Mariaella dussumieri Gray : Blanford & Godwin-Austen, 1908, *Fauna Brit. India*, Mollusca : 205, fig. 71.

Shell internal, flatly convex, sometimes solid but usually thin, membranaceous with a small calcified whitish apex forming an insipid spire.

Animal yellowish brown, generally with irregular dark blotches. Slug-like, mantle lobes united to form an oval shield which covers the shell completely except for a pin-hole orifice. On the mantle there are two raised lines or ridges, one running from the pin-hole orifice round the left margin of the shell, the other running towards the respiratory orifice, at the right side. Posterior portion of the body behind the shield sharply keeled, ending in a large caudal gland. Peripodial groove distinct. Foot tripartite with obtusely pointed posterior end.

Material : i) Three exs., Panthenthodu, 13. 12. 80. (Coll. Dr. R. S. Pillai) ii) 4 exs., Dam site, Kunti R., 17. 1. 80, iii) 2 exs., 5 km. from Mukkali, towards project site, 15. 1. 80. (Coll. Dr. S. K. Bhattacharya.)

Distribution : Restricted to the Western Ghats and peninsular India, Sri Lanka.

Remarks : Specimens collected from the Silent Valley are all young, measuring upto 22 mm. Full-grown specimens in extended condition normally reach upto 100—120 mm. The maximum size mentioned by Blanford & Godwin-Austen (1908), 20 cms. may be rare.

Genus *Euplecta* Semper, 1870

Euplecta indica (Pfeiffer)

Helix indica Pfeiffer, 1846, *Symbolae*, 3 : 66.

Euplecta Indica (Pfeiffer) : Satyamurti, 1960, *Bull. Madras Govt. Mus.*, 6 No.4 : 109, pl. 8, fig. 3a, 3b-

Shell depressedly turbinate, narrowly perforate, lenticular, strongly sculptured by close oblique ribs, decussated by raised spiral lines, as a result the whole surface appears granulated. The sculpture very faint below. Spire conoid, whorls 5-6, convex, gradually increasing, body whorl strongly keeled at the periphery. Shell rather white, a pale yellowish brown periostracum present, aperture oblique, rather crescent shaped. Peristome thick, columellar margin oblique,

Material i) One ex., 10 kms. S. W of Valiyaparathodu, 28. 1. 80. (Coll. Dr. S. K Bhattacharya).

Distribution : The genus *Euplecta* is restricted to Peninsular India and Sri Lanka.

Remarks : Shell shows remarkable variation in sculpture and general shape. It is very much allied to *E. emiliana* from Sri Lanka. However typical shells of *E. indica* are more convex.

Genus **Macrochlamys** (Benson, 1832) Gray, 1847

Macrochlamys vilipensa (Benson)

Helix vilipensa Benson, 1853, *Ann. & Mag. Nat. Hist.* (2) : 12 93.

Macrochlamys vilipensa (Benson) : Satyamurti, 1960, *Bull. Madras Govt. Mus.*, 6 No. 4 : 102, pl. 11, figs. 3a, 3b.

Shell translucent, glossy, deeply umbilicate, depressedly conoid, smooth, whorls 6, convex, sutures impressed; spire slightly raised, apex obtuse, peristome thin, aperture oblique, broadly crescent shaped, columellar margin a little arched, slightly reflected above.

Material : One ex., Dam site, alt. 875 m., 4.12.80. (Dr.R.S. Pillai).

Distribution : India : Kerala ; Calcad Hills, Silent Vally ; Sri Lanka.

SUMMARY

The small lot of terrestrial molluscs from the Silent Valley comprises of 5 genera and 3 families.

The molluscan fauna of South India in general, shows affinity towards that of Sri Lanka. The present study of the molluscs from Silent Valley also confirms this. Three, out of the five species studied

(viz. *Euplecta indica*, *Mariaella dussumieri* and *Macrochlamys vilipensa*) are known from the Southern India and Sri Lanka. Among these, *M. dussumieri* extends up to Maharashtra. Out of the remaining 2 species while *Theobaldius deplanatus* is restricted to Southern India only *Glessula dikrangense* extends as far north as Arunachal Pradesh.

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ORTHOPTERAN FAUNA OF SILENT VALLEY, KERALA

By

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(With 33 Text figures)

INTRODUCTION

Though Annandale (1906), Bolivar (1900, 1902 and 1918), Hebard (1929), Henry (1937 and 1940), Singh and Kevan (1965), Tandon and Shishodia (1969) and Uvarov (1929) have mostly dealt with the taxonomic papers exclusively on the South Indian grasshoppers and crickets but none have studied the orthopteran fauna of Kerala, specially of this Silent Valley. Present paper deals with 33 species of orthoptera, out of which 16 species are new record for the area whereas one species i.e. *Eucoptacra binghami* Bolivar is new to India. Several new species will also be described somewhere else. Keys for the different species are presented here. Diagrams of different parts of the body of species are also incorporated. This study is based on the material from the areas explored by different scientists including one of the authors (A. K. Hazra), of Zoological Survey of India. Thus the present study will add definitely an additional fauna of Orthoptera for the area which was not recorded upto now. We believe that there may be still a number of species of Orthoptera from the said area which have not yet been collected and described.

The following shrubs and herbs (grass) are the most predominant grassland flora in the valley :

Shrubs : *Strobilanthes* sp., *Leea aspera* ; *Sarcandra* sp. ; *Amomum* sp., *Ochlandra* sp. ; *Schummarianthus* sp. and *Elastostemma* sp.

Herbs (Grass) : *Themeda gigantea* and *Cymbopogon* sp.

Key to the species and subspecies of grasshoppers and crickets of silent valley.

Superficial Key To The Species And
Subspecies Of Grasshoppers And Crickets

1. Antennae longer than the body, many segmented ; tympanal organs present on the anterior tibiae ; male elytra transformed into a stridulatory organ called mirror ; ovipositor very large, usually extending far beyond the abdominal extremity. ... 2
- Antennae shorter than the body, with less than 30 segments ; tympanal organs, when present, at base of abdomen ; male elytra not transformed into a mirror ; ovipositor not enlarged. ... 6
2. Spines of posterior tibiae immovable, without hairs. ... 3
- Spines of posterior tibiae movable, pubescent. ... *Pteronemobius* sp.
3. Body very convex ; females with short elytra, which is contiguous on the median line. ... *Gryllopsis femorata* Chopard
- Body not so convex ; females with well developed elytra, never reduced to small, lateral pads. ... 4
4. Head flattened, specially in male ; in female head less flattened but the anterior ocellus is placed at the apex of the frontal rostrum ; mandibles of male strong and lengthened. ... *Velarifictorus aspersus* (Walker)
- Head rounded ; anterior ocellus is placed on the forehead ; mandibles of male weak and not lengthened. ... 5
5. Body stout and somewhat depressed ; head without yellow band between the lateral ocelli ; mirror of elytra as broad as long, divided behind the middle by a curved vein ; four or five oblique veins ; veins of lateral field regularly and feebly spaced. ... *Plebeiogryllus guttiventris* (Walker)
- Body not stout, convex ; head with a narrow yellow band connecting the lateral ocelli ; mirror of elytra longer than wide, divided by a curved vein ; two oblique veins present ; veins of lateral field of elytra distant and strongly curved. ... *Modicogryllus confirmatus* (Walker)

6. Pronotum more or less cover the whole or the greater part of the abdomen ; elytra short, scale like, and lateral in position ; tympanal organs absent ; anterior and middle tarsi two segmented and the posterior tarsi three segmented ; arolium absent ; phallic complex reduced. ... 7
- Pronotum not cover the whole abdomen ; elytra well developed or reduced ; tympanal organs present ; all the tarsi three segmented ; arolium present ; phallic complex well developed. ... 8
7. Frontal costa widely forked between the ocelli, the rami strongly divergent ; pronotum compressed and foliaceous ; lateral lobes of pronotum not produced into spines. ... *Deltonotus gibbiceps* (Bolivar)
- Frontal costa not widely forked between the ocelli, the rami moderately divergent ; pronotum neither compressed nor foliaceous ; lateral lobes of pronotum produced into spines. ... *Eucriotettix flavopictus* (Bolivar)
8. Head acutely conical ; foveolae of vertex superior and forming the extremity ; fastigial furrow present ; prosternal tubercle present ; lower basal lobe of posterior femora mostly longer than the upper, or both of the same length ; stridulatory mechanism absent ; cingulum capsule like ; valves of penis paired, undivided ; epiphallus bridge shaped, with dorso-lateral appendices ; ancorae and sclerites absent ; lophi hook-like. ... 9
- Head of variable shape ; foveolae of vertex lateral or inferior ; fastigial furrow absent (rarely present, but apparently as a secondary formation) ; prosternal tubercle present or absent ; lower basal lobe of posterior femora mostly shorter than or equal to upper one ; stridulatory mechanism of various structure found ; ectophallus differentiated ; cingulum differentiated ; valves of penis paired, flexured or divided ; epiphallus mostly bridge shaped, sometimes disc shaped, sometimes divided ; ancorae and lophi present (sometimes lost). ... 11

9. Body usually subfusiform or cylindrical ;
elytra and wings completely absent. ... *Orthacris* sp.
- Body fusiform, slender and compressed,
or heavy, stout and strongly depressed ;
elytra and wings present. ... 10
10. Anterior margin of prosternum strongly
reflexed and dilated ; body short and
stout ; pronotum rugose, and much wide-
ned behind ; elytra short or extend upto
the apex of abdomen ; wings often abbrev-
iated ; posterior femora a little stout. ... *Chrotogonus* (Ch.) *oxypterus*
(Blanchard)
- Anterior margin of prosternum neither
reflexed nor dilated ; body moderately
slender, and compressed ; pronotum not
so rugose, and not much widened behind ;
elytra pointed and extend beyond the
apex of abdomen ; wings not abbreviated ;
posterior femora not so stout. ... *Atractomorpha crenulata*
(Fabricius)
11. Prosternal process or tubercle mostly
absent. ... 12
- Prosternal process or tubercle present ... 19
12. Stridulatory serration on internal side of
posterior femora absent. ... 13
- Stridulatory serration on internal side of
posterior femora present. ... *Aulacobothrus* sp.
13. Fastigium of the vertex rounded towards
the front, which is nearly vertical. ... 14
- Fastigium of the vertex not rounded
towards the front, which is oblique. ... 15
14. Dorsum of pronotum or its carina cut by
two grooves. ... *Trilophidia annulata* (Thunberg)
- Dorsum of pronotum or its carina cut by
one groove. ... *Pternoscirta cinctifemur* (Walker)
15. Antennae ensiform or flattened at the
base. ... 16
- Antennae filiform ... *Aiolopus* sp.
16. Foveolae of vertex obsolete or not visible
from above ; size of body a little larger. ... 17
- Foveolae of vertex visible from above ;
size of body smaller. ... *Bababuddinia bizonata* Boliver
17. Antennae unicolorous ; vertex and prono-
tum without broad yellow band on the
dorsal surface. ... *Phlaeoba* sp.
- Antennae ringed or tipped with obscure
yellow ; vertex and pronotum with a
broad yellow band on the dorsal surface,
which run upto the end of elytra. ... *Phlaeoba antennata* Brunner

18. Lower external lobe of hind knee with spine-like apex, ... 19.
 — Lower external lobe of hind knee with rounded, angular or subacute apex, but never spine-like. 21
19. Prosternal process with apex broadened, flattened, transverse and trilobate, ... *Chitaura indica* Uvarov
 — Prosternal process simple, conical with subacute or rounded apex. ... 20
20. Cercus of male conical, narrowing towards apex ; supra-anal plate with a small tubercle on either side of dorsal surface ; female sub-genital plate with two longitudinal ridge on ventral surface, which extend forwards from the posterior margin, these ridges often toothed. ... *Oxya hyla hyla* Serville
 — Cercus of male conical with obliquely truncate apex ; supra-anal plate of male without tubercles on either side ; female sub-genital plate on ventral surface with a subapical tooth on each side of a median spine. *Oxya nitidula* (Walker)
21. Last abdominal tergite in male with well developed furcula ; supra-anal plate mostly with attenuate or trilobate apex ; sub-genital plate with transverse fold. ... 22
 — Last abdominal tergite in male without well developed furcula ; supra-anal plate variable ; sub-genital plate without transverse fold. 24
22. Frontal costa distinctly widened between antennae and wider than the vertex between the eyes. *Eucoptacra binghami* Uvarov
 — Frontal costa not or scarcely wider between antennae. 23
23. Antennae distinctly ensiform ; head and pronotum without rugosity or granulations. *Coptacra ensifera* Bolivar
 — Antennae not ensiform ; head and pronotum with rugosely punctate and with raised granules. *Coptacra punctaria* (Walker)
24. Mesosternal inter-space closed. 25
 — Mesosternal inter-space open. 27
25. Antennae ensiform ; fastigium of vertex very long and slender. *Calamippa prasina* (Bolivar)
 — Antennae filiform ; fastigium of vertex short. 26

26. Prosternal tubercle compressed laterally, slightly bent backwards, not reaching the anterior margin of mesosternum obtuse at apex. *Oxyrrhepes obtusa* (De Haan)
- Prosternal tubercle very broad at lower surface, bent backwards, behind the middle, touching the anterior margin of mesosternum, broadly flattened behind the middle, apex more or less truncate. *Tristria pulvinata* (Uvarov)
27. Mesosternal lobes rounded or obtusangular. 28
- Mesosternal lobes rectangular. 32
28. Dorsum of pronotum flat or weakly tectiform, with median and lateral carinae; lateral carinae linear; male cercus with strongly compressed lobiform or subacute apex. 29
- Dorsum of pronotum of variable shape; lateral carinae, if present, not linear; male cercus variable, but not strongly compressed lobiform or subacute apex. 30
29. Prosternal tubercle bilobed at apex; posterior femora thickened at apex and very slender towards the apex. *Tylotropidius varicornis* (Walker)
- Prosternal tubercle straight, obtuse at apex; posterior femora thickened at base, not very slender towards the apex. *Eyprepocnemis alacris alacris* (Serville)
30. Pronotum not constricted in the middle; the stripe on the head and lateral lobe of pronotum is sometimes absent. 31
- Pronotum at least slightly constricted in the middle. *Xenocatantops humilis humilis* (Serville)
31. Elytra lateral and not reaching margin of second tergite; wings not traceable; male cerci not bifurcate. *Palniacris maculata* Henry
- Elytra and wings well developed, reaching upto the apex of abdomen; male cerci bifurcate. *Catantops henryi* Bolivar
32. Pronotum strongly tectiform, integument strongly rugose; median carina of pronotum sharp; wings rose coloured at base. *Chondracris rosea* (De Geer)

- Pronotum moderately tectiform, integument fairly rugose or dotted, almost smooth ; median carina of pronotum not sharp ; wings lemon-yellowish. ...

Cyrtacanthacris tatarica
(Linnaeus)

SYSTEMATIC ACCOUNT

Suborder	: ENSIFERA
Superfamily	: GRYLLOIDEA
Family	: GRYLLIDAE
Subfamily	: GRYLLINAE

1. *Gryllopsis femorata* Chopard

1935. *Gryllopsis femorata* Chopard, *Ann. Mag. nat. Hist.*, (10) 16 : 288.
1969. *Gryllopsis femorata*, Chopard, *Fauna of India, Grylloid.*, : 81.

Diagnostic characters : Size medium ; head big, globular, with feebly marked yellowish lines on the occiput ; antennae longer than the body, and filiform ; anterior tibiae perforated on their external face only ; posterior femora stout and short ; posterior tibiae short, with five to six spines on both sides ; elytra extend beyond the metanotum and meet on the median line ; oviposition short, and slender ; apical valves lanceolate.

Specimens examined : 2 ♀ ♀ , Road to Mukkali, 8. xii. 1980, Dr. R. S. Pillai.

Distribution : India (Tamil Nadu, Karnataka and Meghalaya).

Remarks : Chopard (1969) recorded *Gryllopsis femorata* from Tamil Nadu and Karnataka. Later on Biswas et al (1975) have recorded this species from Meghalaya. It is recorded here for the first time from Kerala.

2. *Velarifictorus aspersus* (Walker)

(Fig. 1)

1869. *Gryllus aspersus* Walker, *Cat. Derm. Salt. Br. Mus.*, 1 : 39.
1936. *Scapsipedus aspersus*, Chopard, *Ceylon J. Sci.*, (B) 20 : 29.
1964. *Velarifictorus aspersus*, Randell, *Can. Ent.*, 96 : 1587.

Diagnosis characters : Size medium ; head flattened, with six yellow lines on the occiput and a yellow band between the ocelli ; face concave ; mandibles strong and lengthened ; antennae longer than the

body ; mirror lozenge-shaped, divided by a straight vein behind the middle ; two oblique veins present ; wings short ; genitalia agree with the original description of Chopard (1969).

Specimens examined : 1 ♂, Dam Site, 871 m, 4. xii. 1980, Dr. R. S. Pillai ; 1 ♂, way to Valiyaparathodu, 15. xii. 1980, Dr. R. S. Pillai.

Distribution : India (Maharashtra, Andhra Pradesh, Karnataka and Meghalaya) ; Tropical Asia ; China ; Taiwan ; Philippines.

Remarks : This species is recorded here for the first time from Kerala, and can be separated easily from the other species recorded here by its strong and lengthened mandibles.

3. *Plebeiogryllus guttiventris* (Walker)

(Fig. 2)

1971. *Gryllus guttiventris* Walker, *Cat. Derm. Salt. Br. Mus*, 5, suppl., 6.

1964. *Plebeiogryllus guttiventris*, Randell, *Can. Ent.*, 96 : 1598.

Diagnostic characters : Size medium ; head adorned with six short, light lines on the occiput ; frontal face normal ; antennae filiform, and longer than the body ; pronotum strongly transverse ; posterior femora short and thick ; posterior tibiae with six spines on each margin ; genitalia similar as illustrated by Chopard (1969).

Specimen examined : 1 ♀ (nymph), Road to Cardamom Estate, 11. xii. 1980, Dr. R. S. Pillai.

Distribution India (Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Bihar, West Bengal and Orissa) ; Sri Lanka ; Burma ; Sudan.

This species has also been studied somewhere else from Andhra Pradesh.

Remarks : *Plebeiogryllus guttiventris* (Walker) is widely distributed species and generally attracted on the light. It can be easily identified by its stout, and somewhat depressed body and short, thick posterior femora.

4. *Modicogryllus confirmatus* (Walker)

(Figs. 3, 4 & 5)

1859. *Acheta confirmata* Walker, *Ann. Mag. nat. Hist.*, (3) 4 : 221.

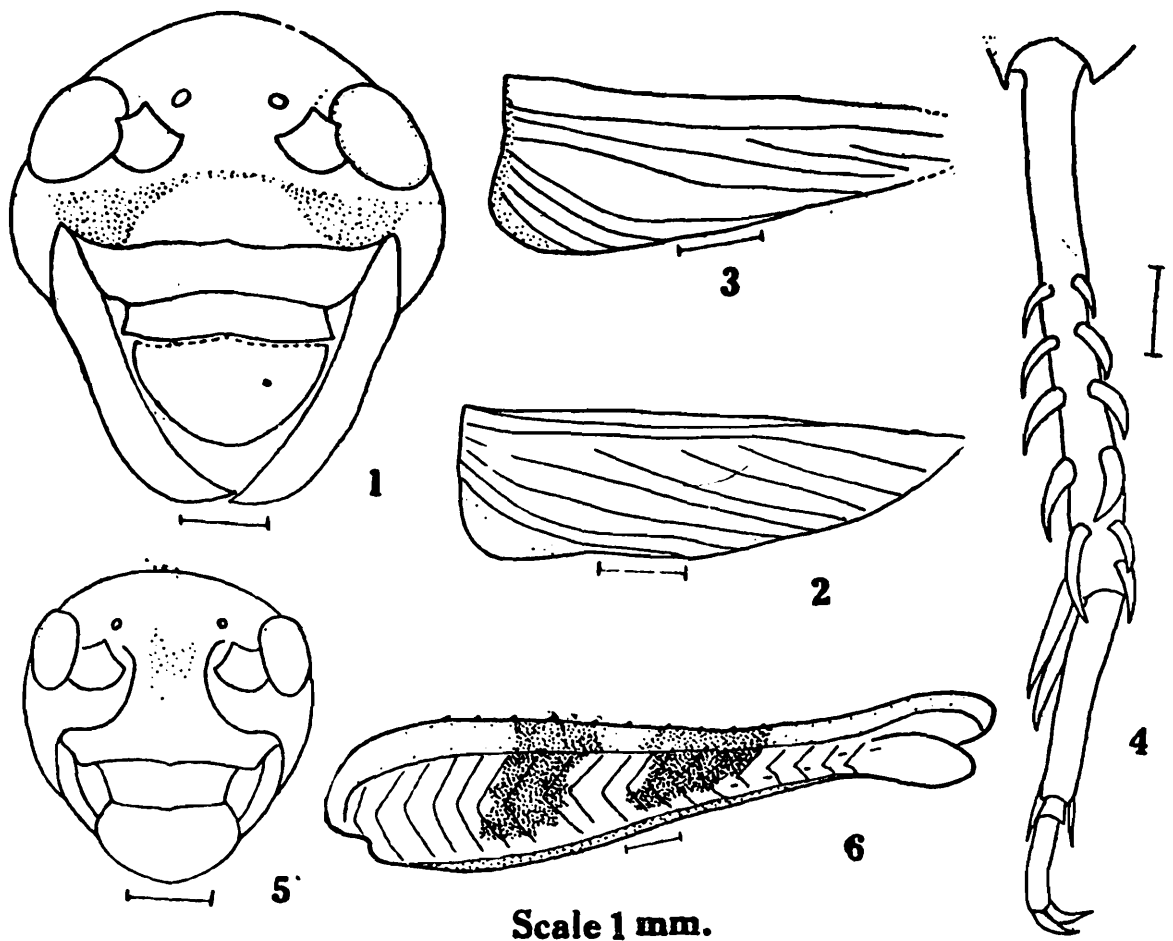
1869. *Gryllus confirmatus*, Walker, *Cat. Derm. Salt. Brit. Mus.*, 1 : 37.

1964. *Modicogryllus confirmatus*, Randell, *Can. Ent*, 96 : 1584.

Diagnostic characters : Size medium ; head adorned with six light markings on the occiput and a narrow yellow line connecting the lateral ocelli ; posterior tibiae with five to six spines on each margin ; elytra of male extend upto the apex of abdomen ; mirror longer than wide, divided by a curved vein ; two oblique veins present ; veins of lateral field of elytra distant and strongly curved ; elytra of female with three veins, and four branches of cubital ; ovipositor long, and lanceolate.

Specimens examined : 1 ♂, way to Valiaparathodu, 5. xii. 1980, Dr. R. S. Pillai ; 1 ♀, 2 kms. towards Mukkali, 6. xii. 1980, Dr. R. S. Pillai ; 1 ♀, Dam site, 9. xii. 1980, Dr. R. S. Pillai.

Distribution : India (Uttar Pradesh, Madhya Pradesh, Bihar, West Bengal, Orissa, Assam, Meghalaya, Karnataka, Tamil Nadu,



- Fig. 1. Front view of head of *Velarifictorus aspersus* (Walker).
 Fig. 2. Lateral field of elytra of *Plebeigryllus guttiventris* (Walker).
 Fig. 3. Lateral field of elytra of *Modicogryllus confirmatus* (Walker).
 Fig. 4. Posterior tibiae and tarsal segments of *Modicogryllus confirmatus* (Walker).
 Fig. 5. Front view of head of *Modicogryllus confirmatus* (Walker).
 Fig. 6. External side or disc of posterior femur of *Catantops henryi* Bolivar.

Maharashtra and Andaman Islands) ; Sri Lanka ; Bangladesh ; Nepal ; Burma ; Malaya ; Indo-China ; Philippines.

Remarks : *Modicogryllus confirmatus* is recorded here for the first time from Kerala, and can be easily separated out from other species described here by the disposition of the veins of the lateral field of the elytra, which are widely separated.

Subfamily : NEMOBIINAE

5. *Pteronemobius* sp.

Diagnostic characters : Size small ; body pubescent ; head globular ; maxillary palpi brown with the two last joints white ; antennae longer than the body ; posterior tibiae with very long movable spines ; mirror divided into two almost equal parts by an oblique vein ; apical field of elytra reduce ; wings absent.

Specimen examined : 1 ♂, 7 kms. from Mukkali, 15. i. 1980, Dr. S. K. Bhattacharya.

Remarks : The present specimen under discussion is a peculiar one, as it resembles with *Pteronemobius panteli* Chopard [or *P. pantelianus* Chopard ; see below] in some characters but not agreeing fully with its all characters. This specimen is also not resembling with other Indian species of *Pteronemobius* J. & K. Hence, we are recording it here upto genus only, due to the lack of sufficient material for the determination of the species.

Both the names, *P. panteli* Chopard, 1969 and *P. pantelianus* Chopard, 1967, mentioned above are invalid under nomenclature rules. While the first is preoccupied by *P. panteli* (Hebard, 1913), the second is an unavailable name. This has been discussed in detail in a separate study under publication (Shishodia and Varshney, in press).

Suborder : CAELIFERA

Superfamily : TETRIGOIDEA

Family : TETRIGIDAE

Subfamily : CLADONOTINAE

6. *Deltonotus gibbiceps* (Bolivar) (Fig. 8)

1902. *poecilotettix gibbiceps* Bolivar, *Annls Soc. ent. Fr.*, 70 : 580.

1906. *Deltonotus gibbiceps*, Hancock, *Genera Insect.*, fasc. 48 : 14.

1914. *Deltonotus gibbiceps*, Kirby, *Fauna British India, Orthoptera, Acrididae* : 16.

Diagnostic characters : Size small ; head short ; vertex obtusely produced in front of the eyes ; frontal costa widely forked between the lateral ocelli ; antennae longer than the anterior femora ; pronotum covers more or less whole body, compressed, foliaceous and acutely tectiform, in front obtusely angulated, behind truncated ; posterior femora thick and the upper carina minutely granulated, acutely sinuated before the apex ; first joint of posterior tarsi with three pulvilli of equal length.

Specimen examined : 1 ♀, 4 kms. South East of Valiaparathodu, 29. i. 1980, Dr. S. K. Bhattacharya, Registration No. 7836/H5.

Distribution : India (Tamil Nadu).

Remarks : *Deltonotus gibbiceps* (Bolivar) is recorded here for the first time from Kerala, and can be easily identified by the widely forked frontal costa, compressed and foliaceous pronotum which is acutely tectiform and projecting above the head and the absence of elytra and wings.

Subfamily : SCELIMENINAE

7. *Eucriotettix flavopictus* (Bolivar) (Figs. 7 & 9)

1902. *Criotettix flavopictus* Bolivar, *Annls Soc. ent. Fr.* 70 : 582.

1914. *Acanthalobus flavopictus*, Kirby, *Fauna of British India, Orthoptera, Acrididae* : 41.

1938. *Eucriotettix flavopictus*, Günther, *Stettin. ent. Ztg.*, 99 : 133, 170, 180, 187.

Diagnostic characters : Size small ; frontal costa not widely forked, the rami divergent moderately ; head slightly raised above the pronotum ; vertex narrower than an eye or sometimes in female as broad as an eye ; antennae filiform and longer than the anterior femora ; eyes slightly elevated above the vertex, globular ; pronotum transverse anteriorly, subulate posteriorly and extend beyond the apex of posterior femora ; dorsum of pronotum and its median carina normal ; posterior angles of lateral lobes of pronotum produced into sharp spines, which are directed outwards ; elytra very small, rounded at apex ; wings caudate ; first segment of posterior tarsi longer than the third.

Specimens examined : 1 ♀, 4 kms. towards Kumatanthodu, 960 m. 18. i. 1980. K. R. Rao ; 3 ♂♂, Valiaparathodu, 940 m. 23. i. 1980,

K. R. Rao ; 3 ♂♂, 1 ♀, Around proposed Dam site, April-May, 1980, Dr. A. K. Hazra ; 1 ♀, way to Valiaparathodu, 5. xii. 1980, Dr. R. S. Pillai.

Distribution : India (Tamil Nadu, Karnataka, Kerala and Assam) ; Burma (Dawna Hills).

Remarks : This species is generally found in South India and can be easily recognised by the moderately forked frontal costa, narrower vertex, well raised eyes above the pronotum and outwardly directed spines of lateral lobes of pronotum.

Superfamily : ACRIDOIDEA

Family : PYRGOMORPHIDAE

Subfamily PYRGOMORPHINAE

8. *Orthacris* sp.

Diagnostic characters Size medium ; Body slender, head conical, not longer than wide ; foveolae of the vertex contiguous, superior and forming the extremity of the fastigium ; front not sloping ; antennae filiform, shorter than the body ; cheeks and lateral pronotal lobes with numerous tubercles ; pronotum not carinated ; supra-anal plate lanceolate ; cerci short and straight ; valves of ovipositor sinuated.

Specimen examined 1 ♀, Around Proposed dam, 15. i. 1980, Dr. S. K. Bhattacharya,

Distribution India (South India) ; Sri Lanka.

Remarks In absence of males we could not reach upto the specific level of identification.

9. *Atractomorpha crenulata* (Fabricius)

1793. *Truxalis crenulatus* Fabricius, *Entomologia systematica*, 2 : 28.

1861. *Atractomorpha crenulata*, Saussure, *Annls Soc. ent. Fr.*, (4) 1 : 475.

1914. *Atractomorpha crenulata*, Kirby, *Fauna British India, Orthoptera, Acrididae* : 181.

1969. *Atractomorpha crenulata*, Kevan, *Zool. J. Linn. Soc.*, 48 : 187.

Diagnostic characters : Size medium ; body long, slender, and compressed ; head conical, not longer than the pronotum ; fastigium about as long as the eye ; front very oblique ; antennae subfiliform, shorter than the body, and placed in front of the ocelli ; eye oblong ; lateral pronotal lobe with a membranous area near the posterior margin ; elytra extend one-third of their length beyond the apex of

posterior femora, narrow, pointed at apex ; wings shorter than elytra and rosy at base.

Specimen examined : 1 ♂, Road to Cardomom Estate, 11 xii. 1980, Dr. R. S. Pillai.

Distribution : India (West Bengal, Andhra Pradesh, Tamil Nadu, Andaman Islands, Madhya Pradesh, Rajasthan, Bihar, Jammu and Kashmir, Goa, Maldive and Laccadive Islands) ; Pakistan ; Bangladesh ; Sri Lanka ; Lower Burma ; South Vietnam ; Thailand ; Malaya ; N. W. Andalas.

Remarks : Though *Atractomorpha crenulata* is recorded here for the first time from Kerala but otherwise widely distributed in India. A large number of specimens were studied somewhere else from Orissa, Uttar Pradesh, Punjab, Haryana, Arunachal Pradesh, Assam, Manipur, Tripura, Gajarat, Maharashtra etc. including above Indian States and found that the colour of the wings at base depend upon the maturation of the specimens.

10. *Chrotogonus* (*Chrotogonus*) *oxypterus* (Blanchard)

1836. *Ommexechea oxypterus* Blanchard, *Annl. Soc. ent. Fr.*, 5 : 622.

1914. *Chrotogonus oxypterus*, Kirby, *Fauna British India, Orthoptera, Acrididae*, : 166.

1959. *Chrotogonus* (*Chrotogonus*) *oxypterus*, Kevan, *Publcoes cult. Co. Diam. Angola*, 43 : 48.

Diagnostic characters : Size small but broader ; head small, narrowed towards the front ; foveolae of the vertex contiguous, superior, and forming the extremity of the fastigium ; antennae filiform, shorter than the body ; pronotum rugose and much widened behind ; anterior margin of prosternum strongly reflexed and dilated ; elytra shorter or extend upto the the apex of abdomen, surface nodulose ; wings often shorter than elytra and darker in colour.

Specimen examined : 1 ♀, Road to Cardomom Estate, 11. xii. 1980, Dr. R. S. Pillai.

Distribution : India (South India) ; Sri Lanka.

Remarks : *Chrotogonus* (*Chrotogonus*) *oxypterus* is reported to occur in South India but we have also studied somewhere else from other adjacent states like Maharashtra, Madhya Pradesh, Orissa, West Bengal and Bihar.

Subfamily : GOMPHOCERINAE

11. *Dnopherula (Aulacobothrus)* sp.

Diagnostic characters : Size medium ; head short ; vertex with long lateral margins which extend far over onto the occiput in the form of carinas ; occiput with distinct median carina which also extends onto the posterior part of the vertex ; antennae filiform, not longer than head and pronotum together ; pronotum flat, and bears lateral carinae ; elytra and wing well developed ; posterior femora with rounded dorsal genicular lobes.

Specimens examined : 1 ♀, 1 km from Mukkali towards dam site, 15. i. 1980, Dr. S. K. Bhattacharya ; 2 ♀ ♀, Base Camp, 1040 m, 23. i. 1980, K. R. Rao ; 1 ♂, 2 ♀ ♀, 1 km towards Dam site from Base Camp, 980m., 31. i. 1980, K. R. Rao.

Distribution : India (Madhya Pradesh, Maharashtra, Tamil Nadu, Karnataka, Sikkim, West Bengal, Assam, Bihar and Himachal Pradesh) ; South America.

This species is also studied somewhere else from Haryana, Delhi, Jammu and kashmir, Uttar Pradesh and Orissa.

Remarks : At present this species is identified upto the genus level.

Family : ACRIDIDAE

Subfamily : OEDIPODINAE

12. *Trilophidia annulata* (Thunberg)

(Fig. 10)

1815. *Gryllus annulatus* Thunberg, *Mem. Acad. Sci. St-Petersb.*, 5 : 234.
 1910. *Trilophidia annulata*, Kirby, *Syn. Cat. Orth.*, 3 : 244.
 1914. *Trilophidia annulata*, Kirby, *Fauna British India, Orthoptera, Acrididae* : 149.
 1965. *Trilophidia annulata*, Hollis, *Trans. R. ent. Soc. Lond.*, 117 (8) : 251.

Diagnostic characters : Size medium ; vertex behind eyes with a pair of tubercles ; fastigium of vertex elongate-trapezoid, lateral carinae high, sinuous ; fastigial foveolae irregularly oval, wide, and deep ; antennae filiform in basal two-third and slightly thickened in apical part, longer than head and pronotum together ; pronotum tectiform, constricted in prozona. strongly tuberculate ; median carina in prozona forming two high, tooth-like projections, in metazona sharp ; dorsum of pronotum cut by two sulci ; lateral carinae of pronotum irregular in

front of first sulcus forming tooth-like tubercles ; elytra and wings considerably exceeding the tip of abdomen.

Specimens examined : 1 ♀ , Road to Cardomom Estate, 11. xii. 1980, Dr. R. S. Pillai ; 1 ♀ , Around Proposed Dam site, April-May, 1980, Dr. A. K- Hazra.

Distribution : Distributed in Oriental and eastern Palaearctic regions. In India it is widely distributed.

Remarks : This species can be easily identified by the peculiar well marked crest of pronotum, which is strongly bilobed in profile.

13. *Pternoscirta cinctifemur* (Walker)

1859. *Acridium cinctifemur* Walker, *Ann. Mag. nat. Hist.*, (3) 4 : 223.

1914. *Pternoscirta cinctifemur*, Kirby, *Fauna British India, Orthoptera, Acrididae* : 134.

Diagnostic characters : Size medium ; vertex short, wide, flat, with carina like margins ; foveolae irregularly or roundly triangular, not reaching the anterior margin of fastigium ; antennae slightly longer than the head and pronotum together ; ventral part of body and legs, specially the lower margins of the femora, with long dense hairs ; pronotum with small sparse tubercles, distinctly constricted medially ; median carina of pronotum sharp, moderately raised, intersected before the middle by a transverse groove ; elytra narrow, slightly expanded on the costa near the base, extend beyond the apex of posterior femora ; wings rose coloured at base, clouded hyaline towards apex ; posterior tibiae black, banded with yellow at base and blue beyond.

Specimens examined : 1 ♀ , Near Base Camp, 17. i. 1980, Dr. S. K. Bhattacharya ; 1 ♀ , 2 ♀ ♀ , Around Proposed Dam site, April-May, 1980, Dr. A. K. Hazra.

Distribution : India (Tamil Nadu. Goa and West Bengal) ; Sri Lanka.

This species has also been studied somewhere else from Nagaland, Orissa, Assam and Uttar Pradesh.

Remarks : *Pternoscirta cinctifemur* (Walker) is recorded here for the first time from Kerala, and can be easily recognised from the other species of the genus by the red colouration of the basal part of the wings.

14. *Aiolopus* sp.

Diagnostic characters Size medium ; fastigium of vertex elongato-angular, slightly concave, with well developed lateral carinulae ; antennae filiform, as long as, or longer than the head and pronotum together ; pronotum slightly tectiform, and slightly constricted on prozona ; lateral carinae of pronotum absent ; dorsum of pronotum cut by posterior sulcus only, posterior margin of pronotum obtuse-angular ; elytra and wings fully developed and extend beyond the apex of posterior femora.

Specimen examined : 1 ♀, Road to Cardomom Estate, 14. xii. 1980, Dr. R. S. Pillai.

Distribution : Widely distributed throughout the Old World south of latitude 50°N and north of latitude 40°S., extending westwards to the Cape Verde Islands eastwards to the Samoan Islands. It is widely distributed throughout in India.

Remarks : This species has much resemblance with *Aiolopus thalassinus tamulus* (Fabricius) but the punctations on the frontal ridge and the colouration of the posterior tibiae differ from the latter species.

15. *Bababuddinina bizonata* Bolivar

1918. *Bababuddinina bizonata* Bolivar, *Revta R. Acad. Cienc. exact fis. nat. Madr.*, 16 : 382.

Diagnostic characters : Size medium ; head subconical ; fastigium of vertex longer than its width, almost trapezoidal, convex, with transverse basal furrow and sharp marginal carinulae merging with carinulae of vertex ; fastigial foveolae hardly visible from above ; antennae flattened towards basal segments (from third to seventh segment) ; disc of pronotum flattened, crossed by one sulcus behind the middle of pronotum ; metazona shorter than prozona, roundly angular posteriorly ; lateral carinae convergent in middle, divergent behind the middle ; elytra and wings fully developed and slightly surpass the apex of posterior femora ; supra-anal plate roughly triangular, acute at apex ; cerci longer than the super-anal plate, obtuse at apex ; sub-genital plate acute at apex.

Specimen examined : 1 ♂, Base camp, 1040m, 23. i. 1980, K. R. Rao.

Distribution : India (Karnataka and Tamil Nadu).

Remarks *Bababuddinia bizonata* is recorded here for the first time from Kerala. It is very similar to *Dnopherula (Aulacobothrus)* Boliver in appearance but can be differentiated from the latter by the flattened basal segments of the antennae, longer prozona of pronotum and the curvature of the lateral carinae of pronotum in the middle.

16. *Phlaeoba* sp.

Diagnostic characters : Size medium ; head as long as, or shorter than the pronotum and equally broad ; face somewhat oblique ; fastigium produced in front of the eyes as much as behind, obtusely rounded at the extremity ; antennae ensiform, as long as head and pronotum together ; pronotum granulose, all the carinae well developed, parallel ; elytra and wings under development stages.

Specimen examined : 5 nymphs, Around Proposed Dam site, April-May, 1980, Dr. A. K. Hazra.

Distribution : Distributed in the Oriental Region. It is found throughout India.

Remarks : Due to the nymphal stages the specimens could not be identified upto the specific level.

17. *Phlaeoba antennata* Brunner

1893. *Phlaeoba antennata* Brunner, *Annali Mus. civ. Stor. nat. Giacomo Doria*, (2) 13 : 125.

1914. *Phlaeoba antennata*, Kirby, *Fauna British India, Orthoptera, Acrididae* : 102.

Diagnostic characters : Size medium ; head as long as, or shorter than the pronotum and equally broad ; vertex short, slightly projecting forward ; foveolae absent ; face oblique ; antennae ensiform, slightly longer than head and pronotum together ; pronotum smooth ; lateral carinae run parallel ; elytra narrow, with obtusely rounded apex, not reaching upto the apex of abdomen ; wings bluish hyaline and slightly shorter than the elytra.

Colour olive-brown or olive-green, with a broad light yellow band running from the vertex to the end of the elytra ; antennae black with light yellow apex ; posterior femora brown ; posterior tibiae olive-green.

Specimen examined: 1 ♂, Way to Valiyaparathodu, 15. xii. 1980, Dr. R. S. Pillai.

Distribution India (Assam and Rajasthan); Burma; Malaya Peninsula; Sumatra; Borneoan; China (Hongkong); Hainan; Tonkin; Perak; Annam.

This species has also been studied somewhere else from Uttar Pradesh, West Bengal, Arunachal Pradesh, Manipur and Tripura.

Remarks: *Phlaeoba antennata* is recorded here for the first time from Kerala. It is found generally in the forest area.

Subfamily OXYINAE

18. *Chitaura indica* Uvarov (Fig. 13)

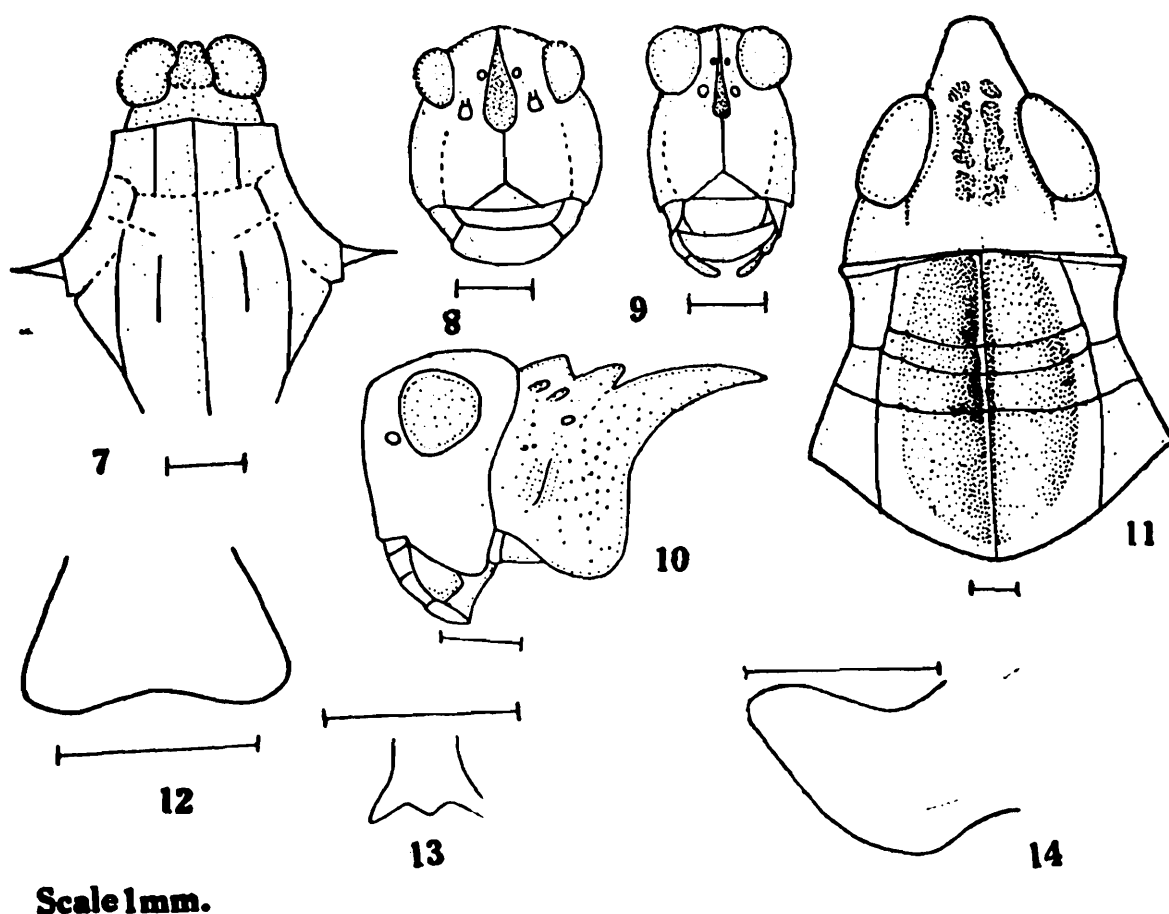
1929. *Chitaura indica* Uvarov, *Revue suisse Zool*, 36 : 553.

Diagnostic characters: Size medium; fastigium of vertex, from above, roundly triangular, as long as, or almost as long as wide; antennae filiform, about as long as head and pronotum together; pronotum smooth; prosternal tubercle with apex antero-posteriorly flattened, trilobate apically; elytra and wings reduced to micropterus form, scale like; tenth abdominal tergite of male with furcula on hind margin.

Specimens examined: 1 ♂, Silent Valley, 4 kms, towards Kumatanthodu, 960m, 18. i. 1980, K. R. Rao; 1 ♂, Silent Valley Base Camp, 1040 m, 21. i. 1980, K. R. Rao; 1 ♂, 1 ♀, Along Valiyaparathodu and Kunti river, 940 m, 22. i. 1980, K. R. Rao; 3 ♂ ♂, 1 ♀, Valiyaparathodu, 23. i. 1980 and 26. i. 1980, Dr. S. K. Bhattacharya and party; 2 ♂ ♂, 1 ♀, Around Proposed Dam site, April-May, 1980, Dr. A. K. Hazra; 2 ♂ ♂, way to Viliyaparathodu, 5. xii. 1980, Dr. R. S. Pillai; 4 ♀ ♀, 2 kms. towards Mukkali, 6. xii. 1980, Dr. R. S. Pillai; 4 ♀ ♀, Road to Mukkali, 8. xii. 1980, Dr. R. S. Pillai; 2 ♂ ♂, 1 ♀, Dam site, 9. xii. 1980, Dr. R. S. Pillai; 2 ♂ ♂, 1 ♀, Road to Valiyaparathodu, 10. xii. 1980, Dr. R. S. Pillai; 1 ♂, 1 ♀, Road to Cardomom Estate, 14. xii. 1980, Dr. R. S. Pillai.

Distribution: India (Karnataka and Kerala).

This species has also been studied somewhere else from Tamil Nadu.



- Fig. 7. Top view of head and thorax of *Eucriotettix flavopictus* (Bolivar).
 Fig. 8. Front view of head of *Deltonotus gibbiceps* (Bolivar).
 Fig. 9. Front view of head of *Eucriotettix flavopictus* (Bolivar).
 Fig. 10. Lateral view of head and pronotum of *Trilophidia annulata* (Thunberg).
 Fig. 11. Top view of head and pronotum of *Tylotropidius varicornis* (Walker).
 Fig. 12. Prosternal tubercle of *Tylotropidius varicornis* (Walker).
 Fig. 13. Prosternal tubercle or process of *Chitaura inäica* Uvarov.
 Fig. 14. Prosternal tubercle of *Oxyrrhepes obtusa* (De Haan).

Remarks : It is very similar to the genus *Oxya* in appearance but can be differentiated from the latter by the flattened and trilobate prosternal tubercle and reduced elytra and wings.

19. *Oxya hyla hyla* Serville (Figs 15, 16, 19, 20 & 26)

1831. *Oxya hyla* Audinet-Serville, *Annls Sci. nat. (Zool.)*, 22 : 287.

1971. *Oxya hyla hyla*, Hollis, *Bull. Br. Mus. nat. Hist. (Ent.)* 26 no. 7 : 282.

Diagnostic characters : Size medium, fastigium of vertex, from above, short, with widely rounded or obtuse apex, antennae filiform, as long as, or slightly smaller than head and pronotum together ; prosternal tubercle conical with subacute or rounded apex ; elytra and wings well developed ; supra-anal plate with small tubercle on either side ; cercus conical or compressed laterally ; lower genicular lobe of posterior femora spined ; tenth abdomen tergite, in male, without furcula ; epiphallus with curved hook-like outer lophi and tooth like inner lophi ; valves of ovipositor with hook-like marginal spines ; ventral surface of sub-genital plate, in female, with a pair of median spines on posterior margin, and with a median longitudinal concavity, which is bordered on each side by a longitudinal ridge bearing short spines.

Specimens examined : 1 ♀, Dam site, Kunthipuzha river, 960 m, 19. i. 1980, K. R. Rao ; 2 ♂♂, 1 ♀, Valiyaparathodu and tributary of Kunti river, 960 m, 21. i. 1980, K. R. Rao ; 1 ♂, 2 ♀♀, Valiyaparathodu, 23. i. 1980, Dr. S. K. Bhattacharya ; 1 ♀, 6 kms West of Valiyaparathodu, 27. i. 1980, Dr. S. K. Bhattacharya.

Distribution : India (Uttar Pradesh, Madhya Pradesh, West Bengal, Bihar, Rajasthan, Orissa, Tripura, Arunachal Pradesh, Meghalaya, Assam, Tamil Nadu, Karnataka, Andhra Pradesh, Goa) ; Africa ; Madagascar ; Persia ; Afghanistan ; Pakistan ; Nepal ; Sri Lanka and Bangladesh.

This species has also been studied somewhere else from Himachal Pradesh, Haryana and Punjab.

Remarks *Oxya hyla hyla* Serville more or less occur throughout in India, but never has been recorded from Kerala.

20. *Oxya nitidula* (Walker) (Figs. 21 & 25)

1870. *Acridium nitidulum* Walker, *Cat. Derm. Salt. Br. Mus.*, 4 : 631.

1871. *Oxya nitidula*, Walker, *Cat. Derm. Salt. Br., Mus., Suppl.*, : 64.

1971. *Oxya nitidula*, Hollis, *Bull. Br. Mus. nat. Hist. (Ent.)*, 26 no. 7 : 315.

Diagnostic characters : Size medium ; similar to the preceeding species but the supra-anal plate without lateral tubercles ; cerci conical, with obliquely tuncate apex ; epiphallus with relatively

straight outer lophi and small inner lophi ; valves of ovipositor with tooth-like spines ; ventral surface of sub-genital plate with a pair of well developed submarginal lateral spines, posterior margin with a single medial spine and a pair of lateral spines.

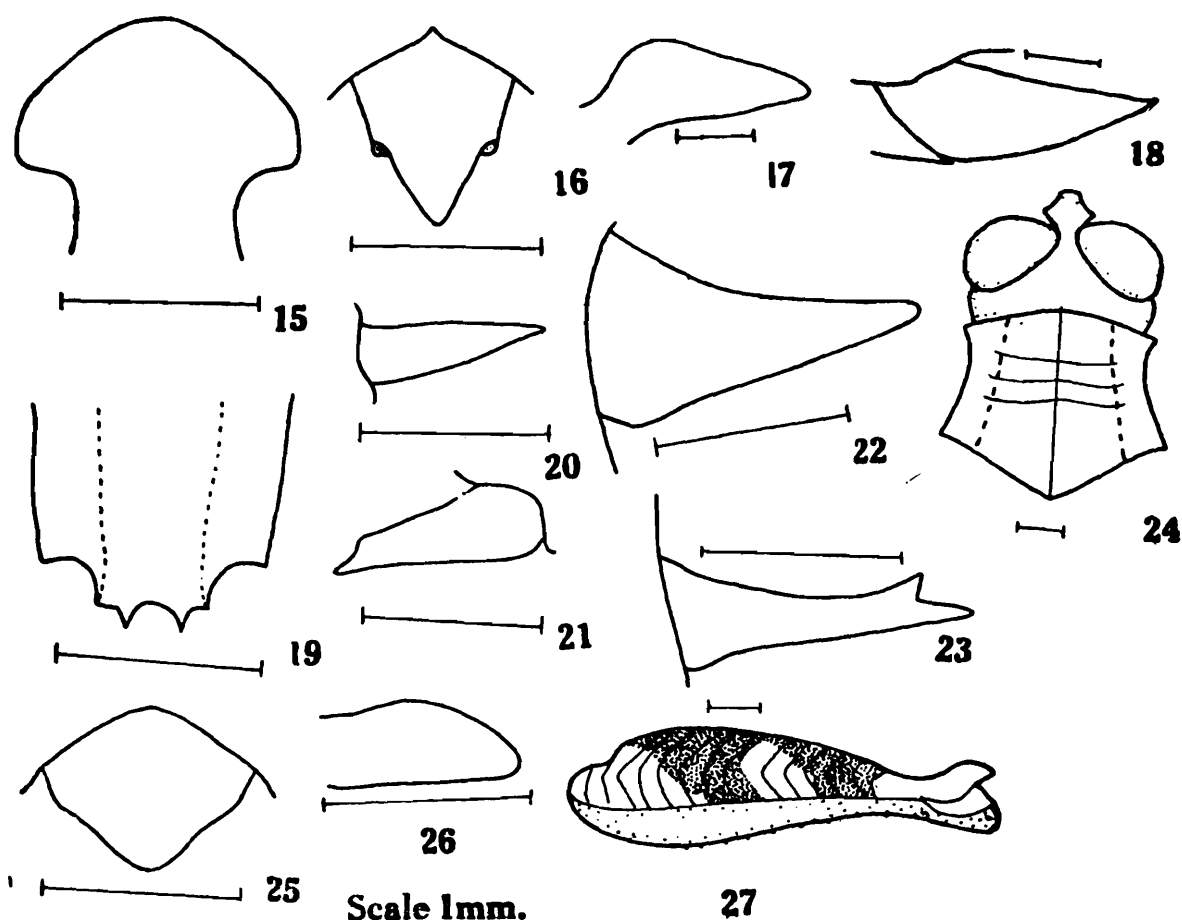


Fig. 15. Top view of fastigium of *Oxya hyla hyla* Serville.

Fig. 16. Dorsal view of supra-anal plate of male *Oxya hyla hyla* Serville.

Fig. 17. Lateral view of prosternal tubercle of *Cyrtacanthacris tatarica* (Linnaeus).

Fig. 18. Lateral view of sub-genital plate of male *Cyrtacanthacris tatarica* (Linnaeus).

Fig. 19. Ventral view of sub-genital plate of female *Oxya hyla hyla* Serville.

Fig. 20. Lateral view of cercus of male *Oxya hyla hyla* Serville.

Fig. 21. Lateral view of cercus of male *Oxya nitidula* (Walker).

Fig. 22. Lateral view of cercus of male *Cyrtacanthacris tatarica* (Linnaeus).

Fig. 23. Lateral view of cercus of male *Catantops henryi* Bolivar.

Fig. 24. Dorsal view of head and pronotum of *Xenocatantops humilis humilis* (Serville).

Fig. 25. Dorsal view of supra-anal plate of male *Oxya nitidula* (Walker).

Fig. 26. Lateral view of prosternal tubercle of *Oxya hyla hyla* Serville.

Fig. 27. External side of posterior femur of *Xenocatantops humilis humilis* (Serville).

Specimen examined 1 ♂, Road to Cardomom Estate, 11. xii. 1980, Dr. R. S. Pillai.

Distribution : India (Andhra Pradesh, Kerala, Karnataka, Tamil Nadu) ; Sri Lanka.

This species has also been studied somewhere else from Rajasthan, Orissa and West Bengal.

Remarks The structure of cerci of the present specimen differs from Hollis (1971) as it is not strongly truncate at apex.

Subfamily : COPTACRIDINAE

21. *Eucoptacra binghami* Uvarov

1921. *Eucoptacra binghami* Uvarov, *Ann. mag. nat. Hist.*, (9) 7 : 503.

1957. *Eucoptacra binghami*, Willemse, *Publties natuurh. Genoot. Limburg*, Reeks X : 444.

Diagnostic characters : Size medium ; head rugulose ; fastigium of vertex sloping, separated from the frontal ridge by an indistinct transverse keel or row of points ; frontal ridge flat ; frontal costa distinctly widened between the eyes ; antennae feebly flattened and dilated beyond the middle, as long as or slightly longer than head and pronotum together ; pronotum cut by the principal sulcus nearly in the middle ; elytra with a distinct, oblique, narrow callous fascia, a little behind the middle and extend beyond the apex of posterior femora, obliquely truncate at apex ; last abdominal tergite, in male, with well developed furcula ; posterior femora with a black spot before the middle of superio-external area ; sub-genital plate, in female, little triangularly expanded at the hind margin.

Specimens examined : 4 ♀ ♀, 1 km from Mukkali towards dam site, 15. i. 1980, Dr. S. K. Bhattacharya.

Distribution : Burma ; Thailand ; Tonkin ; Federation of Malaya State.

Remarks : Uvarov (1921) has described *Eucoptacra binghami* from Burma. He has also mentioned that the Pusa collection contains one male, without precise indication of locality. Later on Willemse (1957) studied the Acridoidea of the Indo-Malayan and adjacent regions and he mentioned India as the region of distribution but the part which

was included in it comes under Burma. Hence it is concluded that the present species is recorded here for the first time from India.

22. *Coptacra ensifera* Bolivar

1902. *Coptacra ensifera* Bolivar, 1902. *Annls Soc. ent. Fr.*, 70 : 621.

1914. *Coptacra ensifera*, Kirby, *Fauna British India, Orthoptera, Acrididae* : 239.

Diagnostic characters : Size medium ; fastigium shortly tricarinate between the eyes, the middle carina produced backwards ; frontal costa, not, or scarcely wider between the antennae ; antennae ensiform, as long as, or slightly longer than head and pronotum together ; pronotum rugose, slightly tectiform, crossed by all the three sulci, posterior margin obtusely angular ; lateral carinae of pronotum absent ; elytra as long as, or shorter, than the posterior femora, obliquely truncate at apex ; wings yellowish hyaline ; legs embeded with grey hairs ; posterior tibiae red.

Specimens examined : 3 ♂♂, Around Proposed Dam Site, April-May, 1980, Dr. A. K. Hazra.

Distribution India (Tamil Nadu and Karnataka).

Remarks Uvarov (1921) has recorded *Coptacra ensifera* from Karnataka (Belgaum) and remarked that the species has been described from Madura, Madras, but evidently distributed all over India. Later on Uvarov (1929) has again recorded it from Karnataka. Since then no record is available from other parts of India. During our present study we are recording it from Kerala for the first time. We think that the distribution of the species is restricted to South India only.

23. *Coptacra punctaria* (Walker)

1870. *Acridium punctarium* Walker, *Cat. Derm. Salt. Br. Mus.*, 4 : 639.

1914. *Bibractoides punctoria*, Kirby, *Fauna British India, Orthoptera, Acrididae* : 236.

1929. *Coptacra punctaria*, Uvarov, *Revue Suisse Zool.*, 36 : 561.

Diagnostic characters Size medium ; head short ; fastigium at apex slightly depressed, subhexagonal ; face with four distinct carinae, the inner carinae parallel, the outer carinae slightly diverge laterally ; antennae a little flattened, as long, or slightly longer than head and pronotum together ; head and pronotum rugose, tuberculate ; pronotum short, a little tectiform, posterior margin angulate ; median carina crossed by all the three sulci ; lateral carinae not traceable ;

prosternal tubercle stout at base, acutely rounded at apex ; elytra extend a little beyond the apex of posterior femora, obliquely truncate at apex ; wings yellowish with reddish nervures, as long as, or a little shorter than the elytra ; posterior femora a little longer than the abdomen, with two black patches above ; posterior tibiae bright red.

Specimen examined : 1 ♀, Silent Valley along Kuntipuzha, 17. i. 1980, K. R. Rao ; 1 ♀, Base Camp, 21. i. 1980, K. R. Rao ; 1 ♀, Around Proposed Dam Site, April-May, 1980, Dr. A. K. Hazra.

Distribution : India (Tamil Nadu).

Remarks : Walker (1870) has recorded this species from South India without giving any precise locality. Later on Uvarov (1929) has also reported it from Coonoor (Tamil Nadu). *Coptacra punctaria* (Walker) is recorded here for the first time from Kerala. This species differs from the other species of the genus by the black tubercles and rugosity on the head and pronotum.

Subfamily TROPIDOPOLINAE

24. *Calamippa prasina* (Bolivar)

1902. *Xenippa prasina* Bolivar, *Annls Soc. ent., Fr.*, 70 : 617.

1940. *Calamippa paasina*, Henry, *Trans. R. ent. Soc. Lond.*, 90 : 520.

Diagnostic characters : Size medium but very slender and elongate, somewhat depressed ; head extend forward beyond the eyes ; face reclinate ; fastigium of vertex long, parabolic at apex ; rounded tectate dorsally ; foveolae not traceable ; frontal ridge strongly compressed from tip of fastigium to base of antennae, thereafter gradually diverging ; eyes depressed and elongate ; antennae ensiform, shorter than head and pronotum together ; pronotum rounded above, truncate in front, obtusely rounded behind, compressed, median and lateral carinae not traceable ; disc of pronotum crossed by three shallow transverse sulci ; prosternal tubercle slightly curve backwards at apex with dorsal rounded and ventral pointed teeth ; elytra long, narrow, acutely rounded at apex, extend beyond the apex of posterior femora, not reaching upto the apex of abdomen ; wings as long as, or shorter than elytra ; posterior femora slender, rounded outwardly ; cerci of male long, lanceolate, extend beyond the subgenital plate ; cerci of female long, extend beyond the ovipositor.

Specimens examined : 1 ♂, 1 ♀, Around Proposed Dam site, April-May, 1980, Dr. A. K. Hazra.

Distribution : India (Tamil Nadu).

Remarks : *Calamippa prasina* (Bolivar) is recorded here for the first time from Kerala. It looks like *Mesopsis* Bolivar in appearance but can be differentiated from the latter by the characters mentioned above.

25. *Oxyrrhepes obtusa* (De Haan)

(Fig. 14)

1842. *Acridium (Oxya) obtusum* De Haan, *Verh. Ned. Overz. Bezitt. Orth.* : 155, 156.

1955. *Oxyrrhepes obtusa*, Willemse, *Publities, natuurh. Genoot. Limburg*
Reeks VIII : 32, 33.

Diagnostic characters : Size a little larger than the medium ; head short ; fastigium short, sloping, obtuse at the apex, and with a depression in the middle ; vertex with a median and two lateral longitudinal darker lines or small spots ; antennae filiform or with slightly flattened segments, shorter than the head and pronotum together ; pronotum brown above, darker on the lateral lobes ; median carina crossed by three transverse sulci, posterior margin obtusely rounded ; prosternal tubercle compressed laterally, curved backwards at the apex, nearly reaching the anterior margin of mesosternum but not touching it ; elytra and wings extend behind beyond the apex of posterior femora ; supra-anal plate broad at base, conically pointed at apex ; sub-genital plate of male slender and narrowly pointed at apex.

Specimens examined : 1 ♂, Valiyaparathodu, 23. i. 1980, Dr. S. K. Bhattacharya ; 2 ♂♂, 13 kms South of Valiyaparathodu, 28. i. 1980, Dr. S. K. Bhattacharya ; 6 ♂♂, 6 ♀♀, Around Proposed Dam Site, April-May, 1980, Dr. A. K. Hazra ; 1 ♂, Road to Cardomom Estate, 14. xii. 1980, Dr. R. S. Pillai.

Distribution : India (Karnataka, Tamil Nadu, Madhya Pradesh, Rajasthan and Sikkim) ; Sri Lanka ; Burma ; Java ; China ; Indo-China ; Taiwan ; Palawan ; Lombok ; Sebesi Island ; Ceram ; Sulawesi and Gilolo Island.

Remarks : *Oxyrrhepes obtusa* is recorded here for the first time from Kerala, and can be identified easily by the shape of fastigium,

prosternal tubercle and the slender and pointed sub-genital plate of male.

26. *Tristria pulvinata* (Uvarov)

(Fig. 29)

1921. *Tapinophyma pulvinata* Uvarov, *Ann. Mag. nat. Hist.*, (9) 7 : 497,

1929. *Tristria pulvinata*, Uvarov, *Revue suisse Zool.*, 36 : 559.

Diagnostic characters : Size medium ; head obtusely conical, shorter than the pronotum ; fastigium of vertex short and obtuse, its margin obtuse and smooth ; eyes ovate with strongly narrowed towards the apex ; antennae dorso-ventrally flattened and weakly dilated in the middle, shorter than head and pronotum together ; pronotum sub-cylindrical, anterior and posterior margin roundly truncate ; median carina of pronotum crossed by three transverse sulci, lateral carinae low and with slight divergent posteriorly ; prosternal tubercle bent backwards and touch the mesosternum, its lower surface very broad, concave, trapezoidal with lateral margins raised and hind margin feebly excavated ; elytra and wings not reaching the apex of the abdomen ; supra-anal plate, of female, very narrow and elongate.

Specimens examined : 2 ♀ ♀ (nymphs), 1 km towards Dam site from Base Camp, 980 m, 31. i. 1980, K. R. Rao ; 6 ♀ ♀, Around Proposed Dam site, April-May, 1980, Dr. A. K. Hazra.

Distribution : India (Bihar, Karnataka, Tamil Nadu and Punjab) ; Sri Lanka.

This species has also been studied somewhere else from various localities of West Bengal, Assam and Haryana.

Remarks : *Tristria pulvinata* is recorded here for the first time from Kerala, and can be easily identified by the obtusely conical head and the specific shape of prosternal tubercle.

Subfamily : EYPREPOCNEMIDINAE

27. *Tylotropidius varicornis* (Walker)

(Figs. 11 & 12)

1870. *Heteracris varicornis* Walker, *Cat. Derm. Salt. Br. Mus.*, 4 : 667.

1914. *Tylotropidius varicornis*, Kirby, *Fauna British India, Orthoptera, Acrididae*, : 265.

Diagnostic characters : Size a little larger and stouter than the medium ; fastigium of vertex with two depressions at the base ; front of head oblique ; antennae filiform and as long as head and pronotum together ; dorsum of pronotum dark brown, anterior and posterior margin roundly angulate ; median carina of pronotum raised and crossed by three transverse sulci, lateral carinae pale in colour, converge posteriorly ; prosternal tubercle compressed, truncate and slightly notched in the middle at apex ; elytra with a row of triangular whitish spots upon the radial nervure and a pale longitudinal strip in the costal area, extend beyond the apex of abdomen, but not surpass the apex of posterior femora ; posterior femora thick at base, very slender and long towards the apex ; supra-anal plate, of male, elongato-triangular, sulcated ; cerci straight and acuminate.

Specimens examined : 1 ♂ (nymph), Silent Valley second Camp, 1040 m, 21. i. 1980, K. R. Rao ; 1 ♂, Silent Valley Base Camp, 1440 m. 23.i.1980, K. R. Rao ; 4 ♂♂, 3 ♂♂, Around Proposed Dam site, April-May, 1980, Dr. A. K. Hazra.

Distribution : India (Tamil Nadu and Maharashtra) ; Sri Lanka ; Burma.

This species has also been studied somewhere else from Madhya Pradesh, Uttar Pradesh, Himachal Pradesh, Haryana, Karnataka, Andhra Pradesh and Meghalaya.

Remarks : *Tylotropidius varicornis* is recorded here for the first time from Kerala. It can be easily identified by the specific dark brown mark on the dorsum of pronotum, convergence of lateral carinae posteriorly ; slender and long posterior femora towards apex and bilobed prosternal tubercle at apex.

28. *Eyrepocnemis alacris alacris* (Serville)

1839. *Acridium alacre* Serville, *Histoire naturelle des insectes Orthopteres* : 682.

1958. *Eyrepocnemis alacris alacris*, Dirsh, *Proc. R. ent. Soc. London.*, (B) 27 : 40.

Diagnostic characters : Size slightly longer than the medium ; fastigium of vertex parabolic, a little concave ; frons oblique ; antennae filiform, as long as, or slightly longer than the head and pronotum together ; dorsum of pronotum almost flat, with a characteristic dark brown markings, truncate in front, rounded and subtruncate behind ; median and lateral carinae crossed by three transverse sulci, lateral

carinae slightly convergent in front ; elytra with numerous brown spots ; posterior femora with a long and black streak ; posterior tibiae bluish-grey, with two whitish rings at the base.

Specimen examined : 1 ♂, Road to Mukkali, 8. xii. 1950, Dr. R. S. Pillai.

Distribution : India (Throughout India) ; Pakistan ; Afghanistan ; E. Persia ; Sri Lanka.

Remarks : This species can be easily recognised by the fully developed elytra and wings, the specific dark brown markings on the dorsum of pronotum, colourless wings, dark brown spots on the elytra and the bluish grey posterior tibiae with two whitish rings at the base and reddish apex and tarsi.

Subfamily : CATANTOPINAE

29. *Xenocatantops humilis humilis* (Serville)

(Figs. 24 & 27)

1839. *Acridium humile* Serville, *Histoire naturelle des insectes Orthopteres* : 662.

1814. *Catantops humilis*, Kirby, *Fauna British India, Orthoptera, Acrididae* : 250.

1953. *Xenocatantops humilis humilis*, Dirsh and Uvarov, *Tijdschr. Ent.*, 96 (3) : 237.

Diagnostic characters : Size medium ; fastigium of vertex with slightly raised carinulae between the eyes ; interocular distance narrower ; antennae filiform, longer than head and pronotum together ; pronotum slightly constricted halfway its length, roundly truncate in front and roundly angulate behind ; sulci more distinct than in *Stenocatantops* Dirsh & Uvarov ; median carina crossed by three transverse sulci ; prosternal tubercle acutely conical ; elytra and wing surpassing the apex of posterior femora ; outer medial area of posterior femora with two transverse dark brown fasciae.

Specimen examined : 1 ♂, Base Camp, 21.i. 1980, K. R. Rao.

Distribution : India (Arunachal Pradesh, Assam, Meghalaya, Kerala, Tamil Nadu, Andaman Islands, West Bengal, Bihar, Madhya Pradesh, Uttar Pradesh) ; Tibet ; Sri Lanka ; Bangladesh ; Thailand ; Tibet ; Burma ; Malaya ; Indochina ; Yunnan ; Philippines ; Borneo ; Sumatra ; Java ; Lombok ; New Guinea.

This species has also been studied somewhere else from Himachal Pradesh, Manipur, Sikkim, Mizoram and Orissa.

Remarks : *Xenocatantops humilis humilis* (Serville) is generally found in thick forest regions and can be easily recognised by the slightly constricted pronotum in the middle, two dark brown fasciae on the external face of posterior femora.

30. *Palniacris maculatus* Henry

1940. *Palniacris maculatus* Henry, *Trans. R. ent. Soc. Lond.*, 90 : 531.

Diagnostic characters : Size medium ; occiput roundly-convex ; fastigium of vertex declivent, transversely furrowed, laterally bounded by carinulae and with small foveoles ; antennae filiform, and extend beyond the pronotum behind ; pronotum slightly tectiform, emarginate forward in the middle, roundly truncate behind ; median carina of pronotum crossed by three sulci, lateral carinae not distinct ; prosternal tubercle acutely conical at apex ; elytra reduced, lateral, lanceolate, not reaching the middle of second tergite, and with two black spots ; posterior femora extend beyond the apex of abdomen ; supra-anal plate triangular, sulcate medially at base ; cerci conical and compressed.

Specimen examined : 1 ♂, Road to Mukkali, 8. xii. 1980, Dr. R. S. Pillai.

Distribution India (Tamil Nadu and Karnataka).

Remarks : *Palniacris maculatus* is recorded here for the first time from Kerala. It can be identified easily by the shape of head and pronotum, and the reduced elytra with two black spots which are placed obliquely on the apex.

31. *Catantops henryi* Bolivar (Figs. 6 & 23)

1918. *Catantops henryi* Bolivar, *Revta R. Acad. Cience. exact. fis. nat. Madr.*, 16 : 404.

1956. *Catantops henrvi*, Dirsh, *Publcoes. cult. Co. Diam. Angola*, 28 : 90.

Diagnostic characters : Size medium ; head shorter than pronotum ; fastigium sub-pentagonal with convex anterior margin ; antennae filiform, shorter than head and pronotum together ; prosternal tubercle rounded at apex which is slightly inclined backwards ; elytra and wings extend beyond the apex of posterior femora ; posterior femora with two broad incomplete fasciae on the external

disc, the smaller being on the apex ; cerci short, bifurcated at apex, the internal lobe short with rounded apex.

Specimens examined : 1 ♂, 10 kms east of Valiyaparathodu Camp, 25. i. 1980, Dr. S. K. Bhattacharya ; 1 ♂, 1 km towards Dam site from Base Camp, 980 m, 31 i. 1980, K. R. Rao ; 2 ♂ ♂, 5 ♀ ♀, Around Proposed Dam site, April-May, 1980, Dr. A. K. Hazra ; 1 ♂, 2 ♀ ♀, 2 kms towards Mukkali, 6. xii. 1980, Dr. R.S. Pillai ; 1 ♂, Road to Valiyaparathodu, 10. xii. 1980, Dr. R. S. Pillai.

Distribution : India (Kerala, Karnataka, Maharashtra and Goa) ; upper Burma.

Remarks : *Catantops henryi* can be easily separated from the other species of the genus by the darker fasciae on the external disc of posterior femora and bifurcated cerci.

Subfamily CYRTACANTHACRIDINAE

32. *Chondracris rosea* (De Geer)

(Figs. 28, 30, 32 & 33)

1773. *Acrydium roseum* De Geer, *Memoires pour servir a l'histoire des insectes*, Stockholm 3 : 488.

1923. *Chondracris rosea*, Uvarov, *Bull. ent. Res.*, 14 : 39.

1975. *Chondracris rosea*, Tandon, *Dr B.S. Chauhan Comm. Vol.* : 396.

Diagnostic characters : Size large ; fastigium trapezoidal ; antennae filiform, and slightly longer than head and pronotum together ; pronotum compressed, tectiform, integument strongly rugose ; median carina of pronotum moderately to distinctly raised throughout, crossed by three transverse sulci ; prosternal tubercle slightly thick before the apex, then narrowing towards obtuse apex ; elytra extend beyond the apex of posterior femora ; wing rose coloured towards base ; supra-anal plate, of male, almost triangular ; cerci short, and acute at apex ; sub-genital plate acutely conical ; valves of ovipositor short, apex hooked.

Specimens examined : 1 ♀, Project side, Base Camp, 24 kms N.W. of Mukkali, April-May, 1980, Dr. A. K. Hazra ; 1 ♀, 12 kms towards Dam site from Base Camp, 1040 m., 27. i. 1980, K. R. Rao ; 1 ♂, 1 km towards Dam site from Base Camp, 980 m, K. R. Rao ; 2 ♂ ♂, 1 ♀, Around Proposed Dam site, April-May, 1980, Dr. A. K. Hazra.

Distribution : India (Arunachal Pradesh, Assam, Bihar, Madhya

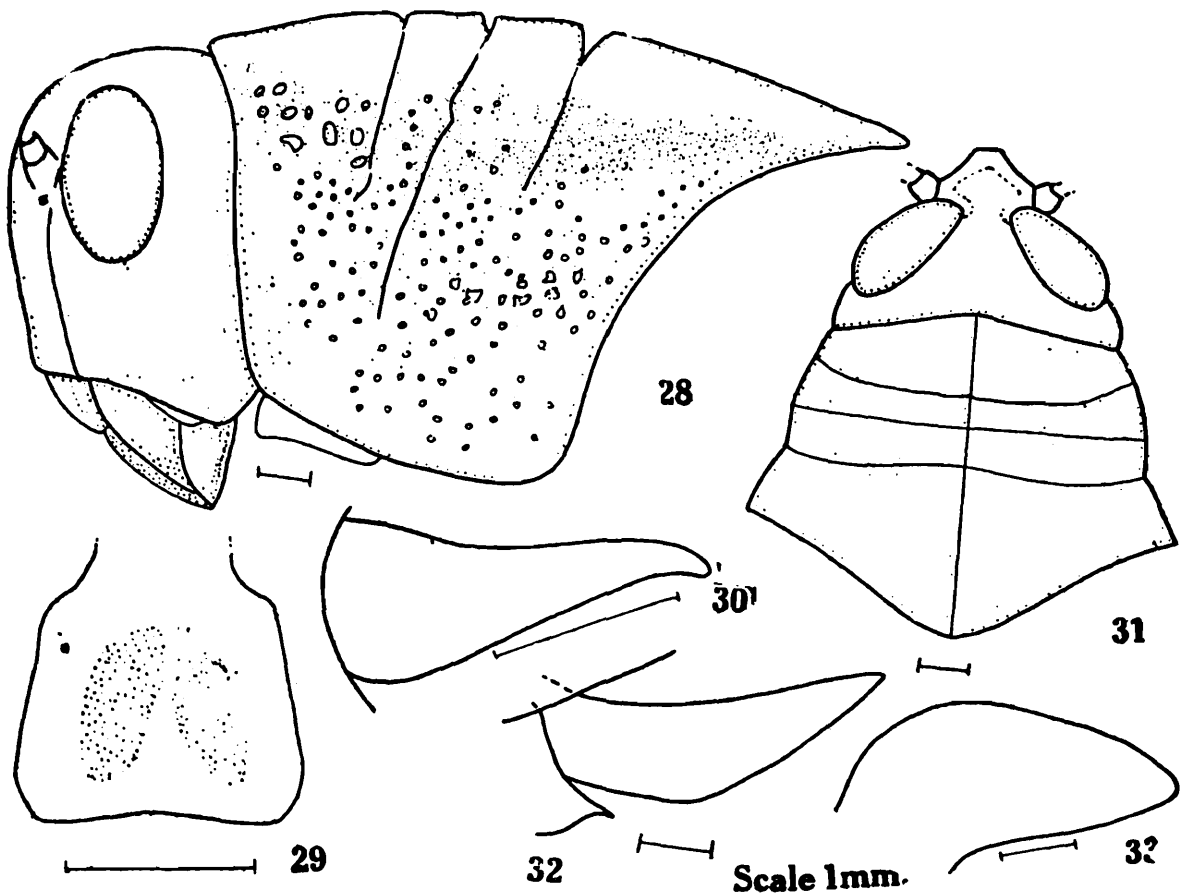


Fig. 28. Lateral view of head and pronotum of *Chondracris rosea* (De Geer).

Fig. 29. Ventral view of prosteral tubercle of *Tristria pulvinata* (Uvarov).

Fig. 30. Lateral view of Cercus of male *Chondracris rosea* (De Geer).

Fig. 31. Dorsal view of head and pronotum of *Catantops pulchellus* (Walker).

Fig. 32. Lateral view of sub-genital plate of male *Chondracris rosea* (De Geer).

Fig. 33. Lateral view of prosteral tubercle of *Chondracris rosea* (De Geer).

Pradesh, Manipur, Tripura, Uttar Pradesh, West Bengal, Sikkim, Kerala and Tamil Nadu); Bhutan; Bangladesh; Thailand; Indonesia; Korea; Japan; Vietnam; China; Java; Tainan; Philippines; Manchuria; Hainan Islands.

Remarks : This species can be separated from the other species discussed here by the larger size, pale-green colouration, tectiform pronotum and rose coloured basal area of hind wing.

33. *Cyrtacanthacris tatarica* (Linnaeus)

1758. *Gryllus locusta tataricus* Linnaeus, *Systema Naturae* (10th ed.) : 432.

1923. *Cyrtacanthacris tatarica*, Uvarov, *Bull. ent. Res.*, 14 : 39.

Diagnostic characters : Shorter than the *Chondracris rosea*; fasti-

gium of vertex angular, in middle depressed ; antennae filiform, as long as head and pronotum together ; pronotum moderately tectiform, slightly constricted, integument fairly rugose or smooth, posterior margin angular ; median carina of pronotum a little raised and crossed by three transverse sulci ; prosternal tubercle large, strongly curved backwards, almost touching mesosternum ; elytra extend beyond the apex of posterior femora supra-anal plate, of male, compressed, and with subacute apex ; sub-genital plate, of male, elongate and acutely conical ; valves of ovipositor moderately robust.

Specimens examined : 3 ♂♂, Around Proposed Dam Site, April-May, 1980, Dr. A. K. Hazra.

Distribution : India (Andhra Pradesh, Bihar, Rajasthan, Jammu and Kashmir) ; Africa except N. Africa and Sahara ; S. W. Asia including Sri Lanka, Thailand, Hainan, Philippines, Sumatra ; Madagascar and Seychelles.

This species has also been studied somewhere else from Himachal Pradesh, Haryana, Uttar Pradesh, Bihar, Rajasthan, Orissa, Karnataka, Maharashtra, Meghalaya, West Bengal, Arunachal Pradesh, Manipur, Tripura and Bangladesh.

Remarks *Cyrtacanthacris tatarica* is widely distributed species in India. It can be easily separated from the closely related genus *Patanga* Uvarov, by the prosternal tubercle which is curved backwards and touches the mesosternum. At present this species is reported here for the first time from Kerala.

SUMMARY

Present paper deals with 33 species of grasshoppers and crickets, out of which 20 species are new records for the area whereas one species i.e. *Eucoptocra binghami* Bolivar is recorded for the first time from India. Key to the species is provided. Diagrams of different parts of these insects are also incorporated.

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* Original not seen

AMPHIBIAN FAUNA OF SILENT VALLEY, KERALA, S. INDIA

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(With 3 Text-figures)

INTRODUCTION

The richest expression in diversity and abundance of the Indian Amphibia is met with in the Western Ghats as evidenced by the earlier works of Boulenger (1882, 1890, 1920), Daniel (1963 a, b; 1975) etc. There have been a few additions to its faunal wealth in more recent years (Pillai, 1978, a, b; 1979). However, the large tract of evergreen forest constituting Silent Valley remained practically unknown with regard to its Amphibian fauna.

The present work tries to fill this lacuna and incorporates the results of the study of Amphibia collections made in Silent Valley in January-February 1979, January-February 1980, April-May 1980, and November-December 1980. All data on details of collections etc. have not been included here as is customary in a taxonomic paper of this kind because it would be too voluminous. However, all the relevant details are given at the appropriate places.

19 species are being reported here which includes one Caecilian new to science. These however, represent only a fraction of the amphibian wealth of Silent Valley. There are several localities in the Valley yet to be surveyed and future surveys shall undoubtedly reveal many more species.

The colour given for the species is mostly that in the preserved state unless otherwise Stated. All specimens were collected by the author except those few which are indicated at the appropriate places. Reference which give descriptions are cited under each species.

LIST OF SPECIES OF AMPHIBIA FROM SILENT VALLEY

Class : AMPHIBIA
 Order : GYMNOPIIONA
 Family : ICHTHYOPHIDAE

Genus (1) *Ichthyophis* Fitzinger

1. *Ichthyophis longicephalus* sp. nov.

Order : ANURA
 Family : BUFONIDAE

Genus (2) *Ansonia* Stoliczka

2. *Ansonia rubigina* Pillai and Pattabiraman

Genus (3) *Bufo* Laurenti

3. *Bufo parietalis* Boulenger
4. *Bufo microtympanum* Boulenger
5. *Bufo silentvalleyensis* Pillai

Genus (4) *Nectophryne* Buchholz and Peters.

6. *Pedostibes tuberculosus* (Gunther)

Family : MICROHYLIDAE

Genus (5) *Ramanella* Rao & Ramanna.

7. *Ramanella triangularis* (Gunther)

Family : RANIDAE

Genus (6) *Micrixalus* Boulenger

8. *Micrixalus nudis* Pillai
9. *Micrixalus thampii* Pillai
10. *Micrixalus saxicola* (Jerdon)

Genus (7) *Nannobatrachus* Boulenger

11. *Nannobatrachus beddomii* Boulenger

Genus (8) *Nyctibatrachus* Boulenger

12. *Nyctibatrachus major* Boulenger

Genus (9) *Rana* Linnaeus

13. *Rana limnocharis* Wiegmann
14. *Rana beddomii* (Gunther)
15. *Rana temporalis* (Gunther)

Family : RHACOPHORIDAE

Genus (10) *Rhacophorus* Kuhl.

16. *Rhacophorus malabaricus* Jerdon

Genus (11) *Philautus* Gistel

17. *Philautus variabilis* (Gunther)

18. *Philautus signatus* Boulenger

19. *Philautus pulcher* Boulenger

SYSTEMATIC ACCOUNT

1. *Ichthyophis longicephalus* sp. nov.

Figs. 1-3

Diagnosis : A small species, 192 mm in length. Head comparatively longer. Distinct lateral yellow stripe from tip of tail to posterior margin of second nuchal collar. An indistinct patch on the lateral side of each collar and one on the angle of jaw. 348 primary and secondary annuli, 8 of which on tail. Tentacles much closer to eye than to nostril.

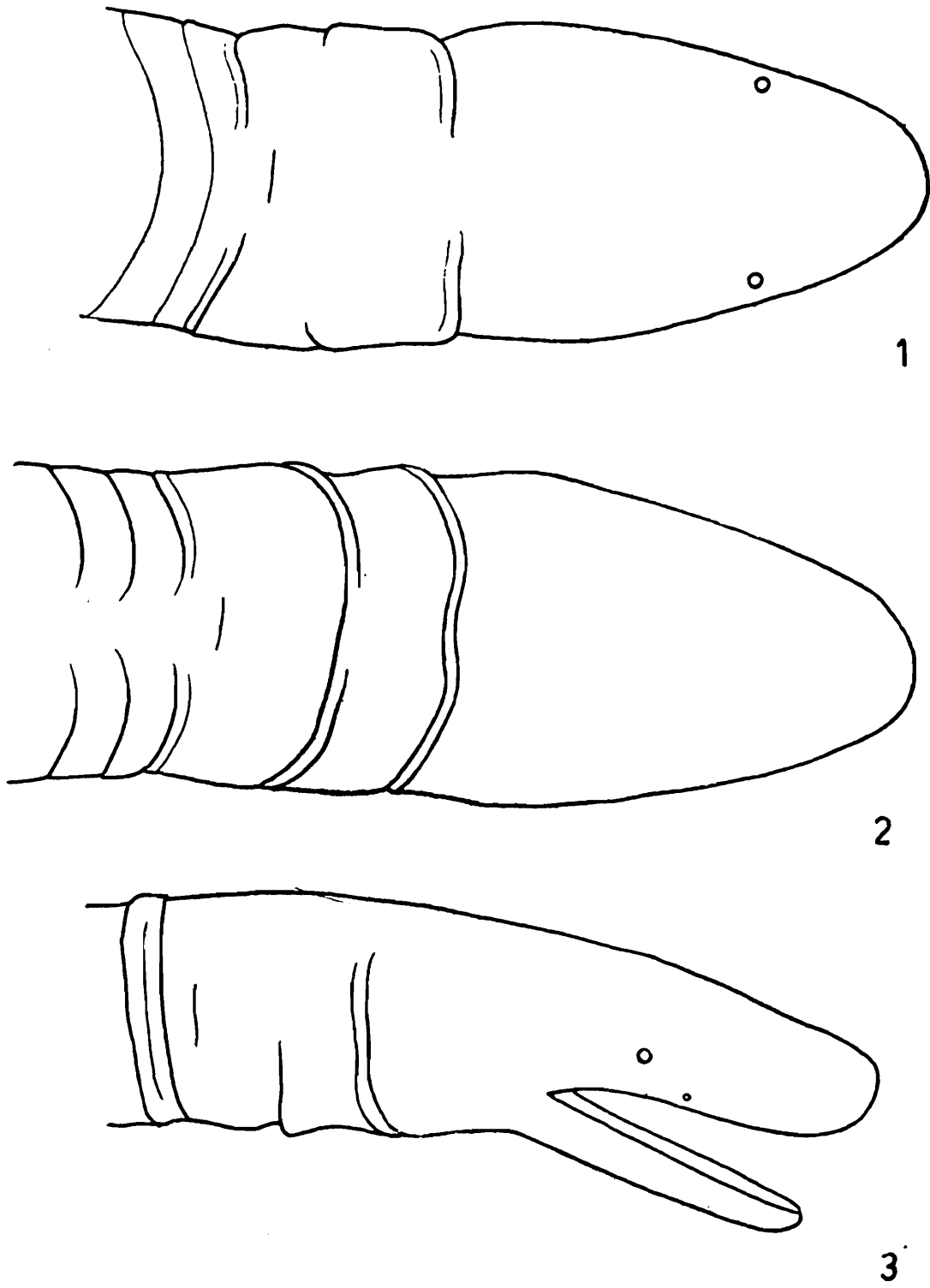
Description : Body short, fairly broad, its width (maximum) in length about 23 times; head comparatively long (16 times in total length), blunt, narrower than body; eyes distinct, distance between them more than length of snout (from level of eye to tip of snout); tentacular aperture at the margin of the upper lip and much closer to eye than to nostril, its distance from eye less than half its distance from nostril. Eye well developed, in a socket, closer to tip of snout than to the first nuchal groove. Nostrils nearly terminal, not very close to each other, visible from above ; snout extends a little beyond mouth.

Head followed by two nuchal collars, the first strongly outlined on ventral side by the anterior nuchal groove which is clear laterally and fairly so dorsally. The first collar is completely fused with the second dorsally ; the second groove is pronounced on the ventral side and abruptly terminates laterally at the level of angle of mouth. The second collar is delimited posteriorly by a very weak groove which is practically indistinguishable ventrally, dimly visible laterally and less so dorsally. Second collar bears one or two incomplete folds dorsally.

There are 348 primary and secondary annuli following the collars dorsally, the ventral count being 350. The annuli tend to cross the dorsal side rather sinuously while on the venter they are curved backwards at an angle but do not meet in the midventral line which gives the impression of a mid-ventral longitudinal line extending from behind collar to the proximity of vent. 8 annuli

on tail of which 3 or 4 are interrupted by vent. Tail short, terminating in a bluntly pointed tip, its length in total length approximately 43 times.

A single row of scale below the skin on the anterior part of the body. Two or three rows seen on the more posterior annuli.



Ichthyophis longicephalus sp. nov.

Fig. 1 Dorsal view Fig. 2 Ventral view Fig. 3 Lateral view

Four series of teeth present as follows : premaxillary-maxillary, 17-18; prevomeropalatine, 14-14; dentary, 16-16; splenial, 16-14. Premaxillary-maxillary and dentary teeth about the same size, splenials smallest of all.

Tongue narrow, anteriorly striated and covers the splenials almost fully. Choanae narrow, long, interchoanal distance about 8 times that of transverse distance of one

Dark violet brown above, without lighter bands along annuli. Distinct yellow stripe along side of body from tip of tail to posterior margin of second nuchal collar. An indistinct patch on either side of second collar and a distinct band on lateral aspect of first collar. This band is not connected to another patch on the angle of jaw. Venter somewhat lighter than dorsum, each annulus demarkated by a narrow pale band which is broken in the middle resulting in a longitudinal midventral line from collar to near the vent. A whitish spot surrounding the vent, connected to the lateral stripes by two bands on either side.

Measurements

Total length		 192 mm
Tail length		 4.5 mm
Head width		 7.5 mm
Body width (Maximum)	...	 8.5 mm
Eye to tentacle		 1.4 mm
Tentacle to nostril		 3.1 mm
Eye to eye		 5.1 mm
Eye to tip of snout		 4.5 mm
Snout tip to first groove		 12 mm
Snout tip to second groove		 14.7 mm

Material : A total of 40 specimens were collected from smaller tributaries and streamlets joining Kunthi River. However all these turned out to be juveniles and larvae (possessing a caudal fin) except one example collected on 27.1.1979 on which the present description is based. Eight specimens are on the verge of becoming adults but still possess tail fin. *Holotype*. An adult, 192 mm in total length, loc, Silent Valley, Kerala, S. India, alt. 1050 metres, coll. R. S. Pillai, 27 Jan. 1979. Type presently deposited with the Southern Regional Station, Zoological Survey of India, Madras 28. The specimen was collected

from wet, slushy ground close to a brook flowing through thick forest. A number of larvae were collected from the brook.

Remarks : All striped forms of *Ichthyophis* which were earlier regarded as *I. glutinosus* have been split up into different species (Taylor, 1961). Taylor (1968) regards the proper *I. glutinosus* (Linn.) as confined to Sri Lanka.

Only three striped forms inhabit India. These are *I. beddomei* Peters, *I. tricolor* Annandale and *I. minor* Pillai (In press), all of which are quite distinct from *I. longicephalus* sp. nov. However, it is closely related to *I. glutinosus* from which it could easily be distinguished by the much longer head (16 times in total length in comparison with about 25 times in *glutinosus*, 20 to 23 times in *tricolor* and 23 to 26 times in *beddomei*).

2. *Ansonia rubigina* Pillai and Pattabiraman.

1981. *Ansonia rubigina* Pillai and Pattabiraman. *Proc. Indian Acad. Sci.*, 90, 203.

Two examples of this torrent toad were collected from Kummattan Thodu, a tributary of Kunthi River on 2nd May, 1980.

3. *Bufo parietalis* Boulenger

1882. *Bufo parietalis* Boulenger, *Cat. Batr. Sal. Brit. Mus.* : 312.

19 males and females are available, all of them collected from the banks of Kunthi River in January-February, 1979 and April, 1980. The largest female measures 95 mm in head and body.

Cranial ridges black, cornified. Canthal, supraorbital and parietal ridges are conspicuously raised, the parietals on either side enclosing a concave, pearshaped, smooth area. Toes less than half-webbed. Subarticular tubercles on toes not very clearly demarkated from the equally prominent warts. Dorsum with very prominent warts.

All earlier descriptions of colour are from preserved specimens. The live colouration is as follows. Females light brownish yellow on head and back. Sides of head and body marbled with black. Limbs banded. Venter marbled on throat, chest and front half of belly. Some of the larger females, however, has a uniformly dark brown crown and dorsum.

Males (breeding) are almost brightly coloured, the dominant one being yellow. Sides marbled with light or reddish brown. Venter not marbled. The yellow is lacking in non-breeding males collected from under stones which are brownish above.

Notes on breeding : On the morning of 3rd February, 1979, I could hear from my tent the males calling in the typical toad fashion. The breeding site was a 200 metre stretch of Kunthi River. Several hundred pairs of males and females were found in amplexus, many in the process of laying long strings of eggs. Only two or three batches of already laid eggs were seen suggesting that breeding and laying started only on the previous night. Neither eggs nor breeders were noticed on any of the previous three days when I had occasion to cross the river at that point. No breeders were seen either two days later when we had to cross the river at that point while shifting camp.

The river at the breeding site was shallow and flowed over a bed of pebbles. Giant boulders rose here and there. There were reed forests on both sides of the river—a favourite feeding ground of elephants.

4. *Bufo microtympanum* Boul

1882. *Bufo microtympanum*, Boulenger, *Cat. Batr. Sal. Brit. Mus.* : 307.

A single example of this toad is available in the collections taken near the 16 Km point to Mukkali on 18.1.1979.

The specimen measures 34 mm from tip of snout to vent. Tympanum small, less than half diameter of eye. Upper surface with warts and tubercles, brown in colour. Venter pale, marbled with brown.

5. *Bufo silentvalleyensis* Pillai

1981. *Bufo silentvalleyensis* Pillai, *Bull. zool. Surv. India*, 3 (3) : 156.

A single specimen collected near Valiaparathodu on 17 January, 1979.

Smooth skin, slender limbs, parietal ridge directed obliquely inwards.

6. *Pedostibes tuberculosus* (Gunther)

1882. *Nectophryne tuberculosa*, Boulenger, *Cat. Batr. Sal. Brit. Mus.* : 280.

A single example of this rare tree toad is available collected by Dr. S. K. Bhattacharya on 15.1.1980 from a spot in Silent Valley, 24 Km Northwest of Mukkali.

Subsequent to the original description of this toad by Gunther (1875) from Malabar, no more material has been collected and as such the present record of this toad from Silent Valley is very significant.

Fingers webbed at base, toes nearly entirely webbed (the three distal phalanges of fourth toe being fringed by the webs), tips of fingers and toes dilated in the form of truncated discs.

Skin of dorsum tubercular, brownish grey above, profusely marbled with pale with the result that the head appears to be spotted with dark brown, broad longitudinal lines behind head dorsally and dark brown on flanks, limbs barred, venter light brown with irregular pale markings.

7. *Ramanella montana* (Jerdon)

1934. *Ramanella montana*, Parker, *Monograph Microhylidae* : 91.

Three examples are being referred to this species, the largest measuring 30 mm in head and body collected from under a stone inside dense forest on 22.1.1979. The other two were collected at night along with *Rhacophorus malabaricus* on 21.4.1980 at an altitude of 1040 metres.

Snout longer than diameter of eye, finger with large triangular discs. Toes with slightly dilated tips, clearly webbed at base.

Skin smooth above, pale brown to chocolate, snout dark upto level of eyes and then narrowing to the median line to broaden between the shoulders, narrowing again to broaden once more and break up in the sacral region. Limbs with crossbars. Lower surfaces brown or dark brown with white spots and blotches.

8. *Micrixalus nudis* Pillai

1978 a. *Micrixalus nudis* Pillai, *Proc. Indian Acad. Sci.* : 173.

A small example, measuring 13.5 mm in body length is being

referred to this species, originally described from Wynad (Pillai, 1978). This constitutes its second record.

Dorsum brownish without dorsolateral glandular folds or other markings. A chocolate coloured band from behind eye to shoulder. Limbs with cross bars. Ventrally white, throat and breast marbled with brown.

9. *Micrixalus thampii* Pillai

1981 a. *Micrixalus thampii* Pillai, *Bull. zool. Surv. India.* : 153.

Two specimens, a female and a male were collected near the dam site on 26th and 27th January, 1979.

10. *Micrixalus saxicola* (Jerdon)

1890. *Micrixalus saxicola*, Boulenger, *Fauna Brit. India* : 465.

A single specimen, 30 mm from tip of snout to vent belonging to this species is available in the collection, taken on 21.4.80 from near the dam site at an altitude of 870 metres.

Fingers and toes with large discs, hind limbs long and fully webbed. Skin smooth above, slate brown with lighter, irregular markings. Pale white below, throat and breast brownish.

The specimen was clinging to the vertical side of a boulder projecting from the fast flowing Kunthi River, its cryptic colour merging well with the moist surface of the rock making it practically invisible.

11. *Nannobatrachus beddomii* Boul.

1882. *Nannobatrachus beddomii* Boulenger, *Cat. Batr. Sal. Brit. Mus.* : 466.

9 examples of small-sized ranids, the largest of which measures 20 mm in total length are being referred to this rare species. Eight examples were collected by the author on 24.1.79 from forest litter in the central part of Silent Valley (alt. approximately 1000 m). One example was collected by Dr. S. K. Bhattacharya on 29.1.1980 from Valiaparathode.

The vertical condition of the pupil is not very clearly seen as is often the case after preservation, the same condition being observed

in the related genus, *Nyctibatrachus* (See Pillai, 1978). Stout for its size. Tympanum indistinct. Vomerines present, snout blunt, without canthus rostralis, inter-orbital space narrower than upper eye lid, fingers short and blunt-tipped, first shorter than second, toes with small discs, webbing rudimentary, a small inner metatarsal tubercle. Tibio-tarsal articulation reaches eye when adpressed. Skin smooth, brownish above with a few darker spots, two light bands on back on each side of the middle, limbs with cross bars. White beneath, throat brownish. Thickened, whitish, oval patches on the inner aspect of thighs extending from its base to more than half its length in one male example.

Nannobatrachus beddomii, known from Malabar and Tinnevely hills, is being recorded for the first time after its original description by Boulenger in 1882, after a gap of more than a hundred years.

12. *Nyctibatrachus major* Boul.

1978 b. *Nyctibatrachus major*, Pillai, *Bull. zool. Surv. India*, : 135.

Many examples are available from all over Silent Valley, the largest measuring 47 mm from tip of snout to vent.

Two males measuring 42 mm and 38 mm have much darker throats, nuptial pads on the inner aspect of first finger and two whitish oval thickened patches on the ventral side of the thighs, close to each other as in the male of *Nannobatrachus beddomii*, but shorter and broader.

Skin of back and sides with corrugations and wrinkles. Brown or dark brown above, limbs barred. Throat brownish. Venter pale.

13. *Rana limnocharis* Wiegmann

1920. *Rana limnocharis*, Boulenger, *Rec. Indiau Mus.*, : 28.

A number of examples have been collected at various altitudes ranging from 800 to 1050 metres. Those collected from a stream at Panthencode on 16.1.1979 were breeding, males were calling.

14. *Rana beddomii* (Gunther)

1920. *Rana beddomii*, Boulenger, *Rec. Indian Mus.* : 114.

Many examples of this species are available from various areas

within Silent Valley, small examples to large ones measuring over 55 mm in total length.

A good deal of variation in colour has been noticed. Generally brownish above with indistinct dark spots. Some has a light vertebral line from between the eyes to the hind end. A dark interocular line is most common. A black streak on the canthus rostralis and a temporal streak enclosing the tympanum are distinctive. A few specimens, are fully pale whitish above with no colour or markings, the temporal and canthal streaks becoming very prominent.

A few tadpoles with long tail which have been collected from moist vertical surface of rocks near the dam site apparently belong to this species.

15. *Rana temporalis* (Gunther)

1920. *Rana temporalis*, Boulenger, *Rec. Indian Mus.* : 159.

Maximum number of examples in the collection belong to this species, their habit of sitting exposed on rocks and pebbles in running water making them easy for capture. They also allow close approach. Large specimens were seen foraging on forest floor in the proximity of water. They are available even at altitudes of 1100 metres or more though Annandale (in Boulenger, 1920) states that they are not found at great altitude.

Dorsum between the two dorsolateral glandular folds brownish, often with a few scattered dark spots. Outer edge of dorsolateral folds darker, canthus rostralis and temporal region also darker, continued backwards on flanks. Limbs with brownish cross bars. Venter whitish, throat and breast at times brownish.

16. *Rhacophorus malabaricus* Jerdon

1890. *Rhacophorus malabaricus*, Boulenger, *Fauna Brit. India* : 473.

Two examples of these have been collected at night near the dam site on 22. 4. 80. They were found clinging on to a rock in a stagnant pool of water far away from the river.

Colour when live was very distinctive. Dorsum green, flanks paler with greenish dots, hind margin of thighs yellowish red. Ventrally yellowish. The fully webbed fingers and toes had a different

colour scheme. Outer webs of fingers crimson, inner green. Webs on toes fully crimson.

17. *Philautus variabilis* (Gunther)

1890. *Ixalus variabilis*, Boulenger, *Fauna Brit. India* : 487.

15 examples collected on 17th, 22nd, 24th, 27th January, 1979 and 22nd, 30th April, 1980 belong to this species.

Uniformly brownish above or variously marked. Flank is some lighter. Ventrally granular, white, throat and breast brown.

At the time of collection some were green in colour and faintly mottled.

18. *Philautus signatus* Boulenger

1890. *Ixalus signatus*. Boulenger, *Fauna Brit. India* : 487.

Two examples measuring 24 mm and 33 mm in total length. Limbs are comparatively thin for the body.

A small pointed papilla on tongue. Skin smooth, brownish above in the smaller specimens and with patterns in the larger one. White below, belly granular.

19. *Philautus pulcher* Boulenger

1882. *Ixalus pulcher* Boulenger, *Cat. Batr. Sal. Brit. Mus.* :469.

A single specimen measuring 23 mm from tip of snout to vent collected on 16.1.1979

No lingual papilla, fingers with a rudiment of web, tips with large discs, toes more than half webbed and with discs.

Skin smooth above, granular on belly. A beautiful frog, leaf green above when collected (turned purple in spirit). Fore arms with two or three large green spots above. Femur with a median thin dorsal green line, tibia fully green. Ventrally white.

The specimen was found attached to a leaf and with legs drawn close to the body it was perfectly oval in shape.

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I am highly obliged to Dr. B. K. Tikader but for whose enthusiasm and initiative the publication of this paper would not have been possible.

I am also grateful to Dr. T. N. Ananthakrishnan for giving the opportunity to survey and lead the Silent Valley expeditions and to Dr. K. K. Tiwari for personally visiting us and spending some time with us in Silent Valley.

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FISHES OF SILENT VALLEY

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INTRODUCTION

This paper deals with the list of fishes from Silent Valley and their importance in the study of fishes. As has been demonstrated in several papers (Hora, 1941 ; Hora and Law, 1941 ; Hora, 1942; Rajan, 1955 ; Silas, 1951 a & b), the Western Ghats of Peninsular India, especially the hill ranges lying to the south of the Nilgiris have proved to be one of the most fertile fields for Ichthyological studies. The fish-fauna exhibit a variety of adaptive modifications induced by the necessity of living in swift currents of the torrential streams.

During the years 1979-1980 the Zoological Survey of India team headed by Dr. R. S. Pillai, Deputy Director conducted three intensive surveys of the little explored Silent Valley Reserve Forests. A systematic account giving details of the number of specimens of each species present in the collection, the size range in standard length, the date and locality of collection and their range of distribution are given in this paper.

List of Species

- Family I : ANGUILLIDAE
1. *Anguilla bengalensis* (Gray & Hardw.)
- Family II : CYPRINIDAE
2. *Barilius gatensis* (Cuv. & Val.)
 3. *Garra menoni* Rema Devi & Indra

Family III : HOMALOPTERIDAE

4. *Noemacheilus (mesonoemacheilus) triangularis*
(Day)

5. *Noemacheilus (mesonoemacheilus) guentheri* Day

6. *Homaloptera pillaii* Indra & Rema Devi

Family IV : COBITIDAE

7. *Lepidocephalichthys thermalis* (Cuv. & Val.)

Family V : SISORIDAE

8. *Glyptothorax annandalei* Hora

Family VI : CHANNIDAE

9. *Channa gachua* (Ham.)

Order : ANGUILLIFORMES

Suborder : ANGUILLOIDEI

Family : ANGUILLIDAE

Genus : *Anguilla* Shaw.

Anguilla bengalensis (Gray & Hardw.)

1833-34. *Muraena bengalensis* Gray and Hardwicke, III. Ind. Zool. Hardwicke, 2, pl. 95, fig. 5. (type locality : the Ganges).

1889. *Anguilla bengalensis* Day, Fauna. Brit. India, Fish. 1, p. 86.

Material : 1 ex., 98.5 cm. T.L.

Description : Length of head 3 in the distance between the snout and the vent ; length of tail one fifth more than that of the trunk ; the distance between the gill opening and the origin of the dorsal fin is one seventh more than the length of the head unlike the description of Day (1889) where it is one third or one fourth more than head length ; also the distance between the origin of dorsal and anal fins is less than the length of the head ; head rather broader than the body ; lower jaw prominent ; the cleft of the mouth is nearly one third head length ; diameter of eye nearly three in length of snout ; lips well developed, the vomerine band does not extend posteriorly so far as the maxillary one, the mandibular teeth divided by a longitudinal groove ; Pectorals three in head length ; vertical fins fleshy and rays are not distinct.

Distribution : Islands in the Indian Ocean, Continent of India and Burma. This eel is common in the Andaman Islands and probably ranges to the Malay Archipelago, Formosa and the Pacific. It attains to about four feet and upwards in length.

Affinities : *Auguilla bengalensis* has been recorded only in the rivers of North India. For the first time a large specimen has been collected from Silent Valley. Menon, A.G.K. (Pers. Comm.) opines that *Anguilla bicolor*, a South Indian form which grows upto two feet and which has lesser number of dorsal fin rays (220–245) and a shorter fin length may be a smaller variety of *Anguilla bengalensis* which grows upto 4 feet and has more number of fin rays (250–305); as observed in *Cynoglossus* where rays are added on to the front of the dorsal fin, as the fish grows, shifting the position of dorsal fin. Hence this character, viz. the position of dorsal fin to vent used in classifying *A. bengalensis* and *A. bicolor* may not be of a specific nature. This view can be substantiated only by the study of different size groups of *A. bicolor* and *A. bengalensis*.

Order : CYPRINIFORMES

Suborder : CYPRINOIDEI

Family : CYPRINIDAE

Genus : **Barilius** Hamilton.

Barilius gatensis (Cuv. & Val.)

1844. *Leuciscus gatensis*, Cuvier and Valenciennes, *Hist. Poiss.* xvii. p. 309.

1889. *Barilius gatensis*, Day, *Faun. Brit. India*, Fish. 1. p. 349.

Material : 18 exs., 34.0–121.0 mm. S.L., 22nd January 1979; 3 exs., 32.0–33.0 mm. S.L., 23rd January 1979; 1 ex., 82.0 mm. S.L., 24th January 1979; 9 exs., 48.0–71.0 mm. S.L., 1st January 1979; 3 exs., 19.0–38.0 mm. S.L., 16th January 1980; 23 exs., 46.0–90.0 mm. S.L., 26th January 1980; 1 ex., 65.0 mm. S.L., 28th February 1980; and 8 exs., 56.0–93.0 mm. S.L., 29th April 1980.

Description : D.2/8; A.3/14; L.1.40. One pair of minute mandibular barbels. In the males the snout and cheek covered with large glands and rough spots on the scales. 11–15 vertical bars along the sides becoming more or less broken up in the adult. Opercle blotched, dorsal and anal with dark bases and light margins. Caudal deeply forked.

Distribution : Western Ghats of Malabar and Nilgiri hills upto about 5000' above the sea level.

Garra menoni Rema Devi & Indra

1984. *Garra menoni* Rema Devi and Indra, *Bull. Zool. Surv. India*, 5 (2 & 3) : 121-122.

Holotype : River Kunthi, Silent Valley (Alt. 867 metres), Kerala, 19th January, 1979, 69.0 mm. S.L., Reg. No. F.553.

Paratypes : River Kunthi, Kerala, 19th January, 99 exs, 31.0—69.0 mm. S.L.,

Description : D.3/7-8; P.1/12-15; V.1/7-8; A.2-3/5; C.17-19.

Depth of body 5.29 (4.39—6.48), length of head 4.23 (3.71 – 5.23). in standard length; width of head 1.3 (1.17 – 1.65); snout 2.01 (1.71 – 2.38); eye 5.7 (4.0 – 7.0) in length of head; eye 2.63 (1.75 – 3.5) in interorbital width; eye 2.85 (2.0 – 3.5) in snout. Pupil of eye either in the middle or a little behind the middle of the length of head. Snout round and smooth, the males with fine tubercles. Two pairs of barbels, smaller than the diameter of eye. 7-8 outer gill rakers in the lower part of the anterior arch. Mental disc well developed, length of disc 1.46 (1.2—1.7) in its own width. 32-36 scales in lateral line, 4.5 from the origin of dorsal to lateral line, 3-3½ between this and the pelvic. Chest and belly naked. A part of the prepelvic region with subcutaneous scales. Distance from vent to anal fin 3.48 (2.13—5.0) in that between pelvic and anal fin. Width of caudal peduncle 1.35 (1.0—1.82) in its own length.

Posterior chamber of air bladder measured in one specimen is found to be 14% in standard length.

Colour in formaldehyde dark brown above paler beneath. A faint lateral band from gill opening to the base of the caudal fin.

Relationships : This form differs from the widely distributed *G. mullya* (Sykes) and other known forms, Menon (1964), in colour pattern, in the absence of scales on the chest and belly, and in the marked difference in the position of the vent. It differs from *G. hugi* Silas in the presence of scales in the mid dorsal streak, and in the lesser number of lateral line scales etc.

Distribution ; River Kunthi, Silent Valley, Kerala State

Order : CYPRINIFORMES

Suborder : COBITOIDEI

Family : HOMALOPTERIDAE

Subfamily : NOEMACHEILINAE

Genus : *Noemacheilus* Van Hasselt, 1823

Subgenus : *Mesonoemacheilus* Banareescu & Nalbant

Noemacheilus (Mesonoemacheilus) triangularis Day.

Material : 16 exs., 39.0-61.0 mm. S.L , 22nd January 1979, River Kunthipuzha, Silent Valley, Kerala.

Description : D.3/7-8; V.1/6-7; A.3/5; P.1/9-11; C.18-20. Lateral line complete.

Length of head 4.11 (3.81-4.5), depth of body 6.76 (6.21-7.6) in S.L.; width of head 1.78 (1.52-2.0), length of snout 2.44 (1.78-2.9), eye diameter 6.23 (5.0-7.71) in head length; eye 2.57 (2.0-3.13) in snout and 1.85 (1.62-2.0) in interorbital width; length of caudal peduncle 1.26 (0.85-1.62) in height of caudal peduncle ; post dorsal 1.01 (0.96-1.14) in pre dorsal distance ; distance between anus to anal fin 3.21 (2.17-3.5) in the distance between anus to base of ventral fin.

Body subcylindrical in front and laterally compressed in the posterior half. Nasal flaps produced into a barbel like process. Barbels three pairs, two rostral and one maxillary. The second rostral reaches middle of the eye while the maxillary extends to its hind border. Head mottled and the dorsal body surface is with bands which exhibit variations in size, pattern and number, the bands being of a vertical, horizontal or of a zig-zag pattern. No two specimens were found to have the same colour pattern. Vertical and paired fins not spotted. A dark black band along the lateral line from head to the base of the caudal. Varying number of spots (1-9) are seen along the sides of the body (sometimes spots absent) and none below the lateral line. Caudal forked and its base with two to three spots or a blotch. Males with a movable broad suborbital process. Ventrals with a fleshy appendage at its base.

Relationship : After the work of Day (1889), new species have been described by Hora (1921, 1935 & 1937) and Menon (1950) from Peninsular India. Fraser (1942), Hora (1926, 1942), Hora and law (1941), John (1936), Rajan (1955), Raj Tilak and Tiwari (1976), Silas (1951, 1952, 1954) and Suter (1944) have reported on the list of *Noemacheilus* from different parts of Peninsular India. The *Noemacheilus* are an extremely interesting though difficult group of fishes. A revision of the family has been done by Banareescu & Nalbant (1968). Subsequently Menon (1984) studying the Cobitoid fishes has placed the genus *Noemacheilus* under the subfamily Noemacheilinae, included under the family Homalopteridae. Under the order Cypriniformes the Homalopterids and Noemacheilids have been grouped under the suborder Cobitoidei. *Noemacheilus triangularis* Day has been placed under the subgenus *Mesonoemacheilus* Banareescu and Nalbant, under the *triangularis* complex.

Relationship : *Noemacheilus (Mesonoemacheilus) triangularis* from Silent Valley differs from all the other peninsular forms in its unique body colour pattern and body stature. It also differs from the typical *N. triangularis* Day in the body colour pattern and in the absence of bands or other markings in the paired and vertical fins. In addition it has a well developed nasal appendage like process.

***Noemacheilus (Mesonoemacheilus) guentheri* Day**

1867. *Noemacheilus guentheri* Day, *Proc. Zool. Soc.* p. 285.

Material : 5 exs., 23.0-37.0 mm. S.L., 18th February 1979, Cherupuzha, Nedungayam, Coll. T S. N. Murthy; 1 ex., 56.0 mm. S.L., 3rd March 1979, R. Cherupuzha, New Amarambalam, Coll. K. R. Rao ; 26 exs., 32.5-52.0 mm, S.L., 7th March 1979, Poochapara, Coll. K. R. Rao ; 25 exs., 32.0-49.0 mm. S.L., 18th March 1979, Sayivala, Coll. K. R. Rao ; and 1 ex., 35.0 mm. S.L., 22nd March 1979, Nelambur, Punjakolli, Coll. K. R. Rao.

Description : D.3/7-8 ; V.1/6-8 ; A.3/5 ; P.1/8-10 ; C.18-19. Lateral line complete.

A detailed account of the colour pattern is given (Plate I, Fig.1) to supplement Day's description of *N. guentheri*. There are about 9-13 rows of narrow white bands alternating with broad interspaces

restricted to the back of the body. In very young examples similar bands are also seen on the ventral surface posterior to the ventral fins and in some, these bands meet the dorsal bands along the sides. Two bands are seen encircling the body in all, one behind the head and the other at the base of the caudal fin. The rest of the bands in the adults are broken up on either side to form three alternating rows of spots, the middle row having a black border and situated along the lateral line. Rarely the entire sides are spotted, the spots extending further down to the ventral surface in which case about four to five alternate rows of spots are seen. The dark brown ground colour becomes paler towards the ventral side. Dorsal and caudal brightly spotted in three to four rows. Ventral and anal faintly spotted in two rows. A black spot at the beginning of the dorsal and a black blotch or band at the base of the caudal. Head faintly blotched. A faint black streak extends from eye to base of caudal along the lateral line and another along the dorsal profile. Caudal forked, lower lobe slightly the longer. Ventral bases with a fleshy appendage. Males with a movable broad suborbital spine.

Distribution : Nilgiris, Western Ghats, S. India.

Relationship : This bears a fair resemblance to *N. guentheri* Day, in the colour pattern and morphometric characters; it differs from the same in the presence of a complete lateral line system. In *N. guentheri* Day the lateral line extends only upto anal fin.

Subfamily : HOMALOPTERINAE

Genus : **Homaloptera** Van Hasselt

Homaloptera pillaii Indra and Rema Devi

1981. *Homaloptera pillaii* Indra and Rema Devi, *Bull. Zool. Surv. India*, 4 (1) : 67-70.

Material : 21 exs , 33.0-69.0 mm. S.L., 19th January 1979, Silent Valley, Kerala.

Description : D. 1/7-9; A 1-2/4-5; P. 7-9/11-13; V 2-3/8-9; L. 1.83-93.

Depth of body 14.33 (12.52-16.66), Length of head 24.51 (20.70-26.53), Length of caudal 21.19 (16.0-23.92), in percent of S.L., snout 49.02

(44.44-57.14), eye diameter 15.02 (10.0-20.0), length of pectoral 104.9 (89.29-120.5) in percent of head length; eye 30.21 (19.05-40.0) in percent of snout, 42.63 (25.0-60.24) in percent of interorbital distance. The gape of mouth 46.93 (35.71-58.14) in percent of width of head; distance between anus and anal fin 15.31 (10.72-22.22) in percentage of distance between anus and pelvic fin base; height of caudal peduncle 73.18 (53.76-92.59) in percent of length of caudal peduncle; mouth inferior, transverse and slightly arched; rostral groove and rostral fold slightly developed; lips full, plain and continuous, two pairs of rostral and a pair of maxillary barbel present; all are of equal size and nearly twice the length of diameter of eye; gill opening oblique, extending to ventral surface for a short distance; head and ventral surface up to the base of pelvic fin scaleless, dorsal origin just behind that of pelvic base and behind the middle of the length; pectorals not reaching pelvic; anus nearer to anal fin than to the pelvics; pelvics with two simple rays except in one example where one side of the fin has three simple rays; caudal fin emarginate; lateral line complete with 83-93 small scales; caudal peduncle 1.08-1.86 in its own length.

Body light to dark brown, mottled with irregularly spaced dark spots. Dorsal side of head with dark spots. Anal with poorly defined bean shaped blotch at its base. All other fins are dusky brown and without any markings. Abdomen yellowish to light brown in colour.

Distribution : River Kunthi, Silent Valley, Kerala.

Relationship : *Homaloptera pillaii* differs from the only other species described from Western Ghats viz. *Homaloptera montana* Herre, in a number of meristic and morphometric characters and in colour pattern. The main differences seen were the more number of branched rays in the dorsal, pectoral and pelvic fins and the more number of lateral line scales in *H. pillaii* compared to *H. montana* Herre.

Family : COBITIDAE

Genus : *Lepidocephalichthys* Bleeker

Lepidocephalichthys thermalis (Cuv. and Val.)

1846. *Cobitis thermalis* Valenciennes, *Hist. nat. Poiss.*, 18, p. 78.

Material : 1 ex., 32.0 mm. S.L., 28th February 1980, Silent Valley.

Distribution : Southern India, Malabar Coast, Wynaad and Ceylon.

Suborder : SILUROIDEI

Family : SISORIDAE

Genus : **Glyptothorax** Blyth**Glyptothorax annandalei** Hora

1923. *Glyptothorax annandalei* Hora, *Rec. Ind. Mus.* XXV, p. 14. pl. 1, fig. 3.

1938. *Glyptothorax annandalei* Hora, *Rec. Ind. Mus.* XL, p. 372, text fig. 3.

Material : 1 ex., 53.0 mm. S.L., 19th January 1979, Silent Valley.

Description : D. $1\frac{1}{6}$; P. $1\frac{1}{10}$; V $1\frac{1}{6}$; A. $1\frac{1}{10}$; C. 17.

Length of head 5.5, of caudal 4.3, height of body 8 in total length ; eyes slightly behind the middle of the length of head ; width of the interorbital equals to two sevenths of the length of head ; width of head slightly shorter than head length, upper surface smooth ; gape of mouth $2\frac{1}{3}$ in length of head ; lips not fringed ; thoracic adhesive apparatus elongated, reaching to the first third of the pectoral spine, its plaits are not branched ; the nasal barbel reach halfway to the orbit, the maxillary extend to the first third of pectoral, the outer mandibular to the gill opening, the inner are shorter ; dorsal slightly higher than the body, its spine rather slender and enveloped in the skin ; pectoral spine moderately broad, internally weakly denticulated ; the fins do not reach the ventral ; caudal forked.

Distribution : Western Ghats, Vindhya and Nepal Himalayas.

Relationship : This fish bears very close resemblance to *G. annandalei* but differs from it in having almost a smooth skin, the dorsal origin being almost equidistant from the snout and the commencement of the adipose dorsal. Pectorals are as long as head. It resembles *G. lonah* (Sykes) in the absence of granulated skin but differs from it in the dorsal being longer than body depth as against $\frac{3}{4}$ th body depth in *G. lonah*.

Order : CHANNIFORMES

Family : CHANNIDAE

Genus : **Channa** Scopoli**Channa gachua** (Ham.)

1822. *Ophiocephalus gachua* Hamilton, *Fish. Ganges.*, p. 68, 367, pl. 21, Fig. 21.

Material : 12 exs., 86.0-115.0 mm. S.L., 16th January 1979, Silent Valley.

Distribution : Fresh waters of India, Pakistan, Burma and Ceylon.

DISCUSSION

576 specimens were collected from River Kunthi belonging to six families and comprising 9 species of which two are new to Science. This collection forms a very valuable addition to our knowledge of the fish fauna of this area. From the array of novelties that has hitherto been collected from the Western Ghats, it would seem that in each of its river systems, the naturalist is sure to come across new forms or else new facts pertaining to the status, relationship, distribution etc. of species known to science or forms in the process of evolution. The fish fauna of hill-streams offers an unique opportunity to study some of the most remarkable adaptive designs among fishes.

Among Indian fresh water fishes, members of families Cyprinidae, Psilorhynchidae, Cobitidae, Homalopteridae, Sisoridae, and Pillaiidae have successfully colonised the hill-streams and in doing so many of them have evolved various devices to resist the fast current. Yazdani (1983) studied the origin and evolution of the frictional and adhesive devices in fishes of the torrents.

Of the species collected from Silent Valley extreme adaptations to hill-stream habitats are met with in *Garra*, *Glyptothorax* and *Homaloptera*. *Noemacheilus* which live in rapid running streams under pebbles show less well-marked adaptations.

A detailed morphometric study of the two new species and the *Noemacheilus* spp. were undertaken principally with a view to determine the more precise systematic characters in the genus and to find the range of variation within individual species limits of certain characters, which have been earlier widely used for separating species. For ex. *Noemacheilus* (*Mesonoemacheilus*) *triangularis* (Day) showed extreme variations in colour pattern and no two individual showed similar pattern thus showing that in this form slight changes in colour pattern cannot be of use in separating species (Plate 1, fig. 2&3). But as a group they showed certain marked difference in the colour pattern from other known forms.

In *Garra* spp. the position of eye which was previously used as one of the characters in classification were found to vary in the 100 exs. of the new species studied in detail. The different size groups studied showed that the eye occupies more or less the anterior position in young forms and as the size increased they were gradually found to shift through the middle to a posterior position. Similarly the presence or absence of scales is of phenomenal importance in Ichthyological studies and hill stream forms show extreme adaptations in the reduction of scales thus reducing the resistance against the fast flowing mountain streams. In the new species of *Garra* the scales are absent along the ventral surface which are in close contact with the substratum and laterally subcutaneous scales are present, weaker scales along the remainder of the body are met with. So also on the dorsal side scales greatly apposed to the skin were met with showing that evolutionary changes are still in progress towards complete absence of scales. Of the other species described from Silent Valley *Anguilla bengalensis* and *Glyptothorax annandalei* and *Noemacheilus* spp. show some variations in their morphometric and meristic characters from the typical form. The wide ranges in the biometric characters and the variable colour pattern seen within species could well imply that evolutionary changes are still in progress ; the structural modifications arising in response to the necessities of the hill-stream habitat in fish fauna which have colonized the torrents by means of a step by step migration from lower levels. The various factors that have brought about the fundamental changes in the adaptive features in the hill-stream fishes can best be observed in the Silent Valley.

Hora (1949), Silas (1952), Menon (1973) and Jayaram (1977) have clarified the taxonomic position of many of the Peninsular representatives of the Indian fresh water fishes and their probable course of migration, their zoogeographical significance etc. From the contributions of the above mentioned Systematists it is known that the most remarkable feature of the zoogeography of India is the occurrence of the Malayan element in the freshwater and torrential fauna of the Indian peninsula. The typical Himalayan Ichthyofauna *Noemacheilus* and *Garra* are represented in the present collection.

The Homalopteridae constitute a remarkable family of Cyprinoid fishes which have undergone a great variety of adaptive modifications induced by the necessity of living in swift currents of the torrential streams ; it has a fairly wide range of distribution, extending from

Peninsular India in the West to the Formosa in the Northeast and Islands of the Malayan Archipelago in the South. The preponderance of endemic genera and species in the different zoogeographical units is a remarkable feature met with among these fishes, for it indicates rapid evolutionary radiation after isolation. Of the four Homalopterid genera the genus *Homaloptera* is represented by only one species which are endemic in Peninsular India. The discovery of yet another species of *Homaloptera* in Peninsular India may throw light on the migration of torrential fishes from Eastern Himalayas to Western Ghats.

According to Hora (1932) "it is worthwhile to remember that so long as we are ignorant of the factors constituting what is known as an environment, it is futile to lay too much stress on the characters of the animals inhabiting it, more especially with reference to their utility and evolution." and that evolution in the hill-stream fish fauna has been solely determined by the peculiar factors of their environment; increased specialisation always been associated with increased efficiency for life in tempestuous currents. The torrential streams of hills and mountain ranges owing to their strong currents, abundant oxygen, characteristic nature of the encrusted and other food sources owing to the rocky nature of the bottom, and the thick canopy above provide an unusual environment which offers unlimited gradations to aquatic life. Hora (op. cit.) also remarks that the fish fauna have become so modified under the influence of these factors that it is not possible to keep them alive out of hill-streams.

SUMMARY

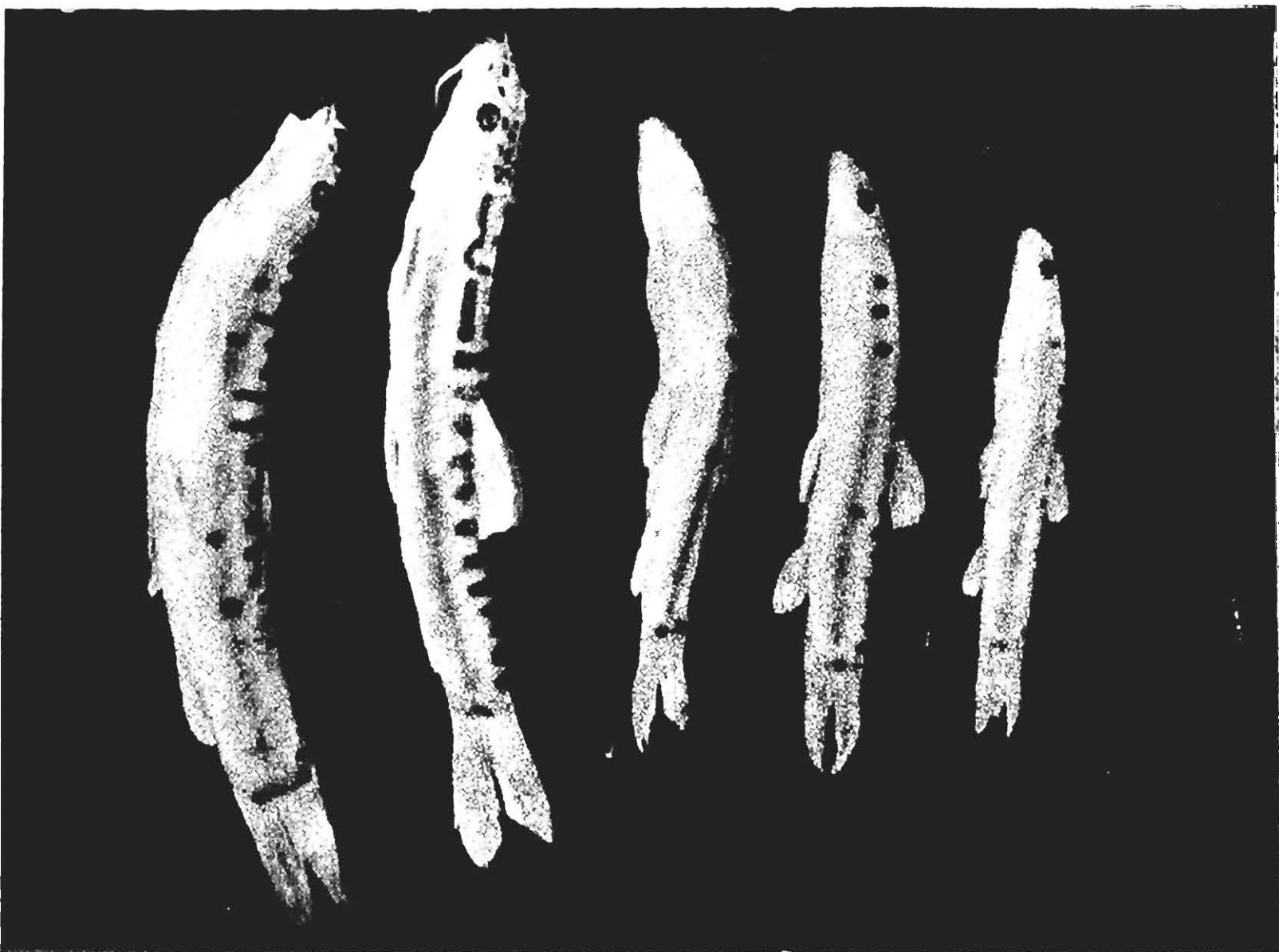
The Silent Valley by the Zoological Survey of India has yielded 576 specimens belonging to nine species and five families of which two are new to science viv. *Homaloptera pillaii* Indra and Rema devi and *Garra menoni* Rema devi and Indra. Species descriptions are detailed wherever necessary.

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Lateral view of *Noemacheilus Mesonoemacheilus güentheri* Day.



Lateral view of *Noemacheilus Mesonoemacheilus triangularis* Day.



Dorsal view of *Noemacheilus Mesonoemacheilus triangularis* Day.

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STUDIES ON THE TAXONOMY AND GEOGRAPHICAL DISTRIBUTION OF THE SPECIES OF BATS OBTAINED BY THE SILENT VALLEY (KERALA, INDIA) EXPEDITION, 1980.

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(With one text-figure)

INTRODUCTION

The Silent Valley Expedition of 1980, conducted by a team of zoologists of the Zoological Survey of India, Calcutta, headed by Dr. S. K. Bhattacharyya, Deputy Director, could obtain a small collection of mammals, chiefly bats. This collection contains 40 examples of bats belonging to three families, five genera and six species, one quill of the Indian Crested Porcupine, *Hystrix indica indica* Kerr, 1792, and one example of juvenile House Rat, *Rattus rattus* (Linnaeus, 1758) which could not be identified beyond the specific level, with certainty. In the following pages a brief account only of the bats has been given.

The specimens of bats could be procured only from two localities of the Silent Valley, Palghat district, Kerala, viz., Base Camp, 24 km. NW of Mukkali, and Baliaparathodu, 34 km. NW of Mukkali.

All the bats were collected with the help of nylon mist nets which were set up in the afternoon and the bats were recovered usually in the next morning. The fruit bats and the Rhinolophids were collected from the forests, mostly from those situated on the bank of a small river. All the specimens, except otherwise stated, are preserved in alcohol.

Only recent changes (after the publication of Ellerman and Morrison-Scott 1951) in synonymies have been included. All measurements are in millimetres. The figures in the parentheses, followed

by the range of measurements, indicate arithmetic means (for more than two specimens). Citations for earlier locality records for a species have been given only when such localities have been omitted from the geographical distribution of the species, both in the reports on the various collections of mammals obtained by the Bombay Natural History Society's Mammal Survey of India, Burma and Ceylon, and by Ellerman and Morrison-Scott (1951).

SYSTEMATIC ACCOUNT
Order CHIROPTERA
Suborder MEGACHIROPTERA
Family PTEROPODIDAE
Subfamily PTEROPODINAE

1 *Rousettus leschenaulti leschenaulti* (Desmarest, 1820)

Indian Fulvous Fruit Bat

Pteropus leschenaultii Desmarest, 1820. Encyclop. Method, Mamm, 1 : 110 (Environs de Pondichery = environments of Pondicherry, India).

Pteropus seminudus Kelaart, 1850. J. Ceylon Brch R. Asiat. Soc., 2 : 201 (*nomen nudum*).

Pteropus seminudus Kelaart, 1850. J. Ceylon Brch R. Asiat. Soc., 2 : 216 (Mount Laviana, Ceylon = Sri Lanka).

Xantharpyia seminuda Gray, 1870. Cat. Monkeys, Lemurs, & Fruit-eating Bats, Brit. Mus. : 115 (Ceylon = Sri Lanka).

Material : 2 ♂, 1 subad. ♂, 5 ♀, 8 subad. ♀ ; Baliaparathodu ; 23, 28, 29 Jan 1980.

Measurements :

External—

2 ♂ : Forearm 82.3, 82.6; tail 11.2, 20.3; ear 17.8, 18.4; tibia 36.3, 39.5 ; foot and claw 19.2, 21.6.

5 ♀ : Forearm 77.6—82.7 (80.4) ; tail 14.0 18.9 (16.6); ear 17.7 19.3 (18.5) ; tibia 35.0—36.6 (35.8) ; foot and claw 16.2—19.7 (18.2).

Cranial—

2 ♂ : Total length 37.6, 38.7 ; condylobasal length 35.4, 37.5 ; upper tooth-row (front of canine to back of last molar) 13.8, 15.5 ; cranial width 15.6, 15.7 ; zygomatic width 22.9, 23.0 ; canine width 7.2, 7.5 ; molar width 10.7, 11.3 ; mandibular length 27.9, 28.9.

- 5 ♀ : Total length 36.4—37.6 (37.0); condylobasal length 34.7—36.0 (35.4); upper tooth-row 13.7—14.5 (14.0); cranial width 14.7—15.5 (15.0); zygomatic width 20.7—23.0 (21.9); canine width 6.8—7.3 (7.0); molar width 10.5—11.3 (10.8); mandibular length 27.1—28.5 (27.6).

Remarks : It would not be quite out of place to discuss how the genus *Rousettus* is represented in the Indian Union and the distributional range of *Rousettus leschenaulti leschenaulti* (Desmarest). As per Ellerman and Morrison-Scott (1951), Prakash (1963), Agrawal and Sinha (1973) and Agrawal and Bhattacharyya (1977), though *Rousettus l. leschenaulti* is the only form of *Rousettus* which occurs in many parts of the Indian Union, two species of this genus also occur within the Indian limits, one near the western boundary and the other near the eastern border.

According to Prakash (1963), '..... *Rousettus arabicus* is Saharo-Rajasthani in distribution. *A. [sic] arabicus*, an Arabian species, finds suitable habitat in the Indian desert' However, all serious attempts to locate any previously collected material of this species from India as also attempts to collect fresh material from the locality specifically suggested by Dr. I. Prakash (personal communication, 4 Aug 1981), have miserably failed. Further, Sinha (1980) in his comprehensive study on the bats of Rajasthan, did not mention this species. It can, therefore, be stated with fair amount of certainty that Prakash's (*op. cit.*) conclusion is based merely on theoretical conjecture. *Rousettus arabicus* Anderson and de Winton, 1902, which is now called *Rousettus aegyptiacus arabicus* Anderson and de Winton (Eisentraut 1960), is known to undertake much local movements. It is also known to occur in southern Pakistan, east up to west of the Indus river (Roberts 1977). There is, therefore, every likelihood of its being obtained in the arid areas of Rajasthan and Gujarat. Till then, *Rousettus aegyptiacus arabicus* should be excluded from the Indian list.

Agrawal and Sinha (1973) have identified their single specimen from Tripura as *Rousettus amplexicaudatus amplexicaudatus* (E. Geoffroy, 1810) on comparison with material from Moulmein, Burma, present in the National Zoological collection of India (N.Z.C.I.) Calcutta, housed in the Zoological Survey of India (Z.S.I.), Calcutta, and labelled as *Rousettus amplexicaudatus*, with which their specimen

is similar in the structure of the baculum. Agrawal and Bhattacharyya (1977) consider the same specimen as *Rousettus amplexicaudatus* and observe that their specimen resembles *Rousettus leschenaulti* in the size of the third lower molar but resembles *R. amplexicaudatus* in the width of the ear and in the structure of the baculum. In a revisionary study, Rookmaaker and Bergmans (1931), who have also examined the specimen from Tripura mentioned above, have shown that the westernmost and northernmost limits of *Rousettus amplexicaudatus* are Tagoot, Tenasserim, southern Burma (*ex* Hill and Thonglongya 1972) and Thailand respectively, and the Tripura material is to be referred to *Rousettus l. leschenaulti*.

It would, therefore, stand that within the Indian Union the only *Rousettus* found is *R. l. leschenaulti* (Desmarest), which again is reported from the following different regions of this area :—Jammu and Kashmir (Chakraborty 1983), Uttar Pradesh, Sikkim (Ghose and Ghosal 1984), Assam (Blyth 1844), Arunachal Pradesh (Rookmaaker and Bergmans 1981), Tripura (Rookmaaker and Bergmans *op. cit.*). West Bengal, Bihar (Dobson 1876), Orissa (Das and Agrawal 1973), Andhra Pradesh and Tamil Nadu (Jerdon 1874), Kerala, Karnataka, Goa (Agrawal 1973), Maharashtra, Madhya Pradesh (Khajuria 1979) and Rajasthan. The fruit bats obtained from the Siju Cave, Garo Hills (Meghalaya) were reported as *Cynopterus sphinx gangeticus* Andersen, 1910, by Kemp (1924) on the basis of identification provided by H. C. Robinson of the Federated Malay States Museum. These specimens were later regarded as *Cynopterus sphinx sphinx* (Vahl, 1797) by Kurup (1968). But they are not at all *Cynopterus*, and excepting one example, are, in fact, *Rousettus l. leschenaulti*. These, therefore, confirm the occurrence of *Rousettus l. leschenaulti* in Meghalaya. Incidentally, N.Z.C.I. has specimens of this bat from all the localities mentioned here, besides those from others.

Sinha (1969), while synonymising *Rousettus seminudus* with *Rousettus leschenaulti*, follows Andersen (1912) who dates the former species from Gray's (1870) *Xantharpyia seminuda*. Andersen (*op. cit.*) states, 'The name *Xantharpyia seminuda* is commonly assigned to Kelaart, but Kelaart seems never to have published any description of the species ; ' This, of course, is not correct. The name *Pteropus seminudus* appears for the first time on page 201 of the second volume of the journal cited before, but is not accompanied by any description, as Kelaart (1850a), the author, simply gives a list of

mammals of Sri Lanka. On page 216 of the same volume, under a separate article, however, this name appears again wherein the author (Kelaart 1850b) gives the description and mentions various measurements as well as the type-locality of his new species. This species should, therefore, be dated from this last-named source, as have been done by Ellerman and Morrison-Scott (1951), and not from Gray's (1870) *Xantharpyia seminuda*.

The known range of distribution of *Rousettus leschenaulti leschenaulti* (Desmarest) is, therefore, Pakistan (Mirza 1965); India (where it is widely distributed, details as above); Sri Lanka (Sinha *op. cit.*); Nepal; Bhutan (Chakraborty 1975); Burma; southern China including Xizang (=Tibet, Cai and Zhang 1980); Hong Kong; Vietnam, Laos (Phillips 1967), possibly Kampuchea (=Cambodia, Rookmaaker and Bergmans 1981) and Thailand.

2. *Cynopterus brachyotis ceylonensis* Gray, 1870

Lesser Shortnosed Fruit Bat

Cynopterus marginatus var. *ceylonensis* Gray, 1870. Cat. Monkeys, Lemurs, & Fruit-eating Bats, Brit. Mus. : 122 (Ceylon = Sri Lanka).

Material : 2 ♂, 1 ♀ ; Base Camp ; 17 Jan 1980. 5 ♂, 1 subad. ♂, 4 ♀, 2 subad. ♀ ; Baliaparathodu ; 23, 29 Jan 1980.

Measurements :

External—

7 ♂ Forearm 63.7—66.0 (64.8) ; tail 12.2—14.3 (13.9) ; ear 15.2—17.0 (16.0) ; tibia 20.8—25.2 (23.7) ; foot and claw 13.7—15.2 (14.6).

5 ♀ : Forearm 64.6—67.6 (65.5) ; tail 12.7—14.9 (14.0) ; ear 15.5—18.7 (16.9) ; tibia 22.2—24.4 (23.4) ; foot and claw 14.3—15.0 (14.7).

Cranial—

7 ♂ : Total length 30.5—31.5 (30.9) ; condylobasal length 29.0—30.0 (29.6) ; upper tooth-row 10.2—10.9 (10.5) ; cranial width 12.2—13.3 (12.7) ; zygomatic width 19.6—20.6 (20.0) ; canine width 6.5—7.6 (6.9) ; molar width 9.1—9.8 (9.4) ; mandibular length 22.0—23.0 (22.5).

3 ♀ : Total length 29.2—30.9 (30.4) ; condylobasal length 28.0—29.7 (28.8) ; upper tooth-row 9.5—

10.4 (10.0) ; cranial width 12.2—12.8 (12.6) ; zygomatic width 19.1—20.3 (19.8) ; canine width 6.1—6.4 (6.3) ; molar width 8.6—9.2 (8.9) ; mandibular length 20.9—22.5 (22.0).

Remarks Till recently, *Cynopterus brachyotis ceylonensis* Gray was known only from Sri Lanka. Agrawal (1973) recorded it from Goa on the west coast of the Indian mainland. The present specimens, obtained for the first time from Kerala, indicate that this subspecies might possibly occur all along the western part of India, north at least to Goa.

Family RHINOLOPHIDAE

3. *Rhinolophus rouxi rouxi* Temminck, 1835 Rufous Horseshoe Bat

Rhinolophus rouxi Temminck, 1835. Monogr. Mamm., 2 : 30b (Pondicherry and Calcutta, India).

Rhinolophus Petersii Dobson, 1872, *J. Asiat. Soc. Beng.*, 41, pt. 2 : 337 (Some part of India, precise locality not known).

Material : 4 ♀ ; Base Camp ; 17 Jan 1980.

Measurements :

External—

4 ♀ Forearm 49.3—51.5 (50.3) ; tail 22.3—27.6 (25.6) ; ear 16.0—18.6 (16.9) ; tibia 20.6—22.4 (21.3) ; foot and claw 9.7—10.5 (10.0).

Cranial—

4 ♀ : Total length 21.2—22.1 (21.7) ; condylocanine length 18.1—19.0 (18.6) ; upper tooth-row 8.1—8.5 (8.3) ; cranial width 8.8—9.1 (9.0) ; zygomatic width 11.0—11.4 (11.2) ; postorbital width 2.6—2.7 (2.6) ; canine width 5.2—5.6 (5.4) ; molar width 8.2—8.4 (8.2) ; mandibular length 14.0—14.4 (14.2) ; lower tooth-row 8.4—8.8 (8.7).

Remarks : Sinha (1973), after examining the two syntypes of *Rhinolophus petersi* Dobson, present in the N.Z.C.I., Calcutta, has synonymised that taxon with *Rhinolophus rouxi rouxi* Temminck, 1835.

So far as the Indian Union is concerned, *Rhinolophus rouxi* is known from Kerala (Jerdon 1874), Tamil Nadu, Pondicherry, Karnataka, Goa (Agrawal 1973), Maharashtra, Andhra Pradesh

(Sinha 1973), Orissa (Das and Agrawal 1973), Uttar Pradesh, West Bengal, and Arunachal Pradesh (Lal 1983). The N.Z.C.I., Calcutta, has specimens from these areas excepting Pondicherry. This species is hereby reported for the first time from Madhya Pradesh (unreported specimen from Bastar district, Madhya Pradesh, present in the N.Z.C.I., Calcutta), and from Himachal Pradesh (two unreported specimens from Solan, Solan district, Himachal Pradesh, present in the N.Z.C.I., Solan, housed in the High Altitude Zoology Field Station, Z.S.I., Solan, Himachal Pradesh). Incidentally, there is also an example of this species from the Ajodhya Hills, Puruliya district, West Bengal, just on the border of Bihar, in the N.Z.C.I., Calcutta. Brosset's (1962a) statement that '...the Decan, Gujarat, Madhya Pradesh, and all regions of the dry and continental central part of India seem out of the range of the distribution of *Rhinolophus rouxi*' is, therefore, not fully borne out.

Ellerman and Morrison-Scott (1951) consider the Indian population of *Rhinolophus rouxi* as belonging to the nominate subspecies, while the Chinese population, according to them, belongs to the only other subspecies, *Rhinolophus rouxi sinicus* Andersen, 1905. Topal (1975), mainly on the basis of the structure of the baculum, prefers to call his specimens from northern Vietnam as *Rhinolophus sinicus*. But the differences in the structure and measurements of the bacula of his specimens from those of the Indian material, also studied by him, can very well come within the range of individual variation. Even he himself has no explanation for the slight differences in the bacula of the two populations of his northern Vietnamese material. Topal's (*op. cit.*) specimens should, therefore, better be referred to *Rhinolophus rouxi* Temminck, at the moment. Again, Lal (1983) reports a specimen from Subansiri district of Arunachal Pradesh, India, as *Rhinolophus rouxi sinicus* Andersen. Further, the same author has reported a specimen of *Rhinolophus rouxi rouxi* Temminck from Toungoo, central Burma (Lal 1981).

Studies on further specimens, especially on those from the mountainous regions of northern India and Nepal, and from southern China, Burma and northern Vietnam are needed to delimitate precisely the limits (both taxonomic and geographical) of the two subspecies of *Rhinolophus rouxi* Temminck.

The distributional range of the species *Rhinolophus rouxi*, therefore, stands as Sri Lanka, peninsular India (where it is fairly widely distributed, details as above) north to Solan in Himachal Pradesh, east to Uttar Pradesh, Nepal, Arunachal Pradesh and southern China (Hupeh, Fujian (=Fukien), Sichuan (=Szechuan). Yunan (=Yunnan) and Chekiang) and Hong Kong (Romer 1966) ; also central Burma and northern Vietnam.

4. *Rhinolophus lepidus lepidus* Blyth, 1844

Blyth's Horseshoe Bat

Rhinolophus lepidus Blyth, 1844. *J. Asiat. Soc. Beng.*, 13 : 486 (Vicinity of Calcutta, West Bengal, India).

Material : 1 ♂, 2 ♀ ; Baliaparathodu ; 23, 24 Jan 1980.

Measurements :

External—

1 ♂ : Forearm 40.0 ; tail 17.8 ; ear 15.0 ; tibia 14.9 ; foot and claw 7.4.

2 ♀ : Forearm 39.5, 40.6 ; tail 17.5, 20.3 ; ear 15.5, 17.5 ; tibia 13.3, 15.0 ; foot and claw 7.5, 7.5

Cranial—

2 ♀ : Total length 16.5, 16.6 ; condylocanine length 14.2, 14.2 ; upper tooth-row 6.0, 6.1 ; cranial width 6.6, 7.2 ; postorbital width 2.2, 2.4 ; canine width 3.6, 3.9 ; molar width 5.5, 6.2.

Remarks : In recent years, there have been much discussions regarding the limits of the species *Rhinolophus lepidus* Blyth, 1844, and the recognition of its various subspecies. Ellerman and Morrison-Scott (1951) consider that this species consists of two subspecies, the nominate subspecies in India and *Rhinolophus lepidus shortridgei* Andersen, 1918 (type locality : Pagan, Burma), in Burma and southern China. These authors also consider *Rhinolophus monticola* Andersen, 1905 (type-locality : Mussoorie, Dehra Dun district, Uttar Pradesh, India), and *Rhinolophus feae* Andersen, 1907* (type-locality Biapo, Karen Hills, Burma), as distinct species and, with some doubt, place them under the *lepidus* subgroup. Aellen (1959) places *Rh.*

*Though Ellerman and Morrison-Scott (1951), Sinha (1973) and Hill and Yoshiyuki (1980) give 1905 as the date of publication of *Rhinolophus feae* Andersen, but on the title page of the concerned volume of the journal in which the description appears for the first time and which is present in the library of the Zoological Survey of India, the date is printed as 1907.

monticola as a subspecies of *Rh. lepidus*, though he thinks that the former can as well be a synonym of the nominate subspecies of the latter. Gaisler (1971), on the basis of a brief examination of the type of *monticola*, is inclined to believe that the same represents a good subspecies. Sinha (1973) in his review of the Indian forms of the genus *Rhinolophus*, considers both *Rh. monticola* and *Rh. feae* as distinct species. Hill and Yoshiyuki (1980) consider *Rhinolophus monticola*, *Rhinolophus rufulgens* Andersen, 1905 (type-locality : Perak, Malay Peninsula, Malaysia), *Rhinolophus feae*, *Rhinolophus rufulgens cuneatus* Andersen, 1918 (typ-locality : Dali, northern Sumatra = Sumatera), and *Rhinolophus lepidus shortridgei* as conspecific with *Rhinolophus lepidus* and recognise the following subspecies under it :—

(1) *Rhinolophus lepidus moticola* Andersen, 1905, (2) *Rh. l. lepidus* Blyth, 1844, (3) *Rh. l. shortridgei* Andersen, 1918, (4) *Rh. l. feae* Andersen, 1907, (5) *Rh. l. rufulgens* Andersen, 1905, and (6) *Rh. l. cuneatus* Andersen, 1918.

Again, Lal (in press) considers *Rhinolophus monticola* as a synonym of *Rhinolophus l. lepidus* and *Rhinolophus feae* as a subspecies of *Rhinolophus lepidus*. Under the circumstances, Hill and Yoshiyuki's (*op. cit.*) conception regarding the specific limits of *Rhinolophus lepidus* Blyth, 1844, appears to be most convincing.

Hill and Yoshiyuki (1980) include only the northern part of India within the distributional range of *Rhinolophus lepidus*. But this species, so far as the Indian Union is concerned, is known from Kumaon in Uttar Pradesh, Delhi (Brosset 1962a), Rajasthan (Prakash 1956), Madhya Pradesh, Maharashtra, Karnataka, Kerala (Blanford 1891), Orissa (Das and Agrawal 1973), Bihar, West Bengal and Meghalaya. The N.Z.C.I., Calcutta, has specimens from all these places except Uttar Pradesh and Delhi. This species is reported here for the first time from Tamil Nadu and Andhra Pradesh based on unreported specimens present in the same collection from Salem district of Tamil Nadu (Mammal Survey Collection) and Vishakhapatnam district of Andhra Pradesh. The distributional range of *Rhinolophus lepidus*, as understood above, therefore, stands as follows :—

Afghanistan (Aellen 1959), Nepal (Mitchell 1980), India (where it is widely distributed, details as above), east to southern China

(Sichuan and possibly Yunan), south through Burma, peninsular Thailand, Malay Peninsula and adjoining islands, and Sumatra (=Sumatra).

The controversy regarding the status of *Rhinolophus monticola* Andersen, 1905, can be settled only after studying good series from Afghanistan, India and Nepal when the southeasternmost limits of *Rh. l. monticola*, if found valid as a subspecies, are precisely determined.

Following Blyth (1844), who says regarding the type-specimens, 'The specimen (in spirits) and an injured skin of apparently the same species, were both probably obtained in the vicinity of Calcutta.', there exists some element of doubt regarding the type-locality of *Rhinolophus lepidus* Blyth. Since this species is very common around Calcutta— vicinity of Calcutta (not simply Calcutta, as some authors give) should be accepted as the type-locality of *Rhinolophus lepidus* Blyth.

Family VESPERTILIONIDAE

Subfamily VESPERTILIONINAE

5. *Myotis peshwa* (Thomas, 1915)

Peshwa's Bat

(Text-figure 1)

Leucone peshwa Thomas, 1915. *J. Bombay nat. Hist. Soc.*, 23 : 610 (Poona, Bombay =Pune district, Maharashtra, India).

Material : 1 ♀ ; Baliaparathodu ; 28 Jan 1980.

Additional material : 1 ♂ (study skin and skull) ; Molem, Goa ; 18 Feb 1980 (collected by G. Topal and preserved in the Hungarian Natural History Museum, Budapest).

Measurements :

External—

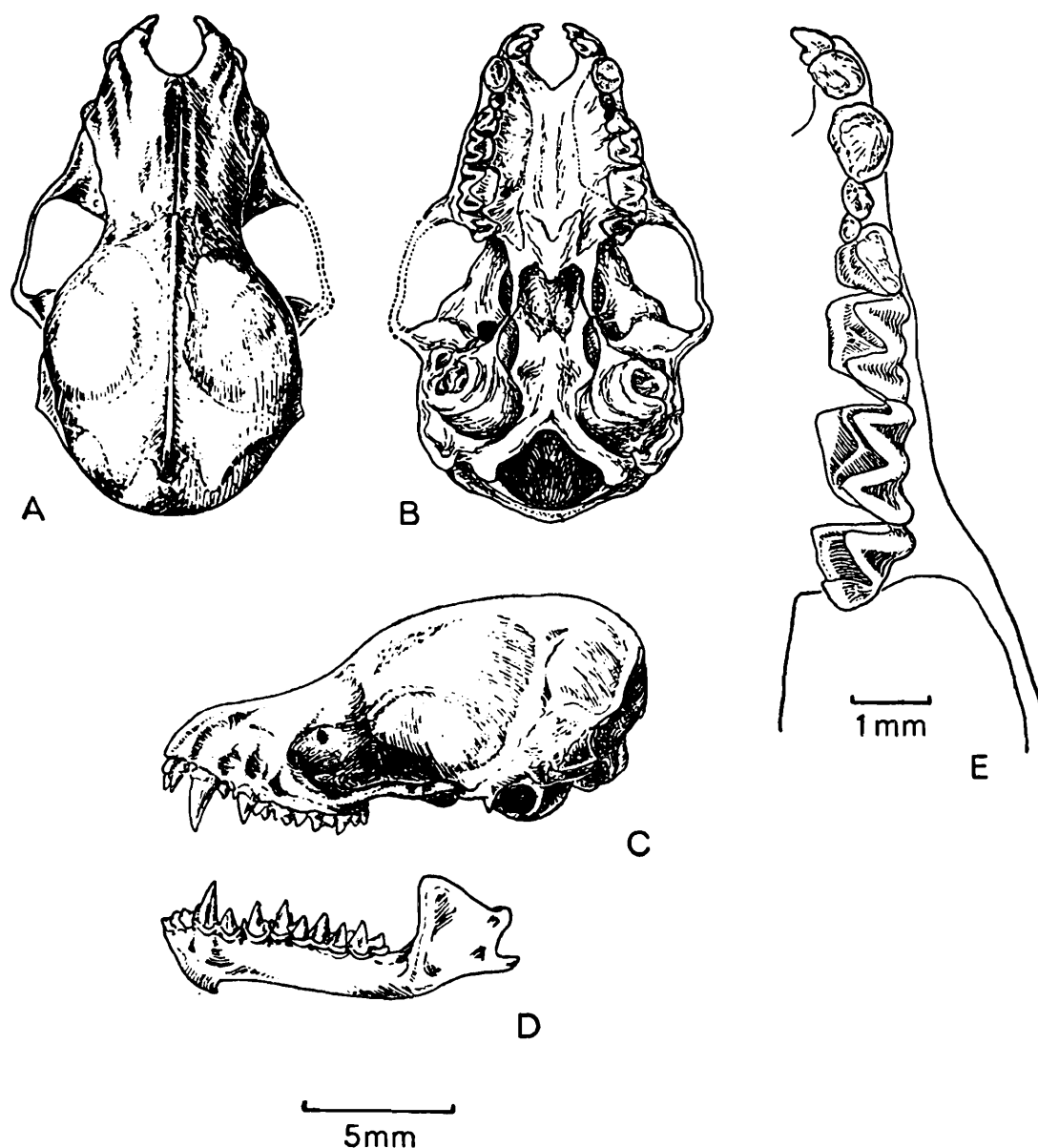
1 ♂, 1 ♀ : Forearm 38.7, 38.0 ; tail 38.9, 42.5 ; ear 15.6, 14.0 ; tragus 7.4, 6.5 ; tibia 17.0, 16.4 ; foot and claw 10.3, 10.0.

Cranial—

1 ♂, ♀ : Total length 15.9, 15.9 ; condylobasal length 14.5, 14.4 ; condylocanine length 13.7, 13.4 ; upper tooth-row 5.6, 5.8 ; cranial width 7.8, 7.5 ; zygomatic width 9.9, — ; mastoid width 8.0, 8.0 ;

postorbital width 3.7, 3.7 ; width across anterior orbital foramina 4.1, 4.0 ; canine width 4.3, 4.0 ; molar width 5.8, 6.0 ; mandibular length —, 10.7 ; length of right ramus of mandible 11.5, 10.6 ; lower tooth-row 6.1, 6.5.

Field notes : The male specimen was caught near water, at about 19.10 hours. It was entangled in the net at a height of about 1.2 metres from the ground. The female specimen was netted



Text-figure 1. Skull of *Myotis peshwa* (Thomas) from the Silent Valley, Kerala, India : A. dorsal view, B. ventral view, C. lateral view, D. lateral view of lower jaw, E. left upper tooth-row

near the edge of a hill-stream flowing through the forest. It was caught at about 19.15 hours when the twilight was fading and darkness coming in.

Remarks : The male specimen is slightly lighter than the female one.

Ellerman and Morrison-Scott (1951) place, with some doubt, *Leucone peshwa* Thomas, 1915, as a subspecies of *Myotis adversus* (Horsfield, 1824). Brosset (1962*b*) questions the suitability of such an arrangement and considers *Myotis peshwa* (Thomas) as a distinct species. Hill (1977) has concluded that *Myotis peshwa* is a species more closely related to *Myotis horsfieldi* (Temminck, 1840) than to *Myotis hasseltii* (Temminck, 1840) or to *Myotis adversus*.

Myotis peshwa (Thomas), one of the rarest Indian bats, has so far been reported only from Sabalgarh, Morena district, Madhya Pradesh (Hill 1977); Jabalpur district, Madhya Pradesh (Khajuria 1979); near Satara, Satara district, Maharashtra (Hill *op. cit.*); Elephanta Island, off Bombay, Maharashtra (Brosset 1962*b*); Pune, Pune district, Maharashtra (Thomas 1915) and Kodai, Kumrun, near Mangalore, Dakshina Kannada (=South Kanara) district, Karnataka (Hill *op. cit.*). Brosset (*op. cit.*) includes Thana (=Thane), Maharashtra, in the list of localities of this species, on the basis of Wroughton (? year). But I cannot trace this specimen. Khajuria (1980) mentions this species from Mandla district, Madhya Pradesh, on the basis of Hill (*op. cit.*), but the latter author never mentions any such specimen. The present specimens record *Myotis peshwa* for the first time from Goa and Kerala. The Kerala specimen extends the range of distribution of this species further southwards.

Subfamily MURININAE

6. *Harpiocephalus harpia lasyurus* (Hodgson, 1847)

Hairywinged Bat

Noctulinia lasyura Hodgson, 1847, *J. Asiat. Soc. Beng.*, 16 : 896 (Central Hills, sub-Himalayas = Darjiling, Darjiling district, West Bengal, India, according to Wroughton 1918).

Harpiocephalus harpia madrassius Thomas, 1923. *J. Bombay nat. Hist. Soc.*, 29 : 28 (Perumal, Palni Hills, South India = Perumal, Palni Hills, Madurai district, Tamil Nadu, India).

Material : 1 ♂ (study skin and skull); Baliaparathodu; 23 Jan 1980.

Measurements :

External—

1 ♂ : Forearm 44.7; tail 40.0; ear 15.7; tragus 10.6; tibia 20.5; foot and claw 11.4.

Cranial—

- 1 ♂ Total length 21.5 ; condylobasal length 19.0 ; condylocanine length 18.4 ; palatal length 8.8 ; upper tooth-row 6.7 ; cranial width 9.5 ; zygomatic width 13.1 ; postorbital width 5.5 ; canine width 6.1 ; molar width 7.2.

Field notes : The present specimen was caught at about 20.00 hours, near a pool of water in a clearing in the valley, either side of which was covered with tall trees.

Remarks Das (1986) has synonymised *Harpiocephalus harpia madrassius* Thomas, 1923, with *Harpiocephalus harpia lasyurus* (Hodgson, 1847). This species has also been reported from Sabah, northern Borneo (Medway 1965).

SUMMARY

A collection of bats consisting of six species, namely, *Rousettus leschenaulti leschenaulti* (Desmarest), *Cynopterus brachyotis ceylonensis* Gray, *Rhinolophus rouxi rouxi* Temminck, *Rhinolophus lepidus lepidus* Blyth, *Myotis peshwa* (Thomas) and *Harpiocephalus harpia lasyurus* (Hodgson), from the Silent Valley, Palghat district, Kerala, India, is reported. It has been concluded that the genus *Rousettus* is represented in the Indian Union by *Rousettus leschenaulti leschenaulti* whose geographical distribution has been discussed. Taxonomy of *Rhinolophus rouxi*, *Rhinolophus lepidus* and *Myotis peshwa* has been reviewed. For the first time, *Rousettus l. leschenaulti* is authentically recorded from Meghalaya ; *Cynopterus brachyotis ceylonensis* from Kerala ; *Rhinolophus r. rouxi* from Himachal Pradesh and Madhya Pradesh ; *Rhinolophus l. lepidus* from Andhra Pradesh and Tamil Nadu, and *Myotis peshwa* from Goa and Kerala. The skull of *Myotis peshwa* is figured.

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Late Addition

DYTISCIDAE (COLEOPTERA INSECTA) OF SILENT VALLEY KERALA, INDIA WITH A DESCRIPTION OF A NEW SPECIES

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INTRODUCTION

Five species belonging to 3 genera, *Sandracottus* Sharp, *Hydaticus* Leach and *Copelatus* Erichson of Dytiscid beetles have been dealt with from Silent Valley, Kerala. Among them, a new species of the genus *Copelatus* is described under the name of *biswasi*.

During April, 1979 to May, 1980 Zoological Survey of India sent survey parties to Silent Valley of Kerala State. The present study is based on a collection of 120 examples of the family Dytiscidae which belong to 5 species under 3 genera. The representative of the family Dytiscidae are best fitted in aquatic life among the known water-beetles, and convex and stream-lined shaped, paddle like hind legs give them characteristic appearance. They can be easily distinguished from closely related family Hydrophilidae by their first visible abdominal sternite divided and palpi short, and it differs from the family Gyrinidae having single pair of eyes. Dytiscid beetles are good swimmers, most of them are carnivorous and feed on nymph of Odonata and small aquatic animals.

Indian Dytiscids has been worked chiefly by Vazirani during 1968 to 1977 where he has dealt with 223 species from India of which 69 species from South India. So far known, majority South Indian species has been recorded from Tamil Nadu (=Madras State) including Nilgiri Hills. Practically, nothing is known from Kerala State specially from Silent Valley. All the species are dealt in this paper has been recorded for the first-time either from state or above mentioned Valley.

Family DYTISCIDAE
Subfamily DYTISCINAE

1. *Sandracottus dejeani* (Aubé)

1838. *Hydaticus dejeani* Aubé, in Dejean *Spec. Coleopt.* Paris, 6 : 165

1882. *Sandracottus dejeani* Sharp *Sci. Trans. R. Dublin Soc.* 2 : 686.

Material examined : 1 ex., Mukkali, Palghat, 11.xi.1980, S. Biswas.

Remarks : It is widely distributed in the Oriental region. So far, this species has been recorded from Orissa, Bihar, Uttar Pradesh, Rajasthan, Madhya Pradesh and Andhra Pradesh. Now this species is extended beyond Andhra Pradesh in India and it is the first time recorded from Silent Valley of Kerala State.

This species is nearest to *Sandracottus festivus* (Illiger) but can be separated by the head being reddish yellow, the posterior border of vertex black, the pronotum with a few black and comparative coarses punctures.

2. *Hydaticus* (Guignotites) *vittatus* (Fabricius)

1775. *Dytiscus vittatus* Fabricius, *Syst. Ent. App.* : 825

1838. *Hydaticus vittatus* Aubé in Dejean *Spec. Coleopt.* 6 : 208.

Material examined 26 exs., Silent Valley, 34 kms. N. W. of Mukkali, 28.1-29.1.1980, S. K. Bhattacharyya & Party ; 11 exs., Silent Valley, Dam site, 16.1.1980, S. K. Bhattacharyya & party ; 6 exs., Silent Valley, 29.1.1980, S. K. Bhattacharyya & party ; 48 exs., Silent Valley and Karapara expl., 1980, Dam site, 4.12.1980, 9.12.1980, R. S. Pillai & party ; 11 exs., Silent Valley, Valiaparathodu, 25.4.1980, R. S. Pillai & party ; 4 exs., Half way to Valiaparathodu, Silent Valley, 2.5.1980, R. S. Pillai & party.

Remarks : It is widely distributed in India, Nepal, Burma, siam and Ceylon. So far, this species has been recorded from Assam, Bihar, Uttar Pradesh, Rajasthan, Kashmir, Madhya Pradesh, Orissa, Maharashtra, Andhra Pradesh, Kerala, Madras and West Bengal (Darjeeling) in India (Brancucci, 1979). Now, it is the first time recorded from Silent Valley in Kerala.

This species is recognised by the humeral and the submarginal yeallow stripes narrow and joined together posteriorly before the

middle of elytra, where as in *H. histrio* Clark, the yellow stripes joined after the middle of elytra and in *H. leechi* Sato, the two stripes are free on each elytron.

3. *Hydaticus* (*Guignotites*) *histrio* Clark

1864. *Hydaticus histrio* Clark, *Trans. Ent. Soc. London* (3) : 2 : 221, pl. 4, fig. 5.

Material examined : 1 ex., Silent Valley, Kerala, 25.1.1980, S. K. Bhattacharyya & party.

Remarks : It is distributed in India, Pakistan, Persia Arabia. So far, it is recorded from Bihar, Uttar Pradesh, Himachal Pradesh, Punjab & Kashmir (Brancucci, 1979). Now it is extended to South India in Kerala. It is the first time recorded from Silent Valley in Kerala.

This species is recognised by the humeral and the submarginal yellow stripes broad and joined together posteriorly after the middle of elytra.

4. *Hydaticus* (*Guignotites*) *leechi* Satö

1882. *Hydaticus vittatus*, Sharp, *On Aquat. Carn. Col.* : 670

1899. *Hydaticus vittatus*, ab., *guadrivittatus* Regimbart ; *Ann. Soc. Ent. France* 68 : 329

1961. *Hydaticus leechi* Sath, *Trans. Shikoku ent. Soc.*, 7 : 61.

1973. *Hydaticus leechi* Sath : Vazirani, *Rec. zool. Surv., India* 67 : 82

Material examined : 4 exs., Kerala, Silent Valley, Dam site, 16.1-29.1.1980, S. K. Bhattacharyya & Party ; 2 exs., Silent Valley, Valiaparathodu, 21.4-25.1980, R. S. Pillai & party ; 1 ex., Silent Valley & Karakal expl., 1980, Dam site, 4.12.1980, R. S. Pillai & party.

Remarks : It is distributed in India & Indonesia. So far, it is recorded from Andaman Islands in India. Now, it is recorded in the main land of India in the South and it is the first time recorded from Silent Valley in Kerala.

This species is recognised by the humeral and submarginal striae are free on the elytra. Vazirani (1973) recorded this species from South Andamans where the humeral and the submarginal stripes are red in colour whereas the materials from Silent Valley, Kerala are yellow in colour.

Subfamily COLYMBETINAE

Tribe COPELATINI

The tribe copelatini can be recognised by its metafemora devoid of any group of ciliae at the posteroapical angle, the posterior claws equal, the pronotum not subcordiformis, the sides of pronotum distinctly margined and the hind coxal lines divergent anteriorly.

Genus *Copelatus* Erichson

The genus *Copelatus* Erichson can be recognised by the form being elongate, usually a little convex, the surface microreticulate, the sides of pronotum very finely rebordered, the elytra with varying number of longitudinal striae in addition to the normal sutural striae.

So far, 12 species are known from India and they are placed under the genus *Copelatus*. Vazirani (1970) placed they Indian species of *Copelatus* under the following groups, namely, *Haemorroidalis*, *Irinus* and *Duodecimstriatus*. The new species described below superficially resembles to *Irinus*—group but unlike latter group, its elytra have distinct 10 dorsal striae and one submarginal stria, which is similar to African species *ilybioides* Regimbart and its allies.

The groups are compared with the 12 group, Sharp (1882).

Comparison :

A	Elytra with striae		Elytra without striae	
(i)	12 group (Sharp 1882)		Haemorroidalis—group	
(ii)	Irinus—group			
(iii)	Duodecimstriatus—group			
B	Elytra with 10 dorsal striae & one submarginal striae		Elytra with 6 dorsal striae & one submarginal striae.	Elytra with 6 striae only.
	12 — Group (Sharp 1882)		Irinus—Group	Duodecimstriatus group.

5. *Copelatus biswasi* sp. nov.

Length 5 mm.; width across head 2.00 m.m., width across pronotum 2.5 mm. & width across elytra 3.00 mm.

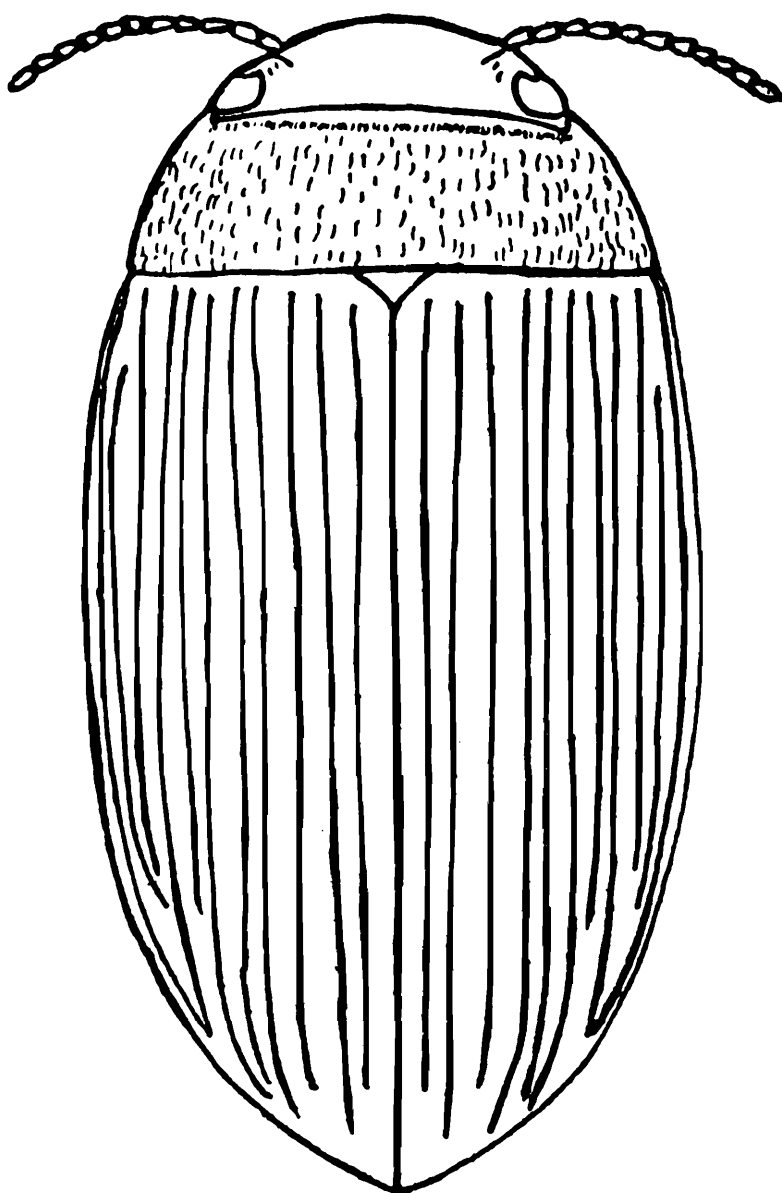


Fig. 1

— 1 mm —

Form (Fig. 1) oblong, subparallel, little attenuated posteriorly, nearly flat to slightly convex. Head dark brownish red, punctation fine and sparse; surface microlined; eyes white and well developed; antennae brown, filiform, 11-segmented and segments elongate. Pronotum reddish brown, darker on the disk, covered with broken longitudinal impressed line all over; anterior margin with a few punctures; anterior angle bluntly projected and posterior angle

nearly rectangular ; sides narrowly rebordered. Elytra brownish red, its lateral margin rebordered and furnished with distinct 10 striae and a submarginal stria. Striae of 1st to 8th complete from elytral base to apex, whereas 9th incomplete and extending upto middle and 10th starts a little beyond basal margin but extending upto apex, submarginal stria starts from base but converges towards apex. Scutellum moderately large, transversely triangular and impunctate. Ventral surface blackish brown, metacoxae striated, metacoxal lines divergent anteriorly ; spur of metatibiae striaght. Aedeagus as figured (Fig. 2)

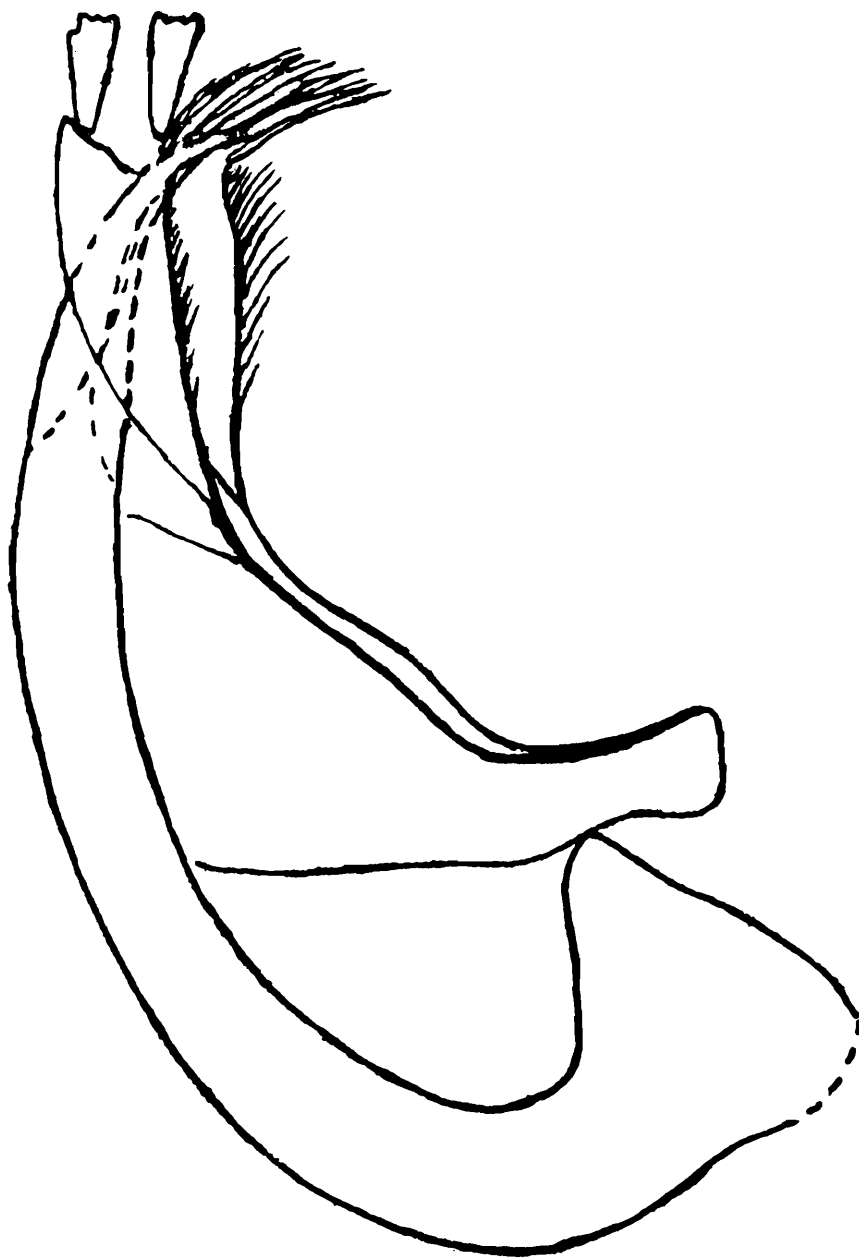


Fig 2

Holotype ♂, India : Kerala, Silent Valley, 29.1.1980, S. K. Biswas.

Paratype : 4 exs., India Kerala, Silent Valley, 29.1.1980. S. K. Biswas. All deposited in Zoological Survey of India collection.

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