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

RECORDS
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INTERACTION BETWEEN COLLEMBOLA AND FUNGI POPULATIONS : A CASE STUDY AT MUNICIPAL GARBAGE DUMPING AREA AT DHAPA, CALCUTTA

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INTRODUCTION

In India and abroad numerous workers like Christiansen (1964), Edward *et. al.* (1973), Choudhuri and Roy (1967, '72), Hazra and Choudhuri (1983) and Mitra *et. al.* (1983) studied on the qualitative and quantitiative ecology of collembolan population. Some authors like Tadros (1983), Mishra (1964), Gujarati (1968) and Behura (1981) have worked on fungi ecology in different cultivated and uncultivated soils. Hazra and Choudhuri (1990) made a preliminary study on the relationship of soil micro and macro fauna in degraded and polluted soil environment. No serious attempt has so far been made in India to study the process of decomposition involving the interaction between the population of Collembola and soil microflora (fungi-actinomycetes) and its correlation with major soil factors (like temperature, moisture, pH, organic carbon and nitrate) in such a field where the dumping of city wastes is being done regularly and where cultivation of different vegetables is practiced regularly in rotations round the year.

MATERIAL AND METHOD

A total of 324 soil samples were drawn, 9 from each of the three plots each measuring 5 sq. meter, at monthly intervals over a period of one year from January to December, 1997. Each plot was sampled at random by using stainless steel samplers, each measuring 8.55 cm^2 in cross sectional area. The soil samples drawn were extracted through the Tullgren apparatus, modified by Macfadyen (1953). The soil texture was analysed by following the standard procedure as outlined by Folk and Ward (1957) and Shephard (1954) and the nomenclature was used as proposed by them. The soil moisture was determined by oven dry method (Dowdeswell, 1959); soil nitrate was evaluated colorimetrically; organic carbon (%) was eastimated by titration method (Walkley and Black, 1934); temperature was recorded by soil thermometer; pH was eastimated by pH-Meter (WTW—pH 320). The fungi population was assesed by the dilution plate method by inoculating the soil solution of 1 : 1000 dilution in Czapek-Dox medium [containing : sucrose-30.0 gm, sodium nitrate-3.0 gm, magnesium sulphate-0.5 gm, potassium chloride-0.5 gm, agar-agar-13.0 gm/L and streptomycin-30 ml/L (added separately to avoid the bacterial contamination) having pH 7.3 at 25°C]. The fungi population was recorded after 72 hrs. of incubation at 30°C.

THE EXPERIMENTAL SITE

The site is located at Dhapa in east Calcutta, where household and other garbage of Calcutta are dumped regularly by Municipal Corporation. Part of the field, where dumping material is in the state of mineralization, is used for cultivation of mixed vegetable like cauliflower, cabbage, lettuce, different chinese salad leaves etc. rotationally; besides, maize is grown during monsoon. The cast leaves and remains of all these crops after cropping are the source of principal organic litter elements at the site. No tree species is present at this site. The soil is blackish brown in colour and silty sand to sandy in texture (Table : 3) and is mainly composed of huge quantities of decomposed and semi-decomposed organic material, generated from the dumping material.

OBSERVATION

Collembolan fauna

3762 exs. extracted from the soil samples, drawn from the site, belong to 10 genera and 12 species. The most dominant of all the species is *Xenylla* (36.62%) followed by *Lepidocyrtus* sp. (a) (34.44%), *Cyphoderus javanus* (11.72%), *Lepidocyrtus* sp. (b) (10.49%), *Cryptopygus* sp. (3.13%) which appeared sporadically. Further sequences of dominancy were as follows : *Friesea* sp. (1.62%), *Lepidocyrtus* sp. (c) (0.98%), *Ballistrura* sp. (0.69%), *Calx* sp. (0.45%), *Proisotoma (Proisotoma)* sp. (0.37%), *Sphaeridia* sp. (0.079%) and *Isotomiella minor* (0.026%) occurred only once or twice during the period of study. Maximum diversity was found in June (9 species) and minimum in July and November (3 species) (Table. 1, Fig. 1).

Table 1 : Monthly abundance of collembolan species (in percentage)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Lepidocyrtus sp. (a)	0.026	0.69	31.84	1.14	—	—	—	—	—	—	—	0.026	34.44
Lepidocyrtus sp. (b)	—	—	9.70	0.47	0.23	0.053	—	0.026	—	—	—	—	10.49
Lepidocyrtus sp. (c)	—	—	0.58	—	—	0.10	—	—	0.053	0.026	—	0.026	0.98
Calx sp.	—	—	—	—	—	0.45	—	—	—	—	—	—	0.45
Cyphoderus javanus	0.053	2.41	0.079	0.34	0.026	—	—	0.053	1.08	1.96	3.64	2.04	11.72
Isotomiella minor	—	—	—	—	—	0.026	—	—	—	—	—	—	0.026
Cryptopygus sp.	0.053	1.59.	—	—	0.026	0.15	0.053	0.079	0.61	0.55	—	—	3.13
Proisotoma (Proisotoma) sp.	—	—	—	—	—	—	—	—	—	—	0.37	—	0.37
Ballistrura sp.	—	—	—	—	—	0.50	0.18	—	—	—	—	—	0.69
Xenylla sp.	1.22	17.35	3.69	3.21	0.18	2.23	0.47	1.72	2.28	2.47	1.64	0.34	36.62
Friesea sp.	—	—	0.47	0.15	—	0.55	—	—	0.26	—	—	0.15	1.62
Sphaeridia sp.	0.053	—	—	—	—	0.026	—	—	—	—	—	—	0.079
TOTAL	1.40	22.06	46.38	5.34	0.47	4.12	0.71	1.88	4.30	5.02	5.66	2.60	

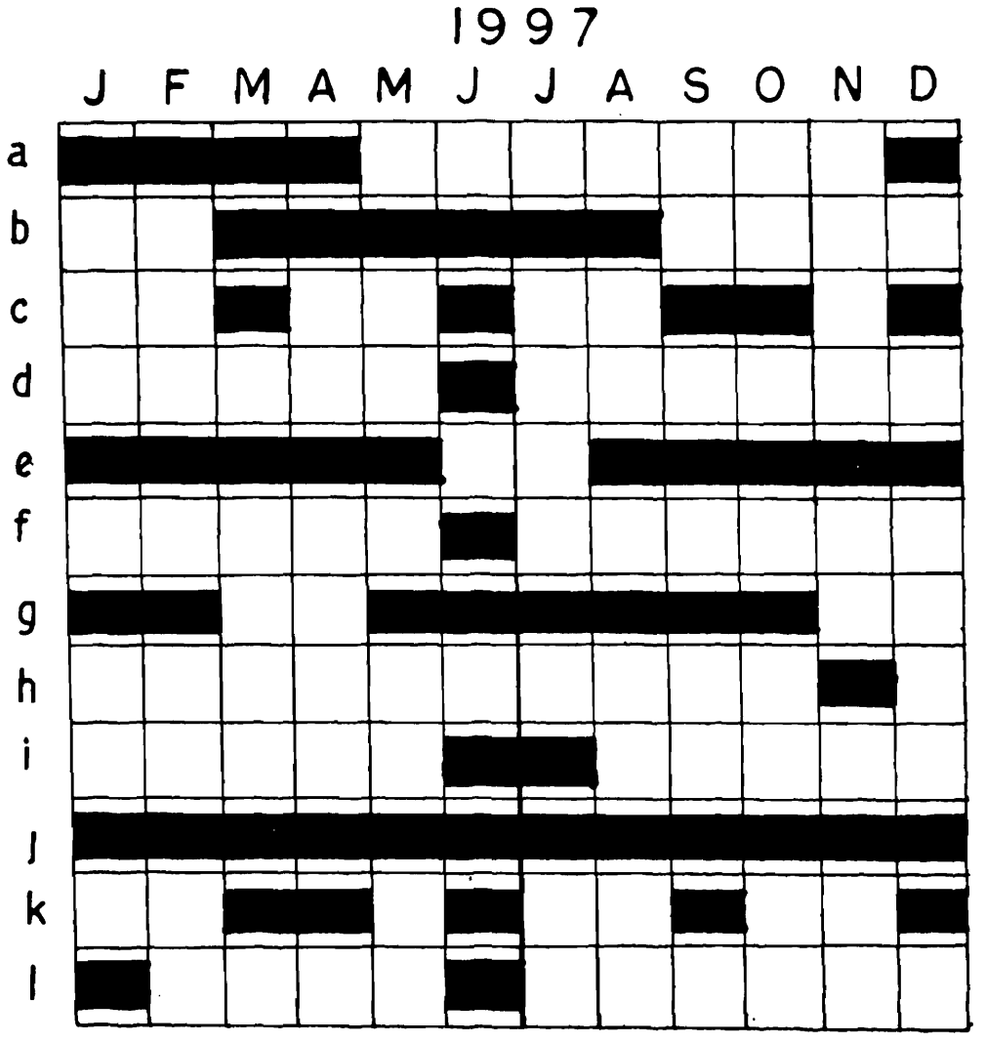

Fig. 1. : Monthly occurrence of different species of Collembola.

Explanations : a. *Lepidocyrtus* sp. (a), b. *Lepidocyrtus* sp. (b), c. *Lepidocyrtus* sp. (c), d. *Calx* sp., e. *Cyphoderus javanus*, f. *Isotomiella minor*, g. *Cryptopygus* sp., h. *Proisotoma (Proisotoma)* sp., i. *Ballistrura* sp., j. *Xenylla* sp. k. *Friesea* sp., l. *Sphaeridia* sp.

Fungi-Actinomycetes population

Fungi population isolated from the soil samples (770×10^3 /gm. of soil) belong to 7 genera. Also actinomycetes was isolated from the same dilution plates. The bulk of fungi was represented by Penicillium (55.32%) followed by *Fusarium* (15.84%), *Aspergillus* (7.40%), *Cephalosporium* (3.89%), *Mucor* (1.16%), *Trichoderma* (3.59%), *Sclerotium* (2.59%). Actinomycetes (10.12%) appeared in the culture.

Maximum diversity was observed during April and May when actinomycetes and 5 fungi genera appeared in the culture. It was minimum in September being represented by actinomycetes and 2 fungi genera; however, during June-August, no actinomycetes appeared in the culture (Table 2, Fig. 2).

Table 2 : Monthly abundance of fungi-actinomycetes (in percentage)

	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Penicillium	6.10	0.64	18.44	2.85	3.24	3.76	4.28	3.76	2.33	1.81	6.49	1.55	55.32
Trichoderma	1.03	1.16	1.03	—	—	—	—	—	—	—	0.25	0.12	3.59
Aspergillus	0.12	0.25	1.68	0.12	0.51	0.51	0.64	0.38	0.51	0.64	1.29	0.64	7.40
Mucor	—	—	—	0.25	0.12	0.38	0.25	0.12	—	—	—	—	1.16
Fusarium	—	14.28	—	—	0.38	1.03	—	—	—	0.12	—	—	15.84
Sclerotium	—	—	—	1.42	0.77	—	—	—	—	—	—	0.38	2.59
Cephalosporium	—	—	1.18	2.07	—	—	—	—	—	—	—	—	3.89
Actinomycetes	1.81	1.55	2.72	0.77	0.38	—	—	—	1.03	0.12	0.51	1.16	10.12
TOTAL	9.09	17.92	25.71	7.53	5.45	5.71	5.19	4.28	3.89	2.72	8.57	3.89	

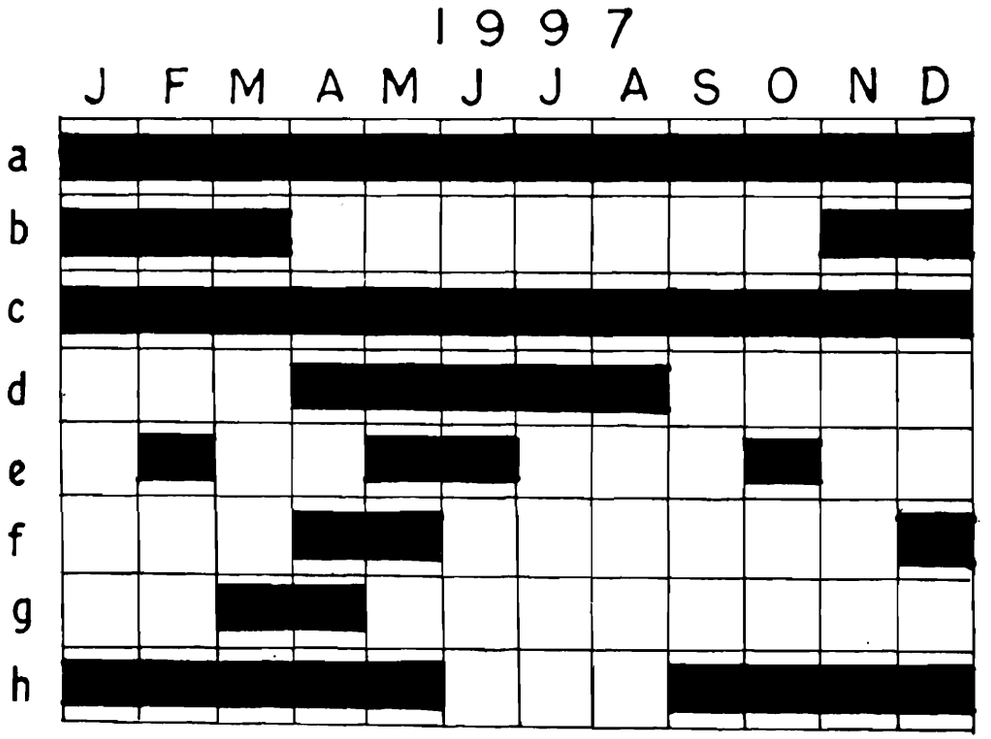

Fig. 2. : Monthly occurrence of actinomycetes and different genera of fungi.

Explanations : a. *Penicillium*, b. *Trichoderma*, c. *Aspergillus*, d. *Mucor*, e. *Fusarium*, f. *Sclerotium*, g. *Cephalosporium*, h. *Actinomycetes*.

Monthly fluctuation of population of Collembola and fungi-actinomycetes

It is interesting to note that the Collembola exhibited the highest peak of population in the month of March (46.38%) coinciding with the fungi-actinomycetes population (25.71%). During April-May, population of both Collembola and fungi-actinomycetes declined sharply eventually with a moderate peak during June. During July to October, there was a gradual rise in the population of Collembola but fungi-actinomycetes population maintained a constant population. Again the Collembola and fungi-actinomycetes population gave rise a higher peak during November (Fig. 3).

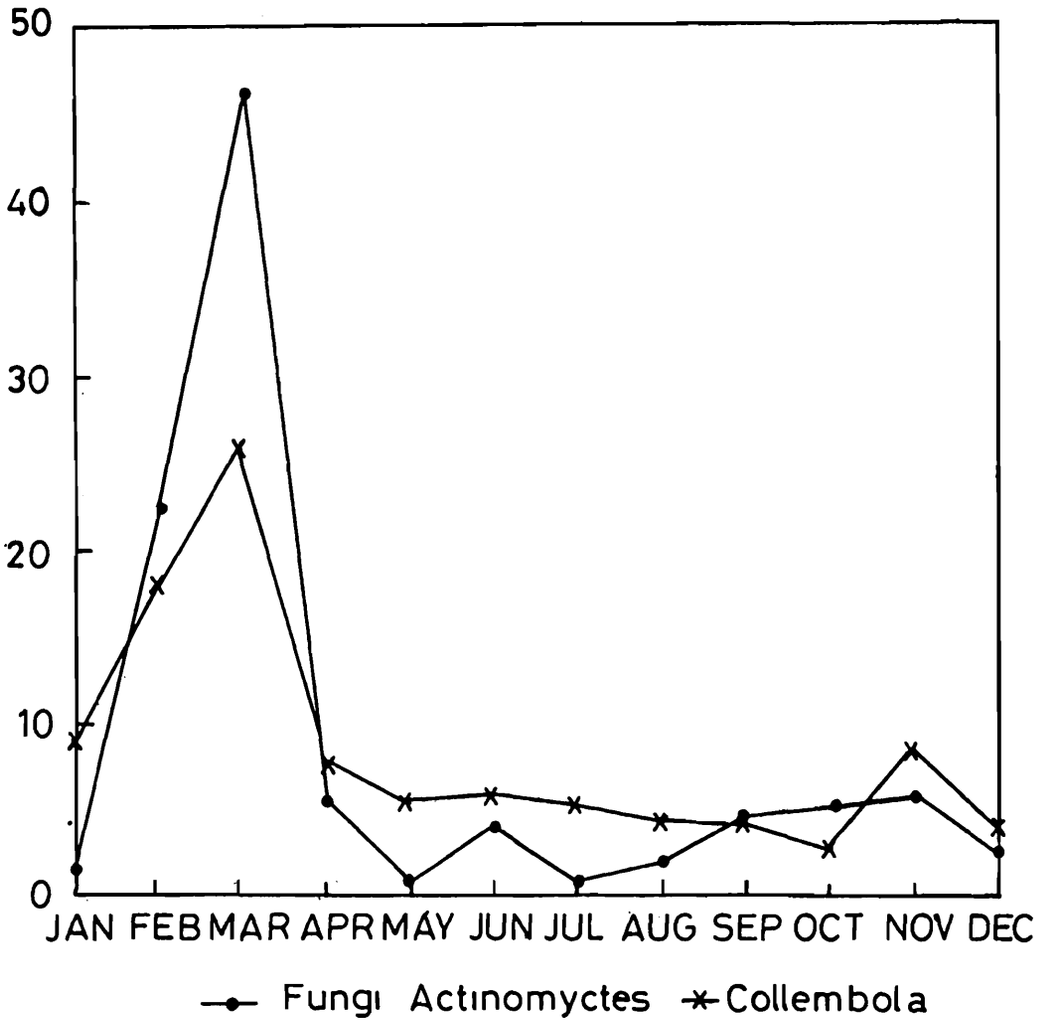

Fig. 3. : Monthly dynamics of Collembola and Fungi-Actinomycetes population.

Soil factors

The soil of the site is silty sand to sandy where the coarse sand was maximum (57.95%). Highest organic carbon was during March (4.11%) and minimum (3.28%) in May. NO_3 content was 23 ppm in August and 806 ppm in March. During July to September there was depletion in NO_3 because of the leaching of soil for monsoon rains. pH of the soil varied between 6.4 to 7.8 during the months under observation. Moisture content varied between 24.06% to 44.56% during this period. Temperature was minimum (21°C) in January and in March it was maximum 39°C (Table. 3, 3A, Fig. 4).

Table 3 : Analysis of edaphic factors at the studied site (expressed in percentage)

	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Temperature	5.60	8.27	10.41	9.34	9.34	7.47	9.07	7.20	9.71	8.54	7.74	7.20
Moisture	5.38	8.89	10.66	9.97	6.14	8.82	10.81	10.61	8.85	7.58	6.99	6.77
pH	8.94	8.01	7.43	8.82	8.47	8.01	7.78	8.94	8.36	7.54	8.57	9.05
Organic Carbon	8.0	8.98	9.34	8.66	7.46	8.12	7.93	7.93	8.25	8.43	8.57	8.25
Nitrate	6.73	18.24	18.52	9.23	10.94	12.75	1.58	0.52	1.28	7.30	6.57	6.27

Table 3A : Mechanical analysis of soil

Coarse Sand	Medium Sand	Fine Sand	Coarse to Medium Silt	Fine Silt	Clay
57.9562%	3.944%	8.5943%	9.0118%	11.0002%	9.4928

STATISTICAL TREATMENT OF DATA

Data pertaning to the soil factors and population density were subjected to statistical correlation with the number of Collembola (Y) in relation to each of the 6 variables (x = fungi-actinomycetes, organic carbon, nitrate, temperature, moisture, pH) considered in this investigation. Regression analysis was carried out by pulling together data for 12 months. From this analysis, it is found that number of Collembola showed positively significant correlation with fungi-actinomycetes, organic carbon, nitrate and negatively significant correlation with pH. Temperature and moisture, however, showed a positive but no significant correlation with the population density of Collembola (Table. 4).

Table 4 : Regression equation and "r" value between Collembola, Fungi-Actinomycets and edaphic factors

Parameter	Mean	r Value	Regression Equation
y : Collembola Population	8.32		
Fungi-Actinomycetes	8.32	0.94 **	Y = –7.01 + 1.84 x
Organic Carbon	8.34	0.83 **	Y = –171.50 + 21.60 x
Mitrate	7.55	0.73 **	Y = – 5.19 + 1.62 x
Temperature	8.32	0.47	Y = – 30.42 + 4.65 x
Moisture	8.35	0.41	Y = – 15.90 + 2.91 x
pH	8.32	– 0.56 *	Y = 117.18 – 13.07 x

*Significant at 5% level **Significant at 1% level.

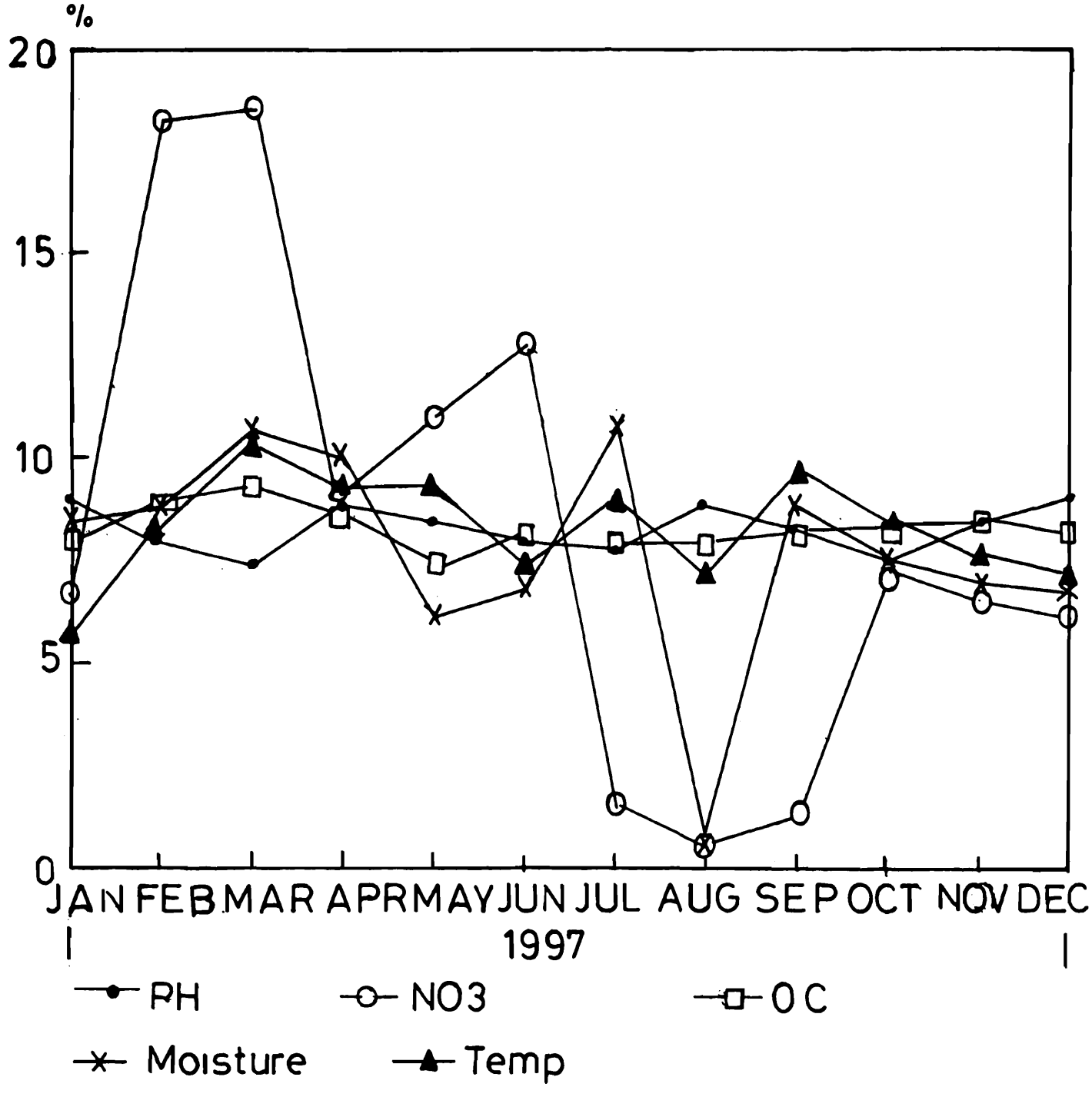

Fig. 4. : Monthly changes of soil factors at the studied site.

DISCUSSION

Population of Collembola consisting of 12 species showed changes with the change of months (Table. 1, Fig. 3) being maximum in March and February and minimum in May. Such was the observation of Sheals (1957), Haarlov (1960), Weisfogh (1948), Macfadyen (1952) in the temperate countries. During the March, refuse of cauliflower, cabbage, letuce etc. remain the main constituent of the dumping material while in other times it is mainly the household wastes from the city. In this study, dominant genera of Collembola *Viz.*, *Xenylla* sp. and *Lepidocyrtus* sp. attained their respective peaks during February and March. *Xenylla* sp. was found consistently throughout the year, but the occurrence of three different *Lepidocyrtus* sp. were always infrequent with low population during the period of observations. Besides, some other species also occurred very inconsistently represented by isolated examples (Table. 1, Fig. 1).

Fungi-actinomycetes exhibited a positive significant correlation with the micro fauna (Table. 4). *Penicillium* found to be predominant and of all the microflora only *Penicillium* and *Aspergillus* were found to be consistent in their occurrence. Other fungi genera were observed inconsistently in the culture maintained. Further, actinomycetes did not appear in the samples during June-August (Table. 2, Fig. 2).

Regarding the soil factors, nitrate and organic carbon content showed a strong positive significant correlation with the collembolan and microbial population. Whereas, temperature and moisture showed a positive but not significant correlation; pH interestingly showed a negative but significant correlation perhaps well within the tolerance range of most of the species. Since most of the Collembola are saprophagous, it may be that the soil pH exerts influence on collembolan population by controlling the growth and activities of microflora.

SUMMARY

The present investigation is based on monthly soil samplings for a period of one year from January 1997 to December '97.

Altogether 3762 examples of Collembola were extracted from 324 soil samples. Culturing of soil samples *in vitro* (Czapek-Dox medium) resulted in the development of fungi and actinomycetes colonies approximately 770×10^3/gm. of soil. The contribution incorporates monthly population dynamics of Collembola in relation to fungi serving as major food for edaphic and euedaphic Collembola. The result shows that there is direct correlation between population of Collembola and fungi while the other parameters like moisture, nitrate and organic carbon have indirect bearing.

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EFFECTS OF MONOCULTURE ON COLLEMBOLA AT A CROP FIELD IN NADIA (WEST BENGAL)

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INTRODUCTION

The distribution, abundance and seasonal changes in the population density of Collembola were investigated both in India and abroad by numerous workers. Notable amongst them are Bellinger (1954), Sheals (1957), Harrlov (1960), Christiansen (1964), Choudhuri and Roy (1972), Mitra *et. al.* (1977), Addison (1980), Hazra (1984), Hazra and Choudhuri (1983, '90), Alfred *et. al.* (1991) and Hazra and Sanyal (1996). Though Mitra *et. al* studied the distribution of Collembola in accordance with different vegetation, the influence of sugarcane crop on the distribution of Collembola in India has not been reported so far. The present report forms part of a study of a longterm project on the qualitative and quantitative composition of collembolan fauna of a controlled monoculture of sugarcane crop persisting in the field through out the period of observation.

MATERIAL AND METHOD

A total of 108 soil samples were drawn, 9 from each of the 3 plots (5 sq. m) at monthly intervals over a period of one year. Each plot was sampled at random by using stainless steel samplers having 8.55 cm^2 in cross sectional area. The soil samples were extracted through the Tullgren funnel, modified by Macfadyen (1953).

THE EXPERIMENTAL SITE

The site was located within the experimental crop fields of Sugarcane Research Station at Bethuadahari in the district of Nadia, West Bengal, about 120 km north of Calcutta. The field underwent monoculture of sugarcane throughout the year. No chemical or organic manure was applied except a cover of sugarcane leaves undergoing decomposition with grasses like *Cynodon dactylon, Dichanthium annulatum, Physelis* sp., *Arundinella* sp. growing naturally in the field. The soil was brownish in colour and sandy silt in texture.

OBSERVATION

The analysis of extracts revealed the presence of 19 collembolan species belonging to 18 genera. The most predominant was *Salina indica* (35.0%) followed by *Lepidocyrtus* sp. (a)

(24.95%), *Isotomurus* sp. (20.45%), *Cyphoderus javanus* (4.8%), *Seira* cf. *indica* (3.2%), *Lepidocyrtus* sp. (b) (2.77%), *Sminthurides* sp. (2.59%), *Isotomiella minor* (2.0%). The species like *Dicyrtoma* sp. (0.69%), *Xenylla* sp. (0.51%), *Ballistrura* sp. (0.51%), *Dicranocentrus* sp. (0.51%), *Temeritus* sp. (0.34%), *Arrhophalites* sp. (0.34%), *Heteromuricus cercifer* (0.34%), *Entomobrya* sp. (0.17%), *Homidia* sp. (0.17%), *Yosiia dehradunia* (0.17%), *Dicranocentroides* sp. (0.17%) occurred only once or twice throughout the sampling period (Table. 1, Fig. 1).

Table 1 : Monthly abundance of collembolan fauna (in percentage)

	<——1996——>									<—1997—>			
	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
Lepidocyrtus sp. (a)	0.86	0.17	0.17	1.55	0.69	1.03	0.17	0.86	0.69	7.27	7.97	3.46	24.95
Lepidocyrtus sp. (b)	—	—	—	—	—	—	0.17	0.36	—	2.25	—	—	2.77
Entomobrya sp.	—	—	—	—	—	—	0.17	—	—	—	—	—	0.17
Homidia sp.	0.17	—	—	—	—	—	—	—	—	—	—	—	0.17
Seira cf. indica	—	0.17	3.11	—	—	—	—	—	—	—	—	—	3.2
Yosiia dehradunia	—	—	—	—	—	—	—	—	—	—	0.17	—	0.17
Heteromuricus cercifer	0.17	—	—	—	—	0.17	—	—	—	—	—	—	0.34
Cyphoderus javanus	0.17	0.17	0.17	0.17	2.25	0.34	—	—	—	0.17	1.03	0.34	4.8
Dicranocentroides sp.	0.17	—	—	—	—	—	—	—	—	—	—	—	0.17
Dicranocentrus sp.	0.51	—	—	—	—	—	—	—	—	—	—	—	0.51
Salina indica	1.38	0.17	0.51	6.41	16.63	2.77	2.07	0.86	0.17	2.07	1.03	0.86	35.0
Isotomurus sp.	—	—	—	—	1.38	0.17	0.17	0.86	—	—	12.13	5.71	20.45
Isotomiella sp.	—	—	0.34	—	—	0.17	—	—	—	0.86	0.69	—	2.0
Ballistrura sp.	—	—	—	0.17	—	0.34	—	—	—	—	—	—	0.51
Xenylla sp.	—	—	—	—	0.34	—	—	0.17	—	—	—	—	0.51
Arrhophalites sp.	—	0.34	—	—	—	—	—	—	—	—	—	—	0.34
Sminthurides sp.	0.17	0.34	—	—	—	0.34	—	—	—	—	1.38	0.34	2.59
Dicyrtoma sp.	—	—	—	—	0.69	—	—	—	—	—	—	—	0.69
Temeritus sp.	—	—	—	0.34	—	—	—	—	—	—	—	—	0.34
TOTAL	3.63	1.38	4.33	8.66	22.01	5.37	2.77	3.11	0.86	12.82	24.26	10.74	

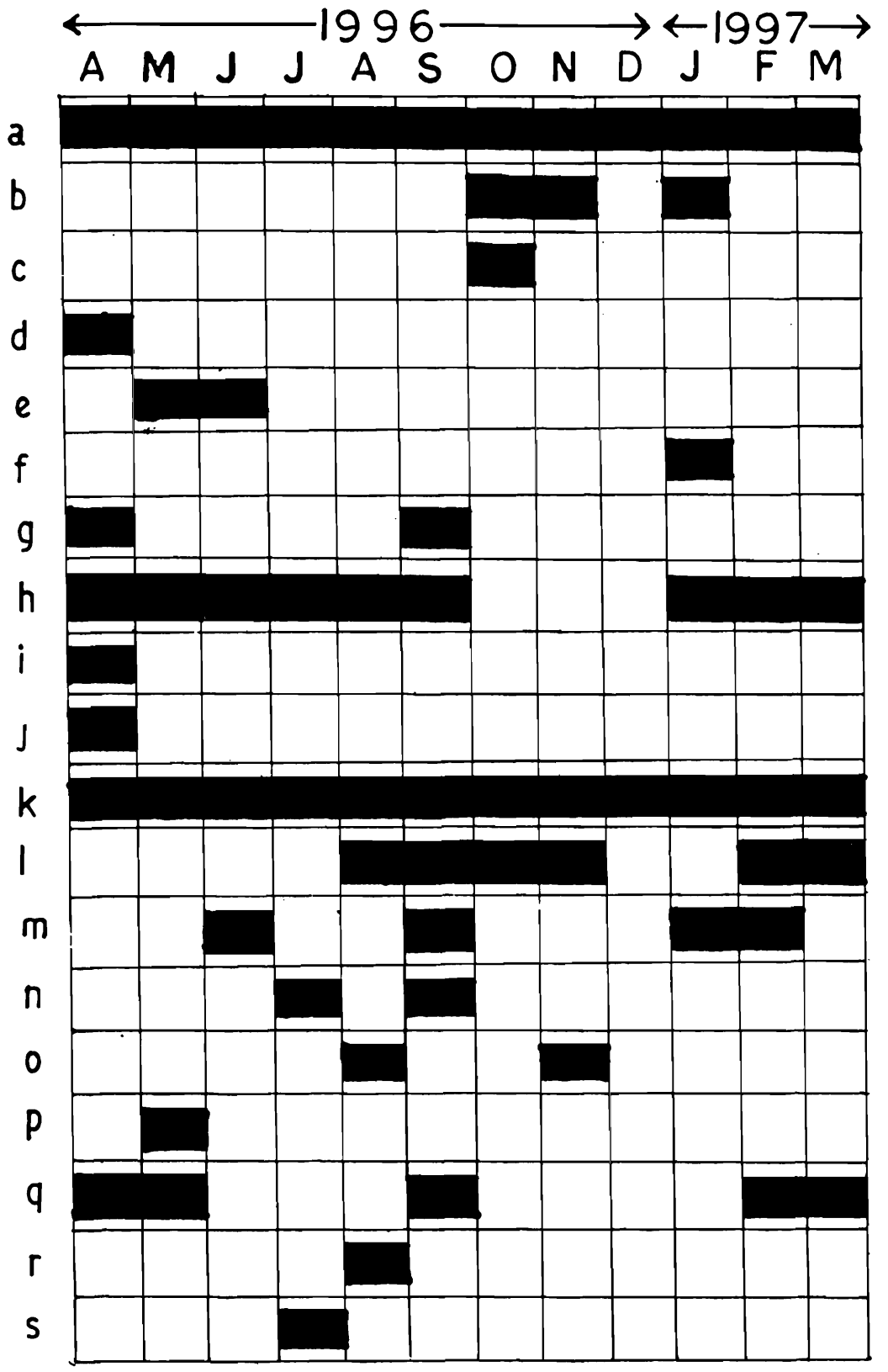

Fig. 1. : Monthly occurrence of different species of Collembola.

Explanations : a. *Lepidocyrtus* sp. (a), b. *Lepidocyrtus* sp. (b), c. *Entomobrya* sp., d. *Homidia* sp., e. *Seira* cf. *indica*, f. *Yosiia dehradunia*. g. *Heteromuricus cercifer*, h. *Cyphoderus javanus*, i. *Dicranocentroides* sp., j. *Dicranocentrus* sp., k. *Salina indica*, l. *Isotomurus* sp., m. *Isotomiella* sp., n. *Ballistrura* sp., o. *Xenylla* sp., p. *Arrhophalites* sp., q. *Sminthurides* sp., r. *Dicyrtoma* sp., s. *Temeritus* sp.

MONTHLY DYNAMICS IN POPULATION

The collembolan population showed its highest peak (24.26%) in the month of February '97 and minimum (0.86%) in the month of December '96. A second peak (22.01%) was found in August followed by smaller peaks (12.82% and 10.74%) during January and March '97 (Fig. 2).

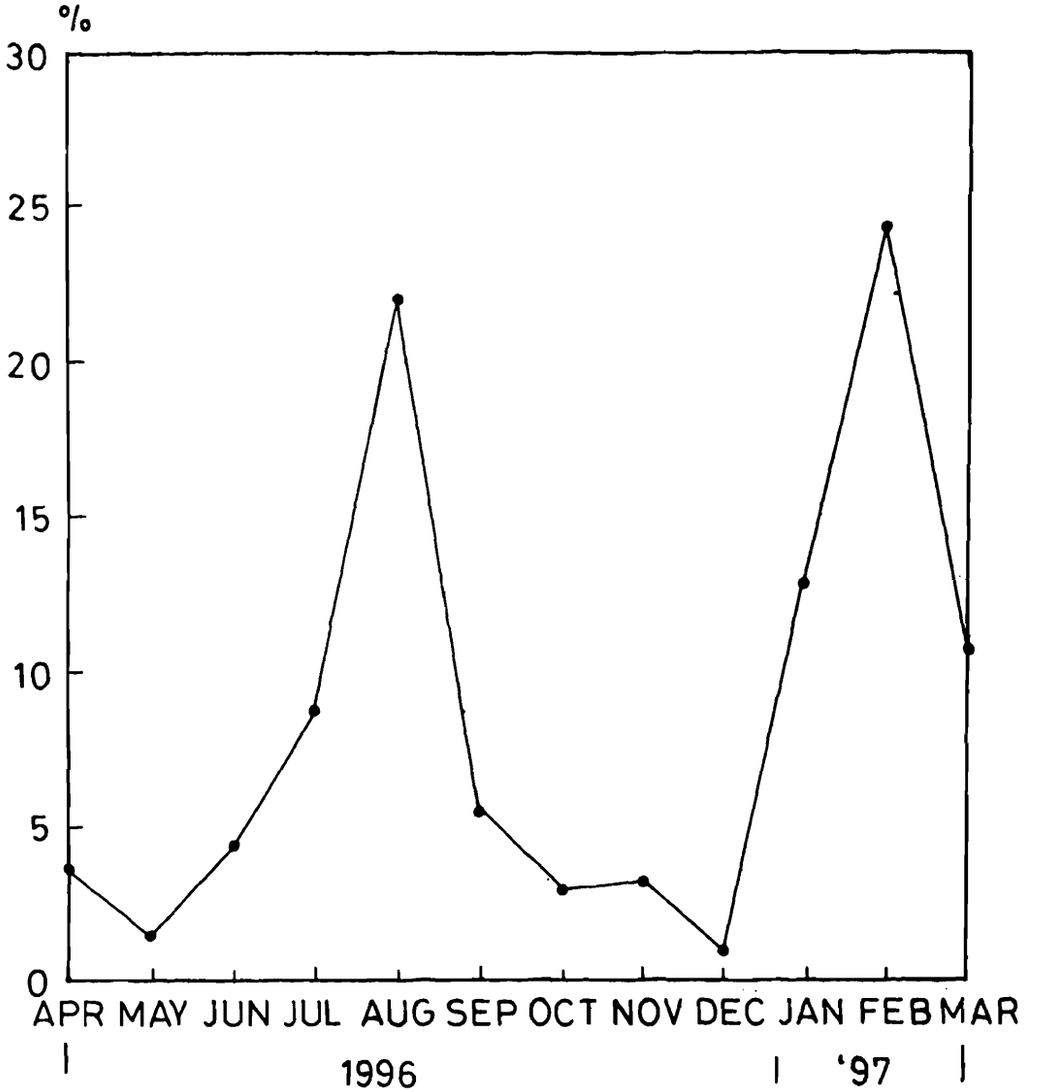

Fig. 2. : Dynamics of Collembolan population.

Salina indica occurred through out the year being specially abundant during the rainy season (July-September) with highest peak in August (16.63%), and with moderate build up (0.86%-6.41%) during rest of the year barring May and December when it was only 0.17% of the total collembolan population. The second dominating species *Lepidocyrtus* sp. (a) was also found through out the sampling period and it was maximum during February (7.97%). The *Isotomurus* sp. was dominant during February (12.13%) but it was infrequent in occurrence. While, *Cyphoderus javanus* had minimum population build up (0.17%-1.03%) (being absent in samples of October to December) but showed its peak of population during August (2.25%).

Seira cf. *indica* appeared in samples of May (0.17%) and June (3.11%) *i.e.*, at the very beginning of the cultivation. *Sminthurides* sp. and *Isotomiella minor* comprising 2.59% and 2.0%

respectively of the total population did not show any regular occurrence throughout the sampling period (Table. 1).

DISCUSSION

The result presented here is based on the random sampling from a monoculture crop field (sugarcane) which is retained in the field for over a year. The collembolan population from this sugarcane field was represented by 18 genera involving 19 species. In earlier reports, the peak of population of Collembola was observed in the month of July-August and minimum in May by Choudhuri and Roy (1972), Mitra (1976) and Hazra (1976) in vegetational sites other than sugarcane, dealt with in this study. In the present study, Collembola exhibited the highest peak in February and the minimum in December. This difference might be due to the effect of no cultivation in the February (Mitra, 1993). The plantation at the site was done in late March when there was no undergrowth in the field. Further, no pesticides or insecticides were used throughout the period of cultivation. Eventhough, the field underwent handweeding during monsoon, the diversity of species was significant in comparison to the individual population buildup of each species.

SUMMARY

The present investigation is based on the monthly soil sampling made during April '1996 to March '97 with a view to assesing the diversity of collembolan fauna, both qualitatively and quantitatively, in a sugarcane crop-field at Nadia, West Bengal.

Extraction of 108 soil samples yielded 1154 examples of Collembola belonging to 18 genera and 19 species. The species belonged to *Salina* sp., *Lepidocyrtus* sp., *Isotomurus* sp., *Cyphoderus* sp., *Seira* sp., *Sminthurides* sp., *Isotomiella* sp. Frequency of occurrence of most of the species during this period has been infrequent barring *Salina indica* (Imms), being most predominant in the sugarcane field. Two peaks of population were observed, one during February, followed by the another in August.

ACKNOWLEDGEMENT

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FIRST REPORT ON THE AMPHIBIANS OF KASARAGOD DISTRICT, KERALA

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INTRODUCTION

In order to gain an insight in to the faunal composition of Kasaragod district, Kerala, the Western Ghats Field Research Station of the Zoological Survey of India has conducted 6 surveys in the plains and hills of the district. The present paper constitutes results of the studies on 14 species of Amphibians collected during the surveys. This paper assumes significance because it is the first authentic document on the Amphibian fauna of Kasaragod district which is faunistically very poorly known.

Kasaragod is the fourteenth and the northern most district of Kerala state. The district spreads over an area of approximately 1964 sq. km. between latitudes 12°5' to 12°48' N and longitudes 74°52' to 75°55' E, flanked by the Western Ghats in the east and the Arabian sea in the West and demarcated by the Thalapadi river in the north and Thrikaripur river in the south. The natural vegetation of the district comprises of moist deciduous, dry deciduous, semi evergreen and wet evergreen types of forests all of which are in a highly fragmented state. The elevation of the land increases assymetrically from the sea level as it goes east reaching upto a maximum of 800 m.

The Amphibians studied were collected from areas falling under the two forest ranges of the district namely, Kasaragod and Kanjangad during September 1993 to March 1994. The collections were made during day.

The literature based on which the present study has been conducted are that of Boulenger (1890, 1904), Daniel (1963, 1975), Daniel and Sekar (1989), Daniels (1991, 1992), Inger *et. al* (1984), Inger and Dutta (1986), Pillai (1978, 1979, 1981, 1986), Pillai and Murthy (1986), Pillai and Pattabiraman (1981), Pillai and Ravichandran (1991), Satyamurti (1967) and Taylor (1961).

SYSTEMATIC LIST OF AMPHIBIANS OF KASARAGOD DISTRICT

Class AMPHIBIA

Order GYMNOPHIONA (APODA)

Family ICHTHYOPHIIDAE TAYLOR

Genus ***Uraeotyphlus*** Peters

1. *U. menoni Annandale*
2. *U. narayani* Seshachar

Order ANURA

Family BUFONIDAE GRAY

Genus *Bufo* Laurenti

3. *B. melanostictus* Schneider
4. *B. beddomii* Gunther

Family RHACOPHORIDAE HOFFMAN

Genus *Philautus* Gistel

5. *P. leucorhinus* (Lichtenstein & Martens)
6. *P. pulcherrimus* (Ahl)

Family RANIDAE GRAY

Genus *Micrixalus* Boulenger

7. *M. nudis* Pillai

Genus *Nyctibatrachus* Boulenger

8. *N. major* Boulenger

Genus *Rana* Linnaeus

9. *R. limnocharis* Gravenhorst
10. *R. temporalis* (Gunther)
11. *R. tigerina* Daudin
12. *R. cyanophlyctis* Schneider
13. *R. beddomii* (Gunther)
14. *R. semipalmata* Boulenger

Key to the families of Amphibians of Kasaragod district

1. Limbs absent; body elongate, snake-like or worm-like ..... *Ichthyophiidae*

   Limbs present; body not snake-like or worm-like 2

2. Upper jaw toothed; tongue bifid 3

   Jaws toothless; tongue entire, not bifid ..... *Bufonidae*

3. Digits with an intercalary cartilage between penultimate and terminal phalanges; fingers minutely to fully webbed ..... *Rhacophoridae*

   Digits without an intercalary cartilage between penultimate and terminal phalanges; fingers free ..... *Ranidae*

SYSTEMATIC ACCOUNT

Order GYMNOPHIONA

Family ICHTHYOPHIIDAE

Diagnosis : Limbless, snake-like or worm-like in general appearance; the head except for the lack of annulations indistinguishable from the body; eyes rudimentary, sometimes covered by cranial bones; a short tentacle present on each side of the head between eye and nostril; mouth armed with teeth; small scales usually present, embedded in the skin; body with a series of annulations; a short tail present or absent.

Genus ***Uraeotyphlus*** Peters

1879. *Uraeotyphlus* Peters, *Mon. Berl. Acad.*,

Diagnosis : Tentacle flap-like situated almost directly below nostril near mouth; eyes externally visible.

Key to the species of Uraeotyphlus of Kasaragod district

Head short, triangular in shape with a blunt and rounded snout; snout about as long as the distance between the eyes; tail with 10 complete circular folds ..... *menoni* Annandale.

Head elongate, rounded anteriorly and slightly flattened dorsoventrally; snout longer than the distance between the eyes; tail with 4 complete circular folds ..... *narayani* Seshachar

1. ***Uraeotyphlus menoni*** Annandale

1913. *Uraeotyphlus menoni* Annandale, *Rec. Ind. Mus.* 9 : 301.

Material examined : 1 ex. Chappakal-Kavadikanam (Bandadka : Adoor R. F.), 20.iii.1994. Coll : K. C. Gopi.

Diagnosis : Dark brown above, white below speckled with minute brown spots; head short; tail bearing 10 circular folds.

Measurement : The specimen studied measures 109 mm. in total length, 6 mm. in width at the widest region and bears over 200 folds round the body and 10 folds on the tail.

Ecological notes : The material has been collected in water from a very shallow slow flowing stream, among pebbles and loose gravel partially embedded in detriting plant matter at the periphery of a moist deciduous forest.

Distribution : India : Kerala : Trichur, Kondotti, Koduvalli.

Status : Rare.

2. ***Uraeotyphlus narayani*** Seshachar

1939. *Uraeotyphlus narayani* Seshachar, *Proc. Ind. Acad. Sciences.* **11**(B) : 224.

Material examined : 1 ex. Kavadikanam (Bandadka : Adoor R.F.), 23.iii.1994. Coll : K. C. Gopi.

Diagnosis : Body steel gray above, slightly lighter or brownish below; head elongate; tail with 4 circular folds.

Measurement : 107 mm. in total length, 5 mm. in width at the widest point, bears about 102 primary folds round the body and 4 complete folds on the tail.

Ecological notes : Collected amidst loose gravel within a creek submerged by water of a small stagnant puddle on a hill slope inside a moist deciduous forest.

Distribution : India ; Kerala : Kannam-Kottayam.

Status : Rare.

Order ANURA

Family BUFONIDAE

Diagnosis : Skin rough and tuberculated; jaws toothless; tongue oval; pupil horizontal.

Genus ***Bufo*** Laurenti

1768. *Bufo* Laurenti, *Synopsis Rept. Vienna. :* 25.

Diagnosis : Parotid glands large and prominent; fingers free, no discs; toes more or less webbed; outer metatarsal united.

Key to the species of Bufo of Kasaragod district

Head with bony ridges; tympanum distinct about two-thirds the diameter of eye;toes about half webbed; middle of back with two series of large warts ..... *melanostictus* Schneider

Head without bony ridges; tympanum very small or indistinct; toes fully webbed; middle of back without two series of large warts ..... *beddomii* Gunther

3. ***Bufo melanostictus*** Schneider

1799. *Bufo melanostictus* Schneider, *Hist. Amphib.* : 216.

Material examined : 3 exs. Parappa R. F., 13.x.1993. Coll : K. C. Gopi.

Diagnosis : Skin heavily tuberculated and with many black spine-tipped warts; two series of large warts present along the middle of the back; crown of head smooth or with a few tubercles; cranial ridges, upper lip, tips of fingers and toes, metatarsal tubercle and tubercles on the palm with black cornifications in the adult.

Measurements : Snout to vent length 24 to 28.3 mm.

Ecological notes : One specimen obtained from leaf litter on the outskirts of a semi evergreen forest and two from leaf litter in a nearby Rubber plantation.

Distribution : Oriental Region.

Status : Very common.

4. ***Bufo beddomii*** Gunther

1875. *Bufo beddomii* Gunther, *Proc. Zool. Soc. London* : 569.

Material examined : 1 ex. Pullodi, 27.x.1993. Coll : K. C. Gopi.

Diagnosis : Tympanum small, rather indistinct; toes entirely webbed; dorsally brown with indistinct black spots; limbs marbled with carmine.

Measurement : Snout to vent length 18 mm.

Ecological notes : Collected on leaf litter in a wet evergreen forest patch.

Distribution : India : Kerala : Malabar, Travancore hills, Ponmudi.

Status : Rare.

Family RHACOPHORIDAE

Diagnosis : Upper jaw toothed; vomerine teeth present or absent; an intercalary cartilage between penultimate and terminal phalanges present; fingers minutely to fully webbed or free; toes two-thirds to fully webbed; tips of fingers and toes dialated in to prminent discs.

Genus ***Philautus*** Gistel

1848. *Philautus* Gistel, *Naturgesch. Thierr.*, : 10.

Diagnosis : Skin smooth, sometimes granulated; tongue free and deeply notched behind; vomerine teeth absent; pupil horizontal; tympanum distinct or hidden; fingers free or minutely webbed at base; toes partly or entirely webbed; tips of digits dialated in to discs.

Key to the species of Philautus of Kasaragod district

Snout sharply pointed; tympanum distinct but small being only half the diameter of eye; toes nearly half webbed; body coloured brown or olive above .... *leucorhinus* (Lichtenstein & Martens)

Snout rounded; tympanum indistinct or hidden; toes more than half webbed; in life, body coloured leaf green above; thigh with a median thin dorsal green line...*pulcherrimus* (Ahl)

5. ***Philautus leucorhinus*** (Lichtenstein & Martens)

1856. *Ixalus leucorhinus* Lichtenstein & Martens, *Nomencl. Rept. Mus. Berol. :* 36.

Material examined : 19 exs. Kavadikanam (Bandadka : Adoor R.F.), 23.iii.1994 (1 ex.); Parappa R.F., 24.ix.1993 (3 exs.) and 13.x.1993 (8 exs.); Chempilankai (Muliyar R.F.), 14.x.1993 (6 exs.); Pullodi, 27.x.1993 (1 ex.). Coll : K. C. Gopi.

Diagnosis : Skin smooth above, granular on the belly and under the thighs; a fold from eye to the shoulder; a dark band below the canthus rostralis and on the temporal region; sometimes a large hexagonal or triangular spot on the snout; usually a dark band between the eyes and an arched one on each side of the back; sometimes a light vertebral line or band.

Measurements : Snout to vent length 13.7 to 28 mm.

Ecological notes : Specimens were collected on leaf litter and on leaves of short shrubs in wet evergreen, semi evergreen and moist deciduous forests.

Distribution : India : Hills of Malabar coast as far as north Kanara, Pirmed and Dhoni forest in Kerala., Sri Lanka.

Status : Very common.

6. ***Philautus pulcherrimus*** (Ahl)

1882. *Ixalus pulcher* Boulenger, *Cat. Batr. Sal. Brit. Mus.* : 469.

Material examined : 1ex. Manchucholamala, 26.i.1994. Coll : K. C. Gopi.

Diagnosis : 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; in life, leaf green above, femur with a median thin dorsal green line, tibia fully green; ventrally white.

Measurement : Snout to vent length 16 mm.

Ecological notes : Collected from leaf of a shrub in moist deciduous forest.

Distribution : India : Kerala, Tamil Nadu.

Status : Common.

Remarks : The specimen studied tallies with the description of the species except for its fairly visible tympanum.

Family RANIDAE

Diagnosis : Upper jaw toothed; in most species, the fingers are free but toes are more or less completely webbed; foot with one or more metatarsal tubercle which may be blunt, sharp, finger shaped or shovel shaped; tips of digits with or without discs; no intercalary cartilage between penultimate and terminal phalanges.

Key to the genera of Ranidae of Kasaragod district

1. Vomerine teeth present 2

   Vomerine teeth absent ..... *Micrixalus* Boulenger

2. Pupil horizontal or roundish sub triangular; dorsally skin warty or with longitudinal glandular folds ..... *Rana* Linnaeus

   Pupil vertical; dorsally skin wrinkled ..... *Nyctibatrachus* Boulenger

Genus ***Micrixalus*** Boulenger

1888. *Micrixalus* Boulenger, Proc. Zool. Soc. London., : 204.

Diagnosis : Skin warty or tuberculated; vomerine teeth absent; tympanum indistinct or hidden; fingers free, tips of digits dialated in to small distinct round discs with circum marginal groove.

7. ***Micixalus nudis*** Pillai

1978. *Micixalus nudis* Pillai, *Proc. Indian Acad. Sci.*, **87** (B) : 173.

Material examined : 2 exs. Manchuchola Mala, 26.i.1994. Coll : K. C. Gopi.

Diagnosis : Dorsum brownish without markings; dorsolateral glandular fold absent; a chocolate coloured band from behind eye to shoulder; limbs cross barred; ventrally white, throat and breast marbled with brown.

Measurements : Snout to vent length 13.7 to 16 mm.

Ecological notes : Collected in water from a small stream inside a moist deciduous forest.

Distribution : India : Kerala : Wynad, Ponmudi.

Status : Common.

Genus ***Nyctibatrachus*** Boulenger

1882. *Nyctibatrachus* Boulenger, *Catalogue of Batrachia and Salientia,* London : 503.

Diagnosis : Pupil vertical; tongue free and deeply bifid behind; vomerine teeth in two straight or oblique series; tympanum concealed; fingers free; toes webbed; tips of digits dialated into small discs.

8. *Nyctibatrachus major* Boulenger

1882. *Nyctibatrachus major* Boulenger, *Cat. Batr. Sal. Brit. Mus.*, : 114.

Material examined : 1 ex. Manchuchola Mala, 26.i.1994. Coll : K. C. Gopi.

Diagnosis : Pupil vertical; skin of back and sides with vermiform wrinkles; brown or dark brown above; limbs barred; throat brownish; ventrally pale; toes three-fourths webbed.

Measurement : Snout to vent length 17 mm.

Ecological notes : Collected from the bank of a hill stream in a moist deciduous forest.

Distribution : India : South India : Wynad, Dhoni forest, Cochin and Ponmudi in Kerala; Kalakkad forest in Tamil Nadu.

Status : Common.

Genus ***Rana*** Linnaeus

1758. *Rana* Linnaeus, *Syst. Nat.* ed., 10 Holmiae : 210.

Diagnosis : Skin not smooth; tongue free, deeply notched and bifid behind; vomerine teeth present (rarely absent); pupil horizontal; tympanum distinct, sometimes hidden; parotid gland absent; fingers free; toes webbed; tips of digits simple or dialated.

Key to the species of the genus Rana of Kasaragod district

1. Tips of fingers and toes dialated in to discs bearing distinct horse shoe shaped circum marginal groove 2

   Tips of fingers and toes not dialated in to discs and without circum marginal groove 3

2. Tongue with a pointed papilla 4

   Tongue without a papilla; medium sized frogs with toes nearly entirely webbed; dorsolateral glandular fold from above the tympanum to the hip usually with a dark outer edge; tibio-tarsal articulation reaching nostril or tip of snout or a little beyond; body yellowish brown to dark bronze coloured above ..... *temporalis* (Gunther)

3. Toes fully webbed 5

   Toes usually half webbed with three phalanges of the fourth toe free; skin of back warty and often with short and interrupted longitudinal glandular folds; outer metatarsals united in the basal half; an inner and outer metatarsal tubercle present ..... *limnocharis* Gravenhorst

4. First finger at least as long as second; tympanum half to two-thirds diameter of the eye ..... *beddomii* (Gunther)

   First finger longer than second; tympanum as large as eye and close to it ..... *semipalmata* Boulenger

5. Skin of back with longitudinal folds; inner metatarsal tubercle small, blunt and obtuse; large sized frogs ..... *tigerina* Daudin

   Skin of back warty; inner metatarsal tubercle finger-like; medium sized frogs ..... *cyanophlyctis* Schneider

9. ***Rana limnocharis*** Gravenhorst

1829. *Rana limnocharis* Gravenhorst, Zoologici : 41.

Material examined : 8 exs. Kavadikanam (Bandadka : Adoor R.F), 19.iii.1994 (6 exs.) and 23.iii.1994 (1 ex.); Karadka R.F., 21.iii.1994 (1 ex.). Coll : K. C. Gopi.

Diagnosis : Toes usually half webbed with three phalanges of the fourth toe free; tibio-tarsal articulation reaching nostril; skin warty above, usually with short and interrupted longitudinal glandular folds; a strong fold from eye to shoulder; usualy gray or brown above with darker markings and darker bars on lips and legs; often with a vertebral band; smooth and white below.

Measurements : Snout to vent length 14 to 26.2 mm.

Ecological notes : Collected in water of a slow flowing stream inside moist deciduous forests.

Distribution : Main land of India and Andaman-Nicobar, East Asia from Pakistan, Nepal, Sri Lanka and China to Japan.

Status : Very Common.

10. ***Rana temporalis*** (Gunther)

1864. *Hylorana temporalis* Gunther, *Rept. Brit. India.,* : 427.

Material examined : 1 ex. Parappa R. F., 24.ix.1993. Coll. K. C. Gopi.

Diagnosis : 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 darker, the colouration continued backwards on flanks; limbs cross barred with brown; ventrally white, throat and breast at times brownish; tibio-tarsal articulation reaching nostril or tip of snout or a little beyond; no fold behind tympanum down to the shoulder.

Measurement : Snout to vent length 66.4 mm.

Ecological notes : The specimen has been obtained away from stream on humid soil shaded by short shrubs inside a semi evergreen forest.

Distribution : India : Mahabaleshwar (Maharashtra), Ponmudi (Kerala), Papanasam and Nilgiris (Tamil Nadu).

Status : Common.

11. ***Rana tigerina*** Daudin

1803. *Rana tigerina* Daudin, *Hist. Rain. Gren. Crap.,* : 64.

Material examined : 1 ex. Kavadikanam (Bandadka : Adoor R.F), 23.iii.1994. Coll : K. C. Gopi.

Diagnosis : Toes completely webbed; skin of back with longitudinal folds; inner metatarsal tubercles small, blunt; heels overlap when legs are folded at right angles to the body; tympanum

distinct, nearly the size of eye; first finger longer than second; olive green or brownish above with darker markings; often with a light coloured vertebral streak; limbs barred or spotted.

Measurement : Snout to vent length 72.5 mm.

Ecological notes : Collected in water from a slow flowing stream inside a moist deciduous forest.

Distribution : Throughout the Indian subregion, Sri Lanka, Burma to South East Asia, South China and Taiwan.

Status : Very common.

12. ***Rana cyanophlyctis*** Schneider

1799. *Rana cyanophlyctis* Schneider, *Hist. Amph.* **I** : 137.

Material examined : 18 exs. Parappa R.F, 13.x.1993 (1 ex.); Chempilankai (Muliyar R.F), 14.x.1993 (2 exs.); Kavadikanam (Bandadka : Adoor R.F), 19.iii.1994 (6 exs.), 20.iii.1994 (4 exs.), 23.iii.1994 (4 exs.); Karadka R.F, 21.iii.1994 (1 ex.). Coll : K. C. Gopi.

Diagnosis : Snout rounded; first and second fingers of more or less equal length; toe tips swollen and rounded; a single line of porous warts on flanks; inner metatarsal tubercle finger-like; skin warty above and gray, olive, brown or blackish above with darker spots or marblings; a dark edged white band on the back of the thighs.

Measurements : Snout to vent length 19.3 to 54.1 mm.

Ecological notes : All the specimens studied were collected in water at the edge of streams or pools inside moist deciduous and semi evergreen forests.

Distribution : Throughout the Indian Peninsula from the Himalaya southwards, Iran, South Arabia, Sri Lanka, Nepal and Thailand.

Status : Very common.

13. ***Rana beddomii*** (Gunther)

1875. *Polypedates beddomii* Gunther, *Proc. Zool. Soc. London.*, : 571.

Material examined : 1 ex. Manchucholamala, 26.i.1994. Coll : K. C. Gopi.

Diagnosis : Inter orbital space as broad as upper eyelid; first finger at least as long as second; tibio-tarsal articulation reaching the tip of snout or a little beyond; skin of back with short longitudinal folds; a strong supra tympanic fold; a black streak on the canthus rostralis and a temporal streak enclosing the tympanum; generally brownish above with indistict dark spots, occassionally fully pale whitish above with no colour or markings but for the dark temporal and canthal streaks; ventrally uniform white.

Measurement : Snout to vent length 24.2 mm.

Ecological notes : Collected in water of a slow flowing stream inside a moist deciduous forest.

Distribution : India : Western Ghats (Kerala, Karnataka, Tamil Nadu, Maharashtra).

Status : Very common.

14. ***Rana semipalmata*** Boulenger

1882. *Rana semipalmata* Boulenger, *Cat. Batr. Brit. Mus.*, : 56.

Material examined : 3 exs. Pullodi, 27.x.1993 (1 ex.); Kavadikanam (Bandadka, Adoor R.F), 23.iii.1994 (2 exs.). Coll : K. C. Gopi.

Diagnosis : Inter orbital space as broad as the upper eyelid or a little narrower; first finger a little longer than the second; tibio-tarsal articulation reaching the tip of the snout or between the eye and snout; skin of back with short longitudinal folds; sides granulate with small warts; brown above, sides of body darker, loreal and temporal regions blackish; ventrally white, throat and breast mottled with brown.

Measurements : Snout to vent length 22 to 22.8 mm.

Ecological notes : Collected in water of slow flowing streams inside wet evergreen and moist deciduous forests.

Distribution : India : Kerala : Calicut, Dhoni forest, Cochin, Ponmudi., Tamil Nadu : Anamalai hills, Poombarai, Kodaikanal.

Status : Common.

Analysis of Taxonomic and Ecological Data : An analysis of taxonomic and ecological data of Amphibians in the present collection (Table-I) from Kasaragod district reveals that the forests of the districts though highly fragmented, still houses a fair assemblage of Amphibian fauna represented by 14 species which include 2 species of Caecilians. Certain biologically richer habitats in Kerala like the Silent-Valley (partly surveyed) and Ponmudi are known so far only to be represented by 19 (Pillai, 1986) and 25 (Inger *et. al.*, 1984) species of Amphibians respectively. It is well known that though locally abundant, populations of many Amphibians have become widely seperated (Daniels, 1991) due to habitat destruction. In the present collection, barring *P. leucorhinus* and *R. cyanophlyctis* found in 4 out of 6 localities surveyed, and *R. limnocharis* and *R. semipalmata* in 2 localities, rest of the Amphibians recorded (*R. tigerina, R. temporalis, R. beddomii, M. nudis, N. major, B. beddomii, B. melanostictus, P. pulcherrimus, U. menoni* and *U. narayani*) are confined to either one of the survey localities only. The collection data also show that populations of *P. leucorhinus* and *R. cyanophlyctis* are comparatively larger by number and enjoy a wider area of distribution. The next in order is *R. limnocharis*. Rest of the species recorded in the present study are represented poorly in the district. It may also be mentioned here that though *R. tigerina* is known to occur widespread in the country (Inger and Dutta, 1986) and over the entire range of Western Ghats (Daniels, 1992), the species is represented in the present collection only by a single specimen from a single locality.

TABLE-1

Collection data of Amphibians from Kasaragod district

Species of Amphibians collected (locality wise)	Number of specimens collected	Locality of collection	Type of forest
		Parappa R.F.	
R. cyanophlyctis	1	In water.	Semievergreen
R. temporalis	1	Away from stream on humid forest soil.	
P. leucorhinus	11	On leaf litter and leaves of shrubs	
B. melanostictus	3	On leaf litter.	
		Pullodi	Wet evergreen
R. semipalmata	1	In water.	
P. leucorhinus	1	On leaf of shrub.	
B. beddomii	1	On leaf litter.	
		Chempilankai, Muliyar R.F.	Moist deciduous
R. cyanophlyctis	2	In water.	
P. leucorhinus	6	On leaf litter and on leaves of shrubs.	
		Manchucholamala	Moist deciduous
R. beddomii	1	In water.	
M. nudis	2	In water.	
N. major	1	Bank of a stream.	
P. pulcherrimus	1	On leaf of a shrub.	
		Karadukka, Karadka R.F.	Moist deciduous
R. cyanophlyctis	1	In water.	
R. limnocharis	1	In water.	
		Chappakal, Kavadikanam (Bandadka, Adoor R.F.)	Moist deciduous
R. cyanophlyctis	14	In water.	
R. tigerina	1	In water.	
R. limnocharis	7	In water.	
R. semipalmata	2	In water.	
P. leucorhinus	1	On leaf litter.	
U. menoni	1	In water.	
U. narayani	1	In water.	

The species of Amphibians which are recorded from single localities show patchy distribution within the district and are at a higher risk of extinction if the already fragmented forests of Kasaragod district are subjected to further degradation.

SUMMARY

A collection of Amphibians from Kasaragod district, Kerala is reported. The fauna include 2 species of Gymnophiona and 12 species of Anura. In addition to the systematic account, appropriate keys to the identification and analysis of the taxonomic and ecological data of the material reported are provided.

ACKNOWLEDGEMENTS

The authors are indebted to Dr. A. K. Ghosh, Director and Dr. J. R. B. Alfred, Additional Director, Zoological Survey of India, Calcutta and to Dr. P. T. Cherian, Joint Director, Zoological Survey of India, Madras for facilities and encouragement. The help and co-operation rendered to the survey party by Sri Chandrasekhara and Sri Sreedharan, Forest Range Officers of the Kasaragod and Kanjangad forest ranges respectively are gratefully acknowledged.

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STUDIES ON SOME SPIDERS OF THE FAMILY OXYOPIDAE (ARANEAE : ARACHNIDA) FROM INIDA.

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INTRODUCTION

Spiders of the family Oxyopidae have received very little attention in India. Pocock (1900, 1901) described four and three new species of *Oxyopes* and *Peucetia* respectively. Sherriff (1951) redescribed and figured Pocock's species of *Oxyopes* found in the oriental region. Tikader (1965, 1969, 1970), Biswas (1975) and Gajbe (1992) described thirteen, one and two species respectively.

The type speciemens are deposited in the National Zoological Collection, Zoological Survey of India, Calcutta.

1870. *Oxyopidae* Thorell. *Nova., Acta. Reg. Soc. Sci.,* 7 (3) : 188.

1898. *Oxyopidae* : Simon, *Hist. Nat. Araign.,* 2 : 379.

1900. *Oxyopidae* : Pocock, *Fauna Brit. India, Arach.,* : 254.

1950. *Oxyopidae* : Sheriff, *Proc. zool. Soc. Lond.,* 120 (4) : 651.

1964. *Oxyopidae* : Brady, *Bull. Mus. Comp. zool.,* 131 (13) : 444.

1970. *Oxyopidae* : Tikader, *Rec. zool. Surv. India.,* 64 (1-4) : 70.

1976. *Oxyopidae* : Brady, *Psyche,* 82 (2) : 189.

Type-genus : *Oxyopes* Latreille

Distribution : Temperate and tropical countries.

Characters : The cephalothorax is variable in shape, has the carapace high and convex, sloping sharply at the thoracic declivity and the sides. Anterior row of eyes recurved, anterior medain eyes smallest, much smaller than the anterior lateral eyes. Posterior row procurved. Posterior median eyes equal in size to posterior eyes. The chelicerae are very long and tampering at the distal end, and the fangs are short. The cheliceral margin is short and armed with one tooth on each side of the anterior and posterior margin or without teeth. The boss on the anterior lateral face of the chelicera is not so prominent. The labium is always longer than wide and the maxillae exceeds greatly its length. The sternum is roughly heartshaped and tapers behind to a thin projection between the posterior- coxae.

Key to the genera of the family Oxyopidae

1. Inner margin of chelicera provided with a single tooth on each side; Anterior lateral eye row subequal to posterior median eye row; posterior eye row strongly procurved. Living specimens not green in colour ..... *Oxyopes* Latreille

   Inner margin of chelicera without tooth; Anterior lateral eye row obviously wider than posterior median eye row; posterior eye row only slightly procurved. Living specimens bright green in colour ..... *Peucetia* Thorell.

Genus 1. ***Oxyopes*** Latreille

1804. *Oxyopes* Latreille, *Nouv. Dict. Hist. Nat.*, 24 : 135.

1898. *Oxyopes* : *Simon*, Hist. Nat. Araig., : 379.

1950. *Oxyopes* : Brady, *Bull. Mus. Comp. zool.*, 131 (13) : 447.

1970. *Oxyopes* : Tikader, *Rec. zool. Surv. India*, 64 (1-4) : 70.

Characters : Posterior row of eyes strongly procurved and equidistant from each other. Ocular quandragle longer than wide and limited by the posterior median eyes and the anterior lateral eyes.

Type-species : *Oxyopes heterophthalmus* Latreille.

Distribution : Europe, Africa, Asia, Australia and america.

Key to species of the Genus *Oxyopes* Latreille

1. Spider of small size (Total lengyh upto 9 mm.) ..... 2.

   Spider of large size (Total length more than 9mm) ..... 9.

2. Clypeus provided with two or four black lines extending from anterior median eyes to base of fang of chelicera ..... 3.

   Clypeus not provided with black lines. ..... 8.

3. Carapace not clothed with spatulate hairs ..... 4.

   Carapace clothed with spatulate hairs ..... 6.

4. Carapace with three to four longitudinal bands. ..... 5.

   Carapace without three to four longitudinal bands. ..... 7.

5. Carapace with four longitudinal bands, Abdomen mid-dorsally and laterally with red'bands ..... *ashae* sp. nov.

   Carapace with three bands, abdomen with longitudinal deep brown line ... *chittrae* Tikader

6. Abdomen dorsally with brown longitudinal patch and sides with blackish lines ..... *pandae* Tikader

   Abdomen mid-dorsally with yellow-brown patch, Lateral sides with brown lines ..... *sunandae* Tikader

7. Clypeus with two black lines, abdomen provided with irregular laonigudinal broad, line .. .. *sakuntalae* Tikader

   Clypeus with two black lines, Abdomen laterally provided with lance-shaped brown patch ..... *subhadrae* Tikader

8. Abdomen mid-dorsally with deep brown band and laterally with brown patches sp. nov. ..... *biharensis*

   Abdomen mid-dorsally with deep brown band and laterally with silvery white and brown band ..... gujaratensis sp. nov

9. Carapace with two to four longitudinal brown or black bands 10

   Carapace without longitudinal brown or black bands 15

10. Carapace provided with four longitudinal brown bands. Abdomen mid-dorsally with broad light brownish green band and laterally with black patches ..... *bharatae* sp. nov.

    Carapace provided with deep brown patches. Abdomen with lance-shaped brown patch, laterally with blackish line ..... *shwetae* Tikader

11. Carapace without deep brown or black blunt or spatulate hairs 12

    Carapace with deep brown or black blunt or spatulate hairs 13

12. Carapace without patch. Abdomen dorsally provided with deep brown bars ..... *sikkimensis* Tikader

    Carapace uniform. Abdomen dorsally with lance-shaped black patch, laterally with black line ..... *sitae* Tikader

13. Carapace with black minute spatulate hairs ..... *assamensis* Tikader

    Carapace with deep brown minute spatulate hairs 14

14. Abdomen with longitudinal broad light to deep brown band ..... *sushilae* Tikader

    Abdomen with spatulate hairs, posterior half with dirty white chevrons ..... *ratnae* Tikader

15. Legs prvovided with black patches ..... *rukminiae* sp. nov.

    Legs uniform, space not provided with patches or lines 16

16. Carapace with V-shaped patch ..... *kamalae* sp. nov.

    Carapace without V-shaped patch 17

17. Abdomen dorsally provided with muscular corrugations ..... *pawani* Gajbe

    Abdomen dorsally not provided with muscular corrugations. 18

18. Abdomen dorsally provided with silvery white band and laterally with black bands ..... *kusumae* sp. nov.

    Abdomen dorsaly provided with red band and laterally with two black bands ..... *naliniae sp. nov.*

1. ***Oxyopes ashae*** sp. nov.

(Figures 1-4)

Type-specimen : *Holotype* female deposited in the National Zoological Collection, Zoological Survey of India, Calcutta (Reg. Nu. 5500/18).

Type-locality : INDIA, Madhya Pradesh, Gudari village, near Orccha, Bastar District. Coll. U.A. Gajbe, 27. XII. 1983.

General : Cephalothorax and legs light yellowish-green, abdomen silvery white. Total length 8.9 mm. Carapace 3.6 mm. long, 2.7 mm. wide; abdomen 5.2 mm. long, 2.1 mm. wide.

Cephalothorax : Longer than wide, convex, cephalic region slightly high, clothed with pubescence, centre of thorax provided with a conspicuous fovea, Carapace provided with four longitudinal deep brown bands as in Figure 1. Anterior row of eyes strongly procurved (as seen from in front), medians smaller than the laterals and equally spaced. posterior row of eyes strongly procurved, equal in size and nearly equidistant from each other. All eyes encircled by a black

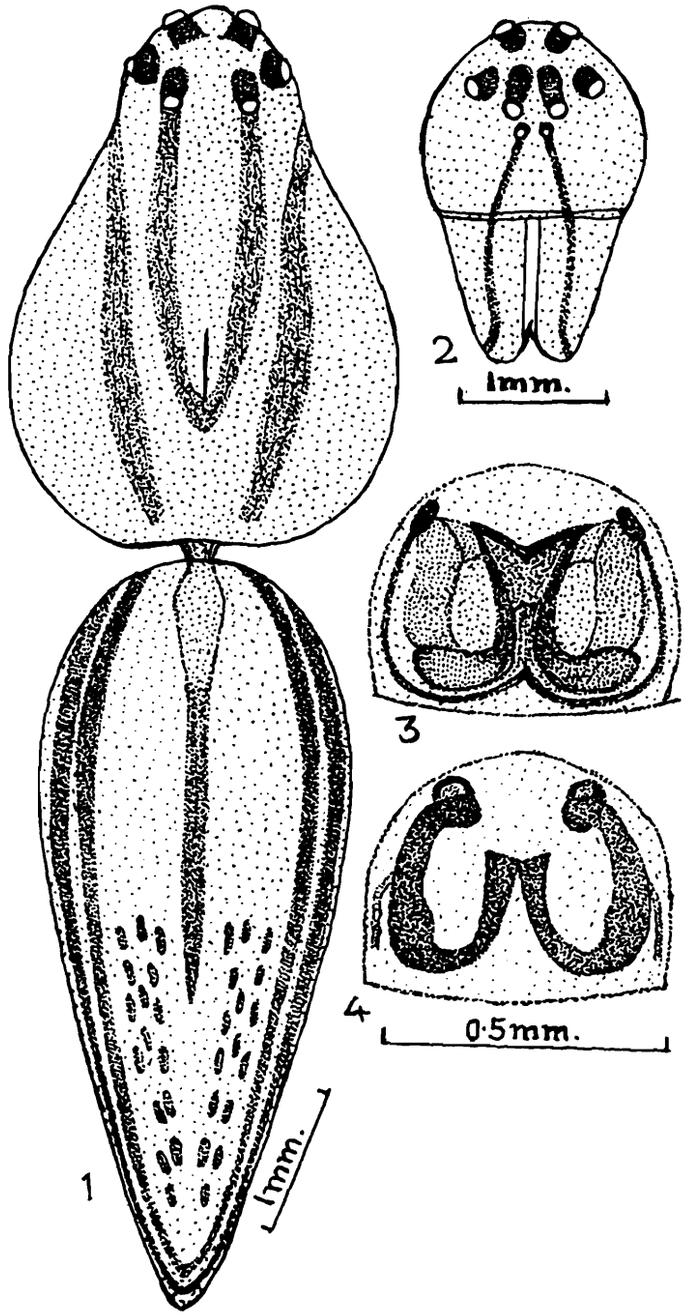

Fig. 1-4. Oxyopes ashae sp. nov.
1. Dorsal view of female, legs omitted; 2. Clypeus; 3. Epigyne; 4. Internal genitalia.

patch. Clypeus long, vertical, provided with black band extending from anterior median eyes to the base of fangs of chelicera as in Figure 2. Sternum heart-shaped, pointed behind, clothed with hairs and some spines, rebordered and near coxae provided with black patches, chelicera long, vertical, light yellow, inner margin provided with one minute tooth and outer margin with two dissimilar teeth. Labium and maxillae longer than wide, brownish-green anterior margin provided with distinct scopulae. Leg long and strong, clothed with hairs and conspicuous spines, uniform in colour without any patches.

Abdomen : Longer than wide, narrowing behind, clothed with pubescence, mid-dorsally provided with longitudinal red stripe starting from anterior end and up to just middle of abdomen, laterally provided with two longitudinal black bands extending from anterior end to the posterior end just above the spinnerets, mid-dorsal half with small black patches as in Figure 1. Ventral side pale yellow but middle provided with conspicuous longitudinal broad stripe starting from epigastric furrow to the base of spinnerets. Epigynum as in Figure 3. Internal genitalia as in Figure 4.

This species closely resembles *Oxyopes ratnae* Tikader, but differs from it as follows : (i) Cephalothorax provided with deep brown band but in *O. ratnae* cephalothorax without bands. (2) Abdomen dorsaly provided with one mid-dorsal stripe four lateral black stripes but in *O. ratnae* abdomen laterally provided with three stripes. (3) Epigyne and internal genitalia also structurally different.

2. ***Oxyopes chittrae*** Tikader
(Figures 5-7)

1965. *Oxyopes chittrae* Tikader, *Proc. Indian Acad. Sci.*, 62 (3) : 140.

Type-speciemeş : *Holotype* female, *Allotype* four male deposited in the National Zoological Collection, Zoological Survey o India, Calcutta. (Reg. No. 3192/18) and 3193/18).

Type-locality : INDIA, Maharashtra, NCL compound, Poona. Coll. *B. K. Tikader*, 21. IX. 1962.

General : Cephalothorax and legs brownish-green, abdomen brown. Total length 6.9 mm. Carapace 2.5 mm. long, 2.0 mm. wide; abdomen 4.5 mm. long, 2.4 mm. wide.

Cephalothorax : Longer than wide, high, narrowing in front cephalic region slightly high, clothed with fine hairs; centre of thorax provided with fine fovea. Eyes eight in two rows, encircled with black patch. Posterior row slightly procurved and situated in equal distance, anterior row strongly recurved and anterior median eyes smaller than others. Clypeus long. Sternum heart shaped, pointed behind and clothed with hairs. Legs long and strong, clothed with hairs and conspicuous long spines. Male same in colour as female, male palp as in Figure 7.

Abdomen : Longer than wide, maximum width in-front, and narrowing behind, clothed with fine hairs, mid-dorsally with a conspicuous longitudinal deep-brown broad stripe extending from

base to end of abdomen and this deep-brown stripe surrounded by chalk-white patches as in Figure 5. Epigynum as in Figure 6.

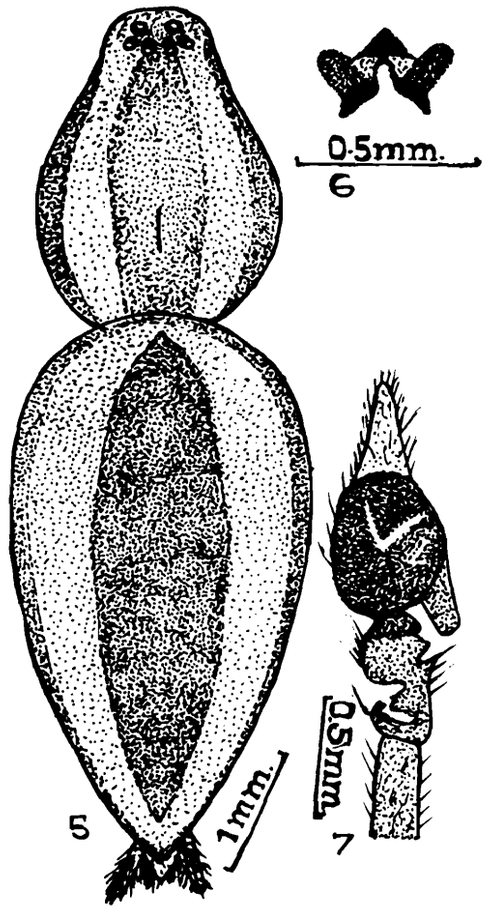

Fig. 5-7. *Oxyopes chittrae* Tikader
5. Dorsal view of female, legs omitted; 6. Epigyne; 7. Male palp.

Distribution : INDIA : Poona, Maharashtra.

3. ***Oxyopes pandae*** Tikader
(Figures 8-10)

1969. *Oxyopes pandae* Tikader, *Oriental Ins.*, 3 (1) : 33.

Type-specimen : *Holotype* female, *Allotype* male, deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 3822/18 and 3824/18).

Type-locality : INDIA : Uttar Pradesh, Engineering College Compound, Allahabad. Coll. *M. S. Pande*, 1. IV. 1968.

General : Cephalothorax and legs greenish-white, abdomen brownish-green. Total length 7.5 mm. Carapace 2.8 mm. long, 2.5 mm. wide; abdomen 4.8 mm. long, 2.2 mm wide.

Cephalothorax : Longer than wide, narrowing in front, cephalic region slightly high, clothed with short spatulate hairs; centre of thorax provided with short fovea. Eyes eight in two rows,

bases of eyes encircled with black patch; posterior row slightly procurved, equidistant from each other, anterior row strongly recurved, anterior median eyes smallest. Middle of ocular quadrangle with a pair of long spines directed forward. Clypeus long, with two conspicuous brown stripes extending from antrior median eyes to near the base of fangs of chelicerae. Sternum heart-shaped, pointed behind, clothed with fine hairs and spines. Legs long and strongly clothed with hairs and constpicuous long spines; ventral side of femora of all legs provided with conspicuous longitudinal brown or black stripes. Femora of I and II legs provided with two pairs of robust ventral spines.

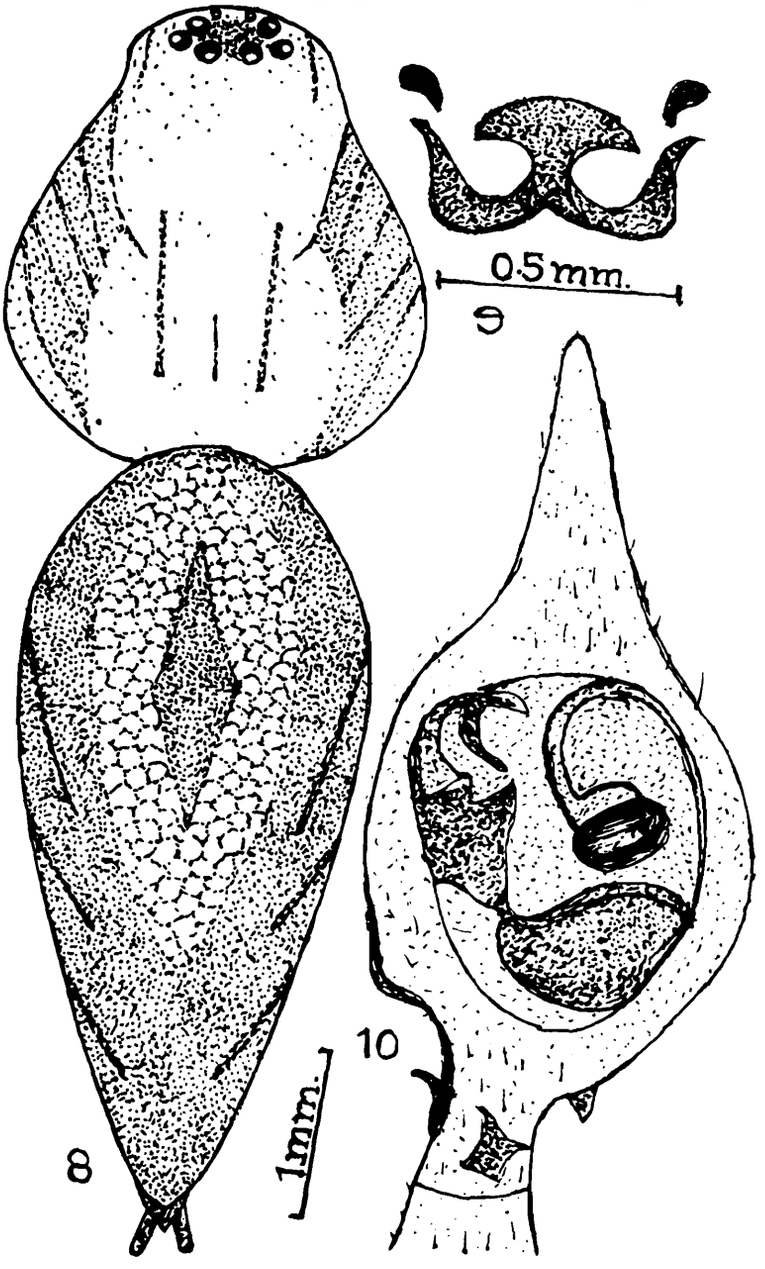

Fig. 8-10. *Oxyopes pandae* Tikader
8. Dorsal view of female, legs omitted; 9. Epigyne; 10. Male palp.

Abdomen : Long, narrowing behind, clothed with fine hairs, mid-dorsally with a brown longitudinal patch and the sides with some blackish lines as in Figure *8*. Ventral side with broad longitudinal deep brown stripe, extending from epigastric fold to near the base of spinnerets. Epigyne as in Figure *9*. Male smaller than female. Male palp as in Figure *10*.

Distribution : INDIA; Allahabad, Uttar Pradesh.

4. *Oxyopes sunandae* Tikader
(Figures 11-12)

1970. *Oxyopes sunandae* Tikader, *Rec. zool. Surv. India,* 64 (1-4) : 74.

Type-specimen : *Holotype* female deposited in the National Zoological Collection, Zoological Survey of India, Calcutta (Reg. No. 3184/18).

Type-locality : INDIA : West Sikkim, Legship, Coll. *B. K. Tikader,* 1.x. 1959.

General : Cephalothorax and legs light brownish green; abdomen dirty-white, Total length 8.0 mm. Carapace 3.4 mm. long, 2.2 mm. wide; abdomen 4.8 mm. long, 2.0 mm. wide.

Cephalothorax : Longer than wide, convex, clothed with fine hairs and some deep-brown special type of blunt or spatulate hairs mainly on the thoracic region as in Figure *11*. Centre of thorax with fine fovea. Eyes pearly white, in two rows, eyes encircled by black patch. Posterior row of eyes procurved and equal distance apart. Anterior row strongly recurved, anterior lateral

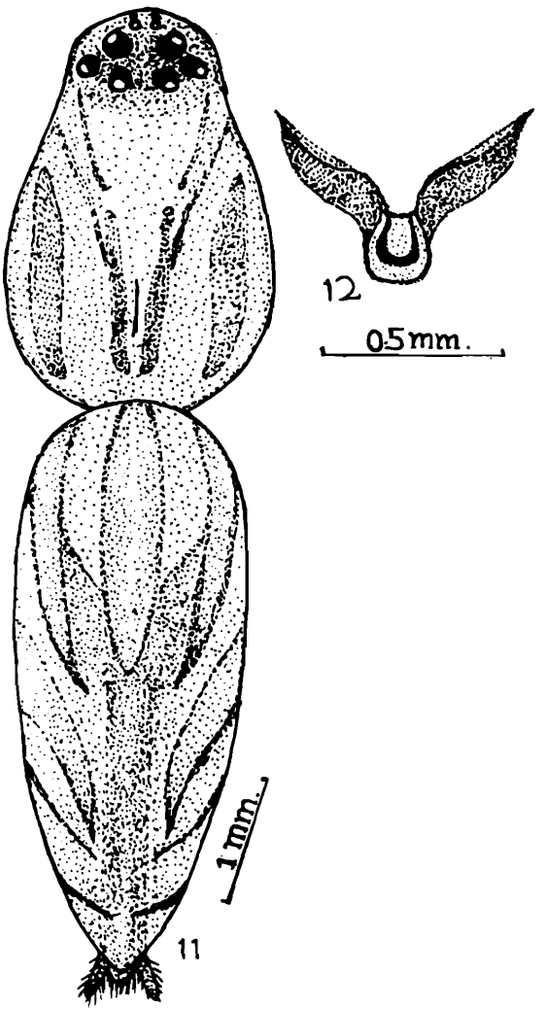

Fig. 11-12. *Oxyopes sunandae* Tikader
11. Dorsal view of female, legs omitted; 12. Epigyne.

eyes large and medians very small. Clypeus long and broad, provided with two black stripes extending from anterior median eyes to near the base of fangs of chelicerae. Sternum heart shaped, pointed behind, clothed with fine hairs and conspicuous long spines, lower side of femora of all legs provided with a longitudinal black stripe.

Abdomen : Longer than wide, narrowing behind, clothed with fine grey hairs; anterior with a mid-dorsal lanceshaped yellowish-brown patch; laterally provided with conspicuous deep brown broad longitudinal lines extending from epigastric furrow to spinnerets. Epigyne as in Figure *12*.

Distribution : INDIA : Legship, Sikkim.

5. *Oxyopes sakuntalae* Tikader

(Figures 13-15)

1970. *Oxyopes sakuntalae* Tikader, *Rec. zool. Surv. India,* 64 (1-4) : 73.

Type-specimens : *Holotype* female *allotype* one male deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 3187/18 and 3188/18).

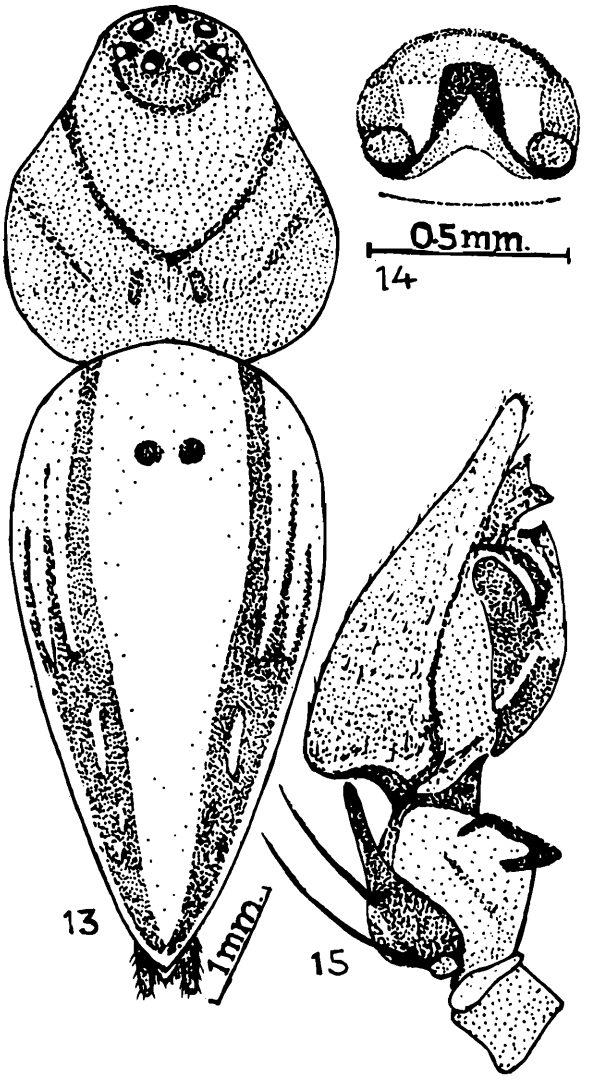

Fig. 13-15. *Oxyopes sakuntalae* Tikader
13. Dorsal view of female, legs omitted; 14. Epigyne; 15. Male palp.

Type-locality : INDIA : West Bengal, Bhudbari Dist. Darjeeling. Coll. *B. K. Tikader*, 15. IX. 1959.

General : Cephalothorax, legs and abdomen brownish green. Total length 8.5 mm. Carepace 3.2 mm. long, 2.9 mm. wide; abdomen 5.5 mm. long, 2.8 mm. wide.

Cephalothorax : Slightly longer than wide, convex, cephalic region slightly high and broad, clothed with fine hairs, centre provided with sharp fovea. Eyes pearly white, posterior row procurved and equally distance, base of each eye encircled with a black patch. Anterior row strongly recurved and anterior medians small. Clypeus long and provided with two black lines extending from anterior median eyes to near the base of fangs of chelicerae. Sternum oval, pointed behind, clothed with fine hairs and spines. Legs long and strong, clothed with fine hairs and conspicuous long spines, all legs provided with longtudinal deep-brown discontinuous lines, one situated dorsally, and one ventrally.

Abdomen : Longer than wide, narrowing behind with an irregular longitudinal broad line extending from base to end of abdomen as in Figure *13*. Ventral side uniform pale colour but middle provided with a conspicuous longitudinal broad black line extending from epigastric fold to base of spinnerets. Epigyne as in Figure 14. Male almost like female. male palp as in Figure 15.

Distribution : INDIA : Darjeeling, West Bengal.

6. ***Oxyopes subhadrae*** Tikader
(Figures 16-18)

1970. *Oxyopes subhadrae* Tikader, *Rec. zool. Surv. India*, 64 (1-4) : 71.

Type-specimen : *Holotype* female deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 3186/18).

Type-locality : INDIA : West Sikkim, Legship. Coll. *B. K. Tikader*, 1. × 1959.

General : Cephalothorax and legs brownish-green, abdomen dirty white. Total length 8.2 mm. Carapace 3.2 mm long, 3.0 mm. wide; abdomen 5.0 mm. long, 3.4 mm. wide.

Cephalothorax : Longer than wide, convex, clothed with fine hairs, cephalic region slightly high and broad, centre provided with fovea. Eyes in two rows, encircled by black patch. Anterior row of eyes strongly recurved, medians very small, posterior row slightly procurved, posterior medians closer to adjacent laterals than to each other. Clypeus long, clothed with grey hairs, provided with black line starting from anterior median eye to the base of fangs of cheicerae as in Figure *18*. Sternum heart-shaped, pointed behind, clothed with fine hairs. Legs long and strong, clothed with fine hairs and conspicuous long spines.

Abdomen : Longer than wide, narrowing behind, clothed with fine hairs, mid-dorsally with a lance shaped brown patch and all over the abdomen provided with irregular net-like white patches

as in Figure 16. Ventral side uniform light brown colour and clothed with short and stout deep brown hairs. Epigyne as in Figure 17.

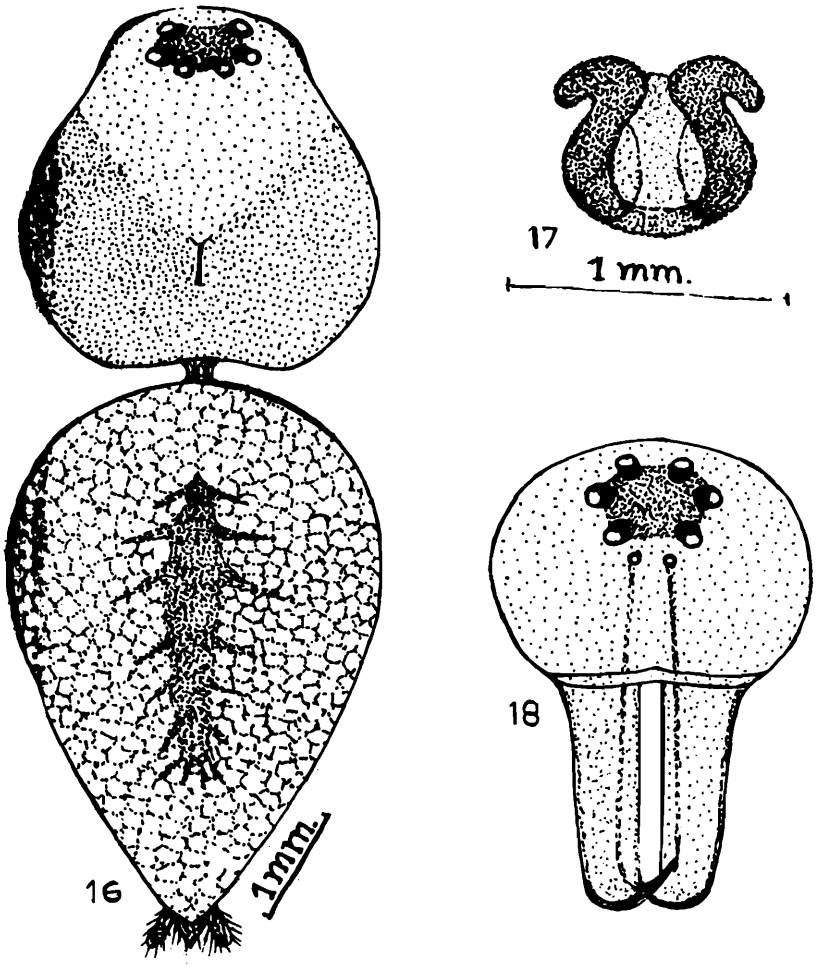

Fig. 16-18. *Oxyopes subhadrae* Tikader
16. Dorsal vew of female, legs omitted; 17. Epigyne; 18. Clypeus.

Other Material Examined : 1 ♀, Junglighat, Port Blair, Andaman. Coll. *B. S. Lamba,* 28. II 1964.

Distribution : INDIA : Sikkim, Andaman.

6. ***Oxyopes biharensis*** sp. nov.
(Figures 19-22)

Type-specimen : *Holotype* female deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 5497/18).

Type-locality : INDIA : Bihar, Kierpur, Purneah district, Coll. *C. Paiva,* 8.IX. 1915.

General : Cephalothorax and legs light reddish-green, abdomen brownish-green, Total length 8.4 mm. Carapace 3.4 mm. long, 2.9 mm. wide; abdomen 5.0 mm. long 3.0 mm. wide.

Cephalothorax : Longer than wide, convex, cephalic region slightly high and broad, middle of thoracic region provided with a conspicuous fovea, clothed with pubescence from which light

reddish bands radiate to lateral sides. Anterior row of eyes strongly recurved (as seen from in front), medians much smaller than the laterals and nearly equidistant to each other. Posterior row of eyes procurved, equal in size and equidistant to each other. All eyes encircled by a black patch. Clypeus long, vertical, clothed with fine hairs, without any band as in Figure *20*. Sternum heart-shaped, pointed behind; light yellowish-green, clothed with hairs and some spines. Chelicerae vertical, long, reddish green, Clothed with hairs and some spine like hairs; inner and outer margins provided with one tooth each. Labium and maxillae longer than wide, reddish-green, clothed with hairs and spines, anterior margin provided with conspicuous scopulae. Legs long and strong, clothed with hairs and long spines, femora of all legs laterally without black line.

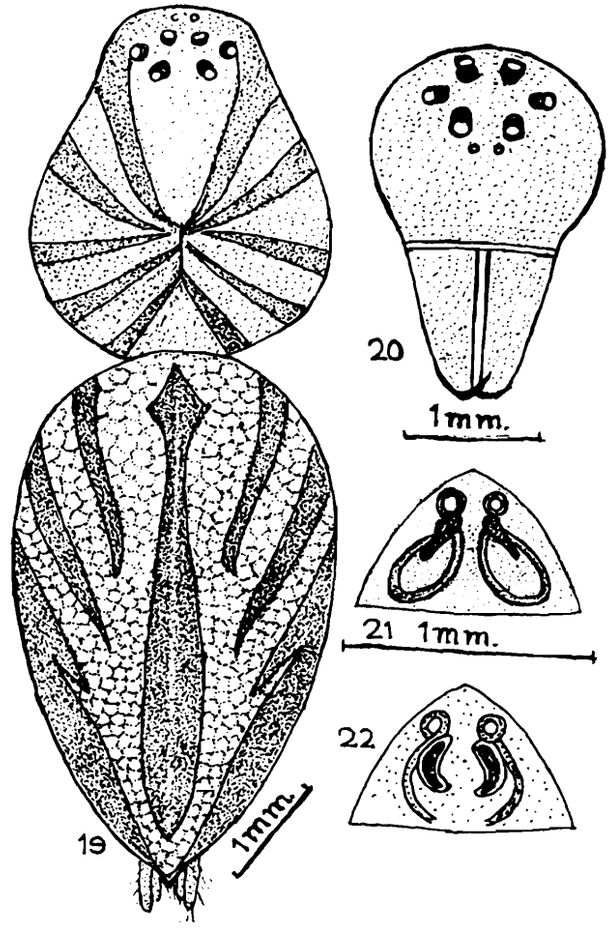

Fig. 19-22. *Oxyopes biharensis* sp. nov.
19. Dorsal view of female, legs omitted; 20. Clypeus; 21. Epigyne; 22. Internal genitalia.

Abdomen : Longer than wide, narrowing posteriorly, widest at the middle, clothed with pubescence, provided with deep brown stripe starting from anterior end to posterior end; laterally with deep brown patches, interspered with patches of silvery white as in Figure. *19*. Ventral side lighter than the dorsal, midventrally provided with longitudinal broad brown stripe starting from epigastric furrow to the base of spinnerets., Epigyne as in Figure *21*. Internal genitalia as in Figure *22*.

This species resembles *Oxyopes subhadrae* Tikader but differs from it as follows : (1) Carapace provided with light reddish bands, while *O. subhadrae* carapace is uniform without

bands. (2) Abdomen middorsaly provided with deep brown band starting from anterior end to the base of spinnerets and silvery white patches, but in *O. subhadrae* abdomen middorsally provided with light brownish-green band. (3) Epigyne and internal genitalia also structurally different.

8. ***Oxyopes gujaratensis*** sp. nov.
(Figures 23-26)

Type-specimen : *Holotype* female deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 5498/18).

Type-locality : INDIA : Gujarat, Sasangir. Coll. *T. G. Vazirani,* 11. IV. 1979.

General : Cephalothorax and legs reddish-green, abdomen deep brown. Total length 8.0 mm. Carapace 3.5 mm. long, 2.8 mm. wide; abdomen 4.8 mm. long, 2.9 mm. wide.

Cephalothorax : Longer than wide, convex, broad in front cephalic region slightly higher, clothed with pubescensce, middle of thoracic region provided with conspicuous fovea and V-shaped

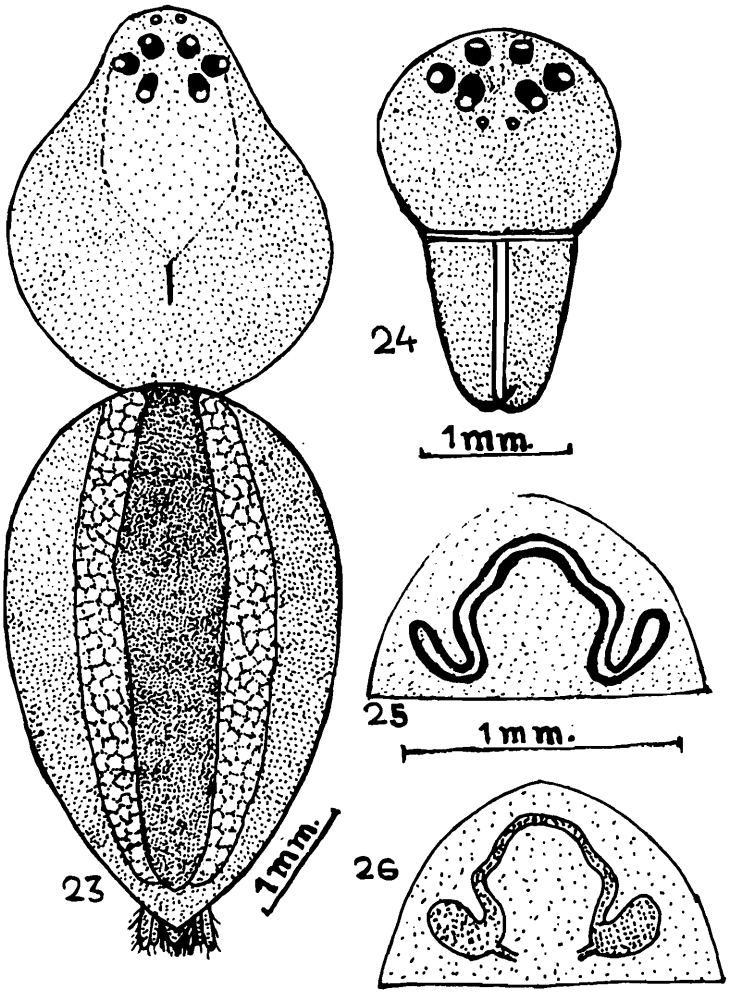

Fig. 23-26. *Oxyopes qujaratensis* sp. nov.
23. Dorsal view of feamle, legs omitted; 24. Clypeus; 25. Epigyne; 26. Internal genitalia.

yellowish patch starting from fovea to the posterior lateral eyes. Anterior row of eys strongly recurved (as seen from in front). medians much smaller than the laterals and nearly equidistant to each other. Posterior row of eyes procurved, eyes equal in size and equidistant to each other. All

eyes encircled by black patch. Clypeus high, vertical, clothed with hairs and some spines, without band as in Figurre. *24*. Sternum heart-shaped, pointed behind clothed with hairs and some spines. Chelicerae moderately strong, vertical, reddish green, clothed with hairs and some spines, inner and outer margins provided with one small tooth each. Labium and maxillae longer than wide, light reddish-green in colour. clothed with hairs and some spines, anterior margin provided with distinct scopulae. Legs relatively long and strong, clothed with hairs and spines.

Abdomen : Longer than wide, narrowing posteriorly, widest at the middle, clothed with pubescence; middorsaly provided with deep brown stripe starting from anterior end to the posterior end of abdomen and laterally with longitudinal silvery white and light brown band starting from anterior end to the posterior end of abdomen as in Figure *23*. Ventral side slightly lighter than the dorsal, midventrally provided with longitudinal broad light brown stripe extending from epigastric furrow to the base of spinnerets. Epigyne as in Figure 25. Internal genitalia as in Figure 26.

This species closely resembles *Oxyopes assamensis* Tikader but differs from it as follows : (1) Cephalothorax provided with V-shaped patch, but in *O. assamensis* cephalothorax without patch. (2) Abdomen middorsally provided with deep brown stripe and laterally with two silvery white patches from anterior to posterior end of abdomen, but in *O. assamensis* abdomen dorsally provided with black discontinuous patches. (3) Epigyne and internal genitalia also structurally different.

9. ***Oxyopes bharatae*** sp. nov.
(Figures 27-30)

Type-specimen : *Holotype* female deposited in National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 5502/18).

Type-locality : INDIA : Madhya Pradesh, Madan Mahal, Jabalpur. Coll. *U. A. Gajbe,* 13. XII. 1983. (Reg. No. 5502/18).

General : Cephalothorax and legs light yellowish-green, abdomen dirty chalk white. Total length 10.0 mm. Carapace 3.2 mm. long, 2.8 mm. wide; abdomen 6.7 mm. long. 2.4 mm. wide.

Cephalothorax : Longer than wide, convex, cephalic region slightly higher and broader, middle of thoracic region provided with a conspicuous fovea, clothed with pubescence and provided with four longitudinal brown stripes extending from posterior median and lateral eyes to the posterior end of carapace. Anterior row of eyes strongly recurved (as seen from in front), medians much smaller than the laterals and nearly equidistant to each other. Posterior row of eyes procurved, equal in size equidistant to each other. All eyes encircled by a black patch. Clypeus long, vertical, clothed with fine spine like hairs, provided with a black stripe extending from anterior median eyes to the base of fangs of chelicerae as in Figure *28*. Sternum heart-shaped, pointed behind, light yellowish-green, clothed with hairs and some spines. Chelicerae vertical, long, light yellowish green, clothed with hairs and spine like hairs, inner margin provided with one tooth and outer

margin with two teeth each. Labium and maxillae longer than wide, dark yellowish green, clothed with hairs and spines, anterior margin provided with conspicuous scopulae. Legs long and strong, clothed with hairs and conspicuous long spines. Femora of all legs laterally provided with black line; yellowish-green, clothed with hairs and spines, anterior margin provided with conspicuous scopulae. Legs long and strong, clothed with hairs and conspicuous long spines.

Abdomen : Longer than wide, narrowing posteriorly, clothed with pubescence, middorsally provided with broad light brownish-green stripe extending from anterior end to posterior end and laterally with black patches as in Figure *27*. Ventral side lighter than the dorsal, midventrally provided with longitudinal broad brown stripe having the margins black in colour starting from the epigastric furrow to the base of spinnerets. Epigyne as in Figure *29*. Internal genitalia as in Figure *30*.

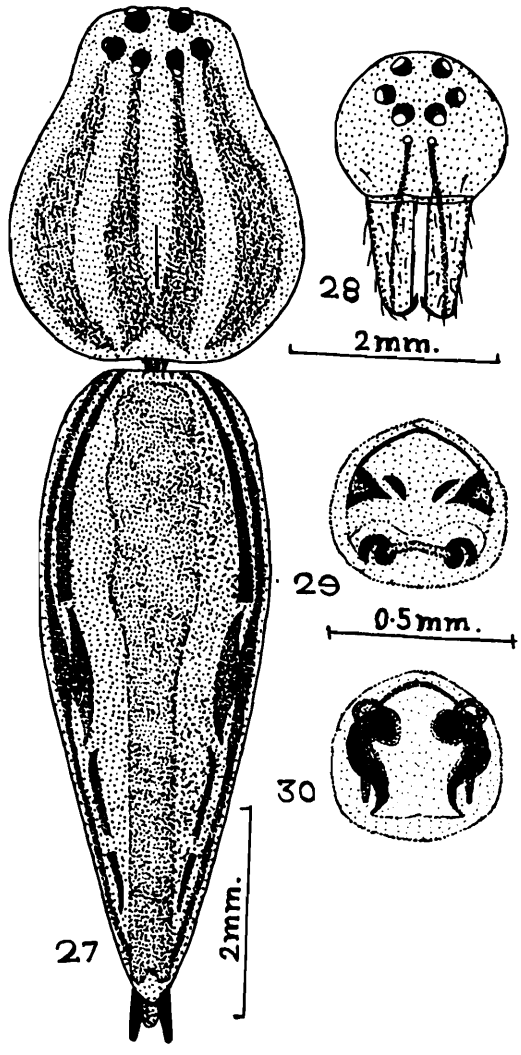

Fig. 27-30. *Oxyopes bharatae* sp. nov.
27. Dorsal view of female, legs omitted; 28. Clypeus; 29. Epigyne; 30. Internal genitalia.

This species closely resembles *Oxyopes subhadrae* Tikader but differs from it as follows : (1) Carapace provided with four longitudinal stripes but in *O. subhadrae* carapace uniform without stripes. (2) Abdomen middorsaly provided with light brownish-green stripe and laterally with

black patches but in *O. subhadrae* abdomen middorsally provided with a lance-shaped brown patch and irregular net-like white minute pacthes. (3) Epigyne and internal genitalia also structurally different.

Other Materials Examined : 2 ♀♀, Siripur. Saran Bihar, Coll. *Mackenzie*, August, 1913.

Distribution : INDIA : Madhya Pradesh, Bihar.

10. ***Oxyopes shwetae*** Tikader
(Figures 31-33)

1970. *Oxyopes shwetae* Tikader, *Rec. zool. Surv. India*, 64 (1-4) : 78.

Type-specimen : *Holotype* female *allotype* one male deposited in the Naional Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 3177/18 and 3178/18).

Type-locality : INDIA : West Sikkim, Manjithar, Coll. *B. K. Tikader*, 22. IX. 1959.

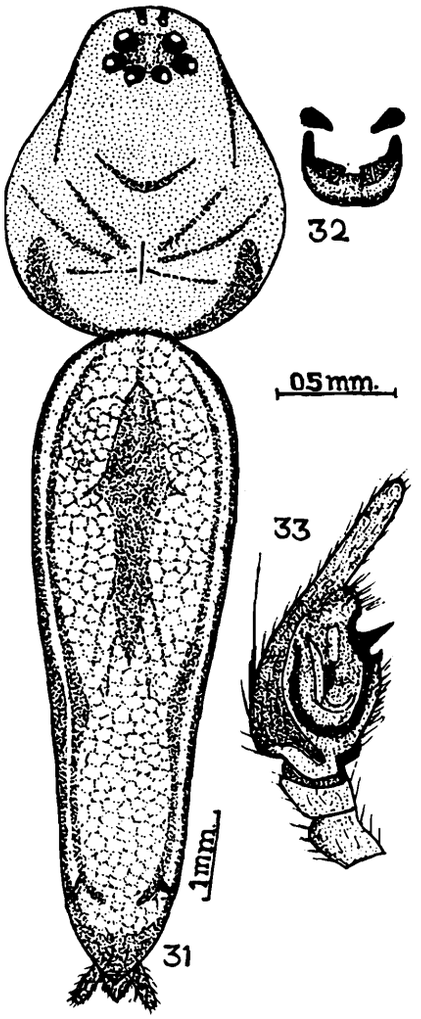

Fig. 31-33. *Oxyopes shwetae* Tikader
31. Dorsal view of female, legs omitted; 32. Epigyne; 33. Male palp.

General : Cephalothorax and legs light brownish-green. Abdomen chalk white Total length 12. 0 mm. Carapace 4.0 mm. long, 3.5 mm. wide; abdomen 8.0 mm. long, 2.5 mm. wide.

Cephalothorax : Longer than wide; convex, cephalic region high, clothed with fine hairs, posterior lateral side of thorax provided with deep brown patches, short blunt hairs, two longitudinal black lines on either side of cephalic region; centre of thorax with a short fovea. Eyes in two rows, all eyes encircled by black patch. Posterior row of eyes slightly procurved and equally spaced. Anterior row of eyes strongly recurved, anterior medians very small. Clypeus long and provided with two black lines extending from anterior median eyes to near the base of fang of chelicerae. Sternum heart-shaped, pointed behind, clothed with fine hairs and conspicuous long spines, ventral side of femora of all legs provided with a longitudinal black line.

Abdomen : Longer than wide, narrowing behind, anterior mid-dorsally with a lance-shaped brown patch; lateral side with longitudinal blackish line extending from base to end of abdomen; dorsum with minute net-like chalk white patches as in Figure *31*. Ventral side with similiar chalk white nets but middle provided with a longitudinal broad brown stripe extending from epigastric furrow to spinnerets. Epigyne as in Figure *32*. Male similar to female, but smaller in size; male palp as in Figure 33.

Distribution : INDIA : Manjithar, Sikkim.

11. ***Oxyopes sikkimensis*** Tikader
(Figures 34-36)

1970. *Oxyopes sikkimensis* Tikader, *Rec. zool. Surv. India,* 64 (1-4) : 76.

Type-specimen : *Holotype* female *Allotype* two males deposited in the National Zoological Collection, Z. S. I. Calcutta (Reg. No. 3181/18 and 3182/18)

Type locality : INDIA, West sikkim Lership, coll. B. K. Tikader, 2.x.1959.

General : Cephalothorax and legs brownish-green. abdomen blackish, Total length 14.5 mm. Carapace 6.0 mm. long, 5.0 mm. wide; abdomen 9.0 m. long, 3.5 mm. wide.

Cephalothorax : Slightly longer than wide, convex, cephalic region high, clothed with short and blunt deep brown hairs. Eyes in two rows, all eyes encircled by black patch. Posterior row slightly procurved and all eyes equidistant to each other. Anterior row slightly recurved, anterior medians very small, Clypeus long and broad, clothed with similar hairs like cephalothorax, lateral end of margin with a black spot. Sternum heart-shaped, pointed behind, clothed with hairs and small spines, legs long and strong, clothed with hairs and conspicuous long spines; front side of each femur provided with a longitudinal deep brown line.

Abdomen : Longer than wide, narrowing behind clothed with fine grey and brown hairs; dorsum provided with irregular dirty-white and deep brown bands as in Figure 34. Ventral side uniform light-brown colour but middle provided with two conispicuous blackish lines, extending

from epigastric furrow to base of spinnerets. Epigyne as in Figure *35*. Male similar in colour but smaller than female, male palp as in Figure *36*.

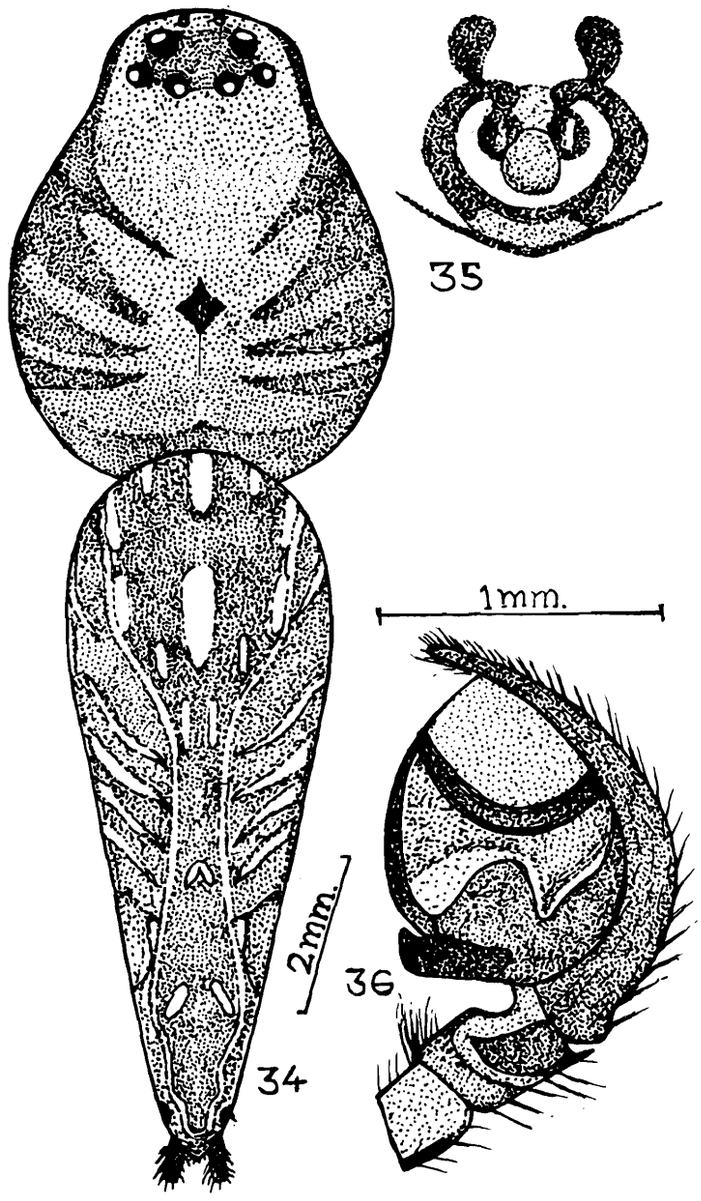

Fig. 34-36. *Oxyopes sikkimensis* Tikader
34. Dorsal view of female, legs omitted; 35. Epigyne; 36. Male palp.

Distribution : INDIA : Sikkim legship, Nayabazar.

12. ***Oxyopes*** sitae Tikader
(Figures 37-38)

1970. *Oxyopes sitae* Tikader, *Rec. zool. Surv. India,* 64 (1-4) : 75.

Type-specimen : *Holotype* female deposited in the National Zoological Collection, Z. S. I. Calcutta (Reg. No. 3080/18).

Type-locality : INDIA : West sikkim, Rohtak Call. *B. K. Tikader,* 24. IX 1959.

General : Cephalothorax and legs brownish-green. abdomen pale brown. Total length 11.6 mm. Carapace 5.4 mm. long. 4.0 mm. wide; abdomen 6.4 mm. long, 3.2 mm. wide.

Cephalothorax : Longer than wide, convex, cephalic region high and broad, clothed with fine hairs; centre of thorax with a short fovea. Eyes in two rows, eyes are encircled by black patch. Posterior row of eyes procurved and situated at equal distance. Anterior row of eyes strongly recurved and anterior medians small. Clypeus long and provided with black lines extending from anterior median eyes to near base of fangs of chelicerae. Sternum heart-shaped, pointed behind, clothed with fine hairs and spines. Legs long and strong, clothed with fine hairs and conspicuous long spines; lower side of femora of all legs provided with two, and dorsal side of patella and tibiae with one conspicuous longitudinal black line.

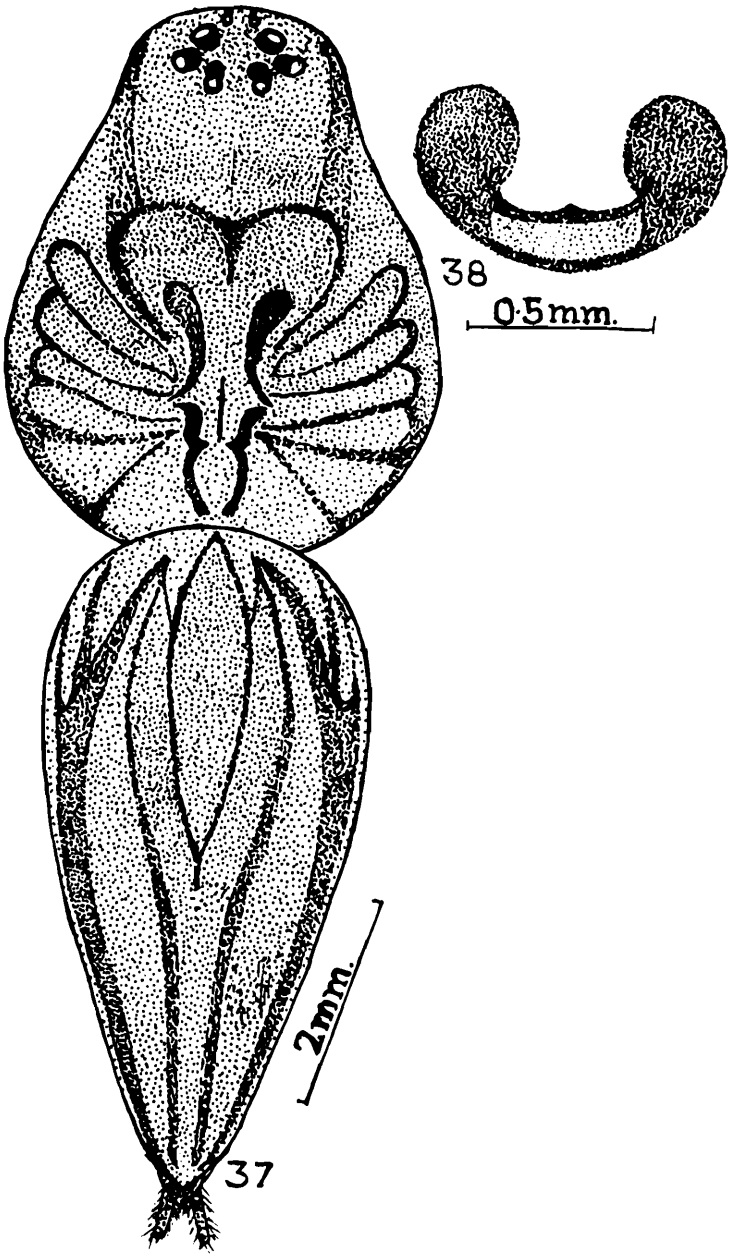

Fig. 37-38. *Oxyopes sitae* Tikader
37. Dorsal view of female, legs omitted; 38. Epigyne.

Abdomen : Longer than wide narrowing behind, clothed with fine grey and dark hairs. Anterior middorsally with a lance-shaped black patch and lateral sides provided with longitudinal black line extending from base to end of abdomen as in figure 37. Ventral side uniform pale colour, but middle provided with a conspicuous longitudinal broad black stripe extending from epigastric furrow to th;e base of spinnerets. Epigyne as in Gigure 38.

Other Materal examined : 1 ♀, 2 ♂♂, Tailanda, Little Andaman, Col. *A. Daniel,* 19. II 1961. (Reg. No. A/3531).

Distribution : INDIA : Sikkim, Andaman.

13. ***Oxyopes assaemensis*** Tikarder
(Figures 39-41)

1969. *Oxyopes assamensis* Tikader, *Oriental Ins.,* 3 (1) : 34.

Type-specimens : *Holotype* female deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 2325/18).

Type locality : INDIA : Assam, Elephant Falls, Coll. *S. Biswas,* 27. VI. 1966.

General : Cephalothorax and abdomen brownish-green, legs green. Total length 10.0 mm. Carapace 3.2 mm. long, 2.2 mm. wide; abdomen 6.7 mm. long, 3.4 mm. wide.

Cephalothorax : Longer than wide, narrowing in front, cephalic region slightly high, clothed with black minute spatulate hairs and some spines; centre of thorax with fovea. Eyes in two rows, encircled with black patch; posterior row slightly procurved, posterior medians closer to each other than to adjacent laterals; anterior row strongly recurved and laterals closer to each other than to anterior medians, anterior median eyes smallest. Clypeus long and broad, with three cospicuous black lines extending from anterior median eyes to near the base of fang of chelicerae as in Figure *41*. Sternum heart-shaped, pointed behind, clothed with fine hairs and spines. Legs long and strong clothed with hairs and conspiuous long spines. ventral side of all femora with a conspicuous longitudinal black line. Femora I and II with three pairs of robust ventral spines.

Abdomen : Longer than wide, narrowing behind, clothed with small black spatulate hairs. Middorsally with a broad-brown stripe extending from base to end of abdomen. Lateral sides decorated with black and white longitudinal patches as in Figure *39*. Ventral side with a broad conspicuous black longitudinal stripe extending from epigastric fold to near the base of spinnerets. Epigyne as in Figure *40*.

Other Material Examined : 2 ♀♀, 8 ♂♂, Zino, Subansiri Division Arunachal Pradesh, Coll. *A.N.T. Joseph,* 16. V. 1966. 5 ♀♀, 4 ♂♂, Hapoli, Subansiri Division, Arunachal Pradesh, Coll. *A. N. T. Joseph,* 15. V 1966.

Distyribution : INDIA : Maghalaya, Arunachal Pradesh.

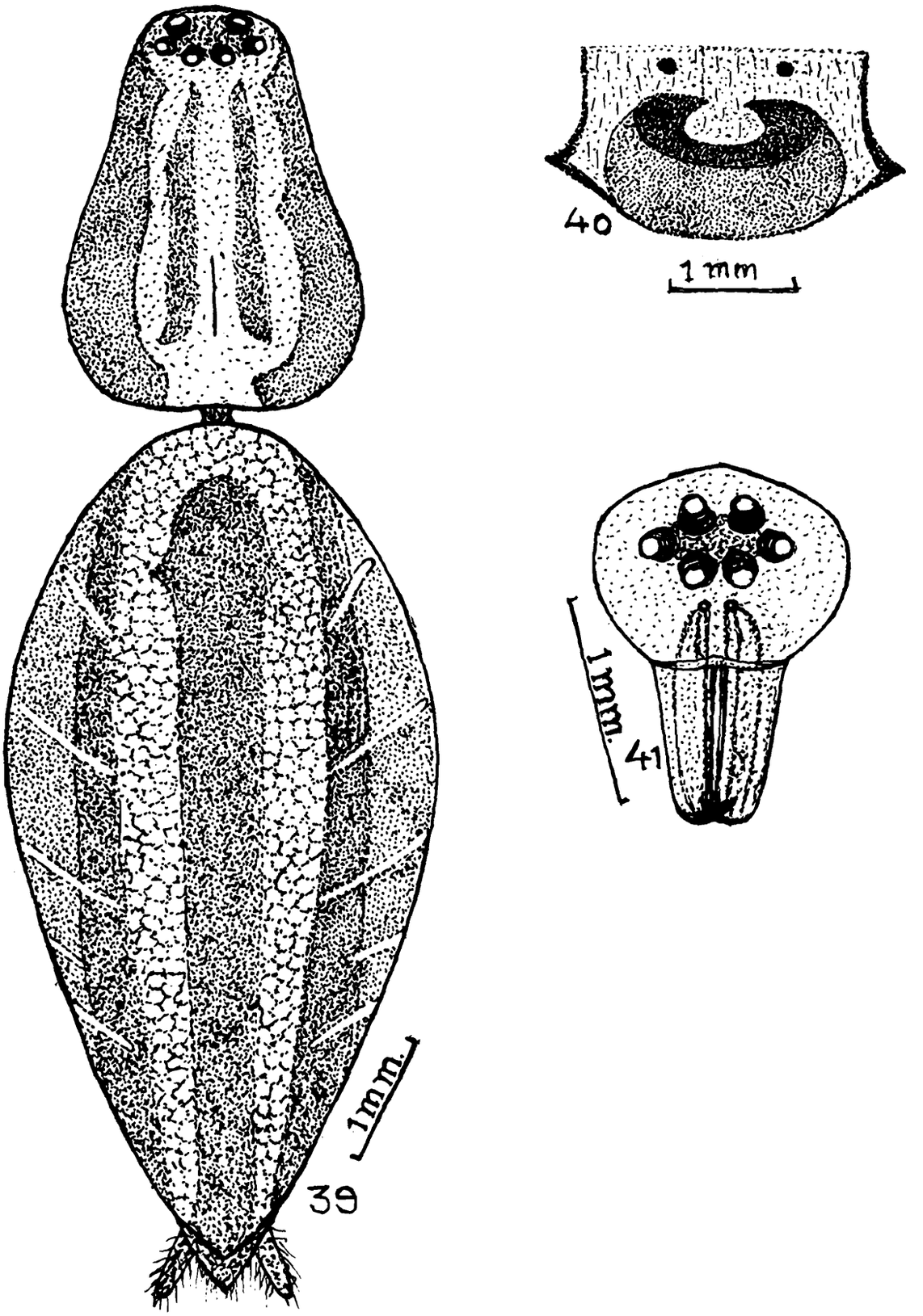

Fig. 39-41. *Oxyopes assamensis* Tikader
39. Dorsal view of female, legs omitted; 40. Epigyne; 41. Clypeus.

14. *Oxyopes sushilae* Tikarder
(Figures 42-44)

1965. *Oxyopes sushilae* Tikader, *Proc. Indian Acad. Sci.*, 62 (3) : 141.

Type-specimens : *Holotype* female deposited in the National Zoological Collection, Zoological Survey of India, Calcutta (Reg. No. 3190/18).

Type-locality : INDIA : Maharashtra, Poona University Compound Poona, Coll. *B. K. Tikader*, 11. IX. 1962.

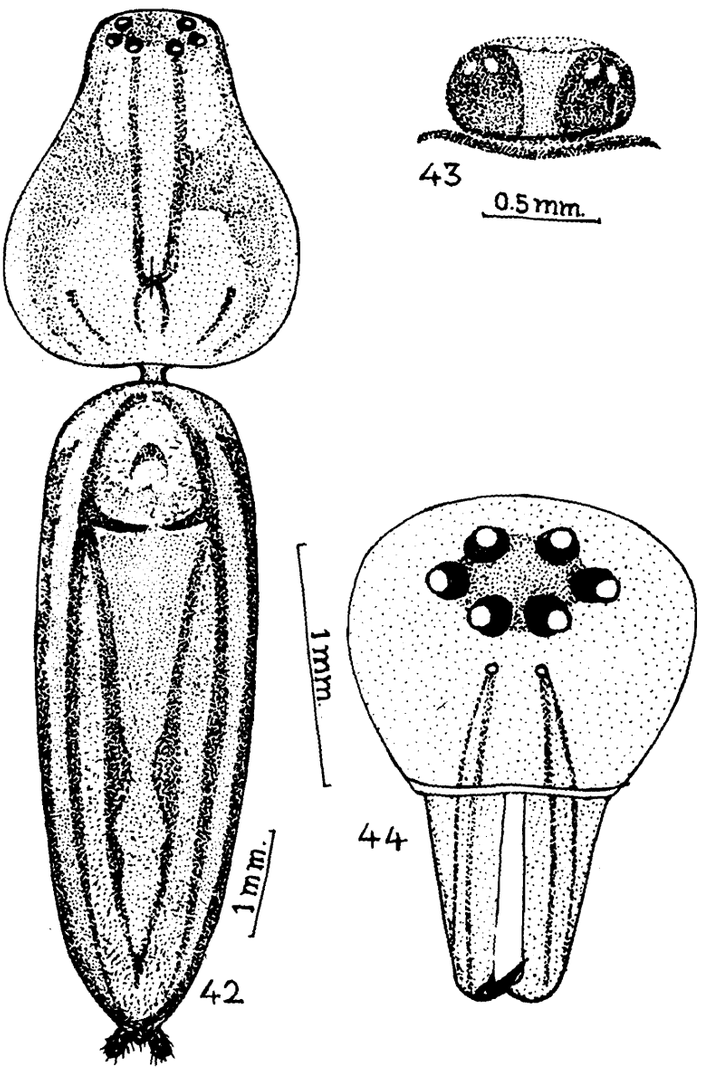

Fig. 42-44. *Oxyopes sushilae* Tikader
42. Dorsal view of female, legs omitted; 43. Epigyne; 44. Clypeus.

General : Cephalothorax and legs green, abdomen brown. Total length 10.0 mm. Carapace 3.5 mm. long, 2.9 mm. wide; abdomen 6.4 mm. long 1.9 mm. wide.

Cephalothorax : Longer than wide convex, cephalic region slightly higher, clothed with short spatulate deep brown hairs; centre of thorax provided with foveal depression. Eyes eight in two

rows, encircled by black patch. Posterior row of eyes slightly procurved and situated equal distance apart, anterior row strongly recurved and anterior median eyes smallest. Clypeus long and broad, provided with two black lines extending from anterior median eyes to near the base of fangs of chelicerae as in Figure 44. Sternum heart-shaped, pointed behind, clothed with fine hairs and spines. Legs long and strong, clothed with hairs and conspicuous long spines; ventral side of femora of all legs provided with a conspicuous longitudinal black line.

Abdomen : Long, narrowing behind, clothed with fine thick hairs, dorsally with a broad longitudinal light to deep brown stripe as in Figure 42. Ventral side yellowish white and midventrally with a broad longitudinal deep brown strips extending from epigastric fold to near the base of spinnerets. Epigyne as in Figure 43.

Distribution : INDIA : Maharashtra, Poona.

15. ***Oxyopes ratnae*** Tikarder
(Figures 45-47)

1970. *Oxyopes ratnae* Tikader, *Rec. zool. Surv. India,* 64 (1-4) : 70.

Type-specimens : *Holotype* female, *Allotype* one male deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 3175/18).

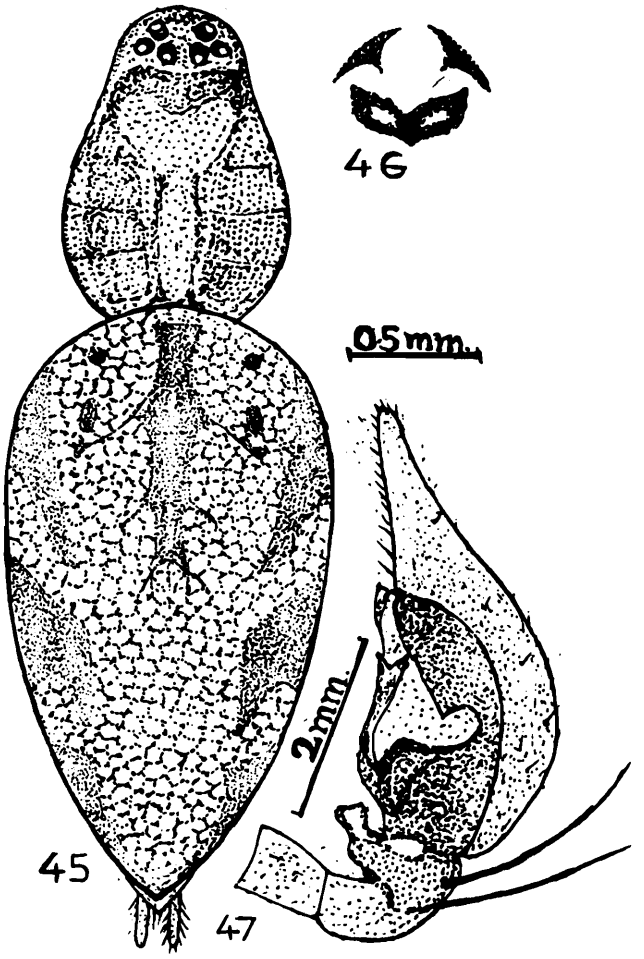

Fig. 45-47. *Oxyopes ratnae* Tikader
45. Dorsal view of female, legs omitted; 46. Epigyne; 47. Male palp.

Type locality ; INDIA : West sikkim, Legship. Col. *B. K. Tikader* 1. ×. 1959.

General : Cephalothorax and legs brownish-green, abdomen dirty white. Total length 10.0 mm. Carapace 3.5 mm. long, 2.6 mm. wide; abdomen 6.7 mm. long, 3.8 mm. wide.

Cephalothorax : Longer than wide, convex, cephalic region slightly higher, clothed with short spatulate deep brown hairs; centre of thorax provided with fine fovea. Eyes in two rows, encircled by black patch. Posterior row slightly procurved and equally spaced. Anterior row strongly recurved, anterior medians very small. Clypeus long and provided with two black lines extending from anterior median eyes to near the base of fangs of chelicerae. Sternum heart-shaped, pointed behind, clothed with hairs and spines. Legs long and strong, clothed with hairs and conspicuous long spines, upper side of femora of all legs provided with a longitudinal deep brown line.

Abdomen : Longer than wide, narrowing behind, clothed with fine and some spatulate hairs. Lateral sides with deep brown patch, posterior half with dirty white chevrons as in Figure *45*. Ventral side uniform dirty white but middle provided with conspicuous longitudinal broad black lines, extending from epigastric furrow to base of spinnerets. Epigyne as in Figure *46*. Male smaller than female, male palp as in Figure *47*.

Distribution : INDIA : Sikkim.

16. ***Oxyopes rukminiae*** sp. nov.
(Figures 48-51)

Type-specimen : *Holotype* female deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 5499/18).

Type locality : INDIA : Madhya Pradesh, Tondabeda village, near Orcha, Bastar district. Coll. *U. A. Gajbe*, 20. XII. 1983.

General : Cephalothorax and legs brownish-green, abdomen dark brown. Total length 9.8 mm. Carapace 4.0 mm. long, 3.0 mm. wide; abdomen 5.6 mm. long, 2.4 mm. wide.

Cephalothorax : Longer than wide, cephalic region high and broad, clothed with pubescence, posterior half provided with a conspicuous fovea. Anterior row of eyes strongly recurved (as seen from in front). medians smaller than the laterals and equally spaced. Posterior row of eyes strongly procurved, equal in size and equidistant from each other as in Figure *48*. All eyes encircled by a black patch. Clypeus long, vertical, provided with black reticulations and black patch near the base of chelicera as in Figure *49*. Sternum heart-shaped, pointed behind, provided with hairs and some short spines. Chelicera long, vertical, inner margin provided with one minute tooth and outer margin with two dissimilar teeth. Labium and maxillae longer than wide, light yellowish green, anterior end provided with distinct scopulae. Legs long and strong, clothed with hairs and conspicuous long spines and dorsally provided with black patches.

Abdomen : Longer than wide, narrowing posteriorly, clothed with pubescence and muscular corrugations as in Figure 48. Ventral side provided with mid-ventrally longitudinal broad black stripe and laterally with white stripe extending from epigastric furrow to base of spinnerets. Epigyne as in Figure 50. Internal genitalia as in Figure 51.

This species closely resembles *Oxyopes ratnae* Tikader, but differs from it as follows : (1) Cephalothorax provided with deep brown stripe, but in *O,. ratnae* cephalothorax with out stripes. (2) Abdomen dorsally provided with ne middorsal stripe, four lateral black stripes, but *O. ratnae*

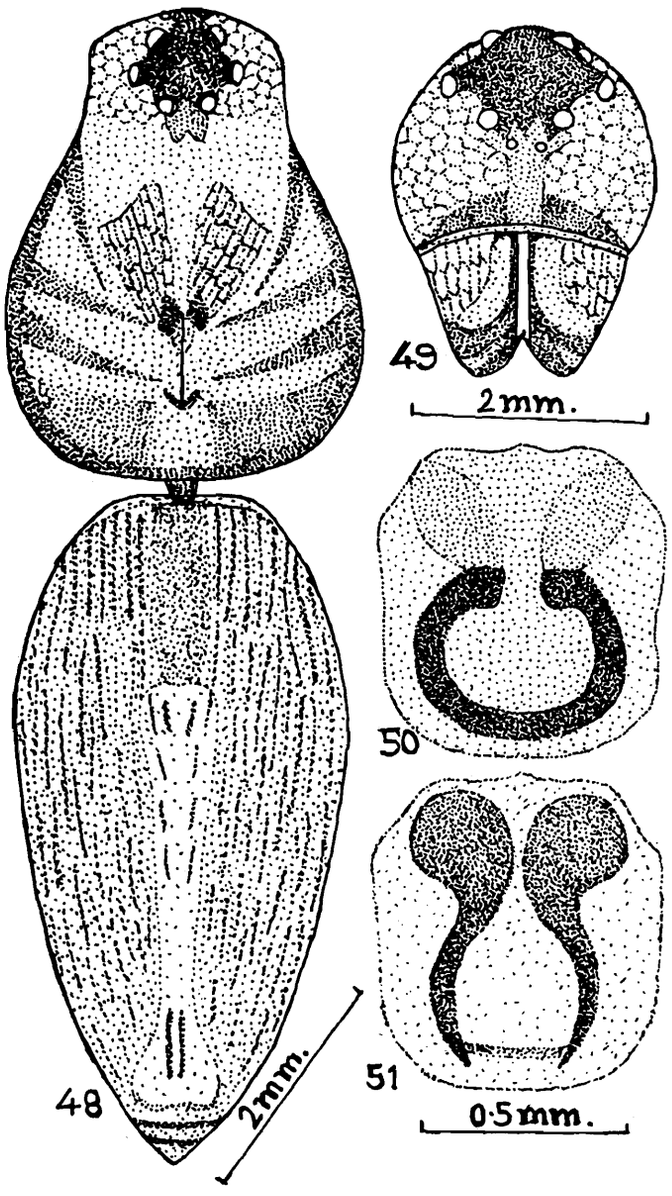

Fig. 48-51. *Oxyopes rukminiae* sp. nov.
48. Dorsal view of female, legs omitted; 49. Clypeus; 50. Epigyne; 51. Internal genitalia.

abdomen laterally provided with three stripes. (3) Epigyne and internal genitalia also structurally different.

Other Materaial Examined : 4 ♀♀, Mukki, Banjar valley, Balaghat dist., Coll. *B Biswas*, 7.IX. 1957, 1 ♀, Mukki Banjar valley, Balaghat dist., *B. Biswas*, 11. IX. 1957. 1♀, Mukki Banjar valley, Balaghat dist., Coll. *B. Biswas*, 30 VIII. 1957. 1♂, Mukki, Banjar valley, Balaghat dist., Coll. *B. Biswas*, 9. IX. 1957. 2 ♀♀, 2 ♂♂, Parambhikulum, Kerala, Coll. *F. H. Gravely*, 24. IX. 1914. 1 ♀, Castle Rock, Karnataka, Coll. *S. Kemp.*, 3.X. 1916.

Distribution : INDIA : Madhya Pradesh, Kerala, Karnataka.

17. ***Oxyopes kamalae*** sp. nov.
(Figures 52-55)

Type-specimens : *Holotype* female deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 5503/18)

Type locality : INDIA : Madhya Pradesh, on the bank of Gour river, Jabalpur. Coll. U. A. Gajbe, 16. IX. 1979.

General : Cephalothorax and legs brownish-black; abdomen silvery white. Total length 9.8 mm. Carapace 3.9 mm. long, 2.5 mm. wide; abdomen 5.9 mm. long, 2.9 mm. wide.

Cephalothorax : Longer than wide, convex, broad in front, cephalic region slightly high, clothed with pubesecense; middle of thoracic region provided with conspicuous short fovea and

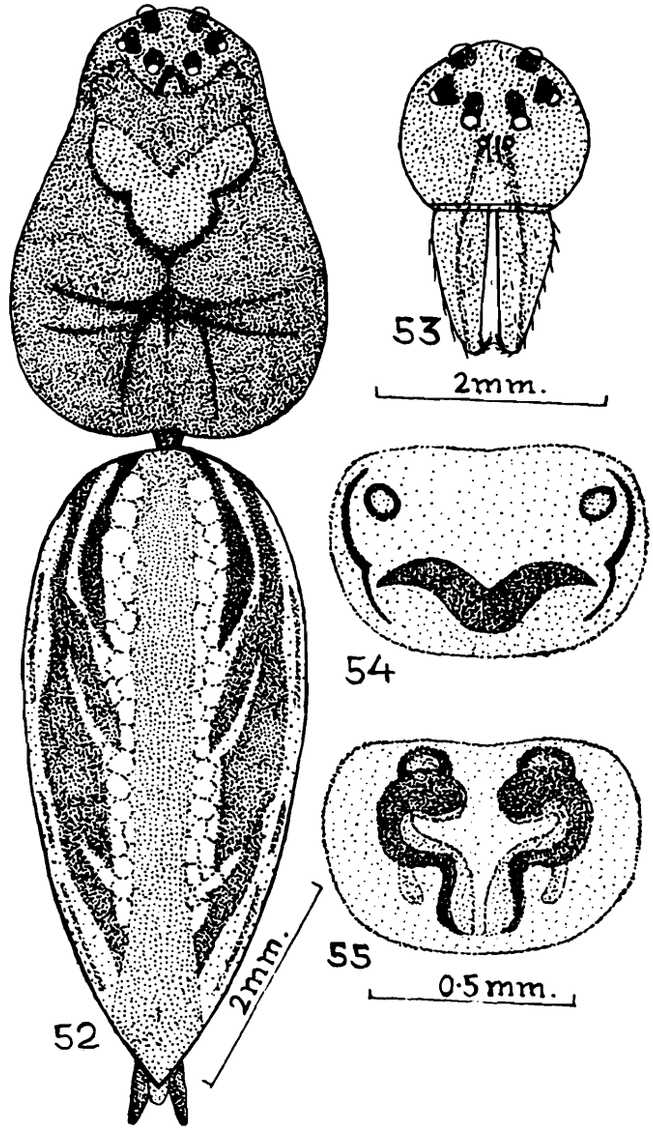

Fig. 52-55. *Oxyopes kamalae* sp. nov.
52. Dorsal view of female, legs omitted; 53. Clypeus; 54. Epigyne; 55. Internal genitalia.

black markings radiating to laterally with anterior light reddish-green V-shaped patch as in Figure 52. Anterior row of eyes strongly recurved (as seen from in front), medians smaller than the laterals and nearly equdistant to each other. Posterior row of eyes procurved, equal in size and equidistant to each other. All eyes encircled by black patch. Clypeus high, vertical, clothed with some spines, provided with light brown band extending from the anterior median eyes to the base of fangs of chelicerae as in Figure 53. Sternum heart-shaped, pointed behind, clothed with hairs and some spines. Chelicerae moderately strong, vertical reddish-green clothed with hairs and some spines, inner margin provided with one tooth and outer margin also provided with one larger tooth. Labium and maxillae longer than wide, light brown in colour, clothed with hairs and some spines, anterior margin provided with distinct scopulae. Legs relatively long and strong. clothed with hairs and conspicuous spines.

Abdomen : Longer than wide, narrowing posteriorly clothed with pubescence, middorsally provided with light brown band and laterally black and silvery white patches as in Figurte. 52. Ventral side same in colour as dorsal, midventrally provided with longitudinal broad black band extending from epigastric furrow to the base of spinnerets. Epigyne as in Figure 54. Internal genitalia as in Figure 55.

This species resembles with *Oxyopes assamensis* Tikader but differs from it as follows : (1) Cephalothorax provided with V- shaped patch and black markings radiates from fovea, but in *O. assamensis* cephalothorax clothed with minute spatulate hairs. (2) Abodmen dorsally provided with light brown band and black patches, but in *O. assamensis* abdomen dorsally provided with black discontinous patches, (3) Epigyne and internal genitalia also strucutrally different.

18. ***Oxyopes pawani*** Gajbe
(Figures 56-58)

1992. *Oxyopes pawani* Gajbe, *Rec. zool. Surv. India,* 91(3-4) : 389.

Type-specimen : *Holotype* female deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 5432/18).

Type-locality : INDIA : Uttar Pradesh, Golakur near Lucknow, Coll. P. L. Tondon, 14.XI. 1976.

General : Cephalothorax and legs brownish green, abdomen dark brown, Total length 9.7 mm. Carapace 3.9 mm. long, 3.2 mm wide; abdomen 5.8 mm. long, 2.0 mm. wide.

Cephalothorax : Longer than wide, convex, with cephalic region high and broad, clothed with white pubescence; posterior half provided with conspicuous fovea. Anterior row of eyes strongly recurved (as seen from in front), with medians smaller than laterals and with eyes equally spaced; posterior row of eyes procurved with eyes equal in size and equidistant from each other; all eyes encircled with black patch. Clypeus long, provided with chalk-white patch, extending from anterior median eyes to near base of fang of chelicerae. Chelicerae moderately strong; inner margin of each provided with one small tooth and outer margin with two dissimilar teeth. Labium and maxillae longer than wide brownish green; maxillae provided with scopulae. Sternum heart-

shaped, pointed behind, provided with hairs and some short spines. Legs relatively long and strong, clothed with hairs and conspicuous long spines.

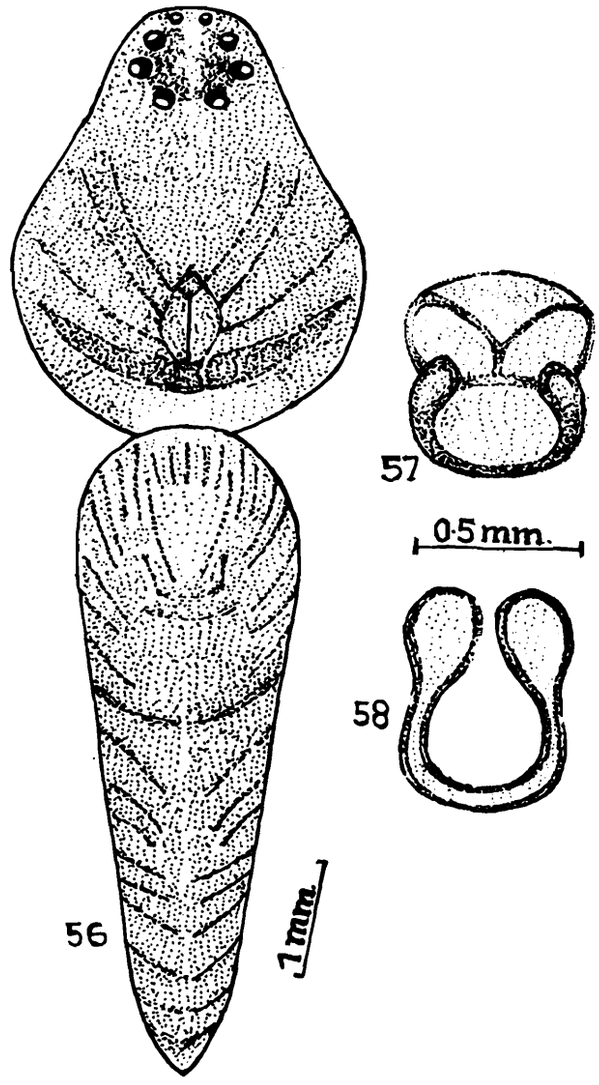

Fig. 56-58. *Oxyopes pawani* Gajbe
56. Dorsal view of female, legs omitted; 57. Epigyn; 58. Internal genitalia.

Abdomen : Longer than wide, narrowing behind, clothed with white pubescence and muscular corrugation as in Figure *56*. Ventral side provided with midventral black patch and two longitudinal white stripes extending from epigstric furrow to base of spinnerets. Epigyne as in Figure 57. Internal genitalia as in Figure *58*.

Distribution : INDIA : Uttar Pradesh, Lucknow.

19. ***Oxyopes kusumae*** sp. nov.
(Figures 59-62)

Type-specimens : *Holotype* female *paratype* two females deposited in the National Zoological Collection of Zoological Survey of India, Calcutta. (Reg. No. 5501/18)

Type-locality : INDIA : Madhya Pradesh, Mandla Town, Coll. *B. N. Chopra*, 23. V 1927.

General : Cephalothorax and legs light reddish green, abdomen dirty chalk white. Total length 9.8 mm. Carapace 3.3 mm. long, 2.4 mm. wide; abdomen 6.6 mm. long,. 3.2. mm. wide.

Cephalothorax : Longer than wide, convex, clothed with fine hairs and some deep brown special type of blunt or spatulate hairs on the thoracic region centre of thoracic region provided with a fine fovea. Anterior row of eyes strongly recurved (as seen from in front), medians smaller than the laterals and nealy equidistant from each other. Posterior row of eyes procurved, equal in size and equidistant from each other. All eyes encircled by a conspicuous black patch. Clypeus long, vertical clothed with long spines, provided with light red stripe extending from anterior median eyes to the base of fang of chelicera as in Figure *60*. Sternum heart-shaped, pointed behind, light yellow in colour, clothed with hairs and some spines. chelicerae moderately strong,vertical, reddish-green; inner margin of each provided with one tooth and outer margin with two teeth. Labium and maxillae longer than wide, yellowish-green, clothed with hairs and spines,

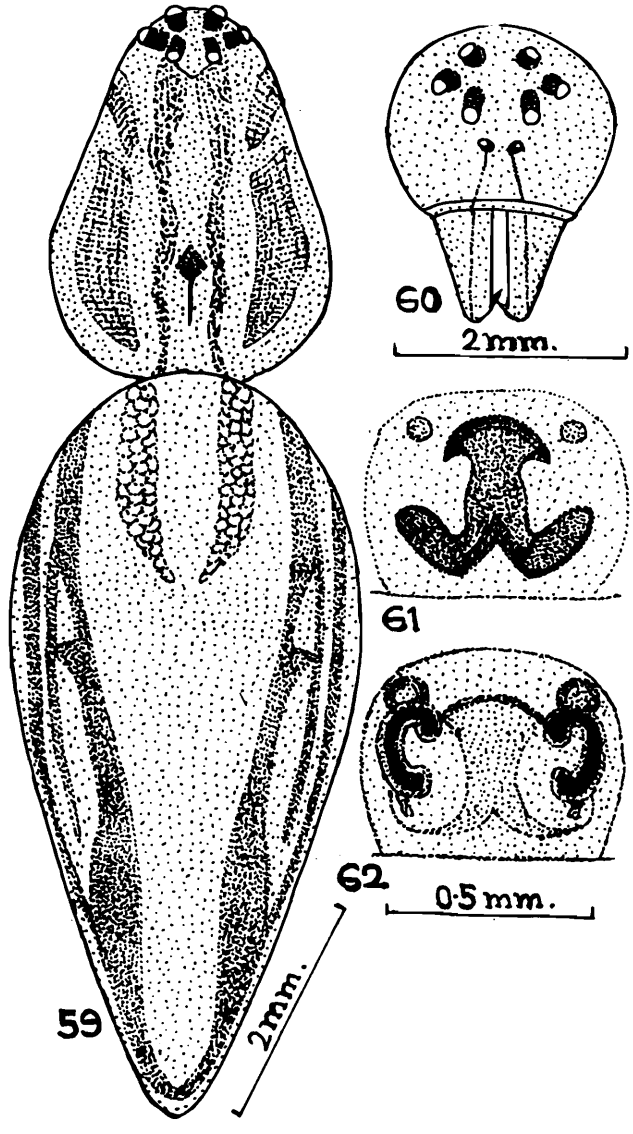

Fig. 59-62. *Oxyopes kusumae* sp. nov.
59. Dorsal view of female, legs omitted; 60. Clypeus; 61. Epigyne; 62. Internal genitalia.

anterior margin provided with conspicuous scopulae. Legs long and strong, clothed with hairs and conspicuous long spines, uniform in colour without any patch.

Abdomen : Longer than wide, narrowing behind, clothed with pubescence; middorsally provided with two silvery white stripes and lateraly with black stripes as in Figure *59*. Ventral side lighter than the dorsal, provided with midventral broad light brown stripe extending from epigastric furrow to the base of spinnerets. Epigyne as in Figure 61. Internal genitalia as in Figure 62.

This species resembles *Oxyopes sunandae* Tikader, but differes from it as follows : (1) All legs are uniform in colour, but in *O. sunandae* lower side of femora of all legs provided with a longitudinal black line (2) Abdomen dorsally provided with silvery white bands and laterally with black bands, but *O. sunandae* abdomen provided with lance shaped yellowish-brown patch. (3) Epigyne and internal genitalia also sturucturally different.

20. ***Oxyopes naliniae*** sp. nov.
(Figures 63-68)

Type-specimens : *Holotype* female, *Paratype* one female, *allotype* two males deposited inNational Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 5504 to 5506/18).

Type locality : INDIA : Madhya Pradesh, Hulki village, Jabalpur district, coll. *U. A. Gajbe,* 30.X. 1985. *Paratype* and Allotype, Kaladehi village, Jabalpur district. Coll. *U. A. Gajbe,* 20. IV 1982.

General : Cephalothorax deep red, legs yellowish-green, abdomen silvery white. Total length 9.5 mm. Carapce 3.6 mm. long, 2.8 mm. wide; abdomen 6.4. mm. long, 2.5 mm. wide.

Cephalothorax : Longer than wide, convex, cephalic region provided with a conspicuous fovea, clothed with pubescence, provided with two light red stripes strating from posterior lateral eyes to just above the posterior end of carapace as in Figure 63. Anterior row of eyes strongly recurved (as seen from in front), medians smaller than the laterals and nearly equidistant from each other. Posterior row of eyes procurved, equal in size and equidistant to each other. All eyes encircled by a black patch. Clypeus long, vertical, provided with a black stripe extending from anterior median eye to the base of fangs of chelicerae as in Figure 64. Sternum oval, pointed behind, clothed with hairs and some spines. Chelicerae long vertical, light red in colour; inner margin of each provided with one tooth and outer martin with two teeth. Labium and maxillae longer than wide, deep red, clothed with hairs and spines, anterior margin provided with scopulae. Legs long and strong, clothed with hairs and conspicuous spines, uniform in colour, without any patches. Male same in colour as female but smaller than the female, Male palp as in Figures *67, 68*.

Abdomen : Longer than wide, narrowing posteriorly, clothed with pubescence; provided with middorsal red stripe and laterally two black stripes extending from anterior end to the posterior end as in Figure *63*. Ventral side lighter than the dorsal, provided with broad midventral

longitudinal black stripe starting from epigastric furrow to the base of spinnerets. Epigyne as in Figure *65*. Internal genitallia as in Figure *66*.

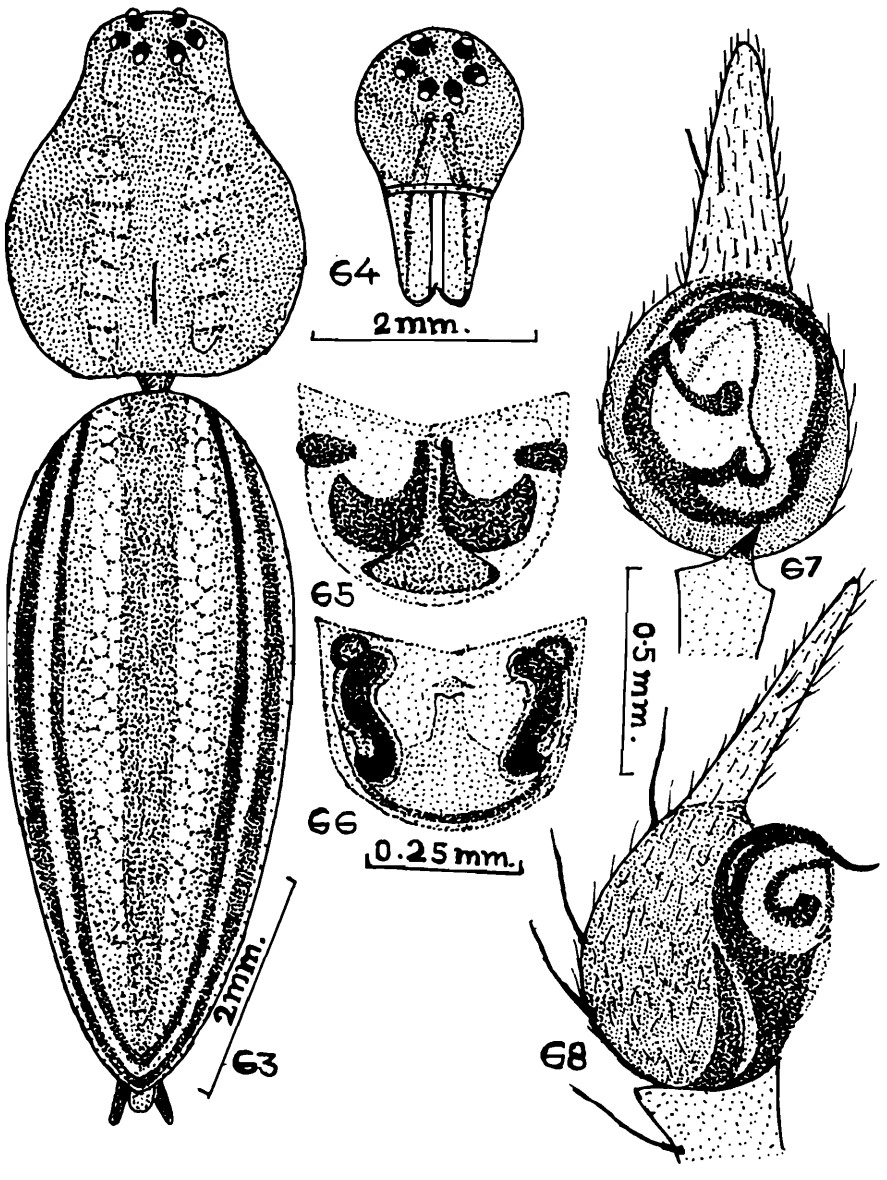

Fig. 63-68. *Oxyopes naliniae* sp. nov.
63. Dorsal view of female, legs omitted; 64. Clypeus; 65. Epigyne; 66. Internal genitalia; 67. Male palp, ventral view; 68. Male palp, lateral view.

This species closely resembles *Oxyopes shwetae* Tikader, but differs from it as follows : (1) Cephalothorax provided with two light red bands, but in *O. shwetae* cephalothorax provided with deep brown patches. (2) Abdomen mid dorsally provided with red band and laterally with two black bands, but in *O. shwetae* abdomen provided with lance shaped brown patch, lateral sides with longitudinal blackish line. (3) Epigyne, internal gentialia and male palp also structurally different.

Other Material Examined : 1 ♀, chitrakote, Bastar dist., Coll. *U. A. Gajbe*, 1. I. 1984. 1 ♀, Garia pahar Kanker Baster, 4.I. 1984. 1 ♀, Narayanganj, Mandla dist., Coll *U. A. Gajbe*, 22. XI. 1981. 1 ♀, on the bank of Hiran river near Patan, Jabalpur dist., Coll. *U. A. Gajbe*, 29. IX 1981. 2 ♀♀, 1 ♂, Amlkhas Jabalpur dist., Coll. *B. S. Gurum*, 21. IX. 1974. 1 ♀, Hulki village Jabalpur

district, Coll. *U. A. Gajbe*, 30.IX 1988. 1 ♀, 1 ♂, Kaladehi, Jabalpur dist., Coll. *U. A. Gajbe*, 20. IV 1982. 1 ♀, Kalpi village. Mandla dist., Coll. *U. A. Gajbe*, 15 VI. 1982. 1 ♂, Barela village Jabalpur dist. Coll. *U. A. Gajbe*, 15. IX. 1981. 1 ♀, Junnardeo, Chhindwara dist., Coll. *R. K. Singh*, 16. IX. 1991. 1 ♀, 1 ♂, Dhauripatha village, patalkot, chindwara dist., Coll. *R. K. Singh*, 16. X. 1992. 2 ♀♀, 2 ♂♂, Kinstama, Chhindwara dist., Coll. *R. K. Singh*, 19. IX. 1991., 1 ♀, 1 ♂, Parasia, Chhidwaradist., Coll. *R. K. Singh*, 15. IX. 1991 2 ♀♀, 1 ♂, Amarwada, Chhindwara dist., Coll. *R. K. Singh*. 12. IX. 1991. 1 ♀, 1 ♂, Katura village, Chhatarpur dist., Coll. *R. K. Singh*. 30. IX. 1993.

Distribution : INDIA, Madhya Pradesh.

Genus II ***Peucetia*** Thorell

1869. *Peucetia* Thorell, *On European spiders Uppasala*, 7 : 196.

1900. *Peucetia* : *Pocock, Fauna Brit. India Arach.*, 255.

1964. *Peucetia* : Brady *Bull. Mus. Comp. zool.* 131 (13) : 505.

1970. *Peucetia* : Tikader, *Rec. zool. Surv. India*, 64 (1-4) : 79.

Characters : Cephalothorax not so high or convex as that of *Oxyopes* or *Hamataliwa*. The face is vertical and the eyes occupy a comparatively smaller area. Anterior median eyes smallest, posterial median eyes and posterior lateral eyes subequal in size, longer than anterior median eyes. Anterior lateral eyes much the largest. Labium much longer than wide; Maxillae very long, slightly enlarged distally and greatly the length of the labium, coverging in front of it. Cheliceral retromargin without tooth. Abdomen very elongate, almost cylinderical, tappering gradually behind the spinnerets. Legs very long in comparsion to body length, with conspicuous black spines. Integument free of hair except for white hair in eye region. Predominate colour of integument green or shades of green in the living spider. Colour is changed rapidly in alcohol.

Type-species : *Peucetia viridis* Blackwall

DistributiOon : Europe, Arica, Asia, and America.

Key to the species of the Genus Peucetia Thorell

1. Spiders of small size (Total lengyh less than 12 mm.) ..... 2.

   Spiders of large size (Total length more than 12 mm.) ..... 5.

2. Clypeus provided with two lateral lines ..... 3.

   Clypeus provided with four lateral lines ..... *rajani* sp. nov.

3. Abdomen without stripes but middorsally with silvery white patches ..... *ketani* Gajbe

   Abdomen with stripes but middorsally without silvery white patches ..... 4.

4. Abdomen middorsally with light brown reticulations ..... *yogeshi* sp. nov.

   Abdomen laterally with longitudinal whitish stripe, extending middorsally with three pairs of whitish spots ..... *choprai* Tikader

5. Clypeus with two to four brown or black lines ..... 6.

   Clypeus without brown or black lines ..... *punjabensis* sp. nov.

6. Clypeus with four black lines ..... *latikae* Tikaker

   Clypeus with two black or brown lines ..... 7.

7. Carapace with conspicuous black spots and U-shaped red marking ..... *hairshnkarensis* Biswas

   Carapace without conspicuous black spots and without U-shaped marking ..... 8.

8. Abdomen uniformaly with yellowish green with brownish reticulations, mid-ventrally with silvery white band ..... *biharensis* sp. nov.

   Abdomen not uniform, middorsally with brownish patches ..... 9.

9. Abdomen not uniformaly yellowish green, middorsally with five brownish patches and mid-ventrally with broad longitudinal reticulate black stripe ..... *pawani* sp. nov.

   Abdomen anteriorly with silvery white portion, posteriorly brownish reticulation, ventral side uniform without black stripe ..... *viveki* sp. nov.

21. ***Peucetia rajani*** sp. nov.

(Figures 69-72)

Type-specimen : *Holotype* female deposited in National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 5494/18).

Type locality : INDIA : Madhya Pradesh, Hatkachora village near Jagadalpur, Bastar district, coll. *U. A. Gajbe*, 2. I. 1984.

General : Cephalothorax and legs light yellowish-green, abdomen green. Total length 6.5 mm. Carapace 2.8 mm. long, 2.2 mm. wide; abdomen 3.6 mm. long. 1.8 mm. wide.

Cephalothorax : Longer than wide, narrow in front, clothed with pubescence, middle of thoracic region provided with sharp fovea, with black spots all around the cephalothorax as in Figure 69. Eyes situated on the cephalic region in a compact group which is slightly high, anterior lateral eyes largest of all the eyes. Anterior row of eyes strongly recurved (as seen from in front); medians smaller than the laterals and nearly equidistant to each other. posterior row slightly procurved, equal in size and equidistant to each other. All eyes encircled by a black patch. Clypeus long, verticl, provided with four lateral deep brown stripes, two starting from the anterior median eyes and two latral stripes as in Figure 70. Sternum heart-shaped, pointed behind, clothed with hairs and spines, provided with black roundish spots. Chelicerae moderately strong, vertical, olive green, clothed with hairs, inner and outer margin without teeth. Labium longer than wide, deep brown, clothed with hairs and spines, anterior margin provided with scopulae. Maxillae longer than wide, nearly double the length of labium, olive green, clothed with hairs and spines, anterior margin provided with scopulae. Legs relatively long and strong, clothed with hairs and conspicuous spines, coxae and femora of all legs provided with black round spots.

Abdomen : Longer than wide, nearly elliptical, clothed with pubescence, provided with two lateral and one transverse silvery white stripe exending from anterior end to the posterior end as in Figure 69. Ventral side lighter than the dorsal; laterally provided with two silvery white stripes extending from the epigastric furrow to the base of spinnerets. Epigyne as in Figure 71. Internal genitalia as in Figure 72.

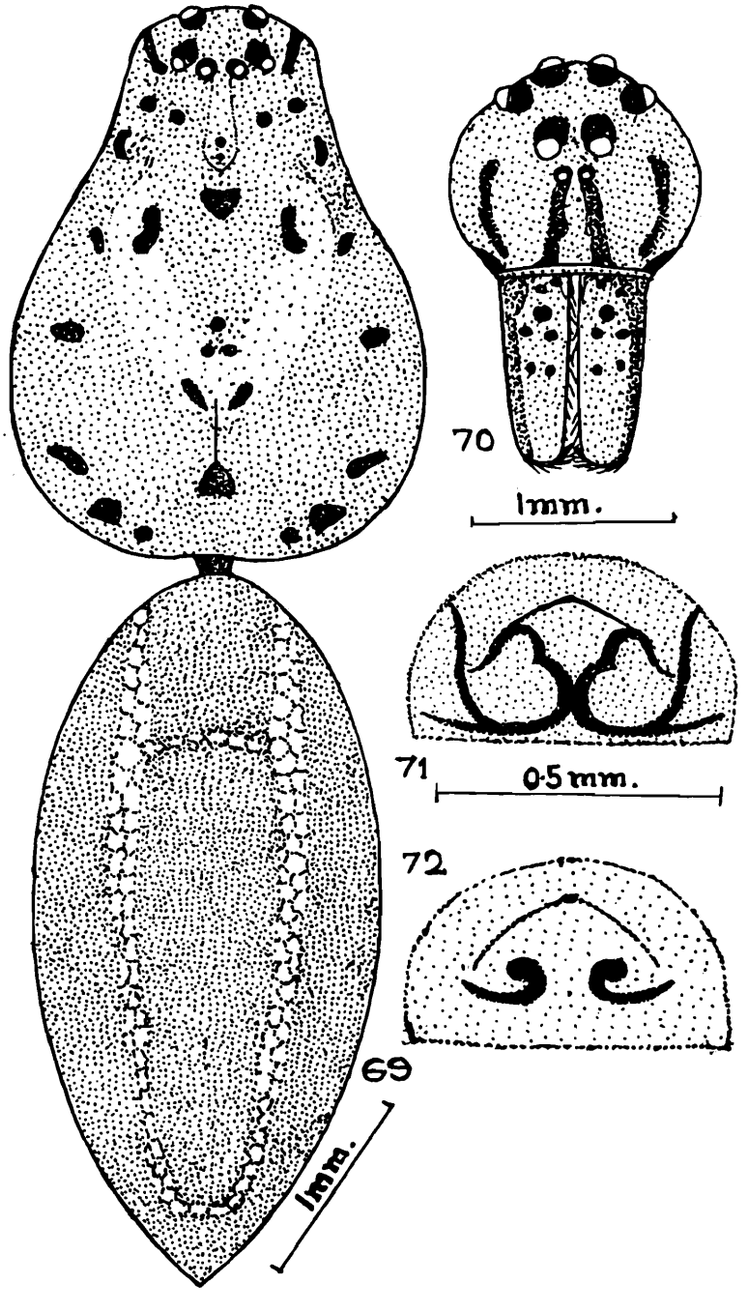

Fig. 69-72. *Peucetia rajani* sp. nov.
69. Dorsal view of female, legs omitted; 70. Clypeus; 71. Epigyne; 72. Internal genitalia.

This species resembles *Peucetia hairshankarensis* Biswas but differs from it as follows : (1) Cephalothorax provided with black spots but without U-shaped red marking, but in *P. harishankarensis* cephalothorax with U-shaped red markings (2) Abdomen dorsally provided with two lateral andone transverse silvery white band, but in *P. harishankarensis* abdomen dorsally

provided with longitudinal broad olive green band. (3) Epigyne and internal genitalia also structurally different.

Other Materials examined : 1 ♀, Chawarpani village, chhindwara dist., *U. A. Gajbe,* 7. I. 1990.

Distribution : INDIA : Madhya Pradesh.

22. *Peucetia ketani* Gajbe
(Figures 73-75)

1992. *Peucetia ketani* Gajbe, *Rec. zool. Surv. India,* 91 (3-4) : 390.

Type-specimen : *Holotype* female deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 5433/18).

Type-locality : INDIA : Uttar Pradesh, Golakur near Lucknow, Coll. *P. L. Tondon,* 14. XI. 1976.

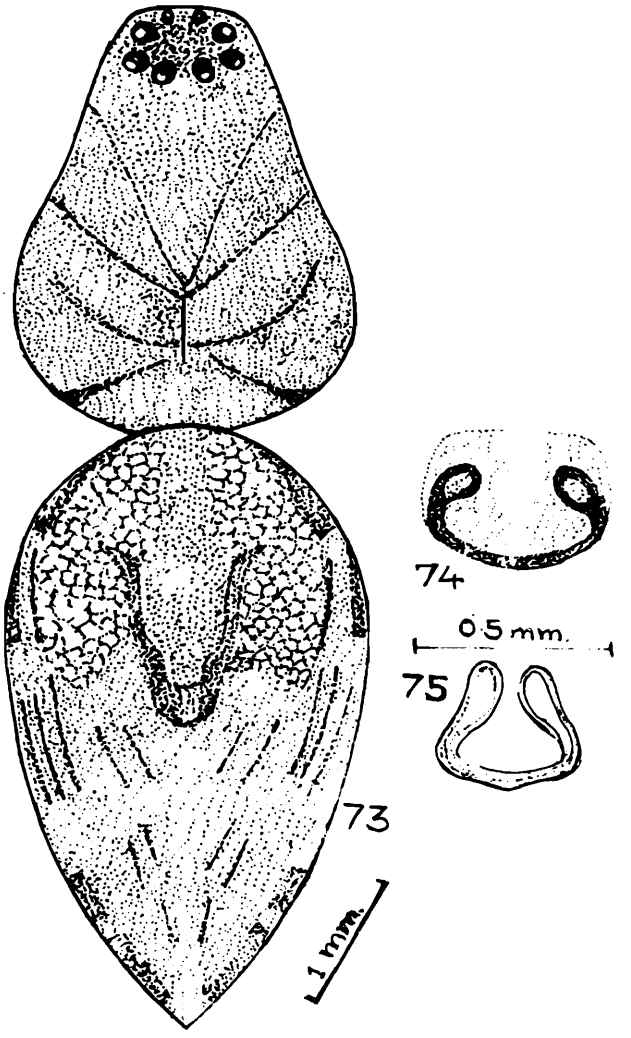

Fig. 73-75. *Peucetia ketani* Gajbe
73. Dorsal view of female, legs omitted; 74. Epigyne; 75. Internal genitalia.

General : Cephalothorax and legs brownish-green, abdomen dirty chalk white. Total length 7.3 mm. Carapace 3.2 mm. long 2.5 mm. wide; abdomen 4.1 mm. long, 2.6 mm. wide.

Cephalothorax : Longer than wide, moderately high, clothed with pubescence and few short spines, provided with conspicuous short fovea on posterior half. Anterior row of eyes strongly recurved, with anterior medians smaller than laterals and with eyes equally spaced; posterior row of eyes slightly procurved with eyes equidistant from each other and equal in size. Clypeus long. Chelicerae moderately strtong. Labium and maxillae longer than wide and provided wiht scopula. Sternum oval, pointed behind, clothed with white hairs.

Abdomen : Longer than wide, narrowing behind clothed with hairs and some spines, provided with some black patches and mid dorsally with silvery white palches as in Figure 73. Ventral side same in colour as dorsal but provided with a deep brown longitudinal stripe extending from epigastric furrow to base of spinnerets. Epigyne as in Figure 74. Internal genitalia as in Figure *75*.

Distribution : INDIA : Uttar Pradesh, Lucknow.

23. ***Peucetia yogeshi*** sp. nov.

(Figures 76-81)

Type-specimens : *Holotype* female, *paratype* five females, *allotype* one male deposited in the National Zoological collection, Zoological Survey of India, Calcutta, (Reg. No. 5495 to 5496/18).

Type locality : INDIA : Madhya Pradesh, Chhotedonger village, Narayanpur Tahsil, Bastar district, Coll. *U. A. Gajbe*, 26. XII. 1983.

General : Cephalothorax and legs light yellowish-green, abdomen light green. Total length 10.2 mm. Carapace 4.0 mm. long, 3.0 mm. wide; abdomen 6. 0 mm. long, 2.4 mm. wide.

Cehpalothorax : Longer than wide, narrowing in front clothed with pubescence, middle of throacic region provided with sharp fovea with radiating light brown lines towards the sides; cephalothorax provided with black spots as in figure 76. Eyes encircled by black patch, anterior lateral eyes strongly recurved (as seen from in front), medians smaller than the laterals and nearly equidistant to each other. Clypeus long, vertical, clothed with some spines and provided with two deep brown lines (or stripes) extending just below the anterior median eyes to the anterior end of clypeus as in Figure 77. Sternum heart-shaped, pointed behind, green in colour. Clothed with hairs and spines. Labiurm longer than wide, light green in colour, clothed with hairs and spines. Maxillae longer than wide nearly double the length of labium, light yellowish-green, clothed with spine like hairs, anterior margin provided with conspicuous scopulae. Legs relatively long and strong, clothed with hairs and conspicuous spines, coxae and femora of all legs provided with

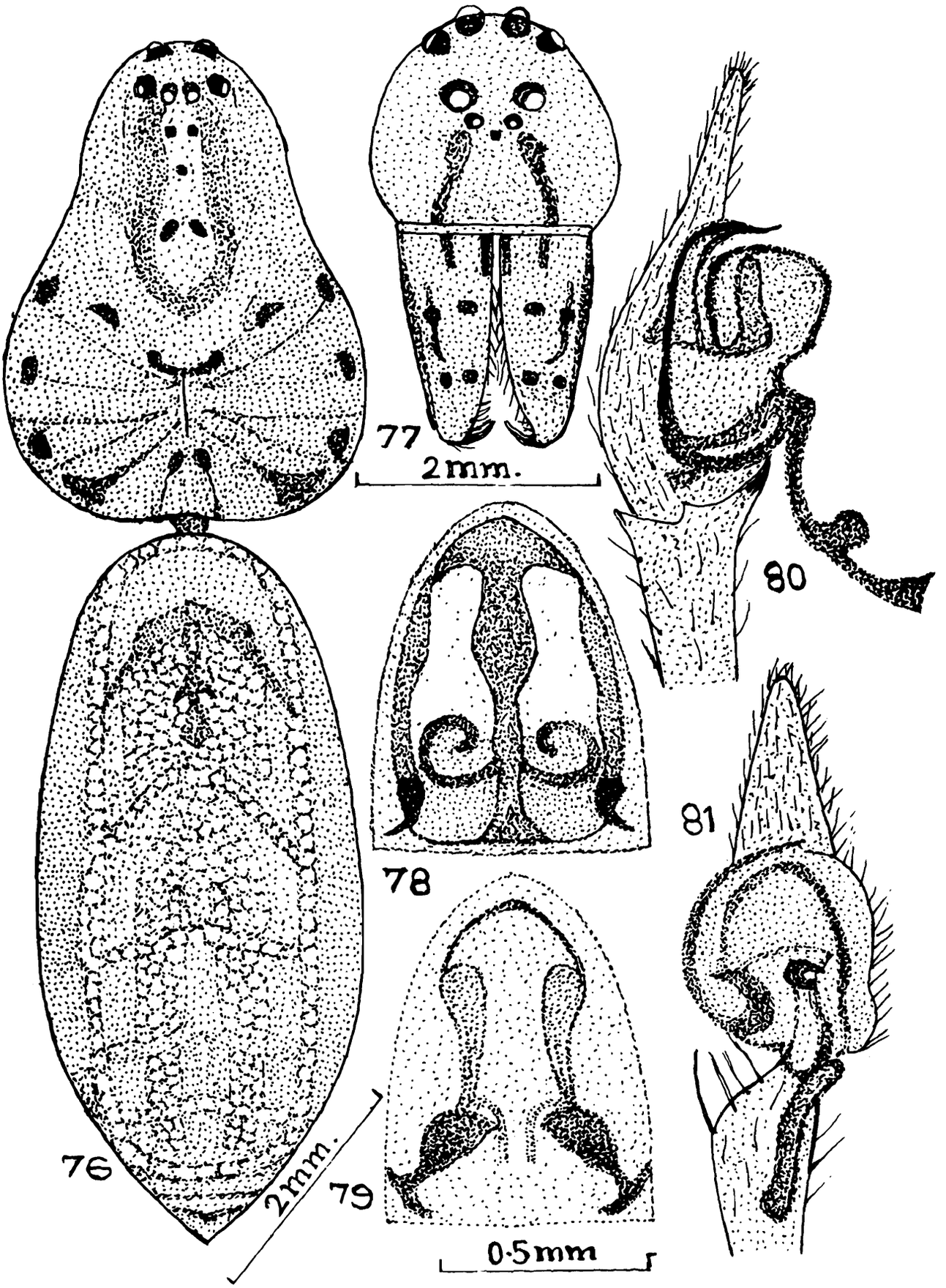

Fig. 76-81. *Peucetia yogeshi* sp. nov.
76. Dorsal view of female, legs omitted; 77. Clypeus; 78. Epigyne; 79. Internal genitalia; 80. Male palp, lateral view; 81. Male palp, ventral view.

small black spots. Male same in colour as female but smaller than the feamle, male palp as in Figure 80-81.

Abdomen : Nearly elliptical, narrowing behind, middorsally provided with light brown reticulations as in Figure *76*. Ventral side lighter than the dorsal and midventrally provided with a broad stripe of black reticulations. Epigyne as in Figure *78*. Internal genitalia as in Figure 79.

This species closely resemble with *Peuceaia latikae* Tikader but differs in the structure of epigyne, internal genitalia and male palp.

24. ***Peucetia choprai*** Tikarder
(Figures 82-85)

1965. *Peucetia choprai* Tikader, *Proc. Indian Acad. Sci.*, 57 (3) ; 143.

Type-specimens : *Holotype* female, *allotype*, one male deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 3168/18 and 3169/18).

Type-locality : INDIA Maharashtra, near Pashan Tank Poona, Coll. *R. N. Chopra*, 22. IX. 1961.

General : Cephalothorax brownish-green, legs green, abdomen light blue. Total length 7.0 mm. Carapace 2.7 mm. long, 2.2 mm. wide; abdomen 4.3 mm. long, 2.2 mm. wide.

Cephalothorax : Longer than wide, moderately convex, slightly broader in front, cephalic region high and eyes situated on the top; centre of thorax provided with a fine fovea. Eyes pearly white, posterior row straight or slightly procurved and eyes equidistant to each other; anterior row short and strongly recurved, antheior median eyes smallest and lateral eyes largest. All the eyes are encircled by black patch. Clypeus long and broad provided with two pairs of brown lines extending from anterior median eyes to near the base of fang of chelicerae as in Figure 84. Sternum heart-shaped pointed behind, clothed with hairs and few spines.

Abdomen : Longer than wide, narrowing behind, clothed with fine hairs, lateral side provided with a longitudinal whitish line extending from base to end and middorsally provided with three pairs of conspicuous whitish spots as in Figure *82*. Epigyne as in Figure *83*. Male similar in colour but legs very long, male palp as in Figure 85.

Other materal examined : 1 ♂, Mehgaon, Bind dist., Coll. *R. K. Singh*, 21. IX. 1994. (Reg. No. A/3534)

Distribution : INDIA : Maharashtra, Madhya Pradesh.

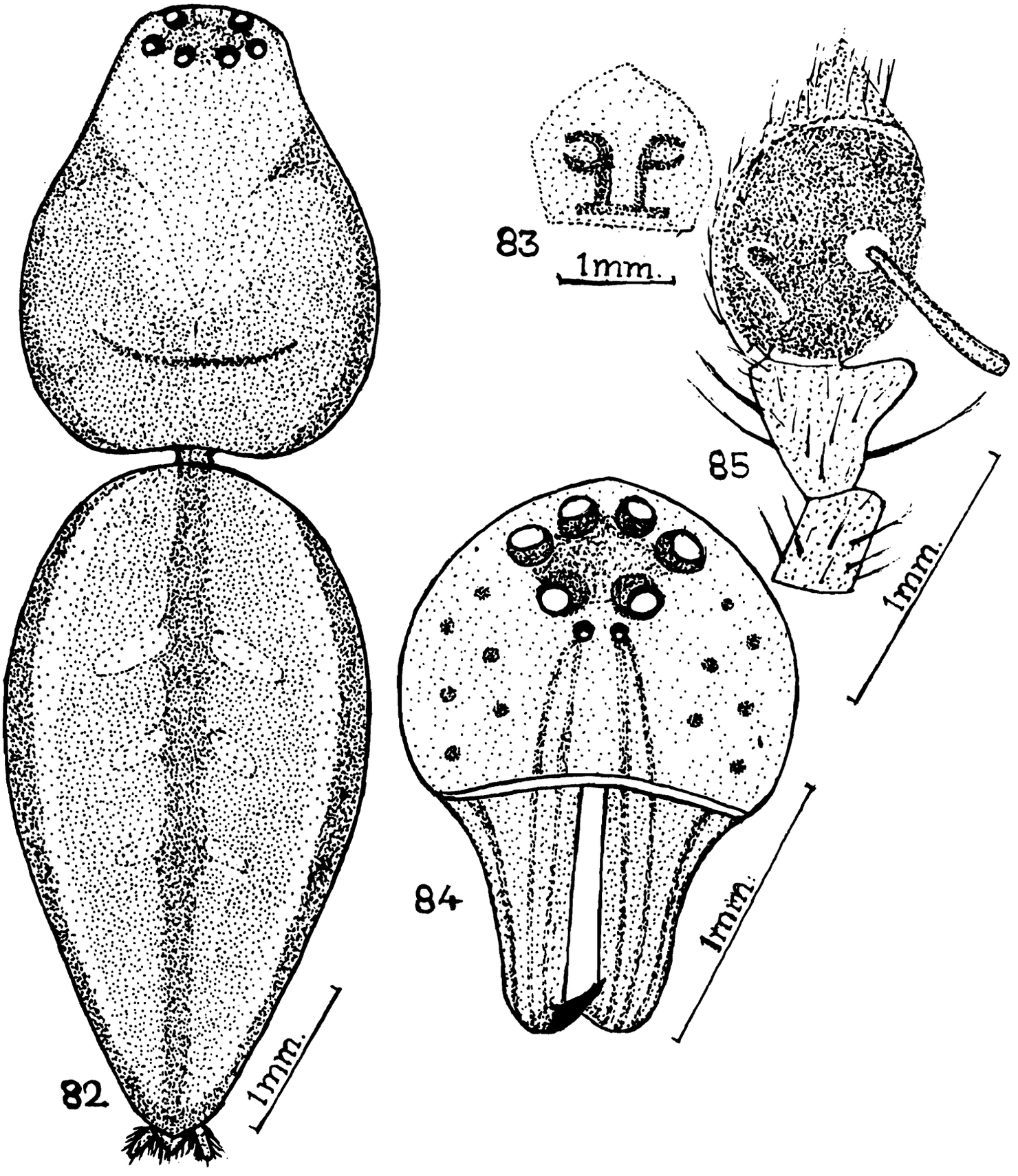

Fig. 82-85. *Peucetia choprai* Tikader.
82. Dorsal view of female, legs omitted; 83. Epigyne; 84. Clypeus; 85. Male palp, ventral view.

25. ***Peucetia punjabensis*** sp. nov.
(Figures 86-89)

Type-specimens : *Holotype* female deposited in the National Collection, Zoological Survey of India, Calcutta. (Reg. No. 5491/18).

Type locality : INDIA : Punjab, Khewra Salt Range, Coll. *S. L. Hora,* 30. IX. 1930.

General : Cephalothorax and legs yellowish-green, abdomen green. Total length 14.8 mm. Carapace 6.2 mm. long, 4.2 mm. wide; abdomen 8.8 mm. long, 6.2 mm. wide.

Cephalothorax : Longer than wide, broad in front, clothed with pubescence and spine like hairs, cephalic region high, thoracic region provided with conspicuous long fovea with light

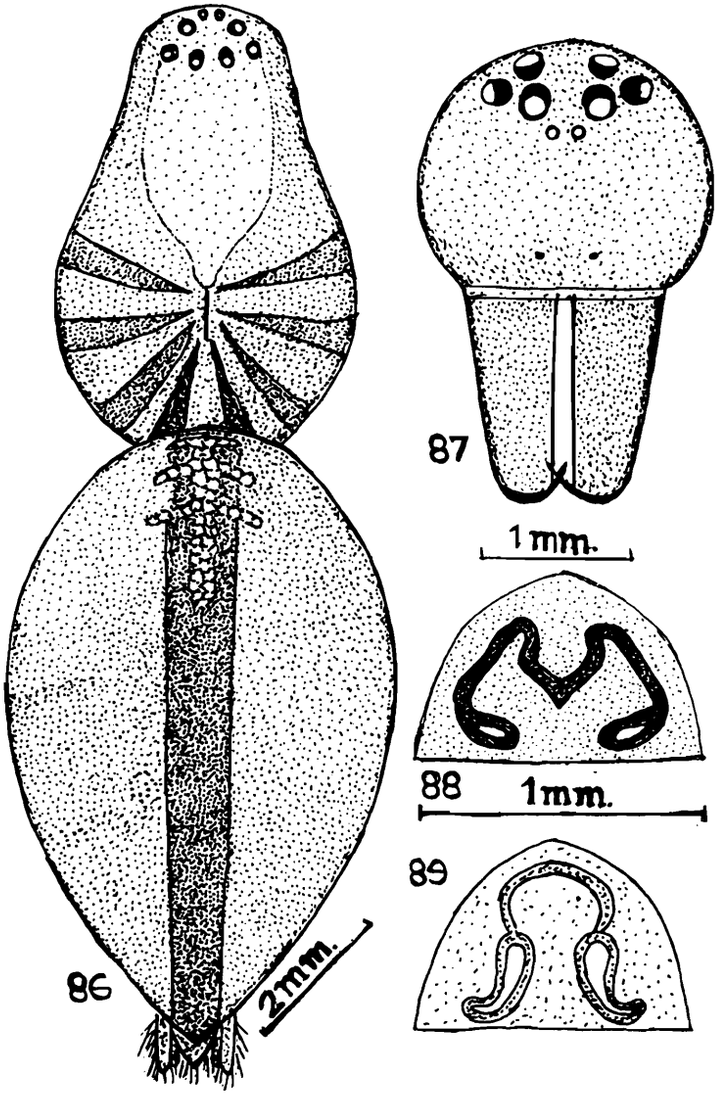

Fig. 86-89. *Peucetia punjabensis* sp. nov.
86. Dorsal view of female, legs omitted; 87. Clypeus; 88. Epigyne; 89. Internal genitalia.

reddish bands radiating to the lateral sides and whitish bands to the posterior lateral eyes. Anterior row of eyes strongly recurved (as seen from in front), anterior medians very small, anterior lateral largest. Posterior row of eyes slightly procurved, equal in size and equdistant to each other. All

the eyes encircled by black patch. Clypeus long, vertical and without any band as in Figure 87. Sternum heart-shaped, pointed behind, clothed with hairs and spines. Chelicerae moderately strong. vertical, clothed with hairs and spines, inner and outer margins without teeth. Labium and maxillae longer than wide, maxillae nearly double the length of the labium, clothed with hairs and spines, anterior margin of both provided with distinct scopulae. Legs long and strong, clothed with hairs and conspicuous spines. Coxae and femora of all legs without roundish spots.

Abdomen : Longer than wide, nearly elliptical, widest at the middle, clothed with small spine-like hairs, provided mid-dorsally with greenish patch extending to the annal tubercle as in Figure 86. Ventral side slightly lighter than the dorsal; midventrally provided with broad longitudinal green patch and laterally with silvery white patches starting from epigastric furrow to the base of spinnerets. Epigyne as in Figure 88. Internal genitalia as in Figure 89.

This species resembles *Peucetia choprai* Tikader, but differs from it as follows (1) Abdomen middorsally provided with greenish-pacth, but in *P. choprai* abdomen dorsally provided with longitudinal whitish line. (2) Epigyne and Internal genitalia also structurally different.

26. ***Peucetia latikae*** Tikarder
(Figures 90-93)

1970. *Peucetia latilcae* Tikader, *Rec. zool. Surv. India,* 64 (1-4) : 80.

Type-specimens : *Holotype* female, *allotype* one male deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 3171/18 and 3172/18)

Type locality : INDIA : West sikkim, Manjithar, Coll. *B. K. Tikader,* 22. IX. 1959.

General : Cephalothorax, legs and abdomen green. Total length 20.9 mm. Carapace 7.0 mm. long, 5.0 mm. wide; abdomen 13.0 mm. long, 6.0 mm. wide.

Cephalothorax : Longer than wide, moderately high provided with conspicuous black spots and cephalic region high and broad, clothed with a few spines, centre provided with a sharp fovea. Posterior row of eyes slightly procurved and equidistant; bases of all eyes encircled by black patch. Anterior row of eyes strongly recurved and anterior medians very small. Clypeus long and broad, provided with four black lines extending from ocular area to near the base of fangs of chelicerae as in Figure 92. Sternum oval, pointed behind, clothed with spiny hairs. Legs long and strong, clothed with conspicuous black spots and black long spines.

Abdomen : Long, narrowing behind, clothed with fine hairs; middorsally with a longitudinal broad brown stripe and this band bordered by a whitish line as in figure 90. Ventral side lighter in colour than dorsal. Epigyne as in Figure 91. Male almost like feamle, male palp as in Figure 93.

Distribution : INDIA : Sikkim, Manjithar.

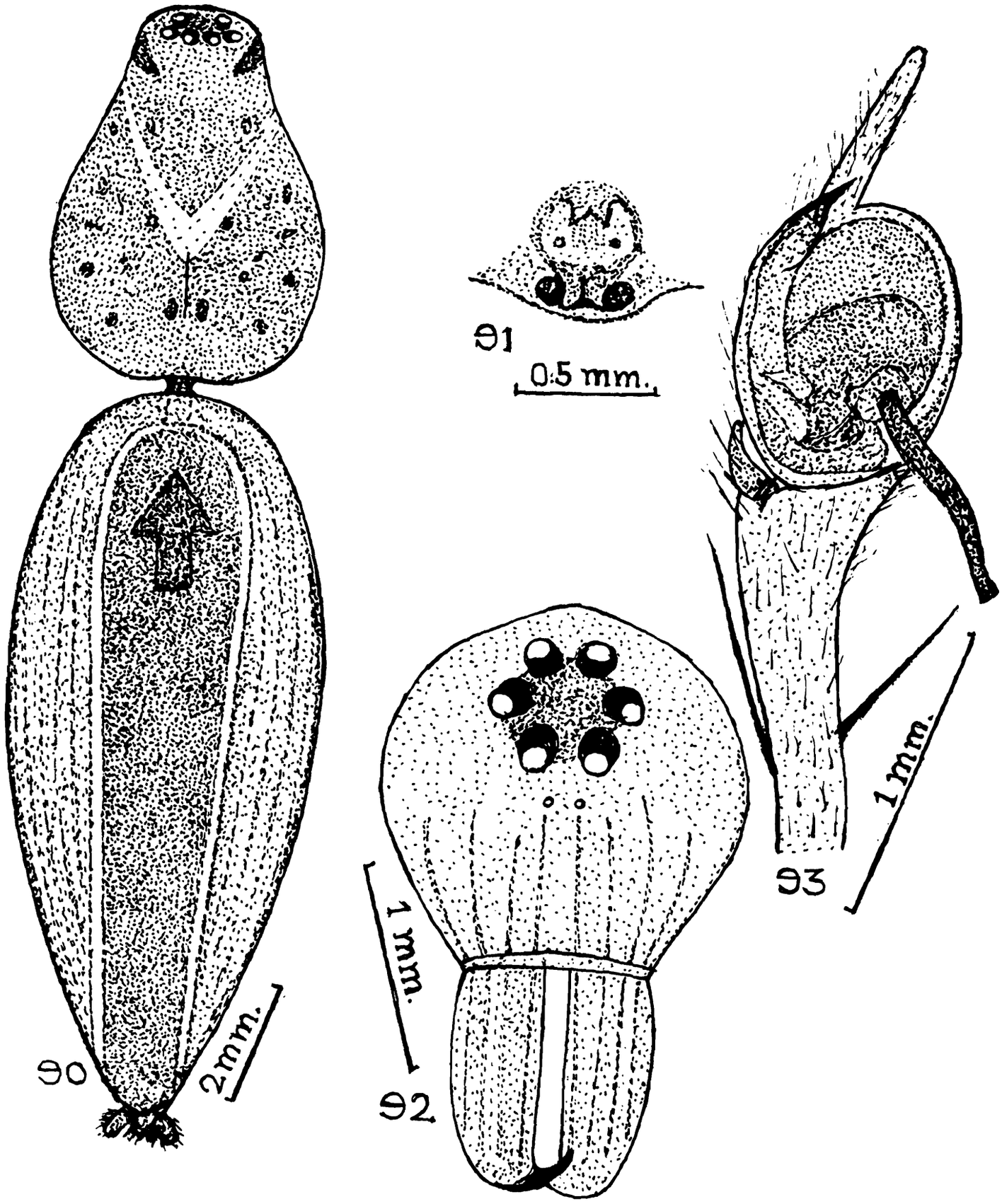

Fig. 90-93. *Peucetia latikae* Tikader

90. Dorsal view of female, legs omitted; 91. Epigyne; 92. Clypeus; 93. Male palp, ventral view.

27. *Peucetia harishankarensis* Biswas
(Figures 94-96)

1975. *Peucetia harishankarensis* Biswas, *Curr. Sci.*, 44 (10) : 350.

Type-specimens : *Holotype* female deposited in the National Zoologial Collection, Zoological Survey of India, Calcutta. (Reg. No. 3669/18).

Type-locality : INDIA : Orissa, Harishankar, Bolandgir, Coll. *J. K. Sen,* 3.XI. 1973.

General : Cephalothorax light green, legs reddish brown, abdomen magenta colour. Total length 17.0 mm. Carapace 6.0 mm. long, 4.5 mm. wide; abdomen 11.0 mm. long, 5.6 mm. wide.

Cephalothorax : Longer than wide, narrow in front and provided with conspicuous black spots and U-shaped red marking. Cephalic region slightly higher. Eyes eight and situated on the elevated

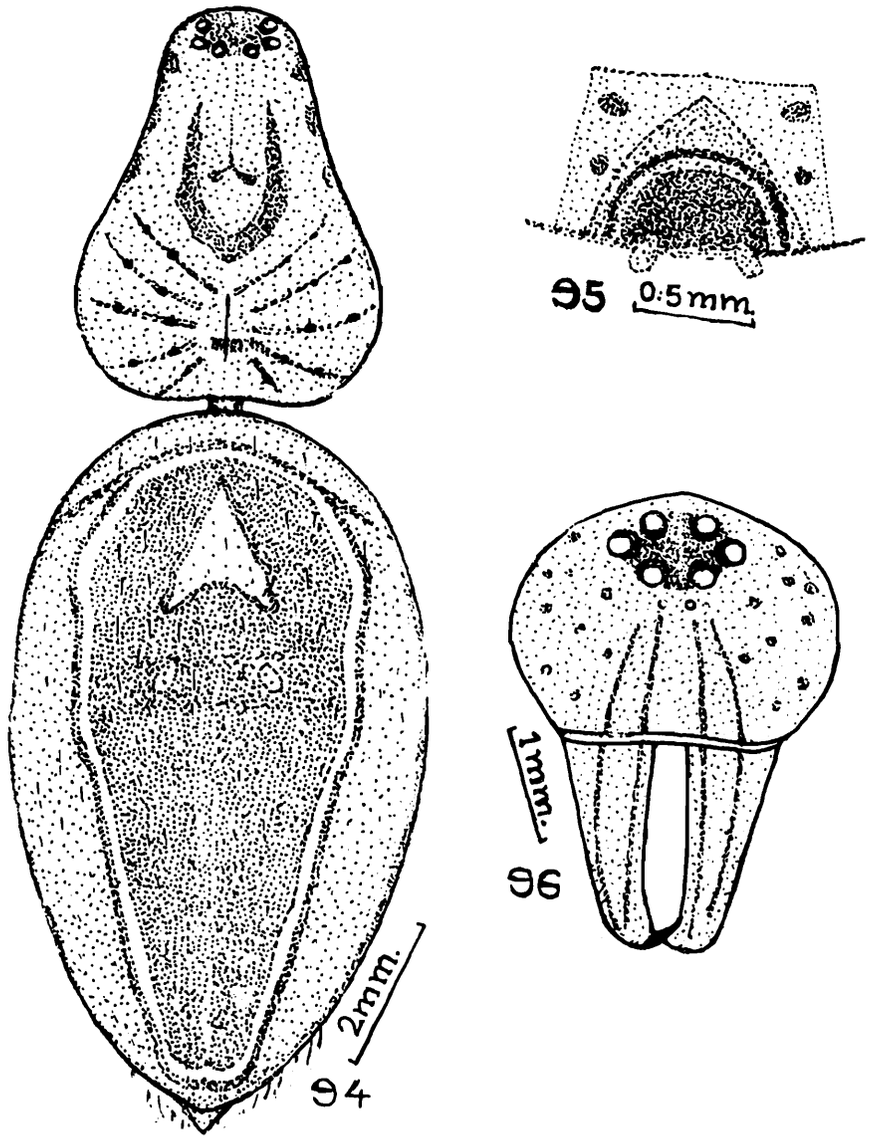

Fig. 94-96. *Peucetia harishankarensis* Biswas
94. Dorsal view of female, legs omitted; 95. Epigyne; 96. Clypeus.

portion of the cephalic region; all eyes are encircled by black patch. Posterior eye row slightly

procurved and equidistant, anterior row strongly recurved and anterior medians very small. Clypeus long and broad, provided with a pair of black lines extending from ocular area to the base of the fang of chelicera as in Figure 96. Sternum oval, clothed with fine hairs. Legs long and strong with conspicuous long spines.

Abdomen : Longe than wide, narrowing behind, clothed with hairs. Middorsally provided with a longitudinal broad olive green band extending from the base to the end of abdomen as in Figure 94. Ventral side lighter than the dorsal, Epigyne as in Figure 95.

28. ***Peucetia biharensis*** sp. nov.
(Figures 97-100)

Type-specimens : *Holotype* female, *Paratype* five females deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 5489 to 5490/18).

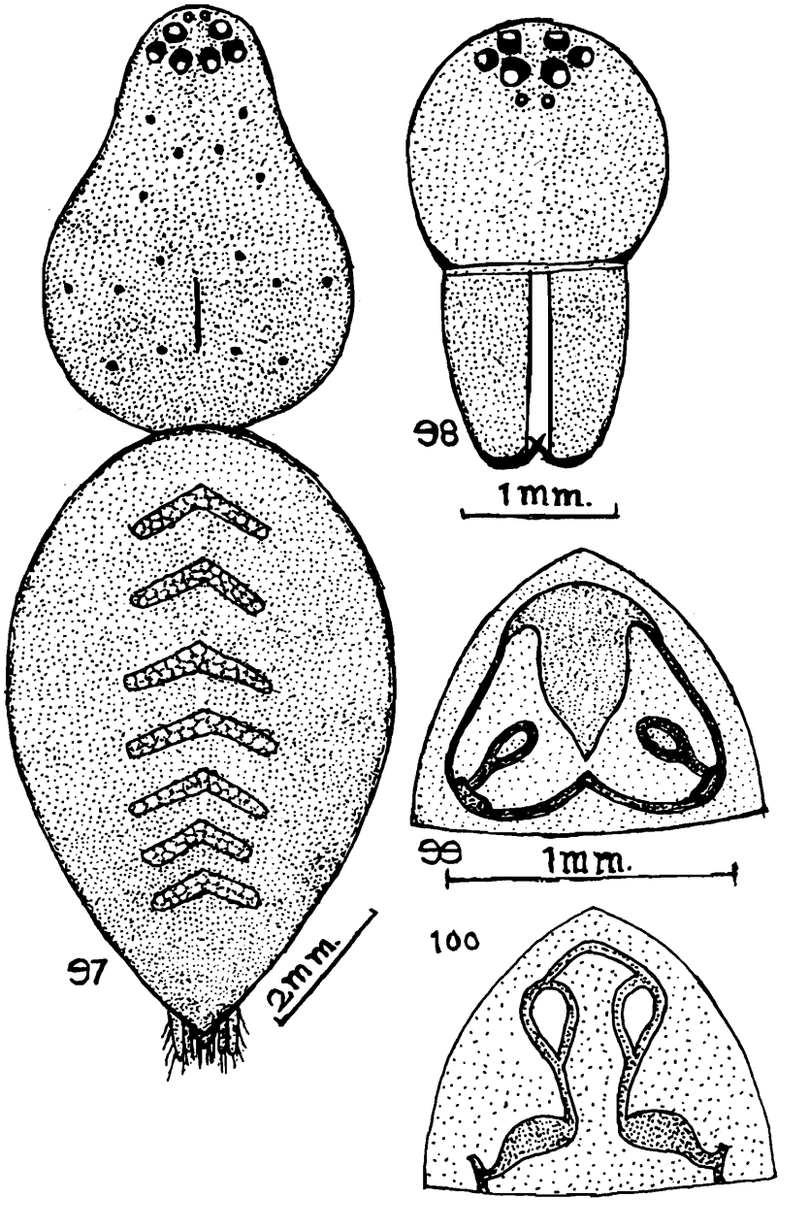

Fig. 97-100. *Peucetial biharensis* sp. nov.
97. Dorsal view of female, legs omitted; 98. Clypeus; 99. Epigyne; 100. Internal genitalia.

Type locality : INDIA : Bihar, Siripur, Saran, Coll. *Mackenzie,* August, 1913.

General : Cephalothorax and legs reddish-green, abdomen yellowish-green. Total length 15.0 mm. Carapace 6.4 mm. long, 4.2 mm. wide; abdomen 9.0 mm long, 5.0 mm. wide.

Cephalothorax : Longer than wide, narrowing in front, clothed sith pubescence, thoracic region provided with a fine fovea. Cephalothorax with a high cephalic region. Anterior row of eyes strongly recurved (as seen from in front); medians very smaller than the laterals and lateral eyes are largest. Posterior row of eyes slightly procurved, equal in size and equidistant from each other. all the eyes are encircled by black patch. Clypeus high, vertical, clothed with spines, provided with light brown band starting from anterior median eyes up to the anterior end of clypeus as in Figure 98. Sternum heart shaped, pointed behind, clothed with hairs and spines. Chelicerae moderately strong, vertical, clothed with hairs, inner and outer margins without tooth. Labium longer than wide, clothed with hairs and spines, anterior margin provided with scopulae. Maxillae longer than wide, nearly double the length of labium, clothed with hairs and spines; anterior margin provided with distinct scopulae. Legs relatively long and strong, clothed with hairs and conspicuous long spines; coxae and femora of all legs provided with roundish deep brown spots.

Abdomen : Longer than wide, nearly elliptical, widest at the middle, narrowing posteriorly, clothed with pubescence, uniform, provided with brownish reticulations as in Figure *97*. Ventral side slightly lighter than the dorsal, midventrally provided with silvery white stripe starting from epigastric furrow to the base of spinnerets. Epigyne as in Figure 99. Internal genitalia as in Figure 100.

This species resembles *Peucetia harishankarensis* Biswas, but differs from it as follows : (1) Abdomen dorsally provided with brownish reticulations, but in *P. harishankarensis* abdomen middorsally with a longitudinal broad olive green band. (2) Epigyne also structurally different.

29. ***Peucetia pawani*** sp. nov.
(Figures 101-104)

Type-specimen : *Holotype* female deposited in the National Zoologicl Collection, Zoological Survey of India, Calcutta. (Reg. No. 5492/18).

Type locality : INDIA : Madhya Pradesh, Porpa village near Jagdalpur, Bastar district, Coll. *U. A. Gajbe,* 31. XII. 1983.

General : Cephalothorax yellowish-green, legs light brownish-green, abdomen light green. Total length 12.8 mm. Carapace 4.8 mm. long, 3.6 mm. wide; abdomen 7.8 mm. long, 3.8 mm. wide.

Cephalothorax : Longer than wide, broad in front, clothed with pubescence, cephalic region high, thoracic region provided with conspicuous fovea from which light reddish lines radiate to the lateral sides, cephalothorax provided with black spots as in Figure *101*. Anterior row of eyes strongly recurved (as seen from in front), medians very small, anterior medians larger in size than all the other eyes and equally spaced. Posterior row of eyes slightly procurved, equal in size and

equidistant to each other. All the eyes encircled by black patch. Clypeus long, vertical, provided with light stripe starting from anterior median eyes to the base of clypeus as in Figure 102. Sternum heart-shaped pointed behind, clothed with hairs and spines and provided with black spots. Chelicerae moderately strong, vertical, clothed with hairs and spines, inner and outer margins without tooth. Labium and maxillae longer than wide, maxillae nearly double the length of labium, clothed with hairs and spines, labium provided with black spots; anterior margins of both provided

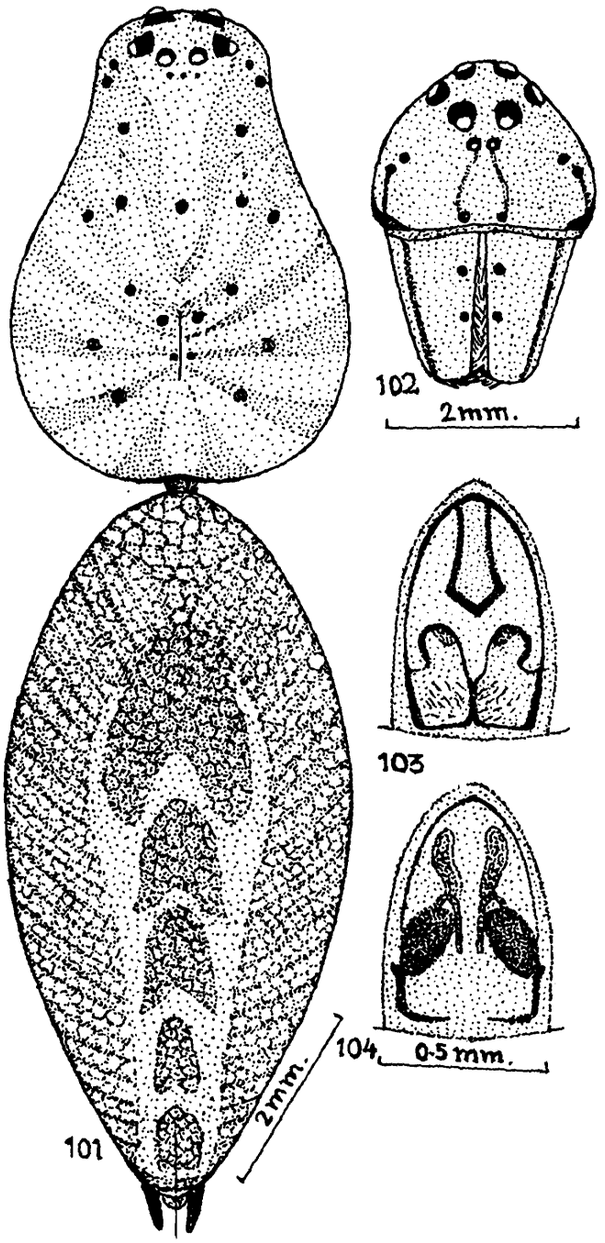

Fig. 101-104. *Peucetia pawani* Gajbe

101. Dorsal view of female, legs omitted; 102. Clypeus; 103. Epigyne; 104. Internal genitalia.

with distinct scopulae. Legs long and strong, clothed with hairs and conspicuous spines; coxae and femora of all legs provided with black roundish spots.

Abdomen : Longer than wide, nearly elliptical; widest at the middle, clothed with small spine-like hairs and provided middorsally with five brownish patches and laterally with brownish patch with reticulatios as in Figure 101. Ventral side lighter than the dorsal, midventrally provided with broad longitudinal reticulate black stripe starting from the epigastric furrow to the base of spinnerets. Epigyne as in Figure 103. Internal genitalia as in Figure 104.

This species resembles with *Peucetia choprai* Tikader but differs from it as follows : (1) Carapace provided with black spots but in *P. choprai* Carapace uniform without black spots. (2) Abdomen dorsally provided with five brownish patches and lateraly with brownish reticulations, but in *P. choprai* abdomen dorsally provided with longitudinal whitish line and middorsally with three pairs of whitish spots. (3) Epigyne and internal genitalia also structuturally different.

30. ***Peucetia viveki*** sp. nov.
(Figures 105-108)

Type-specimen : *Holotype* female deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. (Reg. No. 5493/18).

Type locality : INDIA : Madhya Pradesh, Omkareshwar, Ujjain district. Coll. *V.V. Rao*, 22. II. 1969.

General : Cephalothorax and legs light yellowish-green, abdomen light brownish-green, Total length 15.2 mm. Carapace 5.4 mm. long, 3.7 mm. wide; abdomen 9.6 mm. long, 2.4 mm. wide.

Cephalothorax : Longer than wide, narrowing in front, clothed with pubescence, thoracic region provided with a fine fovea from which radiates black bands towards the lateral sides. Cephalothroax provided with eight black roundish spoits as in Figure *105*. Eyes compact on the high cephalic region; anterior lateral eyes largest of all the eyes. Anterior row of eyes strongly recurved (as seen from in front); anterior medians smaller than the laterals and equally spaced. Posterior row of eyes slightly procurved, equal in size and equidistant from each other. All the eyes encircled by black patch. Clypeus high, vertical, clothed with spines, provided with deep brown stripes up to the anterior end of clypeus as in Figure *106*. Sternum heart-shaped, pointed behind, clothed. with hairs and spines; middorsally provided with broad longitudinal deep brown stripe. Chelicerae moderately strong, vertical, clothed with hairs, reddish-green in colour; provided with four longitudinal brown stripes, inner and outer margins without teeth. Labium longer than wide, deep brown, clothed with hairs and spine like short hairs; anterior margin provided with scopulae. Maxillae longer than wide, nearly double the length of labium; light yellowish green and clothed with hairs and some spines; anterior margin provided with distinct scopulae. Legs relatively very long and strong. clothed with hairs and conspicuous long spines, coxae and femora of all legs provided with roundish black spots.

Abdomen : Nearly elliptical, widest at the middle, narroing posteriorly, clothed with pubescence, provided anteriorly with silvery white band and posteriorly with brownish reticulations as in Figure *105*. Ventral side slightly lighter than the dorsal. Epigyne as in Figure 107. Internal genitalia as in Figure 108.

This species closely resembles *Peucetia viridans* (Hentz), but differs from it as follows : (1) Abdomen dorsally provided with brownish reticulations, but in *P. viridans* abdomen bright green

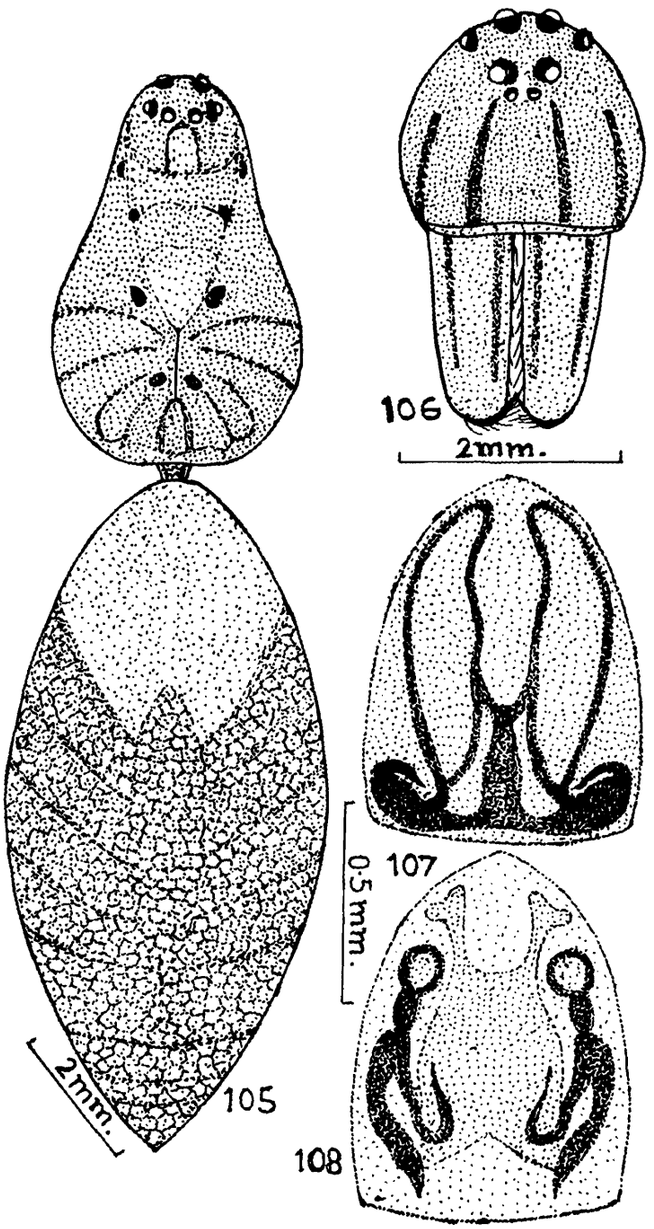

Fig. 105-108. *Peucetia viveki* sp. nov.
105. Dorsal view of female, legs omitted; 106. Clypeus; 107. Epigyne; 108. Internal genitalia.

with chalk white markings. (2) Clypeus provided with four longitudinal brown bands, but in *P. viridans* no such band (3) Epigyne and internal genitalia also structurally different.

SUMMARY

This paper deals with thirty species of the family Oxyopidae. Twenty species of *Oxyopes* and ten species of *Peucetia*, out of which eight species and six species are new to science respectively are described.

ACKNOWLEDGMENTS

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A CHECK LIST OF THE MARINE AND ESTUARINE FISHES OF SOUTH ORISSA, EAST COAST OF INDIA

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INTRODUCTION

Gopalpur (19° 16'N and 84° 55'E), Ganjam (22° 22'N and 85° 02'E) and Patisonapur (18° 4'N and 84° 25'S) are the main marine fish landing centres in Ganjam district of Orissa state. The fish fauna at these three centres usually comprise the marine and estuarine species which were caught from the Bay of Bengal, a pocket lagoon situated to the north-eastern side of Gopalpur and the two prominant estuarine systems, the Rushikulya and Bahuda river estuaries. Information concerning the systematics of fish fauna from this region are quite scanty. Only Misra (1981) has published a preliminary account on the fish fauna of this region based on his collections made from Berhampur fish market. The present communication reports, the systematics of marine and estuarine fishes of South Orissa coast as an additional information to the above publication.

Fish specimens were collected at monthly interval from three locations mentioned supra above spreading over a period of one year from March 1988 to February 1989. Each specimen was examined thoroughly and identified following standard literature (Day, 1978; Misra, 1962; Weber and Beaufort, 1933; F.A.O. Fish Identification Mannual, 1974; Munro, 1982). The systematics arrangement was made as per the classification given by Berg (1940). The English name and local name in Oriya was quoted following the Indian Standard Glossary (1974).

The fish fauna was represented by 118 species, 7 belonging to class Chondrichthyes and 111 to class Osteicthyes (Table I). The former class comprised one order, two families and three genera. The later class was represented by 13 orders, 53 families and 78 genera. Percoidei is the richest order comprising 18 families, 28 genera and 45 species. 93 species have been identified as marine forms while 25 species were estuarine in their occurrence.

Table I. A Check list of the Marine and Estuarine Fishes of South Orissa

	English name	Local name
Grade : PISCES		
Class : CHONDRICHTHYES		
Sub-class : ELASMOBRANCHII		

* Address for correspondence.

	English name	Local name
I Order : LAMNIFORMES		
Sub-order : SCYLIORHINOIDEI		
1. Family : CARCHARHINIDAE		
Carcharhinus dussumieri (Muller & Henle)	Black Shark	Kola Magara
C. gangeticus (Muller & Henle)	Grey shark	Munda Magara
C. limbatus (Muller & Henle)	Grey shark	Kolapora Magara
C. melanopterus (Quoy & Gaimard)	Black finned shark	Icha Magara
C. sorrah (Muller & Henle)	Shark	Khira Magara
Scoliodon laticaudus (Muller & Henle)	Yellow dog shark	Dog fish
2. Family : SPHYRNIDAE		
Sphyrna blochii (Cuvier)	Hammer headed shark	Jualia Magara
Class : OSTEICHTHYES		
Sub-class : ACTINOPTERYGII		
II Order : CLUPEIFORMES		
Sub-order : CLUPEOIDEI		
3. Family : CLUPEIDAE		
(a) Sub-family : DUSSUMIERIINAE		
Dussumieria acuta (Valenciennes)	Rainbow sardine or Common sprat	Kunur danta
(b) Sub-family : CLUPEINAE		
Sardinella albella (Valenciennes)	Short-bodied sardine	Paunia puiee
S. fimbriata (Valenciennes)	Lesser sardine or Fringe-scale sardine.	Kabala
S. gibbosa (Bleeker)	Indian sprat	Kabala
S. longiceps (Valenciennes)	Oil sardine	Disco Kabala
(c) Sub-family : ALOSINAE		
Hilsa ilisha (Hamilton)	Indian shad or River shad	Ilisa
H. Kelee (Cuvier)		
(d) Sub-family : DOROSOMATINAE		
Nematalosa nasus (Bloch)	Long-Ray Bony Break	Bolangi

	English name	Local name
4. Family : ENGRAULIDAE		
(a) Sub-family : COLLINAE		
Coilia dussumieri (Valenciennes)	Gold spotted grenadier anchovy	Koorvai
(b) Sub-family : ENGRAULINAE		
Stolephorus commersonii (Lacepede)	Commerson's Anchovy	Kokali
S. indicus (Van Hasselt)	Indian Anchovy	Kokali
Thryssa dussumieri (Valenciennes)	Dussumier's Anchovy	Kokali
5. Family : CHIROCENTRIDAE		
Chirocentrus dorab (Forsskal)	Wolf Herring Silver bar	Khandabalia
III Order : ELOPIFORMES		
Sub-order : ELOPOIDEI		
6. Family : ELOPIDAE		
Elops machnata (Forsskal)	Giant Herring	
IV Order : ANGUILLIFORMES		
Sub-order : ANGUILLOIDEI		
7. Family : MURAENIDAE		
Gymnothorax punctatus (Bloch & Schneider)	White spotted moray	
8. Family : CONGRIDAE		
Uroconger lepturus (Richandson)	Slender Conger Eel	
9. Family : OPHICHTHIDAE		
Ophichthus apicalis (Bennett)	Pointed Tail Snake Eel	
V Order : GONORYNCHIFORMES		
Sub-order : CHANOIDEI		
10. Family : CHANIDAE		
Chanos chanos (Forsskal)	Milkfish or Salmon Herring	Sebakhainga
VI Order : SILURIFORMES		
11. Family : BAGRIDAE		
Mystus gulio (Hamilton)	Long-Whiskers Cat-fish	

	English name	Local name
12. Family : ARIIDAE		
Tachysurus caelatus (Valenciennes)	Engraved Cat-fish	Kantia
T. sona (Hamilton)	Marine Cat-fish	Kantia
13. Family : PLOTOSIDAE		
Plotssus lineatus (Thumberg)	Striped Cat-fish Eel	
VII Order : MYCTOPHIFORMES		
14. Family : SYNODONTIDAE		
Saurida gracills (Quoy & Gaimard)	Slender-Lizard fish	
S. tumbil (Bloch)	Greater Lizard fish	Budimottah
15. Family : HARPADONTIDAE		
Harpadon nehereus (Hamilton)	Bombay duck	Newa
VIII Order : LOPHIIFORMES		
16. Family : ANTENNARIIDAE		
Antennarius hispidus (Bloch)	Shaggy Fishing-Forg	
17. Family : OGCOCEPHALIDAE		
Halieutaea indica (Annandale & Jenkins)		
H. stellata (Vahl)	Stellate Hand Fish	
IX Order : ATHERINIFORMES		
Sub-order : EXOCOETOIDEI		
18. Family : EXOCOETIDAE		
(a) Sub-family : EXOCOETINAE		
Exocoetus volitans (Linnaeus)	Two-winged Flying Fish	
(b) Sub-family : HEMIRAMPHINAE		
Hyporhamphus limbatus (Valenciennes)	Gaimard's Half Beak	Gangaturi
Rhynchorhamphus georgii (Valenciennes)	Long billed Half Beak	
Zenarchopterus dispar (Valenciennes)	Viviparous Half Beak	Gamardi
X Order : SYNGNATHIFORMES		
Sub-order : AULOSTOMOIDEI		
Super family : AULOSTOMOIDAE		

	English name	Local name
19. Family : FISTULARIIDAE		
Fistularia petimba (Lacepede)	Smooth Flute-Mouth	
XI Order : SCORPAENIFORMES		
Sub-order : SCORPAENOIDEI		
20. Family : SCORPAENIDAE		
Pterois russelli (Bennett)	Russell's Fire Fish	Kukuda Ganga
21. Family : SYNANCEIIDAE		
Minous trachycephalus (Bleeker)		
Sub-order : PLATYCEPHALOIDEI		
22. Family : PLATYCEPHALIDAE		
Platycephalus indicus (Linnaeus)	Indian Flat-Head	Tokoro
XII Order : PERCIFORMES		
Sub-order : PERCOIDEI		
23. Family : CENTROPOMIDAE		
Ambassis dussumieri (Cuvier)		
A. commersoni (Cuvier)	Commerson's Glassy Perchlet	
Lates calcarifer (Bloch)	Giant Perch or cock-up	Bhetki
24. Family : SERRANIDAE		
(a) Sub-family : EPINEPHELINAE		
Epinephelus morrhua (Valenciennes)	Banded-Cheek Reef-cod	Bhola
25. Family : TERAPONIDAE		
Terapon jarbua (Forsskal)	Crescent Perch or Zoned Perch	Gahana
T. puta (Cuvier)	Small-scaled banded Grunter or Zoned Perch	Tadikiri
T. theraps (Cuvier)	Large-scaled banded Grunter	
26. Family : APOGONIDAE		
Apogon auritus (Lacopede)	Golden Cardinal Fish	Ghandee
A. quadrifisciatus (Cuvier)	Four-band Cardinal Fish	Ghandee

	English name	Local name
27. Family : SILLAGINIDAE		
Sillago sihama (Forsskal)	Silver whiting	Lerdi
28. Family : LACTARIIDAE		
Lactarius lactarius (Schneider)	Big jaw jumper	Suduma
29. Family : CARANGIDAE		
Carangoides malabaricus (Bloch)	Malabar Trevally	
Caranx carangus (Bloch)	Black-tailed Trevally	Kanti
Megalaspis cordyla (Linnaeus)	Horse mackerel	
Scomberoides tala (Cuvier)	Deep queenfish	
30. Family : CORYPHAENIDAE		
Coryphaena hippurus (Linnaeus)	Dolphin fish	
31. Family : LEIOGNATHIDAE		
Gazza achlamys (Jordan & Starks)	Naked toothed Pony fish	
G. minuta (Bloch)	Toothed Pony Fish or Silver bellies	Polanga
Leiognathus bindus (Valenciennes)	Orange-finned Pony fish	
L. daura (Cuvier)	Golden striped pong fish	
L. fasciatus (Lacepede)	Banded Pony fish	
L. splendens (Cuvier)	Splendid Pony fish	
Secutor ruconius (Hamilton)	Dee-Bodied Pony fish	
32. Family : LUTJANIDAE		
Lutjanus argentimaculatus (Forsskal)	Red Snapper	
L. johni (Bloch)	Moser perch	Kokarba
L. lutjanus (Bloch)	Rosy snapper	Scosta
L. sanguineus (Cuvier)	Blood-red snapper	Scosta
33. Family : NEMIPTERIDAE		
Nemipterus japonicus (Bloch)	White-tailed Pink Perch	
34. Family : GERREIDAE		
Gerres filamentosus (Cuvier)	Long-Rayed Silver-biddy	Jageri

		English name	Local name
	G. oyena (Forsskal)	Lined Silver-biddy	Jagiri
	Gerremorpha setifer (Hamilton)	Black-tipped Silver-biddy	
	Pentaprion longimanus (Cantor)	Long-finned Silver-biddy	
35. Family :	POMADASYIDAE		
	Pomadasys hasta (Bloch)	Lined Silver Grunter	Gorsa
	P. maculatus (Bloch)	Spotted Grunter	
36. Family :	LETHRINIDAE		
	Lethrinus nebulosus (Forsskal)	Banded Sea bream	Karva
37. Family :	SCIAENIDAE		
	Dendrophysa russelli (Cuvier)	Russell's jewfish	
	Johnius aneus (Bloch)	Grey-Fin jewfish	
	Otolithes cuvieri (Trewaves)		
	O. ruber (Schneider)	Rosy jew fish	
38. Family :	MULLIDAE		
	Parupeneus macronema (Lacepeda)	Long-rayed Goat fish	
	P. fraterculus (Valenciennes)	Two-spot Goat fish	
	P. indicus (Shaw)	Indian Goat fish	Guli binda
	Upeneus tragula (Richardson)	Black-striped Goat fish	
39. Family :	SCATOPHAGIDAE		
	Scatophagus argus (Linnaeus)	Spotted butter-fish	
40. Family :	CICHLIDAE		
	Etroplus suratensis (Bloch)	Banded Etroplus	
Sub-order :	MUGILOIDEI		
41. Family :	MUGILIDAE		
	Liza macrolepis (Smith)	Borneo Mullet	
	L. parsia (Hamilton)	Gold-spot Mullet	
	L. tade (Forsskal)	Green-back Mullet	Maji
	Mugil cephalus (Linnaeus)	Grey mullet	Khainga
Sub-order :	SPHYRAENOIDEI		
42. Family :	SPHYRAENIDAE		
	Sphyraena obtusata (Cuvier)	Blunt Jawed sea-pike or Barracuda	

	English name	Local name
Sub-order : POLYNEMOIDEI		
43. Family : POLYNEMIDAE		
Eleuthronema tetradactylum (Shaw)	Indian Salman or Four-thread tassel fish	Sahalo
Polydactylus indicus (Shaw)	Thread fin or Indian tassel fish	
P. sextaris (Bloch)	Black-spot six-thread tassel fish	
Polynemus paradiseus (Linnaeus)	Mango fish	Topsi
Sub-order : GOBIOIDEI		
44. Family : ELEOTRIDAE		
Eleotris fusca (Bloch & Schneider)	Brown gudgeon	Bundi
45. Family : GOBIIDAE		
(a) Sub-family : GOBIINAE		
Acentrogobius griseus (Day)	Grey Goby	
Glossogobius giuris (Hamilton)	Bar-eyed Goby	
(b) Sub-family : APOCRYPTEINAE		
Pseudapocryptes lanceolatus (Bloch & Schneider)	Pointed-tailed Goby	
Sub-order : KURTOIDEI		
46. Family : KURTIDAE		
Kurtus indicus (Bloch)	Indian hump-head	
Sub-order : ACANTHUROIDEI		
47. Family : ACANTHURIDAE		
Sub-family : ACANTHURINAE		
Acanthurus lineatus (Linnaeus)	Blue-lined Surgeon-fish	
Sub-order : SCOMBRIODEI		
48. Family : TRICHIURIDAE		
Eupleurogrammus muticus (Gray)	Ribbon-fish	
Trichiurus lepturus (Linnaeus)	Ribbon-fish	

		English name	Local name
49. Family :	SCOMBRIDAE		
	Rastrelliger brachysoma (Bleeker)	Striped mackerel	
	R. kanagurta (Cuvier)	Indian mackerel or Rake-Gilled-Mackerel	Kanagurda
	Thunnus orientalis (Temminck & Schlegel)		
Sub-order :	STROMATEOIDEI		
50. Family :	STROMATEIDAE		
	Pampus argenteus (Euphrasen)	Silver pomfret	Dhola Chandee
	P. chinensis (Euphrasen)	White pomfret or Chinese pomfret	Dhola Chandee
51. Family :	APOLECTIDAE		
	Apolectus niger (Bloch)	Brown pomfret	
XIII Order :	PLEURONECTIFORMES		
Sub-order :	PLEURONECTOIDEI		
52. Family :	BOTHIDAE		
	Pseudorhombus arsius (Hamilton)	Large-toothed Flounder or Indian flat-head	Pot potia
	P. javanicus (Bleeker)	Javanese Flounder	Pot potia
	P. triocellatus (Bloch)	Three-spot Flounder or Flat fish	
Sub-order :	SOLEOIDEI		
53. Family :	SOLEIDAE		
	Zebrias zebra (Bloch)	Zebra sale	
54. Family :	GYNOGLOSSIDAE		
	Cynoglossus macrolepidotus (Bleeker)	Large-scaled Tongue-sole	
	C. macrostomus (Norman)		
XIV Order :	TETRAODONTIDORMES		
Sub-order :	TETRAODONTOIDEI		
55. Family :	TETRADONTIDAE		
	Canthigaster margaritatus (Ruppell)	Ocellated Toby	

SUMMARY

This check list of marine and estuarine fishes of South Orissa was prepared based on the collections made over a period of one year from March 1988 to February 1989 from three important fish landing centres namely Ganjam, Gopalpur and Patisonapur of Ganjam district. In total 7 species from the class Chondrichthyes and 111 species from class Osteichthyes were encountered. The common English name, as well as the local name in Oriya for each species was given.

ACKNOWLEDGEMENTS

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THREE SPECIES OF FRESHWATER OSTRACODA (CRUSTACEA) FROM TAMILNADU

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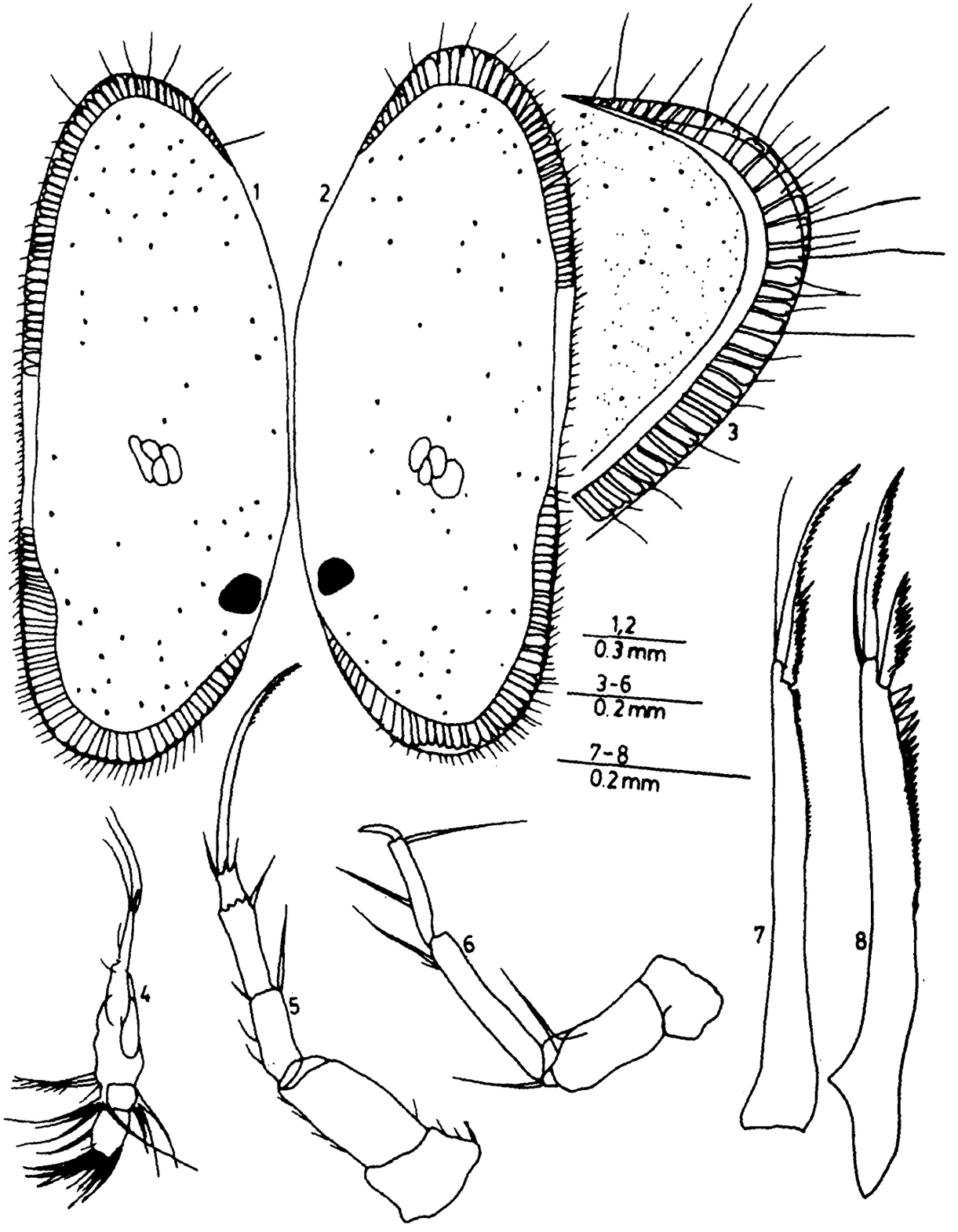
INTRODUCTION

While studying the faunal diversity of Wetlands of Tamil Nadu, three species of Class Ostracoda viz. *Stenocypris major* (Baird, 1859), *Cypretta fontinalis* Hartman, 1964 and *Physocypria furfuracea* (Brady, 1886) were collected from a drinking water overhead tank at Thiruvanmiyur residential area and YWCA rain water pool, Madras. All the three species have been already described from this region (Victor and Fernando, 1979). However the descriptions were inadequate to identify the species. The present study gives full descriptions of all the three species with illustrations of diagnostic characters.

1. *Stenocypris major* (Baird, 1859)
(Figs. 1-8)

Female : Body length 2.005 ± 0.055 (N = 10), height 0.777 ± 0.017 mm. Shell elliptical in shape, dorsal margin smoothly convex, ventral side straight with an inundation slightly before the middle towards anterior side. Both anterior, posterior and ventral side with hairs, anterior side with small hairs, posterior side with 7-8 long hairs and ventral side with long and short hairs. Anterior margin more convex than posterior. Radial band of septa present from anterior to posterior margin, anterior and posterior septa longer than the ventral septa at the middle. Surface of valve punctate and hairy. Central muscle scars present (Figs. 1-3). First antenna with first podomere of protopodite four times longer than the second podomere with a three segmented Rome organ; second antenna with hairy natatory setae reaching the tips of the terminal claws. I thoracic leg with all setae setulate (Fig. 4), II thoracic leg with a toothed end claw (Fig. 5), III thoracic leg with a prominent claw and seta, seta in the penultimate podomere setulate (Fig. 6). Furcal rami asymmetrical, posterior margin of right ramus strongly toothed, terminal seta of left ramus (Fig. 7) slightly longer than the terminal claw (Fig. 8).

Remarks : This species is considered to be cosmopolitan in occurrence and highly variable in morphology and size. Body size is one of the characters often changing in this species. The maximum size recorded in this species from various parts of South East Asian region changes considerably (Victor and Fernando, 1981). They also pointed out that almost all the species so far collected outside the Oriental region might not be true *S. major*. The presence of fine invisible



Figs. 1-8 : *Stenocypris major* (Baird, 1859), female : 1-Left valve, external view ; 2-Right valve, external view; 3-anterior end of the valve; 4-maxilla; 5-Thoracic leg II; 6-Thoracic leg III; 7-8-furca.

teeth on the left furcal rami also shows variation. In some of the studies, it is mentioned that these teeth present only at the distal region of the furca. However, the present study shows that these fine teeth are conspicuous only at high power with proper orientation of the furca under the microscope.

2. *Cypretta fontinalis* Hartman, 1964
(Figs. 9-16)

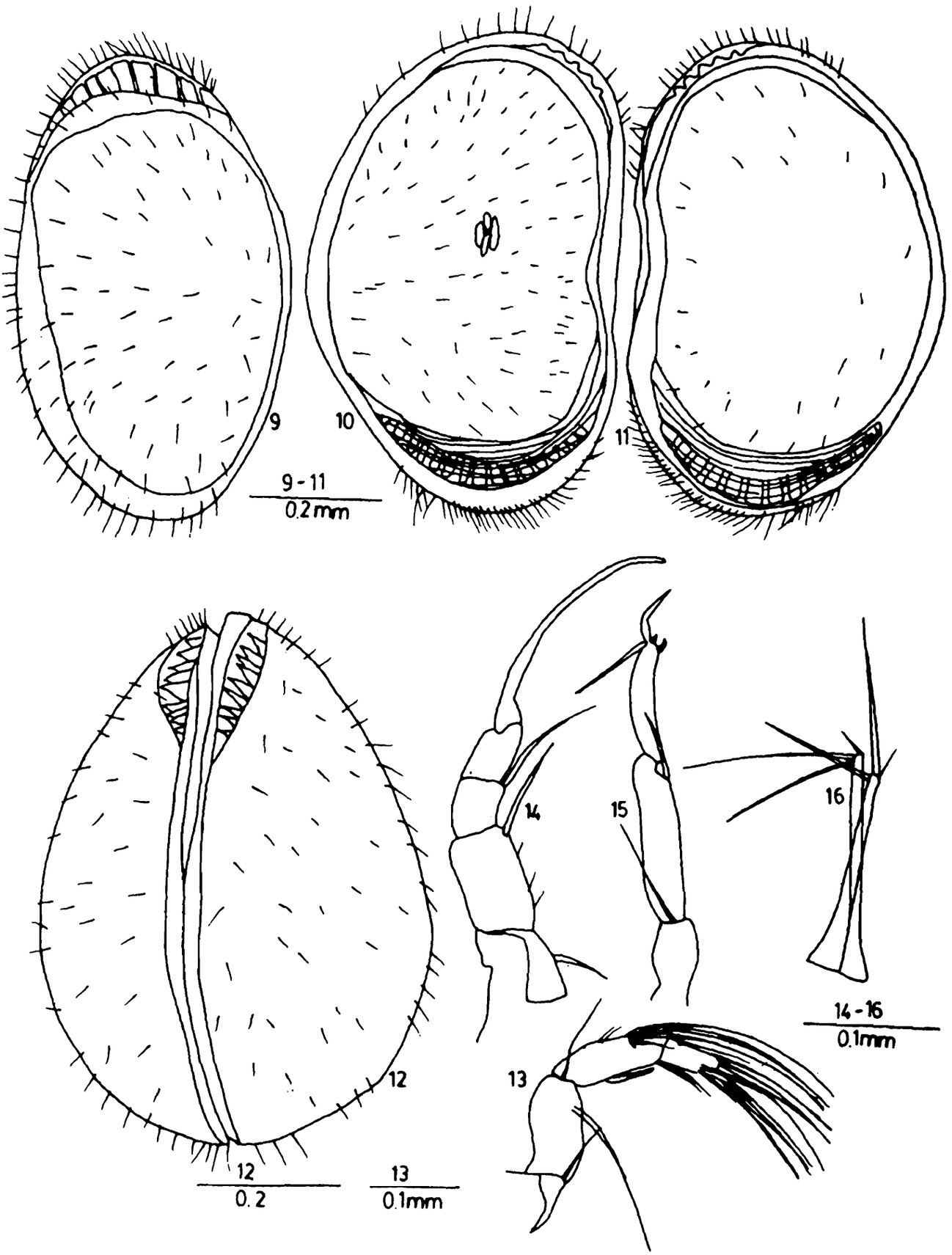
Female : Body length 0.736 ± 0.013 mm; height 0.568 ± 0.011 mm. Valves tumid, narrow at anterior end and broad at posterior side, maximum height slightly below the middle right, valve overlapping the left, valves without any ornamentation and with hairs sparsely present at the posterior end and regularly present at the anterior region and ventral. Anterior margin of valve with a well-defined septa (Figs. 9-12). Prominent central muscle scars present on the valve. II antenna with the natatory setae almost reaching the tips of terminal claws and aesthetasc 'Y' two-segmented (Fig. 13). II thoracic leg with distal claw curved (Fig. 14). Terminal podomere of the third leg with a long claw, two small claws and relexed seta (Fig. 15). Furcal rami symmetrical, terminal and subterminal claws slender, dorsal seta less than $^1/_4$ the length of subterminal claw and terminal seta rudimentary (Fig. 16).

Remarks : The present species appears to be slightly smaller in size than the Hartman's original description (0.83-0.86 mm). Both Hartman (1965) and Victor and Fernando (1979) did not give any description about the thoracic appendages. The presence of a projection or a wavy pattern in the posterior side of right valve was not described by both the previous authors (loc. cit).

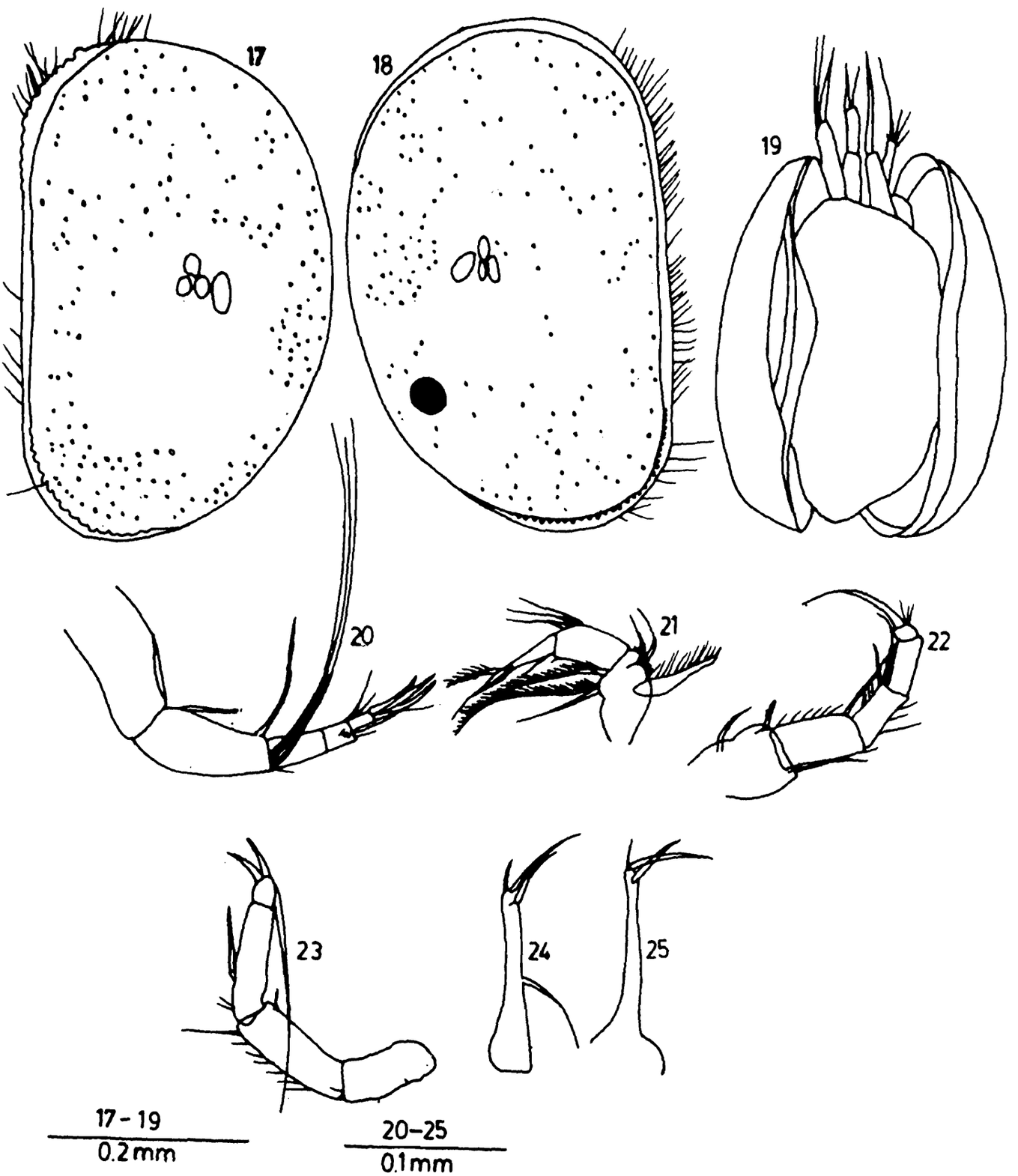
3. *Physocypria furfuracea* (Brady, 1886)
(Figs. 17-25)

Female : Body length 0.523 ± 0.0009; height 0.0347 ± 0.000 mm (N = 23). Shell subovate, dorsal side convex, maximum height slightly posterior to middle, both anterior and posterior margins rounded, left valve overlapping the right, anterior and posterior margins rounded, right valve with tubercles on anterior and posterior margins (Figs. 17-19). Left valve with smooth margins. Valve surface smooth with purple patch when alive. Natatory setae of the second antenna well developed, reaching well beyond the tips of the terminal claws; exceeding more than twice the length of terminal claws, claws evenly toothed (Fig. 20). Maxilla small (Fig. 21). Second segment of the second leg with single seta, and claw slender and smooth, seta on terminal segment very long (Fig. 22). Third leg with a short terminal segment with two claws and a long refluxed seta (Fig. 23). Furcal rami symmetrical; short and stout, dorsal seta placed almost at the middle of the ramus and longer than the terminal claws (Fig. 24), terminal seta with $^1/_3$ length of the terminal claw (Fig. 25).

Remarks : This species was first described from Sri Lanka. Victor and Fernando (1979) synonimised *P. tuberata* Gurney 1916 with the present species without mentioning any reasons for it. *P. furfuracea* occurs in Maharashtra, Gujarat, Andrapradesh, Kerala and in Tamil Nadu it is recorded from Salem, Srirangam and Pondicheri.



Figs. 9-16 : *Cypretta fontinalis* Hartman, 1964, female : 9-12-valves, external view ; 13-antenna II; 14-thoracic leg II; 15-thoracic leg III; 16-furca.



Figs. 17-25 : *Physocypria furfuracea* (Brady, 1886), famale : 17-19-valves, external view; 20-antenna II; 21-Maxilla; 22-thoracic leg II; 23-thoracic leg III; 24-25-furca.

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Rec. zool. Surv. India : **97** (Part-3) : 97-104, 1999

A NEW SPECIES AND NEW RECORDS OF SIX SOIL MESOSTIGMATID (ACARINA) MITES FROM CALCUTTA

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INTRODUCTION

Polyaspis (Berlese, 1881) is a uropodid genus of the family Polyaspidae whose members are commonly encountered in soil. So far 10 species of *Polyaspis* mites are known from the world. Of these, only one species, *viz., Polyaspis (Adyscritaspis) bengalensis* Pramanik and Raychaudhuri, 1978 is known from Indian soil. The present new species, *Polyaspis (Polyaspis) calcuttaensis* is described here as the second species from this subcontinent.

Subgenus *Adyscritaspis* was erected by Pramanik and Raychaudhuri (1978) based on the presence of free genital and metasternal shield and metasternal setae placed on ventral membrane. However, the characters of subgenus *Adyscritaspis* was originally described as the character of subgenus *Polyaspis* Berlese, 1881. Therefore, the subgenus *Adyscritaspis* should be treated as a junior synonym of subgenus *Polyaspis.*

Besides the description of the above species, the present paper deals with the first record of the male of *Polyaspis (Polyaspis) bengalensis* alongwith records of five other species of mesostigmatid mites from Calcutta.

The type materials and other specimens are deposited in the National Zoological Collection of Zoological Survey of India, Calcutta. All measurements in the text are expressed in micrometer (μm).

Polyaspis (Polyaspis) calcuttaensis sp. nov.
(Figs. 1-6)

Female : Body elongated, oval, sides of anterior margin slightly depressed. Dorsum 361.9 long, 230.3 wide, pale brown, distinctly ornamented and irregularly striated. Dorsal shield divided into anterior and posterior shields with a gap in between them (fig. 1); anterior dorsal shield several times larger and wider (282 long, 164.5 wide) than posterior dorsal shield (42.3 long, 91.7 wide), covering most of the dorsum, with 14 pairs of setae; marginal and lateral setae leaf-like, placed on isolated platelets (fig. 2); except J2 and J3 all other dorsal setae peg-like. A pair of peg-like setae present in between two dorsal shields, the tip of the setae extends upto anterior margin

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of posterior dorsal shield; posterior dorsal shield roughly triangular in shape with honeycomb like ornamentation and punctation and bearing no seta.

Tritosternum tripartite, tritosternal base triangular, wider than longer (fig. 3); sternal shield incomplete posteriorly and fused with endopodal shield; st1 and st2 of equal length, placed on sternal shield; st3 on antero-lateral margin of genital shield; pseudosternal setae, st4 and st5 at level of coxae III and IV. Genital shield oval, raised into crescentic hood–like structure anteriorly, metapodal shield rectangular, with two pairs of setae, one pair peg-like, other leaf-like; 5 pairs of setae present on soft cuticle, 1 pair situated at level of metapodal and other 4 pairs placed around anal shield. Ventri-anal shield broad, granulated and partly striated; with two pairs of setae excluding a pair of par- and a post-anal setae; anal aperture large. Stigma lies between coxae III and IV; peritrematal shield not distinct.

Gnathosoma with 4 pairs of setae. Movable digit of chelicera bidentate; fixed digit with a row of irregular teeth arranged along its cutting edge (fig. 4). Leg I without ambulacrum; tarsus of leg I as in fig. 5.

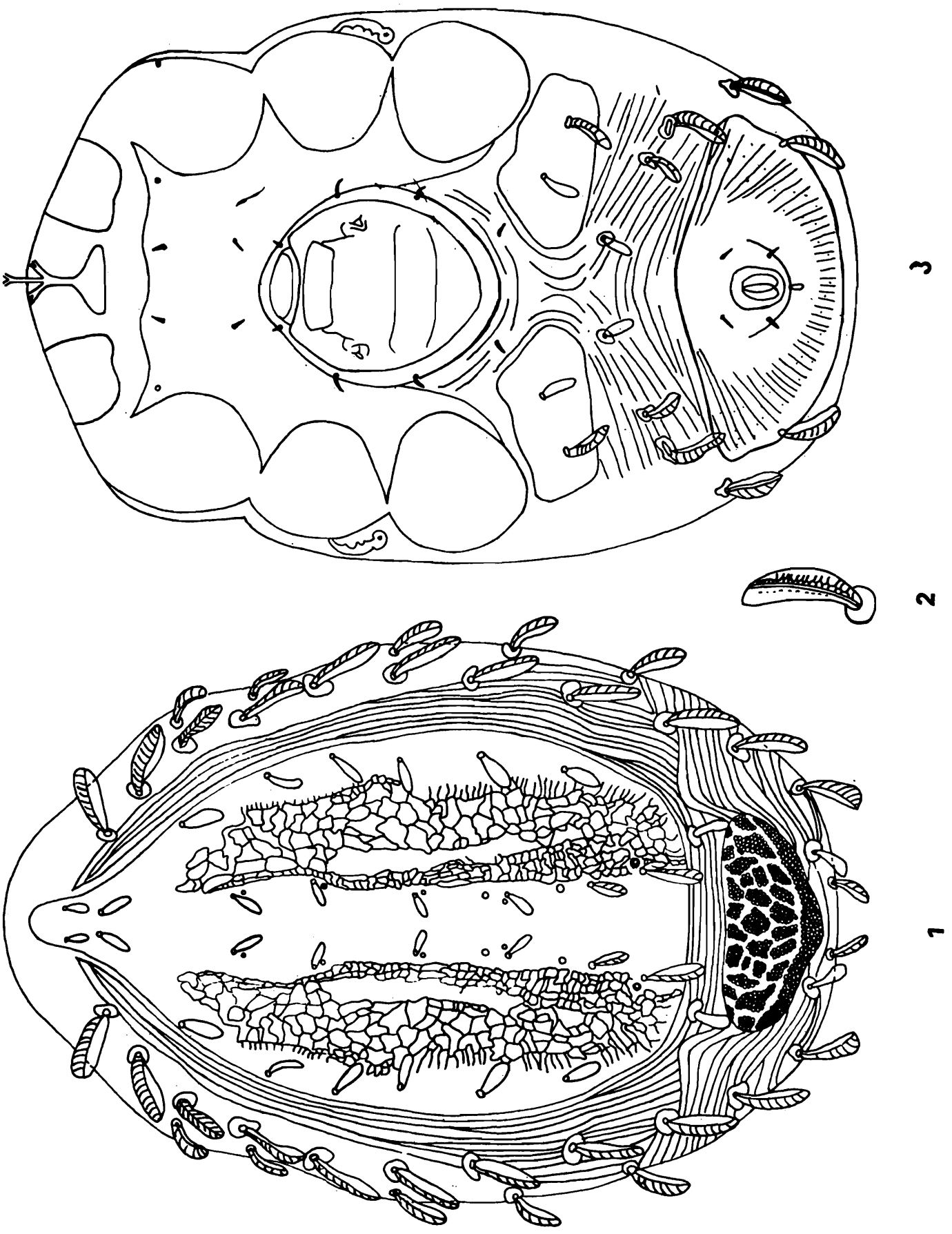
Male : Body elongated, oval as in female; dorsum collectively 491.1 long, 305.5 wide, pale brown, rough, irregularly striated, highly ornamented; anterior and posterior dorsal shield with a gap in between them; anterior dorsal shield 243 long and 223.2 wide with 14 pairs of setae; marginal and lateral setae leaf-shaped, placed on isolated platelets, excepting two pairs other dorsal setae peg-like, a pair of setae present between two dorsal shields extending upto anterior margin of posterior dorsal shield; posterior dorsal shield roughly triangular (915.7 long, 115.1 wide), with punctations and ornamentations.

Tritosternal base broader and half circular with bifid laciniae. Five pairs of sternal setae present. Genital orifice placed on sternal plate between coxae III and IV. Holoventral shield granular in appearance with 3 pairs of leaf-like, 3 pairs of peg-like and two pairs of simple setae excluding a pair of par- and post-anal setae. Anus present on a semilunar depression; no distinct peritrematal shield, stigma lies between coxae III and IV (fig. 6).

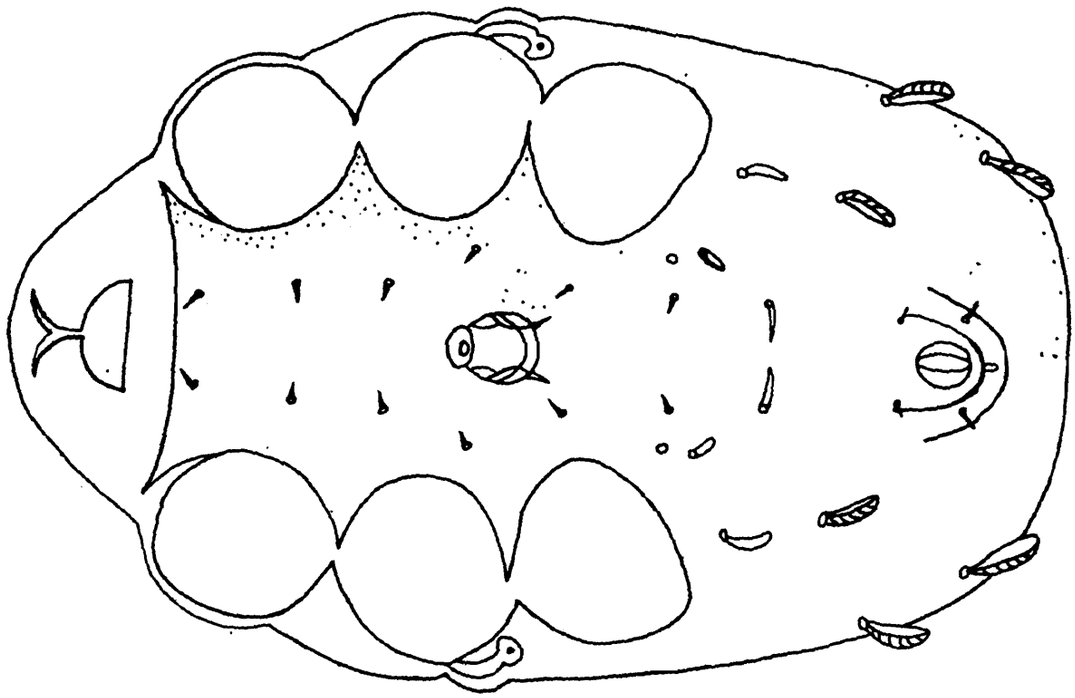
Gnathosoma with usual 4 pairs of hypostomatic setae. Cheliceral and leg structure same as in female.

Material examined : Holotype : ♀, India : West Bengal : Calcutta, Elgin Road; 25.iii.1992; ex. soil under Wax flower (*Ervatamia divaricata*) plant ; coll. Sharmistha Sarkar. *Paratypes :* 5 ♀♀, 2 ♂♂ including allotype, data same as for holotype.

Remarks : Polyaspis (Polyaspis) calcuttaensis sp. nov. closely resembles *Polyaspis (Polyaspis) bengalensis* Pramanik and Raychaudhuri, 1978 in shape and position of metapodal shield, position of setae st1, st3, st4 and number of ventral setae in female. However, the present species can easily be differentiated from *bengalensis* in regards to shape of tritosternum in male, presence of gap in between two dorsal shields with a pair of setae, shape of genital and ventri-anal shields in female, number of dentition in movable digit of chelicera and position of st2 in female.



Figs. 1-3. : *Polyaspis (Polyaspis) calcuttaensis* sp. nov., female
1. Dorsum; 2. Marginal setae; 3. Venter.



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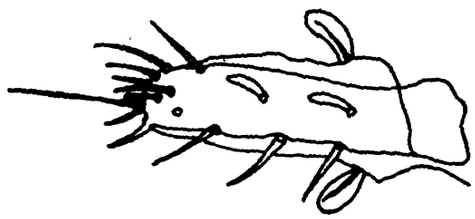

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Figs. 4-5. : *Polyaspis (Polyaspis) calcuttaensis* sp. nov., female
4. Chelicera; 5. Leg I.
Fig. 6. : *Polyaspis (Polyaspis) calcuttaensis* sp. nov., male
6. Venter.

RECORDS OF SIX SPECIES AS NEW TO CALCUTTA

Polyaspis (Polyaspis) bengalensis Pramanik and Raychaudhuri (Figs. 7-10)

1978. *Polyaspis (Polyaspis) bengalensis* Pramanik and Raychaudhuri, *Soil Biology and Ecology in India,* UAS Tech. Series No. **22** : 143.

Male : Body elongated, oval. Dorsum 470 long and 315.2 wide, highly ornamented. Dorsal shield divided into anterior and posterior shields; anterior dorsal shield large covering most of dorsum, with 15 pairs of peg-like setae; posterior dorsal shield triangular, without any seta and anterior margin attaining posterior margin of anterior dorsal shield (fig. 7); marginal and lateral setae leaf-like placed on isolated platelets.

Tritosternum with broad triangular basal part and trifid laciniae (fig. 8). Sternal setae 5 pairs. Genital orifice placed on sternal shield, at level in between coxae III and IV. Holoventral shield granular and with 7 pairs of simple and 7 pairs of leaf-like setae excluding a pair of par-and post-anal setae. Anus present on a semilunar depression; no distinct peritrematal shield, stigma lies at posterior level of coxa III.

Gnathosoma with usual 4 pairs of setae. Movable digit of chelicera unidentate (fig. 9). Leg-I without ambulacrum (fig. 10).

Material examined : 3 ♂♂ and 6 ♀♀, India : West Bengal : Calcutta, Bhowanipur; 24.iii.1992; ex. soil under Wood apple (*Aegle marmelos*) tree ; coll. Sabyasachi Sarkar.

Remarks : Polyaspis (Adyscritaspis) bengalensis was described by Pramanik and Raychaudhury, 1978 as new to science on the basis of female specimens collected from 24-Parganas, West Bengal. The nine specimens studied here conform with the original description of *Polyaspis (Adyscritaspis) bengalensis* (Pramanik and Raychaudhury, 1978). Thus the male of the specimen is recorded here for the first time, but subgenus *Adyscritaspis* should be treated as a junior synonym of subgenus *Polyaspis,* so the specimens must be treated as type of *Polyaspis (Polyaspis) bengalensis.*

Hypoaspis vacua (Michael, 1891)

1891. *Laelaps vacuus* (Michael), *Proc. zool. Soc. Lond.*, 651.

1966. *Hypoaspis vacua* (Michael) : Evans and Till, *Bull. Brit. Mus. (nat. Hist.) Zool.,* **14** : 190.

Material examined : 1 ♂, India : West Bengal : Calcutta, Elgin Road; 1.vii.1992; ex. soil under Wax flower *(Ervatamia divaricata)* plant ; coll. Sharmistha Sarkar.

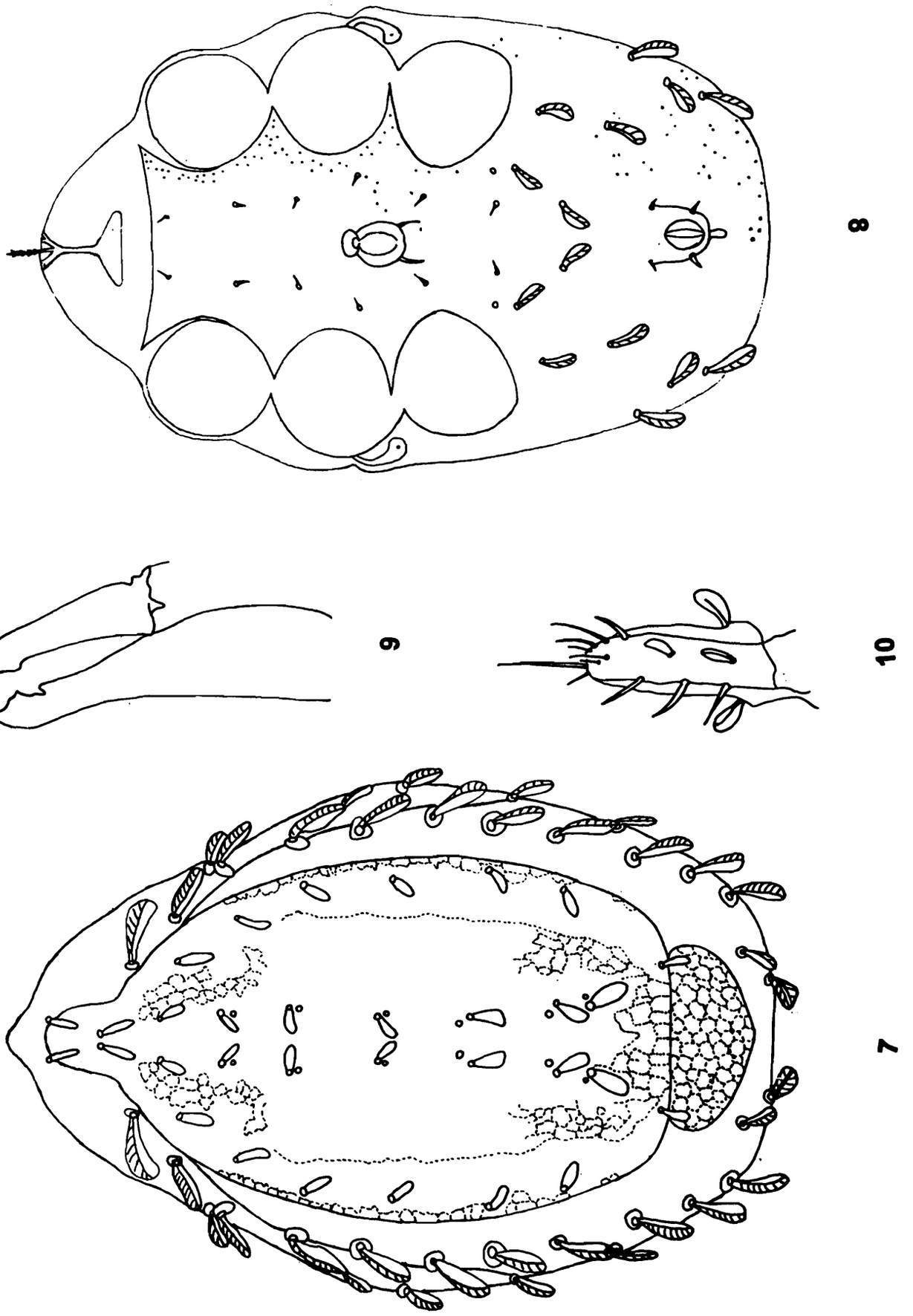
Distribution : India : Uttar Pradesh, West Bengal. Elsewhere : Austria, Britain, Italy.

Asca pseudospicata Bhattacharyya, 1965

1965. *Asca pseudospicata* Bhattacharyya, *Proc. zool. Soc., Calcutta,* **19** : 34.

Material examined : 1 ♂, India : West Bengal : Calcutta, Bhowanipur; 24.iii.1992; ex. soil under Wood apple tree *(Aegle marmelos) ;* coll. Sabyasachi Sarkar.

Distribution : India : Uttar Pradesh, West Bengal.



Figs. 7-10. : *Polyaspis (Polyaspis) bengalensis* Pramanik and Raychaudhuri, male
7. Dorsum; 8. Venter; 9. Chelicera; 10. Leg I.

Gymnolaelaps sitalaensis Bhattacharyya, 1966

1966. *Gymnolaelaps sitalaensis* Bhattacharyya, *Zool. Anz.*, **177** (2) : 153.

Material examined : 1 ♂, India : West Bengal : Calcutta, Bhowanipur; 22.iii.1992; ex. soil under Jack fruit tree *(Artocarpus integrifolia);* coll. Sharmistha Sarkar.

Distribution : India : West Bengal.

Epicrosejus abinashi Bhattacharyya, 1966

1966. *Epicrosejus abinashi* Bhattacharyya, *J. Bombay nat. Hist. Soc.*, **62** (3) : 573.

Material examined : 2 ♂♂, India : West Bengal : Calcutta, Elgin Road; 24.iii.1992; ex. soil of grassland coll. Sharmistha Sarkar.

Distribution : India : West Bengal.

Gamasiphis indicus Bhattacharyya, 1978

1978. *Gamasiphis indicus* Bhattacharyya, *Indian J. Acar.*, **2** : 78.

Material examined : 2 ♀♀, India : West Bengal : Calcutta, Bhowanipur; 24.iii.1992; ex. soil under Wood apple tree *(Aegle marmelos) ;* coll. Sabyasachi Sarkar.

Distribution : India : West Bengal.

SUMMARY

A new species, *Polyaspis (Polyaspis) calcuttaensis* sp. nov. is described and illustrated from Calcutta, West Bengal. The male of the species *Polyaspis (Polyaspis) bengalensis* Pramanik and Raychaudhuri, 1978 is recorded for the first time with description and illustration. The subgenus *Adyscritaspis* is treated here as a junior synonym of subgenus *Polyaspis.* Five other known species of mesostigmatid mites *viz., Hypoaspis vacua* (Michael, 1891); *Asca pseudospicata* Bhattacharyya, 1965; *Epicrosejus abinashi* Bhattacharyya, 1966; *Gymnolaelaps sitalaensis* Bhattacharyya, 1966 and *Gamasiphis indicus* Bhattacharyya, 1978 are also reported as first record from Calcutta.

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Rec. zool. Surv. India : **97** (Part-3) : 105-108, 1999

A NEW SOIL UROPODID MITE (ACARINA : MESOSTIGMATA) FROM WEST BENGAL, INDIA

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INTRODUCTION

The mites of the genus *Trichouropoda* Berlese, 1916 belonging to family Trematuridae are found to occur in different habitats throughout the world. A total number of 159 species of *Trichouropoda* are known from the world (Hirschmann, 1983).

Very little information is known about trichouropods from India due to very little exploration of mite fauna in different States of India. So far only two species *viz.*, *Trichouropoda* (?) *parasitica* Choudhuri and Mukherjee, 1964 from domestic fowls and *Trichouropoda similijavaensis* Hiramatsu and Hirschmann, 1979 from soil are known from India. While studying the soil mites of Purulia, West Bengal a number of male specimens are encountered which are identified as a new species *Trichouropoda asoki*.

Type materials are deposited in the National Zoological Collection, Zoological Survey of India, Calcutta.

Trichouropoda asoki sp. nov.
(Figs. 1-6)

Description : Female : Unknown.

Male : Body oval with wavy margin. Dorsum 643.8 µm long, 503.2 µm wide, dark brown and highly ornamented; ornamentation of anterior region differs from ornamentation of posterior region (fig. 1); ornamentation of marginal region as in fig. 2; 19 pairs of dorsal setae simple, long; marginal setae exceptionally long, pilose except a pair of apical setae.

Tritosternum with single pilose lacina and tritosternal base bulb like with a median streak (fig. 3). Holoventral shield highly ornamented and its chaetotactic pattern shown in fig. 4. Sternal shield incomplete, 5 pairs of sternal setae present (fig. 4). Genital orifice present on sternal plate between coxae III and IV; 7 pairs of long ventral setae present on soft cuticle posterior to the region of coxa IV. Ventrianal shield broad, ornamented with 6 pairs of setae excluding a pair of par- and post-anal setae; large anal aperture situated on a flask-like depression. Stigma lies between coxae II and III; peritreme anteriorly curved and extending to coxa II; peritrematal shield

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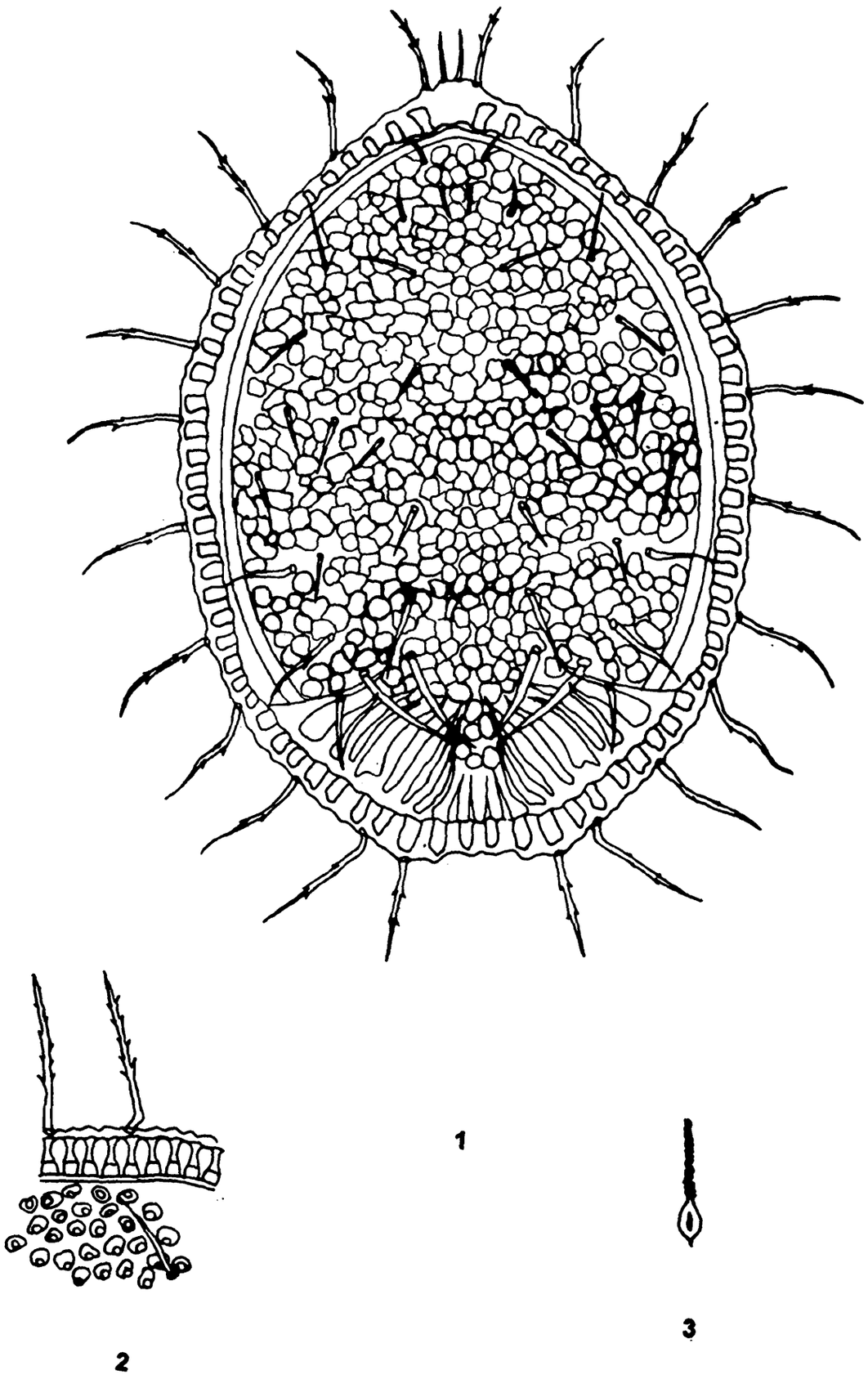
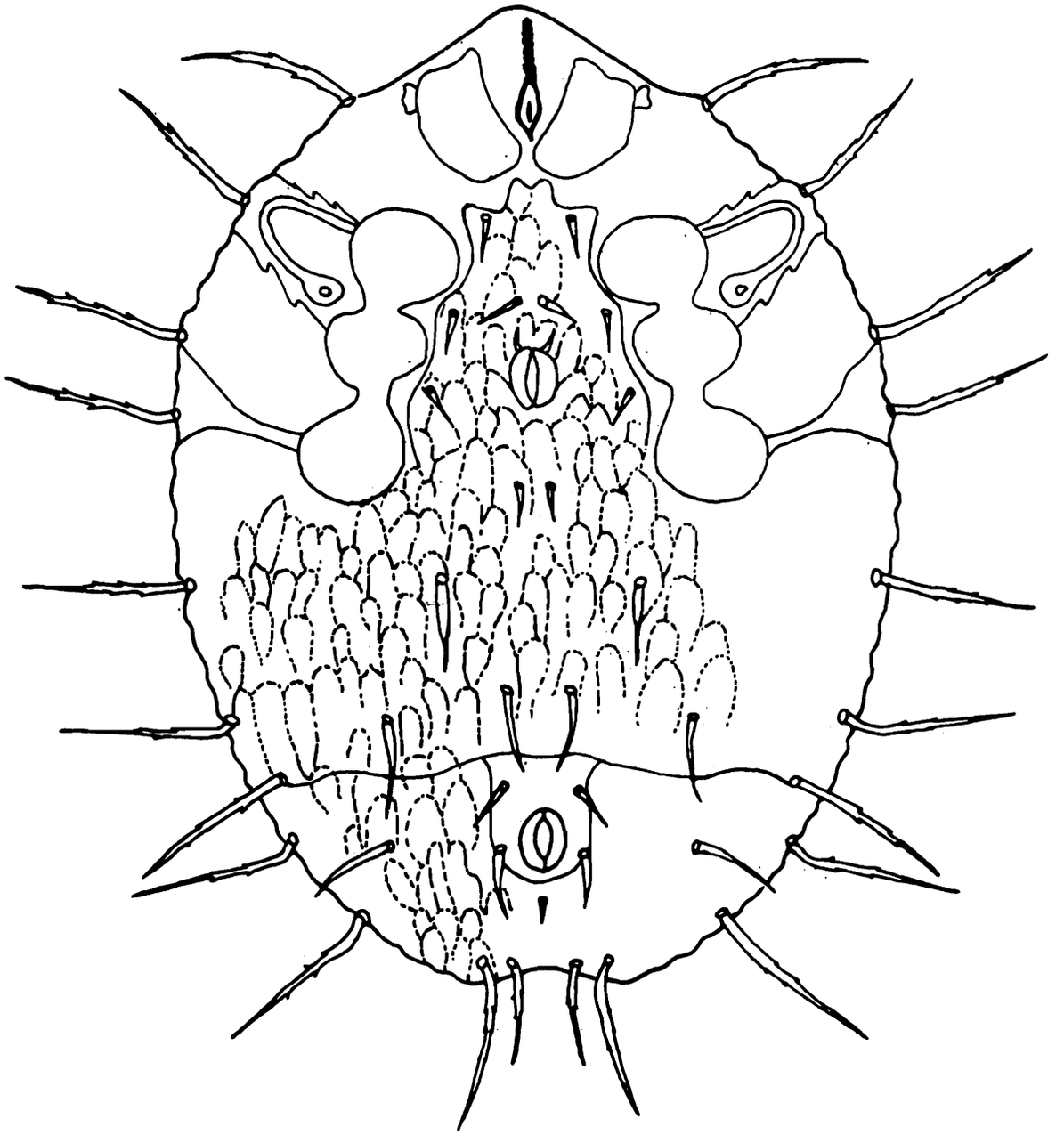


Figs. 1-3. : *Trichouropoda asoki* sp. nov., male
1. Dorsum; 2. Ornamentation of marginal region; 3. Tritosternum; 4. Venter; 5. Chelicera.



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Figs. 4-5. : *Trichouropoda asoki* sp. nov., male
4. Venter; 5. Chelicera.

distinct.

Gnathosoma with 4 pairs of hypostomatic setae. Movable digit of chelicera multidentate (fig. 5). Leg I with ambulacra and claws. Coxa I with ridges on antero-lateral margin. Femur I-IV with lamina.

Material examined : Holotype : ♂, India, West Bengal, Purulia district, Bansgarh, Balarampur; ex. soil under litter; 11.ix.1987; coll. A. K. Sanyal. *Paratypes :* 6 ♂♂, data same as for holotype.

Remarks : The new species *Trichouropoda asoki* shows close resemblances with *Trichouropoda atlantica* Sellnick, 1963, in the shape and ornamentation of dorsal and ventral shield, long marginal setae compared to body size and dentition of chelicera. However, the present species can easily be differentiated from *atlantica* by the difference in the number and shape of dorsal setae, shape of marginal setae and tritosternum. Position and relative length of ventral setae also differs.

This species is named after Mr. Asok Basu, late father of the first author.

SUMMARY

The paper embodies a description with illustrations of a new species of mite *Trichouropoda asoki* sp. nov. under the family Trematuridae from Purulia, West Bengal. The species shows resemblances to *Trichouropoda atlantica* Sellnick, 1963 but differs in the number and shape of dorsal setae, shape of marginal setae and position and size of ventral setae.

ACKNOWLEDGEMENTS

The authors express their gratefulness to the Director, Zoological Survey of India for providing laboratory facilities. Thanks are also due to Sri Asit K. Bhattacharyya, SRF, ZSI for his help throughout the period of this study.

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HETEROPNEUSTES LONGIPECTORALIS (SILURIFORMES : HETEROPNEUSTIDAE) A NEW SPECIES FROM THE ANAMALAI HILLS, IN THE WESTERN GHATS

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INTRODUCTION

Heteropneustidae is a monotypic family known by the genus *Heteropneustes* which is restricted in its distribution to the Indian Sub Continent and Southeast Asia. Till recently two species, *H. fossilis* (Bloch) and *H. microps* (Gunther), were recognised under this genus of which the latter is exclusive to Sri Lanka. On the basis of recent studies Pethiyagoda and Bahir (1998) established that the confluence of caudal and anal fins observed in *microps* and used in distinguishing it from its congener *fossilis* has only resulted from the anomalous fin regeneration of damaged or malformed hypurals and that only one species is involved. Hence he considered *microps* a junior synonym of *fossilis*. Two other species, *H. singio* (Hamilton) and *H. macrocephalus* (Gunther) have already been recognized as synonyms of *fossilis* by Day (1875-78), Hora (1936), Misra (1976), Jayaram (1981) and Talwar and Jhingran (1991).

During a faunistic survey of Indira Gandhi Wildlife Sanctuary in the Anamalai Hills in the Western Ghats in 1996, four specimens of an interesting new species of *Heteropneustes* were collected. The species is described here under the name *H. longipectoralis*. The type specimens are deposited in the collections of SRS, ZSI, Chennai.

Heteropneustes longipectoralis sp. nov.
(Plate I, Figs. 1-5)

Holotype : F(Fish) 4935, ZSI/SRS, 150 mm SL, Thirumurthi Dam, Anamalai Hills, Western Ghats, Tamil Nadu, India, Coll. M. B. Raghunathan, 11th Feb., 1996.

Paratypes : 3 exs. F. 5044, ZSI/SRS, 146-154 mm SL, data same as for holotype.

Diagnosis : A siluroid with slender, elongated body having short spineless rayed dorsal, a long anal non confluent with caudal, long pectoral with a strong spine, almost reaching pelvic base, pelvic with 6 rays, long and pointed caudal, four pairs of barbels, wide gill openings with gill membranes free from isthmus and a short air-bladder.

Description : B. 7; D. 7; P. 1/8-9; V. 6; A. 66-73; C. 18 (about 14 branched), Lateral line present.

Body elongate, subcylinderical to pelvic base, compressed behind, its greatest depth is 7.6 (6.97-8.19) in SL, 8.64 (7.78-9.39) in TL, depth at middle of anal 8.41 (7.89-9.25). Head depressed, covered with osseous plates dorsally and laterally, occipital groove a small oval depression in the posterior interorbital; head width almost equalling its length, 1.22 (1.19-1.27) in

head length; snout 3.25 (3.01-3.55) in HL; eyes with free orbital margins, lateral, 5.97 (4.83-6.97) in HL, 2.93 (2.49-3.55) in interorbital width; nostrils wide apart, anterior tubular, posterior a small slit, restricted to behind the nasal barbel; mouth small, terminal, transverse; teeth in wide bands on jaws with 6-7 rows of small villiform teeth, the vomerine in two spindle-shaped patches on either side converging anteriorly and widely diverging posteriorly. Barbels four pairs, nasal barbels extending to pectoral base or beyond, maxillary barbels extend to middle of pectoral as also outer mandibular barbels, inner mandibular barbels extend to a little beyond pectoral base. Gill openings wide, gill membranes free from isthmus, exposed bony area on the ventral side of head from the point of overlap of the gill membranes to the lower end is 3.38 (3.14-3.88) in head width. Dorsal short, without spine, 2.17 (1.78-2.84) in HL, situated in the anterior third of body, predorsal distance 2.20 (2.14-2.24) in post dorsal distance; pectorals long and pointed, 1.23 (1.12-1.35) in head length, pectoral with a strong spine, very faintly serrated anteriorly and internally, pectoral fin length 1.27 (1.11-1.50) in the length between pectoral base to pelvic base; pelvics rounded 1.79 (1.70-1.99) in head length, reaching beyond anus, origin slightly behind or opposite dorsal origin, much nearer to anal origin than to pectoral base; anal very long, not confluent with caudal origin, two eye diameters behind dorsal origin, base 1.62 (1.59-1.67) in standard length; caudal long, pointed, 1.17 (1.14-1.23)in head length. Air bladder reduced in length (Table 2) averaging 39.17% in SL vs. 47.70% (pooled data) in *H. fossilis*, its width is however greater in the former, being 20.79% in body depth vs. 18.56% in the latter, the presence or absence of air probably influencing its size. From table 2 it is also evident that the air bladder is mostly of unequal length on either side of the fish. The number of spiral thickenings on the bladder ranges from 17-21 in the new species vs. 24-28 in *H. fossilis*.

Skin smooth, uniformly dark brown on preservation with no yellowish lateral bands.

Distribution : India : Western Ghats : Anamalai Hills.

Etymology : The species is named *longipectoralis* owing to the long pectorals characteristic of the species.

Comparative material : 4 exs., 98-150 mm SL, F. 5258, Attidiya, Sri Lanka, Coll. Rohan Pethiyagoda, 21.iv.1993; 5 exs., 75-83 mm SL, F. 4274, Mekkarai, Tambraparni drainage, Tirunelveli Dist., Western Ghats, Coll. M. S. Ravichandran, 19.iii.95; 1 ex., 80 mm SL, F. 4458, Kodaimelazakian anaicut, Tambraparani drainage, Tirunelveli District, Western Ghats, Coll. M. B. Raghunathan, 9.iv.95; 7 exs., 100-140 mm SL, F. 4619, Kulsi River, Assam, Coll. R. S. Lal Mohan, 17.xi.95 and 4 exs., 145-205, F. 4408, Pond at Thennur, Pondicherry, Coll. M. Mary Bai, 30.xii.94.

REMARKS

Several biometric characters of the new species were measured and statistically analysed. These have been compared with those of samples of *fossilis* collected from different ecological zones like its type locality in Southeastern India, Brahmaputra drainage in the north-east, from Sri Lanka as also an interesting collection from Tambraparni drainage in Southern Western Ghats. The results are presented in Table 1. with the mean followed by the range in parenthesis.

The new species differs from the widely distributed *fossilis* in having relatively much slender body, larger eyes, longer pectorals, long and pointed caudal, a short air bladder and such other characters as evident from Table 1.

Table 1. Comparison of Biometric Characters of *H. longipectoralis* sp. nov. with *H. fossilis* from Various Localities

Characters	Anamalai Hills	Tirunelveli	Pondicherry	Kulsi River	Sri Lanka
Total length (TL mm)	166-172(N=4)	83-92 (N=6)	(N=4)	114-151 (N=7)	110-168 (N=4)
Standard length (SL mm)	146-154	75-83	145-205	110-140	98-150
Dorsal (D)	7	7	7	7	7
Pectoral (P)	1/8-9	1/7-8	1/8	1/7-8	1/8
Ventral (V)	6	6-7	6	6	6
Anal (A)	66-73	51-68	58-62	68-74	62-71
Caudal (C)	18	20-22	23	21	20
TL/HL	6.46 (6.16-6.84)	6.07 (5.70-6.27)	—	6.52 (6.26-6.92)	6.23 (5.64-6.71)
SL/HL	5.68 (5.52-5.96)	5.45 (5.13-5.61)	5.74 (5.41-6.35)	5.81 (5.58-6.15)	5.54 (5.02-6.05)
SL/BD	7.60 (6.97-8.19)	7.04 (6.50-7.73)	5.64 (5.49-5.77)	6.12 (5.61-6.99)	6.22 (5.85-6.71)
HL/HW	1.22 (1.19-1.27)	1.22 (1.17-1.28)	1.14 (1.05-1.16)	1.22 (1.18-1.27)	1.26 (1.21-1.30)
HL/Snout	3.25 (3.01-3.55)	3.38 (2.85-4.10)	3.25 (2.93-3.62)	3.30 (3.05-3.74)	3.30 (3.05-3.49)
HL/Eye	5.97 (4.83-6.97)	6.81 (6.43-7.30)	6.73 (6.59-6.82)	7.68 (7.20-8.15)	7.92 (7.55-8.57)
IOW/Eye	2.93 (2.49-3.55)	3.69 (3.54-3.92)	3.43 (3.19-3.71)	3.95 (3.73-4.33)	3.73 (3.58-3.90)
HL/Ht. of D	2.17 (1.78-2.84)	1.93 (1.64-2.26)	2.03 (1.92-2.15)	1.73 (1.58-1.84)	2.07 (1.88-2.29)
HL/Lt. of P	1.23 (1.12-1.35)	1.49 (1.38-1.65)	1.38 (1.23-1.60)	1.44 (1.35-1.54)	1.64 (1.35-1.91)
HL/Lt. of P spine	1.38 (1.34-1.45)	1.70 (1.54-1.99)	—	1.76 (1.58-1.94)	1.88 (1.65-2.05)
Dist. betw. P to V/Lt. of P	1.27 (1.11-1.50)	1.67 (1.58-1.77)	1.80 (1.58-2.10)	1.66 (1.51-1.88)	1.84 (1.49-1.97)
Predorsal dist/Postdorsal	2.20 (2.14-2.24)	1.96 (1.91-2.03)	2.17 (1.99-2.30)	2.14 (2.02-2.32)	2.14 (2.04-2.34)
HL/Lt. of V	1.79 (1.70-1.99)	2.03 (1.89-2.26)	1.97 (1.92-2.02)	1.88 (1.59-2.15)	2.06 (1.77-2.09)
Dist. betw. V to A/Lt. of V	0.87 (0.76-0.94)	0.89 (0.77-1.08)	0.77 (0.64-0.91)	0.87 (0.66-1.06)	0.67 (0.61-0.78)

Characters	Anamalai Hills	Tirunelveli	Pondicherry	Kulsi River	Sri Lanka
SL/Lt. of BC	4.06 (3.71-4.36)	3.79 (3.56-3.91)	3.92 (3.32-3.85)	4.01 (3.76-4.32)	4.07 (3.88-4.44)
HW/HD at middle of E	2.29 (2.18-2.40)	2.14 (1.94-2.30)	2.59 (2.39-2.80)	2.18 (1.89-2.40)	2.40 (2.27-2.60)
HW/Lt. of Isthmus	3.38 (3.14-3.88)	3.39 (2.67-4.63)	3.41 (3.17-3.65)	2.70 (2.22-3.25)	2.44 (2.12-2.66)
HW/HD at occiput	1.53 (1.48-1.59)	1.47 (1.42-1.52)	1.50 (1.40-1.62)	1.65 (1.59-1.72)	1.62 (1.57-1.67)
BD at V base/BW at V base	1.43 (1.37-1.48)	1.45 (1.39-1.66)	1.38 (1.08-1.62)	1.35 (1.24-1.41)	1.53 (1.44-1.67)
BD at C base/Greatest BD	2.47 (2.22-2.80)	2.60 (2.40-2.84)	3.19 (2.82-3.53)	2.78 (2.40-3.01)	2.78 (2.61-3.04)
HL/Lt. of C	1.17 (1.14-1.23)	1.57 (1.39-1.83)	—	1.39 (1.24-1.64)	1.47 (1.37-1.69)
Greatest BD/Lt. of A	1.28 (1.21-1.37)	1.52 (1.38-1.76)	2.25 (2.18-2.32)	1.80 (1.64-2.10)	1.76 (1.47-1.91)
Nasal barbel/HL	1.03 (0.86-1.14)	0.79 (0.66-0.83)	1.10 (1.04-1.55)	1.42 (1.27-1.54)	1.30 (1.26-1.33)
Max. barbel/HL	1.38 (1.16-1.50)	1.20 (1.11-1.36)	1.56 (1.41-1.66)	2.09 (1.86-2.35)	1.77 (1.60-1.87)
Outer Mand. Barbel/HL	1.17 (1.08-1.25)	1.12 (0.92-1.42)	1.41 (1.14-1.66)	1.68 (1.54-1.88)	1.63 (1.57-1.74)
Inner Mand. barbel/HL	0.88 (0.76-1.07)	0.94 (0.78-0.96)	1.40 (1.21-1.69)	1.57 (1.38-1.74)	1.46 (1.39-1.60)
SL/Base of A	1.62 (1.57-1.67)	1.69 (1.66-1.74)	1.76 (1.64-1.93)	1.66 (1.63-1.70)	1.58 (1.51-1.64)
SL/Nasal barbel	5.56 (5.18-6.44)	6.69 (4.94-8.06)	5.03 (4.69-5.25)	4.08 (3.75-4.39)	4.27 (3.81-4.79)
SL/Max. barbel	4.15 (3.67-4.78)	4.55 (3.94-5.00)	3.57 (3.26-4.06)	2.80 (2.37-3.13)	3.13 (2.90-3.30)
SL/Outer Mand. barbel	4.89 (4.46-5.52)	4.97 (4.01-5.59)	4.12 (3.76-4.80)	3.40 (2.72-3.71)	3.38 (3.18-3.66)
SL/Inner Mand. barbel	6.53 (5.13-7.84)	5.81 (4.85-6.56)	4.14 (3.75-4.71)	3.70 (3.20-4.06)	3.78 (3.53-4.27)
SL/BD at middle of A	8.41 (7.89-9.25)	7.98 (7.43-9.15)	5.95 (5.47-6.26)	6.27 (5.61-7.19)	6.94 (6.48-7.39)
BD/HD at middle of Eye	2.11 (1.94-2.28)	2.02 (1.90-2.26)	3.01 (2.78-3.28)	2.54 (2.24-2.88)	2.69 (2.38-2.87)
TL/BD	8.64 (7.78-9.39)	7.85 (7.33-8.55)	—	6.88 (6.42-7.97)	7.00 (6.59-7.56)

Abbreviations used : **BC—Body Cavity; betw.—between; BD—Body depth; BW—Body width; Dist.—Distance; E–Eye; HD—Head depth; HL—Head length; Ht.—Height; HW—Head width; IOW—Interorbital width; Lt.—Length; Mand.—Mandibular; Max.—Maxillary.**

Table 2. Measurements of the air-bladder of *Heteropneustes longipectoralis* sp. nov. and those of *H. fossilis* from various localities

Characters (in mm)	Anamalai Hills n = 2				Tirunelveli n = 3						Pondicherry n = 2				Kulsi River n = 2				Sri Lanka n = 2			
Total length	172		166		92		89		89		188		—		157		122		168		110	
Standard length	154		146		83		79		80		170		176		140		109		150		98	
Body depth	22.1		20.1		11.6		10.8		11.6		30.4		30.8		22.9		18.0		24.9		15.5	
Post dorsal distance	105		101		53.2		52.6		51.9		120		125		95.1		73.6		108		67	
Length of anal fin	98		90		49		47.6		46.2		88		107		85.9		66.2		99		63	
	R*	L*	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L
Length of air-bladder	54.7	61.8	56.3	62	32.4	33	38.5	36.1	38	37	88	85.9	88.2	87.5	66	70.4	54.3	52.6	73	75	47.6	45.9
Width of air-bladder	4.5	5.3	3.4	4.4	2.8	2.7	2.4	2.1	1.7	1.7	6.3	5.9	5.4	5.0	3.3	3.9	3.1	3.1	4.6	5.0	3.0	2.8
Extent of air-bladder behind dorsal origin	28.0	38.3	30.1	36.8	17.8	21.0	23.8	22.6	25.2	23.9	57.9	55.3	61.1	56.3	41.6	47.7	36.8	36.0	50.9	51.5	30.7	30.4
Extent of air-bladder behind anal origin	15.9	25.7	20.9	26.2	13.8	13.8	19.0	17.5	19.6	18.9	41.0	38.6	44.0	42.0	31.7	38.5	29.2	30.0	42.2	43.4	24.0	22.7

* R—Right side

L—Left side

Typical *H. fossilis* is spindle shaped where as in the new species the body is uniformly slender. From the Tables it is apparent that the specimens from Tirunelveli Dt. exhibit many characters intermediate between those of the new species and typical *fossilis* with an inclination for more affinities to the latter especially because of the nature of the eyes and relative lengths of the pectoral and shape of caudal fins. The new species is also distinctive in possessing long and pointed pectoral and caudal fins, larger eyes and such other characters as evident from the tables (Plate II, Figs. 1-5). The Tirunelveli specimens are smaller in size, being juveniles. Assigning their correct taxonomic status should await further detailed studies based on adult specimens.

Key to the species of Heteropneustes

1. Pectorals long and pointed, length $^{3}/_{4}$ths the distance between pectoral to pelvic fin origin; caudal pointed; body slender; eyes large about 6 or less in HL; air bladder short, less than $^{2}/_{5}$ths in SL and extending to about $^{1}/_{4}$th over anal fin ..... *Heteropneustes longipectoralis* sp. nov.

2 Pectorals short and rounded, $^{1}/_{2}$ to $^{1}/_{3}$rd the distance between pectoral to pelvic fin origin; caudal rounded; body slender to deep; eyes small more than 6 times in HL; air bladder relatively longer, about $^{1}/_{2}$ in SL extending to about $^{1}/_{3}$rd to $^{1}/_{2}$ length of anal fin ..... *Heteropneustes fossilis* (Bloch)

SUMMARY

A new species, *Heteropneustes longipectoralis* from the Anamalai Hills in the Western Ghats is described. This is the second species of the genus so far known. A key to both the species is also given.

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PLATE I

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

1. Lateral view of *H. longipectoralis* sp. nov., Holotype, F. 4935, 150.0 mm SL; 2. Dorsal view of same; 3. Ventral view of same; 4. Close up of ventral view of same, showing long pectorals; 5. Close up of head of same showing large eyes.

PLATE II

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

1. Lateral view of *H. longipectoralis* sp. nov., Holotype, F. 4935, 150 mm SL; 2. Lateral view of *H. fossilis* from Brahmaputra, Assam, F. 4619, 140 mm SL; 3. Lateral view of *H. fossilis* from Kodaimelazakian Anaicut, Tirunelveli Dt., F. 4458, 80 mm SL; 4. Lateral view of *H. fossilis* from Thenur, Pondicherry, F. 4408, 165 mm SL; 5. Lateral view of *H. fossilis* from Attidiya, Sri Lanka, F. 5258, 150 mm SL; 6. Air bladder in *H. longipectoralis* sp. nov., Paratype, F. 5044, 154 mm SL; 7. Air bladder in *H. fossilis* from Brahmaputra, F. 4619, 140 mm SL.

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PRELIMINARY OBSERVATIONS ON THE ROLE OF THREE SOIL MACROINVERTIBRATES IN THE BREAK DOWN OF THE LEAF LITTER IN A GARDEN NEAR CALCUTTA

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INTRODUCTION

Soil dwelling macroinvertebrates include earthworms, land snails, Crustacea, millipeds, insects of various orders and many other invertebrates. These invertebrates help in the break down of littered organic matters either in the form of plant materials or animal matters. Directly and indirectly these animals help in the soil formation. Soil formatin is a dynamic process wherein both micro and macroinvertebrates take part. Moreover, it includes weathering of parent materials, decomposition and incorporation of organic matter as well as the accretion of new materials. In these stages of soil formation soil dwelling invertebrates also play great role. The role played by earthworms is well established since the days of Darwin; in case of other invertebrates researches are going on.

In the present paper roles of the snail, *Opeas gracile* (Hutton) (Pulmonata : Subulinidae), millipede *Orthomorpha coarctata coarctata* Saussure (Diplopoda : Strongylosomidae), and the earthworm, *Perionyx excavatus* Perrier (Haplotaxida : Megascolecidae) in the process of disappearance of leaf litter in a garden at Dum Dum Park on the eastern fringe of Calcutta opposite Bidhan Nagar (Salt Lake city). have been reported.

MATERIALS AND METHODS

Observations were made both in field and in the laboratory. For field observations a small garden, at Dum Dum Parkwas selected. The garden was adjacent to the residence of the second author (TRM). It was a small patch of land used for raising vegetables and ornamental plants. The garden contained following species of plants; *Clitorea ternatea* L., *Limonia crenulata* Roxb., *Hiptage benghalensis* Kurtz., *Nerium indicum* Mill., *Ixora coccinea* L., *Dolichos lablab* L., *Aegle marmelos* Corr., *Michalia champaca* L., *Bougainvillia* sp., *Capsicum* sp. *Citrus* sp., *Vinca rosea* L., *Ipomoea pes-caprae* Sw., *Hibiscus rosa-sinensis* L., *Murraya paniculata* (L) Jack, *Punica granatum* L. *Gardenis jasminoides* Ellis, *Ervatamia coronaria* Stapf., *Jasminum humile* L., *Carissa carandus* L., *Hibiscus mutabilis* L., *Tecoma capensis* Lindl.

Preferences of *Opeas gracile, Orthomorpha coarctata* and *Perionyx excavatus* of different ages, for leaves and parts of leaves of different species of the aforesaid plants were directly observed in the experimental field from early morning to midmorning, every day by TRM. Freshly fallen leaves as well as those under different stages of decay were kept in nylon net bags (Ladies'

hair net) and left on the soil surface tying to tree trunk with a long thread to observe the activities and succession of the macroinvertebrates on the leaves.

In the laboratory, experimental animals were kept either alone or with others, in wide mouthed glass jars half-filled with garden soil and moistened with rain and pond water. Fallen leaves were collected, dried in the air, weighed (in some cases) and moistened with pond water and offered to the animals. Activities of different animals in the experimental conditions on different species of plants, either occurring in the garden or collected from elsewhere, were recorded from 10.30 hrs to 19.30 hrs. every day. Numerical data were collected to assess the approximate quantity of biomass added.

OBSERVATIONS

A. *In the experimental field :* In the field all species of animals, under consideration, were found to feed normally freshly fallen, etiolated or slightly decomposed leaves. Snails of different age groups were found to eat plant materials of their choice. Among millipedes immature ones played key role while in cases of earthworm there was no distinction of activities betwen old and young ones. They eat all available leaves which appeared to be soft and without choice. Snails and millipedes were found to prefer freshly fallen but etiolated leaves of *Clitorea ternatea, Limonia crenulata, Nerium indicum, Hiptage benghalensis, Ixora cocinea, Dolichos lablab, Capsicum* sp., and *Citrus* sp. Semi-decomposed leaves of *Hibiscus rosa-sinensis, Ipomoea pes-caprae* and *Vinca rosea* were accepted by snails and millipedes. Freshly fallen green leaves of *Aegle marmelos* were often accepted by the animals.

The definite preferences in consumption of different parts of leaves by snails and millipedes were also recorded. It was found that animals prefer only the soft parts of lamina of leaves of *Clitorea ternatea, Limonia crenulata, Dolichos lab lab* and *Citrus* sp., were eaten and the veins were left. In cases of *Hibiscus benghalensis, Nerium indicum, Ixora coccinea, Aegle marmelos* whole leaf was consumed leaving only the midrib. All these macro-invertebrates avidly consumed the decomposed leaves of *Hibiscus rosa-sinensis, Vinca rosea* and *Ipomea pes-caprae.*

B. *In the laboratory :* In the laboratory condition millipedes were not showing much interest in feeding as seriously it was doing in the field environment. Earthworms and snails showed activities identical to the natural environment. Following table (Table-1) shows the food preferences of the snail in the laboratory.

Table 1. Food preferences of *Opeas gracils* (Hutton)

Name of plants	Edible			Non-edible
	Fallen	Plucked	Stale or decomposed	
1. *Clitoria ternatea* L.	+	— —	+	—
2. *Limonia crenulata* Roxb.	+	— —	+	—
3. *Hiptage benghalensis* Kurz.	+	— —	+	—

Name of plants	Edible			Non-edible
	Fallen	Plucked	Stale or decomposed	
4. *Nerium indicum* Mill.	+ (Softening preferred)	— —	+	—
5. *Ixora coccienea* L.	+ (-do-)	— —	+	—
6. *Dolichos lablab* L.	+	— —	+	—
7. *Cassia sophera* L.	+	— —	+	—
8. *Aegle marmelos* Corr.	(Not observed)	+	+	—
9. *Michalia champaca* L.	+ (Only fleshy part of the petiole)	—	— (Lamina)	—
10. *Bougainvillaea* sp.	+	(Not observed)	+	—
11. *Capsicum* sp.	+	—	+	—
12. *Citrus* sp.	+	—	+	—
13. *Vinca rosea* L.	—	—	+	—
14. *Ipomoea pes-caprae* Sw.	—	—	+	—
15. *Hibiscus rosa-sinensis* L.	—	—	+	—
16. *Croton sparsiflorus* Morung	—	—	+	—
17. *Mangifera indica* L.	—	—	+	—
18. *Calotropis gigantea*(L) R. Br.	—	—	+	—
19. *Bauhima* sp.	—	—	+	—
20. *Aralia* sp.	—	—	+	—
21. *Murraya paniculata* (L) Jack	—	—	—	+
22. *Eranthemum platiferum* Nees	—	—	—	+
23. *Ficus benjamina* L.	—	—	—	+
24. *Punica granatum* L.	—	—	—	+
25. *Gardenia jasminoides* Ellis	—	—	—	+
26. *Jasminum humile* L.	—	—	—	+
27. *Carissa carandus* L.	—	—	—	+
28. *Hibiscus inutabilis* L.	(Not observed)	—	(Not observed)	?
29. *Tecoma capensis* Lindl.	(Not observed)	—	(Not observed)	?
30. *Ervatamia coronaria* Stapf.	—	—	(Not observed)	?

+ : i) Consumed in cases of edible plants; ii) Not consumed in cases of nonedibles
— : i) Rejected in case of edible plants; ii) Accepted in case of nonedibles
? : Not clearly known.

Following observations were also recorded in the laboratory during the period from August to November, 1975, in additions to the above mentioned observations.

1. A mixture of dry fallen leaves of *Clitorea ternatea, Lemonia crenulata, Bougainvillia,* and *Nerium indicum* weighing 5 gms 480 mgm were given to two adult earthworms and two adult millipedes. They consumed the whole mass during the period from August 29, 1975 to September 28, 1975.

2. 2 gm 10 mgm of dry fallen leaves of *Dolichos lablab* were given to one adult earthworm. It consumed the whole in 20 days from October 5, 1975, to October 25, 1975.

3. One piece of dry fallen leaf *Dolichos lablab* was offered to two four days starving millipedes. They consumed the whole leaf in one day, from October 10, 1975 to October 11, 1975.

4. 1 gm 134 mgm of dry fallen leaves of *Ixora coccinea* were given to five snails, one earthworm and one millipedes. They took more than one month for consumption, from October 16, 1975 to November 20, 1975.

DISCUSSION

From the above observations it is clear that snails and earthworms of all age groups play significant role in the disappearance of leaf litter. In case of millipedes the immatures play leading role. Pattern of feeding of snails and millipedes are identical.

Mitra and Biswas (1974) already showed that sometimes *Opeas gracile* help in the disappearanc of animal matters. Mitra et. al. (1976) already conjectured the importance of *Opeas gracile* in the improvement of soil quality. Frömming (1960) reported that snails, *Trichia villosa,* help in the enrichment of soil with nutrients. Puh (1941) reported that earthworms help in enriching the organic materials, cation-exchange capacity, available phosphorus, potash, etc. Buckman and Brady (1969) reported that snails, slugs, millipedes, showbugs etc. initiate decomposition process. They believe that millipedes often do much work with the digestion of organic matters and forming casts, they influence the structure of the horizon. This view may be applied in the casesof animals under consideration.

SUMMARY

The paper reports the role of the land snail, *Opeas gracile* (Hutton), milliped, *Orthomorpha coarctata coarctata* Saussure and the earthworm, *Perionyx excavatus* Perrier in the disappearance of leaf litter.

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AQUATIC HEMIPTERA (INSECTA) OF KASARAGOD DISTRICT, KERALA STATE

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INTRODUCTION

The study of Aquatic Hemiptera is important because many aquatic bugs are good bioindicators of water quality (Jansson, 1977). Some of the water bugs are key stone predators, their abundance is essential to the existence of animal communities in an aquatic habitat (Murdoch et at., 1984). Besides, they are valuable for the study of zoogeographic relationships as water bugs are less likely to be transported by agencies of man (Hungerford, 1958).

The available information relating to the aquatic and semi-aquatic Hemiptera of India is based on taxonomic recording of species from different parts of the country. Annandale (1919), Distant (1903, 1906, 1909, 1910a, 1910b), Dover (1928), Horvath (1915) and Pavia (1919a, 1919b) were a few of the earliest workers to contribute to our knowledge of these aquatic and semi-aquatic bugs of the country. Later Chen (1960), Hafiz & Mathai (1938), Hafiz & Ribeiro (1939), Hafiz & Pradhan (1947), Hutchinson (1933), Pradhan (1950a & b) Thirumalai (1983, 1986, 1989, 1992, 1994a & b, 1996, 1997), Thirumalai & Dam (1996), Thirumalai & Sharma (press), Ravishankar & Venkatasen (1988), Venkatasen & Rao (1981), Zettel (1977), Ghosh *et al* (1989) and Bal & Basu (1994) rendered additional information on the Indian aquatic bugs. The revisionary work of Andersen (1975, 1980, 1990, 1993), Andersen & Foster (1992), Andersen & Chen (1993), Chen & Nieser (1993), Den Boer (1965), Hungerford & Matsuda (1958), Polhemus (1994), Polhemus & Andersen (1984), Polhemus & Polhemus (1994, 1995) on a few genera of Gerridae; Brooks (1951), Hungerford (1933), Lansbury (1968) on Notonectidae; Chen (1960), Hutchinson (1940), Wroblewski (1960, 1962) on Corixidae; Lansbury (1972) on the genus *Ranatra* (Fab.) of Nepidae; Andersen (1983, 1989), Lundblad (1936), Polhemus (1990a) on a few genera of Veliidae; Andersen & Polhemus (1980) on Mesoveliidae; Hungerford & Evans (1934), Polhemus & Polhemus (1995) on Hydrometridae; Kormilev (1971) on Ochteridae; Polhemus (1990b) on Helotrephidae of the world are also noteworthy to understand the Indian aquatic bugs.

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A perusal of the above cited literature on the Indian aquatic bugs reveals that 58 species are known from various localities in Kerala (Appendix I). These studies are mostly from the southern part of Kerala and the only information available on the aquatic Hemiptera of Kerala, north of Palghat gap is from Silent Valley (Thirumalai, 1986).

Little is known about the fauna of Kasaragod, the northern most district of Kerala. The forest areas of the district being in a highly fragmented state, the faunal information collected from this area may serve as base line data for comparison with other biologically rich habitats.

The present study is based on the water bugs collected from various aquatic habitats of Kasaragod district. Under each species, the citation for the original description and other accompanying work necessary to understand the taxon or its occurrence in India are given. Besides, a key to the species known to be distributed in Kasaragod district is also provided.

Key to the species of Aquatic and Semi-Aquatic Hemiptera of Kasaragod District, Kerala

1. Antenna visible, not concealed, as long as or longer than head; hind femora long surpassing end of abdomen; winged and wingless forms (Family : Gerridae) 2

   Antenna not visible. concealed below and shorter than head; hind femora short, not surpassing end of abdomen; winged forms 6

2. Body long and thin; metasternum well developed 3

   Body elongate or oval; metasternum reduced to a very short subtriangular plate (Subfamily : Halobatinae) 5

3. Fore tarsus long, atleast half the length of tibia; hind tarsi fused; distal half of middle femur bears a dense brush of long hairs in males (Subfamily : Ptilomerinae) ..... *Ptilomera (Ptilomera) agroides* Schmidt

   Foretarsus short; hind tarsal segments distinct, not fused; middle femur lacks brush of long hairs in males 4

4. Fourth antennal segment long and straight; rostrum surpassing prosternum; pronotum with dark line along its entire length; second front tarsal segment equal to or longer than the first (Subfamily : Gerrinae) ..... *Limnometra anadyomene* (Kirkaldy)

   Fourth antennal segment short and curved; rostrum not surpassing prosternum (Subfamily : Cylindrostethinae) ..... *Cylindrostethus productus* (Spinola)

5. Length more than 4.5 mm; eyes not covering anteriolateral angles of mesonotum; third antennal segment longer than fourth ..... *Metrocoris malabaricus* Thirumalai

   Length less than 4.5 mm; eyes fully covering anteriorlateral angles of mesonotum; third and fourth antennal segments subequal ..... *Ventidius (Ventidius) aquarius* Distant

6. Elongate forms; hind legs oar-like; abdominal appendages absent; hind tibia and tarsi ciliated; swims upside down (Family : Notonectidae) 7

   Flattened forms; hind legs not oar-like; short abdominal appendages present; hind tibia and tarsi compressed; swims normally (Family ; Belostomatidae) .... *Lethocerus indicus* Lepeletier & Serville

7. Length more than 13.00 mm; metaxyphus long ..... *Enithares hungerfordi* Brooks

   Length less than 10.00 mm; metaxyphus short ..... *Enithares fusca* Brooks

A SYSTEMATIC LIST OF AQUATIC HEMIPTERA OF KASARAGOD DISTRICT, KERALA STATE

Order : Hemiptera

Suborder : Heteroptera

Family : NOTONECTIDAE

Subfamily : NOTONECTINAE

Genus : ***Enithares*** Spinola

1. ***Enithares fusca*** Brooks

2. ***Enithares hungerfordi*** Brooks

Family : BELOSTOMATIDAE

Subfamily : LETHOCERINAE

Genus : ***Lethocerus*** Mayr

3. ***Lethocerus indicus*** (Lepeletier & Serville)

Family : GERRIDAE

Subfamily : GERRINAE

Genus : ***Limnometra*** Mayr

4. ***Limnometra anadyomene*** (Kirkaldy)

Subfamily : CYLINDROSTETHINAE

Genus : ***Cylindrostethus*** Fieber

5. ***Cylindrostethus productus*** (Spinola)

Subfamily : PTILOMERINAE

Genus : ***Ptilomera*** Amyot & Serville

6. ***Ptilomera (Ptilomera) agroides*** Schmidt

Subfamily : HALOBATINAE

Genus : ***Metrocoris*** Mayr

7. ***Metrocoris malabaricus*** Thirumalai

Genus : ***Ventidius*** Distant

8. ***Ventidius (Ventidius) aquarius*** Distant

SYSTEMATIC ACCOUNT

Family NOTONECTIDAE

Subfamily NOTONECTINAE

1. *Enithares fusca* Brooks

Enithares fusca Brooks, 1948, *J. Kans. Ent. soc.*, **21** : 46; Lansbury, 1968, *Pacific. Insects,* **10** : **412;** Thirumalai, 1986, *Rec. Indian Mus.,* **84** : 30; Thirumalai, 1994a, *Misc. Occ. Pap. Rec. zool. Surv. India,* **165** : 12.

Diagnosis : Medium sized (9.1 to 9.45 mm) oblong bugs with short metaxyphus (fig. 2) and absence of black spicules on the mesotrochanter (fig. 3).

Material examined : 2 Females from Chempilankai, Muliyar R. F., 14.x.1993, *Coll :* K. C. Gopi.

Distribution : India : Kerala, Tamilnadu.

Remarks : This species is very similar to *E. ciliata* (Fabricius) in general size and coloration and has so far been reported only from Kerala and Tamilnadu states.

2. *Enithares hungerfordi* Brooks

Enithares hungerfordi Brooks, 1948, *J. Kans. Soc.*, **21** : 41; Lansbury, 1968, *Pacif. Insects,* **10** : **372;** Thirumalai, 1986, *Rec. zool. Surv. India,* **84** : 30; Thirumalai, 1989, *Misc. Occ. Pap. Rec. zool. Surv. India,* **118** : 22, Thirumalai, 1994a *Misc. Occ. pap. Rec. zool. Surv. India,* **165** : 13.

Diagnosis : Size more than 13.0 mm; head and thorax as in fig. 4; embolium greatly expanded ventrally towards head (Fig. 5.); metaxyphus very long with acuminate apex (Fig. 6). The basal width of the metaxyphus equals the median length.

Material examined : 5 females from Pullody, 27.x.1993; 2 males, 3 females and 5 immature stages from Ranipuram, 25.i.1994, *Coll :* K. C. Gopi.

Distribution : India : Kerala, Tamilnadu.

Remarks : Out of the six species so far known from India, *E. fusca* and *E. hungerfordi* are restricted to southern part of India. This species has also been reported from Eastern Ghats (Thirumalai, 1989).

Family BELOSTOMATIDAE

Subfamily LETHOCERINAE

3. ***Lethocerus indicus*** (Lepeletiler & Serville)

Belostoma indica Lep. & Serv., 1825, *Encycl. Meth.*, **X** : 272 : *B. indicum* Lep. & Serv. : Mayr, 1871, *Vehr. Zool.*, **21** : 426 : Distant, 1906, *Fauna British India*, **3** : 38; *L. indicus* (Lep. & Serv.,) : Bueno, 1927, *Bull. Brooklyn Ent. Soc.*, **22** : 30; Lundblad, 1934, *Arch. Hydrobiol. Suppl.*, **12** : 52.

Diagnosis : A very long elongate bug ranging from 60 to 85 mm in length; antenna concealed, irregular with lateral prolongations (Fig. 7). Fore femur dilated, bearing grooves. Corium with strong anastomosing longitudinal veins; ventral laterotergite pubescent; abdominal sternite covered with short spinules.

Material examined : 1 male from Payaradukka, 19.iii.1994, *Coll :* K. C. Gopi.

Distribution : India (widely distributed); Indonesia; Malaysia; Philippines; Srilanka.

Remarks : This 'giant water bug' is known to feed on large insects and also is attracted towards light. Members of this genus usually prefer large water bodies like ponds, lakes etc., but they are occasionally found in streams and reservoirs.

Family GERRIDAE

Subfamily GERRINAE

4. ***Limnometra anadyomene*** (Kirkaldy)

Gerris anadyomene Kirkaldy, 1901, *Entomologist*, **34** : 117; Distant, 1903, *Fauna British India*, **2** : 177; Dover, 1928, *J. Bombay nat. Hist.*, **32** : 614. *L. anadyomene* (Kirk.) : Lundblad, 1934, *Arch. Hydrobiol. Suppl.*, **12** : 37; Hungerford & Matsuda, 1958, *Kans. Univ. Sci. Bull.*, **39** : 402; *Tenagogonus (Limnometra) anadyomene* (Kirk.) : Matsuda, 1960, *Kans. Univ. Sci. Bull.*, **41** : 206; Thirumalai, 1986, *Rec. zool. Surv. India*, **84** : 10; Thirumalai, 1989, *Misc. Occ. Pap. Rec. zool. Surv. India*, **118** : 42; *Tenagogonus (Limnometra) longispinulus* Thirumalai, 1986, *Rec. zool. Surv. India*, **84** : 11.

Diagnosis : Larger species (fig. 8), size ranging from 11.1 to 14.6 mm; the male connexival spines equal or surpassing the tip of abdomen, never so in females.

Materials examined : Winged 4 males, 5 females from Pullody, 27.x.1993. *Coll :* K. C. Gopi.

Distribution : India : Karnataka, Kerala, Tamilnadu; Malaysia; Myanmar; Singapore; Philippines; SriLanka.

Remarks : The habitat of *L. anadyomene* is restricted to forest streams. Recently, Nieser & Chen (1992) treated *Limnometra* a separate genus where as Mastuda (1960) and Andersen (1975, 1982) considered it a subgenus of *Tenagogonus.*

Subfamily CYLINDROSTETHINAE

5. *Cylindrostethus productus* (Spinola)

Gerris productus Spinola, 1840, Essaisur les insectus Hemipteras, Rhynchotes ou Heteropteres, **64**; *Cylindrostethus productus* (Spinola) : Distant, 1903, *Fauna British India,* **2** : 184; Dover, 1928, *J. Bombay nat. Hist. Soc.,* **32** : 614; Hungerford and Matsuda, 1962, *Kans. Univ. Sci. Bull.* **43** : 86. *Janias elongatulus* Distant, 1910a, *Ann. Mag. nat. Hist.,* **5**(8) 5 : 145.

Diagnosis : The connexival spines surpassing the surnal plate (Fig. 9) and the black coloured costal margin of hemelytra are the distinguishing characters of this species.

Material examined : Wingless 3 males, winged 1 female and 1 immature stage from Chempilankai, Muliyar R.F., 14.X.1993; Winged 1 male, wingless 1 male, 5 females from Payaradukka, 19.iii.1994, *Coll :* K. C. Gopi.

Distribution : India : Karnataka, Kerala, Madhya Pradesh, Orissa, Punjab, Tamilnadu, Uttar Pradesh, West Bengal; Nepal, SriLanka.

Remarks : This is the largest species of the genus so far known. In India this species has a wider range of distribution, occurring in Himalayan foot hills also.

Subfamily PTILOMERINAE

6. *Ptilomera (Ptilomera) agroides* Schmidt.

Ptilomera agroides Schmidt, 1926, *Ent. Mitt.,* **15** : 63; Hungerford and Matsuda, 1965, *Kans. Univ. Sci. Bull.,* **45** : 431; Thirumalai, 1986, *Rec. Indian. Mus.,* **84** : 15. *P. lachne* Schmidt, 1926, *Ent. Mitt.,* **15** : 64. *P. laticaudata* (Hardwick) : Distant, 1903, *Fauna British India,* **2** : 185.

Diagnosis : The long dorsolateral projection of pygofer which extends half of its length beyond lateral wings of surnal plate differentiates this species from all other known species (Fig. 10). The distal half of middle femur in male bears a dense brush of long hairs. The connexival spines of female arising from beneath the connexival edge of the seventh abdominal segment near its base (Fig. 11).

Material examined : Winged 2 males & 1 immature stage from Maruthom, 26.x.1993; 2 immature stages from Pullody, 27.x.1993; wingless 9 males, 13 females from Ranipuram 25.i.1994; wingless 5 males, 2 females from Manjucholamala, 26.i.1994; wingless 11 males, 11 females from Beemanadi, 27.i.1994, *Coll :* K. C. Gopi.

Distribution : India : Karnataka, Kerala, Maharashtra, Tamilnadu.

Remarks : A very common gerrid found in the flowing mountain streams of Western Ghats.

Subfamily HALOBATINAE

7. *Metrocoris malabaricus* Thirumalai, 1986

Metrocoris malabaricus Thirumalai, 1986, *Rec. zool. Surv. India,* **84** : 22; Chen & Nieser, 1993a, Streenstruptia, **19** : 54.

Diagnosis : M. malabaricus can easily be recognised by the thick dark band on dorsal half of mesopleura (Fig. 12) and thick long velvety pilosity. The slender male femur and prominent falciform paramere (Fig. 13) which extends beyond genital segments are the other distinguishing characters.

Material examined : Winged 1 male from Ranipuram, 25.i.1994, *Coll :* K. C. Gopi.

Distribution : India : Kerala, Karnataka.

Remarks : This species inhabiting fast flowing streams in upland habitats (altitudes between 871-1500 m), is endemic to Western Ghats.

8. *Ventidius (Ventidius) aquarius* Distant, 1910

Ventidius aquarius Distant, 1910a, *Ann. Mag. Nat. Hist.*, **5** : 150; *V. (Ventidius) aquarius* Distant : Hungerford & Matsuda, 1960, *Kans. Univ. Sci. Bull.*, **40** : 124; Thirumalai, 1986, *Rec. zool. Surv. India*, **84** : 28.

Diagnosis : Eyes overlapping anteriolateral angles of mesonotum (Fig. 14), antennal segments 2nd and 3rd are equal in length, body oval and ochraceous, with 'T'-shaped black marking on pronotum in winged form; venter pale brown.

Material examined : Apterous 1 male, 5 females from Santhimala, Parappa R. F., 24.ix.1993; 4 examples (abdominal segments damaged) from Chempilankai, 14.x.1993, *Coll :* K. C. Gopi.

Distribution : India : Kerala, Tamilnadu.

Remarks : This species is commonly found in lotic habitat in the higher ranges of Kerala and Tamilnadu parts of Western Ghats (altitude between 400-2160 m).

DISCUSSION

An analysis of the collection reveals that family Gerridae is well represented in the aquatic systems of Kasaragod district, being present in all the eight localities surveyed, while the family Notonectidae occupied three and Belostomatidae only one locality. Among all the aquatic bugs reported in this study, *Ptilomera (P.) agroides* dominates the rest both in terms of population and the area of distribution.

SUMMARY

The aquatic Hemiptera of Kasaragod district, Kerala collected during the State Faunal Surveys is studied. This study revealed the presence of 6 genera and 8 species. All the species discussed are recorded for the first time from the study area. A systematic list of aquatic and semi-aquatic Hemiptera known from Kerala is also provided.

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APPENDIX - I

SYSTEMATIC LIST OF AQUATIC AND SEMI-AQUATIC HEMIPTERA KNOWN FROM KERALA STATE

Infraorder : Gerromorpha

Family : MESOVELIIDAE

Subfamily : MESOVELIINAE

1. ***Mesovelia vittigera*** Horvath
   Mesovelia orientalis Kirkaldy
   M. mulsanti White : Distant

Family : HYDROMETRIDAE

Subfamily : HYDROMETRINAE

2. ***Hydrometra butleri*** Hungerford and Evans

Family : VELIIDAE

Subfamily : MICROVELIINAE

3. ***Microvelia (Microvelia) douglasi douglasi*** Scott
   Microvelia repentina Distant
   M. kumaonensis Distant

Subfamily : RHAGOVELIINAE

4. ***Rhagovelia (Rhagovelia) ceylanica*** Lundblad

5. ***Rhagovelia (Rhagovelia) tibialis*** Lundblad

Family : GERRIDAE

Subfamily : RHAGADOTARSINAE

6. ***Rhagadotarsus (Rhagadotarsus) krepelini*** Breddin
   Nacebus dux Distant

Subfamily : TREPOBATINAE

7. ***Cryptobatus raja*** (Distant)
   Gerris raja Distant

Subfamily : GERRINAE

8. ***Aquarius adelaidis*** (Dohrn)
   Gerris spinolae Leth. & Serv.

9. ***Neogerris parvula*** (Stal)
   Gerris parvula Stal

Gerris tristan : Distant
Limnogonus parvulus : Hafiz & Ribeiro

10. ***Limnogonus (Limnogonus) fossarum fossarum*** (Fabricius)
Cimex fossarum Fabricius
Gerris fossarum : Distant

11. ***Limnogonus (Limnogonus) nitidius*** (Mayr)
Hydrometra nitida, Mayr
Gerris nitida Distant

12. ***Limnometra anadyomene*** (Kirkaldy)
Gerris anadyomene Kirkaldy
Tenagogonus (Limnometra) anadyomene Hungerford & Matsuda
Tenagogonus (Limnometra) longispinulus Thirumalai

13. ***Limnometra fluviorum*** (Fabricius)
Cimex fluviorum Fabricius
Gerris fluviorum Distant
Gerris armata Distant
Tenagogonus (Limnometra) fluviorum Hungerford & Matsuda

Subfamily : EOTRECHINAE

14. ***Amemboa (Amemboa) kumari*** (Distant)
Onychotrechus kumari Distant
Amemboa pervati Pradhan

15. ***Onychotrechus major*** Andersen

16. ***Onychotrechus rhexenor*** Kirkaldy

17. ***Onychotrechus spinifer*** Andersen

18. ***Tarsotrechus polhemi*** Andersen

Subfamily : CYLINDROSTETHINAE

19. ***Cylindrostethus productus*** Spinola
Janias elongatulus Distant

Subfamily : PTILOMERINAE

20. ***Pleciobates indicus*** Thirumalai

21. ***Pleciobates nostrus*** Thirumalai

22. ***Ptilomera (Ptilomera) agroides*** Schmidt
Ptilomera lachne Schmidt
P. laticudata Hardwicke : Distant

23. ***Rhematogonus custodiendus*** (Distant)
Jucundus custodiendus Distant

Subfamily : HALOBATINAE

24. ***Metrocoris indicus*** Chen and Nieser
*Metrocoris stali** (Dohrn)

25. ***Metrocoris malabaricus*** Thirumalai

26. ***Metrocoris variegans*** Thirumalai

27. ***Metrocoris velamentus*** Chen & Nieser

28. ***Ventidius (Ventidius) aquarius*** Distant

Infraorder : Nepomorpha

Family : HELOTREPHIDAE

Subfamily : LIMNOTREPHINAE

29. ***Limnotrephes minutissimus*** Zettel

Subfamily : FISCHEROTREPHINAE

30. ***Fistherotrephes indicus*** Zettel

Subfamily : IDIOCORINAE

31. ***Indotrephes bufula*** Zettel

Family : NEPIDAE

Subfamily : NEPINAE

32. ***Laccotrephes griseus*** (Guerin)

33. ***Laccotrephes ruber*** (Linnaeus)

Subfamily : RANATRINAE

34. ***Crecotmetus fumosus*** Distant

35. ***Crecotmetus pilipes*** Distant

36. ***Ranatra elongata*** Fabricius

37. ***Ranatra filiformis*** Fabricus

Family : BELOSTOMATIDAE

Subfamily : BELOSTOMATINAE

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* Specimens from India earlier identified.

38. ***Diplonychus rusticus*** (Fabricius)

Diplonychus indicus Venkatesan & Rao

39. ***Diplonychus annulatus*** (Fabricius)

Subfamily : LETHOCERINAE

40. ***Lethocerus indicus*** (Lepeletier & Serville)

Family : CORIXIDAE

Subfamily : MICRONECTINAE

41. ***Micronecta quadristrigata*** Breddin
Micronecta minthe Distant
Micronecta punctata Fieber
Micronecta merope Distant

42. ***Micronecta scutellaris*** (Stal)
Micronecta dione Distant
Micronecta probe Distant

43. ***Micronecta issa*** (Distant)
Synaptonecta breddini Lundblad

Family : OCHTERIDAE

44. ***Ochterus marginatus*** (Latreille)
Pelogonus marginatus Distant

Family : NAUCORIDAE

Subfamily : NAUCORINAE

45. ***Naucoris scutellaris*** Stal
Naucoris sordius Distant
Naucoris vividus Distant
Thurselinus clathratus Distant

Subfamily : LACCOCORINAE

46. ***Heleocoris vicinus*** Montandon

Family : NOTONECTIDAE

Subfamily : ANISOPINAE

47. ***Anisops breddeni*** Krikaldy

48. ***Anisops cavifrons*** Brooks

49. ***Anisops exigua*** Horvath
Anisops exigera Horvath

50. ***Anisops extendofrons*** Brooks

51. ***Anisops nivea*** (Fabricius)
Notonecta nivea Fabricius
Anisops niveus Distant

52. ***Anisops varia*** Fieber
Anisops varius Distant

Subfamily : NOTONECTINAE

53. ***Enithares ciliata*** (Fabricius)
Notonecta ciliata Fabricius
Enithares indica Distant
E. paivana Distant
E. lactea Paiva

54. ***Enithares fusca*** Brooks

55. ***Enithares hungerfordi*** Brooks

56. ***Enithares triangularis*** (Guerin-Meneville)
Notonecta triangularis Guerin-Meneville

Family : PLEIDAE

57. ***Paraplea indistinguenda*** (Matsumura)

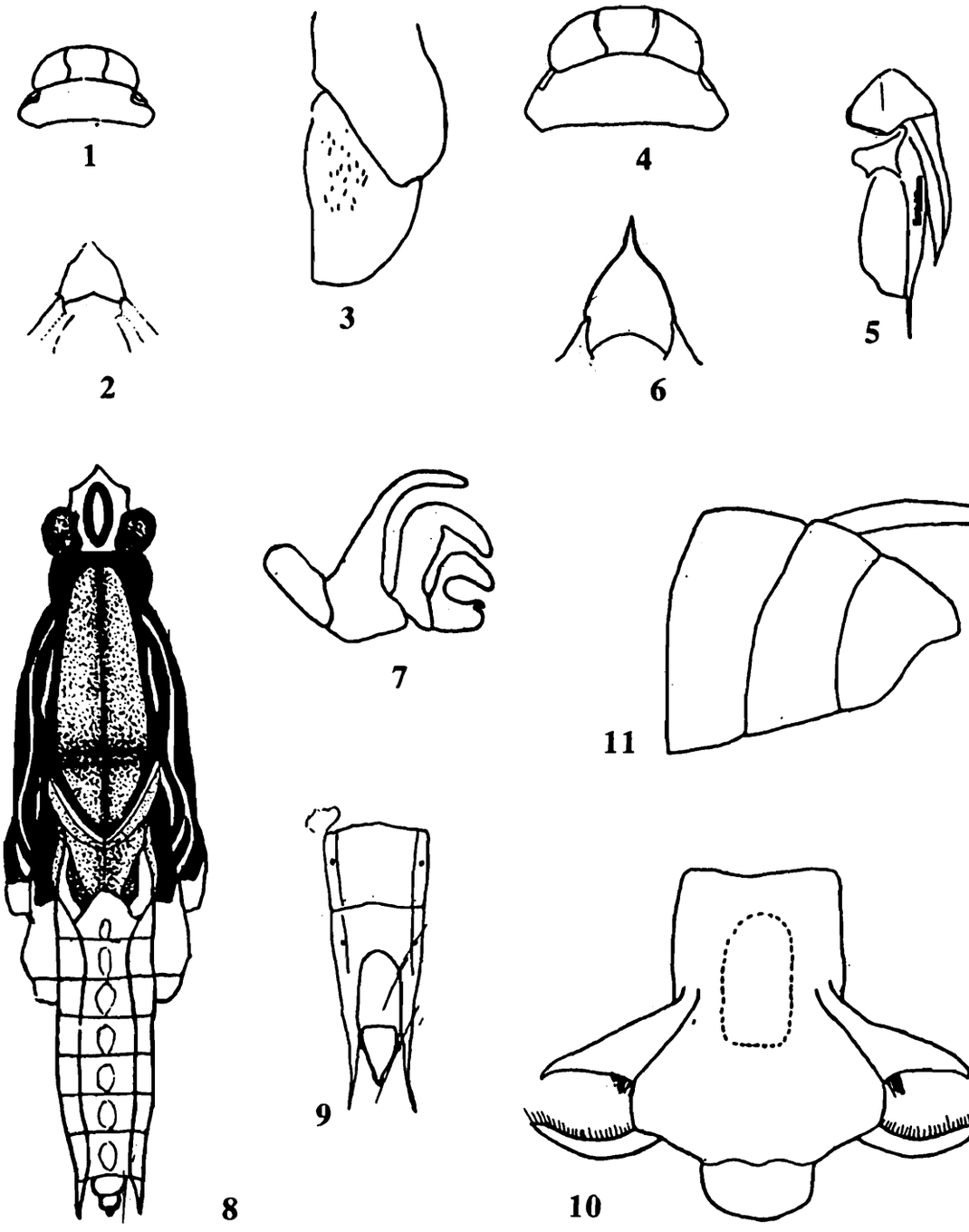
Infraorder : Leptopodomorpha

Family : LEPTOPODIDAE

Subfamily : LEPTOPODINAE

58. ***Leptopus travancorensis*** Distant

PLATE : I



1-3 : *Enithares fusca* Brooks.

1 : Head and pronotum.; 2 : Metaxyphus; 3 : Mesotrochanter.

4-8 : *Enithares hungerfordi* Brooks.

4 : Head and pronotum; 5 : Ventral view of embolium & adjacent structures; 6 : Metaxyphus; 7 : *Lethocerus indicus* Lep. & Serv.—antenna; 8 : *Limnometra anadyomene* (Kirk.); Apterous male dorsal view.

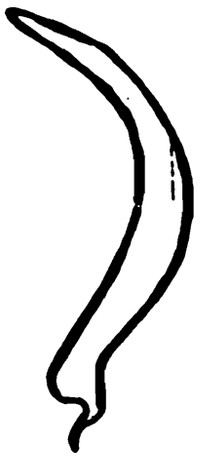
9 : *Cylindrostethus productus* Spinola-Ventral view of apical abdominal segments of male.

10-11 : *Ptilomera (Ptilomera) agroides* Schmidt.

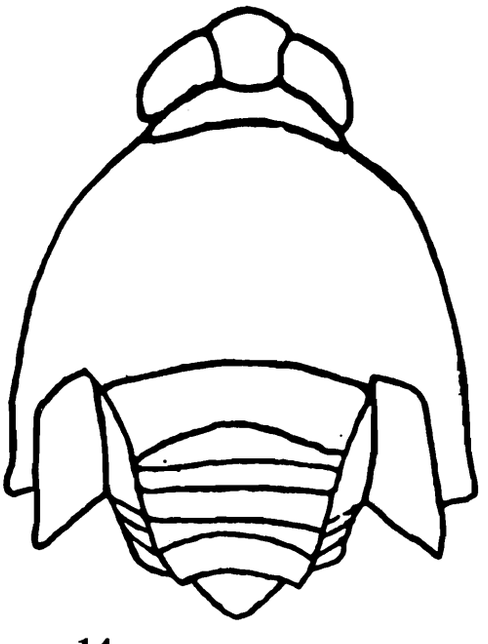
10 : Dorsal view of apical genital segments of apterous male. 11 : Lateral view of apical abdominal segments of apterous female.

PLATE : II

12



13



14

12-13 : *Metrocoris malabaricus* Thirumalai.

12 : Winged male dorsal view (wings partially removed); 13 : Lateral view of paramere.

14 : *Ventidius (Ventidius) aquarius* Distant apterous female.

Rec. zool. Surv. India : **97** (Part-3) : 141-143, 1999

A NEW SPECIES OF SPIDER OF THE GENUS *TMARUS SIMON* (ARANEAE : THOMISIDAE) FROM MADHYA PRADESH, INDIA.

U. A. GAJBE and *PAWAN GAJBE
Zoological Survey of India, Central Regional Station, Jabalpur

The spiders of the genus *Tmarus* are very little known in Indian Fauna. The genus was established by Simon in 1875 with the Type-species *Tmarus piger* (Walckenaer). Tikader (1980) reillustrated and redescribed one species and other new species from India in *Fauna of India* series.

While studying the spider collection collected by the second author from different areas of Jabalpur city we came across a new species of the genus *Tmarus* which is described here as a third species from India.

The type specimen will in due course be deposited in the National Collection, Zoological Survey of India, Calcutta.

Tmarus jabalpurensis sp. nov.

General : Cephalothorax and legs reddish-green, abdomen brownish green. Total length 7.40 mm. Cephalothorax 2.80 mm. long, 2.60 mm. wide; abdomen 4.80 mm. long, 3.70 mm. wide.

Cephalothorax : Longer than wide, cephalic region high, spined, clypeus moderately high, its margin with seven spines directed forward, sides with broad longitudinal dark brown patches. Eyes round, black, both rows recurved but the anterior row more recurved and the posterior row longer than anterior, the lateral eyes larger than the others and ringed with dark green tubercles; anterior median eyes smaller than posterior medians; the median ocular area narrower in front than behind. Legs I and II longer than III and IV, clothed with hairs and spines; tibiae I and II with three pairs of ventral spines.

Abdomen : Longer than wide, high and pointed behind, broadest behind the middle, clothed with spines, five pairs of dark brown patches present, the fifth pair of dark brown patches meeting at the high posterior end as in fig. 1. Mid-ventral side provided with a broad U-shaped light brown band starting from the base of the epigastric furrow and extending up to the spinnerets, lateral sides provided with dark brown spots. Epigyne as in fig. 2. Internal genitalia as in fig. 3.

Type-specimen : Holotype female in spirit, other details as above.

Type-locality : Rampur, Jabalpur District, M.P., Coll. *Pawan Gajbe,* 16. VIII. 1997.

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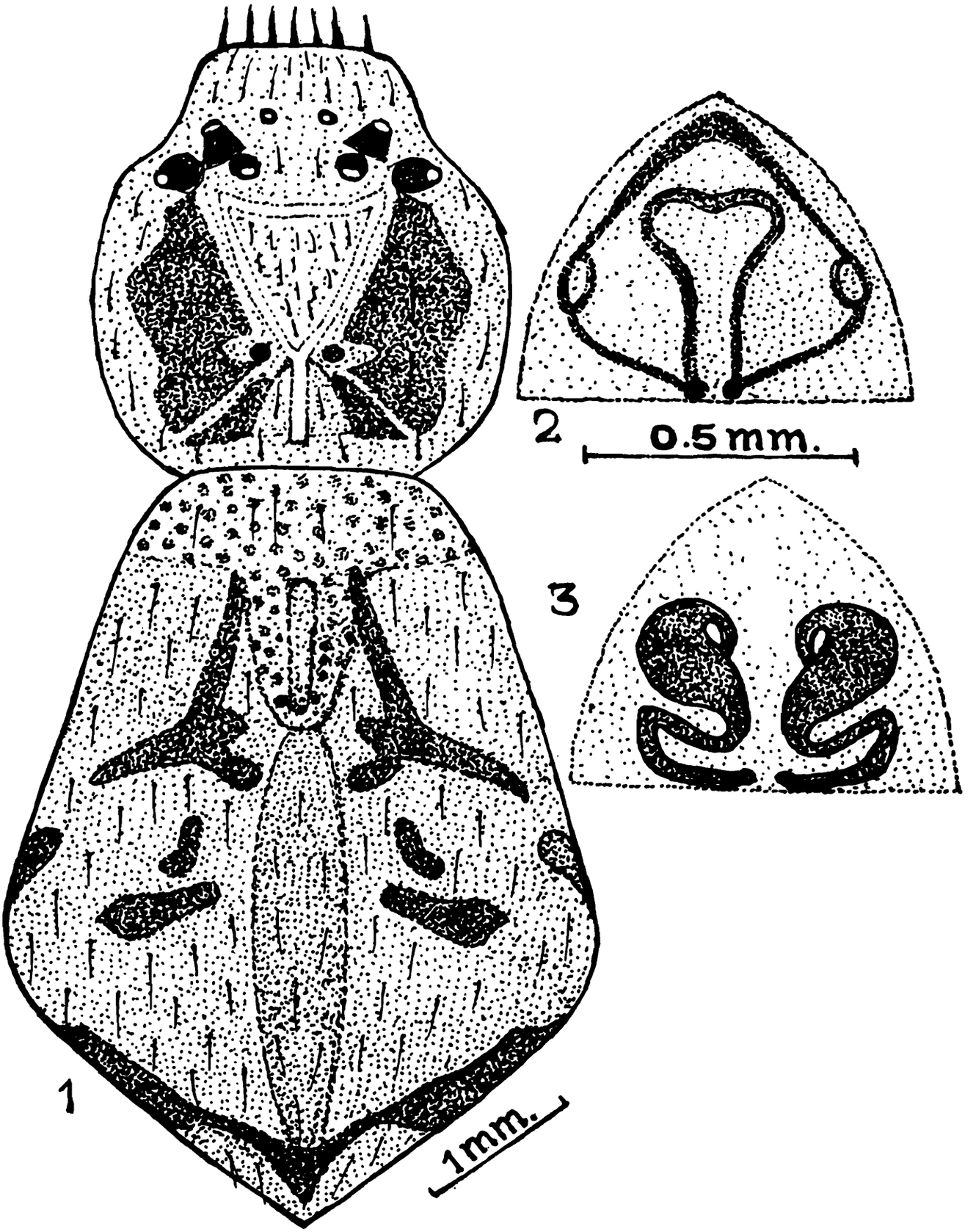
* *Government Autonomous Science College, Jabalpur.*



Figs. 1-3. *Tmarus jabalpurensis* sp. nov.
1. Dorsal view of female, legs omitted; 2. Epigyne; 3. Internal genitalia.

This species resembles with *Tmarus kotigharus* Tikader but differs from it as follows : (i) Cephalothorax and legs reddish green but in *T. kotigharus* cephalothorax yellowish brown and legs pale green. (ii) Eyes ringed with dark green tubercls but in *T. kotigharus* eyes ringed with brown tubercles. (iii) Abdomen with five pairs of dark brown patches but in *t. kotigharus* abdomen with two pairs of dark patches. (iv) Epigyne also structurally different.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. J. R. B. Alfred, Director, Zoological Survey of India, Calcutta, for facilities and to Shri K. Vinod, Stenographer, of this station, for typing the manuscript.

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Tikader, B. K. 1980 *Fauna of India, Spiders,* **1** (1) : 1-245.

Rec. zool. Surv. India : **97** (Part-3) : 145-148, 1999

ON TWO NEW SPECIES OF SPIDERS OF THE GENUS *XYSTICUS KOCH* (ARANEAE : THOMISIDAE) FROM MADHYA PRADESH, INDIA.

U. A. GAJBE and *PAWAN GAJBE
Zoological Survey of India, Central Regional Station, Jabalpur

The spiders of the genus *Xysticus* are very little known in Indian fauna. The genus was established by Koch in 1835, with the type species *Xysticus cristatus* (Clerck). Since the establishment of the genus, Tikader (1980) reillustrated and resdescribed fifteen species and one new species from different parts of India in *Fauna of India* series.

While studying the spider collection collected by the second author from different areas of Jabalpur city we came across two new species of the genus *Xysticus* which are described here.

The type specimens will in due course be deposited in the National Collection, Zoological Survey of India, Calcutta.

1. *Xysticus jabalpurensis* sp. nov.

General : Cephalothorax, legs and abdomen deep brown. Total length 7.80 mm. Cephalothorax 2.80 mm. long, 2.90 mm. wide; abdomen 4.80 mm. long, 4.50 mm wide.

Cephalothorax : Wider than long, clothed with fine haris; eyes black, both rows recurved; ocular quad nearly as long as wide. All eyes tuberculated. Sternum heart-shaped, pointed behind, dark brown, provided with fine hairs. Legs long and stout, clothed with spines and hairs. Tibiae and metatarsi of I and II legs with spines.

Abdomen : Longer than wide, clothed with fine hairs, broadest in the posterior region, dorsally provided with two pairs of black spots, two light brown patches in the middle, between the black spots, as in figure 1. Ventral side as such as dorsal, without any band. Epigyne as in fig. 2. Internal genitalia as fig. 3.

Type-specimen : Holotype female, in spirit, other details as above.

Type-locality : Adhartal, near Jawaharlal Nehru University, Jabalpur, M.P. Coll. *Pawan Gajbe,* 30.12.1997

This species closely resmebles *Xysticus pynurus* Tikader but differs from it as follows : (i) Cephalothorax uniform but in *X. pynurus* cephalothorax, provided laterally with two bands. (ii) Abdomen dorsally provided with four black spots but in *X. pynurus* abdomen provided with paired transverse white lines. (iii) Epigyne also structurally different.

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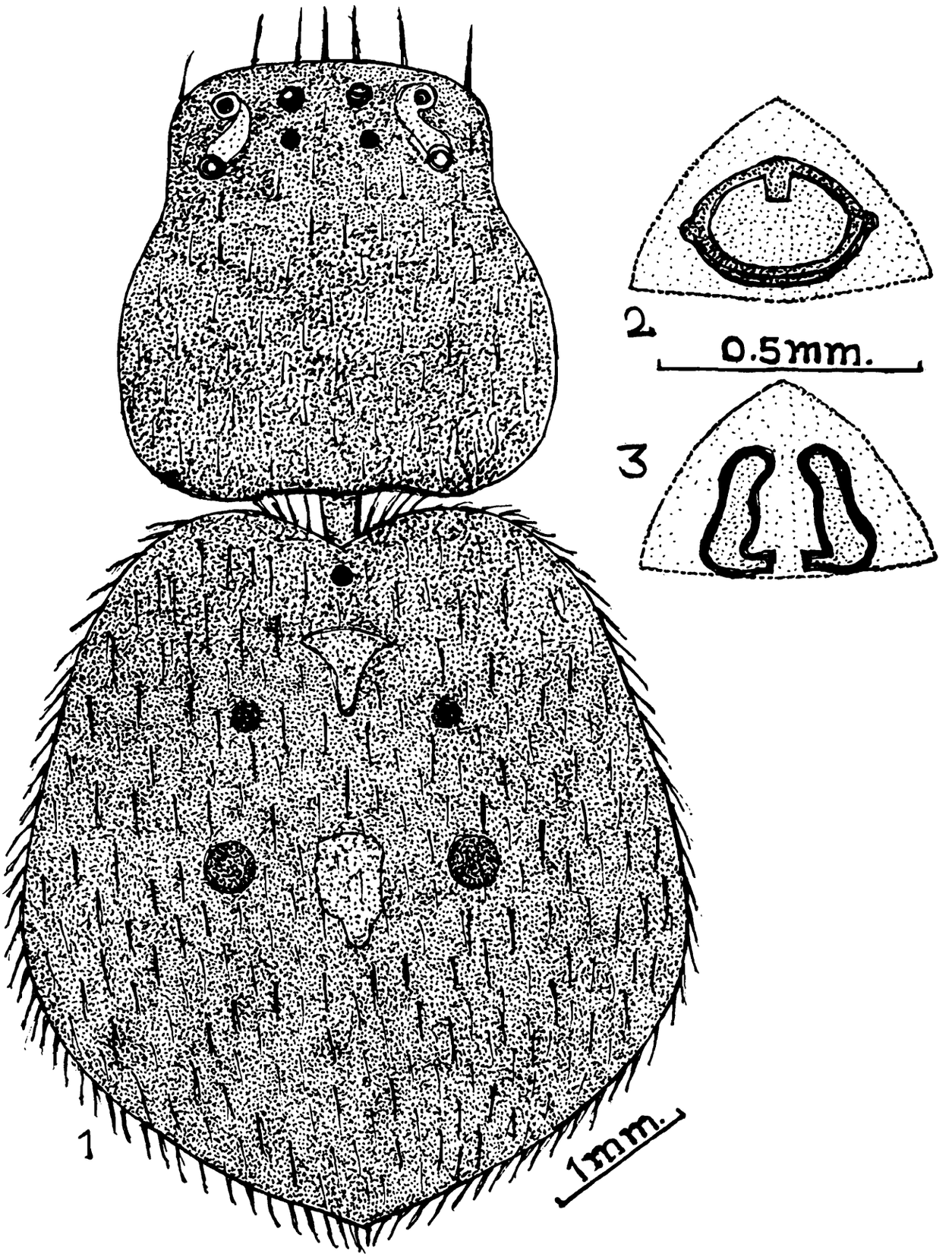
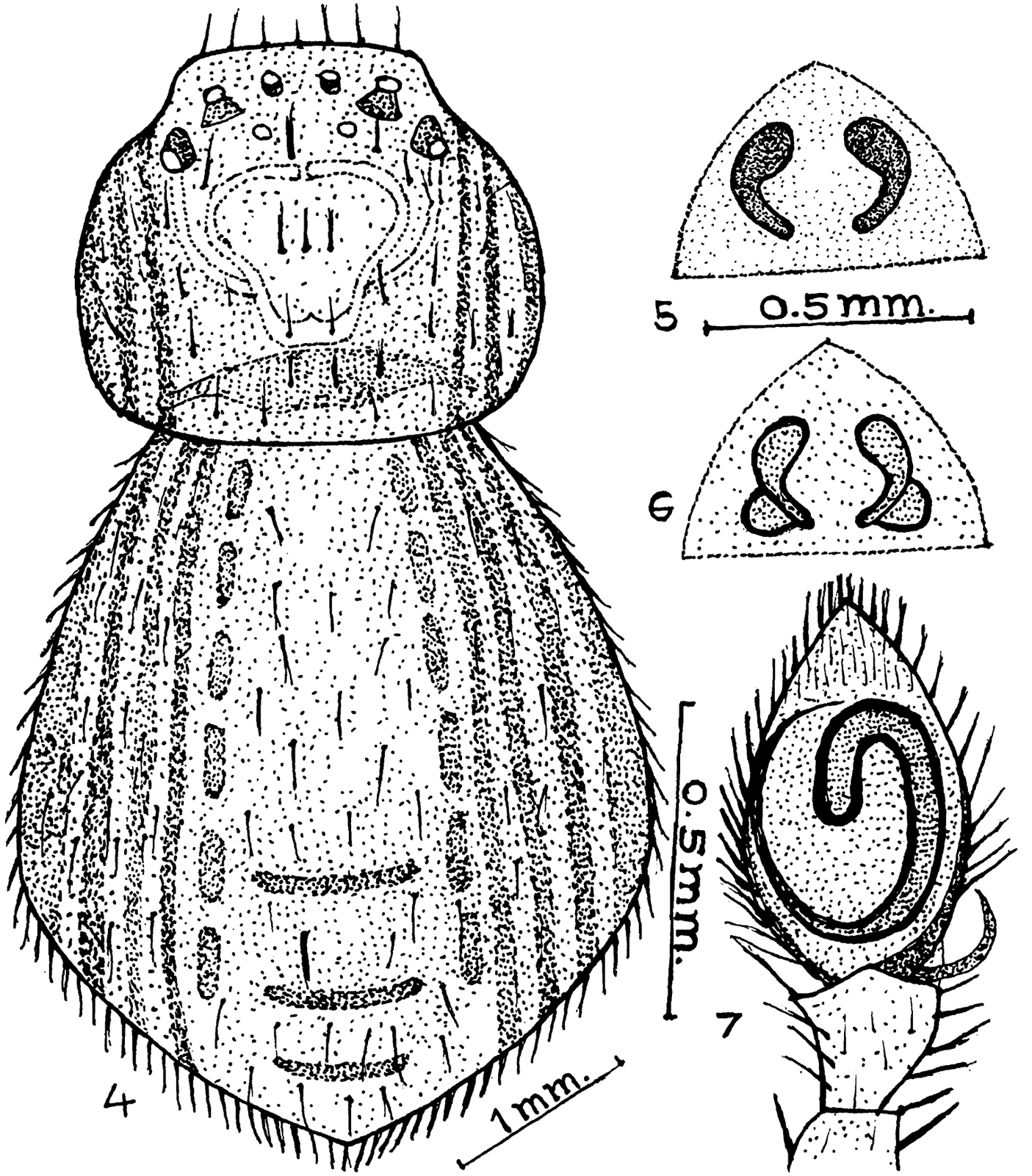
* *Government Autonomous Science College, Jabalpur.*



Figs. 1-3. *Xysticus jabalpurensis* sp. nov.
1. Dorsal view of female, legs omitted; 2. Epigyne; 3. Internal genitalia.



Figs. 4-7. *Xysticus bharatae* sp. nov.
4. Dorsal view of female, legs omitted; 5. Epigyne; 6. Internal genitalia; 7. Left male palp, ventral view.

2. ***Xysticus bharatae*** sp. nov.

General : Cephalothorax and legs reddish green, abdomen chalk white. Total length 6.00 mm. Cephalothorax 2.10 mm long; 2.50 mm. wide; abdomen 3.80 mm long, 3.50 mm. wide.

Cephalothorax : Wider than long, spined, laterally with three pairs of longitudinal deep brown patches, antero-medially with pear-shaped marking and posteriorly with trannsverse deep brown patch as in fig. 4. Clypeus median, margin with seven strong spines directed forward. Eyes black, round, ringed with dark green tubercles. Ocular quad slightly wider than long, space of the anterior median eyes a little wider than that of posterior; lateral eyes larger, posterior median eyes larger than the anterior medians. Legs long and strong, clothed with spines and hairs. Male same in colour as female but smaller than female. Male palp as in fig. 7.

Abdomen : Longer than wide, nearly pentagonal, over-lapping the posterior region of cephalothorax, abdomen dorsally provided with four pairs of longitudinal brown bands starting from the anterior end to the posterior end and three transverse bands as in fig. 4. Ventral side slightly lighter than the dorsal, clothed with hairs and spines. Epigyne as in fig. 5. Internal genitalia as in fig. 6.

Type-specimens : Holotype female, *allotype* male in spirit, other details as above.

Type-locality : On the bank of Gour river on Jabalpur-Mandla road, Jabalpur, M.P. Coll. *Pawan Gajbe,* 2.1.1998.

This species resembles *Xysticus minutus* Tikader but differs fromit as follows : (i) Cephalothorax light reddish green but in *X.minutus* cephalothorax light brown. (ii) Eyes ringed with dark greenish tubercles but in *X.minutus* eyes ringed with dirty white tubercles. (iii) Cephalothorax with three pairs of longitudinal deep brown patches on lateral sides and posteriorly with transverse deep brown patch but *X. minutes* cephalothorax laterally with broad longitudinal dark brown patches. (iv) Abdomen provided with four pairs of longitudinal brown bands but in *X.minutus* abdomen provided with mid-dorsal brown parches. (v) Epigyne and male palp also structurally different.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. J. R. B. Alfred, Director, Zoological Survey of India, Calcutta, for facilities and to Shri K. Vinod, Stenographer, of this station, for typing the manuscript.

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Rec. zool. Surv. India : **97** (Part-3) : 149-190, 1999

ON THE COLLECTION OF HISPINAE (COLEOPTERA : CHRYSOMELIDAE) PRESEERVED IN THE ZOOLOGICAL SURVEY OF INDIA, CALCUTTA.

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Zoological Survey of India, M-Block, New Alipore, Calcutta 700 053

INTRODUCTION

This work is based on the collection of HISPINAE collected by the various survey parties and the named material present in the Zoological Survey of India. This collection comprise 107 species including 14 new species. Moreover, 8 species recorded from Vietnam, Africa, Malaya, Formosa, Myanmar and Borneo are included. About 147 species were recorded so far from India of which only 85 species were present in Z.S.I.

Maulik made a comprehensive work on Indian Hispinae in 1919. Since then no such work has been published by any body. During this period major changes took place in the generic nomen clature. Although Wurmli (1975) made a valuable attempt to give an updated form of World Hispinae. After Maulik's (1919) work a huge number of specimens were pending for proper indentification and publication of the undescribed species. Considering the facts the author has made an attempt to update the Indian Hispinae by providing synonymies of genera and species, and additinal distributional records. Incidentally the Indian species not present in Z.S.I., are not listed here.

SYSTEMATIC ACCOUNT

Order COLEOPTERA

Family CHRYSOMELIDAE

Subfamily HISPINAE

Genus ***Botryonopa*** Blanchard

1845. *Botryonopa* Blanchard *Hist. nat. Ins., 2* : 181.

1958. *Macrispa* Baly, *Cat. Hisp.* : 90

1976. *Botryonopa* : Wurmli, *Ent. Arb. Mus. Frey,* **27** : 70 (= *Macrispa* Baly)

1. ***Botryonopa sheppardi*** Baly

1858. *Botryonopa sheppardi* Baly, *Cat. Hisp.* : 92

1919. *Botryonopa sheppardi* : Maulik., *Fauna Brit. India, Col., Chry. (Hisp. & Cas.)* : 22

Material : ***Assam*** : Sibsagar (lex), S.E. Peel coll., Cachar, Silcuri (lex.), J. Woodmann Coll.; ***Arunachal Pradesh*** : Kameng, Tipi, 213m., 3. v. 1966 (2 exs.), A.N.T. Joseph coll.; No data (2exs.). ***Bangladesh*** : Sylhet (lex.).

Distribution : India : Arunachal Pradesh, Assam and Sikkim. Elsewhere : Bangladesh.

Remarks : First record from Arunachal Pradesh.

2. ***Botryonopa krishnalohita*** (Maulik)

1915. *Macrispa krishnalohita* Maulik, *Rec. Ind. Mus.*, **11** : 369.

1919. *Macrispa krishnalohita* : Maulik, *Fauna Brit. India. Col., Chry. (Hisp. & Cass.)* : 25.

Material : Meghalaya : Garo Hills, Above Tura,—VIII. 1917 (lex.), S. Kemp coll.

Distribution : India : Assam and Meghalaya.

Remarks : Probably this species has been synonymised by Wurmli with *M. saundersi* Baly as the type specimen of *M. krishnalohita* Maulik bears a label of *B. saundersi* det. by Wurmli. But in view of nonavailability of relevant literature and evidence the species name by Maulik is retained with change of generic name only.

Genus ***Estigmena*** Hope

1840. *Estigmena* Hope, *Col. Man.*, **3** : 174.

1919. *Estigmena* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : **26**

3. ***Estigmena chinensis*** Hope

1840. *Estigmena chinensis* Hope. *Col. Man.* **3** : 175.

1919. *Estigmena chinensis* : Maulik, *Fauna Brit. India. Col., Chry. (Hisp. & Cass.)* : 27.

Material : ***Assam*** : Cachar (lex.), J.W.M. coll. ; ***Arunachal Pradesh*** : 23.x. 1966 (2exs.), S.K. Tandon coll. ; ***Kerala*** : Trichur State Museum, VI-VIII.1917 (7exs.), III-V. 1917 (lex.), G.P. Pillai coll. ; Parambikulam, 14-24.ix. 1914 (2exs.), F. H. Gravely coll. ; ***Tripura*** : N. Tripura, Bagbasa 25.v. 1992 (lex.), B. Mitra coll. ; ***Andhra Pradesh*** : Hyderabad (2exs.) ; ***West Bengal*** : Calcutta (lex.). *BANGLADESH* : Chittagong, Rangamati, 11-16. VII. 1915 (4exs.), R. Hodgart coll.

Distribution : India : Arunachal Pradesh, Assam, Andhra Pradesh, Kerala, Madhy Pradesh, Maharashtra, Tamilnadu, Tripura and West Bengal.

Elsewhere : Bangladesh, Myanmar, China, Cambodia, Nepal, Srilanka, Sumatra and Thailand.

Remarks : First record from Arunachal Pradesh and Kerala.

4. ***Estigmena cribricollis*** Waterhouse

1881. *Estigmena cribricollis* Waterhouse, *Ann. Mag. nat. Hist.* (5) **7** : 461.

1919. *Estigmena cribricollis* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 28.

Material : ***Kerala*** : Trichur State Museum, III-V. 1917 (3 exs.), VI-VIII. 1917 (2 exs.), all G. P. Pillai coll.

Distribution : India : Kerala.

Genus ***Anisodera*** Chevrolat

1837. *Anisodera* Chervolat, In Dejean *Cat.* : 363.

1919. *Anisodera* : Maulik, *Fauna Brit. India. Col., Chry. (Hisp.* & Cass.) : 30.

5. ***Anisodera guerini*** Baly

1858. *Anisodera guerini* Baly. *Cat. Hisp.* : 168.

1919. *Anisodera guerini* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 35.

Material : ***Kerala*** : Trichur, III-V 1917 (4exs.), VI-VIII. 1917 (2exs.), all G. P. Pillai coll. ; ***Arunachal Pradesh*** : Subansiri Div., Chukrata, 1128m., 22.v. 1966 (lex.), A.N.T. Joseph coll., Kameng dist., Ankaling, 25. v. 1961 (lex.), K.C. Jairam coll. ; ***Meghalaya*** : Shillong (lex.), Garo Hills, Above Tura, 3500-3900ft., 15.VII-30. VIII. 1917 (2exs.), S. Kemp coll. ; ***Assam*** : Sonapur (lex.) ; ***Kerala*** : Parambikulam, 1700-3200ft., 16-24.ix. 1914 (2exs.), F.H. Gravely coll. ; ***Sikkim*** : (2exs.), without data (lex.).

Distribution : India : Arunachal Pradesh, Assam, Bihar, Karnataka, Kerala, Meghalaya and West Bengal.

Elsewhere : Indo-China, Indonesia, Malacca, Myanmar and Sumatra.

Genus ***Lasiochila*** Weise

1916. *Lasiochila* Weise, *Dtsch. Ent. Zschr.* : 37 (new name for *Anisodera* Baly, 1858).

1916. *Anisoderopsis* Maulik, *Proc. Zool. Soc. London* : 570.

1943. *Lasiochila* : Uhmann, *Stettin. Ent. Ztg.*, **104** : 169 (Synonymized)

6. ***Lasiochila excavata*** (Baly)

1858. *Anisodera excavata* Baly, *Cat. Hisp.* : 105.

1916. *Anisoderopsis excavata* : Maulik, *Proc. Zool. Soc. London,* **1916** : 570.

1958. *Lasiochila excavata* : Uhmann, *Col. Cat. Suppl.* **35** (2) : 162.

Material : ***Sikkim*** : Mangan, 1200m., 8.v. 1962 (12exs.), G. Ramakrishnan coll. Sikkim (5exs.), Rishikhola, 994m., 7.v. 1959 (2exs.), A.G.K. Menon coll. ; ***West Bengal*** : Darjeeling, Pashok, 3000ft., 26.v.–14. vi..1916 (2exs.), F.H. Gravely coll. ; Pashok, 3500ft., v–1916 (3exs.), R.S. Lister coll., Pashok, 11.VI. 1916 (2exs.), L.C. Hartless coll., Kalimpong, 24.IV-10.V 1915 (lex.) F.H. Gravely coll., Darjeeling (lex.), Darjeeling, V-VI.1912 (3exs.) ; ***Bihar*** : Purnea (lex.), C.A. Paiva coll. ; ***Assam*** : Cachar (4exs.), J.W. Mason coll., Sibsagar (2exs.),

MYANMAR : Sadon, IV-V. 1911 (2exs.), E. Colenso coll.

Distribution : India : Assam, Bihar, Meghalaya, Sikkim and West Bengal. Elsewhere : Myanmar and Vietnam.

Remarks : First record from Bihar.

7. ***Lasiochila cylindrica*** (Hope)

1831. *Trogosita cylindrica* Hope, *Zool. Misc.* 27

1885. *Anisodera cylindrica* Baly, *Cat. Hisp.* : 106

1919. *Anisoderopsis cylindrica* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 40.

1958. *Lasiochila cylindrica* : Uhmann, *Col. Cat. Suppl.* **35** (2) : 162.

Material : ***Assam*** : Sibsagar (lex.), Mangaldai, 31.xii. 1910 (lex.), S.W. **Kemp coll.**; ***Meghalaya*** : Garo Hills, Above Tura, 3500-3900ft., 15-VII. -30. VIII. 1917 (3exs.), S.W. **Kemp** coll. ; ***Sikkim*** (3exs.) ; ***West Bengal*** : Darjeeling, Mahanadi, 1200m., 22.V. 1971 (lex.), **A.R.** Bhaumik coll., Darjeeling Chawk, 2000m., 15.V. 1974 (lex.), J.K. Jonathan coll.

Distribution : India : Assam, Meghalaya and West Bengal. Elsewhere : Mayanmar **and Nepal.**

8. ***Lasiochila nigra*** (Maulik) New combination

1919. *Anisoderopsis nigra* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 40.

Material : ***West Bengal*** : Mamode, V. 1988 (lex.), Atkinson coll.

Distribution : India : Kerala and West Bengal.

9. ***Lasiochila vitalisi*** (Maulik)

1919. *Anisoderopsis vitalisi* Maulik, *Ann. Mus. Stor. Nat. Genova,* (3) **8** (48) : 383.

1958. *Lasiochila vitalisi* : Uhmann, *Junk's Col. Cat. Suppl.* Pars 35(2) : 164.

Material : ***Vietnam*** : Namlong, Altomekong, 26.IV. 1918 (lex.).

Distribution : Myanmar and Vietnam.

Genus ***Callispa*** Baly

1858. *Callispa* Baly, *Cat. Hisp.* : 4.

1919. *Callispa* : Maulik, *Fauna Brit. India, Col., Chry.* (Hisp. & Cass.) : 43.

10. ***Callispa jaya*** n. sp.

(Fig. 1)

General appearance oblong-elongated, shiny, yellow brown with eyes, antennae, **mouth parts,** tarsi and articulations of legs, black.

Head extremely finely punctate with a few strong punctures behind eyes. Antennae short, slightly longer than the length of head and prothorax combined, punctate and gradually thickened towards apex, segment 1 short, segment 2 longer than segment 1, segment 3 longer than segment 2 and shorter than the length of segment 1 and 2 combined, segment 4 shorter than segment 3 and almost equal to segment 5, segments 6-10 gradually shorter, segment 11 longest and bluntly pointed. *Prothorax* broader than long (1.35 x 1.00 mm.) sides parallel and margined, anterior angles round and posterior angles acute, surface with a broad lateral depression and a short transverse depression in the middle at base, two to three short rows of coarse punctures placed longitudinally on either side of median line, one row of coarse punctures placed along the basal margin and the same type of punctures on the lateral sides and also on the lateral depressions, rest of the surface impunctate. Scutellum quadrate, sides parallel, apical margin broadly rounded and impunctate. *Elytra* broader than prothorax at base, paralled-sided, punctate-striate, scutellary striole short, besides this, each elytron with ten rows of punctures (eight rows at base), interestices flat and impunctate. Ventral side shiny, abdomen finely and closely punctate, lateral sides of sterna coarsely punctate.

Measurements of holotype : Length 4.70 mm., breadth –2.00 mm. length of prothorax –1.00 mm. width of prothorax – 1.35 mm., length of antennae 1.60 mm.

Holotype ♂, India : West Bengal : Darjeeling dist., Lolegaon, 11.iv.1976, C.R. Basu coll., *Paratypes* 10 ♂ ♀ same as holotype.

This species is near *C. nigritarsata* Maulik but can be separated from the latter species by the following characters : Head extremely finely punctate with a few strong punctures behind eyes, prothorax very broad nearly one and a half times as broad as long, antennal segment 3 shorter than the length of segment 1 and 2 combined, abdomen finely and closely punctate, elytra uniformly yellow-brown, tarsi and articulations of leg-joints black, size smaller (4.70 mm.).

11. *Callispa vittata* Baly

1858. *Callispa vittata* Baly, *Cat. Hisp.* : 7.

1919. *Callispa vittata* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 52.

Material : ***West Bengal*** : Howrah dist., Mourigram, 15.v. 1977 (lex.), T. Sengupta coll. ; ***Karnataka*** : N. Kanara (lex.).

Distribution : India : Karnataka, Tamilnadu and West Bengal.

Remarks : First record from West Bengal.

12. *Callispa dimidiatipennis* Baly

1858. *Callispa dimidiatipennis* Baly, *Cat. Hisp.* : 7

1919. *Callispa dimidiatipennis* : Maulik, *Fauna Brit. India. Col., Chry. (Hisp. & Cass.)* : 56.

Material : ***Assam*** (lex.) ; ***Meghalaya*** : Garo Hills, Above Tura, 3500-3900ft., 15.VII–30.VIII. 1917 (8exs.), S. Kemp coll.

Distribution : India : Assam, Meghalaya and Northern India. Elsewhere : Mayanmar.

Remarks : First record from Meghalaya.

13. ***Callispa brettinghami*** Baly

1969. *Callispa brettinghami* Baly, *Trans, ent. Soc. London* : 365.

1919. *Callispa brettinghami* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 58.

Material : ***Arunachal Pradesh*** : Subansiri Riv., Nacho, 500m., 28.iv.1959 (lex.), J.M. Julka coll. ; ***Sikkim*** : Singtam, 1505m., 5.iv.1959 (lex.), A.G.K. Menon coll. ***Myanmar*** : Upper Tenasserim (lex.).

Distribution : India : Arunachal Pradesh and Sikkim.

Elsewhere : Mayanmar.

Remarks : First record from Arunachal Pradesh and Sikkim.

14. ***Callispa hypoenops*** Maulik

1919. *Callispa hypoenops* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 60.

Material : ***Vietnam*** : Ban Pan, Alto Mekong, 2.v. 1918 (lex.).

Distribution : India : Nagaland : Naga hills. Elsewhere : Indo-China.

15. ***Callispa karena*** Maulik

1919. *Callispa karena* Maulik, *Fauna Brit, India, Col., Chry. (Hisp. & Cass.)* : 62.

Material : ***Meghalaya*** : Garo Hills, Above Tura, 3500-3900ft., 15.vii-30viii. 1917 (lex.) S. Kemp coll. ; ***Vietnam*** : Tonkin, Houei Ko, Luang Prabang (lex.).

Distribution : India : Meghalaya. Elsewhere : Myanmar and Vietnam.

16. ***Callispa bijaya*** n. sp.
(Fig. 2)

General appearance oblong-elongate, shiny, yellow bown with the eyes, labrum, mandible, antennae and sometimes tarsi and articulations of leg-joints, dark red to blakish.

Head finely punctate. Antennae moderately long and longer than the length of head and prothorax combined, segmen 3 markedly shorter than the length of segment 1 and 2 combined and nearly equal to segment 2, segment 4 and 5 equal and each shorter than segment 2 or 3 and equal to segment 1.

Prothorax similar to the previous species *C. jaya* n. sp.

Elytra broader at base than prothorax, parallel-sided, punctate-striate, besides a short scutellar row each elytron with eleven rows of punctures which reduce to ten rows at apex and nine rows at base. Other characters similar to those of the previous species *C. jaya* n. sp.

Measurements of holotype : Length – 4.40mm., breadth – 2.00mm. length of prothorax – 1.00mm. width of prothorax – 1.30mm., length of antennae – 1.60mm.

Holotype ♂, INDIA : WEST BENGAL : Darjeeling dist., Tarkhola, 20.iv. 1976, C.R. Basu coll., *paratypes* 114 exs. : 112 exs., same as holotype ; lex., Darjeeling dist., Teesta Bazar, 18.iv. 1976, C.R. Basu coll., lex., Lolegaon, 11.iv.1976, C.R. Basu coll.

This species is closely allied to *C. jaya* n. sp. but can be separated from the latter species by the following characters : Each elytron with eleven rows of punctures instead of ten rows in *C. jaya* n. sp. ; antennae longer with the segment 3 nearly equal to segment 2 and size smaller (4.40mm.).

17. ***Callispa brihata*** n. sp.
(Fig. 4)

General appearance elongate-ovate, shiny ; head, prothorax and scutellum bright red, eyes and antennae black with the segment 1 ventrally tinged with red, elytra blue-black, ventral side bright red.

Head indistinctly finely punctate with a faint longitudinal depression at middle. Antennae short, punctate, deeply inserted between head and upper border of oral cavity and extending to the base of elytra, apical segments laterally flattened, segmen 1 short, segment 2 longer than segment 1, segment 3 equal to the length of segment 1 and 2 combined, segments 4-10 gradually shorter and densely pubescent, last segment bluntly pointed. *Prothorax* twice as broad as long, sides margined, very feebly rounded posteriorly and widely rounded anteriorly, anterior margin concave, basal margin bisinuate, lateral depressions broad, basal depression small and shallow, surface coarsely and sparsely punctate along the lateral and based areas leaving almost an impunctate space across the anterior border and a narrow space longitudinally down the middle. Scutellum pentagonal, smooth and impunctate. *Elytra* hardly broader than prothorax at base, parallel-sided, convex and punctate-striate, each elytron with a short scutellar row and eleven rows of punctures at middle reduce to ten rows at apical area, fifth to eighth rows depressed at middle, punctures larger at lateral depression just before middle, interstices finely punctate and slightly convex at apical area. Ventral side uniformly red, abdominal sternites strongly punctate, especially the last one densely punctate, posternum impunctate, proepisternum and lateral side of metasternum with coarse punctures.

Measurements of holotype : Length –7.00mm, breadth –3.50mm., length of prothorax –1.50mm., width of prothorax –3.00mm., length of antennae –2.70mm.

Holotype lex., INDIA : SIKKIM : Tadong, 5.ix. 1977, T.D. Soota coll., *Paratype* lex., WEST BENGAL : Darjeeling dist., Bhalukpong, 31.v. 1980, R.N. Tiwary coll.

This species is near *C. montivaga* Maulik but can be easily separated from the latter species by the following characters ; Prothorax strongly transverse (twice as boas as long), each elytron

with eleven rows of punctures excluding scutellar row instead of ten rows in *C. montivaga*, size smaller (7.00mm.).

18. *Callispa ajaya* n. sp.
(Fig. 3)

General appearance oblong-elongate, shiny, pale yellowish brown with the eyes, mouth parts, scutellum and antennae, black, ventral side black with ventral side of head, prothorax and prosternum yellowish brown.

Head impunctate with a faint median circular depression. antennae longer than the head and prothorax combined, punctate, gradually thickened and densely pubescent towards apex, segment 1 short, segment 2 longer than segmen 1, segment 3 longer than segment 2 and shorter than the length of segment 1 and 2 combined, segments 4 to 10 gradually shorter, last segment long and pointed. *Prothorax* slightly broader than long (.90 x 1.10mm.), parallel-sided, front margin straight, lateral depressions moderately deep with coarse punctures, basal median depression short and almost semicircular, a few coarse punctures form a longitudinal pit at either side of the median longitudinal line at middle, rest of the surface almost impunctate. Scutellum quadrate, sides parallel and its apex broadly rounded, surface smooth and impunctate, *Elytra* broader than prothorax at base, slightly broadened towards apex, lateral margins expanded, punctate-striate, each elytron with ten rows of punctures excluding a short scutellar row, interstices flat and impunctate, Ventral side smooth and more shiny, metasternum with a few coarse punctares at lateral sides, abdomen finely punctate, epipleura almost uniformly broad and concave.

Measurements of holotype: Length –4.30mm., breadth –1.70mm., length of prothorax –.90mm., width of prothorax –1.10mm., length of antennae –1.60mm. Paratypes ranging to 4.80mm. in length with 1.80mm. in breadth.

Holotype ♂, INDIA : WEST BENGAL : Darjeeling dist., Ghoombhanjang, 2300m., 29.v. 1975, J.K. Jonathan coll., *Paratypes* same as holotype (2exs.), 30.v. 1975 (2exs.) ; Bijanbari, 900m., 20.v. 1974 (lex.), J.K. Jonathan coll., Pashupatinagar, 1800m., 23.v.1975 (lex.), J.K. Jonathan coll. ; Garubathan, 10.iv. 1976 (2exs.), Tindharia, 856m., 4.v. 1976 (lex.), Chailkhola, 12.iv.1976 (lex.), all C.R. Basu coll.

This species is near *C. bijaya* n. sp. but can be separated from the latter species by the following characters : Head impunctate, antennae thickened apically, with its segment 3 distinctly longer than segment 2, prothorax broader than long and its remaining parts of the surface, other than coarsely punctate areas, being almost impunctate. Elytra with ten rows of punctures (except scutellar row) with the interstices plain and impunctate.

19. *Callispa insignis* Baly

1858. *Callispa insignis* Baly, *Cat, Hisp.* : 4.

1919. *Callispa insignis* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 67.

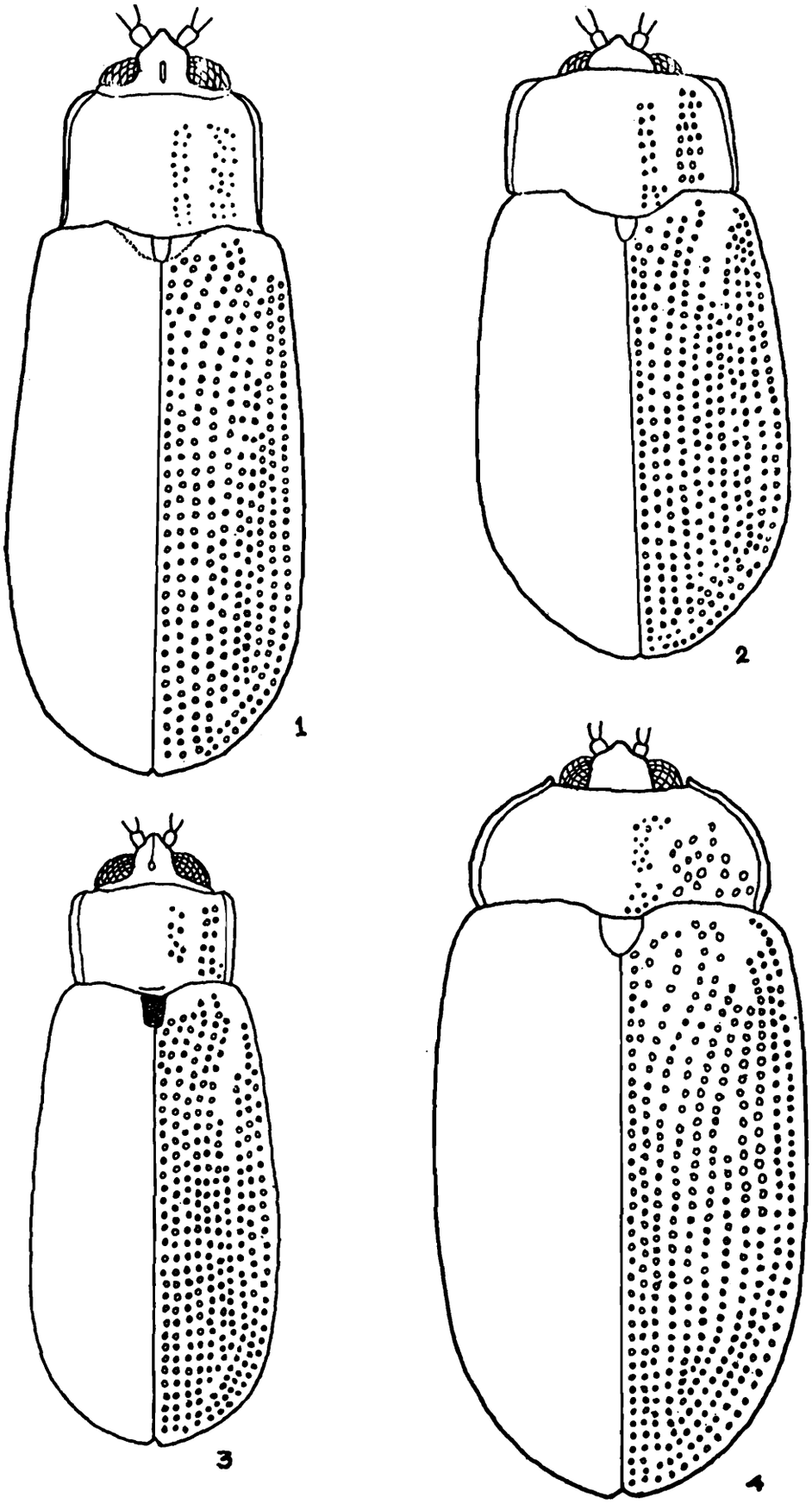


Fig. 1. *Callispa jaya* n. sp. **2.** *Callispa bijaya* n. sp. **3.** *Callispa ajaya* n. sp. **4.** *Callispa brihata* n. sp.

Material : Meghalaya : Garo Hills, Above Tura, 3500-3900ft., 15.VII. –30.VIII. 1917 (lex.), S. Kempa coll.

Distribution : India : Meghalaya and North India (mentioned by Maulik)

Remarks : First record from Meghalaya.

20. ***Callispa paharia*** n. sp.
(Fig. 5)

General appearance oblong, shiny, blue-black. Antennae, scutellum and elytral suture narrowly, black ; ventral side black with palpi, legs and abdomen reddish brown, last segment of abdomen with a black spot at middle.

Head strongly produced between the antennae and finely puncate with a moderately impressed median longitudinal line on the vertex. Antennae long, slightly longer than half the length of the body, segment 1 and 2 short and nearly equal in length, segment 3 almost equal to segment 1 and 2 combined, segment 4 shorter than segment 3 and longer than segment 5, segment 5-10 equal, segment 11 longest and bluntly pointed, and all the segments are of equal width. *Prothorax* twice as broad as long, sides slightly rounded and strongly convergent towards front, width across the front margin nearly half of basal width, anterior angles acute, surface moderately convex, sides strongly punctate and middle part almost impunctate. Scutellum triangular, transverse and its apex broadly rounded, surface smooth and impunctate. *Elytra* broader than prothorax at base, nearly parallel-sided, convex, moderately depressed in the middle at lateral sides (fifth to twelveth row), strongly punctate-striate, striae stronger at lateral sides and finer at apex ; each elytron with a short scutellar row and twelve rows at middle and eleven rows behind middle, interstices flat.

Measurements of holotype –Length 5.00mm., breadth –2.50mm., length of prothorax –.90mm., width fo prothorax – 1.70mm. length of antennae –2.00mm.

Holotype lex., INDIA : WEST BENGAL, Darjeelong dist., Ghoombhanjang, 2300m., 28.v. 1975, J.K. Jonathan coll.

This species is near *C. feae* Baly but can be easily separated from the latter species by its head being finely punctate, prothorax markedly narrower at apex, elytra distinctly broader than prothorax at base, abdomen and legs reddish brown.

Genus ***Amblispa*** Baly

1858. *Amblispa* Baly, Cat. Hisp. : 10.

1919. *Amblispa* : Maulik, *Fauna Brit. India, Col. Chry. (Hisp. & Cass.)* : 70.

21. ***Amblispa ? laevigata*** (Guerin)

1844. *Microrhopala laevigata* Guerin, *Icon. Regne Anim. Ins.* : 278.

1858. *Amblispa laevigata* : Baly, *Cat. Hisp.* : 12.

Material : ***Himachal Pradesh*** : Solan, 1525m., 24.vi. 1968 (lex.), O.B. Chhotani coll. ; ***Madhya Pradesh*** : Jabalpur, 4.iv. 1967 (lex.), H. Khajuria coll., Seoni dist., Doodhia Tank, 12.i. 1917 (lex.), E.A.D. Abreu coll. ; ***Tamilnadu*** : Salem dist., Chitteri Hills, 20-22.vi. 1926 (lex.), H.S. Pruthi coll.

Distribution : India : Himachal Pradesh, Madhya Pradesh, Maharashtra, Kerala, Tamilnadu and West Bengal.

Remarks : Four examples dealt with here are broadly identical with *A. laevigata* (Guerin) but differs in puncturation. Moreover each of them slightly varies individually. One example was attended by Maulik and retained it with a label '*Amblispa*'. As there is no type or even an identified specimen before me and the materials are very few in number I am retaining these under *laevigata* with a query mark.

Genus ***Leptispa*** Baly

1858. *Leptispa* Baly, *Cat. Hisp.* : 1

1919. *Leptispa* : Maulik, Fauna Brit. India. Col., Chry. (Hisp. & Cass.) : 75.

22. ***Leptispa pygmaea*** Baly

1858. *Leptispa pygmaea* Baly, *Cat. Hisp.* : 2.

1919. *Leptispa pygmaea* :*Maulik, Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 76.

Material : ***Assam*** : Addabari, 28.xii. 1966 (lex.), S. K. Bhattacharyya & A.N.T. Joseph coll. ; ***West Bengal*** : North 24-Parganas, Dum Dum Air Port, 24.xi. 1965 (lex.), P. Parui coll. ; ***Maharashtra*** : Belgaum (lex.), Poona, 4.xii. 1893 (lex.) ; ***Kerala/Karnataka*** : Melabar (lex.) ; ***Meghalaya*** : Jayantia Hills : Jowai, Mooralong, 27.ix. 1988 (2exs.), V.D. Srivastava coll. ; E. Khasi Hills : Pynursla, 11.xi. 1991 (lex.), R. C. Basu coll.

Distribution : India : Assam, Kerala/Karnataka, Maharashtra Meghalaya and West Bengal. Elsewhere : Sri Lanka.

Remarks : First record from Assam and West Bengal.

23. ***Leptispa kanistha*** n. sp.
(Fig. 8)

General appearance elongate, narrow, parallel sided, black and shiny ; ventral side black with abdomen yellowish brown and tarsi brownish black.

Head depressed at the bases of antennae, interocular space flat, coarsely and roughly punctate with a broad and deep median longitudinal channel, eyes convex, Antennae short extending to the base of prothorax, segment 1 thickest, punctate, compressed and dilated externally at apex and trancated, segment 2 short and rounded, segment 3 slender and shorter than segment 2, from 4 segments gradually thickened. *Prothorax* as long as broad, sides slightly broadened towards front

and rounded at apical half, margins reflexed, front angles pointed and hind angles acute ; front margin nearly straight ; basal margin straight, slightly produced and depressed at middle before scutellum ; surface convex with a mixture of coarse and fine punctures. Scutellum elongated. parallel sided with its apex rounded, surface impunctate. *Elytra* broader than prothorax at base, parallel sided, apex rounded and dehiscent at sutural angle, humerous longitudinally raised for a certain length, each elytron with ten rows of punctures excluding a short scutellar row, interstices raised at apical areas and the interstice between eighth and ninth rows of punctures raised and terminated before apical area, rows of punctures not placed on impressed lines. Ventral side shiny and punctate, abdominal segments with a depression at lateral sides. Front tarsi very broad and almost as long as tibia, claws simple.

Measurements of holotype : Length–5.10mm. breadth –1.20mm., length of prothorax –1.0mm., breadth of prothorax – 1.0mm, length of antenna –1.30mm.

Holotype lex., INDIA : WEST BENGAL : Darjeeling dist., Tarkhola, 450m., 20.iv. 1976, C.R. Basu coll.

This species is near *L. samkirna* Maulik but can be easily separated from the latter species by its head with a broad and deep median longitudinal channel, antennal segment 1 thickest compressed and dilated externally at apex and truncated, segment 2 distinctly shorter than segment 1, prothorax as long as broad, sides not parallel but slightly broadened towards front, anterior angles pointed. Elytra broader than prothorax at base, rows of punctures are not placed on impressed lines, abdomen yellow brown and size smaller and narrower (5.10x 1.20mm.).

24. ***Leptispa anu*** n. sp.
(Fig. 10)

General appearance small, elongate, narrow, almost parallel-sided, shiny and black.

Head depressed at bases of antennae, interocular space not depressed but slightly convex, granulate and coarsely punctate, latter gradually finer towards base, eyes depressed, antennae short extending beyond the base of prothorax, segment 1 long and slightly shorter than the length of segment 2 and 3 combined, segment 2 not rounded but cylindrical, markedly shorter than segment 1 and slightly shorter than segment 3, the following segments short and gradually thickened, *Prothorax* nearly quadrate (.80 x .90mm), slightly narrowed anteriorly, lateral margins reflexed, very slightly rounded and gently converging from base to apex, anterior margin concave, posterior sinuated, surface transversely convex, no lateral depressions, granulate and strongly punctate. Scutellum elongate, apex rounded, surface shiny, granulate and impunctate. *Elytra* as broad as prothorax at base, nearly parallel-sided with a very slight depression before middle, rounded and slightly reflexed at apex, dehiscent at sutural angles, strongly punctate-striate, punctures placed on the impressed lines, interstices finely punctate, convex and strongly so at apical and lateral areas. Ventral side shiny and punctate, mesosternum and apical part of metasternum longitudinally foldate or sulcate, tarsi longer than tibiae, claws simple.

Measurements of holotype : Length 4.70mm., breadth 1.10mm., length of prothorax –.80mm., width of prothorax – .90mm, length of antennae –1.10mm.

Holotype lex., INDIA : TAMILNADU : Palni Hills, Neutral Saddle, 5000ft., 13-15. ix. 1922, S. Kemp coll.

This species is near *L. kanistha* n. sp. but can be easily separated from the latter species by the following characters : head not depressed but slightly convex, granulate, less coarsely puncate and gradually finer towards base, no median longitudinal channel ; antennal segment 1 long and thick but not compressed and truncated as in *L. kanistha n. sp.*; prothorax slightly narrowed anteriorly ; elytra as broad as prothorax at base, rows of punctures placed on impressed lines, interstices finely punctate ; tarsi longer than tibiae, species entirely black, size smaller (4.70mm.)

25. *Leptispa rufithorax* Maulik

1919. *Leptispa rufithorax* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 78.

Material : Tamilnadu : Nilgiri Hills (lex.), H.L. Andrewes coll.

Distribution : India : Tamilnadu.

26. *Leptispa krishna* n. p.
(Fig. 7)

General appearance small, elongate, narrow, shiny and black, prothorax both dorsally and ventrally and head ventrally red brown with apical border (both dorsal and ventral) of prothorax black, prosternum bordered with black, sometimes prosternal process completely black, antennae black with the ventral side of segment 1 sometimes red.

Head depressed at the bases of antennae, interocular space flat, densely punctate with coarse and fine punctares, median longitudinal impressed line broad and deep. Antennae shorter and half as long as head and prothorax combined, punctate and gradually thickened apically with dense pubescence, segment 1 long and thick, segment 2 shorter than segment 1, segments 3, 4 and 5 subequal and each shorter than segment 2, next segments longer and thicker. *Prothorax* slightly broader than long (1.00 x 1.10mm.), parallel sided, gently rounded behind anterior angles, anterior angles pointed, posterior angles acute and toothed, apical margin straight, basal margin sinuate, surface convex, covered with large and small punctures, anterior border devoid of punctures, Scutellum quadrate, black, impunctate, slightly depressed at the midle and its apical margin rounded. *Elytra* as broad as prothorax at base, almost parallel sided, apex rounded and reflexed, strongly punctate-striate, scutellary striole short and ten regular rows of puncture, rows being slightly inwardly curved, interstices finely punctate and raised at apical and lateral areas. Ventral side shiny, abdomen and metasternum strongly and densely punctate ; mesosternum longitudinally and strongly sulcated, epipleura gradually broadened towards apex.

Measurements of Holotype : Length –4.50mm, breadth –1.20mm., length of prothorax –1.00mm., breadth of prothorax –1.10mm., length of antenna –1.00mm.

Holotype lex., INDIA : SIKKIM, Rangpo, 450m., 19.iv.1976, C.R. Basu coll. ; *paratypes*, same as holotype (2exs.) ; WEST BENGAL : Darjeeling dist. : Rangpo, 450m., 15.iv.1976

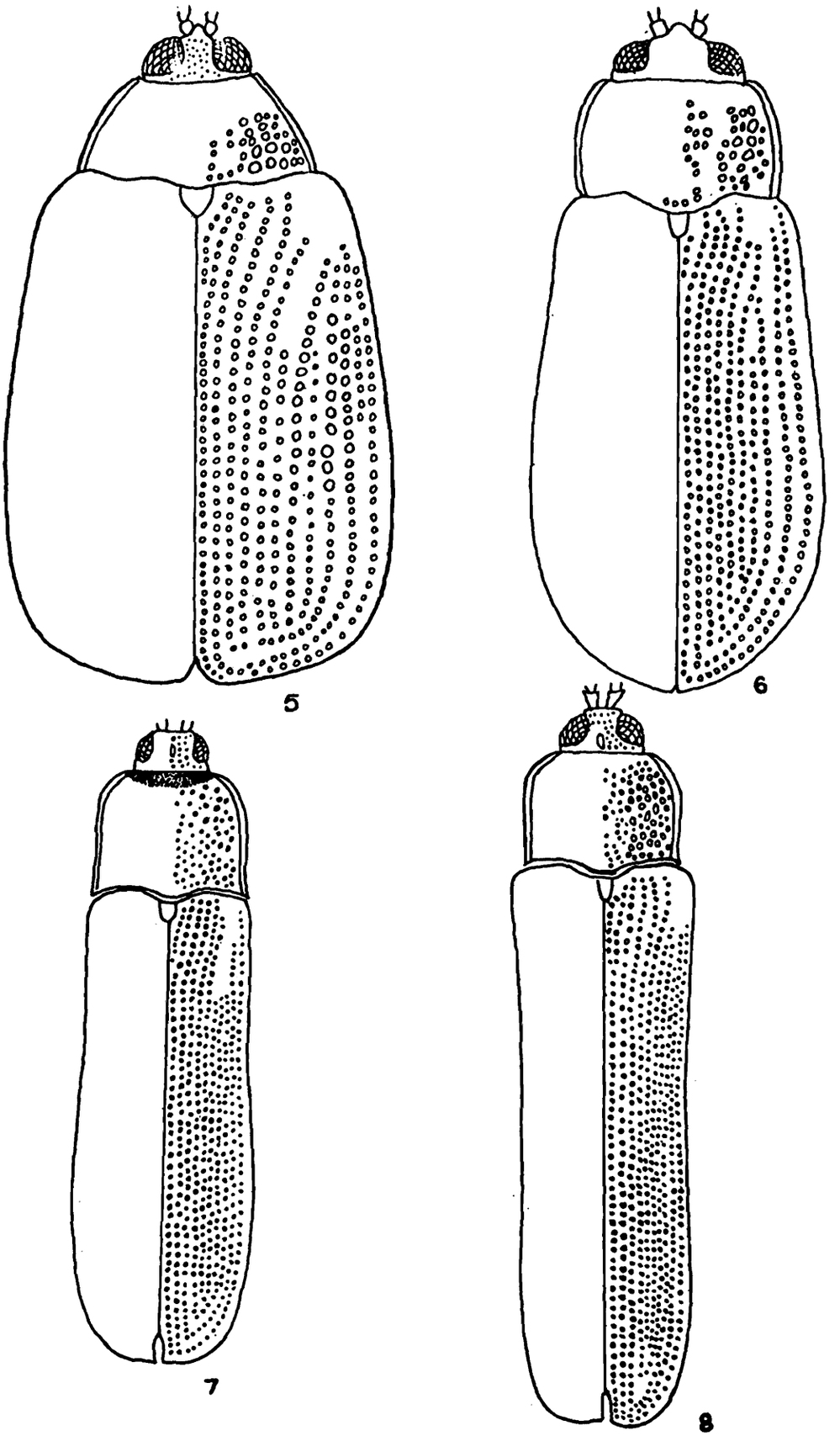


Fig. 5. *Callispa paharia* n. sp. **6.** *Callispa vittata* Baly. **7.** *Leptispa krishna* n. sp. **8.** *Leptispa kanistha* n. sp.

(17exs.), C.R. Basu coll. ; Tarkhola, 20.iv.1976 (2exs.), Teesta Bazar, 18.iv.1976 (2exs.), all C.R. Basu coll. ; Rangpo, 10.iv.1973 (lex.), Rayang, 390m., 13.iii.1973 (lex.), Rendam Tea Estate, 1525m., 23.iv.1973 (lex.), all P.K. Maiti coll.

This species is near *L. rufithorax* Maulik but can be easily separated from the latter species by the following characters : Pronotum almost uniformly punctate and no median longitudinal area is left impunctate, lateral depressions absent, rows of punctures of elytra inwardly carved as in *L. pygmaea* Baly, scutellary striole short, epipleura gradually broader towards apex and the size smaller (4.50mm.).

Genus *Chaeridiona* Baly

1869. *Chaeridiona* Baly, *Trans. ent. Soc. London* : 380.

1919. *Chaeridiona* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 85.

27. *Chaeridiona picea* Baly

1869. *Chaeridiona picea* Baly, *Trans. ent. Soc. London* : 382.

1919. *Chaeridiona picea* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 87.

Material : ***Madhya Pradesh*** : Jabalpur, 16.ix.1967 (3exs.), H. S. Sharma coll., Jabalpur, Sukha vill., 14.ix.1962 (5exs.), S. Chakrapani coll.

Distribution : India : Madhya Pradesh (only 'INDIA' was mentioned in earlier record).

Remarks : First record from Madhya Pradesh.

28. *Chaeridiona pseudometallica* n. sp.
(Fig. 12)

General appearance small, wedge-shaped, convex ; the prothorax and elytra metallic green in the middle, sides purplish red, apical area of elytra also purplish red with the extreme apex yellowish brown ; four apical segments of antennae black, basal two segments dark red and the rests red-brown, scutellum purplish red ; undeside dark brown with the metasternum tending to black ; legs yellowish brown with the tarsi brown.

Head deeply and coarsely punctured with a ridge round the eyes ; the front produced between the antennae and extended downwards to form a longitudinal ridge and runs along the upper border of clypeus. Antennae extending beyond the middle of elytra, segment 1 thick and rounded, segment 2 thick and small, segment 3 longer than segment 2 and equal to segment 4, segment 5 and 6 subequal and each shorter than segment 4, segment 7 shorter than segment 6, segments 8-11 form a club and segments 8-10 subequal, each of them longer than preceeding segments. *Prothorax* quadrate, subcylindrical, sides subparallel and bisinuate, anterior angles notched but not bidentate, surface deeply, coarsely and rugosely punctate. *Scutellum* elongate, depressed, smooth and impunctate. *Elytra* much broader than prothorax at base, sides narrowly margined and

broadened towards apex, humeral callus strongly raised, each elytron with four strongly raised longitudinal costae, the fourth one entire, third one interrupted at middle where there is a strong depression, the first and second ones prominent only at apical area, the interstice between third and fourth costae raised in the middle, suture is also raised ; two rows of punctures betwen each pair of costae, but the fifth and sixth rows reduce to one row at middle where there is a depression and again two rows behind middle, besides these there is a short scutellar row also ; the punctures are deep and coarse ; elytral margin expanded laterally, edge not serrated. *Underside* : prosternum coarsely punctate, metasternum with a row of coarse puncture along lateral and apical margin, abdomn impunctate.

Measurements of holotype : Length –3.20mm., breadth –1.50mm., length of prothorax –.60mm., width of prothorax –.65mm., length of antennae –2.00mm.

Holotype lex., INDIA : WEST BENGAL : Darjeeling dist., Rangiroom, 2000m., 3.iv.1978, C.R. Basu coll. ; *paratype* lex., same as holotype.

This species is very near *C. metallica* Baly but can be easily separated from the latter species by the following characters : The fourth costa of elytra is entire, the first and second costae only prominent at apical area ; the fifth and sixth rows of punctures reduce to one row at middle and again two rows behind middle, elytral margin not serrated but slightly weavy ; antennal segments different, anterior angles of prothorax not bidentate and size smaller (3.20mm.).

Genus ***Prionispa*** Chapuis

1875. *Prionispa* Chapuis, *Gen. Col.* 11 : 337.

1919. *Prionispa* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 88.

29. ***Prionispa himalayensis*** Maulik

1915. *Prionispa himalayensis* Maulik, *Rec. Ind. Mus.* : 371.

1919. *Prionispa himalayensis* : Maulik, *Fauna Brit. India, Col:, Chry. (Hisp. & Cass.)* : 92.

Material : ***West Bengal*** : Darjeeling dist. ; Bhutra Rd., 2000m., 16.v.1974 (lex.), J.K. Jonathan coll., Mahanadi, 1255m., 28.iv.1971 (lex.), A.R. Bhaumik coll., Kurseong, 21.vi.1910 (lex.), N. Annandale coll.

Distribution : India : West Bengal.

30. ***Prionispa sonata*** Maulik

1919. *Prionispa sonata* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 93.

Material : ***Meghalaya*** : Khasi Hills, Shillong, 5500-6400ft., 29.viii. –5.ix.1915 (lex.), S.W. Kemp coll.

Distribution : India : Meghalaya.

Genus *Oncocephala* Chevrolat

1847. *Oncocephala* Chevrolat, d 'Orbigny's *Dict. Univ. Hist. Nat.* **9** : 110.

1919. *Oncocephala* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. Cass.)* : 98.

31. *Oncocephala quadrilobata* Guerin

1844. *Oncocephala quadrilobata* Guerin, *Icon. Regne Anim. Ins.* : 281.

1919. *Oncocephala quadrilobata* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 99.

Material : ***Andaman Islands*** (7exs.), ***Myanmar*** : Downa Hills, 2000-3000ft., 2-3.iii. 1908 (2exs.); ***Andhra Pradesh*** : W. Godavari dist., Koratuni, 13.iv.1996, S.K. Chatterjee coll.

Distribution : India : Andaman Is., Andhra Pradesh, Pondicherry and Tamil Nadu. Elsewhere : Myanmar.

Remarks : Cephalic protuberance with its anterior lobes are much closer and the specimens are larger (5.5m) in examples from Andhra Pradesh.

Genus *Javeta* Baly

1858. *Javeta* Baly, *Cat. Hisp.* : 108.

1919. *Javeta* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass)* : 105.

32. *Javeta pallida* Baly

1858. *Javeta pallida* Baly, *Cat, Hisp.* : 108.

1919. *Javeta pallida* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 106.

Material : ***West Bengal*** : Calcutta (3exs.), Dankuni, 22.1. 1976 (8exs.), K.K. Roy Coll. ; ***Uttar Pradesh*** : Lucknow, 5.iii. 1911 (lex.),

Distribution : India : Tamilnadu and West Bengal.

Remarks : First record from North East India (West Bengal).

Genus *Coelaenomenodera* Blanchard

1845. *Coelaenomenodera* Blanchard, *Hist. Nat. Ins.* **2** : 181

1958. *Coelaenomenodera* : Uhmann, *Col. Cat. Suppl., Pars* 35 (2) : 218.

33. *Coelaenomenodera elaeidis* Maulik

1920. *Coelaenomenodera elaeidis* Maulik, *Bull. Ent. Res.* **10** : 171.

1958. *Coelaenomenodera elaeidis* : Uhmann, *Col. Cat. Suppl.*, pars 35 (2) : 219.

Material : ***Africa*** : Gold Coast (lex.), S. Maulik coll.

Distribution : Africa, France Guiana.

Genus ***Pistosia*** Weise

1905. *Pistosia* Weise, *Arch. Naturg.*, **71** (1) : 93.

1928. *Wallaceana* Maulik, *Proc. Zool. Soc. London*, **1928** : 159 (new name for *Wallacea* Baly, 1858).

1975. *Pistosia* : Wurmli, *Ent. Arb. Mus. Fuey*, **26** : 50.

34. ***Pistosia dactyliferae*** (Maulik) n. comb.

1919. *Wallacea dactyliferae* : Maulik, *Fauna Brit. India, Col., Chry.* (*Hisp. & Cass.*) : 107

Material : ***Tamilnadu*** : Chingleput, 25.xi.1989 (8exs.).

Distribution : India : Bihar and Tamil Nadu.

Genus ***Downesia*** Baly

1858. *Downesia* Baly, *Cat. Hisp.* : 107.

1919. *Downesia* : Maulik, *Fauna Brit. India, Col., Chry.* (Hisp. & Cass.) : 110.

35. ***Downesia gestroi*** Baly

1888. *Downesia gestroi* Baly, *Ann. Mus. Civ. Genova*, : 660.

1919. *Downesia gestroi* : Maulik, *Fauna Brit. India, Col., Chry.* (*Hisp. & Cass.*) : 114.

Material : ***West Bengal*** : Darjeeling dist. : Teesta Bazar, 450m. 19.v. 1976 (lex.), C.R. Basu coll., Kurseong, 1445m., 3.v. 1971 (lex.), A.R. Bhaumik coll.

Distribution : India : West Bengal. Elsewhere : Burma.

36. ***Downesia ratana*** Maulik.

1919. *Downesia ratana* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 120.

Material : ***Malay*** : Hills nr. Taiping, Perak, 26-30.xii. 1915 (lex.), N. Annandale coll.

Distribution : Myanmar and Malay.

Genus ***Agonita*** Strand

1905. *Agonia* Weise (nec Froster), *Deut. Ent. Zeits.* **1905** : 116.

1919. *Agonia* : Maulik, *Fauna Brit. India, Col., Chry.* (Hisp. & Cass) : 122.

1942. *Agonita* Strand, *Folia Zool.* Hydrobiol., **11** : 391 (new name for *Agonia* Weise).

37. *Agonita saundersi* (Baly)

1858. *Gonophora saundersi* Baly, *Cat. Hisp.* : 110.

1919. *Agonia saundersi* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 125.

1958. *Agonita saundersi* : Uhmann, *Col. Cat. Suppl.* pars **35** (2) : 240.

Material : ***West Bengal*** : Darjeeling dist., Mungphu (lex.).

Distribution : India : West Bengal, Elsewhere : Bangladesh (Sylhet).

38. *Agonita fuscipes* (Baly)

1858. *Gonophora fuscipes* Baly, *Cat. Hisp.* : 111.

1958. *Agonita fuscipes* : Uhmann, *Col. Cat. Suppl.* pars **35** (2) : 238.

Material : ***Kerala*** : Vellayani, 23.iv.1956 (4exs.), M.R.G.K. Nair coll.

Distribution : India : Kerala.

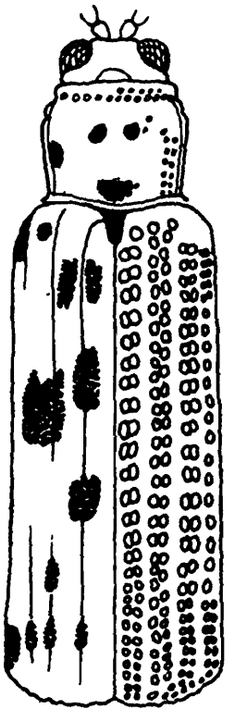
39. *Agonita darjeelingensis* n. sp.
(Fig. 11)

General appearance moderately broad, shining brown, antennae, eyes, apex of labrum, a little less than epical half of elytra, and last abdominal segment, black.

Head with vertex distinctly punctate, slightly depressed around the roots of antenna, Antennae nearly 1/3 length of the body, gradually dilated towards apex, segment 1 rounded, segment 2 slightly longer than segment 1, segment 3 narrower and as long as segment 2, segment 4 slightly shorter than segment 3, segments 4 onward gradually thickened. *Prothorax* distinctly broader than long (1.20mm x 1.90mm.), it's apical width nearly half of basal width (1.00mm x 1.90mm), sides slightly rounded, apical margin straight, basal margin depressed in the middle and slightly produced towards scutellum ; surface convex in the middle, strongly and coarsely punctate leaving a narrow impunctate space longitudinally along the middle, two oblique depressions one on either side, starting from the middle of base towards sides, these depressions and the sides coarsely and roughly punctate. *Scutellum* slightely broader than long, apex rounded, surface smooth and impunctate. *Elytra* slightly broader at base than prothorax, slighty broadened behind, apical margin finely serrated ; each elytron with three costae, first two regular and prominent, third one obliterated at the middle ; between first and second costae and between second and third costae two regular rows of puncture in each case, but between third costa and lateral margin only one row at the middle and two rows at base and apex. Underside shiny, abdominal segments with a lateral depression on either side. Front tarsi very broad and almost as long as tibiae.

Measurements of holotype : Length –5.60mm, breadth –2.20mm, Length of prothorax –1.20mm, width of prothorax –1.90mm.

This species is near *A. himalayensis* (Maulik) but can be separated from the latter species by its head being distinctly punctate, prothorax markedly broader than long.



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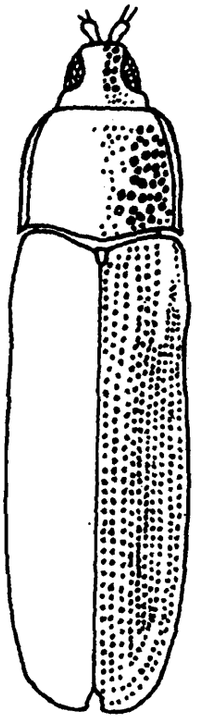

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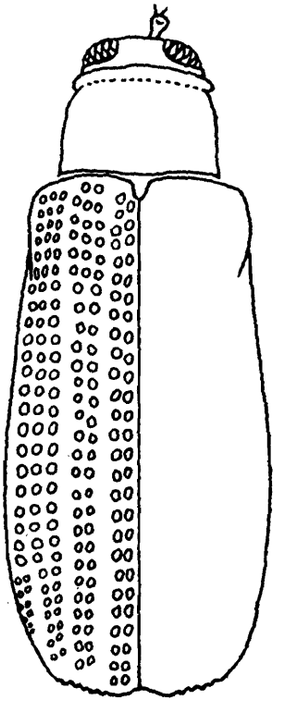

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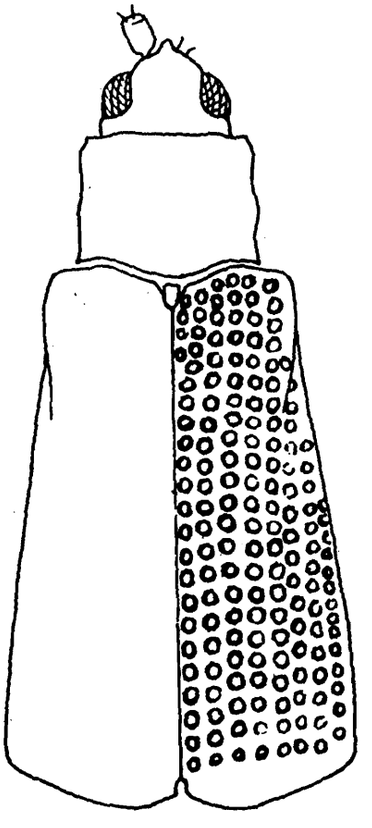

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Fig. 9. *Gonophora pitambara* n. sp. **10.** *Leptispa anu* n. sp. **11.** *Agonita darjeelingensis* n. sp. **12.** *Chaeridiona pseudometallica* n. sp.

Holotype lex., INDIA : WEST BENGAL : Darjeeling dist., Teesta, 214m., 24.v. 1979, M.S. Shishodia coll.

40. *Agonita pitava* n. sp.
(Fig. 15)

General appearance elongate, pale yellowish brown, shiny ; eyes, mandibles and apical part of labrum black ; antennae blackish with the two basal segments red brown.

Head smooth and impunctate. Antennae short extending to the base of elytra (nearly 1/3 length of the body), segment 1-3 almost equal in length, segment 4 short, segments 5-11 gradually thickened. *Prothorax* quadrate, anteriorly subcylindrical and slightly narrow, sides slightly sinuated, surface convex with two oblique depressions, each starting from the middle of the lateral side and converging towards scutellum, another short transverse depression along middle of basal margin, disc with irregular strong punctures and roughly punctate at sides and also along with the oblique depressions. Scutellum elongated with the apical margin rounded, surface impunctate. *Elytra* broader than prothorax at base, slightly broadened behind, apical margin rounded and serrated. Each elytron with eight rows of punctures at basal and apical region and seven rows at middle, and with three costae, first two being well developed but not very acute, third one only traceable at apical end ; suture elevated at apical half. Ventral side shiny, sternum laterally strongly punctate, abdomen fimely punctate with depressions at sides.

Measurements of holotype : Length –4.60mm., breadth –1.80mm., length of prothorax –1.20mm., width of prothorax –1.20mm., length of antennae –1.70mm.

Holotype lex., INDIA : WEST BENGAL : Calcutta, Eden Garden, 11.i.1961, A.P. Kapur coll.

This species is near *A. parvula* (Gestro) but can be easily separated from the latter species by its head being impunctate, third costa nearly absent and only traceable at apex, three basal segments of antennae are equal, species almost entirely pale yellowish brown, size larger (4.60mm.).

41. *Agonita lohita* n. sp.
(Fig. 14)

General appearance elongate, shiny, bright red with the head, eyes, antennae, labrum and underside (except palpi, pro-and mesosternum which are red), black. Sometimes tarsi, vertex of head and abdomen partly mixed with slight red or brown.

Head smooth and impunctate, eyes convex. Antennae nearly half the length of the body, punctate, pubescent and gradually thickened towards apex, segment 1 and 2 almost equal, segment 3 slightly longer than segment 2, segments 4-10 subequal, last segment longest. *Prothorax* quadrate, slightly narrowed in front, sides sinuate and margined, basal margin transversely depressed with a deep groove at middle ; surface convex, finely punctate, a deep oblique fossa on each side of the middle of base, the outer end of which nearly touch a simila longitudinal lateral fossa. *Scutellum* elongated, apical margin rounded, surface convex, smooth and impunctate, *Elytra*

nearly parallel sided, punctate striate, with the apical margin smooth and rounded, Each elytron with three welldeveloped costae of which third one being obliterated for a very short distance behind middle, between each pair of costae two regular rows of punctures, but between the third costae and lateral margin only one row of punctures which become double at base and apex. Ventral side shiny, depressions at lateral sides and with strong setiferous punctures on apical segment.

Measurements of holotype : Length –5.40mm., breadth –1.90mm., length of prothorax –1.20mm., width of prothorax across basal margin –1.20mm., length of antennae –2.30mm.

Holotype lex., INDIA : WEST BENGAL : Darjeeling dist., Lolegaon, 11.iv.1976, C.R. Basu coll. ; *Paratypes* 5exs. : 3exs., same as holotype ; lex., Darjeeling dist., Tarkhola, 450m., 20.iv.1976, C.R. Basu coll. ; lex., Darjeeling dist., Rambi bazar, 2.ix.1973, H.S. Sharma coll.

This species is near *A. immaculata* (Gestro) but can be easily separated from the latter species by its third costa of elytra being obliterated for a very short distance behind middle, apical margin of elytra smooth and devoid of serration, ventral side almost completerly black and size larger (5.40mm.).

Genus ***Gonophora*** Chevrolat

1837. *Gonophora* Chevrolat, In Dejean, *Cat.* 3ed. : 390.

1919. *Gonophora* : Maulik, *Fauna Brit. India, Col., Chry.* (*Hisp. & Cass.*) : 142.

42. ***Gonophora haemorrhoidalis*** (Weber)

1801. *Hispa haemorrhoidalis* Weber, *Obs. Ent.* : 64.

1844. *Gonophora haemorrhoidalis* : Guerin, in Cuvier, *Icon. Regne Annim. Ins.* : 280.

1958. *Gonophora haemorrhoidalis* : Uhmann, *Col. Cat. Suppl.* pars **35** (2) : 246.

Material : ***Malaya Port*** (lex.).

Distribution : Borneo, Indonesia, Malaya and Sumatra.

43. ***Gonophora masoni*** Baly

1888. *Gonophora masoni* Baly, *Ent. Monthly Mag.*, **25** : 85.

1919. *Gonophora masoni* : Maulik, *Fauna Brit. India, Col., Chry.* (*Hisp. & Cass.*) : 146.

Material : ***Andaman Islands*** (4exs.).

Distribution : India : Andaman Is.

44. ***Gonophora pulchella*** Gestro

1988. *Gonophora pulchella* Gestro, *Ann. Mus. Stor. Genova,* (2) **6** : 176.

1919. *Gonophora pulchella* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 146.

Material : ***Sikkim*** : Rhenok, 960m., 3.v. 1962 (lex.), S. Ali coll. ; ***Bangladesh*** : Rangpore (2exs.).

Distribution : India : Assam, Manipur and Sikkim.

Elsewhere : Myanmar, Bangladesh and Vietnam.

Remarks : First record from Manipur and Sikkim.

45. *Gonophora raktava* n. sp.
(Fig. 16)

General appearance narrow, elongate, nearly parallel sided, shiny, redish brown with mandibles, scutellum and a spot on the vertex of head, five spots on pronotum arranged as in *G. pulcella* Gestro and ten spots on each elytron, black. The elytral spots are arranged as follows : the first on the humeral callus, the second between the first and second costae at base ; the third on the lateral margin a little behind humeral callus ; the fourth on the first costa at basal one-third ; the fifth between second and third costae a little behind the fourth spot ; the sixth on the first costa at behind middle ; the seventh on the second costa a little bind the sixth spot ; the seventh, eighth and ninth placed obliquely on first costa, second costa and external apical angle respectively. Antennae dark red with the segment 1 yellow-brown.

Head broad, smooth and impunctate, eyes strongly convex. Antennae less than half the length of the body (2.02 x 5.02mm), segment 1 rounded, segment 2 rounded and smaller than segment 1, segment 3 longer than segment 2, segment 4 slightly longer than segment 3, segment 4-6 subequal, segments 7-10 gradually shorter, segment 11 longest, first three segments punctate and less hairy especially the first one very shiny and hairless. *Prothorax* as long as broad, sides little sinuated and slightly scalloped, not serrated, slightly diverging towards front, surface convex with usual lateral depression, two rounded median depressions and two oblique basal depressions, one one each side of the middle meet the basal transverse depression and also touch the lateral fossa, besides a basal transverse depression at middle ; the depressed areas with strong punctures which form pits, rest of the surface impunctate. *Scutellum* elongated, tappered at middle, slightly rounded apically and impunctatate. *Elytra* nearly parallel sided, apical margin slightly rounded and serrated. Each elytron with three costae, the first one higher than the suture and other costae ; the second one undulated at middle ; and the third one only traceable at base and apex. Two rows of punctures between two subsequent costae, but between the third costa and lateral margin only one row at middle and two rows at base and apex. Each elytron with ten black spots. Ventral side shiny, redish brown, abdominal segments with depressions on lateral sides and with fine punctures.

Measurements of holotype : Length –5.02mm. breadth –1.90mm., length of prothorax –1.10mm. breadth –1.10mm, length of antennae 2.20mm.

Holotype lex. INDIA : WEST BENGAL, Darjeeling dist., Singla, 1/2 km. S. of Goke F.H.R., 450m., 20.iv.1973, H.S. Sharma coll. ; *Paratypes* 2 exs. : 1 exs., Darjeeeling dist., 1km. E. of Goke

F.H.R., 400m., 17.iv.1973, H.S. Sharma coll., 1ex., Darjeeling dist., Takdah, 1500m., 24.ii. 1973, P.K. Maiti coll.

This species is near *G. pulchella* Gestro but can be separated from the latter species by its lateral margins of prothorax not serrated but slightly scalloped, surface less convex ; elytra nearly parallel sided with its lateral margins plain not serrated, puncturation smaller ; ventral side uniformly reddish brown, size smaller (5.02mm.) and narrower.

46. *Gonophora pitambara* n. sp.
(Fig. 9)

General appearance elongate, shiny, yellowish brown to pale yellowish with the mandibles, eyes, scutellum, one spot on the vertex of head, five spots on pronotum and several spots and patches on the elytra, black ; ventral side yellowish brown with the lateral sides of sterna black ; antennae dark red, sometimes 4-6 basal segments black. Elytral spots are disposed as follows : one spot on humeral callus, one longitudinal spot on humeral angle, one large spot on first costa behind scutellum, this spot sometimes divided into two, one on either side of the costa, one large elongated spot on first costa before middle, another one on the same costa behind middle and another small elongated spot at the apical area on first costa ; on the second costa there are three spots, first one very large situated near middle covering second and third costae and tending to meet the spot at humeral angle, the third one small very narrow and elongated situated behind middle and an another similar spot at apical area ; a similar narrow elongated spot on the third costa at apical area ; external apical angle also covering a spot ; all these four spots at apical area tending to form a large patch.

Head with vertex finely punctate, eyes strongly convex. Antennae shorter than the half of the body, segments 1-3 equal; segment 4 slightly shorter, segment 5 equal to segment 4, rests shorter and thicker, last segment longest. *Prothorax* as broad as long, slightly broader at before middle, lateral margin smooth and sinuate, other characters as in *G. raktava* n. sp. *Elytra* parallel sided, apical margins slightly rounded and finely serrated, lateral margins smooth. Each elytron with three costae, first one higher than suture and other costae, second one obliterated at middle, the third one only prominent at base and apical area. Other characters same as *G. raktava* n. sp.

Measurements of holotype : Length 3.70mm., breadth –1.30mm., Length of Prothorax –.80mm., breadth of prothorax –.80mm., Length of antennae –1.60mm.

Holotype lex., INDIA : WEST BENGAL : Darjeeling dist., Tarkhola, 20.iv.1976, C.R. Basu coll., *Paratypes* 13 exs. : 8exs, same as holotype ; 4exs., Darjeeling dist., Lolegaon, 11.iv. 1976, C.R. Basu coll. ; 1ex., Darjeeling dist., Singla, 950., 20.iv.1973, M.S. Shishodia coll.

This species is very close to *G. raktava* n. sp. but can be easily separated from the latter by the following characters : Smaller (3.70mm.) and narrower species, colour yellowish or paler, elytral patches larger, prothorax more wider at apical area, elytra parallel sided, antennal segments 1-3 equal in length.

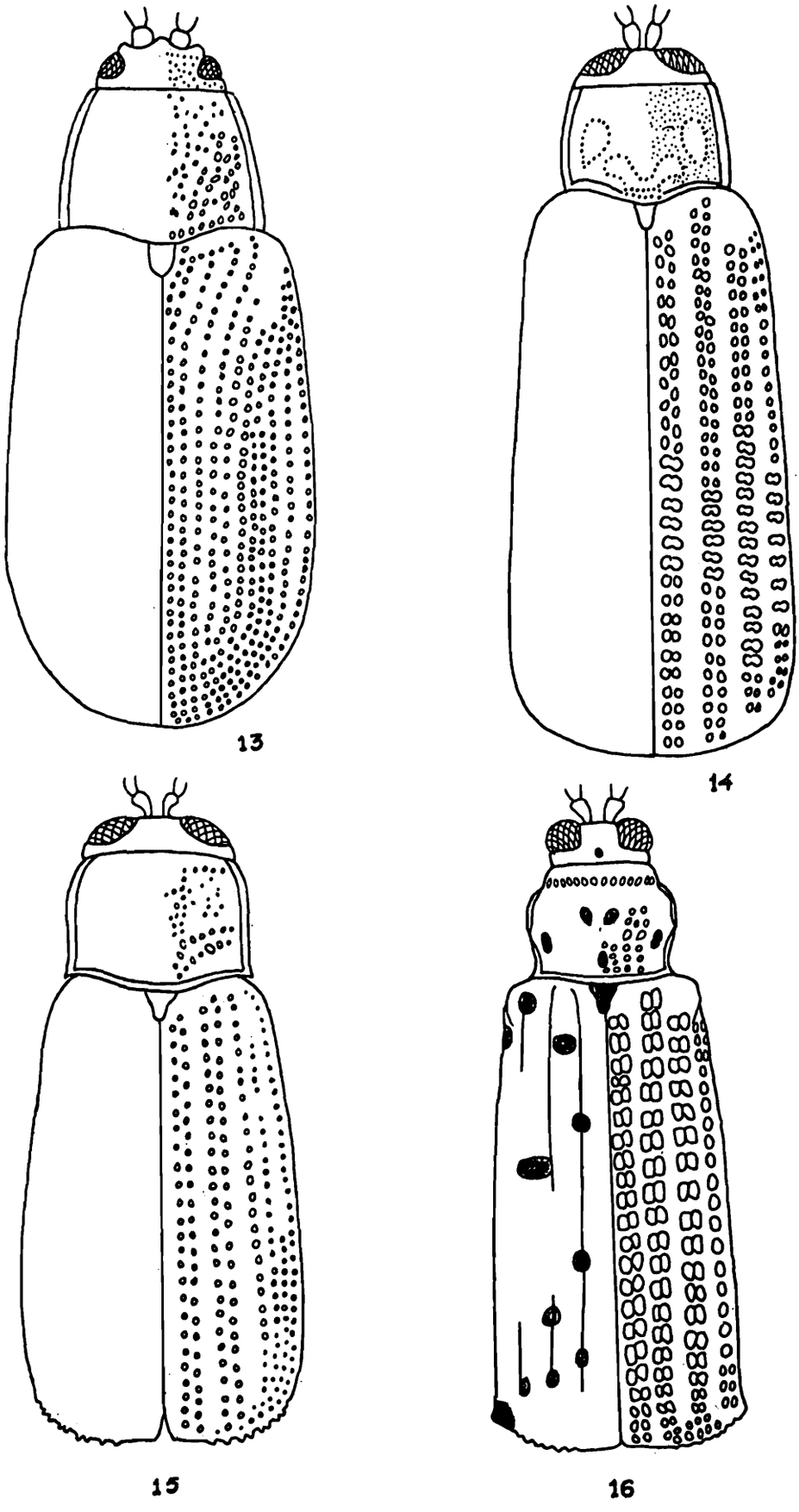

Fig. 13. *Amblispa ? laevigata* (Guerian). **14.** *Agonita lohita* n. sp. **15.** *Agonita pitava* n. sp. **16.** *Gonophora raktava* n. sp.

Remarks : There are variations in colour and spots or patches. When the dorsal colour is yellowish the surface become more shiny, antennae dark red and the elytra with distinct spots. But when the dorsal colour pale yellowish the surface become less shiny, a few spots of elytra coelescent to form patches, and when the antennal segments 4-6 black the lateral sides of sterna become black.

47. ***Gonophora brevicornis*** Weise

1905. *Gonophora brevicornis* Weise, *Deut. Ent. Zeits.* : 114.

1919. *Gonophora brevicornis* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 148.

Material : ***Kerala*** : Trichur, 300ft., 1-4.x. 1914 (lex.), F.H. Gravely coll.

Distribution : India : Kerala and Tamilnadu.

Genus ***Hispellinus*** Weise

1875. *Monochirus* Chapuis, (nec Ratinesque), *Gen. Col.*, **11** : 330.

1897. *Hispellinus* Weise, *Deut. Ent. Zeits.* : 144 (new name for *Monochirus* Chap.)

48. ***Hispellinus moestus*** (Baly)

1888. *Monochirus moestus* Baly, *Ann. Mus. Civ. Genova* : 622.

1897. *Hispellinus moestus* Weise, *Deut. Ent. Zeits* : 145.

Material : ***West Bengal*** : Calcutta, Eden Garden, 31. x. 1958 (lex.), A. P. Kapur coll.

Distrubution : India : Maharastra and West Bengal.

Elsewhere : Borneo, China, Indonesia, Malacca, Myanmar, Sumatra and Vietnam.

Remarks : First record from West Bengal.

49. ***Hispellinus sthulacundus*** (Maulik)

1915. *Monochirus sthulacundus* Maulik, Rec. Ind. Mus. : 373.

1958. *Hispellinus sthulacundus.* : Uhmann, *Col. Cat. Suppl.* pars 35(2) : 265.

Material : ***West Bengal*** : Murshidabad dist., Berhampur 1.1.1908 (lex.) R.E. Lloyd coll.

Distribution : India : West Bengal.

50. ***Hispellinus callicanthus*** (Bates)

1866. *Hispa callicanthus* Bates, *Proc. Zool. Soc. London* : 354.

1958. *Hispellinus callicanthus* : Uhmann, *Col. Cat. Suppl.* pars 35(2) : 261.

Material : ***Formosa*** (lex.), T. Shiraki coll.

Distribution : China (Hainan), Formosa and Philippines.

51. ***Hispellinus minor*** (Maulik)

1919. *Monochirus minor* Maulik, *Fauna Brit. India, Col., Chry.* (Hisp. & Cass.) : 155.

1958. *Hispellinus minor* : Uhmann, *Col. Cat. Suppl.* pars 35 (2) : 262.

Material : ***Arunachal Pradesh*** : Kameng, Charduar, 28.xii.1962 (lex.), S.K. Bhattacharyya & A.N.T. Joseph coll.

Distribution : India : Arunachal Pradesh. Elsewhere : Sri Lanka and Sumatra.

Genus ***Hispa*** Linnaeus

1767. *Hispa* Linnaeus, *Syst. Nat.*, (12) **1** (2) : 603.

1875. *Hispella* Chapuis, *Gen. Col.*, **11** : 260, 334.

1899. *Hispa* : Gestro, *Ann. Mus. Stor. nat. Genova,* (2) **40** : 330 (=*Hispella*).

52. ***Hispa brachycera*** (Gestro)

1897. *Hispella brachycera* Gestro, *Ann. Mus. Civ. Genova* : 123

1958. *Hispa brachycera* : Uhmann, Col. Cat. Suppl. **35** (2) : 271.

Material : ***Orissa*** : Ganjam dist., Rambha, 20.ix.1918 (2exs.), N. Annandale coll. ; ***Andhra Pradesh*** : Vijapuri North, 8.viii.1962 (2exs.), T.N. Maligi coll. ; ***Tamilnadu*** : Salem dist., Chitteri Hills, 20-22.vi.1929 (lex.), H.S. Pruthi coll.

Distribution : India : Andhra Pradesh, Bihar, Himachal Pradesh, Maharashtra, Meghalaya, Orissa and Tamil Nadu.

Remarks : First record from Tamil Nadu.

53. ***Hispa stygia*** (Chapuis)

1877. *Hispella stygia* Chapuis, *Ann, Soc. ent. Belg.*, **22** : 51.

1958. *Hispa Stygia* : Uhmann, *Col. Cat. Suppl.* **35**(2) : 272.

Material : ***Tamilnadu*** : Palni Hills, 7200ft., 24.viii. 1922 (lex.), S. Kemp coll. ; Madras Agri-Hortic. Gardens, 1.xii.1975(lex.), S.K. Gupta coll. ; ***Maharashtra*** : Bombay (lex.) ; ***Madhya Pradesh*** : Jabalpur, Pariat tank, 15.ix.1967(lex.), H.P. Agrawal coll.

Distribution : India : Madhya Pradesh, Maharashtra and Tamil Nadu.

54. *Hispa ramosa* (Gyllenhal)

1817. *Hispella ramosa* Gyllenhal, In Schonherr. *Syn. Ins.* **1** (3) : 6.

1958. *Hispa ramosa* : Uhmann, *Col. Cat. Suppl.*, **35** (2) : 271.

Material : ***West Bengal*** : Howrah dist., Bot. Garden, 31.viii. 1965 (lex.), K.S. Pradhan & K.V.L. Narayan coll., Bot. Garden, 27.x. 1965 (2exs.), K.R. Rao coll., 18.vii. 1959 (lex.), P.C. Dhar Coll. ; North 24-Parganas dist., Ichapur, 8.xii. 1965 (2exs.), K.R. Rao coll., Hooghly dist., Bandel, 26.x, 1964 (lex.), 29.x 1964 (lex.), all A.N.T. Joseph coll. ; Calcutta, 28.xii.1977 (4exs.), C.R. Basu coll. ; *Orissa* : Nandan Kanan, 26.iii. 1974 (lex.), R.K. Kacker coll. ; Keonjhar dist., Anandapur, 8.iv.1973 (lex.), S.K. Gupta coll. ; ***Bihar*** : Pareshnath, 4000-4400ft., 15.iv.1909 (lex.), N. Annandale coll. ; ***Uttar Pradesh*** : Nainital, 26.iv.1908 (lex.), F.H. Gravely coll. ; ***Madhya Pradesh*** : Jabalpur, Pariat tank, 15.ix.1967 (2exs.), H. P. Agrawal coll., ***Punjab*** : Murree Hills, –v.1934 (5exs.), H.S. Pruthi coll., Choa Saiden Shah, Salt Range, 1.v. 1931 (lex.), H.S. Pruthi coll. ; **Tamilnadu** : Nallamalai Hills, 15-23.viii. 1929 (3exs.), H.S. Pruthi coll.

Distribution : India : Bihar, Karnataka, Madhya Pradesh, Orissa, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal. Elsowhere : Sri Lanka.

Remarks : First record from Madhya Pradesh, Orissa and Punjab.

55. *Hispa andrewesi* (Weise)

1897. *Hispella andrewesi* Weise, *Deut. Ent. Zeit.* : 126.

1958. *Hispa andrewesi* : Uhmann, *Col. Cat. Suppl.*, **35**(2) : 269.

Material : ***Tamil Nadu*** : Palni Hills, 7400ft., 25-26.viii. 1922 (2exs.), Nautral Saddle, 5000ft., 13-15.ix. 1929 (2exs.), all S. Kemp coll. ; Without data (lex.), ***Monda Nepal***, 12.v. 1908 (lex.), R.H. coll.

Distribution : Karnataka and Tamilnadu. Elsewhere : China, Indonesia, Myanmar, Nepal and Sri Lanka.

Genus ***Rhadinosa*** Weise

1905. *Rhadinosa* Weise *Deut. ent. Zeit.* : 318.

1919. *Rhadinosa* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 164.

56. ***Rhadinosa laghua*** Maulik

1915. *Rhadinosa laghua* Maulik, *Rec. Ind. Mus.* : 376.

1919. *Rhadinosa laghua* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 166.

Material : ***Assam*** : Mangaldai, 15-18.x. 1910 (lex.), 30-31.xii. 1910 (lex.), all S.Kemp coll. ; ***Tripura*** : Abhoya Barpathari, 4.xii.1969 (lex.), Chailengta, 23.xii.1972(3exs.), Chailengta (Manu), 18.xii.1972 (lex.), all V.C. Agrawal coll. ; Teliamura F.R.H. 11.xi.1974 (lex.), Teliamura, Kanjmura,

14.xi.1974 (lex.), Ambassa, Kanchannagar, 20.xi.1974 (lex.), all M.S. Shishodia coll. ; ***West Bengal*** : South 24 Parganas : Basanti (lex.) Jenkins coll. ; Jalpaiguri : Dainadubi, 12.ix.1975 (lex.), N. Muraleedharan coll. ; Calcutta : Eden Gardens, 13.vi.1966 (lex.), 13.xi.1950 (lex.), all A. P. Kapur coll. ; Calcutta, 31.xi.1960 (lex.), K.D. Chatterjee coll. ; Darjeeling dist. : Mahanadi, 1255m., 28.iv.1971(lex.), A.R. Bhaumik coll., Chunabhati, 400ft., 28.iii.1973 (lex.), Srivastava coll. ; North 24 Parganas dist. : Palta, Jafarpur, 8.xii.1965 (2exs.), R.P. Ghosh coll. ; Howrah dist. : Bot. Gardens, 30.vi.1964 (3exs.), D.K.M. & S. Ali coll., 27.x.1965 (5exs.), K.R. Rao coll. ; 6.i.1968 (lex.), A.P. Kapur coll., 11.xii.1950 (lex.), A.P. Kapur coll.

Distribution : India : Assam, Tripura and West Bengal.

Elsewhere : Myanmar.

57. ***Rhadinosa lebongensis*** Maulik

1919. *Rhadinosa lebongensis* Maulik *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 168.

Meterial : ***Meghalaya*** : E. Khasi Hills : Shillong, Moulai, 20.iii.1991 (2exs.), A.K. Sanyal coll., Cherrapunji, Shella, 7.xii.1991 (2exs.), R.C. Basu coll., Sohrarin, 26.iii.1991 (lex.), A. K. Hazra coll.; Jaintia Hills : Jowai, 20.iii.1990 (1 ex.), B.C. Das coll. ; E. Garo Hills : Rongzeng, 26.v.1990 (lex.), M.S. Shishodia coll.

Distribution : India : Manipur, Meghalaya, Uttar Pradesh and West Bengal. Elsewhere : Yunnan.

58. ***Rhadinosa girija*** Maulik

1915. *Rhadinosa girija* Maulik, *Rec. Ind. Mus.* : 377

1919. *Rhadinosa girija* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 167.

Material : ***Nepal*** : Terai, Chutri Gouri, 26-27. iv. 1907 (lex.).

Distribution : Nepal.

Genus ***Asamangulia*** Maulik

1915. *Asamangulia* Maulik, *Rec. Ind. Mus.* : 378.

1919. *Asamangulia* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 168.

59. ***Asamangulia cuspidata*** Maulik

1915. *Asamangulia cuspidata* Maulik, *Rec. Ind. Mus.* : 378.

1919. *Asamangulia cuspidata* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 169.

Material : ***Bihar*** : Pusa, 28.vi. 1929 (lex.), S.N. Srivastava coll., Pusa, 1953 (3exs.), S.B.D. Agrawal coll., Pusa (lex.) ; ***West Bengal*** (lex.) ; ? ***S. India*** : Kusumpati, 7500ft., 5.vii.1994(lex.), M.G & L.S. coll.

Distribution : India : Bihar and West Bengal, Elsewhere : Afghanistan.

Genus *Dactylispa* Weise

1897. *Dactylispa* Weise, *Deut. ent. Zeit.* 137.

1919. *Dactylispa* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 170.

60. *Dactylispa doriae* (Gestro)

1890. *Hispa doriae* Gestro, *Ann. Mus. Civ. Genova,* **30** : 256.

1919. *Dactylispa doriae* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 172.

Material : ***Arunachal Pradesh*** : Kameng Div., Tipi, 213m., 3.v. 1966 (3exs.), A.N.T. Joseph coll. ; ***West Bengal*** : Darjeeling dist. : Andheri Khola, 500m., 7.iv.1973 (2exs.), Rangpo, 450m., 8.iv.1973 (7exs.), and 10.iv.1973 (2exs.), all H.S. Sharma coll. ; Barbati Busti, 1900m., 18.iii.1973 (lex.), P.K. Maiti coll. ; Teesta Bazar, 214m., 18.iv.1976 (lex.), Tarkhola, 20.iv.1976 (3exs.), all A.R. Bhaumik coll. ; ***Sikkim*** : Rangpo, 450m., 19.iv.1976 (3exs.), Pakyang, 27.iv.1976 (lex.), all A.R.Bhumik coll., Pashok, 3500ft., 21.v.-14.vi. 1916 (2exs.), F.H. Gravely coll.

Distribution : India : Arunachal Pradesh, Assam, Sikkim and West Bengal. Elsewhere : Myanmar, Indonesia and Vietnam.

Remarks : First record from Arunachal Pradesh.

61. *Dactylispa dilaticornis* (Duvivier)

1891. *Hispa dilaticornis* Duvivier, *Ann. Soc. ent. Belg.,* **35** : 48.

1919. *Dactylispa dilaticornis* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 178.

Material : ***West Bengal*** : Calcutta, 8.vi.1959 (lex.), P.C. Dhar coll., 26.x.1960 (lex.), S. Ali coll. ; ***Orissa*** : Angul, Pumekote, 9.iv.1973 (lex.), Mayurbhanj dist., Bisoi, 26.iii.1973 (lex.), all S.K. Gupta coll. ; ***Punjab*** : Gandhala Reserve Forest, 2.v.1931 (lex). H.S. Pruthi coll. ; ***Madhya Pradesh*** : Jabalpur, Pariat tank, 15.ix.1967 (2exs.), H.P. Agrawal coll. ; ***Kerala*** : Travancore, Karunagapalli, 4.v.1915 (lex.), G.P. Pillai coll.

Distribution : India : Bihar, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Pondicherry, Tamilnadu, Uttar Pradesh and West Bengal. Elsewhere : Sri Lanka.

Remarks : First record from Madhya Pradesh and Punjab.

62. *Dactylispa perroteti* (Gestro)

1841. *Hispa perroteti* Guerin, *Rev. Zool.* : 12.

1897. *Dactylispa perroteti* : Weise, *Deut. ent. Zeit.* : 144.

Material : ***West Bengal*** : Siliguri (3exs.), H.E. Andrwes coll. ***Tamilnadu*** : Nilgiri Hills (lex.) H.E. Andrewes coll.

Distribution : India : Tamilnadu and West Bengal.

Elsewhere : Borneo, Indonesia, Malacca and Phillippines.

Remarks : First record from West Bengal.

63. *Dactylispa krishna* Maulik

1919. *Dactylispa krishna* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 181.

1986. *Dactylispa krishna* : Basu, *Rec. Zool. Surv. India*, **84** (1-4) : 154.

Material : ***Kerala*** : Silent Valley, 6.v.1980 (lex.), R.S. Pillai Coll. ; 3.iv. 1980 (lex.) S. Biswas coll. ; ***Karnataka*** : N. Kanara dist., Castle Rock, 3-10.x. 1916 (lex.), S. Kemp coll.

Distribution : India : Kerala, Karnataka and Tamil Nadu.

64. *Dactylispa spinipes* Weise

1905. *Dactylispa spinipes* Weise, *Deut, ent. Zeits.* : 119.

1919. *Dactylispa spinipes* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 182.

Material : ***Kerala*** : Silent Valley : 24.i.1980 (lex.), S.K. Bhattacharyya coll., 6.v. 1980 (lex.), R.S. Pillai coll., 18.i.1980 (8exs.), K.R.Rao coll.

Distribution : India : Kerala and Tamilnadu.

65. *Dactylispa brevispinosa* (Chapuis)

1877. *Hispa brevispinosa* Chapuis, *Ann. Soc. ent. Belg.*, **20** : 56.

1919. *Dactylispa brevispinosa* : Maulik, *Faune Brit. India, Col., Chry. (Hisp. & Cass.)* : 183.

Material : ***Uttar Pradesh*** : Musoorie, 6000ft., –vii. 1933 (10exs.), H.S. Pruthi coll., Naini Tal, 6000-8000ft., 1-9.v. 1930 (lexs.), H.S. Pruthi coll., Bhowali, 12.v.1930(lex.), H.S. Pruthi coll. ; **Punjab** : Dalhousi, 7000ft., v.vi.1927 (lex.), S.L. Hora coll. ; ***Arunachal Pradesh*** : Kameng, Mosheng, 750m., 3.vi. 1961 (lex.), K.C. Jairam coll., Subansiri dist., Chukrli, 1128m., 22.v.1966 (lex.), A.N.T. Joseph coll. ; ***Himachal Pradesh*** : Mahasu dist., Thaneder, 2175m., 16.ix.1969 (lex.), Tikkai, 2450m., 16.ix.1969 (18exs.), all 0.B. Chhotani coll., Chail, 27.vi.1975 (12exs.), T. Sengupta coll., Simla, 23.vi.75 (8exs.) ; ***West Bengal*** : Darjeeling dist. : Ghoombhanjang, 2117m., 28.v.1971 (4exs.), 27.v.1971 (2exs.), 29.iv.1976 (lex.), Lopchu, 1607m., 16.iv.1976 (lex.), Dowhill, 1880m., 30.iv.1976 (lex.), Sonada, 1969m., 10.v.1971 (6exs.), Sukia Pokri. 2140m., 20.v.1971 (2exs.), all A.R. Bhaumik coll. ; Rangiroom, 2000m., 23.v.1974 (2exs.), Bijanbari, 900m., 20.v.1974 (exs.), Rangiroom, 7.v.1975 (2exs.), Manibhanjang, 6400ft., 19.v.1975 (3exs.), all J.K. Jonathan coll., Ghoomabhanjang, 6.x.1974 (lex.), H.K. Bhowmik and A.R. Bhaumik Coll. ; ***Sikkim*** : Singlik, 9.v. 1962 (lex.), Keiozing, 19.v.1962 (lex.), G. Ramakrishna coll.

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Meghalaya, Manipur, Punjab, Sikkim, Uttar Pradesh and West Bengal. Elsewhere : Bhutan, Myanmar, Nepal and Vietnam.

66. ***Dactylispa harsha*** Maulik

1919. *Dactylispa harsha* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 188.

Material : ***Meghalaya*** : Cherrapunji, 2-8.x. 1914 (lex.), S.W. Kemp coll.

Distribution : Meghalaya and Uttar Pradesh.

67. ***Dactylispa xanthopus*** (Gestro)

1898. *Hispa xanthopus* Gestro, *Termes, Fuzetek.* : 262

1907. *Dactylispa xanthopus* : Gestro, *Ann. Mus. Hung.* : 72.

Material : ***West Bengal*** : Darjeeling dist. : Tibetan Naya Busti, 1961m., 8.v. 1971 (4exs.), Hima Falls, Ghoombhanjang, 2180m., 27.v.1971 (2exs.), Jorpokri, 2210m., 25.v.1971 (2exs.), Sukia Pokri 2140m., 20.v.1971 (3exs.), Lopohu, 1607m., 1.v.1976 (147exs.), Ghoombhanjang, 2117m., 29.iv.1976 (20exs.), Tindharia, 4.v.1976 (lex.), Dowhill, 1880m., 30.iv.1976 (lex.), Chailkhola, 12.iv.1976 (3exs.), all A.R. Bhaumik coll.; Lava, 2150m., 4.vi.1974 (2exs.), Bijanbari, 900m., 20.v.1974 (lex.), Rangiroom, 7.v.1973 (lex.), Manibhanjang, 19.v.1975 (lex.), Ghoombhanjang, 29.v.1975 (lex.), Lepchajagat, 7300ft. 4.v.1975 (2exs.), Darjeeling Chawk, 2000m., 13.v. 1974 (lex.), all J.K. Jonathan coll. ; Ghoombhanjang, 6.x.1974 (2exs.), H.K. Bhowmik coll. ; ***Sikkim*** (2exs.).

Distribution : India : Sikkim and West Bengal.

68. ***Dactylispa sadonensis*** Maulik,

1919. *Dactylispa sadonensis* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 191.

Material : ***Myanmar*** : Sadon, 2500-3500ft., -V.1911 (lex.), E. Colenso coll.

Distribution : Myanmar.

69. ***Dactylispa bindusara*** Maulik

1919. *Dactylispa bindusara* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 193.

Material : ***Arunachal Pradesh*** : Namdapha Camp, 23.iv.1981 (2exs.), S. Biswas coll., ***West Bengal*** : Darjeelind dist. : Lebong. -vi. 1909 (lex.), H.M.L. Coll.

Distribution : India : Arunachal Pradesh, Meghalaya, Sikkim, Uttar Pradesh and West Bengal.

70. ***Dactylispa corpulenta*** Weise

1897. *Dactylispa corpulenta* Weise, *Deut. ent. Zeits* : 132.

1919. *Dactylispa corpulenta* : Maulik, *Fauna Brit. India, Col., Chry.* (Hisp. & Cass.) : 196.

Material : ***Kerala*** : Travancore, Quilon, -v. 1915 (lex.), G.P. Pillai coll.

Distribution : India : Kerala and Karnataka. Elsewhere : Laos.

71. *Dactylispa lohita* Maulik

1919. *Dactylispa lohita* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 197.

Material : ***Meghalaya*** : Shillong, 12.x. 1914 (2exs.), S. Kemp coll. ; ***Uttar Pradesh*** : Almora, 6000ft., 30.v.-2.vi. 1930(lex.), Bhowali, 5700ft., 11.v.1930(2exs.), all H.S. Pruthi coll.; ***Himachal Pradesh*** : Solan, 1525m., 20.v. 1968 (lex.), O.B. Chhotani coll. ***Sikkim*** : Phensung, 25.iv.1976 (4exs.), Pakyang, 27.iv.1976 (2exs.) Gangtok, 1704m., 24.iv.1976 (lex.), all A.R. Bhaumik coll. ***West Bengal*** : Darjeeling dist : Lopchu, 1607m., 1.v.1976 (lex.), Chailkhola, 12.iv.1976(lex.), A.R. Bhaumik coll., Manibhanjang, 6400ft., 19.v.1975(lex.), J.K. Jonathan coll.

Distribution : India : Manipur, Meghalaya, Uttar Pradesh and West Bengal.

72. *Dactylispa filiola* Weise

1897. *Dactylispa filiola* Weise, *Deut.* Ent. Zeits. : 135.

1919. *Dactylispa filiola* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 199.

Material : ***Tamilnadu*** : Capecomerin dist., Therakal putton, 12.xii.1975 (2exs.), S.K. Gupta coll. ***Kerala*** : Travancore, Quilon, –V. 1915 (lex.), G.P. Pillai coll., Chalakudi, 14-30.ix. 1914 (lex.), F.H. Gravely coll.

Sri Lanka : Kandy, –.vi. 1908 (lex.), G.E. Bryant coll., Peradenya (lex.).

Distribution : India : Karnataka, Kerala, Maharashtra and Tamilnadu. Elsehwere : China and Sri Lanka.

73. *Dactylispa xanthospila* (Gestro)

1890. *Hispa xanthospila* Gestro, *Ann. Mus. Civ. Genova,* **30** : 261.

1919. *Dactylispa xanthospila* : Maulik, *Fauna Brit. India, Col., Chry, (Hisp. & Cass.)* : 200.

Material : ***Sri Lanka*** : Vairiniya, 22.xii.1923 (2exs.).

Distribution : India : Assam. Elsewhere : Indonesia, Myanmar, Sumatra, Sri Lanka and Vietnam.

74. *Dactylispa severini* (Gestro)

1897. *Hispa severini* Gestro, *Ann. Mus. Civ. Genova,* **38** : 129.

1919. *Dactylispa severini* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 201.

Material : ***Bihar*** : Singhbhum dist., Nawagaon, 5.ii.1955(lex.), A.P. Kapur coll. ; ***Kerala*** : Pambikulam, 1700-3200ft., 16-24.ix. 1914 (lex.), F.H. Gravely coll. ; ***Karnataka*** : South Mysore (lex.).

Distribution : India : Bihar, Karnataka, Kerala and Maharashtra. Elsewhere : Thailand.

75. *Dactylispa atkinsoni* (Gestro)

1897. *Hispa atkinsoni* Gestro, *Ann. Mus. Civ. Genova,* **38** : 132.

1919. *Dactylispa atkinsoni* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 205.

Material : ***Uttar Pradesh*** : Bhim Tal, Kumaon, 19-22.ix.1906 (lex.), N. Annandale coll. ; ***Sikkim*** : Fifth mile, 2100m. 12.v.1962 (lex.), G. Ramakrishna coll., Sikkim (4exs.), Pakyang, 27.iv.1976 (lex.), A.R. Bhaumik coll. ***West Bengal*** : Darjeeling dist : Bhutia Busti, 2000m., 16.v. 1974 (2exs.), Darjeeling, 2050m. 15.v.1974 (24exs.), 17.v.1974 (lex.), Rangiroom, 2000m., 23.v.1974 (19exs.), 7.v.1975 (lex.), Darjeeling Chawk, 2000m., 15.v.1974 (4exs.), 5.vi.1974 (6exs.), Bot. Gardens, 2050m., 16.v.1974 (lex.), Lava, 2150m., 5.vi.1974 (4exs.), Bijanbari, 900m., 20.v.1974 (6exs.), Manibhanjang, 19.v.1975(2exs.), Lepchajagat, 7300ft., 4.v. 1975 (lex.), all J. K. Jonathan coll. ; Darjeeling, 21.i. 1973 (lex.), H.K. Bhaowmik coll., Sonada, 1900m., 11.v.1971 (17exs.), 10.v.1971 (lex.), 20.v. 1971 (lex.) and 13.v.1971 (14exs.), Sukia Pokri, 2140m., 20.v.1971 (x.), Tibetan Naya busti, 1967m., 8.v.1971 (lex.), Hima Falls, Ghoombhanjang, 2180m., 27.v.1971 (lex.), Ghoombhanjang, 28.v.1971 (3exs.), 29.v.1976 (lex.), Mirik, 4700ft., 2.v. 1976 (lex.), all A.R. Bhaumik coll.

Distribution : India : Sikkim, Uttar Pradesh and West Bengal.

76. *Dactylispa ferrugineo-nigra* Maulik

1919. *Dactylispa ferrugineo-nigra* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 208.

1963. *Dactylispa ferrugineo-nigra* : Gressitt & Kimoto, *Pac. Ins. Monogr.*, **1B** : 927

Material : lex. (collected by H.E. Andrews, specimen bearing a label where locality is illigible.)

Distribution : Myanmar,

77. *Dactylispa variabilis* Maulik

1919. *Dactylispa variabilis* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 211.

Material : ***West Bengal*** : Darjeeling dist. : Rangpo 10.v.1973 (2exs.), Singla, 400m., 17.iv.1973 (lex.), Andheri khola, 1400m., 6.iv.1973 (2exs.), all H.S. Sharma Coll., Barbati Busti, 1900m., 15.iii.1973 (2exs.), P.K. Maiti coll. ; Rangpo, 450m., 15.iv.1976 (lex.), Melli, 450m., 17.iv.1976 (lex.), Teesta Bazar, 214m., 18.iv.1976 (5exs.), Tarkhola, 20.iv.1976 (10exs.), Garubathan, 10.v. 1976(lex.), all A.R. Bhaumik coll. ; Singla, –.v. 1913 (lex.), Lord Carmichael coll. ***Sikkim*** : Rangpo, 450m., 19.iv.1976 (11exs.), A.R. Bhaumik coll., Rayang, 1395m., 30.iii.1973 (2exs.), 31.iii.1973 (lex.), H.S. Sharma coll.

Distribution : India : Assam, Sikkim and West Bengal.

Elsewhere : Myanmar, Laos and Vietnam.

78. ***Dactylispa pitapada*** Maulik

1919. *Dactylispa pitapada* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 212.

Material : ***Tamilnadu*** : Nilgiri Hills (lex.), H.E. Andrewes coll. ; ***Kerala*** : Silent Valley, 23.i.1980 (lex.), S.K. Bhattacharyya coll., 6.v.1980 (3exs.), R.S. Pillai coll.

Distribution : India : Kerala and Tamilnadu.

79. ***Dactylispa bilasa*** Maulik

1919. *Dactylispa bilasa* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 216.

Material : ***West Bengal*** : Darjeeling dist. : nr. Barbati Busti, 1900m., 18.iii.1973 (lex.), P.K. Maiti coll.

Distribution : India : Assam and West Bengal.

Remarks : First record from West Bengal.

80. ***Dactylispa elegantula*** (Duvivier)

1892. *Hispa elegantula* Duvivier, *Ann. Soc. ent. Belg.*, **36** : 447.

1919. *Dactylispa elegantula* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 217.

Material : ***West Bengal*** : Darjeeling dist. : Rangiroom, 2000m., 8.vi.1975 (lex.), J.K. Jonathan coll., Darjeeling to Ghoom, 7000-5000ft., 14.vi.1914 (2exs.), F.H. Gravely coll. ; nr. Ghoom, 6000-7000ft., 11.vi.1914 (lex.), Ghumti, 4000ft., vii. 1917 (lex.), all F.H. Gravely coll., Kurseong, 5000ft., 3.vii.1908 (lex.), N. Annandale coll., Darjeeling, 4700-5000ft., 22-23.vi. 1910 (2exs.), N. Annandale coll., Surail, Mongpu, 5000ft., iv-v. 1917 (lex.), S.W. Kemp coll., ***Sikkim*** : Gangtok, 6150ft., 9.ix.1909 (lex.), Singtam, 26.iv. 1976 (lex.), A.R. Bhaumik coll. ***Uttar Pradesh*** : Bhowali, Kumaun Hills, 15.v. 1930 (lex.), Almora dist., Kumaun Hills, Dalmoti, 20-22.v. 1930 (4exs.), all H.S. Pruthi coll.

Distribution : India : Sikkim, Uttar Pradesh and West Bengal.

Remarks : First record from Sikkim and Uttar Pradesh.

81. ***Dactylispa praefica*** Weise

1897. *Dactylispa praefica* Weise, *Deut. Ent. Zeits.* : 135.

1919. *Dactylispa praefica* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 220.

Material : ***Meghalaya*** : Garo Hills, Above Tura, 3500-3900fts., 15.vii-30.viii. 1917 (2exs.), S.W. Kemp coll. ; ***Tamilnadu*** : Nilgiri Hills, 10.x.1910(lex.), H.E. Andrewes coll., ***Sikkim*** : Rangpo, 450m., 19.iv.1976 (lex.), A.R. Bhaumik coll., Singtam, 26.iv.1976(lex.), A.R. Bhaumik coll. ; ***West Bengal*** : Darjeeling dist. Tarkhola, 20.iv.1976(lex.), Lolegaon, 11.iv.1976 (2exs.), all A.R. Bhaumik coll. ; ***Karnataka*** : Coorg, Pollibetta, 24.x.-16.xi. 1915 (lex.), Fletcher coll.

Distribution : India : Karnataka, Maharashtra, Meghalaya, Sikkim, Tamilnadu and West Bengal.

Remarks : First record from Sikkim, Tamilnadu and West Bengal.

82. ***Dactylispa nalika*** Maulik

1919. *Dactylispa nalika* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 220.

Material : ***Tamilnadu*** : Nilgiri Hills (lex.), H.E. Andrewes coll.

Distribution : India : Maharashtra and Tamilnadu.

83. ***Dactylispa kamarupa*** Maulik

1919. *Dactylispa kamarupa* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 223.

Material : ***Assam*** : Mangaldai, 8.i.1911 (6exs.), S. Kemp. coll.

Distribution : India : Assam.

84. ***Dactylispa soror*** Weise

1897. *Dactylispa soror* Weise, *Deut. Ent. Zeits.* : 134.

1919. *Dactylispa soror* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 224.

Material : ***West Bengal*** : Darjeeling dist. : Pashok, 26.v.–.14.vi.1916 (lex.) F.H. Gravely coll. ; Singla, 1500ft., –.v.1913 (lex.), Lord Carmichael coll., Howrah dist. : Bot. Gardens, 18.x.1956 (4exs.), 24.viii.1957 (lex.), all S.P. Shukla coll. ; Calcutta : (5exs.), 17.x.1957(lex.), S.P. Shukla coll., 26.viii.1907(lex.), Mus. Collr. ; ***Sikkim*** : (lex.) ; ***Kerala*** : Cochin State : Parambikulam, 16-24.ix. 1914(2exs.), F.H. Gravely coll., Trichur. –.vi–viii.1917 (lex.), and –iii.-v. 1917 (2exs.), G.P. Pillai coll. ; ***Tamilnadu*** : Nilgiri Hills (2exs.), ***Kerala/Karnatak*** : Malabar, Taliparamba, 24-30.ix. 1915 (2exs.), C.N. coll. ***Karnataka*** : S. Kanara dist. : Kasergode, 1-3.x. 1918 (lex.), T.V.R. coll., Coorg dist., Pollibetta, 24.x. -26.xi. 1915 (lex.) and 15-26. v. 1914 (lex.), Fletcher coll. ; ***Nepal*** : Thamaspur, 18-20.xi. 1908 (lex.), Mus. Collr.

Distribution : India : Karnataka, Kerala, Maharashtra, Sikkim, Tamilnadu and West Bengal. Elsewhere : Nepal and Sri Lanka.

85. ***Dactylispa daipa*** Maulik

1919. *Dactylispa daipa* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 225.

Material : ***West Bengal*** : Calcutta, 2.xii.1977 (13exs.), 20.viii. 1977 (54exs.), C.R. Basu coll., Nadia dist., Kalyani, 23.iv.1974 (3exs.), N. Chakraborty coll., ***Tripura*** : S. Tripura, Shalgara, 13.ix.1992(lex.), B.N. Das coll.

Distribution : India : Andaman Is., Tripura and West Bengal.

Remarks : This species was recorded so far from Andaman Is. and now it is being recorded for the first time from minland of India (West Bengal).

86. ***Dactylispa andrewesiella*** Weise

1905. *Dactylispa andrewesiella* Weise, *Deut. Ent. Zeits.* : 118.

1919. *Dactylispa andrewesiella* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 226.

Material : ***Tamilnadu*** : Palni Hills, Kodaicanal, 6000ft., -.ix. 1922(lex.), S.Kemp coll., Nilgiri (lex.).

Distribution : India : Tamilnadu.

87. ***Dactylispa parbatya*** Maulik

1918. *Dactylispa xanthopus* Maulik, *(nec Gestro), Ann. Mag. nat. Hist.* (9) **1** : 70

1919. *Dactylispa parbatya* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 234 (new name for *xanthopus*)

Material : ***West Bengal*** : Darjeeling dist., Ghoombhanjang, 2117m., 29.iv.1976 (8 exs.) Lopchu, 1607m., 1.v. 1976 (5exs.), Dowhill, 1880m., 30iv.1976 (5exs.), Tarkhola, 20.iv.1976 (2exs.), Tindharia, 856m., 4.v.1976 (lex.), all A.R. Bhaumik coll., Jalapahar (3exs.), Atkinson coll.

Distribution : India : Uttar Pradesh, Tamilnadu and West Bengal..

88. ***Dactylispa kunala*** Maulik

1919. *Dactylispa kunala* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 245.

Material : ***Karnataka*** : N. Kanara, Castle Rock, 11-26.x. 1916 (lex.), S. Kemp coll.

Distribution : India : Karnataka.

89. ***Dactylispa spinosa*** (Weber)

1801. *Hispa spinosa* Weber, *Obs. Ent.* : 65.

1958. *Dactylispa spinosa*.: Uhmann, *Col. Cat. Suppl.* **35**(2) : 314.

Material : ***Borneo*** : Sarawak, 10 miles S. of Kuching, 22.vi.1910 (lex.).

Distribution : Borneo, Celebes and Sumatra.

90. ***Dactylispa manii*** Vazirani

1972. *Dactylispa manii* Vazirani, *Rec. Zool. Surv. India.* **66** (1-4) : 145.

Material : ***West Bengal*** : Darjeeling dist., Lolegaon, 11.iv.1976 (7exs.), A.R. Bhaumik coll. ; ***Arunachal Pradesh*** : Kameng Div, Amatulla River bank, 2km. South of Amatown, 8.iii.1961 (lex.), K.C. Jairam coll.

Distribution : India : Arunachal Pradesh and West Bengal.

Remarks : First record from West Bengal.

91. ***Dactylispa chanchala*** Basu & Saha

1977. *Dactylispa chanchala* Basu & Saha, *Oriental Ins.*, **11** (3) : 383.

Material : ***Kerala*** : Munner, 1565m., 20.iii.1962 (lex.), K.V.L, Narayan coll. ; ***West Bengal*** : Darjeeling dist. : Nr. Barbati Busti, 1900m., 18.iii.1973(lex.), P.K. Maili coll, Rangpo, 1.iv. 1974 (lex.), J. K. Jonathan coll. and 8.ix.1973 (lex.), H.S. Sharma coll., Tarkhola, 20.iv.1976 (lex.), A.R. Bhaumik coll.; ***Sikkim*** : Rangpo, 450m., 19.iv.1976 (3exs.), A.R. Bhaumik coll.

Remarks : First recood from South India (Kerala).

92. ***Dactylispa jonathani*** Basu & Saha

1977. *Dactylispa jonathani* Basu & Saha, *Oriental Ins.* **11** (3) : 379.

Material : ***West Bengal*** : Darjeeling dist. ; Rangiroom F.R.H., 2000m., 24.v. 1974 (lex.), J.K. jonathan coll. ; ***Uttar Pradesh*** : Mussoorie, –.vii. 1933 (lex.), H.S. Pruthi coll. ; ***Kerala*** : Mannar, 1565m., 20.iii. 1962 (lex.), K.V.L. Narayan coll.

Distribution : India : Kerala, Uttar Pradesh and West Bengal.

Remarks : First record from Uttar Pradesh and Kerala.

93. ***Dactylispa shira*** Basu & Saha

1977. *Dactylispa shira* Basu & Saha, *Oriental Ins.* **11** (3) : 382.

Material : ***West Bengal*** : Darjeeling dist. ; Rangiroom 2000m., 23.v. 1974 (4exs.), 26.v.1974 (2exs.), 6.vi.1975 (lex.), 25.v.1975 (lex.) all J.K. Jonathan coll. ; Manibhanjang, 6400ft., 19.v. 1975 (lex.), J.K. Jonathan coll.

Distribution : India : West Bengal.

94. ***Dactylispa bhaumiki*** Basu & Saha

1977. *Dactylispa bhaumiki* Basu & Saha, *Oriental Ins.* **11** (3) : 380.

Material : ***West Bengal*** : Darjeeling dist. ; Sukia Pokri, 2140m., 24.v. 1971(lex.) A.R. Bhaumik coll.

Distribution : India : West Bengal.

95. ***Dactylispa amala*** Basu & Saha

1977. *Dactylispa amala* Basu & Saha, *Oriental Ins.* **11** (3) : 381.

Material : ***West Bengal*** : Darjeeling dist. ; Tarkhola, 20.iv.1976 (lex.), A.R. Bhaumik coll., Andheri khola F.R.H., 1500m., 9.iv. 1973 (lex.), H.S. Sharma coll.

Distribution : India : West Bengal.

96. ***Dactylispa malabikae*** Basu & Saha

1977. *Dactylispa malabikae* Basu & Saha, *Oriental Ins.* **11** (3) : 384.

Material : ***West Bengal*** : Darjeeling dist. : Tarkhola, 20.iv.1976 (2ex.), Teesta Bazar, 18.iv.1976 (lex.), all A.R. Bhaumik coll., 4km. S.E. of Goke F.R.H., 18.iv.1973 (lex.), 6km. E. of Rangpo F.R.H., Monsong, 8.iv.1973 (lex.) , 1km. W. of Rayang F.R.H. 30.iii.1973 (lex.), all H.S. Sharma coll.

Distribution : India : West Bengal.

97. ***Dactylispa molina*** Basu & Saha

1977. *Dactylispa molina* Basu & Saha, *Oriental Ins.*, **11** (3) : 385.

Material : ***West Bengal*** : Darjeeling dist. ; 4km. S.E. of Goke F.R.H., 900m., 18.iv.1973 (lex.), H.S. Sharma coll.

Distribution : India : West Bengal.

Genus ***Dicladispa*** Gestro

1875. *Hispa* : Chapuis (nec Linnaeus), *Gen. Col.*, **11** : 334.

1897. *Hispa (Dicladispa)* Gestro, *Ann. Mus. Civ. Geneva,* **38** : 81.

1898. *Dicladispa* Gestro, t. c. : 712.

98. ***Dicladispa armigera*** (Olivier)

1808. *Hispa armigera* Olivier, *Ent.*, **6** : 763.

1952. *Dicladispa armigera* : Uhmann, *Treubia*, **21** : 236.

Material : ***Orissa*** : Cuttack, 4.xii.1965 (lex.), A.P. Kapur & G.S. Arora coll., Puri dist., Balighai, 16-20. viii. 1911 (2exs.), N. Annandale & F.H. Gravely coll. ; ***Bihar*** : Ranchi dist. ; Khunti, 17.iv.1954 (lex.), A.P. Kapur coll., Darbhanga (lex.), H.S. Beadon coll. ; ***Tripura*** : Nandanagar, Agartala, 13.xi. 1969 (lex.), Abhoya Barpathari, 4.xii. 1969 (lex.), Lakshmipur, 6.xii. 1969 (lex.), Hathalia, 5.xii. 1969 (lex.), Garjee, 1.xii. 1969 (lex.), Charilon, 16.xi. 1969 (lex.), Sheikbari, 3.xii. 1969 (lex.), all V.C. Agrawal coll. ; ***Kerala*** : Malabar dist. (2exs.), E. Thomson coll. ; ***West Bengal*** : 24-Parganas dist. : Barasat, 5.i. 1966 (lex.), J.R. Singh coll., Datta Pukur, 5.xii.1966 (lex.) J. A.N.T. Joseph coll., Khardah, 9.xi.1966 (lex.), S.B. Roy & T.K.C. coll., Santoshpur, 21.xi.1962 (lex.), K. R. Rao & A. Singh coll., Baruipur, 8.xii.1965 (2exs.) K.R. Rao coll. Lakshmikantapur, 15.x.1965 (lex.), S. P. Chakraborty and K.D.C. coll., Barrackpore, 29.ix.

1965 (lex.), O.B. Chhotani coll., Ichapur, 9.xii.1965 (lex.), K.R. Rao coll., 24 Parganas (8exs.), C.W. Bolton coll., Darjeeling dist. : Mongpu (lex.) ; Calcutta : Hulta (4exs.), M.W. Box coll., Eden Gardens, 27.x. 1965 (3exs.), K.R. Rao coll., 30.x. 1962 (3exs.), S. Ali & P. Singh coll. Hooghly dist. : Tribeni, 12.xi. 1965 (llexs.), M.M.G. & S.P.C. coll. ; Howrah (lex.), and another lot of 200 exs. from Calcutta and its neibouring districts. ***Bangladesh*** : Khulna (3exs.), R. Rainey coll. ; Barisal (8exs.).

Distribution : India : Assam, Bihar, Kerala, Tripura and West Bengal.

Elsewhere : Bangladesh, China, Indonesia, Laos, Malacca, Myanmar, Nepal, Sumatra and Thailand.

99. ***Dicladispa birendra*** (Maulik)

1919. *Hispa birendra* Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 250.

1958. *Dicladispa birendra* : Uhmann, *Col. Cat. Suppl.* **35**(2) : 327.

Material : ***Meghalaya*** : Ri-Bhoi : Umran, 1.iv. 1991 (lex.), 5.iv.1991 (lex.), all S.K. Saha coll. ; ***West Bengal*** : Darjeeling dist., Tarkhola, 450m., 20.iv. 1976 (5exs.), A.R. Bhaumik coll.

Distribution : India : Meghalaya and West Bengal. Elsewhere : Myanmar and Vietnam.

100. ***Dicladispa aerea*** (Gestro)

1897. *Hispa aerea* Gestro, *Ann. Mus. Civ. Genova* : 125.

1958. *Dicladispa aerea* : Uhmann, *Col. Cat. Suppl.* **35**(2) : 324.

Material : ***Bihar*** : Ranchi, Kundri, 29.iv.1951 (2exs.), A.P. Kapur coll. ; ***Maharashtra*** : Satara dist., Koyna Valley, 2000ft., 27-28.iv. 1912 (lex.), F.H. Gravely coll.

Distribution : India : Bihar, Karnataka and Maharashtra.

101. ***Dicladispa dama*** (Chapuis)

1877. *Hispa dama* Chapuis, *Ann. Soc. ent. Belg., 20* : 52.

1958. *Dicladispa dama* : Uhmann, *Col. Cat. Suppl.* **35** (2) : 328.

Material : ***Uttar Pradesh*** : Nainital (lex.), Lata Gangola coll.

Distribution : India : Assam and Uttar Pradesh. Elsewhere : Myaumar.

102. ***Dicladispa pallescens*** (Guerin)

1841. *Hispa pallescens* Guerin, *Rev. Zool.* : 13.

1958. *Dicladispa pallescens* : Uhmann, *Col. Cat. Suppl., 35* (2) : 334.

Material : ***Punjab*** : Ganchals Res. Forest, Choa Saiden Shah, Salt Range, 2.v. 1931 (9exs.), H.S. Pruthi coll.; *Bihar* : Ranchi dist., Khunti, 17. ix. 1954 (lex.), A.P. Kapur coll.

Distribution : India : Bihar, Pondicherry, Punjab and Madhya Pradesh.

Remarks : First record from Punjab.

Genus ***Platypria*** Guerin

1840. *Platypria* Guerin, *Rev. Zool.* : 139.

1919. *Platypria* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 256.

103. ***Platypria erinaceus*** (Fabricius)

1801. *Hispa erinaceus* Fabricius, *Syst. El.*, **2** : 59.

1940. *Platypria erinaceus* : Guerin, *Rev. Zool.*, : 141.

Material : ***Tamil nadu*** : Salem dist., Varagembady, -i-ii. 1915 (lex.), C.N. Coll., Coimbatore, 31.X. 1913 (lex.), Fletcher coll.

Distribution : India : Bihar, Maharashtra, Pondicherry and Tamil nadu; Elsewhere : Sri Lanka.

104. ***Platypria andrewesi*** Weise

1906. *Platypria andrewesi* Weise, *Deut. ent. Zeits.* : 404.

1919. *Platypria andrewesi* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 260.

Material : ***Punjab*** : Bhatinda, Bhuchcho, 23.iv. 1975 (3exs.).

Distribution : India : Gujarat, Himachal Pradesh, Madhya Pradesh, Panjab and Tamil Nadu; Elsewhere : Sri Lanka.

105. ***Platypria echidna*** (Guerin)

1840. *Platypria echidna* Guerin, *Rev. Zool.* : 139.

1919. *Platypria echidna* : Maulik, *Fauna Brit. India, Col., Chry. (Hisp. & Cass.)* : 261.

Material : ***Kerala***: : Cochin, Parambikulam, 1700-3200ft.,-.ix. 1914 (2exs.), F.H. Gravely coll.; ***Tamilnadu*** : Palni Hills, Kodaikanal, 6000ft., (lex.), F.H. Gravely coll., Nilgiri (lex.), Anamalai (lex.); ***Karnataka*** : N. Kanara, Castle Rock, 11-26.x. 1916 (lex.) S. Kemp coll.; ***Maharashtra*** : Bombay (lex.); ***Goa*** : Mormugo, .ix. 1916 (2exs.), S. Kemp coll.

Distribution : India : Bihar, Goa, Kerala, Karnataka, Maharashtra, Sikkim and Tamilnadu; Elsewhere : Mayanmar, Sri Lanka and Vietnam.

106. ***Platypria chiroptera*** Gestro

1899. *Platypria chiroptera* Gestro, *Ann. Mus. Civ. Genova* : 172.

1919. *Platypria chiroptera* : Maulik, *Fauna Brit. India, Col., Chry. (Hiap & Cass.)* : 163.

Material : ***Tamilnadu*** : Nilgiri Hills (lex. Damaged), A.K. Weld Dowing coll.

Distribution : India : Tamilnadu.

107. ***Platypria hystrix*** (Fabricius)

1898. *Hispa hystrix* Fabricius, *Ent. Syst. Suppl.* : 166.

1840. *Platyria hystrix* : Guerin, *Rev. Zool.* : 141.

Material : ***Uttar Pradesh*** : Dehra Dun, Harbartupur, 3. vii. 1975 (4 exs.), T. Sengupta coll., Kumaon : Nainital, 1918 (lex.), W. Almora (2exs.), all H.G. Champion coll.; ***West Bengal*** : Calcutta, 4. vii, 1907 (lex.); ***Kerala*** : Ernakulam, 11-14. ix 1914 (lex.), F.H. Gravely coll.; ***Nepal*** : Katmandu (lex.), Soondyijal (lex.).

Distribution : India : Karnataka, Kerala, Tamilnadu, Uttar Pradesh and West Bengal. Elsewhere : China, Indonesia, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam.

SUMMARY

One hundred seven species belonging to twentythree genera are reported in this paper. Fourteen new species namely, *Callispa jaya, C. bijaya, C. brihata, C. ajaya, C. paharia, Leptispa kanistha, L. anu, L. krishna, Chaeridiona pseudometallica, Agonita darjeelingensis, A. pitava, A. lohita, Gonophora raktava and G. pitambara* are described. Twenty four species are recorded first time from different Indian states. Synonymies are presented for the genera and species, as well as general and local distributions of the species.

ACKNOWLEDGEMENT

The author is grateful to the Director, Zoological Survey of India, Calcutta, for providing laboratory facilities for this work. He is thankful to Mr. H. Takizawa of Japan for his help and cooperation. He is also thankful to Dr. S. Biswas, Senior Coleopterist of this department and other collegues of Coleoptera Section.

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3. Wurmli, M. 1975. Gattungsmonographie der altweltlichen Hispinen (Coleoptera : Chrysomelidae : Hispinae) *Ent. Arb. Mus. Frey,* **26** : 1-83.

Rec. zool. Surv. India : **97** (Part-3) : 191-193, 1999

A NEW SPECIES OF SPIDER OF THE GENUS *TIBELLUS SIMON* (ARANEARE : PHILODROMIDAE) FROM MADHYA PRADESH, INDIA.

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Zoological Survey of India, Central Regional Station, Jabalpur

The spiders of the family Philodromidae are little known in Indian Fauna. The genus *Tibellus* was established by Simon in 1875 with the Type-species *Tibellus oblongus* (Walckenaer). Tikader (1980) redescribed and reillustrated four species and described two new species of the genus *Tibellus* from different parts of India.

While studying the spider collection collected by the second author from different areas of Jabalpur city, we came across a new species of the genus *Tibellus* which is described here.

The type specimen will in due course be deposited in the National Collection, Zoological Survey of India, Calcutta.

Tibellus jabalpurensis sp. nov.

General : Cephalothorax and legs brownish-green, abdomen light brownish green. Total length 9.0 mm. Carapace 3.60 mm. long, 2.30 mm. wide; abdomen 5.70 mm. long, 1.90 mm. wide.

Cephalothorax : Longer than wide, sparsely spined, with two longitudinal broad dark brown bands extending from postero-lateral eyes to the base of cephalothorax and two broad dark brown bands extending from postero-median eyes to the base of cephalothorax as in fig. 1. Clypeus medium, margin of clypeus with seven spines directed forward. Anterior row of eyes closed, recurved, anterior four eyes and posterior two median eyes form a hexagonal area, the postero-lateral eyes largest and remote from other eyes. Sternum heart-shaped, pointed behind, clothed with fine hairs. Legs long, spined, II and IV pairs of legs long but I and II longer and more robust than IV, tibiae and metatarsi of I and II with two pairs of ventral spines; well developed claw-tufts and scopulae present on tarsi and extended to the end of metatarsi.

Abdomen : Longer than wide, cylindrical, clothed with spines, narrow behind, slightly overlapping the posterior region of cephalothorax in front, irregular tufts of black hairs on the dorsum; one mid-dorsal and two lateral deep brown bands extending from the anterior end of abdomen to the posterior end of abdomen. Ventral side slightly lighter than the dorsal, provided with mid-ventral broad deep brown longitudinal band starting from epigastric furrow to the base of spinnerets. Epigyne as in fig. 2. Internal genitalia as in fig. 3.

Type-specimen : Holotype female in spirit, other details as above.

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* *Government Autonomous Science College, Jabalpur.*

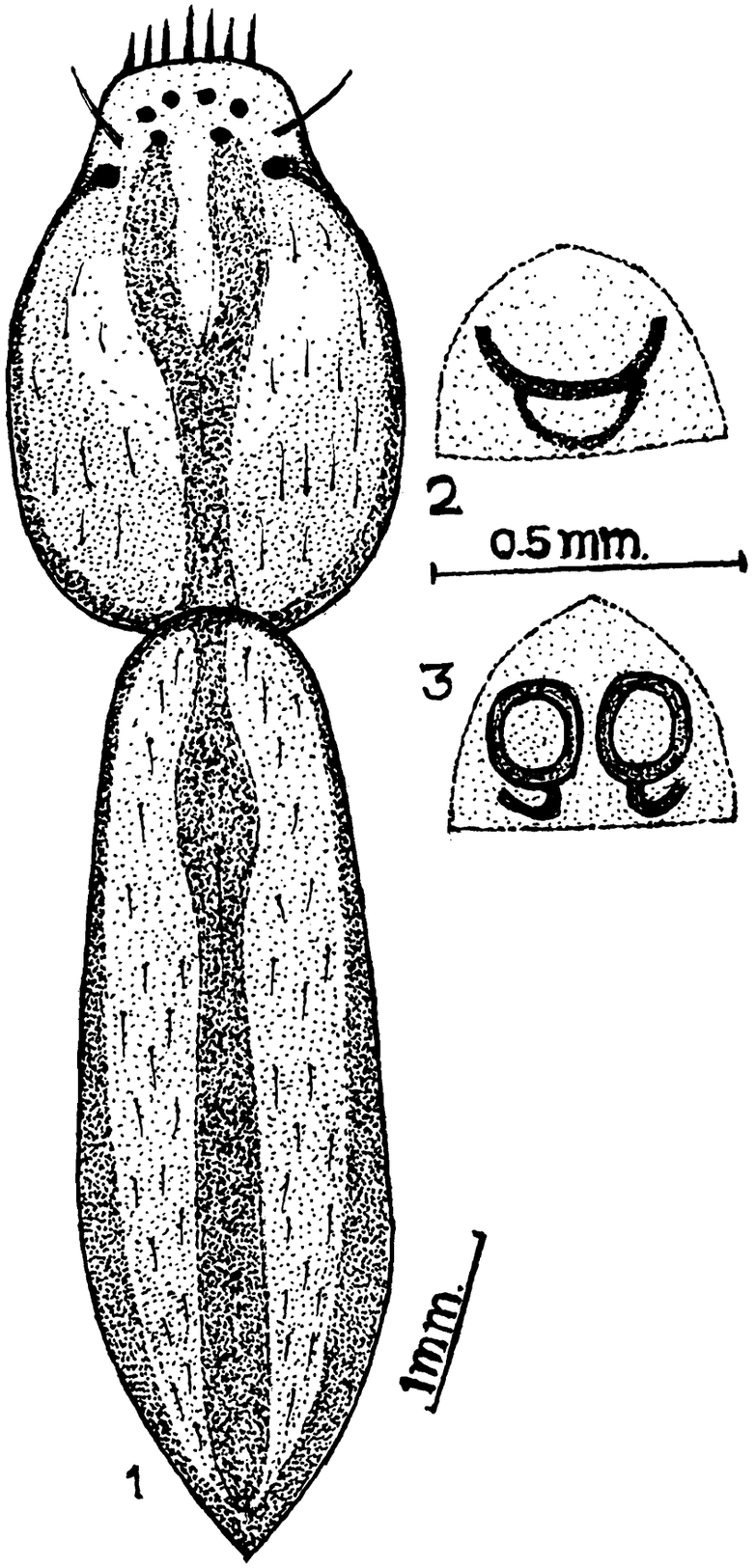

Fig. 1-3. *Tibellus jabalpurentis* sp. nov.
1. Dorsal view of female, legs omitted; 2. Epigyne; 3. Internal genitalia.

Type-locality : Vijaya Nagar, Jabalpur, M.P. Coll. *Pawan Gajbe*, 14.10.1997.

This species resembles *Tibellus chaturshingi* Tikader but differs from it as follows : (i) Cephalothorax provided with two lateral and two mid-dorsal deep brown bands but in *T. chaturshingi* cephalothorax provided with two lateral bands. (ii) Abdomen provided with two and one lateral and mid-dorsal deep brown bands starting from anterior end of abdomen to the posterior end but in *T. chaturshingi* abdomenn dorsally provided with two longitudinal broad light brownn bands extending from the lateral sides of abdomen and join together at the posterior end of abdomen. (iii) Abdomenn ventrally provided with deep brown broad band extending from epigastric furrow to the base of spinnerets but in *T. chaturshingi* abdomen provided ventrally with four longitudinal light brown bands. (iv) Epigyne also structurally different.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. J. R. B. Alfred, Director, Zoological Survey of India, Calcutta, for facilities and to Shri K. Vinod, Stenographer, of this station, for typing the manuscript.

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Rec. zool. Surv. India : **97** (Part-3) : 195-197, 1999

A NEW SPECIES OF SPIDER OF THE GENUS *PHILODROMUS WALCKENAER* (ARANEAE : PHILODROMIDAE) FROM MADHYA PRADESH, INDIA.

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Zoological Survey of India, Central Regional Station, Jabalpur

The spiders of the family Philodromidae are little known in Indian Fauna. The genus was established by Walckenear in 1825 with the Type-species *Philodromus aureolus* (Clerck). Tikader (1980) reillustrated and redescribed twelve species and three new species from different parts of India in *Fauna of India* series.

While studying the spider collection collected by the second author from different areas of Jabalpur city, we came across a new species of the genus *Philodromus* which is described here.

The type specimen will in due course be deposited in the National Collection, Zoological Survey of India, Calcutta.

Philodromus ashae sp. nov.

General : Cephalothorax and legs light yellowish green, abdomen light brownish green. Total length 5.80 mm. Cephalothorax 2.00 mm. long, 2.40 wide; abdomen 3.80 mm. long, 2.70 mm. wide.

Cephalothorax : Wider than long, depressed, uniform in colour, posterior region slightly overlapped by the abdomen. Clypeus narrow, margin provided with small hairs directed forward. Eyes round and black, ringed with white tubercles, anterior row slightly recurved, almost equal in sizeand equally spaced, posterior row longer and some-what more recurved than the anterior row, posterior laterals larger than others. ocular quad longer than wide, space between the anterior medians less than that of posterior medians. Posterior medians further from each other than from the adjacent laterals. Legs relatively long, II leg slightly longer than I, clothed with fine pubescence, dorsal side of I femur with three pairs of spines directed forward; tibiae of I and II with one and two pairs of ventral spines respectively, metatarsi provided with two pairs of ventral spines, tarsal scopulae well developed and claw tuft prominent.

Abdomen : Longer than wide, depressed, clothed with very fine pubescence, posterior part narrower than the anterior part, dorsum antero-medially with a spear shaped light brown patch as in fig.1. Postero-medially with a V-shaped light brown patch. Ventral side lighter than the dorsal with a broad, longitudinal light brown band starting from the base of epigastric furrow to the spinnerets. Epigyne as in fig. 2. Internal genitalia as in fig. 3.

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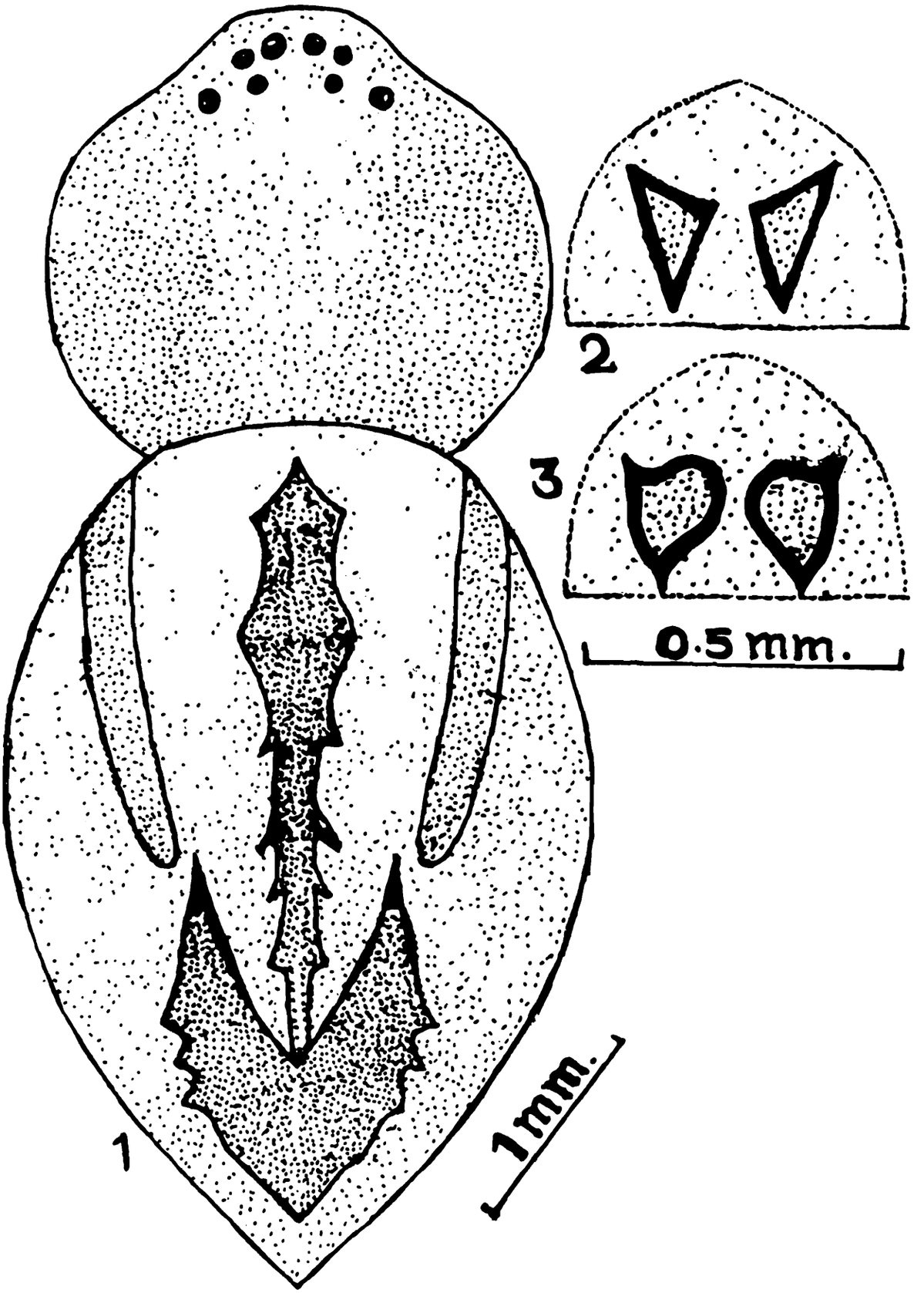
* *Government Autonomous Science College, Jabalpur.*



Figs. 1-3. *Philodromus ashae* sp. nov.
1. Dorsal view of female, legs omitted; 2. Epigyne; 3. Internal genitalia.

Type-specimen : Holotype female, in spirit, other details as above.

Type-locality : Adhartal near Jawaharlal Nehru University, Jabalpur, Coll. *Pawan Gajbe*, 30.12.1997

This species closely resembles *Philodromus shillongensis* Tikader but differs from it as follows : (i) Cephalothorax uniform but in *P. shillongensis* cephalothroax provided laterally with pigmented patches. (ii) Abdomen provided with antero-median spear shaped patch, postero-medially with V-shaped light brown patch but in *P. shillongensis* abdomen without V-shaped patch. (iii) Epigync also structurally different.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. J. R. B. Alfred, Director, Zoological Survey of India, Calcutta, for facilities and to Shri K. Vinod, Stenographer, of this station, for typing the manuscript.

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Rec. zool. Surv. India : **97** (Part-3) : 199-201, 1999

A NEW SPECIES OF SPIDER OF THE GENUS *THANATUS KOCH* (ARANEAE : PHILODROMIDAE) FROM MADHYA PRADESH, INDIA.

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Zoological Survey of India, Central Regional Station, Jabalpur

The spiders of the family Philodromidae are little known in Indian Fauna. The genus was established by Koch in 1937 with the Type-species *Thanatus formicinus* (Clerck). Tikader (1980) described four species of the genus *Thanatus* from different parts of India.

While studying the spider collection collected by the second author from different areas of Jabalpur city we came across a new species of the genus *Thanatus* which is described here.

The type specimens will in due course be deposited in the National Collection, Zoological Survey of India, Calcutta.

Thanatus jabalpurensis sp. nov.

General : Cephalothorax dark brownish green, abdomen and legs light brownish green. Total length 6.80 mm. Cephalothorax 2.40 mm. long, 2.00 mm. wide; abdomen 4.50 mm. long, 2.80 wide.

Cephalothorax : Longer than wide, broadest behind, narrow in front and clothed with hairs and few spines; two deep brown bands starting from the postero-lateral eyes and extending to base of cephalothorax. Lateral sides provided with conspicuous deep brown patches. Posterior middle of cephaothorax provided with U-shaped deep brown marking. Eyes black, eight in two rows, both rows recurved but the posterior row longer and more recurved than the anterior row; posterior lateral eyes larger than others, both rows of eyes together form a crescent-shaped area. Clypeus long, margin of clypeus with seven spines directed forward. Sternum heart-shaped, pointed behind, clothed with hairs and some spines. Legs long and stout, provided with spines, metatarsi of I and II with two pairs of ventral spines, tarsal scopulae well developed and claw tufts prominent.

Abdomen : Longer than wide, broadest in the middle and narrowing behind, clothed with hairs and few spines, abdomen mid-dorsally provided with deep brown band up to the middle of abdomen and laterally with two silvery longitudinal bands starting from anterior end of abdomen to the posterior end as in figure. 1. Ventral side lighter than the dorsal, clothed with hairs. Epigyne as in fig. 2. Internal genitalia as in fig. 3. Male same in colour as of female but smaller than the female. Male palp as in fig. 4.

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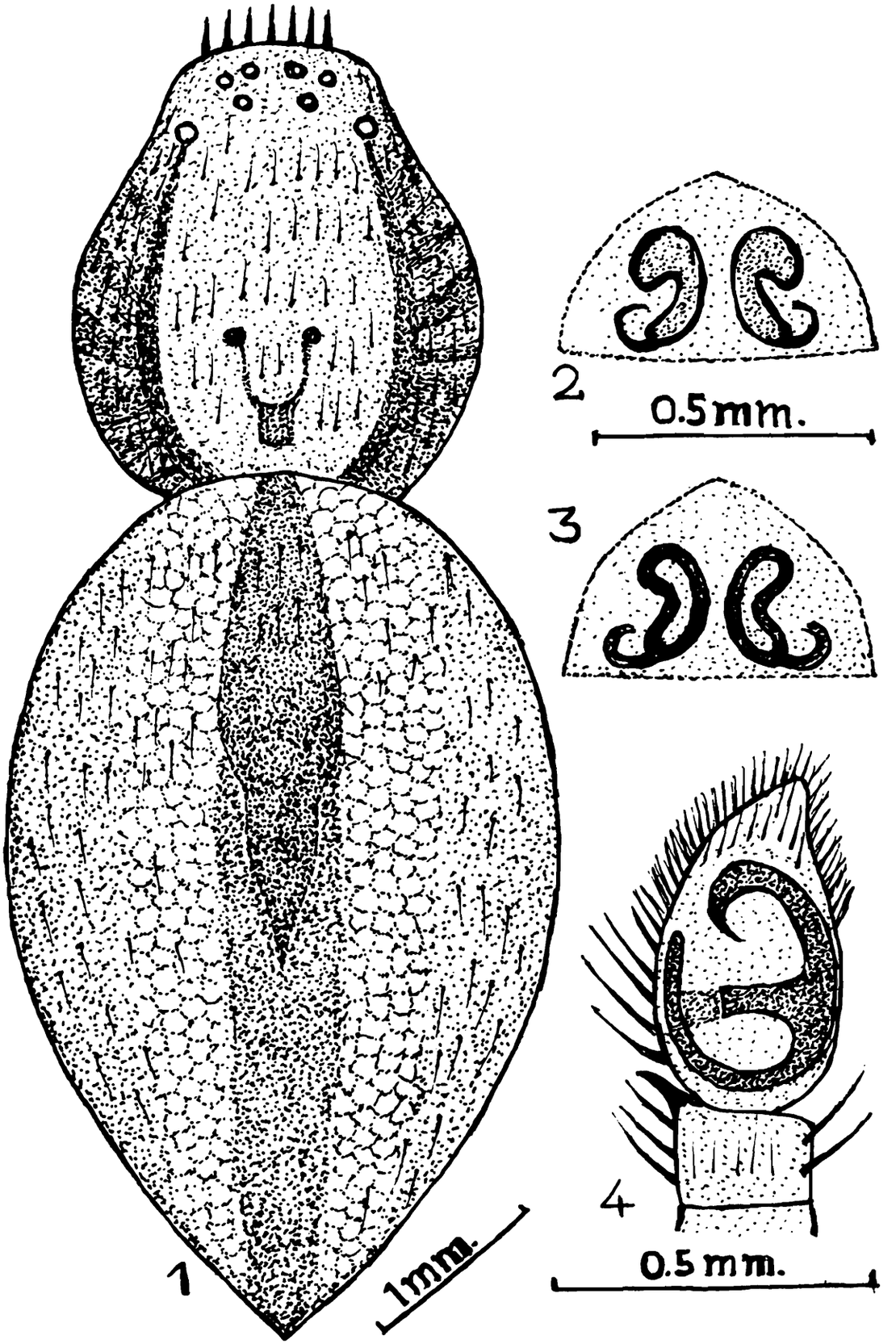

Figs. 1-4. *Thanatus jabalpurensis* sp. nov.
1. Dorsal view of female, legs omitted; 2. Epigyne; 3. Internal genitalia;
4. Right male palp, ventral view.

Type-specimen : Holotype female, *Allotype* one male in spirit, other details as above.

Type-locality : Tilwaraghat, near Narmada bridge, Jabalpur. Coll *Pawan Gajbe,* 9.1.1998.

This species resembles *Thanatus mandali* Tikader but differs from it as follows. (i) Cephalothorax provided with deep brown band starting from postero-lateral eyes to the end of the cephalothorax and mid-dorsally with U-shaped marking but in *T. mandali* lateral sides provided with conspicuous longitudinal deep brown patches. (ii) Abdomen mid-dorsally with deep brown patch up to the middle of cephalothorax and two lateral silvery white bands starting from anterior end of abdomen to the base of abdomen but in *T. mandali* abdomen antero-dorsally provided with deep brown lens-shaped band and posterior end provided with a V-shaped brown mark. (iii) Epigyne also structurally different.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. J. R. B. Alfred, Director, Zoological Survey of India, Calcutta, for facilities and to Shri K. Vinod, Stenographer, of this station, for typing the manuscript.

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Rec. zool. Surv. India : **97** (Part-3) : 203-204, 1999

A NOTE ON THE DISTRIBUTIONAL RECORD OF A RARE TOAD, *BUFO HOLOLIUS* GUNTHER (AMPHIBIA : BUFONIDAE)

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While studying literature on the Amphibian fauna recorded from Southern India, the first author came across an important reference (Satyamurti, 1967) on the distributional record of a rare toad *Bufo hololius* Gunther which appears to have not been referred by Pillai and Ravichandran (1991). Therefore it was felt necessary to update the information on the distributional record of this rare toad.

Bufo hololius (Amphibia : Bufonidae) was originally described by Gunther (1875) based on a specimen recorded from Malabar. Later, Boulenger (1882, 1890), Thurston (1888) and Daniel (1963) referring Gunther (1875) mentioned that the species was known till then only from Malabar.

Satyamurti (1967) studied three specimens of the species deposited in the Madras Government Museum Collected from Chittoor and Nellore districts of Andhra Pradesh, thereby extending the range of the species considerably beyond its original limits.

Pillai and Ravichandran (1991) while redescribing the species based on a specimen available in the Fresh Water Biology Station of the Zoological Survey of India, Hyderabad, Collected from Nagarjuna sagar, Andhra Pradesh on 18-9-1980 by D. M. Mahato, state that the specimen studied by them constitutes an important record having been collected after a gap of 115 years. Further, according to Pillai and Ravichandran (1991), their record of the species from Nagarjunasagar extends the range of its earlier distribution far eastwards to the Eastern Ghats and that the specimen studied by them is the only one available in India, as the type material of the species is deposited in the British Museum of Natural History, London by Gunther.

One specimen of *B. hololius* Gunther displayed in the gallery of Madras Govt. Museum has since been examined by the second author of this paper and found to be in conformity with the details provided by Satyamurti (1967).

Satyamurti (1967) having already established the extension of range of *B. hololius* Gunther eastward (Chittoor and Nellore districts of Andhra Pradesh) from its earlier known distribution (Malabar) based on the three specimens deposited in the Madras Govt. Museum, the specimen studied by Pillai and Ravichandran (1991) from Nagarjunasagar, Andhra Pradesh forms only the

fourth specimen available in India. Accordingly, *B. hololius* Gunther is so far known to occur in Chittoor, Nellore districts of Nagarjun valley in Andhra Pradesh besides its type locality in Malabar.

The snout to vent length of the specimens studied by Gunther from Malabar, Satyamurti from Chittoor (one specimen), Nellore (two specimens) districts of Andhra Pradesh and Pillai and Ravichandran from Nagarjunasagar, Andhra Pradesh are 38 mm, 51 mm, 46 mm, 52 mm, and 35.5 mm respectively.

Gunther (1875), Satyamurti (1967) and Pillai and Ravichandran (1991) have provided sketches of the specimens studied by them.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. A. K. Ghosh, Director, Dr. J. R. B. Alfred, Additional Director, Zoological Survey of India, Calcutta and Dr. P. T. Cherian, Joint Director and Officer-in-charge, Southern Regional Station, Zoological Survey of India, Madras for facilities and encouragements.

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Rec. zool. Surv. India : **97** (Part-3) : 205-211, 1999

A NEW GENUS OF *MICROVELIINAE* (HEMIPTERA: HETEROPTERA: VELIIDAE) FROM NORTH EASTERN INDIA WITH A CHECKLIST OF THE INDIAN SPECIES OF THE SUBFAMILY

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INTRODUCTION

Veliidae is the second largest family of the infraorder Gerromorpha so far known by about 630 species (Andersen 1995). This rather little known family of small insects is often found in cryptic habitats. Of the seven subfamilies hitherto known, five are represented by 22 species in India (Thirumalai, in Press) of which more than forty percent are distributed in northeasternIndia.

During a recent survey of Arunachal Pradesh, some specimens collected from a slow flowing jungle stream, possess a combination of characters not found in any other genera of Veliidae. A new generic name *Aquulavelia* is proposed to include this species.

The type specimens are deposited in the collections of Southern Regional Station, Zoological Survey of India, Chennai.

Aquulavelia gen. nov.

(Type Species : *Aquulavelia occulta* sp. nov.)

Apterous forms with elongate body, covered with hairs of varying length. Head produced posteriorly, extending slightly behind hind margin of eyes (Fig. 1A, H, I, J); vertex raised head deflected in front of eyes (Fig. 1C), with a distinct median furrow dorsally extending about 3/4 its length and not reaching its posterior margin; a pair of well developed pseudocellar pits behind eyes, clypeus protruding; eyes large, globular, situated very close to anterior margin of pronotum, one half width of head between eyes, antennal tubercles small, clearly visible from above; ventral lobe of head touching prothorax. Antenna four segmented 1st segment long curved, incrassate, 3/4ths of its length extending beyond apex of head, 2nd segment shortest, slender, 3rd and 4th filiform, the former 1.5 x the 1st, the latter 1.3 x the 3rd and 2 x the 1st. Rostrum slender, reaching middle of mesosternum.

Pronotum large, punctured, covering mesonotum medialy (Fig. 1 J & I), hind margin broadly rounded.Prosternum broader than mesosternum, the latter slightly elevated; lateral evaporative grooves of scent orifice extending obliquely forwards; lateral evaporatoria small, ovate each with a tuft of spine-like hairs. Foreleg simple, unmodified in both sexes, hind leg longer than middle leg, all femora with long distinct hair-like bristles; foretibia of male with short grasping comb; tarsi slender; middle tarsal segments subequal in length; claws long, falcate inserted distinctly before apex of last tarsus, arolia bristle-like (Fig. 1. D); tarsal formula, 1+2+2.

Abdomen long, sides distinctly curved, more so in female (Fig. 1 H); connexiva broad and obliquely raised, especially in female. Venter with short slender apodemes, distinct in female on 5th to 7th sterna (Fig. 2 S) and in male on 4th to 7th sterna (Fig. 2 R). Male genital segment small, protruding; segment 8 cylindrical, unmodified without distinct hairs or spines (Fig. 2L & P); pygophore simple; proctiger large, elongate and simple with a short lateral out growth (Fig. 2 K); clasper simple, long, flaciform and symmetrical. Endosoma with sclerites as in Fig. 2 M; female genital segment visible.

Discussion : *Aqualavelia* gen. nov. is closely related to the genera *Neoalardus* Distant in general profile and *Baptisa* Distant in possessing long and slender third and fourth antennal segments. However, the new genus differs from *Neoalardus* in smaller size, non-truncate nature of pronotum behind eyes, presence of a short grasping tibial comb in male, unmodified anterior femora and differences in male and female terminalia. The non-truncated anterior angles of pronotum behind eyes and simple unmodified anterior femora in male separate this genus from *Baptista.* Besides, *Aquulavelia* may also be separated from *Lathriovelia* Andersen by the lack of a broad ventral collar and eyes are not distinctly removed from the anterior margin of pronotum.

Etymology : The name of the new genus is derived from *Aquula,* (Latin) that is "a little water"

Aquulavelia occulta sp. nov.
(Fig. 1 & 2 A to S)

Description

Size : Apterous male, length 2.79 to 2.9 mm; maximum width 0.75 to 0.8 mm; apterous female, length 2.85 to 3.06 mm; maximum width 1.05 to 1.32 mm.

Colour : Ground colour, dark brown, venter light brown; acetabula brown; legs pale yellow; dorsal, lateral parts of head, pro, meso, meta nota, 2nd abdominal tergum adpressed with silvery pilosity, denser on pronotum; body with long brown erect hairs dorsally. Antennae, half of all femora, tibia, tarsi, brown; anterior pronotum with a transverse yellow band; antennal tubercles, punctures on pronotum dark brown, connexiva, abdominal tergites 5, 6 & 7 shining brown, venter with thick white hairs.

Structural characters (all measurement in mm otherwise as stated)

Apterous male : Body elongate with subparallel side, with scattered long erect hairs, dorsally and laterally; dorsal, ventral and lateral parts of body with white pubescence. Total length 4 x greatest width across prothorax. Antenna 4 segmented clothed with short setae, 0.7 x as long as body, first segment surpassing more than 3/4 of its entire length beyond head, 4th longest, 2nd shortest; relative length of segments (1-4) : 0.4, 0.3, 0.6,0.7. Head moderately long, 2/3rd longer than wide including eyes; width of eye/interocular space 0.15/0.27.

Pronotum broad, length/width 0.5/0.7, hind margin broadly rounded. Mesonotum hidden beneath pronotal lobe, except laterally. Metanotum well exposed, 1.5 x broader than long. All legs

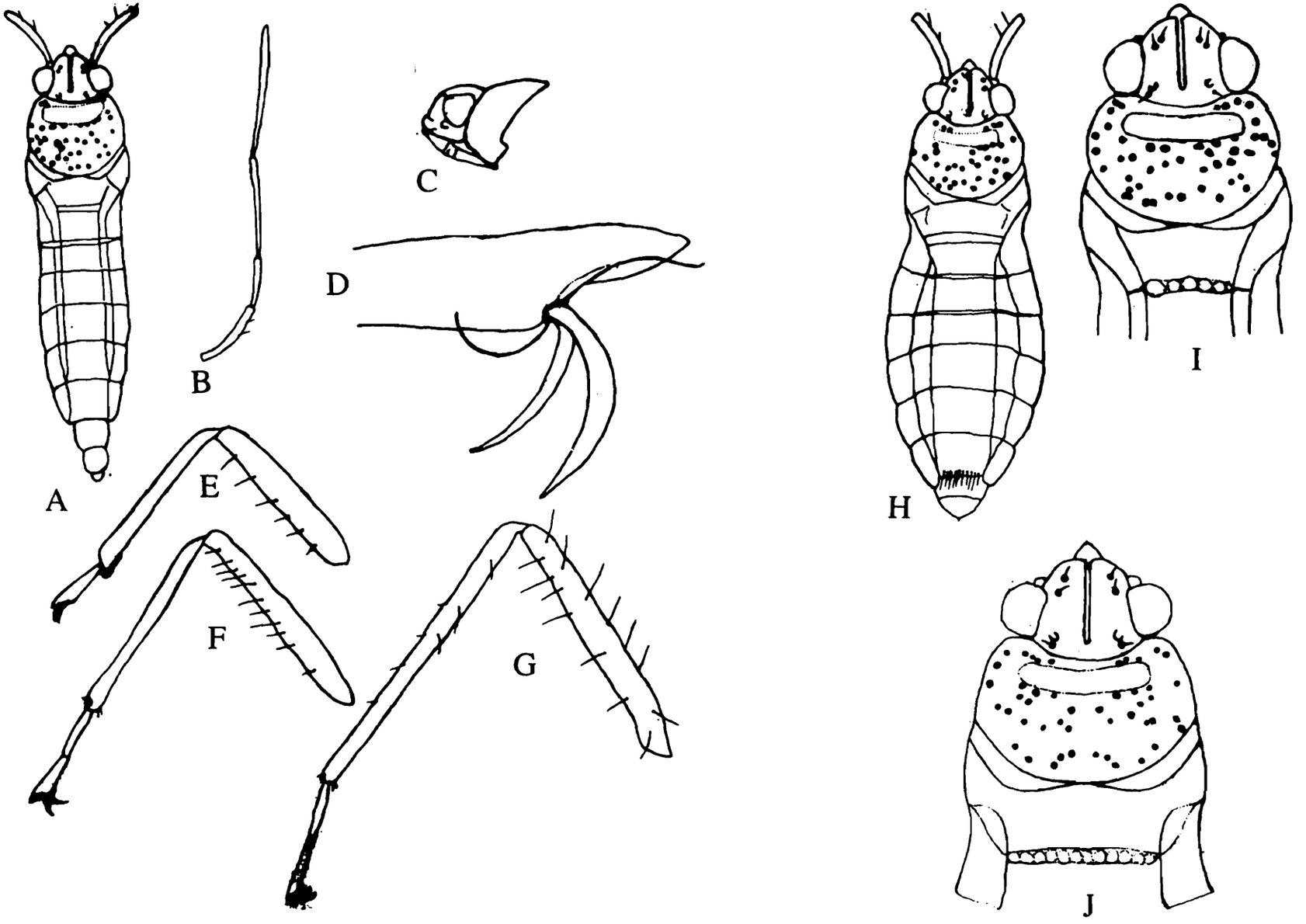

Fig. 1. *Aquulavelia occulta* gen. nov. sp. nov. (apterous form)

A : Apterous male (Antenna partially and legs removed); B : Antenna of male; C : Head and anterior part of pronotum, lateral view (antenna removed); D : Distal part of hind tarsus; E to G: Fore, middle, hind legs Apterous male; H : Apterous female (Antenna partially and legs removed); I : Head & pronotum of male, dorsal view; J : Head & pronotum of female, dorsal view.

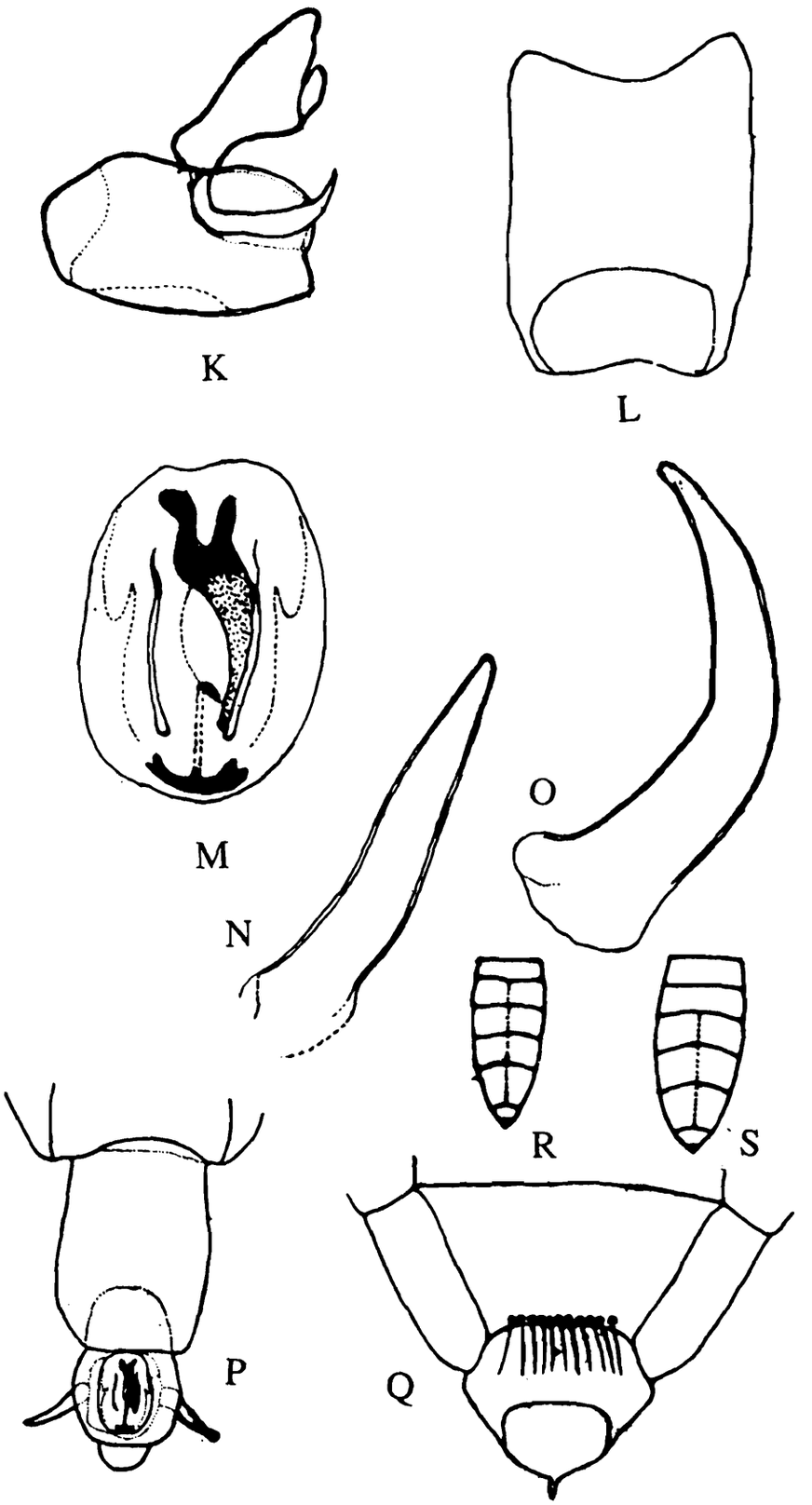

Fig. 2. *Aquulavelia occulta* gen. nov. sp. nov. (apterous form)

K : Genital segments of male, lateral view; L : First genital segment of male, ventral view; M : Endosoma, dorsal view; N & O Claspers, male; P. Genital segments of male, dorsal view; Q : Seventh dorsal abdominal segment of female; R : Ventral view of male abdominal segments (AP-apodeme); S : Ventral view of female abdominal segments (AP-apodeme).

long with short setae. Fore femur incrassate basally, dark erect bristles scattered posterioly; fore tibia slightly thickened apically, with a short grasping comb, 1/7th as long as of tibial length (Fig. 1E). Middle and hind legs long, simple without any modification, middle tibia, hind femur and tibia with erect bristles scattered posteriorly. Relative length of legs :

	Femur	Tibia	Tarsus
Foreleg	0.8	0.8	0.3
Middleleg	1.0	1.0	0.2,0.3
Hindleg	1.2	1.5	0.3, 0.3

Abdomen long, cylindrical with long erect bristles; connexivum broad, moderately obliquely turned upward, tergites 2-7 subequal in length, 4th to 7th venter with distinct, slender apodeme; unmodified (Fig. 2, R); 1st abdominal segment as long as broad (Fig. 2 L); parameres paired, long, symmetrical, curved distally (Fig. 2K, N, O); endosoma with sclerities as in fig. 2 M.

Apterous female : Size a little longer than apterous male, otherwise similar to apterous male in many respects; foretibia without grasping comb; abdominal connexiva very broad, more obliquely turned upward, 7th dorsal abdominnal segment with a row thick setae posteriorly (Fig. 2 Q); relative length of legs:

	Femur	Tibia	Tarsus
Foreleg	0.8	0.8	0.3
Middleleg	1.0	1.0	0.3,0.3
Hindleg	1.2	1.5	0.3, 0.3

Macropterous from unknown:

Comparative notes : Refer to comparative notes in generic decription.

Collection data : All specimens were collected from dark pits of a slow flowing mountain stream, on the side of the road leading to Getha, 10 Kms West of Yingkiong town.

Type material : HOLOTYPE, apterous male, Road to Getha, Yingkiong, Upper Sing District, Arunachal Pradesh, alt : 700 M; Coll : G. Thirumalai, 31. VIII. 1994; PARATYPES : 12 apterous males, 19 apterous females (4 males, 4 females dissected and permanently mounted on sides) and 22 immature stages, collection data same as of Holotype.

Etymology : The name of the species is derived from *'occultus'* (Latin) i.e. hidden or concealed.

Distribution : North Eastern India.

Remarks : The diversity of Gerromorphan families of semi-aquatic bugs comprise many unusual life forms that are most successful group of insect living upon the surface of water (Andersen, 1982). No other group of insects of comparable size in terms of number of species

shows such a remarkable diversity in habitat preferences. Out of this, Microveliinae species contains a number of small to very small water striders inhabiting a wide variety of water types, of which a few are cryptic (Polhemus, 1974). *Aquulavelia occulta* sp. nov. is one such from that lives in a cryptic habitat.

CHECKLIST OF MICROVELIINAE KNOWN FROM INDIA

Family : VELIIDAE

Subfamily : MICROVELIINAE

Aquulavelia occulta gen-nov. sp. nov.	Distribution	: Arunachal Pradesh
Aquulavelia sp. Polhemus*	Distribution	: Madhya Pradesh
Baptisa angulata Andersen 1989.	Distribution	: Karnataka
Microvelia (Microvelia) annandalei Distant, 1909	Distribution	: Tamilnadu
		West Bengal
Microvelia atromaculata Paiva, 1919	Distribution	: Meghalaya
Microvelia (Microvelia) diluta Distant, 1909	Distrubition	: Bihar
		Delhi
		Maharashtra
		Meghalaya
		Orissa
		Tamilnadu
		West Bengal
Microvelia (Microvelia) douglasi douglasi Scott, 1874	Distrubtion	: Arunanchal Pradesh
(Microvelia repentina Distant,1903*)*		Kerala
(M. kumaonensis Distant, 1909*)*		Orissa
		Tamilnadu
		Uttar Pradesh
Microvelia (Microvelia) javadiensis, Thirumalai, 1989	Distrubtion	: Tamilnadu
Microvelia (Microvelia) santala Hafiz & Ribeiro,1939	Distrubtion	: Bihar
		Tamilnadu
Microvelia lineatipes Paiva, 1919	Distrubtion	: Meghalaya
Nealardus typicus (Distant), 1912	Distribution	: Andaman Islands
Pseudovelia (Pseudovelia) sexualis (Paiva), 1917	Distribution	: Assam
		Karnataka

* Polhemus, Personal Communication

SUMMARY

Aquulavelia occulta gen. nov. sp. nov. is described from a cryptic habitat in North Eastern India. A checklist of the species of the subfamily Microveliinae so far known from India is also provided.

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Rec. zool. Surv. India : **97** (Part-3) : 213-222, 1999

FOUR NEW SPECIES OF *CAENOCRYPTOIDES* UCHIDA FROM INDIA, CHINA AND JAPAN
(Hymenoptera : Ichneumonidae)

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INTRODUCTION

The genus *Caenocryptoides* Uchida belongs to the tribe Ischnini of the subfamily Mesosteninae, family Ichneumonidae. It contains small to medium sized species measuring 2.5 to 13.5 mm in length. This is a small genus of Japan and eastern Asia (Townes 1970 : 167).

This genus is recorded here for the first time from India and China. This genus is known by its genotype : *Caenocryptoides tarsalis* (Matsumura) = (*Ischnojopa tarsalis* Matsumura).

Four new species are described here from India (Himachal Pradesh, Meghalaya and Uttar Pradesh), China and Japan. *Caenocryptoides tarsalis* (Matsumura) is also included in the key and the text.

SYSTEMATIC ACCOUNT

Genus ***Caenocryptoides*** Uchida

1936. *Caenocryptoides* Uchida, *Insecta Matsumurana,* **11** : 4. Type : *Ischnojoppa tarsalis* Matsumurana. Original designation.

1970. *Caenocryptoides* Uchida : Townes, *Mem. Amer. Ent. Inst.,* **12** : 167. Syn.

Body moderately slender to stout. Clypeus of moderate size, about 2.5x as wide as long, strongly convex with its apical 0.3 flattened, the apex broadly subtruncate, without a distinct tooth or irregularity. Malarspace about 0.67 as long as the basal width of mandible. Lower tooth of mandible a little shorter than upper tooth. Mesoscutum mat, with small dense punctures; notaulus deep reaching more than 0.5 the length of mesoscutum. Propodeal spiracle about 2.5x as long as wide; apical carina of propodeum medially weak or obsolescent, sublaterally forming weak crests. Hind coxa with or without a short, shallow subvertical groove on its anterobasal face below its artiulation. First tergite (Fig. 1, b) rather broad, with a weak lateral tooth at base, its ventro-lateral carina complete; dorso-lateral carina distinct from spiracle to apex but elsewhere indistint or absent; median dorsal carinae present but weak on basal 0.5 of the tergite. Spiracle of first tergite near its apical 0.45; second tergite mat, with dense punctures. Ovipositor (Fig. 1, c) sheath about 1.0x as long as hind tibia. Wing venation and ovipositor tip as in figure 1, a.

Length : ♀, 8.5-13.5 mm. Fore wing 7.2-10.5 mm. Ovipositor 2.5-4.5 mm.

Type-species.: *Ischnojoppa tarsalis* Matsumura.

Caenocryptoides is readily distinguished by having propodeal spiracle 2.5x as long as wide. Front side of areolet little shorter than outerside, intercubiti convergent. Spiracle of first tergite near its apical 0.45 and clypeus about 2.5x as wide as long. It shows affinities with *Etha* Cameron, *Ischnus* Gravenhorst and other related genera of the tribe Ischnini, in having a weak or strong lateral tooth or projection at the base of first tergite, and clypeus without a median tooth or irregularities.

Key to the species of *Caenocryptoides*

1. Face strongly mat with minute weak and dense setiferous punctures. Hind femur black or red. Upper margin of pronotum entirely black. Propodeum apically black. Not all the tergites with apical bands 2

— Face largely subpolished with small to moderate sized, closely placed punctures. Hind femur yellow with apical about 0.3 black. Upper margin of pronotum with yellow markings. Propodeum apically marked with yellow. All the tergites with narrow apical bands 4

2. Pronotum in the scrobe rugose. Hind femur red. Face, frons, malar-space and temple along the eye margin, and clypeus medially, yellow. First to seventh abdominal tergites narrowly at apex yellow ..... 1. *rugosus*, sp. nov.

— Pronotum in scrobe transversely striate or wrinkled. Hind femur black. Head wholly black. First to third and eighth abdominal tergites apically yellow 3

3. Pronotum in scrobe finely transversely wrinkled. Frons above rugoso-punctate. Speculum on mesopleurum subpolished with minute dense punctures. Scutellum with a small triangular mark at apex; metascutellum black. ..... 2. *tarsalis* (Matsumura)

— Pronotum transversely striate. Frons above strongly mat with dense punctures. Speculum on mesopleurum shiny with distinct evenly spaced punctures. Scutellum and metascutellum, yellow ..... 3. *maai*, sp. nov.

4. Largely black species. Head largely black. Upper margin of pronotum with two small yellow spots. Mesopleurum with a small oval yellow mark near the base of middle coxa. All coxae black; apical mark on propodeum faint and small. Propodeum basad of basal carina with weak dense punctures ..... 4. *nigrifacies*, sp. nov.

— Largely yellow species. Head largely yellow, except frons and vertex in the middle, back of head and clypeus at apex and base, black. Upper margin of pronotum broadly yellow. Mesopleurum with a broad irregular yellow mark. All coxae extensively marked yellow. Propodeum with large marks at apex; basad of basal carina with deep dense punctures .... 5. *flavescens*, sp. nov.

1. *Caenocryptoides rugosus,* sp. nov.

This is a distinct species having pronotum in scrobes rogose. Face, frons, malarspace, temple along the eye margin, clypeus and first to seventh tergites apically, yellow. Hind femur red.

Female : Face strongly, in the middle with dense setiferous punctures. Clypeus at base rugulose with a few setiferous weak punctures, towards the apex smooth and shiny. Mandible at base granulose. Malarspace granulose, 0.6x the basal width of mandible. Frons moderately strongly rugose in the middle, rugulose at sides, towards the antennal base somewhat trans-rugose, a strong median longitudinal carina present. Vertex and temple rugulose, with indistinct setiferous punctures. Pronotum, mesopleurum, metapleurum and propodeum uniformly rugose to strongly rugoso-wrinkled. Scutellum subpolished, with dense, shallow, small sized punctures, its lateral carina more or less confined to its base. Metascutellum subpolished, with fine close and weak punctures. First abdominal tergite granulose (mat) with sparse setiferous punctures; second tergite granulose with dense, moderately strong punctures, following tergites mat and subpolished.

Black. Apex of 5th to base of 10th flagellar segment above white. The following are yellow : Face, frons and temple along the eye margin, malarspace, mandible except the teeth, small mark at the center of clypeus (Fig. 1, d), pronotal collar above, subtegular ridge, tegula at base, triangular mark at the apex of scutellum, metascutellum (Fig. 1, e), apices of 1-7 abdominal tergites narrowly. Legs with all the coxae and trochanters black, except coxae at their apices, yellow; all femora and tibiae reddish-brown, except fore and middle femora and tibiae dorsally dark brown, and their tarsi also dark brown; hind tarsus whitish, except basal 0.6 of its first segment and apical 0.25 of fifth segment black (Fig. 1, f). Wings clear hyaline.

Male : Unknown.

Length : ♀, 8.5 mm. Fore wing 7.2 mm. Ovipositor sheath 2.5 mm.

Holotype ♀, India : Himachal Pradesh : Narkanda in Shimla Hills, 2572 m, 4.x.1962 Coll. V. K. Gupta, Colln. No. 29. *Paratype* 1 ♀, Uttar Pradesh : Dwali in Kumaon Hills, 2743 m, 8.x.1973, V K. Gupta, No. 585 (Z.S.I., Calcutta).

Distribution : India : Himachal Pradesh and Uttar Pradesh.

2. *Caenocryptoides tarsalis* (Matsumura)

1921. *Ischnojoppa tarsalis* Matsumura, Thousand Insects of Japan supplement, **4** : 244. '♀' = ♂, des., fig. Type ♂, Japan : Kyoto (type in Sapporo museum).

1930. *Ischnojoppa tarsalis* Matsumura : Uchida, *Jour. Faculty Agr. Hokkaido Imp. Univ.*, **25** : 213. ♂, ♀. Japan : Sapporo & Garugawa both in Hokkain, Kyoto.

1965. *Caenocryptoides tarsalis :* Townes et al., *Amer. Ent. Inst.*, **5** : 174. Syn.

This species is close to *Caenocryptoides maai,* sp. nov. in having head and femur wholly black, first to third and eighth abdominal tergites apically yellow. It is recognized by having pronotum

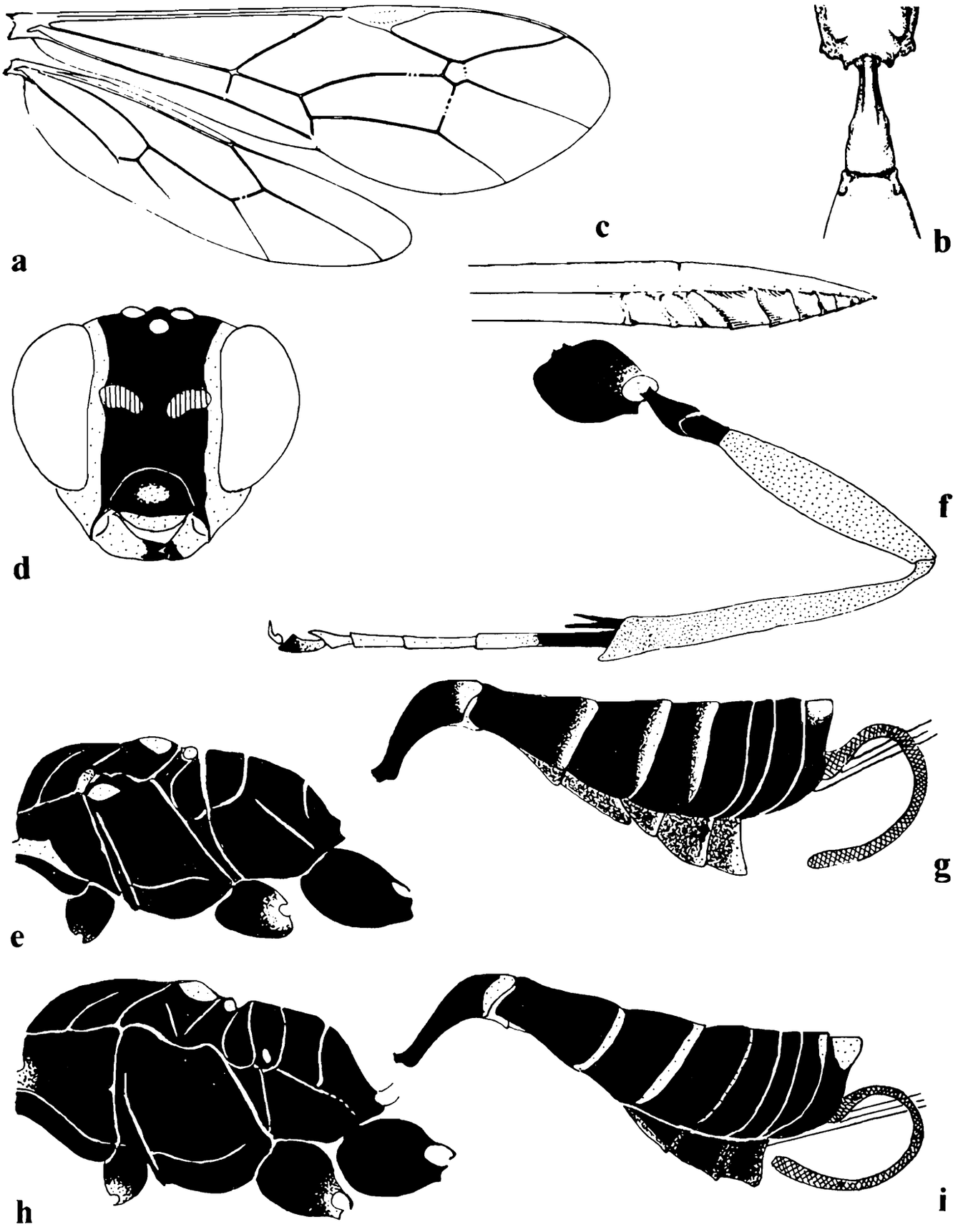

Fig. 1 *Caenocryptoides* Uchida : a, wing venation of fore and hind wings ; b, dorsal view of first tergite ; c, ovipositor tip. *C. rugosus* : colour pattern : d, head front view ; e, thorax side view ; f, hind leg. *C. tarsalis* (Matsumura) : colour pattern : g, abdomen side view. *C. maai* : colour pattern : h, thorax side view ; i, abdomen side view.

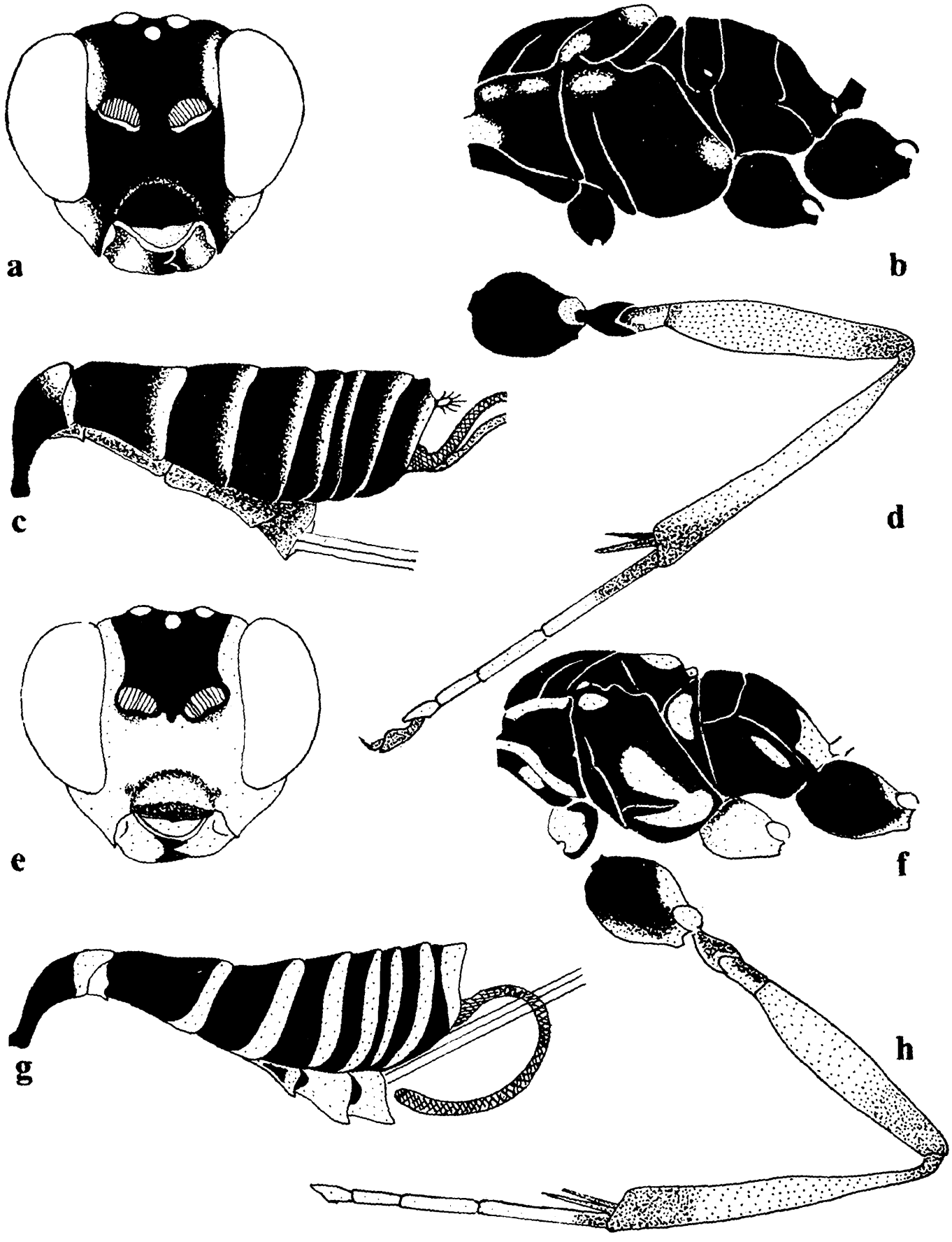

Fig. 2 *C. nigrifácies* : Colour pattern : a, head front view ; b, thorax side view ; c, abdomen side view ; d, hind leg. *C. flavescens* colour pattern : e, head front view ; f, thorax side view ; g, abdomen side view ; h, hind leg.

finely transversely wrinkled in the scrobes. Frons rugoso-punctate. Speculum on mesoplerum subpolished, with minute dense punctures. Scutellum with a small triangular mark at the apex.

Female : Face strongly mat with close setiferous punctures, dull. Clypeus subpolished, sparse to closely punctate. Frons moderately strongly rugoso-punctate, towards the antennal bases smooth and shiny. Vertex largely mat; minutely and closely punctate behind the ocellar triangle. Temple mat with sparse small punctures. Malarspace granulose. Pronotum largely finely trans-wrinkled, upper margin with small coalescent punctures, running into striations ; pronotal collar rough with sparse indistinct punctures. Epomia strong but not reaching up to its upper margin. Mesoscutum with minute dense punctures, with short striae along notauli. Scutellum with fine, distinct, closely placed punctures, lateral carina extending at its basal 0.25. Metascutellum shiny, with minute sparse and shallow punctures. Mesopleurum moderately strongly rugoso-wrinkled, speculum above and mesosternum, finely and closely punctate; prepectal carina extending 0.8 the height of mesopleurum. Metapleurum finely trans-rugoso-wrinkled. Juxtacoxal carina absent. Propodeum between basal carina and apex somewhat finely reticulo-punctate, basad of basal carina, specially near the spiracles densely punctate; basal carina complete, moderately arched, apical carina broadly interrupted in the middle, laterally forming weak crest. First tergite mat, with coarse and close punctures in the middle. Second tergite mat, with minute dense punctures, following tergites mat and subpolished.

Black. 6th to 9th flagellar segments above whitish. The following are yellow : scutellum with a small mark in the middle, apices of first to third tergites very narrowly and eighth tergite broadly in the middle (Fig. 1, g). Wings hyaline with yellowish-brown tinge.

Male : Essentially similar to female, except more slender. Face strongly mat with dense shallow punctures. Frons strongly mat and densely punctate. Pronotum trans-striate in the scrobes, moderately closely punctate above, with obliquely running striations. Mesopleurum moderately strongly trans-rugoso-wrinkled; speculum and mesosternum with deep and moderately close punctures. Metapleurum moderately strongly reticulo-punctate. Propodeum between basal carina and apex reticulo-wrinkled, basad of basal carina with close to dense punctures. First tergite mat, its basal 0.75 sparsely and shallowly punctate. Second tergite mat with weak sparse punctures.

Black. The following are yellow : 15th to 20th flagellar segments, face, clypeus, malarspace, mandibles, except the teeth, frons with two oval marks along the eye margin, temple with two large elongate-oval marks, scutellum with a mediam large mark, apices of all the abdominal tergites narrowly. Leg in general black, except fore and middle coxae and trochanters narrowly to broadly yellow. Hind tarsus from apical 0.2 of first to basal 0.5 of fifth segments whitish-yellow. Wings clear hyaline.

Length : ♀, 10 mm. Fore wing 8 mm. Ovipositor sheath 3.5. ♂ 10.5-11.5 mm. Fore wing 8-8.75 mm.

Specimens examined : 1 ♀, 2 ♂. Japan : Yokokana, 1 ♀, 17.v.1942 & 2 ♂, 22-29.iv.1934, Coll. Kaku Sato (A.E.I. Florida, U.S.A.).

Distribution : Japan.

3. *Caenocryptoides maai,* sp. nov.

This species is close to *Caenocryptoides tarsalis* (Matsumura) by having head and femur black, and first to third and eighth tergites apically, yellow. This species is recognised by its transversely striate pronotum, frons mat with dense punctures. Scutellum and metascutellum, yellow.

Female : Face strongly mat, with undefined setiferous punctures. Clypeus mat, its basal 0.75 with sparse to close, moderate sized punctures, its apical 0.25 smooth. Frons strongly mat in the middle with dense, setiferous punctures, towards the antennal sockets smooth. Vertex mat, in the ocellar triangle closely punctate. Temple subpolished with moderate sized close punctures. Malarspace granulose. Pronotum largely in the middle and below coarsely trans-striate, sparsely puncate in between the striae, its upper area finely puncto-wrinkled, pronotal collar rugulose with fine scattered punctures. Epomia short but strong. Scutellum mat and dull, closely punctate, its lateral carina extending at its basal 0.2. Metascutellum smooth and subpolished. Mesopleurum moderately strongly trans-rugose, speculum shiny, distinctly punctate, area below sternaulus with small, close and shallow punctures, punctures running into fine striations; prepectal carina extending 0.8 the height of mesopleurum. Metapleurum in the upper half moderately strongly wrinkled, in the lower half finely trans-wrinkled. Juxtacoxal carina defined. Propodeum between basal carina and apex wrinkled, basad of basal carina with small and very dense punctures, punctures running into rugosities. First tergite in its 0.66 with close punctures, its apical 0.3 mat; second and third tergites also mat, with very dense punctures; following tergites mat and subpolished.

Black. 5th to 9th flagellar segments white. The following are yellow : pronotal collar at its extreme upper corner, scutellum, metascutellum (Fig. 1, h), apices of first to third and seventh tergites narrowly, eighth tergite broadly in the middle (Fig. 1, i), and extreme apices of fore and middle coxae. Second to fourth hind tarsal segments dirty white. Legs in general black, except their femora and tibiae dark brown. Wings hyaline with light brownish tinge.

Male : Face minutely and densely punctate. Clypeus sparsely punctate. Frons mat, with minute and dense punctures. Vertex minutely and closely punctate. Temple sparsely punctate. Pronotal scrobes coarsely striate, upper margin with deep, close to sparse punctures, collar largely smooth and shiny, with a few minute punctures along the margin. Mesopleurum from the base of middle coxa to base of subtegular ridge strongly wrinkled; speculum, area above sternaulus anteriorly and mesosternum punctate, punctures deep, close to sparse. Metapleurum with strong, moderately large and close punctures. Propodeum between basal carina and apex strongly wrinkled, at some places appears to be reticulate, basad of basal carina with small to large but shallow punctures. First tergite in the middle with coarse shallow and sparse punctures, following tergites mat, except second and third tergites with weak setiferous punctures.

Black. 14th to 20th flagellar segments whitish. The following are yellow : face, clypeus, mandible except the teeth, malarspace, temple along the eye margin, frons with two lateral longish-oval marks, scutellum, metascutellum, tegula, subtegular ridge, apices of all the abdominal tergites, fore and middle coxae and trochanters. Fore and middle femora and tibiae yellowish-

brown, their tarsi dark brown. Hind leg largely black, except extreme apex of coxa, femur and tibia along the inner margin yellowish-brown, apical 0.25 of its first tarsal segment to basal 0.5 of fifth segment white. Wings hyaline with brownish tinge.

Variation : Some males are variable in colour, having pronotal collar, mesosternum, a small oval mark above sternaulus, area near the base of hind wing, metapleurum above, propodeum almost wholly, first tergite, fore and middle legs largely, deep yellow to reddish-yellow. Hind tarsus white except basal 0.3 of first segment black.

Length : ♀, 11-12.5 mm. Fore wing 8.5-9.5 mm. Ovipositor sheath about 3-4 mm. ♂, 9-10 mm. Fore wing 6.5-7.5 mm.

Holotype : ♀ and *allotype* ♂, China : Shaowu Hsien, Fukien, 1200-1500 m, 2.iv. & 30.vi.1942 respectively, Coll. T. C. Maa. *Paratypes* 3 ♀, 5 ♂. Same locality & data as for holo- & allotypes, except 2 ♀ & 2 ♂, 17-28.xi.1942; 2 ♂, 2 & 13.vi.1942 (all in A.E.I., Florida); 1 ♀, 21.v.1942 & 1 ♂, 26.iv.1942 (Z.S.I., Calcutta).

Distribution : China.

4. *Caenocryptoides nigrifacies,* sp. nov.

This species is close to *Caenocryptus flavescens,* sp. nov. in having face largely subpolished and punctate. Hind femur in its basal 0.6, upper margin of pronotum, propodeum apically and all the abdominal tergites narrowly at apex, yellow. It is readly distinguished by having head largely black, upper margin of pronotum with two small yellow marks, all coxae black and mesopleurum with a small yellow mark near the base of middle coxa.

Female : Face subpolished, mat, closely punctate above, sparsely towards the eye margin and clypeal groove. Clypeus sparsely punctate, towards the apex smooth. Malarspace granulose. Frons and vertex mat, frons in front of ocellar triangle ruguloso-punctate, towards the antennal sockets largely smooth and subplished. Vertex with close to sparse punctures. Temple shiny, with sparse and fine punctures. Scutellum shiny, minutely and sparsely punctate, its lateral carina extending at its basal about 0.25. Metascutellum almost smooth and polished. Pronotum in the middle moderately strongly wrinkled, its collar rough with sparse large punctures, upper margin of pronotum with dense deep punctures. Epomia short. Mesopleurum largely finely rugoso-wrinkled, speculum closely punctate, below sternaulus finely and closely punctate, prepectal carina extending 0.75 the height of mesopleurum. Metapleurum densely punctrate; juxtacoxal carina not present. Propodeum between basal carina and apex moderately strongly wrinkled, at some places appears to be reticulate, basad of basal carina weakly and densely punctate. First tergite in the middle with coarse and close punctures, towards the base and apex smooth. Second and third tergites mat, densely punctate, following tergites mat and subpolished.

Black. The following are yellow : 4th to 9th flagellar segments, a small mark near the lower margin of malarspace, base of mandible (Fig. 2, a), two small mark on upper margin of pronotum, scutellum broadly, anterior corner of tegula, subtegular ridge, an oval mark on mesopleurum near the base of middle coxa, apices of all the abdominal tergites narrowly (Fig. 2, b, c). Legs in

general black, all the femora and tibiae yellowish-brown and their tarsi dark brown, except apical 0.3 of hind femur and extreme apex and base of tibia, blackish. Hind tarsus yellowish-white, except basal 0.5 of first and fifth segments wholly blackish (Fig. 2, d). Wings clear hyaline.

Male : Unknown.

Length : ♀, 12 mm. Fore wing 9 mm. Ovipositor sheath about 4.5 mm.

Holotype ♀, Japan : Yokohama, Kanagawaken, 25.v.1993, Coll. Kaku Sato (A.E.I., Florida).

Distribution : Japan.

5. *Caenocryptoides flavescens,* sp. nov.

This species is distinguished from other species by having its body largely marked with yellow.

Female : Face subpolished, in the middle with close and moderately deep punctures, near the eye margin mat and shallowly punctate. Clypeus subplished with close to sparse, small punctures, towards the apex smooth and shiny. Mandibles, except the teeth with close fine punctures. Frons in the middle moderately strongly rugoso-punctate; at sides mat with moderate sized, close and shallow punctures. Ocellar triangle densely punctate. Vertex mat with fine and close punctures. Temple subpolished, sparsely and finely punctate. Malarspace granulose, 0.5x the basal width of mandible. Pronotum strongly wrinkled and carinate in the middle, its upper area and pronotal collar closely punctate. Epomia short but strong. Scutellum shiny, sparsely punctate, lateral carina extending to its basal 0.25. Metascutellum smooth and shiny. Mesopleurum finely rugoso-winkled in the middle, trans-wrinkled above near subtegular ridge, mesosternum and area above sternaulus with fine dense punctures, punctures running into fine aciculations, prepectal carina extending about 0.85 the height of mesopleurum, speculum shiny with small, deep and sparse punctures posteriorly. Metapleurum finely trans-wrinkled, in the center appears to be finely reticulate, juxtacoxal carina not present. Propodeum between basal carina apex finely wrinkled, in the center appears to be reticulate, based of basal carina with moderate sized dense and deep punctures. First tergite mat and subpolished, except at the extreme base and apex with moderate sized deep punctures. Following tergites mat, second and third tergites densely and finely punctate, fourth with setiferous punctures.

Black. 4th to 10th flagellar segments white above. The following are yellow : Face except for a small spot near antennal bases, clypeus except the clypeal groove and apical margin, mandible except the teeth, malarspace, frons and vertex along the eye margin, temple broadly along the eye margin (Fig. 2, e), an oval mark on propleurum, pronotal collar, upper margin of pronotum, tegula, scutellum, metascutellum, subtegular ridge, mesopleurum with a broad irregular mark, metanotum near the base of hind wing, metapleurum with a small spindle-shaped mark above, propodeum with a broad heart-shaped mark (Fig. 2, f), and apices of all the abdominal tergites (Fig. 2, g). All the coxae and trochanters yellow, except fore and middle coxae at the inner side and hind coxae broadly at sides and first trochanteral segment above, black, Rest of legs in general brownish-yellow, except fore and middle femora and tibiae with a line dorsally and their tarsi almost wholly, apical 0.3 of hind femur, tibia at extreme base and apex and tarsus at extreme base,

dark brown to black, (its fifth tarsal segment and claws broken), rest of tarsus white (Fig. 2, h). Wings clear hyaline.

Male : Unknown.

Length : ♀, 13.5 mm. Fore wing 10.5 mm. Ovipositor sheath 4.5 mm.

Holotype : ♀, India : Meghalaya : Cherrapunji in Khasi Hills (formerly in Assam), 1273 m, 5.iv.1966, D.T. Tikar, Colln. No. T 170 (Z.S.I. Calcutta).

Distribution : India : Meghalaya.

SUMMARY

This paper deals with four new species of *Caenocryptoides* Uchida viz., *C. rugosus, C. maai, C. nigrifacies,* and *C. flavescens* from India, China and Japan. A redescription of *C. tarsalis* (Matsumura) is also included in the text.

Caenocryptoides has been recorded from Japan. This is the first record of this genus from India and China.

ACKNOWLEDGEMENTS

I am grateful to Prof. (Dr.) V K. Gupta, Department of Entomology, University of Florida, U.S.A., this study would not have been possible without his encouragement and guidance. I am thankful to Dr. J. R. B. Alfred, Director, Zoological Survey of India, Calcutta for providing me all necessary facilities to carryout this research work.

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Rec. zool. Surv. India : **97** (Part-3) : 223-227, 1999

TWO NEW SPECIES OF *ENCLISIS* TOWNES FROM INDIA
(Hymenoptera : Ichneumonidae)

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INTRODUCTION

The genus *Enclisis* Townes belongs to the tribe Ischnini of the subfamily Mesosteninae, family Ichneumonidae. It contains small to medium species, measuring 7-8 mm in length. This is a small genus previously known from Palaearctic region (Townes, 1970 : 169).

In Palaearctic region this species is represented by three species viz., *Enclisis macilentus* (Gravenhorst), *Enclisis alpicola* Habermehl, and *Enclisis vindex* Tschek. This genus is recorded here for the first time from India. Two new species are described here from Himachal Pradesh in India.

SYSTEMATIC ACCOUNT

Genus *Enclisis* Townes

1970. *Enclisis* Townes, *Mem. Amer. Ent. Inst.*, **12** : 169. Type : *Cryptus macilentus* Gravenhorst. Original designation.

Body moderately slender. Clypeus of moderate size, about 2.3x as wide as long, moderately convex, its apex with a weak median tooth or blunt angulation (Fig. 1, b). Malarspace about 0.7 to 1.0x as long as basal width of mandible. Mandible short with equal teeth. Apical 0.3 of female flagellm not enlarge, not flattened below, blunt and truncate at the end. Mesoscutum polished or weakly mat, its punctures small and fine. Notaulus moderately strong, reaching slightly beyond the center of mesoscutum. Propodeal spiracle circular. Propodeum a little elongate, its apical transverse carina complete, a little stronger sublaterally forming weak crest. Base of hind coxa deep, with a weak basal impression on outer side below its attachment but without a distinct groove. Venation as shown in the figure 1, a; areolet small to large and pentagonal, the second recurrent vein distinctly inclivous. First tergite moderately slender, without a lateral projection at base, the spiracle only slightly behind the middle, its ventrolateral carina sharp and complete, dorsolateral carina sharp to rather blunt (complete or almost so), and median dorsal carinae distinct on petiole, becoming obsolescent near center of postpetiole. Second tergite mat with fine, dense weak punctures. Ovipositor sheath about 0.9 to 1.4 times as long as hind tibia. Ovipositor compressed, its tip heavy, upper valve evenly arched with a distinct nodus, lower valve with 8-10 teeth (Fig. 1, c).

Length : ♀ : 7.5-8 mm; fore wing 6-6.5 mm; ovipositor sheath 2.5-2.8 mm.

Type-species : Cryptus macilentus Gravenhorst.

This genus is close to *Dihelus* Townes in having spiracle of first tergite only slightly behind the middle; ovipositor tip compressed, its ridges subvertical. It is also close to *Cyclaulus* Townes, in having lower tooth of mandible of the same length as upper tooth; center of apical margin of clypeus with a single tubercle or tooth. However, it can be easily distinguished by having hind end of sternaulus curved weakly downward toward base of middle coxa.

The Indian species can be identified by the following key :

Key to the species of *Enclisis*

1. Body largely black; seventh to nineth flagellar segments, face with small lateral spots, clypeus with a median spot and pronotal collar above, whitish. Legs with fore and middle coxae and trochanters, dark reddish-brown. Hind coxa and trochanter, black. Body mat, dull, densely punctate, puncture running into striations or wrinkles. Areolet in fore wing large, wider than high, second recurrent vein close to first intercubitus ..... 1. *nigricoxis,* sp. nov.

— Body extensively marked with white, yellow, brown and red. Fifth to nineth flagellar segments white above. Legs with all the coxae and trochanters, red. Body subpolished, largely rugoso-punctate. Areolet in fore wing small, higher than wide, second recurrent vein close to second intercubitus. ..... 2. *ruficoxis,* sp. nov.

1. ***Enclisis nigricoxis,*** sp. nov.

This species can be recognized by having largely black body, especially all the coxae and trochanters black. Body densely punctate, punctures running into striations; areolet moderately large, wider than high; second recurrent vein close to first intercubitus.

Female : Body largely mat and subpolished. Face with fine dense punctures, punctures running into fine striations or wrinkles. Clypeus subpolished with sparse moderate sized punctures. Malarspace strongly granulose, 0.75x the basal width of mandible. Mandible except the teeth moderately strongly rugoso-punctate. Frons and vertex strongly mat and densely punctate, punctures forming wrinkles, area just behind antennal sockets smooth and shiny. Temple subpolished, with moderately large closely placed punctures. Pronotum and mesoscutum strongly mat, finely wrinkled with weak indistinct punctures, epomia very short. Scutellum shiny, with sparse small sized punctures, its lateral carina more or less confined to its base. Metascutullum smooth and shiny. Mesopleurum densely punctate, punctures fine and running into fine wrinkles, below sternaulus subpolished, with fine dense punctures, speculum largely smooth or polished except above with coarse deep close punctures, prepectal carina extending 0.7x the height of mesopleurum. Metapleurum moderately strongly puncto-wrinkled, juxtacoxal carina weak. Propodeum subpolished, mat, between basal carina and apex finely wrinkled, basad of basal carina granulose with coarse, sparse, shallow punctures, spiracles small, oval. First abdominal tergite subpolished, with sparse, shallow moderate sized punctures, tergites subapically with longitudinally depressed area, basally smooth. Second, third and also fourth tergites mat with dense, fine

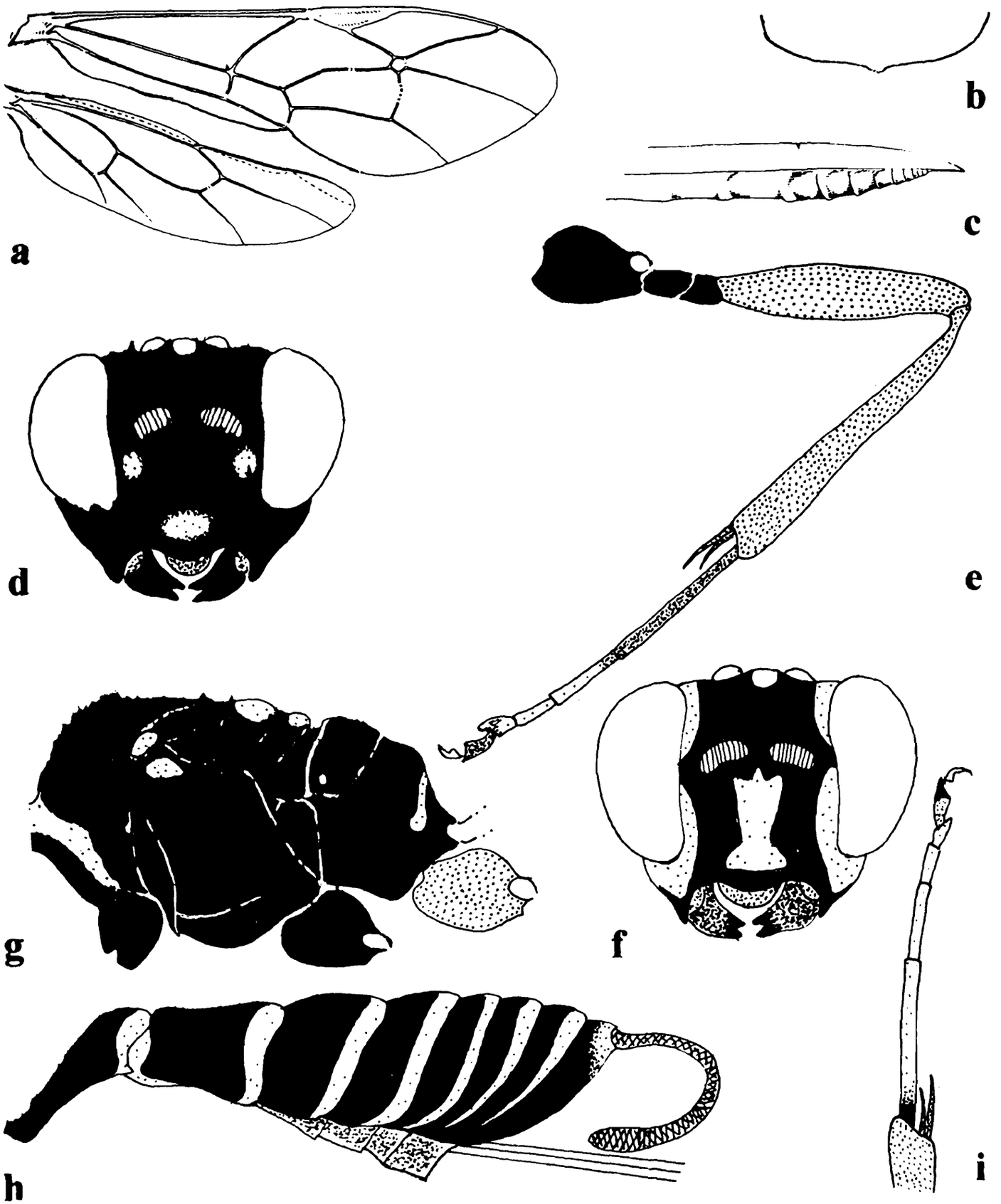

Fig. 1 *Enclisis* Townes : a, wing venation of fore and hind wings ; b, clypeus showing median tooth ; c, ovipositor tip. *E. nigricoxis* : colour pattern : d, head front view ; e, hind leg. *E. ruficoxis* : colour pattern : f, head front view , g, thorax side view ; h, abdomen side view ; i, hind tarsus.

punctures, following tergites mat and subpolished. Fore wing with areolet moderately large, penatagonal, about 1.5x as high as the portion of second recurrent vein above bulla. Nervellus intercepted at its basal 0.4. Ovipositor sheath about 1.1x as long as hind tibia.

Black. Antennae with 7th to 9th segments white above. Face with two small lateral spots and clypeus with median basal spot, white (Fig. 1, d). Head black, except face and temple with reddish hue. Thorax black, except pronotal collar behind neck whitish. Abdomen dark reddish-brown, fore and middle coxae and trochanters dark reddish-brown, their femora and tibiae yellowish-brown and tarsus brown to blackish-brown. Hind coxa and trochanter black, femur and tibia reddish, except tibia clouded with dark brown, tarsus dark brown except for a white band on second to fourth tarsal segments (Fig. 1, e). Wings clear hyaline.

Male : Unknown.

Length : ♀, 7.5 mm. Fore wing 6.0 mm. Ovipositor shealh 2.5 mm.

Holotype ♀, India : Himachal Pradesh : Rahla, 2743 m, in N-W. Himalaya, 5.vi.1970, Coll. T. Chand, No. K. 268 (Z.S.I., Calcutta).

Distribution : India : Himachal Pradesh.

2. ***Enclisis ruficoxis,*** sp. nov.

This species is characterized by having all coxae and trochanters red. Body largely rugoso-punctate. Areolet small, higher than wide, second recurrent vein close to second intercubitus.

Female : Body largely subpolished. Face with dense, shallow moderate size punctures, punctures tending to be sparse and indistinct towards the eye margin. Clypeus with sparse, small and weak punctures, apically smooth and shiny. Mandibles except the teeth longitudinally striate with punctures inbetween the striae. Malarspace granulose, 0.7x the basal width of mandible. Frons above with dense and moderately deep small punctures, punctures running into fine rugosities, towards the antennal sockets smooth and shiny, along the eye margin largely smooth except for a few minute shallow punctures. Vertex minutely and closely punctate. Temple minutely and sparsely punctate, shiny. Pronotum in the middle coarsely wrinkled, upper margin with dense, moderate sized punctures, pronotal collar shiny, weakly and finely striato-punctate, epomia short. Scutellum with sparse, shallow and fine punctures, lateral carina more or less confined to its base. Metascutellum shiny, with a few indistinct punctures. Mesopleurum largely rugoso-wrinkled, mesopleurum above and near speculum with large, deep and close punctures, below sternaulus and prepectus with dense, small sized punctures, at places punctures running into rugosities. Prepectral carina extending almost up to the base of subtegular ridge; speculum smooth and polished; subtegular ridge shiny, indistinctly punctate. Metapleurum finely rugoso-punctate, juxtacoxal carina not well defined. Propodeum between basal carina and apex finely wrinkled, at some places appears to be reticulo-punctate, basad of basal carina finely reticulo-punctate, basal carina with a median longitudinal fairly broad ridge. First tergite medially ruguloso-punctate, towards base and apex rugulose with a few shallow punctures, extreme apex and base subpolished, with sparse to close, shallow punctures. Second and third tergites mat with dense fine shallow

punctures, following tergites mat and subpolished. Fore wing with areolet oblong, sides strongly convergent, about 1.0x as high as the portion of second recurrent vein above bulla. Second recurrent close to second intercuitus. Nervelllus in hind wing intercepted at its basal 0.35. Ovipositor sheath about 1.1x as long as hind tibia.

Black. Antennae with 5th to 9th segments above white; scape in front yellowish-brown. The following are yellow : Face with a triangular mark in the middle and along the eye margin, clypeus, frons and vertex along the eye margin, temple and malarspace with a continuous mark along eye margin (Fig. 1, f), pronotal collar, scutellum, metascutellum, tegula, subtegular ridge, bow-shaped mark on propodeum (Fig. 1, g), apices of all the abdominal tergites (Fig. 1, h). Legs in general deep red, their femora, tibiae and tarsi tending to be reddish-brown, except hind tarsus whitish (Fig. 1, i) with the extreme base of first segment and extreme apex of fifth segment blackish. Wings clear hyaline.

Male : Unknown.

Length : ♀, 8 mm. Fore wing 6.5 mm. Ovipositor sheath 2.8 mm.

Holotype : ♀, India : Himachal Pradesh : Narkanda, 2700 m, 20.vi.1972, Girish Chandra, No. G. 17 (Z.S.I., Calcutta).

Distribution : India : Himachal Pradesh.

SUMMARY

This paper deals with two new species of *Enclisis* Townes viz., *Enclisis nigricoxis* and *Enclisis ruficoxis* from India.

The genus *Enclisis* Townes has been recorded from Palaearctic region. This is the first record of this genus from India.

ACKNOWLEDGEMENTS

I am grateful to Prof. (Dr.) V K. Gupta, Department of Entomology, University of Florida, U.S.A., this study would not have been possible without his encouragement and guidance. I am thankful to Dr. J. R. B. Alfred, Director, Zoological Survey of India, Calcutta for providing me all necessary facilities to carryout this research work.

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Rec. zool. Surv. India : **97** (Part-3) : 229-230, 1999

Short Communication

ON THE CONFIRMATION OF THE OCCURRENCE OF *EPHIPPUS ORBIS* (BLOCH) (PISCES : EPHIPPIDAE) IN WEST BENGAL

Misra (1962 : 279) listed the spade fish *Ephippus orbis* (Bloch) from West Bengal. Later, Talwar *et al.* (1994 : 299) in their comprehensive account of marine and estuarine fish from this state, considered the above record of *E. orbis* as doubtful and omitted from their account. This record thus confirms the occurrence of *E. orbis* in coastal water of West Bengal. A brief description of the specimens is given hereunder.

Ephippus orbis (Bloch)

1787. *Chaetodon orbis* Bloch, *Naturg. Ausland Fische,* 3 : 81.

1878. *Ephippus orbis :* Day, *Fish. India* : 115; pl. 29, fig. 4

Material : Four specimens, 8.0 to 12.6 cm in standard length; collected from Digha 'mohna' West Bengal (Lat. 21°36' N, long 87°30' E) on 7.5.97 & 30.7.97 by S. Mitra; ZSI-MARC Regd. No. 57.

Diagnostic Characters : D IX 9; A III 15; P 19; C 19. Body deep, almost circular, strongly compressed, depth 73.8-76.2% in standard length. Head short, 29.7-31.8% in standard length. Mouth small, terminal, not protrusible, teeth in bands, setiform. Top of head densely scaled; opercle covered with scales almost to its ventral edge. Dorsal spines moderately strong, 3rd and 4th spines longest. Scales small, finely ciliated.

Colour : Greenish brown; 4 to 5 vertical black bars on body from dorsal fin base to belly in young specimens; margins of soft dorsal, pelvic, anal and caudal fins dusky black.

Geographical distribution : Indo-West Pacific.

ACKNOWLEDGEMENTS

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Zoological Survey of India,
Marine Aquarium & Research Centre,
Digha – 721428

T. K. CHATTERJEE
and
S. MITRA

PLATE-1

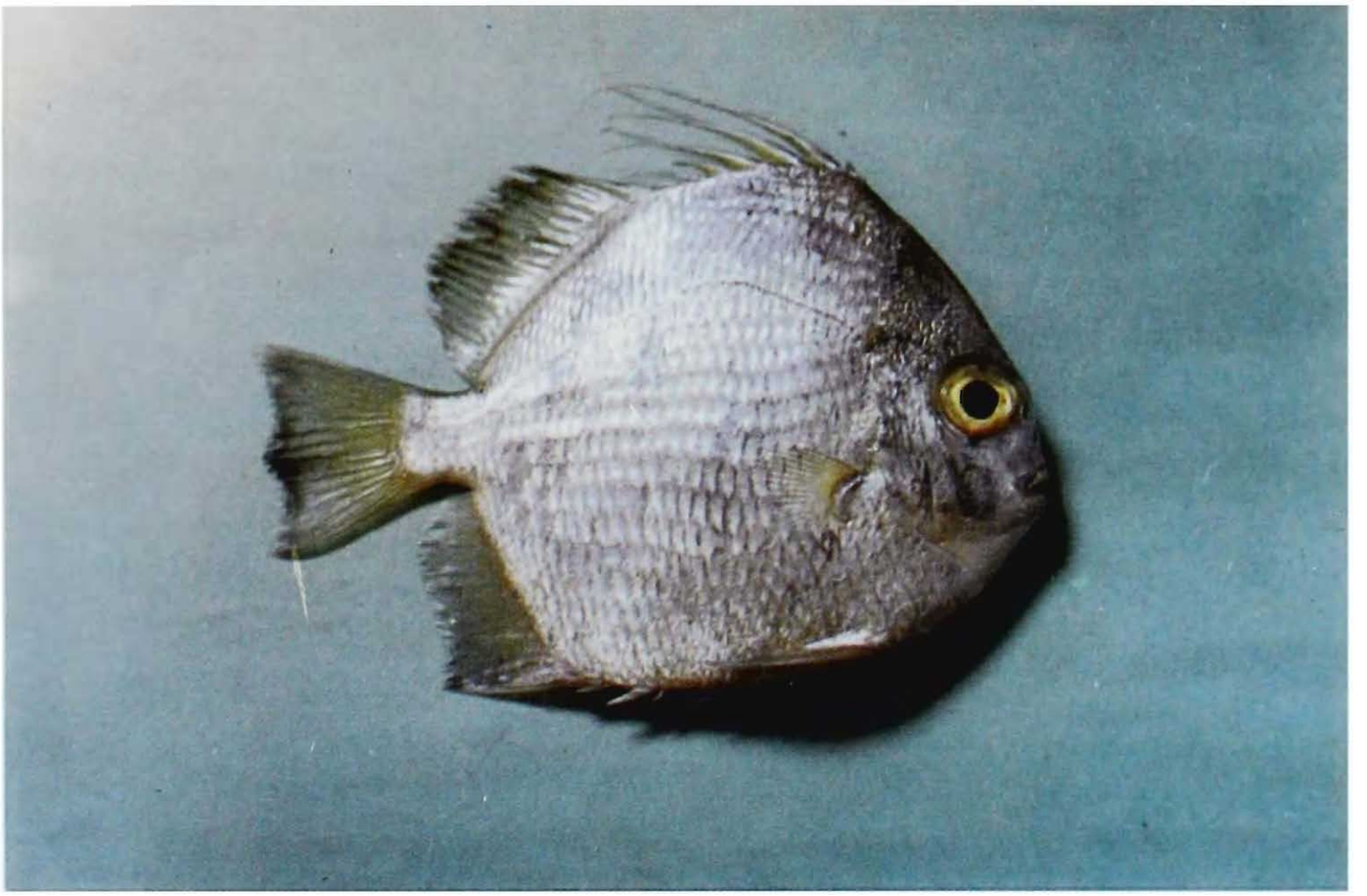

Fig. 1 : Lateral view of *Ephippus orbis* (Bloch).

Rec. zool. Surv. India : **97** (Part-3) : 231-233, 1999

Short Communication

A NOTE ON A SMALL COLLECTION OF FISHES FROM PENNAIYAR RIVER, TAMIL NADU

River Pennaiyar is one of the major river systems of South Arcot district. So far there is no report on the Ichthyofauna of this river, which originates in Western Ghats near Mysore and traverses the districts of Dharmapuri, North Arcot and South Arcot before it joins the Bay of Bengal, near Cuddalore.

While studying the Ichthyofauna of South Arcot district, the authors had an opportunity to collect and study fishes from river Pennaiyar. Collections were made from three locations along the river : (1) Anaicut near Thirukovilur (2) near Thapovanam and (3) At Villipuram. A total of 1437 exs. were collected.

Out of 41 primary and 17 secondary freshwater fishes recorded from South Arcot district, during the present survey, 33 species were encountered from the river Pennaiyar alone.

SYSTEMATIC LIST OF SPECIES COLLECTED FROM THE RIVER

Order : Osteoglossiformes

Suborder : Notopteroidei

Family : NOTOPTERIDAE

1. *Notopterus notopterus* (Pallas)—2 exs.

Order : Anguilliformes

Family : ANGUILLIDAE

2. *Anguilla bengalensis* (Gray)—6 exs.

Order : Cypriniformes

Family : CYPRINIDAE

Subfamily : CYPRININAE

3. *Puntius amphibius* (Val.)—1 ex.
4. *P. chola* (Ham.)—3 exs.
5. *P. conchonius* (Ham.)—2 exs.
6. *P. dorsalis* (Jerdon)—6 exs.
7. *P. fraseri* (Hora)—2 exs.
8. *P. sophore* (Ham.)—95 exs.

9. *P. ticto* (Ham.)—29 exs.
10. *P. vittatus* (Day)—6 exs.

Subfamily : RASBORINAE

11. *Amblypharyngodon microlepis* (Blkr)—28 exs.
12. *Barilius bendelisis* (Ham.)—56 exs.
13. *Brachydanio rerio* (Ham.)—3 exs.
14. *Esomus barbatus* (Jerdon)—232 exs.
15. *Esomus danricus* (Ham.)—27 exs.
16. *Parluciosoma daniconius* (Ham.)—408 exs.
17. *Rasbora caverii* (Jerdon)—127 exs.

Subfamily : GARRINAE

18. *Garra gotyla stenorhynchus* (Jerdon)—1 ex.
19. *Garra mullya* (Sykes)—4 exs.

Family : COBITIDAE

20. *Lepidocephalus thermalis* (Val.)—228 exs.

Order : Siluriformes

Family : BAGRIDAE

21. *Mystus keletius* (Val.)—46 exs.

Family : SCHILBEIDAE

22. *Pseudeutropius atherinoides* (Bloch)—30 exs.

Order : Cyprinodontiformes

Family : ORYZIIDAE

23. *Oryzias melastigma* (Mc Cll.)—27 exs.

Family : POECILIDAE

24. *Gambusia affinis* (Baird & Girard)—15 exs.

Order : Perciformes

Family : AMBASSIDAE

25. *Chanda nama* (Ham.)—1 ex.

Family : CICHLIDAE

26. *Etroplus maculatus* (Bloch)—9 exs.
27. *Oreochromis mossambica* (Peters)—2 exs.

Family : GOBIIDAE

28. *Glossogobius giuris* (Ham.)—26 exs.

Family : MUGILIDAE

29. *Mugil cephalus* Linnaeus—2 exs.

Order : Channiformes

Family : CHANNIDAE

30. *Channa orientalis* Bloch & Sch.—2 exs.

31. *Channa punctatus* (Bloch)—4 exs.

Order : Mastacembeliformes

Family : MASTACEMBELIDAE

32. *Mastacembelus armatus* (Lacepede)—7 exs.

33. *Macrognathus aral* (Bloch & Sch.)—1 ex.

The following 11 species were collected solely from this river in South Arcot district, (1) *Notopterus notopterus,* (2) *Puntius conchonius,* (3) *Barilius bendelisis,* (4) *Brachydanio rerio,* (5) *Garra gotyla stenorhynchus,* (6) *Garra mullya,* (7) *Mystus keletius,* (8) *Gambusia affinis,* (9) *Channa orientalis,* (10) *Macrognathus aral* & (11) *Mastacembelus armatus.*

Earlier Jayaram (1982) reported 142 species of fishes from the east flowing river Cauvery of which 78 were from the Tamil Nadu part of the river. Present report on yet another east flowing river Pennaiyar originating from the Western Ghats, includes some interesting hill stream fishes viz. *Garra gotyla stenorhynchus, Barilius bendelisis* and *Brachydanio rerio,* of these, the occurrence of one specimen of the highly specialized hill stream fish *G. g. stenorhynchus* in the plains of South Arcot could be the result of this species being washed off by the running waters. Jayaram (1982) also collected one specimen of the species from the upper anaicut of Cauvery river near Trichy. Another significant observation is the occurrence of 3 specimens of *B.rerio,* in Pennaiyar. This species was earlier reported only from torrential streams. Jayaram (Op. cit) reported its presence from the mountain streams of Karnataka. This is the first report of this species from the plains of Tamil Nadu.

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REFERENCES

Jayaram, K. C., Venkateswarlu, T. and Raghunathan, M. B., 1982. A survey of the Cauvery river system with a major account of its fish fauna *Rec. zool. Surv. India, Miss. Publ. Occ. Pap.* No. 36 : 1-115, pls. I-XII.

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