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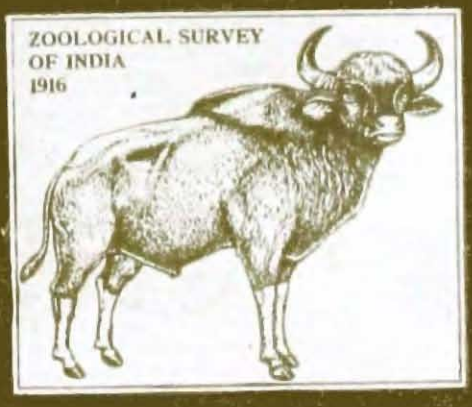

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BULLETIN OF THE ZOOLOGICAL SURVEY OF INDIA

CONTENTS

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DJOMBANGIA CLARIAE N. SP. (CESTOIDEA : CARYOPHYLLIDEA : LYTOCESTIDAE) FROM A SILUROID FISH IN WEST BENGAL

By

D. K. KUNDU, S. B. BHATTACHARYA AND I. B. DATTA

Zoological Survey of India, Calcutta.

ABSTRACT

Djombangia clariae n. sp. is described from the fish *Clarias batrachus* from Bongaon in West Bengal and figured. It has been distinguished from the type species *D. penetrans* Bovien, 1926, *D. indica* Satpute and Agarwal, 1974 and *D. caballeroi* Sahay and Sahay, 1977.

INTRODUCTION

The genus *Djombangia* was erected by Bovien in 1926 from the fish *Clarias batrachus* as *D. penetrans* from Java. Satpute and Agarwal (1974) described *D. indica* from the duodenum of the same host species from Raipur, Madhya Pradesh. Sahay and Sahay (1977) described *D. caballeroi* from the fish *Heteropneustes fossilis* from Chotanagpur, Bihar State. The present communication deals with a fourth species, *D. clariae*, from *Clarias batrachus* from Bongaon, West Bengal.

Two specimens (one mature and the other immature) were recovered from the fish host. On study it was revealed that it significantly differs from *D. penetrans*, *D. indicas* and *D. caballeroi* in certain characters. When freshly recovered, the worm was milky white and highly contractile. After fixing in AFA under cover slip pressure, it contracted due to which deep denticulations appeared on the margin of the body. The neck region also contracted a little. Thus, the overall length and breadth of the body must have been affected to some extent. All measurements are in micron unless otherwise stated. The drawings have been made with the aid of a camera lucida.

SYSTEMATIC ACCOUNT

Family LYTOCESTIDAE Wardle and McLeod, 1952

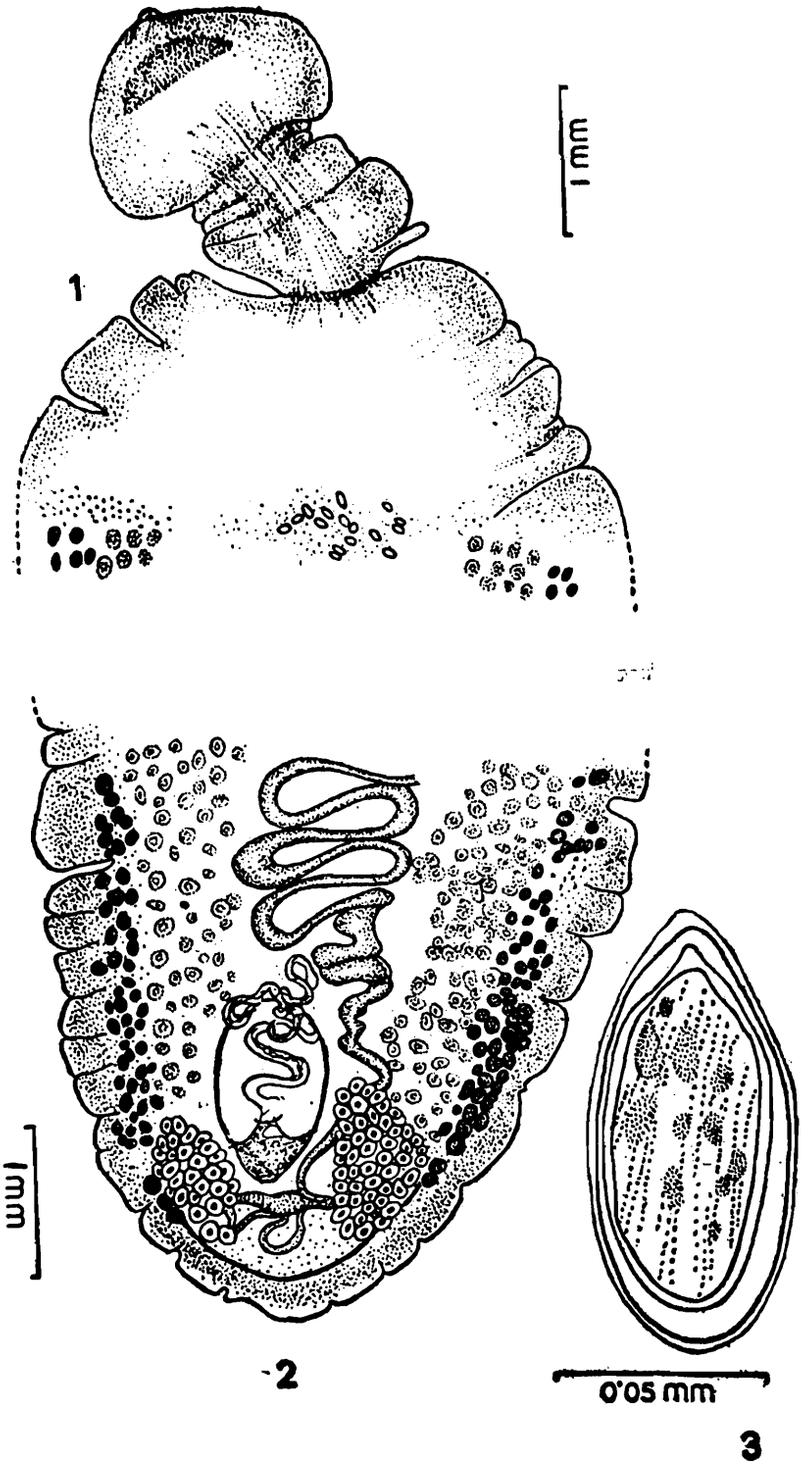
Genus **Djombangia** Bovien, 1926

Djombangia clariae n. sp.

(Figs. 1, 2, 3)

Description (with measurements on one mature specimen) : The body measures

14.035 mm in length and 5.087 mm in breadth. Tegument is very thick. Deep denticulations in tegumental layer developed due to contraction. The body can be easily distinguished into three regions—scolex, neck and body proper. Scolex measures 1.033 mm in length and 1.788 mm in breadth, roughly triangular. At the apex there seems



Figs. 1-3. 1. Anterior part of *Djombagia clariae* n. sp. showing scolex, neck and a part of body proper.
2. Posterior part of *Djombagia clariae* n. sp. showing details of internal organs.
3. An enlarged egg of *Djombangia clariae* n. sp.

to be some evagination (probably distorted form of terminal introvert). The scolex is profusely supplied with glandular cells along the margin. Such cells are heavily concentrated below the apex in a semilunar fashion. Scolex is followed by a contractile neck region, provided with thin muscle fibres. The body proper is marked off from the neck region which is of medium length.

In contracted from, the length of the body proper is 11.55 mm. It is oval or leaf-shaped with rounded posterior end. The testes are follicular, numerous, measuring 165 in diameter on average, distributed in lateral medullary field, from behind the neck to the ovary. Vas deferens tubular, narrow, much coiled and convoluted. It is followed by a short external seminal vesicle. Cirrus sac oval, muscular, discernible, situated in the median medullary zone in the posterior part of the body, enclosing convoluted cirrus, opening into genital atrium in front of ovarian isthmus.

Ovary dumb-bell shaped or bilobed, in two bunches of follicles, on either side of the median line, in the lateral medullary zone, connected by a wide isthmus. The ovarian lobes measure 893-962 by 485-555. The lobes of the ovary are held apart by an ovarian isthmus which measures 729 across. The oviduct arises from behind the ovary, descends and opens into the cotype. The uterus ascends, gets thrown into close intricate lateral coils, finally occupying the median medullary zone, and extending up to the level of testicular field. The eggs are nonoperculate, measuring 82-96 by 41. The uterovaginal duct opens into the genital atrium separately. The vitelline follicles are innumerable, measuring 132 in diameter on average, disposed in lateral cortical zone, surrounding the testicular field in a ring-like fashion, extending almost up to the level of testicular field anteriorly. No post-ovarian vitelline follicles. The common vitelline duct also opens into the ootype. Shell gland complex behind the ovarian isthmus.

Excretory pore terminal. Details of the canals could not be traced out.

Host :	*Clarias batrachus* (L.), Walking catfish, (Pisces. Clariidae)
Location :	Intestine
Locality :	Bongaon, West Bengal
Number of specimens :	1 mature specimen
Specimens deposited :	Z. S. I Reg. No. W 7476/1

Discussion : *Djombangia clariae* n. sp. differs from the type species, *D. penetrans*, in having discernible cirrus sac, smooth nonspinous eggs and presence of seminal vesicles. It differs from *D. indica* which is having a short neck, no receptaculum seminis, and in forming blind rather than perforated diverticula in host gut. Further, it comes close to *D. caballeroi* in many respects but differs mainly in the position of genital atrium which is in front of the ovarian isthmus and not anterior to the cirrus sac, and in the presence of a short seminal vesicle.

ACKNOWLEDGEMENTS

The authors are thankful to Dr. B. K. Tikader, Director, Zoological Survey of India, for providing laboratory and library facilities, and to Dr. M. Hafeezullah, Superintending Zoologist, for continuous encouragements.

References

Bovien, P. 1926. Caryophyllaeidae fro Java. *Vidensk. Meddr dansk. naturh. Foren.*, **82** : 157-181.

Satpute, L. R. and Agarwal, S. M. 1974. "Diverticulosis" of fish duodenum infested with cestodes. *Indian J. Expl. Biol.*, **12**(4) : 373-375.

Sahay, S. N. and Sahay, U. 1977. On a new caryophyllaeid eestode, *Djombangia caballeroi*, sp. nov., from a freshwater fish, *Heteropneustes fossilis*, in Chotanagpur, with an amendation of the generic characters. *Exerta Parasitologica En Memoria Del Doctor Eduardo Caballero Y Caballero*, 371-376.

Bull. zool. Surv. India, 7 (2-3) : 155-164, 1985

LANGURIINI : LANGURIIDAE (COLEOPTERA) OF THE HIMALAYAS

By

A. K. Mukherjee and Tapan Sengupta

ABSTRACT

The present paper deals with 19 species belonging to 7 genera of Languriini : Languriinae from hills of Himalayas, which includes three new records from India and some new records from different States of India.

The present study is based on the collection of Languriid materials from West Bengal, 1975, Meghalaya 1976, Assam 1976, Uttar Pradesh 1976, Kashmir 1976, and Nepal 1976 collected by Dr. W. Wittmer and Dr. C. Baroni. The materials belong to 19 species under 7 genera of the subfamily Languriinae which include three new records from India and some new records from difference states of India.

Family Languriidae

Sub-family Languriinae

Tribe **Languriini** (=Languriinae Arrow)

1. *Tetralanguria elongata* (F.)
2. *Tetralanguria cuprea* (Arrow)
3. *Doubledaya mouhoti* (Crotch)
4. *Caenolanguria assamensis* (Fowler)
5. *Caenolanguria birmanica* (Harold)
6. *Caenolanguria* spp.
7. *Anadastus vicinus* Arrow
8. *Anadastus filiformis* (F.)
9. *Anadastus amabilis* Arrow
10. *Anadastus wiedemanni* Gorham
11. *Anadastus dohertyi* Arrow
12. *Anadastus* sp. nr. *dohertyi* Arrow...(i)
12. *Anadastus* sp. nr. *dohertyi* Arrow...(ii)
13. *Anadastus gratus* Gorham
14. *Anadastus parvulus* (Wiedemann)
15. *Anadastus nigriventris* (Motschulsky)
16. *Anadastus loricatus Arrow*
17. *Epilanguria tenuicornis* Fowler
18. *Pentelanguria elateroides* Crotch
19. *Languriophasma cyanea* (Hope)

1. **Tetralanguria elongata** (F.)

1801. *Trogosita elongata* **Fabricius**, *Syst. Eleuth.* **1 : 152.**

1925. *Pachylanguria elongata* **(Fab.) var.** *tripunctata* **(*Wiedemann*) Arrow** *Fauna Brit. India Clavicornia* **:** *Erotylidae, Languriidae & Endomychidae*, **London : 173.**

1967. *Tetraianguria elongata* **(F.) f.** *tripunctata* **(Wiedemann) : Chujo,** *Ent. Basil.* **1 : 285.**

Material : Meghalaya : 3 exs., Darugiri, Garo Hills, 450 m., 19.5.1976, Wittmer & Baroni ; 4 exs., Barapani old Rd., 1000 m., 14,5.1976, Wittmer & Baroni ; 1 ex.,

Umtyngor, Cherrapunjee, 16.5.1976, Wittmer & Baroni ; 1 ex., Songsak, Garo Hills, 19.5.1976 Wittmer & Baroni ; West Bengal ; 1 ex., Jhepi, Darjeeling, 22.5.1976, Wittmer ; 1 ex., Umg-Kalimpong, Darjeeling, 18.10. 1975, Bhakta Bhadur ; 1 ex., Darjeeling dist., 1277, Bhakta Bahadur ; 1 ex. : Lava, Darjeeling dist., 2200 m., 7.8.1978, Bhakta B. ; 1 ex., Kalimpong Umg, Balu Kop, 6.4. 1977, Bhakta B. : Sikkim : 1 ex., Yartang, 400 m., 17.4.1978, Bhakta B. ; 1 ex., Yoksam-Thing Ling, 1100 m., 8.4.1978, Bhakta B. ; 2 exs., Rangeli River, 900 m., 15.4.1977, Bhahta B.

This species was recorded from Sikkim, West Bengal, Assam, Bangladesh, Burma, Malay Peninsula, Sumatra, Java and Borneo. We have recorded the species from Uttar Pradesh and Arunachal Pradesh (India), here it is being recorded first time from Meghalaya (India) and Nepal.

General appearance elongate, narrowed posteriorly, legs and antennae rather short, antennal club 4-jointed and well developed ; eyes finely facetted ; head and pronotum sparsely and finely punctured ; elytra striate-punctate and apex separately rounded but slightly serrated. Head and antennae black ; pronotum reddish with rounded black patches at centre of disk and lateral margins, sometimes black patch spread over the whole disk ; elytra usually metallic blue, sometimes greenish or coppery ; ventral surface red except for last ventrite which is black.

Length : 12-15 mm.

Remark : This species differs from *T. cuprea* (Arrow) by its hind angles of pronotum very acutely produced and closely applied to the shoulders.

2. **Tetralanguria cuprea** (Arrow)

1925. *Pachylanguria cuprea* Arrow, *Fauna Brit. India, Clavicornia : Erotylidae, Languriidae & Endomychidae* London : 176.

1945. *Tetralanguria cuprea* Villiers, *L'Abeille* 37 : 285.

Material : West Bengal : 1 ex., Lopchu, Darjeeling, 1500 m., 9.5.1976, Wittmer ; Uttar Pradesh : 1 ex., Mussoorie, 1300-2000 m., 27.6.1976, Wittmer ; Nepal : 1 ex., Liri-Thodung, 28.5.1976, Wittmer & Baroni ; 2 exs., Pina-Lake, 2900 m., 30.5.1977, Wittmer ; 1 ex., Pina Lake, 2370 m., 4.6.1977, Wittmer.

This species was recorded from Uttar Pradesh, Assam, Manipur, Sikkim (India) and Burma. Now, it is being first time recorded from Darjeeling district of West Bengal : India.

General appearance elongate, slender, narrowed anteriorly and posteriorly ; head sparsely and coarsely punctured ; antennae short, slender and with 4-jointed club ; eyes finely facetted ; pronotum slightly elongated, sparsely and finely punctured, hind angle acute but not producing or overlapping. The shoulder of elytra well developed, apex usually narrowed, truncate and serrate, striate -punctate, fine punctures on interstices ; scutellum cordate with pointed apex and impunctate ; head, pronotum and elytra deep black with copperish tinge both dorsally and ventrally ; antennae black and legs reddish black.

Length : 10-11 mm.

Remarks : This species differs *T. humeralis* Arrow in shape of pronotum and antennal club.

3. **Doubledaya mouhoti** (Crotch)

1876. *Lauguriosoma mouhoti* Crotch *Cist. Ent.* **1** : 376.

1925. *Doubledaya mouhoti* (Crotch) : Arrow, *Fauna Brit. India, clavicornia* : *Erotylidae, Languriidae and Endomychidae*, London : 202.

Material : Assam : 3 exs., Kaziranga, 75 m., 7-9.5.1976, Wittmer and Baroni ; Sikkim : 1 ex., Mangon, 2.9.1977, Bhakta B.

This species was recorded from Sikkim, Burma, Tenasserim, Indo-China, Malay Peninsula and Borneo. Now, it is being recorded first time from Assam (India).

General appearance shiny, elongate and narrowed posteriorly ; head moderately and finely punctured ; antennae slender and with 4-jointed club ; eyes finely facetted ; pronotum convex, slightly quadrate, moderately and finely punctured, hind angle acute ; elytra striate-punctate, punctures deep, shoulder prominent, apex truncate with pointed outer spine ; scutellum pentagonal with pointed apex and impunctace ; head, pronotum and elytra red except the tip of elytra which is black, antennae and legs black.

Length : 8 mm.-10 mm.

4. **Caenolanguria assamensis** (Fowler)

1886. *Languria assamensis* Fowler, *Trans. Ent. Soc.* London : 24.

1925. *Caenolanguria assamensis* (Fowler) : Arrow, *Fauna Brit. India, Clavicornia* : *Erotylidae, Languriidae and Endomychidae*, London : 240.

Material : Assam : 2 exs., Kaziranga, 75 m., 7-9.5.1976, Wittmer & Baroni ; Meghalaya : 1 ex., Darugiri, Garo Hills, 450 m., 19.5.1976, Wittmer & Baroni ; Himachal Pradesh : 1 ex., Katrain, 1450 m., 11.5.1977, Wittmer & Brancucci.

This species is widely distributed in India and also recorded from Burma. Now, it is being recorded first time from Himachal Pradesh and Meghalaya (India).

General appearance moderately small, elongate and shiny. Head sparsely and finely punctured ; antennae stout, moderately long, club 4-jointed and compact ; eyes moderately large and coarsely facetted ; pronotum transverse, convex, finely and sparsely punctured ; posteriorly narrowed and hind angle acute ; elytra with moderately developed shoulders, posteriorly narrowed, striate-punctate, apex separately rounded ; scutellum glabrous, impunctate, transverse and with pointed apex ; basal sternite without coxal lines. Head and pronotum red ; antennae, elytra and legs black.

Length : 7 to 8 mm.

Remark : This species differs from *C. birmanica* (Harold) by its antennae being slender.

5. **Caenolanguria birmanica** (Harold)

1879. *Languria birmanica* Harold, *Mitth. Munch Ent. Ver. iii* : 74.

1925. *Caenolanguria birmanica* (Harold) : Arrow, *Fauna Brit. India, Clavicornia* : *Erotylidae, Languriidae and Endomychidae*, London : 241.

Material : Meghalaya : 1 ex., Songsak, Garo Hills, 19.5.1976. Wittmer & Baroni ; West Bengal : 1 ex., Darjeeling Umg—Kalimpong, 16.10.1975, Bhakta Bhadur : Sikkim : 2 exs., Choka—Yoksam, 2100 m., 6.4.1978, Bhakta Bhadur.

This species was recorded from various places of India and also known from Burma and Penag. Now, it is being first time recorded from Meghalaya (India).

General appearance moderately large, elongate and shiny. Head sparsely and finely punctured ; antennae slender, club 4-jointed and compact ; eyes prominent and coarsely facetted ; pronotum transverse and not so convex, sparsely and finely punctured and hind angle not very acute ; elytra with moderately developed shoulder, slightly narrowed posteriorly, *striate-punctate*, *punctures* which are fine, less deep and not very close, apex separately rounded ; scutellum small, glabrous, impunctate and transverse. Head and pronotum red, elytra and legs black.

Length : 5 to 7 mm.

Remark : The species differs from *C. assamensis* (Fowler) by it antennae being stout.

6. **Caenolanguria** spp.

Material : Sikkim : 1 ex., Reay Khola, S, Gahgtok, 17.4.1977, Bhakta B ; 1 ex., Rangeli River, 200 m., 21.4.1977, Bhakta B ; W. B. : 1 ex., Lava, Darjeeling 7.5.1978, Bhakta B.

General appearance elongate, parallel-sided, narrowed posteriorly and shiny. Eyes small and coarsely facetted. Antennae short and slender, 2nd joint short and others elongate. Elytral shoulder prominent and apices separately rounded.

Length : 5-10 mm.

7. **Anadastus vicinus** Arrow

1925. *Anadastus vicinus* Arrow, *Fauna Brit. India, Clavicornia : Erotylidae, Languriidae and Endomychidae*, London : 225.

Material : Uttar Pradesh : 3 exs., Mussoorie, 1300-2000 m., 1976, Wittmer.

This species was recorded from Burma and Siam. Now, it is being first time recorded from India.

General appearance moderately large, elongate and shiny. Head sparsely and finely punctured ; antennae stout, club 4-jointed and compact ; eyes moderately large and finely facetted ; pronotum slightly transverse, convex, sparsely and finely punctured, hind angle acute and front angle rounded, large punctures are confined to basal margin ; elytra with well-developed shoulder, striate-punctate, punctures deep, large and close, apices truncate ; scutellum transverse, impunctate and apex pointed ; head and pronotum red, antennal club black, elytra black with greenish tinge and legs red with black.

Length : 7.5 to 8 mm.

Remark : This species differs from *A. bombayensis* Arrow by its body being elongated and legs red with knees black.

8. **Anadastus filiformis** (F.)

1801. *Trogosita filiformis* F. *Syst. Eleuth.* i : 152.
1925. *Anadastus filiformis* F. : Arrow, *Fauna Brit. India, Clavicornia : Erotylidae, Languriidae and Endomychidae*, London : 216.

Material : Assam : 2 exs., Kaziranga, 75 m., 7-9.5.1976, Wittmer & Baroni.

This species was recorded from Burma, Siam, Tonkin, S. China, Japan, Philippines, Java and Borneo. Now it is being first time recorded from India.

General appearance moderately large, elongate, posteriorly slightly narrowed and shiny. Head moderately punctured and coarse ; antennae slender, with 5-jointed, loose club ; eyes fairly prominent and

moderately coarsely facetted ; pronotum nearly quadrate, convex, moderately punctured and coarse, basal margin prominent, hind angle acute and front angle rounded ; elytra elongate, posteriorly narrowed, with prominent shoulder, striate—punctate with deep punctures, apices truncate ; scutellum cordate, impunctate and pointed apex. Head, pronotum and elytra brick-red dorsally and ventrally ; legs and antennae except basal segments black.

Length : 7-8 mm.

Remark : This species is nearest to *Anadastus amabilis* Arrow and *A dohertyi* Arrow but differs in the colour of elytra. The elytral colour of *A. amabilis* Arrow and *A. dohertyi* Arrow but differs in the colour of elytra. The elytral colour of *amabilis* Arrow and *dohertyi* Arrow black whereas in *filitarmis* (F.) the elytra is red.

9. **Anadastus amabilis** Arrow

1926. *Anadastus amabilis* Arrow, *Fauna Brit. India, Clavicornia : Erotylidae, Languriidae and Endomychidae*, London : 216.

Material : Sikkim : 1 ex., Rangeli River, 900 m., 15.4.1977, Bhakta B.

This species was known from Assam. Now it is being first time recorded from Sikkim.

General appearance slender. elongate, parallel sided, posteriorly narrowed and shiny. Head sparsely and finely punctured ; antennae slender, club 5-jointed and not compact ; eyes not large, moderately facetted ; pronotum slightly wider than its length, convex, sparsely and finely punctured ; posteriorly narrowed, well developed basal margin, hind angle acute and front angle rounded ; elytra with well developed shoulder, striate-punctate, punctures deep and not close, apices truncate ; scutellum transverse, impunctate and pointed at apex. Head, pronotum and basal segments of antennae red ; elytra dark metalic green ; antennal club and legs black.

Length : 6 mm.

This species is near to *dohertyi* Arrow but differs in their abdominal lines. In *dohertyi* Arrow, the abdominal lines are parallel, whereas in *amabilis* Arrow, the abdominal lines are divergent.

10. **Anadastus wiedemanni** Gorham

1896. *Anadastus wiedemanni* Gorh. *Ann. Mus. Civ. Genova* xxxvi : 271.

Material : Meghalaya : 1 ex., Songsok, Garo hills, 10.5.1976, Wittmer & Baroni.

This species was recorded from Burma and Meghalaya (Shillong) in India.

General appearance moderately large, elongate, parallel-sided, posteriorly narrowed and shiny. Head sparsely but coarsely punctured ; antennae moderately long, joint 3 longer than other joints, club 4-jointed and abrupt ; eyes fairly prominent and moderately facetted ; pronotum sparsely but coarsely punctured, slightly transverse, convex, hind angle nearly rectangular and front angle rounded ; elytra elongate, parallel-sided, posteriorly narrowed, well-developed shoulders, striate-punctate, punctures deep but not close ; scutellum transverse and impunctate. Head and pronotum red above and beneath ; elytra, antennal club and legs except the base and the abdomen black.

Length : 7 mm.

This species is near to *distinctus* Arrow and differs in their third joint of antennae and shape of the antennal club.

11. **Anadastus dohertyi** Arrow

1925. *Anadastus dohertyi* Arrow, *Fauna Brit. India, Clavicornia : Erotylidae, Languriidae and Endomychidae*, London : 216.

Material : West Bengal : 1 ex., Darjeeling, Thepi-Rinbick, 1300-1350 m., 18.5.1975, Wittmer.

General appearance small, elongate, parallel-sided and shiny. Head moderately punctured ; antennae slender and its club 5-jointed and compact ; eyes prominent but not large, finely facetted ; pronotum quadrate, convex, finely and sparsely punctured, a few large punctures on basal margin, lateral foveae moderately long and deep, front angle nearly rectangular, hind angle blunt and basal margin prominent ; elytra with well-developed shoulder, striate-punctate, punctures coarse but not close and apices distinctly truncate ; scutellum transverse and impunctate. Head and pronotum red dorsally ; elytra black with violet tinge ; antennae except basal segment and legs except base with trochanter black ; prosternum and mesosternum red, metasternum black ; abdomen red with scantily golden recumbent hairs ; Abdominal lines parallel and passing beyond the middle of the basal sternite and forming carinae.

Length : 5 mm.

Remark : It differs with *amabilis* Arrow in abdominal lines where it is divergent, but in *dohertyi* Arrow, the abdominal lines are parallel.

12. **Anadastus** sp. nr. **dohertyi** Arrow.....(i)

Material : West Bengal : 1 ex., Darjeeling, Jhepi, 1300-1400 m., 22.5.1975, Wittmer.

Remark : The specimen is 5 mm. in length, differs from *dohertyi* Arrow especially in abdominal lines, which are parallel, forming distinct carinae, passing beyond the middle of basal sternite but their apices slightly divergent.

12. **Anadastus** sp. nr. **dohertyi** Arrow.....(ii)

Material : Kashmir, : 1 ex., Yusmarg, 2300-2400 m., 5.7.1976, Wittmer.

Remark : This specimen is 5 mm. in length, very similar to *dohertyi* Arrow and above mentioned specimen differs in its antenna being totally black and also basal margin of pronotum, scutellum and ventral surface black.

13. **Anadastus gratus** Gorham

1896. *Anadastus gratus* Gorh. *Ann. Mus. Civ. Genova, xxxvi* : 274.

1925. *Anadastus gratus* Gorh. : Arrow, *Fauna Brit. India. Clavicornia : Erotylidae, Languriidae and Endomychidae*, London : 227.

Material : Sikkim : 1 ex., Rangeli River, 900 m., 15.4.1977, Bhakta B.

It was recorded from Burma. Now, it is being recorded first time from India.

General appearance small, elongate, parallel sided and shiny. Head not finely but sparsely punctured ; antennae slender and 4-jointed club ; pronotum quadrate, sparsely and slightly coarsely punctured, lateral foveae distinct, a few large punctures on basal margin, hind angle acute and front angle blunt. Elytra parallel-sided, slightly narrowed

posteriorly, well-developed shoulder, striate-punctate with deep but not close punctures, apices distinctly truncate ; scutellum cordate, impunctate ; legs slender. Head and pronotum red, antennae black except the basal segments, elytra black with greenish tinge, legs except base and trochanter black ; prosternum red, meso-and meta sternum black, abdomen red ; abdominal lines parallel and extended beyond the middle of the sternite.

Length : 5 mm. to 6 mm.

This species is somewhat similar to *vicinus* Arrow but unlike latter species legs mostly black.

14. **Anadastus parvulus** (Wiedemann)

1823. *Languria parvula* Wied. *Zool. Mag. ii*(1) : 47.
1925. *Anadastus parvulas* (Wied.) : Arrow, *Fauna Brit. India, Clavicornia : Erotylidae, Languriidae and Endomychidae*, London : 218.

Material : Assam : 1 ex., Kaziranga, 75 m., 7-9.5.1976, Wittmer & Baroni.

This species was recorded from Uttar Pradesh and S. India. Now, it is being recorded first time from Eastern India.

General appearance moderately large, elongate, slender, parallel-sided and shiny. Head sparsely but not finely punctured ; antennae rather short, club 4-jointed and compact ; pronotum quadrate, sparsely but not finely punctured, lateral foveae distinct, deep and nearly parallel, a few large punctures on basal margin, hind angle acute and front angle rounded ; elytra parallel-sided, with well-developed shoulders, striate-punctate, punctures deep but not close, apices distinctly truncate, sutural angle minutely spinose ; scutellum short, glabrous and impunctate ; abdominal lines absent. Head and pronotum red, antennel club black but basal joints red, elytra deep blue, prosternum red, meso-and metasternum and abdomen black, legs black except the base of femur and trochanter.

Length : 7 mm.

This species differs with *rufiventris* (Fowler) in the colour of legs. In *rufiventris* (Fowler) legs pale whereas in *parvulus* (Wiedem.) black except the base of femur and trochanter.

15. **Anadastus nigriventris** (Motsch.)

1860. *Languria nigriventris* Motsch. *Schrenek's Reisen, Amurl.*, ii : 241.
1925. *Anadastus nigriventris* (Motsch.) : Arrow, *Fauna Brit. India, Clavicornia : Erotylidae, Languriidae and Endomychidae*, London : 224.

Material : Meghalaya : 1 ex., Umtyngor, Cherrapunjee, 16.5.1976, Wittmer & Baroni.

This species was recorded from Sri Lanka and India [locality not mentioned in the Fauna, Arrow (1925)].

General appearance moderately parallel-sided, elytra tapering posteriorly ; head and pronotum sparasely punctured, pronotum convex and transverse, elytral extremities truncated, eyes moderately large and finely facetted ; antennae slender, club 4-jointed and not compact ; sternite 1 with a pair of parallel abdominal lines. Head and pronotum red both dorsally and ventrally, elytra very dark blue, antennae and legs brown, abdomen and metasternum brownish red.

Length : 8 mm.

It differs from *A. cambodiae* (Crotch) in the puncturation of head and pronotum. In *cambodiae* (Crotch) head strongly punctured whereas in *nigrizentris* (Motsch.) the head feebly punctured.

16. **Anadastus loricatus** Arrow

1925. *Anadastus loricatus* Arrow *Fauna Brit. India, Ceylon and Burma, Clavicornia : Erotylidae, Languriidae and Endomychidae*, London : 213.

Material : West Bengal : 1 ex., Kalimpong Umg. 10.5.1977, Bhakta Bhadur.

It was earlier reeorded from Sikkim. Now, it is being first time recorded from West Bengal.

General appearance elongate, somewhat parallel-sided and tapering posteriorly, moderately large and shiny. Head and pronotum sparsely and finely punctured ; lateral foveae parallel ; antennae slender, club 5-jointed, moderately broad and compact ; elytra striate-punctate, apex distinctly truncate ; basal sternite with a pair of parallel carinae extended beyond the middle of the segment. Head and pronotum deep brown with a black patch on anterior part of pronotum, antennae and legs black, elytra black with greenish tinge.

Length : 8 mm.

It differs from *A. capitatus* Gorham in the colour of pronotum. In *capitatus* Gorham, the pronotum uniformly red whereas in *Loricatus* Arrow, the pronotum with dark anterior patch.

17. **Epilanquria tenuicornis** Fowler

1908. *Epilanguria tenuicornis* Fowl. *Wytsman's Gen. Insect, Languriinae* p. 18, pl. ii, fig. 6.

1925. *Epilanguria tenuicornis* Fowl. : Arrow, *Fauna Brit. India, Clavicornia : Erotylidae, Languriidae and Endomychidae*, London : 250.

Material : Assam : 12 exs., Kaziranga, 75 m., 7-9.5.1976, Wittmer & Baroni ; 1 ex., Kaziranga, 76 m., 7-9.5.1976, Wittmer & Baroni.

This species is distributed almost all ovet India.

General appearance large, elongate, narrowed anteriorly and posteriorly and shiny. Head sparsely and not coarsely punctured ; antennae slender, club 3-jointed, not much dilated and rather insconspicous ; eyes prominent and coarsely facetted ; pronotum quadrate but lateral margins rounded, convex, not coarsely but little densely punctured, basal margins with large punctures, lateral foveae not so deep but slightly parallel, hind angle acute and not produced and front angle rounded ; elytra not parallel-sided, shoulders not markedly developed, striate-punctate, punctures deep and not close, fine punctures on intervals, apices rounded separately ; scutellum depressed, transverse, impunctuate and shiny. Head and pronotum red, antennae and legs black and elytra bluish black.

Length : 8 mm. to 11 mm.

It differs *depressa* (Gorham) in the shape of surface ; in *tenuicornis* Fowler the surface of the body is convex whereas in *depressa* (Gorham) the body flattened.

18. **Pentelanguria elateroides** Crotch

1876. *Pentalanguria elateroides*, Crotch : *Cist. Ent.* i : 380.

1925. *Pentelanguria elateroides* Crotch : Arrow *Fauna Brit. India, Clavicornia : Erotylidae, Languriidae & Endomychidae*, London : 180.

Material : West Bengal : 1 ex., Darjeeling, Lopchu, 1500 m., 31.5.1975, Wittmer ; Bhutan : 1 ex., Chasilakha, 6425, 1978. Dorjee Khandu.

This species was recorded from Assam,

Sikkim, and West Bengal in India. Now, it is being first-time recorded from Bhutan.

General appearance large, elongate, not parallel-sided, narrowed posteriorly and shiny. Head strongly and coarsely punctured ; antennae short, stout and with 5-jointed club, joint 3 comparatively longer than other joints, joints 8-10 strongly transverse ; eyes lateral and finely facetted ; pronotum elongate, longer than width, convex, strongly and coarsely punctured, lateral foveae short and not prominent, hind angle acute and produced behind the shoulder of elytra, and front angle rounded ; elytra narrowed posteriorly, apices produced behind with sutural spines, with large and fine punctures, the large punctures arranged slightly in rows ; scutellum glabrous, impunctate and pointed at apex. Head, pronotum and elytra coppery black ; antennae and legs except base black ; prosternum black ; metasternum and abdomen red except the middle of metasternum, the last segment of abdomen and a large patch at the base of each sternite which is greenish black.

Length : 16 mm to 17 mm.

19. **Languriophasma cyanea** (Hope)

1835. *Languria cyanea* Hope, *Trans. Zool. Soc. Lond.* 1 : 94.

1925. *Languriophama cyanea* Arrow, *Fauna Brit. India, Clavicornia : Erotylidae, Languriidae & Endomychidae*, London : 204.

Material : West Bengal : 2 exs., Darjeeling, Mana Bhanjang, Sukhia Pokri, 9.6.1975, Wittmer ; Uttar Pradesh : 1 ex., Mussoorie, 1300-2000 m., 27.6.1976, Wittmer ; Nepal : 1 ex., Phulchoki, 2600 m. 11-14.6.1976, Wittmer & Baroni.

This species was recorded from Uttar Pradesh, Arunachal Pradesh & Nepal. Now, it is being recorded first-time from Darjeeling.

General appearance moderate, slender, parallel-sided, and shiny. Head sparsely and coarsely punctured ; antennae slender, club 3-jointed and loose, 3rd to 7th elongate, 8th dilated, 9th triangular, 10th transverse and 11th ovate ; eyes lateral, prominent and moderately facetted ; pronotum long and narrowed at front and base, coarsely but very sparsely punctured, base with large close punctures, basal foveae absent, hind angle slightly acute and front angle rounded, elytra slender and parallel-sided with prominent shoulder, striate-punctate, with deep rows of punctures but not close, apices separately rounded ; scutellum impunctate, ovate slightly pointed at apex and shiny ; absence of abdominal lines. Head, pronotum and elytra black with greenish tinge ; the lower surface, legs and antennae black.

Length : 6 mm. to 7 mm.

This species is near to *laeta* Arrow but unlike latter species ; in *cyanea* pronotum blue whereas in *laeta* pronotum bright red.

ACKNOWLEDGEMENT

The authors are grateful to Dr. B. K. Tikader, Director, Zoological Survey of India for laboratory facilities in the Coleoptera Section and Dr. Wittmer of Basel Museum for providing the unidentified materials of Languriidae.

References

ARROW, G. J. 1925. *Fauna of British India, Clavicornia : Erotylidae, Languriidae and Endomychidae, London, XV* + 416 pp.

CROWSON, R. A. 1955. The natural classification of the families of Coleoptera. *Nathaniel Lloyd*, 187 pp. London.

VILLIERS, A. (1945). Revision des Languriides de L'Ancien Monde. *'L' Abeille Jomn. d' Ent. Soc. Ent. France* 37 : 1-317, 637 figures.

SENGUPTA, T. & MUKHERJEE, A. K. 1979. On the Coleopterous subfamily Languriinae from India. *Rec. Zool. Surv. India, Calcutta.* **75** (1-4) : 327-338.

Bull. zool. Surv. India, 7 (2-3) : 165-168, 1985

A NEW SPECIES OF *FORFICULA* LINNAEUS AND NEW RECORDS OF *FORFICULA DAVIDI* (DERMAPTERA : FORFICULIDAE) FROM INDIA

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ABSTRACT

Forficula asketi sp. nov. is described and *Forficula davidi* Burr is recorded for the first time from India.

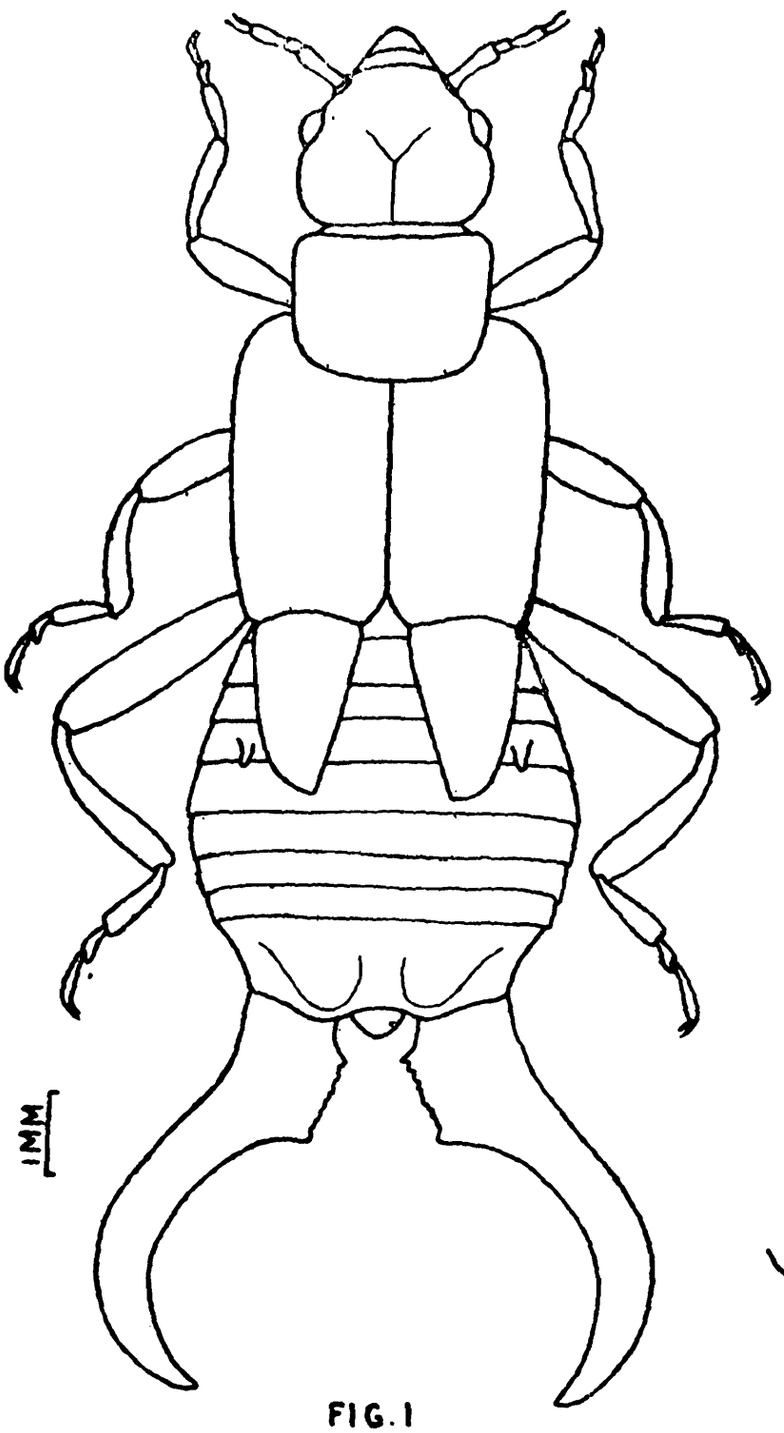
INTRODUCTION

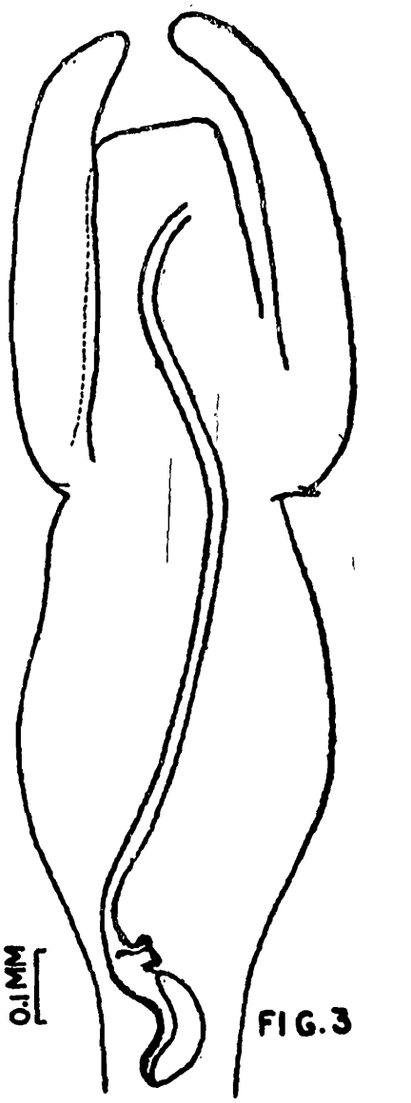
Forficula Linnaeus, 1758 is mainly Oriental, Ethiopean and Palaearctic, but also occurs in the Australian and Malagassian Regions. Of 72 species of this genus, Steinmann (1973) recognized 27 from the Oriental Region, to which Brindle (1975) added three more from Bhutan. Examination of a recent collection of earwigs from the western Himalayas in Himachal Pradesh, India has revealed the existence of a new species, *Forficula asketi*, which is described below. Another species, *Forficula davidi* Burr, 1905 is recorded for the first time from India.

The type specimens will be deposited in the National Zoological Collection, Z. S. I., Calcutta in due course of time.

Forficula asketi sp. nov. (Figs. 1-3)

Male : General colour shiny black, legs unicolourous, brownish. Head smooth, broader than long, tumid, occiput depressed, epicranial suture distinct. Antennae 10-segmented, 1st segment long, stout, 2nd small, 3rd longer than 4th but slightly shorter than 5th, remaining long and cylindrical. Pronotum coriaceous, about one and a half times broader than long, lateral margins straight, slightly reflexed, posterior margin rounded. Elytra coriaceous, humeral angles weak, posterior margin concave. Wings well-developed, coriaceous. Legs slender, tibiae and tarsi densely pubescent below, hind leg with first tarsal segment almost as long as the combined length of second and third. Abdomen convex, sparsely punctulate, lateral tubercles on 3rd tergite slightly and on 4th well-developed. Penultimate sternite with posterior margin broadly rounded (Fig. 2). Ultimate tergite smooth, about three times broader than long, faintly tumid above the roots of forceps, posterior margin trisinuate. Pygidium distinct, small, broader than long, obtuse. Forceps short, concave externally, dilated internally in basal one third with margin straight and crenulate, branches strongly bowed in distal two third, tapering





Figs. 1-3. *Forficula asketi* sp. nov., ♂ : 1. dorsal view ; 2. penultimate sternite ; 3. genitalia.

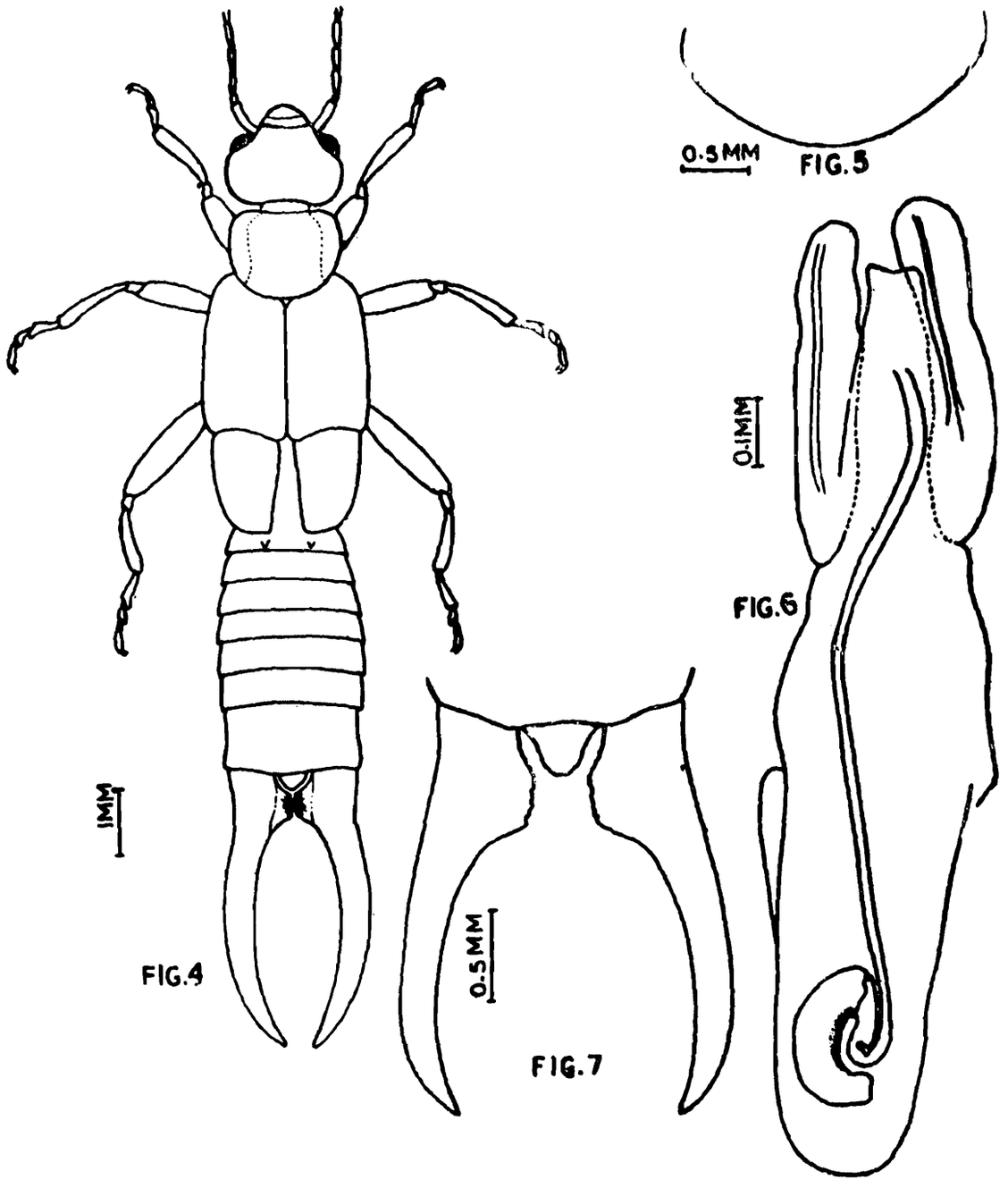
with apices bluntly pointed (Fig. 1). Genitalia as in Fig. 3.

Length : Body 10.2-10.8 mm. ; forceps 4.1-4.4 mm.

Female : Unknown.

Holotype ♂, INDIA : HIMACHAL PRADESH : Sirmour district, Kotla, nr. Habban, 2092 m, 24.v.1980, J. M. Julka & G. L. Purohit. *Paratype* : 1 ♂, same data as for the holotype.

F. asketi sp. nov. is closely related to *F.*



Figs. 4-7. *Forficula davidi* Burr, ♂ : 4, dorsal view ; 5, penultimate sternite ; 6, genitalia ; 7, ultimate tergite, pygidium and forceps.

schlagintweiti (Burr, 1904) and *F bhutanensis* Brindle, 1975 in having unicolourous legs, pronotum strongly transverse and perfect elytra and wings. It can be readily distinguished from both these species by the deplanate forceps in the basal one third which in the latter are in the basal one fourth only. The abdomen in *schlagintweiti* is smooth, whereas in *asketi* it is sparsely punctulate. This species is named after Dr. Asket Singh, Officer-in-Charge, High Altitude Zoology Field Station, Zoological Survey of India, Solan.

Forficula davidi Burr (Figs. 4-7)

Forficula davidi Burr, 1905, *Ent. mon. Mag.* (*ser. 2*), **16** : 86. ♂, China : Mou-Pin, Szechwan ; Burr, 1911, *Genera Insectorum* : 81 ; Borelli, 1915, *Boll. Mus. zool. Anat. comp., Torino*, **30** (698) : 2 ; Bey-Bienko, 1934, *Ark. Zool.*, (20) **25**A : 6 ; Bey-Bienko, 1959, *Ent. Obozr.*, **38** : 617 ; Bey-Bienko, 1967, *Acta ent. bohem.*, **64** : 431 ; Srivastava, 1976, *Rec. zool. Surv. India, Occ. Pap.*, 2 : 62.

Male : General colour black, legs, elytra and wings light brown. Head smooth, broader than long, tumid, epicranial suture indistinct. Antennae 12-segmented, 1st segment long, stout, 2nd small, 3rd slightly longer than 4th but shorter than 5th, remaining long and cylindrical. Pronotum coriaceous, broader than long, slightly narrowed posteriorly, lateral margins pale, slightly convex, angles rounded, prozona somewhat tumid. Elytra about twice as long as pronotum, humeral angles weak, posterior margin concave. Wings well-developed. Legs slender, tibiae and tarsi pubescent below, hind leg with first tarsal segment almost as long as the combined length of second and third. Abdomen punctate, fairly dilated, lateral tubercles on 3rd tergite slightly and 4th well-developed. Penultimate sternite with posterior margin broadly rounded (Fig. 5). Ultimate tergite punctate, about twice as broad as long, faintly tumid above the roots of forceps, posterior margin trisinuate. Pygidium distinct, elongated, posterior margin rounded. Forceps large, slightly concave externally, dilated internally in basal about one fifth with margin crenulate, branches gradually bowed distally, tapering with apices bluntly pointed (Fig. 7). Genitalia as in Fig. 6.

Length : Body 7.2-9 mm ; forceps 2-3.4 mm.

Female : Essentially similar to the male except that the forceps are contiguous and the posterior margin of the ultimate tergite is broadly rounded.

Length : Body 8-8.6 mm ; forceps 1.4-1.6 mm.

Material examined : INDIA : Himachal Pradesh : Sirmour district, Habban, 2334 m, 6 ♂♂, 7 ♀♀, 24.v.1980, J. M. Julka & G. L. Purohit.

This species, so far known from China, is recorded for the first time from India.

Acknowledgements

The authors are thankful to Dr. B. K. Tikader, Director, Zoological Survey of India, Calcutta and the Officer-in-Charge, High Altitude Zoology Field Station, Zoological Survey of India, Solan for providing necessary facilities. They are grateful to Dr. G. K. Srivastava, Suptg. Zoologist, Z. S. I., Calcutta for confirming the identity of the species and improving the manuscript. Thanks are also due to Mr. Anil Gupta, Z. S. I., Solan for his help in preparing the illustrations.

References

Brindle, A. 1975. Ergebnisse der Bhutan-Expedition 1972 des Natur historischen Museums in Basel. *Entomologica Basiliensia*, **1** : 1-59.

Steinmann, H. 1973. A zoogeographical checklist of world Dermaptera. *Folia ent. hung.* (N. S.), **26** : 145-154.

Bull. zool. Surv. India, 7 (2-3) : 169-171, 1985

ON THE OCCURRENCE OF THE NARROWHEADED SEVENGILL SHARK, *HEPTRANCHIAS PERLO* (BONNATERRE, 1788) (CHONDRICHTHYES : HEXANCHIDAE) IN INDIAN WATERS

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ABSTRACT

The narrowheaded sevengill shark, *Heptranchias perlo* (Bonnaterre, 1788) is recorded for the first time from Indian waters, based on eight specimens collected by the junior author off the south-west coast of India. Diagnostic characters of the specimens and an illustration of an Indian specimen, are given.

INTRODUCTION

On March 3-4, 1971 the junior author collected eight specimens of a hexanchid shark off Quilon in Kerala, India. This species was found to be very common on rocky bottom in water 300 m. deep, and, following Misra (1969), was identified as *Heptranchias indicus* (Agassiz). The eight specimens were catalogued as ZSI F6554/2 in the Fish Collection of the Zoological Survey of India.

Agassiz (1835) described *Notidanus indicus* from jaws and teeth, with the indefinite type locality "Indes Orientales". Day (1878, as *Notidanus indicus*) mentioned a record of this shark from off Madras, based on a stuffed specimen deposited in the British Museum (Natural History). Agassiz's and Day's specimens, and the species *N. indicus*, are quite evidently referable to the genus of broadnosed sevengill sharks, *Notorynchus* Ayres, 1855. Bass, D' Aubrey and Kistnasamy (1975) synonymised *Notidanus indicus* with the wide-ranging *Notorynchus cepedianus* (Peron, 1809). We know of no recent records of broadnosed sevengill sharks (*Notorynchus*) from Indian waters and no material of these sharks are available in the collections. Misra (1969) in the *Fauna of India* apparently followed Day's account in giving a description of *Heptranchias indicus*.

Reexamination of the specimens catalogued as ZSI F6554/2 revealed that they represent the first Indian records of the narrowheaded sevengill shark, *Heptranchias perlo* (Bonnaterre, 1788). The specimens include 6 males, 275-293 mm in total length, and 2 females, 304-330 mm in total length ; all are freeliving, immature specimens, close to the size at birth of the species (about 260 mm, according to Bass *et al*, 1975).

Detailed accounts of *Heptranchias perlo* are available in Bigelow & Schroeder (1948), Garrick & Paul (1971) and Bass *et al* (1975), so that we do not include a detailed description here. We do, however, provide an illustration of an Indian specimen, a female 330 mm (Fig. 1) and list the diagnostic characters of the specimens for field identification.

Heptranchias perlo (Bonnaterre)
(Fig. 1)

Squalus perlo Bonnaterre, 1788, *Tableau Encyclop. Ichth.* : 10 (type-locality : Mediterranean).

Heptranchias indicus (*nec* Agassiz) Talwar, 1974, *J. mar. biol. Ass. India*, **14** (2) : 779 (name only).

Diagnostic Characters :

(1) Seven pairs of lateral gill openings (2) a single, small, narrow-based spineless dorsal fin, separated from the upper caudal origin by a space much greater than its base length (3) a pointed, narrow head (4) a narrow angular mouth (5) large eyes (6) long low-rooted lower teeth with a prominent cusp and several abruptly lower cusplets behind it (7) a slim body (8) plain colouration with black spot on dorsal fin and upper caudal lobe (especially prominent in young) (9) relatively small size, adults generally not exceeding 1.5 m.

REMARKS

The only other shark in Indian waters with a single dorsal fin and seven pairs of gill-openings is the broadnosed sevengill shark *Notorynchus cepedianus* (Peron, 1807) (=*Heptranchias indicus*). *N. cepedianus* has a broader-based dorsal fin, separated from the upper caudal origin by a space little greater than its base length, a broadly rounded to broadly pointed head, a broadly arched mouth, short and high rooted lower teeth with cusplets not abruptly smaller than the low cusp, a stout body, no black tips on fins but often scattered small black spots on body and fins, and much larger size, to about 3 m. To our knowledge there have not been additional records of *Notorynchus cepedianus* from India since Day's (1878) account. In other areas where this species occurs it shows a marked preference for cold to warm temperate waters (as off South Africa and on the west coast of North America). This makes us wonder if, in the absence of additional records of *N. cepedianus* from Indian waters, Day's record was based on a specimen with erroneous locality data, and that the species may not occur off India.

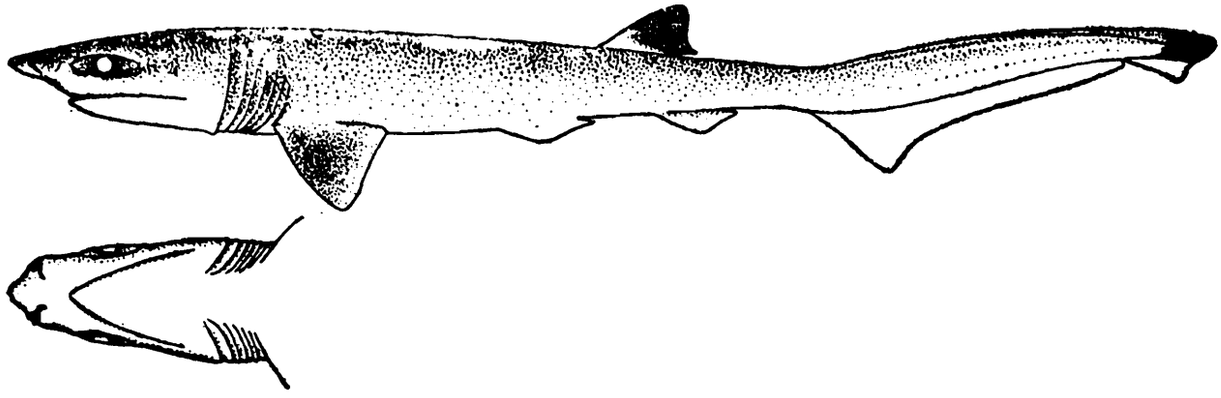

Fig. 1. *Heptranchias perlo* (Bonnaterre), a 330 mm mature male from off the south-west coast of India.

Sixgill sharks, *Hexanchus*, have not been recorded in India to date but are known to occur in the nearby Indian Ocean (see Bass *et al*, 1975) ; they could be expected to occur in the continental slope waters off India. The two species, *H. griseus* (Bonnaterre) and *H. nakamurai* Teng, 1962 (=*H. vitulus* Springer & Waller, 1969) are wide ranging. *H. griseus* is a heavy bodied shark more resembling *Notorynchus cepedianus* while *Hexanchus nakamurai* is a slim shark more resembling *Heptranchias perlo*, but both *Hexanchus* have only 6 pairs of lateral gill openings.

Heptranchias perlo is currently not utilized by the Indian shark fishery but may become important with the expansion of that fishery on the upper continental slope.

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The authors are grateful to Dr. B. K. Tikader, Director, Zoological Survey of India, Calcutta, for facilities.

REFERENCES

AGASSIZ, L. 1835. Recherches sur less poissons fossiles. Vol. 3.

BASS, A. J., D'AUBREY, J. D. AND KISTNASAMY, N. 1975. Sharks of the east coast of southern Africa. V. The families Hexanchidae, Chlamydoselachidae, Heterodontidae, Pristiophoridae and Squatinidae. *Oceanogr. Res. Inst. Durban Invest. Rep.*, (43) : 1-42.

BIGELOW, H. B. AND SCHROEDER, W. C. 1948. Fishes of the western North Atlantic. Part I. Lancelets, Cyclostomes and Sharks. *Mem. Sears Fdn. mar. Res.* : 1-576.

DAY, F. 1875-1878. *The Fishes of India* : being a natural history of the fishes known to inhabit the seas and freshwaters of India, Burma and Ceylon. Taylor & Francis, London. 779 pp. (Issued in 4 parts—for dates see Whitehead and Talwar, 1976).

GARRICK, J. A. F. AND PAUL, L. J. 1971. *Heptranchias dakini* Whitley, 1931, a synonym of *H. perlo* (Bonnaterre, 1788), the sharpsnouted sevengill or perlon shark, with notes on sexual dimorphism in the species. *Zoology Publ., Vict. Univ. Wellington*, (54) : 1-14.

MISRA, K. S. 1969. *The Fauna of India and the adjacent countries.* Pisces (2nd ed.), Vol. I. Manager of Publications, New Delhi. 300 pp.

WHITEHEAD, P. J. P. AND TALWAR, P. K. 1976. Francis Day (1829-89) and his collections of Indian fishes. *Bull. Br. Mus. nat. Hist.* (Hist. Ser.), **5** : 1-189.

Bull. zool. Surv. India, 7 (2-3) : 173-177, 1985

A NEW GENUS AND SPECIES OF PORTUNID CRAB : CRUSTACEA FROM NORTH ANDAMAN

By

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ABSTRACT

In this paper *Neothalamita triangularis*, a new genus and new species belonging to the family Portunidae, collected from Port Cornwallis, North Andaman, India, is described. Characters for differentiating it from its closely allied genera are discussed.

INTRODUCTION

On examination of the crab collection made by Dr. K. K. Tiwari (1959) from North Andaman, I came across two male specimens of portunid caabs with many marked differences from the known genera and species of the family Portunidae. They are therefore being accomodated in a new genus and species which are described below.

SYSTEMATIC ACCOUNT

CLASS : CRUSTACEA

ORDER : DECAPODA

Family : PORTUNIDAE Rafinesque, 1815.

Subfamily : PORTUNIDAE Rafinesque, 1815.

Neothalamita, gen. nov,

Description of male : Carapace distinctly triangular, front broad, almost straight, sharp, blade like, four lobed and well separated from inner supra orbital angle. Lateral sides of the carapace strongly convergent, anterolateral sides armed with three spines, including outer orbital angle. Carapace, smooth, polished, regions ill defined, transverse ridges smooth, faint. Orbits large, cup-like, edges sharp, finely crenulate, two sutures on upper and two on lower edge present. Antennules transversely folded ; antenna excluded from the orbital hiatus ; basal antennal crests are two, granular parallel ridges. Epistome broad, efferent branchial canals distinct. Buccal cavern wider forward, broader than long, its adjoining areas towards front are finely granular. Chelipeds unequal, stout, palm smooth not costate, twice as long as high ; fingers curved, shorter than palm, tips broad and fluted. Legs compressed, spiny and sparsely hairy. Male abdemen 5 jointed, 3-5 terge fused.

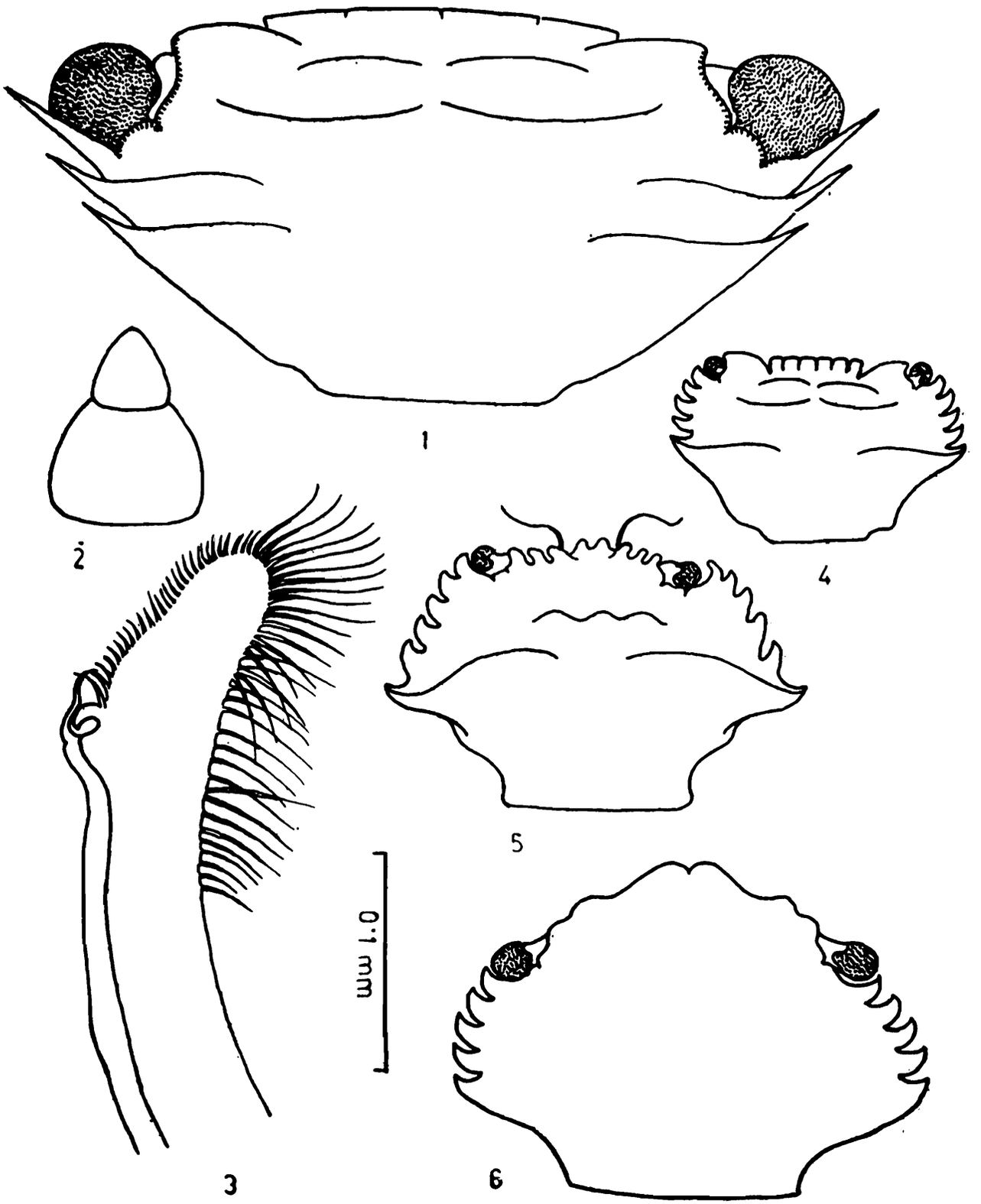
Remarks : Triangular carapace, with oblique, convergent sides, and presence of only three anterolateral spines differentiate this genus from *Thalamita* Latr. 1829, and other allied genera. The table on page

TABLE

Neothalamita	*Thalamita*	*Thalamonyx*	*Charybdis*
1. Carapace :—	1. Caraprce :—	1. Carapace :—	1. Carapace ;—
(i) Triangular in shape,	(i) Hexagonal in shape,	(i) Subcircular in shape	(i) Broad, hexogonal in shape
(ii) Front very broad, straight & four lobed,	(ii) Front broad, straight 2 or 4 or 6 lobed,	(ii) Front not so broad, convex bio-lobed,	(ii) Front not so board, slightly convex, 6 lobed.
(iii) Antro-lateral sides of carapace convergent, with three spines, & in 45° angle with front.	(iii) Ant. Lat. sides of carapace parallel, with 4-5 spines, & 90° or more angular with front.	(iii) Ant. Lat. side of carapace convex with 5 spines & in 135° angle with front.	(iii) Ant. Lat. sides of carapace divergent, convex, with 6 spines & in 135° degree angle with front.
2. Chelipeds unequal, palm not costate, finger tips broad, fluted.	2. Chelipeds almost equal, palm costate, finger tips pointed.	2. Chelipeds almost equal, palm costate, finger tips pointed.	2. Chelipeds almost equal, palm costate finger tips pointed
3. Walking legs—	3. Walking legs—	3. Walking leg—	3. Walking legs—
(i) All the merii with a spine on lower distal corner.	(i) Only merus of the last leg with a spine on lower distal corner.	(i) Merii of 1st three pairs without spines, of last pair with a spine on lower distal corner	(i) Merii of last two pairs only spinate on lower distal corner.
(ii) All the carpal joints with dorsal spine	(ii) No spine on carpus	(ii) No spine on carpus	(ii) No spine on carpus
(iii) Propodus of 1st three pairs wlth a spine on lower distal corner, of last pair, with 7 spinules	(iii) Propodus of 1st three pairs without spines, of last pair with several spinules in few species only	(lii) No spine on propodus of 1st three pairs and perhaps on last pair also.	(iii) No spine on propodus of 1st three pairs, several spinules present on the propodus of last pair of some species only.
(iv) Dactylus of first three pairs with rows of spines, of last pair minutely spinate posteriorly.	(i) Dactylus spineless for first three pairs, of last pair may or may not be spinate posteriorly	(iv) Dactylus spineless for first three pairs, of last pair perhaps spineless, Alcock did not mentioned about spines.	(iv) Dactylus spineless for first three pairs, of last pair, may or may not be spinulate posteriorly.

below expresses the differences the new genus has, from other allied portunid genera.

Type Species : **Neothalamita triangularis** sp. nov. (Figs. 1-3)



Figs. 1. *Neothalamita*, 2. same, last two somites of male abdomen, 3. same, anterior male pleoped, 4. *Thalamita*, 5. *Charybdis*, 6. *Thalamonyx*.

Meterial : Holotype : 1 male, width-20 mm ; Lengh-9 mm ; Front-10 mm Front including supra orbital lobes-15 mm ; Posterior border-6 mm : Z. S. I. Regd. No. C 2789/2.

Paratype : 1 male ; W-13 mm ; L-7 mm ; F-6 mm ; Z. S. I. Regd No. C 2790/2. Both the males were collected from Port Cornwallis, North Andaman, on 3.2.1959 by Dr. K. K. Tiwari.

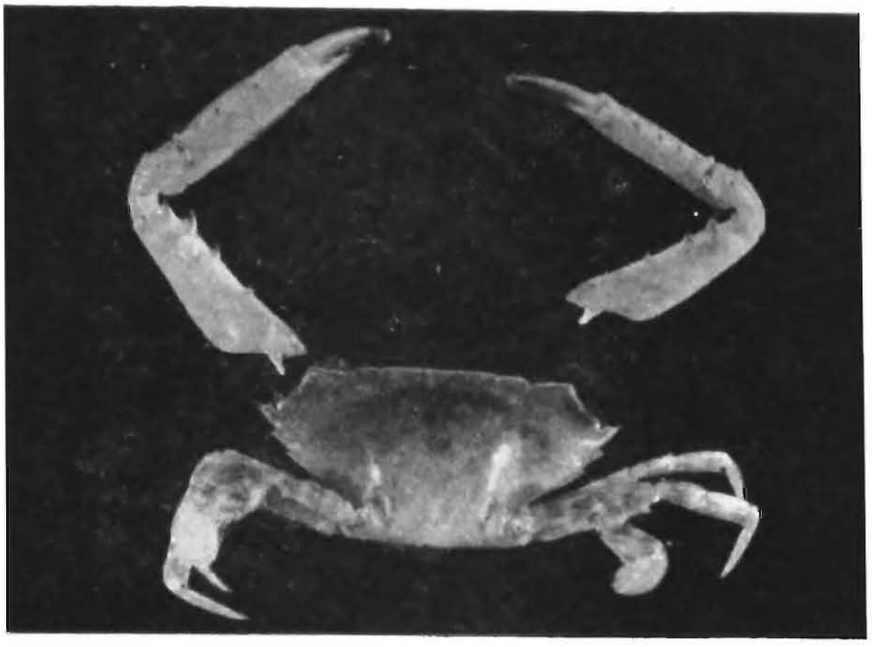
Description of male : Carapace triangular, slightly convex medially in both directions. Region ill defined, surface smooth, crossed transversely by faint smooth ridges. Lateral sides of carapace strongly convergent and its anterior part armed with three strong spines, including the outer orbital angle. The spines decreasing in size from before backwards, their tips are brown in colour. Front half of the greatest width of carapace, slightly convex and sharp, smooth, cut into four, broad, squire lobes by fine sutures, the outer pair is slightly narrower than the inner pair. Upper supra-orbital lobe well separated from the front, slanting inward and broad. Orbits large, cup-like, edge sharp and finely crenulate. Two distinct notches present on the upper and two on the lower edges. Eyes large and on the thick, short, stalk. Merus of external maxilliped broader than long, anterior edge slightly concave and its upper outer corner rounded, extended outwards.

Chelipeds unequal, stout, more than three times the length of carapace ; arm long, upper edge armed with four spines, subterminal one larger, claw like and curved. Lower edge and other proximal sides of arm rough. Wrist armed with a prominent spine on its inner corner and on outer side with two spinules and one tubercle in a row, parallel to its distal end, surface of wrist otherwise smooth. Palm tumit, smooth, its length twice of its height. Upper edge of palm armed with four spines and a distal tubercle in a row. Another row of spinules, very close to the upper row towards its outer side, present, the distal spinule of this row is tubercular and the proximal one is near the wrist. Tips of all the spines and spinules are brown coloured. Fingers short, about half of the palm in length, surface grooved, polished, tips broad and fluted. Cutting edgs of curved fingers dentate and leaves a narrow gap when apposed. Leg joints compressed, merus narrow, upper edge sharply granular and lower distal corner armed with a spine. Upper distal corner of all the carpal joints and lower distal corners of the propodus of first three pairs of legs ends in a large spine. The foliacious propodus of only last pair of legs armed with seven spinules on its postorior edge. Dactylus of first three pairs spiny, styliform, stout and of last pair typically foliacious for swimming. Only the legs are with sparse bristles. Sixth segment of the male abdomen broader than long and its sides are gently curved and convergent distally, seventh segment triangular in shape. Anterior male pleopod a long, stout, curved and grooved process, the process broader and somewhat triangular distally. Apex broadly rounded, inner sub apical area adorned with short, small and spinous bristles, while the outer side fringed with long, thick bristles.

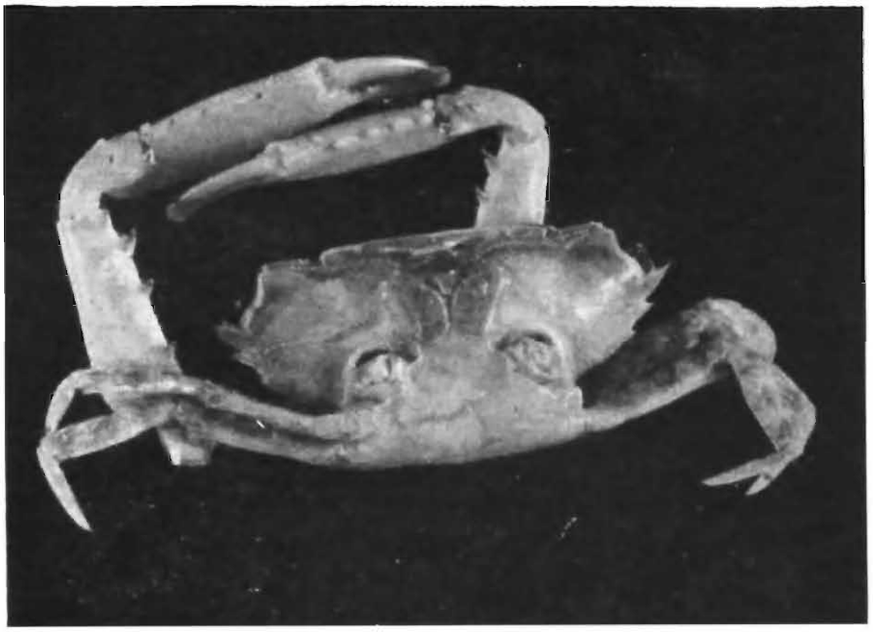
Colour : Dirty grey colour owing to the presence of very fine black dots, leg joints adorned with black and white bands. Cutting edges of fingers and their distal one third

DEB

PLATE I



1



2

Figs. 1-2. 1. *Neothalamita triangularis* Deb. (Dorsal view).
2. Same, (Ventral view).

dark brown in colour. Finger tips white and all the spines are brown tipped.

Remarks : *Neothalamita triangularis* Deb is distinctive because of its triangular shape ; presence of only three anterolateral spines ; very wide and four lobed sharp front. Cup-like, large, oval orbit with thick, short, stalked, large eyes ; broad, fluted finger tips and spinous dactylus of legs are also unlike other species of the allied genera.

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REFERENCES

ALCOCK, A. 1899a. The families Portunidae, Cancridae and Corystidae : The Brachyura Cyclometopa, Part II. Materials for a Carcinological Fauna of India, No. 4 *J. Asis. Soc. Bengal* **68** (II : I) : 1-104

DE HAAN, W. 1835. Crustacea, in : de Siebold, Fauna Japonica.

LATREILLE, P. A. 1829. Crustacea, Arachnides et partie des Insectes. In G. Cuvier, Le rtgne animal distribue anatomie comparee, edition 2, 4 : XXVI—584 pages.

MILNE-EDWARDS, A. 1873b. Recherches sur la Fauna carcinologique de la Nouvelle Caledonie, Deuxieme partie. *Nouv. Archiv. du Mus.* (Paris), **9** : 155-332.

SAKAI, T. 1939. Brachygnatha, Brachyrhyncha. In studies on the Crabs of Japan, 4 : 365-741.

SAKAI, T. 1965. The crabs of Sagami Bay : 1-251.

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PREDATORY BEHAVIOUR OF THE PHOLCID SPIDER *CROSSOPRIZA LYONI* (BLACKWALL) ON MOSQUITOES (*AEDES SP.*)

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ABSTRACT

Predatory behaviour of the pholcid spider, *Crossopriza lyoni* (Blackwall), on mosquitoes (*Aedes* sp.) displays fascinating style of wrapping of the prey with silk. The spider takes about two hrs to complete the preying-feeding action for each mosquito and may "consume" 12-20, on an average 15 mosquitoes (*Aedes* sp.), in a 24 hrs period. The predator also disposes off the prey-residues after feeding, perhaps, to keep the web clean.

INTRODUCTION

During the course of investigations on the behavioural biology and biological control potentials of some spiders, the authors observed the predatory behaviour of *Crossopriza lyoni* (Blackwall) on a variety of insects at Kakdwip, 24-Parganas, West Bengal. These spiders displayed fascinating ethology of predation on various insect preys, of which predation on mosquitoes (*Aedes* sp.) is, herein, communicated.

MATERIALS AND METHODS

Crossopriza lyoni (Blackwall) is a house dwelling pholcid spider which prepares irregular snares at the very inside of houses. They have been observed on several occassions since June 1980 in a room of an electrified, single storeyed, residential building where *C. lyoni* were allowed to live "undisturbed" for study. The time required for handling a prey has been recorded from time to time. The methods of prey-capture, duration and frequency of feeding, etc., were noted accordingly. The predatory potential is estimated by supplying freshly killed mosquitoes.

OBSERVATION

C. lyoni construct irregular snares in all four corners, ceiling and other suitable sites, preferably nearer to the source of light.

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residue after feeding and tries to keep the preferred site for feeding and / or resting free from prey-waste-residue. However, prey-residue may be sometimes seen hanging on the underside of the snare constructed at corner.

Discussion

Great differences exist among spiders as regards the manner in which they obtain their prey (Bristowe, 1958 ; Tikader, 1980). The spiders are, accordingly, categorised as weavers, those who trap their prey by preparing webs, and non-weavers, those who hunt their prey by chasing or by stalking. The pholcid spider, *Crossopriza lyoni*, belongs to the former group. Individuals of this species spin an extremely fine but irregular cobweb, from which they lie suspended upside down. This type of orientation is unlike that of the most of the aerial web-weaving spiders as they orient themselves in a face-down position while resting in their webs (Eberhard, 1967).

Informations are available on the predatory behaviour of lycosid spiders (Cragg, 1961 ; Edgar, 1969 ; Rovner and Knost, 1974 ; Greenquist and Rovner, 1976), diguetid spiders (Eberhard, 1967), linyphiid spiders (Turnball, 1960 ; Eberhard, 1967), dictynid spiders (Jackson, 1979a, b) and araneid spiders (Kajek, 1965). However, very little is known on the prey-capturing mechanisms of pholcid spiders (Bristowe, 1958).

In the pholcid spider, *C. lyoni*, prey-wrapping is a prerequisite to feeding as known to be associated with those spiders that construct trapping webs. This prevents prey from falling out of the web from the spider's elevated sites during feeding, grooming, or subsequent capture attempts (Eberhard, 1967). Rovner and Knost (1974) also suggested that wrapping by lycosids might serve to free the spider from subsequent attacks on additional prey, as occurring in web-weavers.

The preys are normally wrapped after the prey has been subdued by biting in the diguetid and linyphiid web-weavers (Eberhard, 1967). However, this sort of post-immobilization wrapping has not been observed in the present species. This might be due to the fact that the preys were held in a tightly wrapped package and that wrapping began after the prey had ceased most of its vigorous struggling movements. Our findings in this regard supported Rovner and Knost's (1974) hypothesis that the absence of vigorous movements by the prey is a necessary part of the stimulus situation for the onset of wrapping.

Duration and frequency of feeding along with waste disposal of prey residue have been studied in the present species. Our data on the frequency of feeding in *C. lyoni* as observed by supplying freshly killed mosquitoes may lend support to their biological control potentials, as a single individual may devour as many as 20 mosquitoea in a 24 hrs period.

Since the preys of this spider-species are widely incriminated as vectors of various diseases of man and domestic animals, the present study will supply certain useful informations to the biological control programme of mosquitoes.

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REFERENCES

BRISTOWE, W. B. 1958. *The World of Spiders*, London ; Collins.

CRAGG, J. B. 1961. Some aspects of the ecology of moorland animals. *J. Anim. Ecol.*, **30** : 205-234.

EBERHARD, W. 1967. Attack behaviour of diguetid spiders and the origin of prey wrapping in spiders. *Psyche*, **78** : 173-181.

EDGAR, W. D. 1969. Prey and predators of the wolf spider *Lycosa lugubris*. *J. Zool. Lond.*, **159** : 405-411.

GREENQUIST, E. A. AND ROVNER, J. S. 1976. Lycosid spider on artificial foliage : stratum choice, orientation preferences, and prey-wrapping. *Psyche*, **83** : 197-209.

JACKSON, R. R. 1979a. Predatory behaviour of the social spider *Mallos gregalis* : is it cooperative ? *Insectes soc.*, Paris, **26** : 300-312.

JACKSON, R. R. 1979b. Comparative studies of *Dictyna* and *Mallos* (*Araneae* : Dictynidae) : III Prey and behaviour. *Psyche*, **83** : 267-280.

KAJAK, A. 1965. An analysis of food relations between the spiders-*Araneus cornutus* Clerck and *Araneus quadratus* Clerck-and their prey in meadows. *Ekol. pol.* (A) **13** : 717-764.

ROVNER, J. S. AND KNOST, S. J. 1974. Post-immobilization wrapping of prey by lycosid spiders of the herbaceous stratum. *Pyche*, **81** : 398-415.

TIKADER, B. K. 1980. *The Fauna of India*, Araneae : Thomisidae, Vol. I, Part 1, vi+247 pp., Calcutta.

TURNBALL, A. L. 1960. The prey of spider *Linyphia triangularis* (Clerck) (Araneae : Linyphiidae). *Can. J. Zool.*, **38** : 859-873.

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A CHECK LIST OF THE GRYLLIDAE (ORTHOPTERA), WITH INTER-TERRITORIAL DISTRIBUTION, FROM THE EASTERN HIMALAYAS

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ABSTRACT

Recent systematic investigation of the Eastern Himalayas gryllids shows that so far 103 species belonging to 41 genera, under 12 subfamilies, are known to occur. Some of the species lately described from the area are now considered synonymies. Thus *Teleogryllus megalensis* Lahiri and Ghosh, 1975, is synonymised with *T. testaceus* (Walker, 1869) : *Velarifictorus jaintianus* Biswas and Ghosh, 1975, with *V. bhaduri* (Bhowmik, 1967) ; *Scapsipedus lohitensis* Tandon and Shishodia, 1972, with *V. sikkimensis* (Bhowmik, 1967). Besides, a few new species described and a large number of species recorded from the locality necessiated a consolidated list oj valid species for further detailed study of these interesting insects.

INTRODUCTION

The varied ecosystems and topographies of the eastern Himalayas provide an ideal niche for harvering various froms of crickets. Though the publication of Chopard (1969) provides basic information of the crickets of India as a whole, there is no consolidated faunal account of gryllids from these areas. Recent studies by Bhowmik (1967, 1968, 1969, 1975, 1976, 1977a, 1977b), Tandon and Shishodia (1972, 1974), Vasanth *et al* (1975), Vasanth (1978) and Biswas *et al* (1975) have resulted description of some new species, recording of many species and new localities for large number of species. Some of the species recently described are now considered synonymies. Besides, the systematics used in Fauna is back dated and even before its publication has been subjected to systematic revision (Chopard, 1961 ; Randall, 1964).

In view of these, the present communication aims at straightening all scientific confusion, provides the current scientific names in the light of modern systematics with inter-territorial distributional records, in order to facilitate and stimulate further study of this interesting fauna. Furthermore, this check-list will show contrast with faunal wealth of these insects from that of the western Himalayas (having total 70 species ; belonging to 34 genera under 10 subfamilies (4 new speciea)—vide Bhowmik in press). The eastern Himalayas are rich in this respect.

Systematic Accgunt

Order ORTHOPTERA

Family Gryllidae

1. Sub-family Gryllinae

	Name of the species	Inter-territorial distribution	Remarks
1.	*Brachytrypes portentosus* (Lichtenstein, 1796)	W. B. (Darjeeling). Assam (Kaligunga) ; Cachar ; Sibsagar ; Mangaldai ; Ledo ; Majgaown). Meghalaya (Garo Hills ; Khasi Hills.	
2.	*B. orientalis* (Burmeister, 1838)	Assam (Chabua ; Sibsagar ; Ledo). Meghalya (Garo Hills).	
3.	*Gymnogryllus kasmirensis* (Bhowmik; 1967)	Assam (Doom Dooma). Meghalaya (Shillong).	*G. minor* Chopard, 1969, is synonymied with it.
4.	*Gryllus bimaculatus* (De Geer, 1773)	W. B. (Kurseong ; Sukna : Darjeeling). Meghalaya (Khasi Hills). Arunachal Pradesh (Kameng). N. Sikkim.	Very common species.
5.	*Lenigryllus quadrimaculatus* (Saussure, 1877)	Assam.	
6.	*Modicogryllus confirmata* (Walker, 1859)	Assam (Ledo). Manipur (Imphal Valley).	
7.	*Modicogryluss semiobscurus* (Chopard, 1969)	Assam (Near Ledo).	♀ unknown.
8.	*M. minimus* (Chopard, 1928)	Assam (Ledo). W. B. (Sureil). Arunachal Pradesh (Siang).	
9.	*M. blennus* (Saussure, 1877)	Assam (Ledo).	
10.	*M. ehsni* (Chopard, 1969)	Assam (Ledo).	
11.	*Melanogryllus carmichaeli* (Chopard, 1928)	W. B. (Sukna).	
12.	*Plebeiogryllus guttiventris* (Walker, 1871)	Common throughout India	
13.	*Teleogryllus mitratus* (Burmeister, 1838)	Assam (Ledo). Meghalaya (Khasi Hills ; Jaintia Hills). NEFA. W.B. (Darjeeling ; Sukna ; Siliguri ; Naxalbari ; Mirik). Manipur.	
14.	*T testaceous* (Walker, 1869)	W. B. (Darjeeling ; Bamanpukri ; Bhutan Ghat). Meghalaya (Khasi and Garo Hills).	

Name of the species	Inter-territorial distribution	Remarks
15. *T gracilipes* (Saussure, 1877)	Assam (Ledo).	
16. *T. himalayanus* (Chopard, 1928)	W. B. (Kurseong ; Ghumti).	
17. *T fletcheri* (Chopard 1935)	Meghalaya (Shillong).	
18. *T pallidus* (Chopard,1928)	W. B. (Darjeeling).	
19. *Gryllopsis falconneti* (Saussure, 1877)	W. B. (Mongpong ; Bamanpukri ; Bhutan Ghat).	
20. *G. femorata* (Chopard, 1935)	Meghalaya (Garo and Khasi Hills).	♂ unknown.
21. *Turanogryllus rufoniger* (Chopard, 1925)	Meghalaya (Shillong). W. B. (Derjeeling).	
22. *T histrio* (Saussure, 1877)	Assam (Mangaldai ; Kaziranga).	
23. *T pubescence* (Chopard, 1928)	W. B. (Ghumti). Neghalaya (Garo and Khasi Hills).	♂ unknown.
24. *T. pallida* (Chopard, 1969)	W. B. (Derjeeling).	♂ unknown.
25. *Velarifictorus aspersus* (Wallker, 1869)	Meghalaya (Shillong).	
26. *V. parvus* (Chopard, 1928)	W. B. (Sitong Ridge). Meghalaya (Khasi Hills).	
27. *V. grylloides* (Chopard, 1969)	Assam (Ledo Road).	
28. *V. bhadurii* (Bhowmik, 1967)	U. P. (Dehradun). Meghalaya (Jaintia and Khasi Hills).	*V. jaintianus* Biswas and Ghosh, 1975, is synonimised.
29. *V. raychoudhuri* (Bhowmik, 1967)	U. P. (Dehradun).	♀ unknown
30. *V. jharnac* Manipur. (Bhowmik, 1967)		♀ unknown.
31. *V. sikkimensis* (Bhowmik, 1967)	W. B. (Mongpong ; Bamanpukri ; Samsing ; Hasimara). NEFA (Lohit, Deopani).	*S. lohitensis* Tandon and Shishodia, 1972, is synonimised.
32. *V. khasiensis* (Vasanth and Ghosh, 1975)	Meghalaya (Khasi and Garo Hills).	

	Name of the species	Inter-territorial distribution	Remarks
33.	*V arorai* (Tandon, 1972)	NEFA (Subansiri).	
34.	*Loxoblemmus e. equestris* (Saussure, 1877)	Assam (Doom Dooma ; Ledo). Meghalaya (Songsok, Garo Hills). NEFA.	
35.	*L. e. manipurensis* (Bhowmik, 1969)	Manipur (Imphal).	
36.	*L. detectus* (Serville, 1839)	Sikkim. NEFA.	
37.	*L. haani* (Saussure, 1877)	W. B. (Darjeeling). NEFA.	
38.	*L. taicoun* (Saussure, 1877)	NEFA.	
39.	*L. nigriceps* (Chopard, 1933)	Sikkim (Gangtok).	
40.	*L. macrocephalus* (Chopard, 1969)	Assam (Ledo Road). NEFA. W. B.	
41.	*L. longipalpis* (Chopard, 1928)	NEFA (Siang).	
42.	*L. fletcheri* (Chopard, 1935)	Meghalaya (Shillong).	
43.	*L. jacobsoni* (Chopard, 1927)	Meghalaya (Khasi Hills).	
44.	*Stephoblemmus humbertiellus* (Saussure, 1877)	Meghalaya.	
45.	*Parasciobia indica* (Chopard, 1935)	Meghalaya (Shillong).	
46.	*Gryllodes sigillatus* (Walker, 1869)	Assam (Ledo). Meghalaya. W. B. (Sevok).	
47.	*Nemobiodes sukhadae* (Bhowmik, 1976)	W. B. (Mirik , Bamanpukri ; Nilpara ; Rydak ; Suklapara).	
48.	*Cophogryllus ornatus* (Chopard, 1928)	W. B. (Mongphu ; Kurseong ; Jor Pokhri).	♂ unknown.
49.	*C. angustus* (Chopard, 1928)	W. B. (Singla).	♂ unknown
50.	*C. bilineatus* (Chopard, 1969)	Assam (Mishmi Hills).	♂ unknown
51.	*Landreva ebneri* (Chopard, 1969)	Sikkim.	♂ unknown
52.	*L. clara* (Walker, 1869)	Sikkim	♂ unknown

	Name of the species	Inter-territorial distribution	Remarks
		II. Subfamily : NEMOBIINAE	
53.	*Pteronemobius indicus* (Walker, 1869)	Assam (Ledo ; North Lakhimpur). Meghalaya (Garo Hills). NEFA. W. B. (Rydak).	
54.	*P. concolor* (Walker, 1871)	Assam (Ledo). W.B. (Mirik).	
55.	*P. montanus* (Chopard, 1933)	Assam (Ledo). Sikkim. W.B. (Kalimpong).	
56.	*P. rufipes* (Chopard, 1969)	W.B. (Sureil).	♂ unknown.
57.	*P. taprobanensis* (Walker, 1869)	Assam (Chabua ; Doom Dooma ; Tejpur ; Ledo). Meghalaya (Garo Hills). NEFA. W.B. (Darjeeling ; Naxalbari ; Chunabati ; Bhutan Ghat).	
58.	*P. fascipes* (Walker, 1869)	Assam (Chabua ; Ledo ; North Lakshimpur). Sikkim (Rongli Chu). W.B. (Kalimpong ; Kurseong). Meghalaya (Garo Hills). NEFA.	
59.	*P. csikii* (Bolivar, 1901)	Assam (Mangaldai ; Bhutan Frontier). NEFA.	
60.	*P. pilicornis* (Chopard, 1969)	Meghalaya (Garo Hills).	
61.	*P. panteli* (Chopard, 1969)	W.B. (Kurseong ; Ghoombanj ; Mirik)	
62.	*P. strigipennis* (Chopard, 1928)	W.B. (Soom).	
63.	*Speonemobius decoloratus* (Chopard, 1924)	Meghalaya (Garo Hills, Siju Caves).	♀ unknown.
64.	*S. decolyi* (Chopard, 1969)	Assam. W.B. (Kurseong).	♀ unknown.
65.	*S. punctifrons* (Chopard, 1969)	Assam (Ledo).	
66.	*Scottiola minima* (Chopard, 1928)	Assam (Mangaldai, Darrang).	♂ unknown.
67.	*S. divarna* (Bhowmik, 1976)	W.B. (Mirik).	
68.	*S. elongata* (Bhowmik, 1976)	W.B. (Mirik).	
		III. Subfamily : MOGOPLISTINAE	
69.	*Cycloptiloides orientalis* (Chopard, 1925)	Assam (Ledo).	

	Name of the species	Inter-territorial distribution	Remarks
	IV. Subfamily : SCLEROPTERINAE		
70.	*Scleropterus punctatus* (Brunner, 1893)	Assam (Ledo). Arunachal Pradesh (Missamari).	
71.	*S. coriaceus* (Haan, 1842)	Assam (Kaziranga).	
	V. Subfamily : CACOPLISTINAE		
72.	*Cacoplistes rogenhoferi* (Saussure, 1877)	Assam (Gauhati ; Kaziranga). W.B. (Pashok).	
	VI. Subfamily : PHALANGOPSINAE		
73.	*Larandopsis chopari* (Chopard, 1928)	Meghalaya (Garo Hills, Siju Caves).	Known from immature specimens.
74.	*Kempiola longipes* (Chopard, 1924)	Meghalaya (Garo Hiils, Siju Caves).	
75.	*Arachnomimus nietneri* (Saussure, 1878)	W. B. (Ghoombanj).	
76.	*Opilionacris* (?) *annandalei* (Chopard, 1928)	W. B. (Sureil)	Known from a single female
	VII. Subfamily : OECANTHINAE		
77.	*Oecanthus indicus* (Saussure, 1878)	Arunachal Pradesh (Changland ; Tirap Div. ; Lohit ; Kameng). W. B. (Chunabati).	
	VIII. Subfamily : TRIGONIDIINAE		
78.	*Homoeoxipha lycoides* (Walker, 1869)	Assam (Chabua ; Misamari). NEFA. W. B. (Siliguri ; Naxalbari ; Mirik ; Chunabati, North Sevok).	
79.	*Anaxipha longipennis* (Serville, 1839)	Assam (Ledo).	
80.	*A. manipurensis* (Bhowmik, 1968)	Manipur (Imphal Valley).	♂ unknown
81.	*Paratrigonidium nitidum* (Brunner, 1893)	Assam (Ledo).	Little known species

Name of the species	Inter-territorial distribution	Remarks
82. *P. unifasciatum* (Chopard, 1928)	W. B. (Soom).	♀ unknown.
83. *Metioche vittaticollis* (Stal, 1861)	Assam (Ledo).	Little known species
84. *M. pallidinervis* (Chopard, 1928)	W. B. (Sureil).	♀ unknown.
85. *Metiochodes sikkimensis* (Bhowmik, 1968)	North Sikkim.	♀ unknown.
86. *Trigonidium cicindeloides* (Rambur, 1839)	Assam (Mangaldai : Bhutan Frontier ; Chabua ; Dibrugarh). W. B. (Mirik ; Chunabati ; North Sevok ; Santosh river bed).	
87- *T humbertianum* (Sausaure, 1878)	Assam (Dibrugarh ; Doom Dooma). W. B. (North Sevok).	
IX. Subfamily : ENEOPTERINAE		
88. *Xenogryllus transversus* (Walker, 1869)	Assam (Ledo). Sikkim. W. B. (Suklapara).	
89. *X. carmichaeli* (Chopard, 1928)	W. B. (Darjeeling).	
X. Subfamily : ITARINAE		
90. *Itara minor* (Chopard, 1925)	Meghalaya (Garo Hills). W. B. (Darjeeling).	
XI. Subfamily : PODOSCIRTINAE		
91. *Calyptotrypus roonwali* (Bhowmik, 1977)	Manipur (Imphal Valley).	♀ unknown.
92. *C. bimaculatus* (Chopard, 1928)	Arunachal Pradesh (Kameng). North Sikkim. Bhutan (Pedong).	♀ unknown.
93. *C. hofmanni* (Saussure, 1878)	Arunachal Pradesh (Subansiri (Div.).	
94. *Euscyrtus hemelytrus* (Hann, 1842)	Assam (Tinsukia ; Chabua ; Ledo). W. B. (Naxalbari ; Sukha ; Chunabati ; Hasimara).	
95. *E. concinnus* (Hann, 1842)	Assam (Chabua ; Doom Dooma ; Ledo ; N. Lakhimpur). NEFA.	

	Name of the species	Inter-territorial distribution	Remarks
96.	*E. angustifrons* (Chopard, 1969)	Assam (Dibrugarh).	♂ unknown.
97.	*Patiscus cephalotes* (Saussure, 1878)	Sikkim. Assam (Ledo).	
98.	*P. brevipennis* (Chopard, 1969)	Assam (Ledo).	
99.	*P. malayanus* (Chopard, 1969)	Assam (Gauhati).	
100.	*Madasumma melanonotum* (Chopard, 1969)	Assam (Ledo).	♀ unknown.
101.	*M. gravelyi* (Chopard, 1928)	W. B. (Kalimpong).	♀ unknown.
102.	*M. darjeelingensis* (Chopard, 1928)	Meghalaya (Shillong). Bhutan. W B. (Pashok).	
103.	*M. assamensis* (Chopard, 1969)	Assam (Chabua).	♀ unknown.

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REFERENCES

BHOWMIK, H. K. 1967. Five new species of crickets of the genus *Scapsipedus* Saussure (Insecta : Orth.) from India. *Proc. Zool. Soc., Calcutta*, **20** : 123-127.

BHOWMIK, H. K. 1968. Two new species of Grylloidea (Insecta : Orthoptera) from India. *Proc. Zool. Soc., Calcutta*, **21** : 149-152.

BHOWMIK, H. K. 1969. Studies on Indian crickets (Orth. : Insecta) Part I. *Zool. Anz.*, **182**(1/2) : 143-152, 17 figs.

BHOWMIK, H. K. 1975. Studies on Indian crickets (Orth. : Insecta), Part III. *J. Bombay nat. Hist. Soc.*, **72**(2) : 368-382, 11 figs.

BHOWMIK, H. K. 1976. On the Gryllid fauna (Gryllidae : Orth.) of the districts of the North Bengal with description of three new species. *Indian Mus. Bull.*, **11**(1) : 42-48, figs 12.

BHOWMIK, H. K. 1977a. Studies on Indian Crickets (Orth. : Insecta) with descriptions of two new species, *Rec. Zool. Surv. India*, **73** : 23-39, 3 figs.

BHOWMIK, H. K. 1977b. Studies on some Indian Crickets with new distributional records of the subfamily Gryllinae (Gryllidae : Orth.). *Rec. Zool. Surv. India*, **73** : 229-238, 1 fig.

BHOWMIK, H. K. 1985. Contribution to the gryllid fauna of the Western Himalayas

(Orthoptera : Gryllidae). 1. With a complete list of valid species from the area. 2. Description of four new species. *Rec. Zool. Surv. India, Occ. Pap. no.* 73 : 1-85, 35 figs.

BISWAS, S. *et, al.*, 1975. A preliminary study of the insect fauna of Meghalaya. 9 Orthoptera : Glyllidae : Fifteen new records and notes on other species. *Proc. Zool. Soc., Calcutta,* **28** : 23-26.

CHOPARD, L. 1961. Les divisions du genre *Gryllus* basés sur l' etude de l' appareil copulateur (Orth. Gryllidae). *Eos, Madr.*, **37** : 267-287.

CHOPARD, L. 1969. *The fauna of India and the adjacent countries. Orthoptera, 2* (Grylloidea), Govt. of India, Calcutta, xviii+421 pp.

RANDALL, R. L. 1964. The male genitalia in Gryllinae (Orthoptera : Gryllidae) and a tribal revision. *Canad. Ent.*, **96**(12) : 1555-1605, figs.

TANDON, S. K. AND SHISHODIA, M. S. 1972. Notes on the collection of Grylloidea (Orthoptera) from NEFA, India. *Orient. Insects*, **6**(3) : 281-292.

TANDON, S. K. AND SHISHODIA, M. S. 1974. Descriptions of two new species of *Velarifictorus* (Orthoptera : Grylloidea) from India. *Orient Insects*, **8**(3) : 299-302.

VASANTH, M. *et. al.*, 1975. Three new species Gryllidae (Insecta : Orthoptera). *Orient. Insects*, **9**(2) : 221-228.

VASANTH, S. 1978. Three unknown females of crickets (Orth. : Gryllidae) from North East India with notes of their distribution. *Entom*, **3**(2) : 273-276.

Bull. zool. Surv. India, 7(2-3) : 195-197, 1985

PENTAPEDILUM ROBUSTICEPS (DIPTERA : CHIRONOMIDAE) —A NEW SPECIES FROM INDIA

By

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AND

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ABSTRACT

Pentapedilum robusticeps Sp. nov. from Bastar, M. P. is described and illustrated.

INTRODUCTION

In the Oriental region the genus *Pentapedilum* was represented by two species such as *P. nodosum* and *P. convexum* both described by Johannsen (1932) from Caroline Islands, Marina Islands, Java and Sumatra. Recently, two more species, *P. kuluensis* Kulshrestha (1979) and *P. macrotrichium* Guha & Chaudhuri (1981) have been added to the genus. In this paper another new species is described from Bastar (M.P.) and with these number of species in this genus comes to five from the Orient.

Pentapedilum robusticeps sp. nov.

(Figs. 1-5)

Male :

Head : Yellow in colour. Vertex with 8 setae (Post ocular 0, outer verticles 6 and inner verticles 2), corona without seta. Clypeus with 16-18 setae, clypeal ratio 1.12 Maxillary palp yellow, length ratio of palpomeres I-V 8 : 7 : 30 : 28 : 40, L/W ratio 3.75. Eyes bare, reniform and extended dorsally, extension being 0.17 mm long. Frontal tubercle absent. Antenna pale brown, length ratio of flagellomeres I-XII 5 : 2 : 2 : 2 : 2 : 2 : 2 : 2 : 2 : 1 : 1 : 66, AR 3.0. Pedicel ratio 1.0.CA 0.34, CP 1.07.

Thorax : Yellow in colour. Antepronotum thin without V shaped emergination. Acrostichals 14-16 in pairs, dorsocentrals 34 also in pairs and prelars 6. Scutellum with 26 setae in two transverse rows, postscutellum light brown and bare.

Wing (Fig. 1) : Pale with the veins yellow. Brachiolum with 7 setae. Macrotrichia distributed profusely on membranes and veins including cross vein. R_{2+3} very close to R_1 distance being 0.19 mm away from R_1, ending of R_{4+5} with C subacute, r-m

proximal to f-cu ; An slightly proximal to f-cu. Anal lobe weakly developed. Squama with 12 setae. Haltere pale. CR 0.96, VR 1.1.

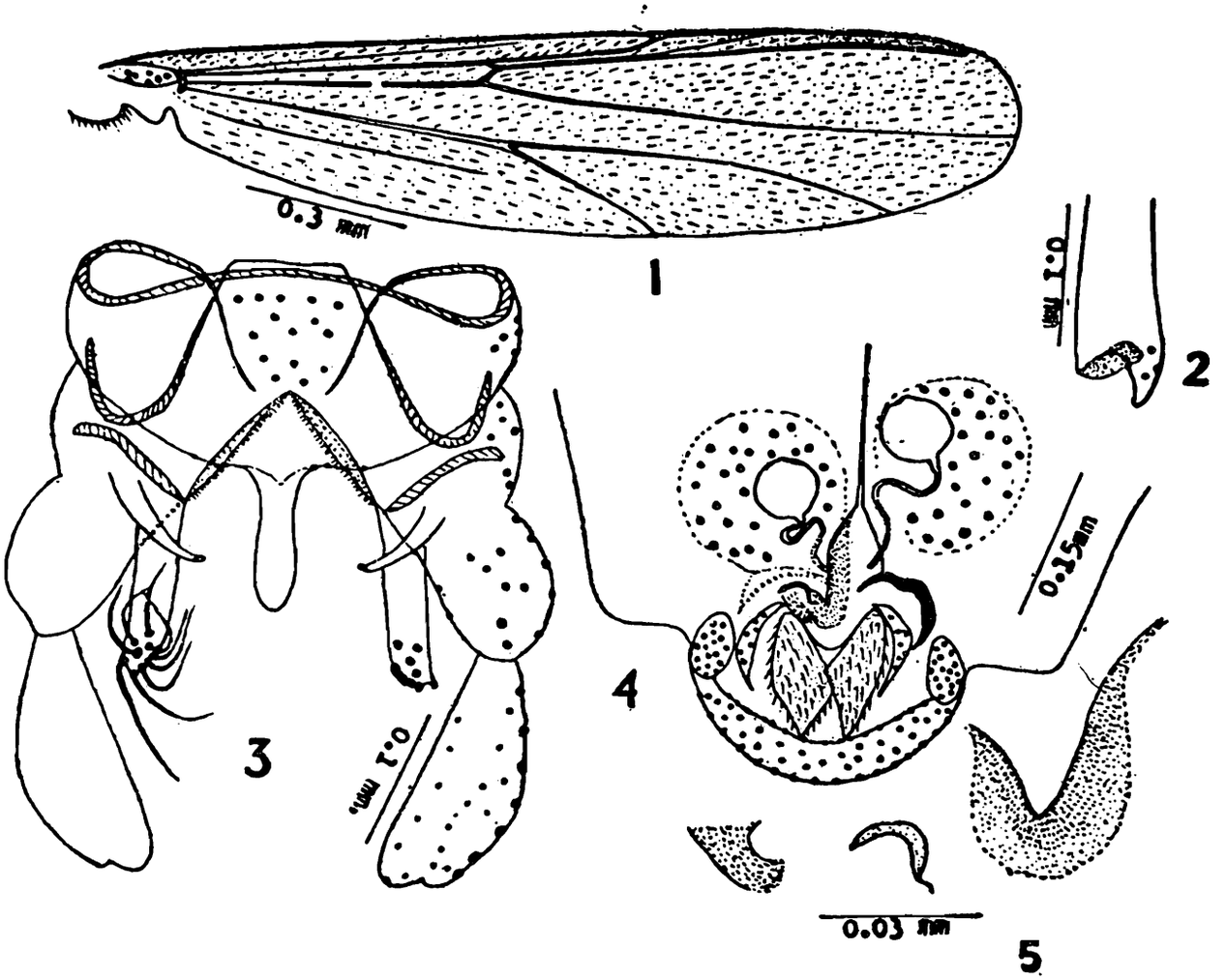
Legs : Yellow in colour with numerous setae. Fore tibial scale (Fig. 2) long with apex blunt. Spur of mid tibia single, curved 0.06 mm long, ratio o f length of spur to the apical diameter of mi d tibia 1 : 1 ; spur of hind tibia also single, curved 0.068 mm long, ratio of length of spur to the apical diameter of hind tibia 1 : 1. LR 1.66 in fore leg, LR 0.61 in mid leg and LR 0.77 in hind leg. TR of hind leg 1.75.

Abdomen : Terga uniformly setaceous with alternate yellow and brown bands.

Hypopygium (Fig. 3) : Anal point 0.68 mm long, stout, blunt and base with 8 setae on each side. Gonocoxite stout with 16-18 setae ; gonostylus with 12 short setae at its inner apical margin. Appendage 1 narrow, 11 little curved at its apex bearing 4-5 setae at the base, appendage 2 finger like with 15-17 long incurved setae. Transverse sternapodeme 0.23 mm long, lateral sternapodeme 0.12 mm long, coxapodeme 0.06 mm and phallapodeme 0.09 mm long. HR 0.57, HV 1.8.

Female :

Similar to male with usual sex differences. Maxillary palp yellow, length ratio of palpomeres I-V 6 : 8 : 25 : 27 : 37.



Figs. 1-5. *Pentapedilum robusticeps* sp. nov.

Genitalia (Fig. 4) : Notum 0.16 mm long. Coxosternapodeme well developed, curved with an apical notch. Gonapophysis VIII (Fig. 5) divided into an elongated dorsomesal, short and stout ventrolateral lobe. Apodeme lobe weak. Tergum IX with many setae. Post genital plate U shaped. Gonocoxite IX with 16-17 setae. Seminal capsules equal, oval with a neck, main body of the capsule measuring 0·06 mm by 0.07 mm, ducts of seminal capsule bent and open in common.

Measurements :

Body length ♂ 3.24, ♀ 3.15 mm.
Wing length ♂ 2.0 mm, ♀ 2.16 mm.
Wing breadth ♂ 0.59 mm, ♀ 0.66 mm.

Holotype : ♂ (Z.S.I. Reg. No. 6562/H_6), India, Madhya Pradesh, Bastar, 7.4.80, coll. *S. Ahmed.*

Allotype : ♀ (Z.S.I. Reg. No. 6563/H_6) data same as holotype.

Paratype : 1 ♂, data same as holotype. Kept in collection of Zoology Deptt. Burdwan University.

Diagnosis : In view of robust anal point this species is designated as *Pentapedium robusticeps.* It seems close to *P. macrotrichium* Guha & Chaudhuri (1980) in wing and legs. *P. calvescens* Freeman (1958) shows resemblances with the present species in some aspects of male hypopygium. The characters like fore tibial scale, anal point and the structure of gonostylus appear to be sufficient to consider it as a separate species under the genus *Pentapedilum.*

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REFERENCES

FREEMAN, P. 1958. A study of Chironomidae (Diptera) of Africa south of the Sahara. Part IV, *Bull. Brit. Mus.* (*Nat. Hist.*) *Ent.* **6**(11) : 263-362.

GUHA, D. K. and CHAUDHURI, P. K. 1981. Record of three genera of Chironominae (Diptera : Chironomidae) from India. *Bull. Zool. Surv. India,* **3**(3) (in press).

JOHANNSEN, O. A. 1932. Chironominae of the Malayan subregion of the Dutch East Indies. *Arch. Hydrobiol. Suppl.* **11** : 503-552.

KULSHRESTHA, A. K. 1979. First record of the genus *Pentapodilum* Kieffer (Diptera : Chironomidae). *Orient. Insects.* **13**(3-4) : 303-306.

Bull. zool. Surv. India, 7 (2-3) : 199-202, 1985

NEMATODES FROM WEST BENGAL (INDIA)
XVII. A NEW SPECIES OF THE GENUS *PRODORYLAIMUS* ANDRA'SSY, 1959 (DORYLAIMIDAE : DORYLAIMIDA)

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ABSTRACT

A new species of the genus *Prodorylaimus* Andrássy, 1959 is described from Santiniketan, district Birbhum, West Bengal. *Prodorylaimus sukuli* sp. n. is characterized by having L=2.42-2.66 mm ; a=30-40 ; b=4.2-4.9 ; c=7.5-11 ; V=44-47 ; odontostyle=30-33 μm ; odontophore=28-33 μm.

INTRODUCTION

Two slides containing the nematodes were brought by the first author to Zoological Survey of India for identification. Upon identification, these nematodes were found to represent a new species of the genus *Prodorylaimus* Andrássy, 1959 which is described hereunder as *P. sukuli.*

MATERIAL

Three type specimens have been registered and deposited with the National Zoological Collection, Zoological Survey of India, Calcutta. *P. Sukuli* ; Holotype female along with one paratype female and one paratype male on slide No. WN 495. The other paratypes have been deposited with the museum of Zoology Department. Visvabharti University, Santiniketan, W. Bengal.

Prodorylaims sukuli* sp. n.

(Fig. 1)

Measurements :

Holotype (♀) : L=2.65 mm ; a=37 ; b=4.5 ; c=7.5 ; V=$^{14}45^{14.5}$

Paratypes : 3 ♀ ♀ : L=2.46-2.66 mm ; a=30-37 ; b=4.2-4.6 ; c=7.9-11 ; V=$^{14\text{-}15.5}44\text{-}47^{14.6\text{-}16.6}$

Paratypes : 3♂ ♂ : L=2.42-2.51 mm ; a=34-40 ; b=4.2-4.9 ; c=8.6-8.8 ; T=49-55.

* Named after Dr. N. C. Sukul, Reader in Zoology, Visva Bharati University, Santiniketan.

Description :

Female : Body slightly curved ventrally upon fixation, tapering towards both extremities. Cuticle finely striated transversely; its thickness varies 2.5-5.5 μm (thickest on tail). Lateral chords granular, 1/5-1/4 of body-width near middle. Dorsal, ventral and latetal body pores indistinct.

Lip region rounded, narrower than body, marked by a slight depression, about 1/6.0-1/

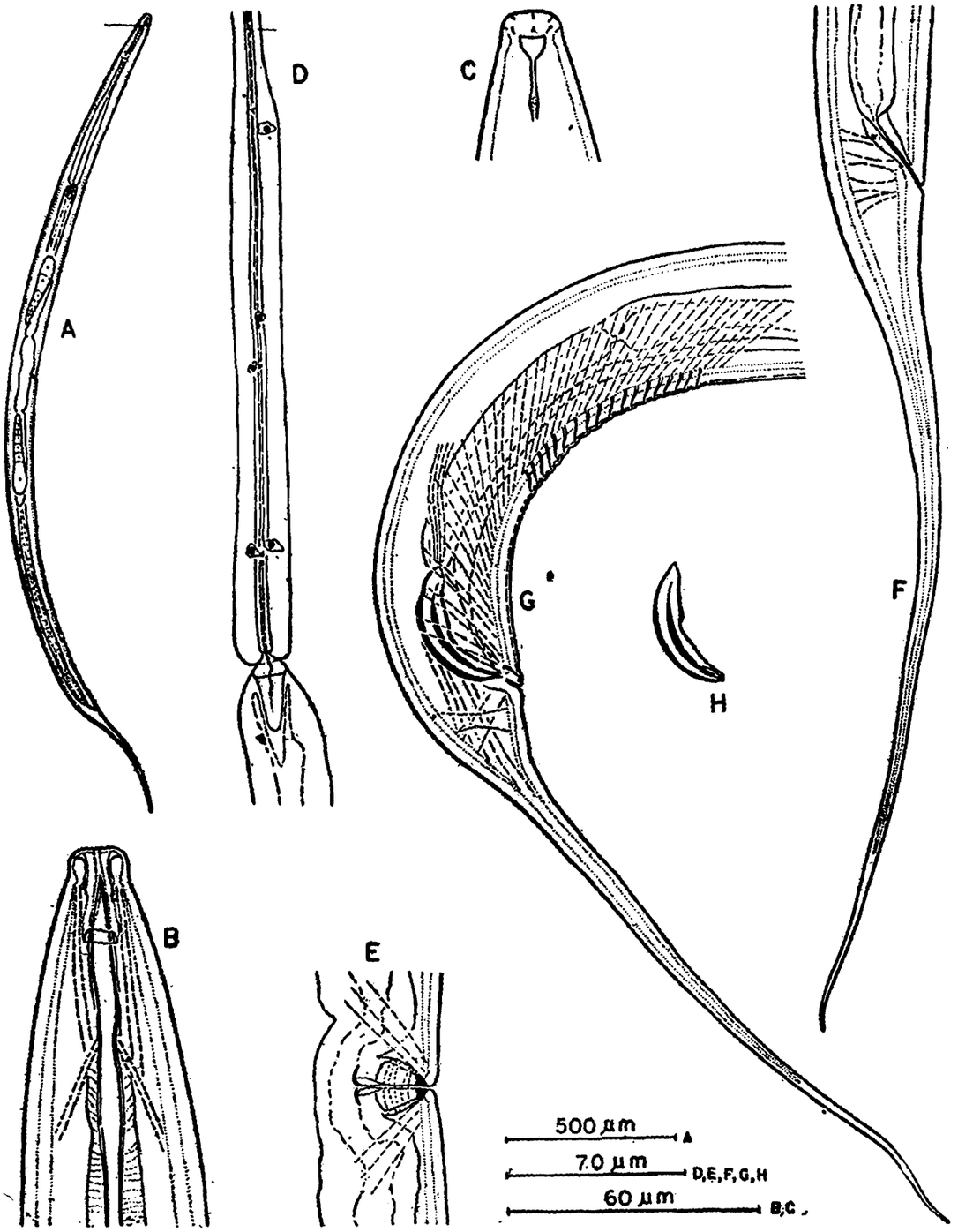

Fig. 1. *Prodorylaimus sukuli* sp. n. : A—Entire female, B—Anterior region, C—Head end (superficial view), D—Basal expanded part of oesophagus showing oesophageal gland nuclei and their orifices, E—Vulva region, F—Female tail, G—Male posterior region, H—Spicule

4.5 of the body-width at base of oesophagous. Amphids stirrup-shaped ; their apertures 6.5-8.0 μm or 47-55% of the corresponding body-width, and 6-7 μm from anterior end. Sensillar pouches 17-19 μm from amphidial slits.

Obontostyle 30-33 μm or 2.1-2.3 head-width long ; aperture 11-12 μm or 37-40% of the odontostyle length. Guiding ring 19-21 μm or 1.3-1.5 head-width from anterior end. Odontophore simple, 28-33 μm or 0.9-1.1 times the odontostyle length. Basal expanded part of oesophagus occupying 46-53% of the neck region. Position of the oesophageal gland nuclei and their orifices as follows (observed only in one female) : DO=55.1 ; DN=58.9 ; DO-DN=3.8 ; S_1N_1=77 ; S_1N_2=80 ; S_2N=91 ; S_2O=92. Nerve ring 133-166 μm or 23-29% of the neck region from anterior end. Cardia elongate-conoid, enveloped in intestinal tissue. Oesophago-intestinal disc present. Prerectum 86-128 μm or 2.3-3.3 anal body-width long. Rectum 27-33 μm or 1.2 anal body-width long.

Vulva a transverse slit. Vagina more than 1/3rd of corresponding body-width long, sclerotized distally. Female reproductive system amphidelphic. Uteri smaller than oviducts, separated by sphincter. Ovaries reflexed ; oocytes arranged in a single row except in the region of multiplication.

Tail long, 230-354 μm or 6-9 anal body-width long. Caudal pores indistinct.

Male : Similar to female in general shape and morphology except for the male reproductive system and more ventrally curved posterior part of the body. Prerectum short, 100-135 μm or 2.5-3.2 anal body-width long. Tail long, 280-290 μm or about 7 anal body-width long. One male was found with broken tail tip (mounted along with holotype female), 150 μm or about 3.5 anal body-width long.

Reproductive system typical. Spicules 57-67 μm or 1.3-1.6 anal body-width long. Lateral guiding pieces 9-11 μm long. Supplements an adanal and 17-18 contiguous ventromedians. Copulatory muscles 39-41.

Differential diagnosis : *Prodorylaimus sukuli* sp. n. comes close to *P. dahli* (Altherr, 1960) Andrássy, 1964 and *P. paralongicaudatus* (Micoletzky, 1925) Andrássy, 1959. From the former it differs in having differently shaped lip region, thicker body (a=47-64 in *P. dahli*), more posterior vulva (V=35-41 in *P. dahli*), longer odontostyle in relation to head-width (odontostyle less than 1.9 head-width in *P. dahli*), shorter odontostyle aperture and odontophore (odontostyle aperture =15–16 μm and odontophore= 28-33 μm in *P. dahli*). From *P. paralongicaudatus* the present new species differs in having shorter odontostyle, odontostyle aperture, odontophore and tail (odontostyle=38-39 μm, odontostyle aperture=14-16 μm, odontophore=42–45 μm and tail more than 20 anal body-width long in *P. paralongicaudatus*). From *P. dahli* and *P. paralongicaudatus* it can further be differentiated in the absence of distinct body pores and post-odontophore constriction.

Type habitat and locality : Collected from soil around roots of an insectivorous plant, *Drosera burmani* at the gullies of the bad land,

Santiniketan, district Birbhum, W. Bengal, India.

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We are grateful to Dr. B. K. Tikader, Director of Zoological Survey of India, Calcutta and the Head of the Zoology Department, Visva Bharati University, Santiniketan for providing research facilities. We are also thankful to Dr. N. C. Sukul, Reader in Zoology Department, Visvabharti University for allowing us to publish the description of the present new species.

REFERENCES

ALTHERR, E. 1960. Results from the Danish Expedition to the French Cameroons (1949–1950). XXVIII.–Nematodes limnicoles. *Bull. Inst. fr. Afr. noire, s. a.*, **22** : 770-787.

BAQRI, Q. H. & COOMANS, A. 1973. A taxonomic revision of the nematode species described by S. Stekhoven & Teunissen (1938) and S. Stekhoven (1944) from National Virunga Park (Zaire Republic). *Explor. Parc. natn. Virunga—Miss G. F. de Witte & H. Damas* **1**, 3-57.

Bull. zool. Surv. India, 7 (2-3) : 203-205, 1985

FIRST RECORD OF A CRAB, *PORTUNUS PUBESCENS* (DANA) FROM INDIAN COASTS (CRUSTACEA : DECAPODA : PORTUNIDAE)

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AND

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Zoological Survey of India, Calcutta.

ABSTRACT

The specimen of *Portunus pubescens* (Dana) 1852, is recorded herewith for the first time from Sagar Island, Bay of Bengal and Tamil Nadu Coast, its diagnostic features are discussed with suitable illustrations.

INTRODUCTION

During faunistic surveys of Tamil Nadu Coast and Sagar Island, Bay of Bengal, few specimens of swimming crab, ***Portunus pelagicus*** (Dana) were collected and the literature revealed that the species has not been reported so far from the Indian Coasts.

As the original description of the species is inadequate and without any illustrations, its subsequent records were also in the same way, a brief description of this species is presented in this paper.

Previous records of the species were from Sandwitch Island, Australia, Hawaii and Japan.

Order : DECAPODA

Family : PORTUNIDAE

Genus **Portunus**

Portunus pubescens (Dana)

(Pl. II, Fig. 1)

Lupa pubescens Dana 1852 : 274
Achelous pubescens, A. M. Edwards 1861 : 342
Portunus pubescens, Rathbun 1906 : 870 ; Edmondson 1954 : 237
Neptunus pubescens, Sakai 1934 : 303
Neptunus (*Neptunus*) *pubescens*, Sakai 1939 : 388
Portunus pubescens Sakai 1965 : 117

Material examined : One male from Mandapam, Tamil Nadu ; coll. Dr. P. K. Talwar, on 22.1.1974, 1 ♂, Width—36 mm. Length—20 mm. Front : 5 mm. 3 exs from Sagar Island, Bay of Bengal on 6.7.1977.

Diagnosis : Carapace very broad at the level of the last antero-lateral teeth, which is three times longer than the preceeding teeth. Shape of carapace broadly oval, it is moderately convex medially on both the directions. The entire crab is covered dorsally with soft hairs and sharp minute granules present on epibranchial regions. The front cut into four obtuse teeth, the middle two are slightly narrower and longer than the outer pair. Inner infra orbital tooth visible dorsally, supra orbital edge cut by two fissures.

The antero-lateral teeth are nine, acuminate, their spineous tips directed anteriorly except the last teeth. The last one is prominent, directed horizontally, strong, spine like and three times larger than the former. A slightly raised granular line from the last antero-lateral teeth crossed the carapace transversely and divide the carapace into anterior and posterior half. One similarly disposed short line present in front of the former line. The posterior border of carapace is smooth and form a common curve with the postero-lateral borders.

Antero-external angle of merus of external maxillipeds rounded but not much produced laterally, the entire merus is covered with soft hairs.

Chelipeds long, equal, arm, with three spines on the anterior border but without any on the posterior border. Wrist has a long spine at the inner corner and two spinules on the outer surface, besides there are two tubercles also at the end of coastae. Both the wrist and palm are coastate, seven smooth coastae present on palm, the upper two parallel ridge along the dorsal surface, each ending in a sharp spine. Fingers costate, shorter than the palm.

Edges of carpus, propodus and dactylus of walking legs thickly fringed with soft hairs along the borders.

Male abdomen five jointed, lateral sides of 4th joint straightly convergent.

Anterior male pleopod long, narrow, curved process apex bent outwardly.

Remarks : The crab is unlike the other known Indian species of the genus *Portunus* in the following respects—the dorsal surface of the entire crab, pterygostomian regions, surface of merus of external maxillipeds are covered with soft, yellowish, short hairs.

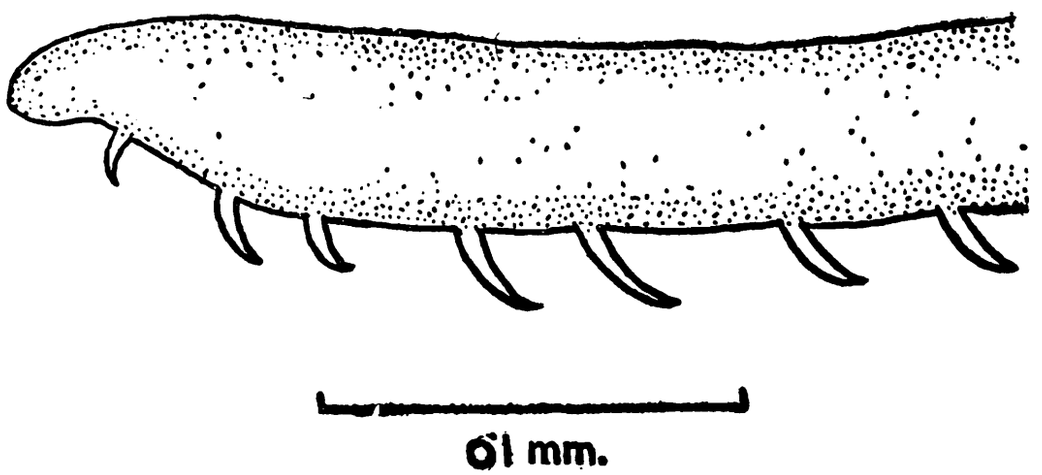


Fig. 1. Anterior male pleopod

The proportional length of the last antero-lateral spines which gives a particular shape to the species unlike other species of the genus. The number of spines on the chelipeds, are also unlike others, same is the case with male abdomen, as anterior pleopod which are very specific in the case of *P. pubescens* Dana.

Distribution : Bay of Bengal, Mandapam, Tamilnadu Coast (First record from India) ; Japan ; Hawii, Sandwitch Is. and Australia.

ACKNOWLEDGEMENT

The authors feel grateful to Dr. B. K. Tikader, Director, Zoological Survey of India, Calcutta, Dr. O. B. Chhotani, Deputy Director, and Dr. (Mrs.) Geeta Chhotani, Suptd. Zoologist of the Crustacea Division, Zoological Survey of India, Calcutta, for encouragement and placing the valuable collections of crustacea at our disposal and for facilities for this work.

REFERENCES

ALCOCK, A. 1899. Materials for a carcinological fauna of India. No. 4. The Brachyura Cyclometopa. Part II. A revision.....Corystidae. *J. Asiat. Soc. Bengal*, Calcutta, **68** part. 2(1) : 1-169.

DANA, J. D. 1852 : United States Exploring Expedition, (Crustacea) during the years 1838-1842, pt. **1** : 1-685.

EDWARDS, A. M. 1961. Etudes Zoologiques sur les Crustaces recents de La famille des Portuniens. *Arch. Mus. Hist. Nat.*, **10** : 309-428.

RATHBUN, M. J. 1907. Reports on the scientific results of the expedition to the tropical pacific, in charge of Alexander Agassiz, by the U. S. F. Fish Comm. Steamer "Albatross".....IX, X, The Brachyura. *Mem. Mus. Comp. Zool.*, **35**(2) : 21-74.

SAKAI, T. 1934. Brachyura from the coast of Kyusyu. Japan. *Sc. Rep. Tokyo Bunrika Daigaku*, Sect. B, I, no. 4 : 41-59.

SAKAI, T. 1939. Studies on the Crabs of Japan IV. Brachygnatha, Brachyrhyncha. Yokendo, Tokyo : 365-741.

SAKAI, T. 1965. The Crabs of Sagami Bay, Edited by Biological Lab. Imperial Household i-XVII+206 pp. Tokyo.

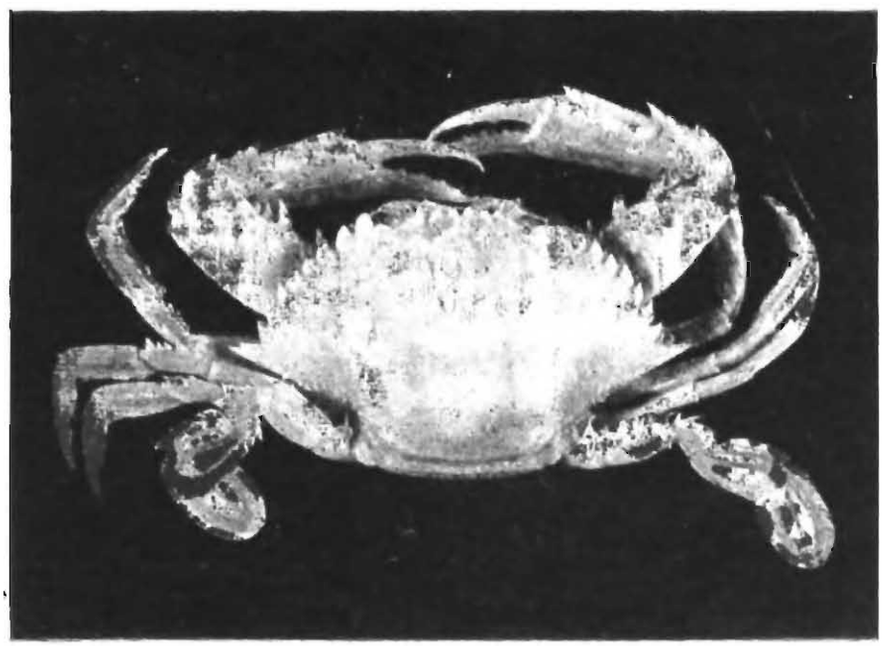


Fig. 1. *Portunus pubescens* (Dana)

Bull. zool. Surv. India, 7 (2-3) : 207-210, 1985

A NEW SPECIES OF *SERENIUS* GUINOT 1976, (CRUSTACEA : DECAPODA : XANTHIDAE) FROM ANDAMANS

MAYA DEB

Zoological Survey of India, Calcutta.

ABSTRACT

A new species, *Serenius andamanicus* is described and its affinities with related forms are discussed.

INTRODUCTION

The family xanthidae is well represented in the seas around India and Andaman Is., while observing the old unnamed collection of crabs lying in the Crustacea Section of Zoological Survey of India, I came across with 10 interesting examples collected from Andamans. The crabs seem to be so far undescribed. In the present paper these specimens are described as a new species under the genus *Serenius* and its relationships with the other three allied species are discussed.

Genus **Serenius** Guinot

Serenius Guinot, 1976 : 272.

Zozymus Dana 1852 : 77 ; Alcock 1898 : 103 : Odnher 1925 : 83 ; Sakai 1939 : 450 ; Sankarankutty 1962 : 124.

Zosimus Buitendijk 1960 : 284 : Guinot 1967 : 560-561 ; 1969 : 238-239 ; 1971 : 1071.

Type species : *Zozymus pilosus* A. Milne Edwards 1867.

Generic characters : Crabs of this genus are rather small in size. Carapace broadly oval, strongly convex antero-posteriorly and moderately so from side to side. Anterior two thirds of carapace divided into regional lobules by broad, deep grooves. The surface of these carapace lobules, posterior third of carapace and often under surfaces of carapace as well as outer surfaces of chelipeds are closely covered with flat topped, confluent granules of different sizes. Short, light to deep brown coloured fur present on the grooves between the lobules and on intergranular spaces, but the textural pattern is very clearly visible. Front bilaminar, deflexed, outer corner of each lobe well pronounced.

Antero-lateral sides of carapace long, convex, carinated, crest like and divided by sutures into four, broad shallow, entire lobes, including the outer orbital corner.

Chelipeds unequal, only the upper edge of arm cristiform, fingers with broad, hollowed out tips. Leg joints merus, carpus, propodus are sharply cristiform on their anterior edges and compressed laterally. Abdomen of male five jointed, 3rd-5th joints fused, but sutures are visible. Anterior male

pleopod quite thick, adorned with subdistal, plumose, bristles, with incurved apex.

Freshly preserved crabs are brick red to orange in colour, which has vanished in long spirit-preserved specimens.

The genus is Indo-Pacific in distribution.

Remarks : The genus *Serenius* Guinot is different from *Zosimus* in having its well demarcated surface lobules of carapace covered with granules and hairs present in between the inter granular and inter lobular spaces. The genus *Actaea*, another allied genus is also different from the *Serenius* in not having the creasted antero-lateral sides and interior edges of leg joints and arms of chelipeds.

DECAPODA : HYPEROLISSA : XANTHIDAE

1. **Serenius andamanicus** sp. nov.

(Pl. III, Fig. 1.)

Material : 1 female Holotype. Width : 13.5 mm ; Length : 8 mm Z.S.I. Regd. No. C 2943/2 ; 2 males paratypes ; W : 10 mm ; L : 6 mm, Regd. No. C 2944/2, from Chria Tapu, South Andamans, coll. *Mr. B. P. Halder*, dt. 24. 5. 1978.

1 male and 1 female paratypes from Corbyns Cove, North Andaman, Reg. No. C 2950/2, Collected by S. W. Kemp on 25. 2. 1915. Five exs. are present from Andamans, collected at different times, by Museum collectors.

Description to female : Small crab with broadly oval carapace which is moderately convex in both the directions. Regions and subregions are well marked by deep broad grooves into lobules. The lobules are flat and covered with granules, which are also flat and are of different sizes. The grooves covered with short, dark-brown hairs which are of light-brown colour in male.

All the lobules of carapace viz. 1M, 2M, 3M ; 1L-6L are distinct. Antero-lateral sides sharp, crested, cut into four rounded, broad, shallow, lobes, including outer orbital angle. Postero-lateral sides shorter than the antero-lateral and convergent. Front bilaminar, vertically deflexed, outer corner separated from inner supra-orbital lobe by a notch. Inner-infra-orbital corner toothed. Antenna stands on the orbital hiatus, antennules transversely fold. Merus of external maxilliped broader than long, its anterior edge slightly oblique.

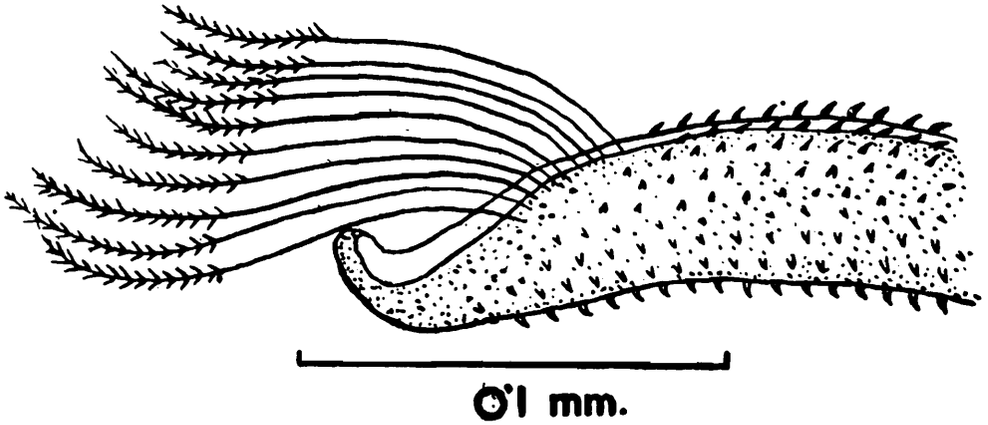


Fig. 1. Anterior male pleopod

DEB PLATE III

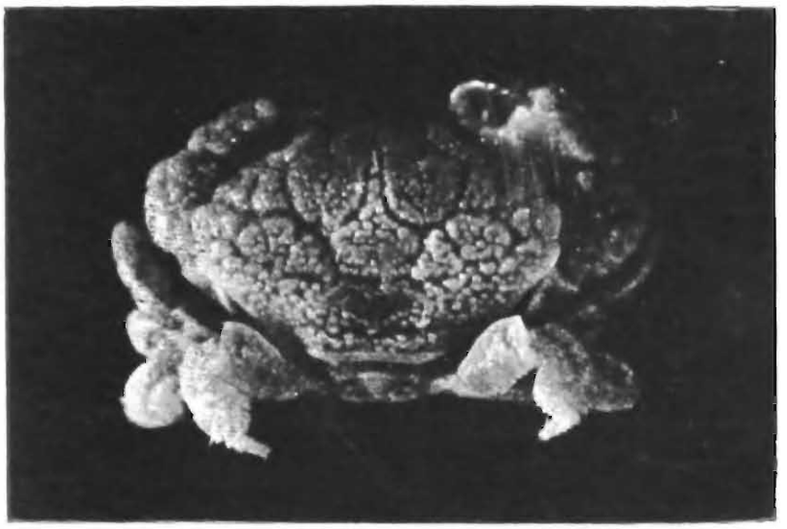


Fig. 1. *Serenius andamanicus* Deb.

Chelipeds sub-equal upper edge of arm sharp, crested, very high, distal end cut into a lobe, surfaces of arm almost smooth. Inner corner of wrist prominent, outer side covered with flat confluent granules. Palm covered with larger granules on outer side and finer, minute one's on inner side. A row of longitudinally arranged granules present medially on the outer-side of palm. Fingers short, curved and sharply granular basally : cutting edges dentate and leaves a narrow gap when apposed ; tips of fingers broad and hollowed out. Fingers blackish brown in colour ; in male the colour is more darker and involved into the lower edge of palm, almost upto the proximal end. Leg joints, except dactylus, are compressed, sharply crested anteriorly, upper side markedly granular and sparsely hairy. Apical claw of dactylus brown coloured. Male abdomen five segmented, 3-5 somites fused. Anterior male pleopod slightly curved process, ciliary groove open apically, apex spooned and slightly curved inward. Inner subapical region adorned with a cluster of long setae and outer side armed with spinules which continued below towards the middle of the process.

Freshly preserved specimens are bright orange to red in colour. Fingers light brown in female and dark brown in male, which involved in lower side of palm in male only.

Remarks : The specimens of *Serenius andamanicus* Deb are very near to the *Serenius demani* (Odhner, 1925), but the following differences separates them viz. the shape of carapace and chelipeds. Anterior male pleopod, their apexes not exactly alike each other. The photo plate of *S. demani* and its text-figure for male pleopod clearly indicate their differences and lastly Dr. Guinot, of Paris Museum is also of the opinion that it is a new species belongs to *Serenius* but not in *Zosimus*.

Acknowledgements

The author feels grateful to Dr. B. K. Tikader, Director, Zoological Survey of India, Calcutta for encouragement and facilities provided for this work and to Dr. D. Guinot, Museum National D'Histoire Naturelle, Paris, for confirmation of the new specific and generic status and for making corrections and suggestions for improvement of the text. She is also thankful to Mr. K. N. Reddy, Zoologist of the section, for going through the manuscript and making valuable suggestions and corrections for the improvement. She also expresses her thanks to the photographers of the Z. S. I., and the typist for their help.

References

Alcock, A. 1898. Materials for a carcinological fauna of India. No. 3. The Brachyura Cyclometopa. Part 1. The family Xanthidae. *J. Asiat. Soc. Beng.*, Calcutta, **67**, Pt. 2, no. 1 : 67-233.

Buitendijk, A. M. 1960. Brachyura of the families Atelecyclidae and Xanthidae, Part. 1. *Temminckia*, **10** : 252-338.

Dana, J. D. 1852. Crustacea, U. S. Exploring Exped...1838-1842, under the command of Charles Wilkes **13** (Plates, 1855).

Guinot, D. 1967b. III. A propos des affinitis des genres Dairoides, Stebbing et *Daira*

de Haan. *Bull. Mus. Hist. nat.*, 2 Ser. **39** no. 2 : 345-374.

GUINOT, D. 1969b. Sur Divers Xanthidae notamment Sur *Actae* DE Haan at *Paractae* Gen. Nov. (Crustacea : Decapoda : Brachyura) *Extrait des Cahiers du pacifique* no. 13 : 238-239.

GUINOT, D. 1971a. Recherches preliminiqres sur Les groupments natureles chez les Crustaces Decapodes Brachyoures VIII. Sunthese et bibliographie. *Bull. Mus. natn. Hist. nat.* 2 ser, **42**, no. 5 : 1071.

GUINOT, D. 1976. Quelques groupes Naturels chez Les Brachyoures *Mem. Mus. Hist. nat.* Paris, t. **97** Ser. A : 272-278.

ODHNER, T. 1925. Monographierte Gattungen der Krabben familie Xanthidae. 1, Goteborgs Vet.-Och Vitt.-Samh. Handl., Ser 4, **29**, no. 1-92.

SAKAI, T. 1839. Studies on the crabs of Japan. IV. Brachygnatha, Brachyrhyncha. *Sci. Rep. Tokyo Bunrika Daig* : 365-741.

SANKARANKUTTY, C. 1962. On Decapoda Brachyura from the Andaman and Nicobar Islands : 2. Family Xanthidae. *J. mar. biol. Ass. India*, **4**(1) : 121-150.

Bull. zool. Surv. India, 7 (2-3) : 211-213, 1985

A NEW SPECIES OF THE GENUS *PARACTAEA* GUINOT 1969, (CRUSTACEA : DECAPODA : XANTHIDAE) FROM ANDAMANS

MAYA DEB

Zoological Survey of India, Calcutta.

ABSTRACT

A new species of a recently described genus *Paractaea* Guinot 1969, from Andaman is described. The new species is closely related to *A. remota* Rathbun 1907, but clearly differs from it in the morphological detail.

INTRODUCTION

While studying the unnamed collection lying in the section, the author came across with an interesting crab from Andaman. This is an unique new species of the genus *Paractaea*. Members of the subfamily Actaeinae Alcock 1898, are well represented in India with the exception of *Paractaea indica* n. sp.

Genus **Paractaea** Guinot

Paractaea Guinot 1969 : 241.

The carapace of the crab broadly oval in shape, moderately convex in both the directions. The entire dorsal surface is divided by broad, deep, grooves into convex, regional and subregional lobules. All these lobules are in turn covered with small, uniform, pearly granules, imbeded in between the short, thick, light coloured fur. The grooves that separating the regional lobules are also covered with similar fur. Outer surfaces of the chelipeds and the leg joints granular and may or may not adorned with granular lobules, sometimes these lobules on appendages are obsolate. Front may be prolonged and vertically deflexed (in *rufopunctata* group) or only slightly convex (in *retusa* group). Outer corner of front separated from the inner supra orbital angle. The antero-lateral sides of carapace cut into five lobes (in *rufopunctata* group) or into four lobes (in *retusa* group). In *Paractaea* the basal antenna segment is more robust and wider than in *Actaea*.

Chelipeds equal or subequal, wrist of palm very swollen and more prominent than palm, outer surfaces of both the segments and leg joints may or may not be nodular.

Male abdomen five jointed, 3-5 joints fused.

Remarks : A group of species of the genus *Actaea* were redesignated as *Paractaea* by Guinot because of their very clean and clearly visible lobular carapace sculpture. Outer surfaces of these labules and appendages are covered closely with small, uniform,

pearly granules, which are very clearly imbeded into the thick, short, brown fur. This carapace sculptures are very species specific and it is very easy to distinguish even the most juvenile and smallest by this character.

Paractaea indica n. sp.

(Pl. IV, Fig. 1)

Holotype : One male, width-11 mm, Length-7 mm. Front-2 mm collected from Sta. 625, Andamans, date of coll. March, 1914. Z. S. I. Reg. No. C2172/2. Paratype 1 male, Malacca, Car Nicobar, 23-3-1959 ; Z. S. I. Reg. No. C3576/2.

Description of male : Carapace broad, transversely oval in shape, thick, more strongly convex antero-posteriorly than from side to side. The entire dorsal surface of carapace divided into convex regional lobules by broad, deep, hairy grooves. All the regional lobules are closely covered with pearly granules of unifrom size and short, brown, soft hairs. The granules are visible to the naked eye. The grooves that divided the carapace are covered with thick, short, brown hairs. Lobules IM distinct from the inner lobe of divided 2M. Mesogastric area, i.s. 3M is very distinctly three lobed. Other lobules such as 4M, IP, 2P, 2L-6L all these lobules are very clear. Front bilobed, deflexed downwards, free edge rounded and entire, separated from the inner supra orbital corner by a notch. Outer corner of frontal lobe not recognisable. Orbits small, rounded and surrounded by granular lobules, dorsally.

Long, convex, antero-lateral sides cut into four, broad, shallow granular lobes, excluding the outer orbital corner. Postero-lateral sides short, concave and convergent.

Chelipeds are equal in male, thickly covered with short, brown, soft fur and granules, which continues upto the 2/3 of the base of both the fingers. Outer surfaces of very swollen wrists and rather compressed palms not at all dimpled or lobular. Fingers short, curved and light brown in colour, tips of fingers are broad, fluted, bare, and white in colour. Leg joints rather short, compressed,

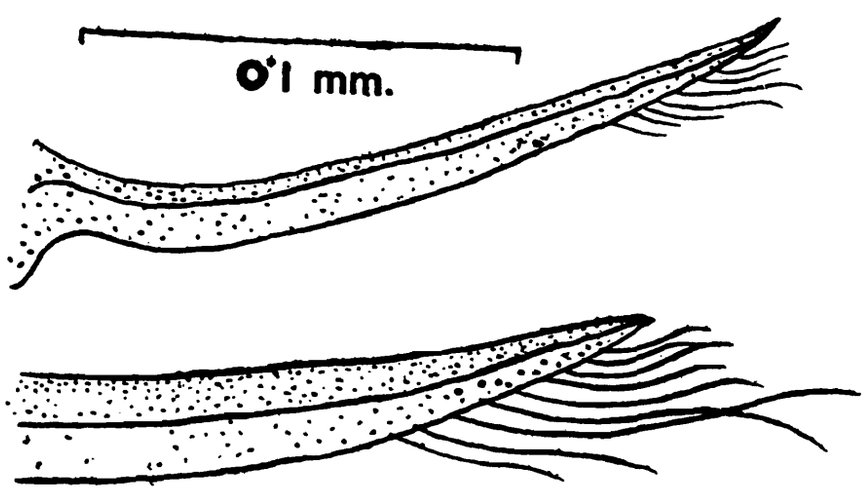


Fig. 1. Anterior male pleopod

covered with sharp granules and thick brown hairs, below the hairs granules are concealed. No indications of nodules present on leg joints. Under surface of the crab is also scantily hairy but not as valvaty as the upper surfaces and appendages.

Anterior male pleopod is straight, grooved, tubular process, apex not very acute in shape. Inner subapical area adorned with a cluster of long setae.

Remarks : *Paractaea indica* Deb is a smooth, clean appearing species. Its lobular textural pattern of carapace are very nicely visible and distinctnes of this design is not same or similar with the other known species of the genus. The lobular pattern of carapace of *P. indica* Deb has got some similarity with the *A. remota* Rathbun 1907, but the former does not fully correspond with the later because of the shape of mesogastric area i.e. 3M, which is distinctly separated into 3 lobules in *P. indica* and its anterior lobe is very small and narrow, unlike the *A. remota*. In *P. indica* Deb the inner lobule of protogastric areolae i.e. 2M is continuous with the 1M anteriorly, like *P. monodi* Guinot 1969, P. 259, but the lobular textural pattern of the rest of the carapace and chelipeds are very specific which do not correspond with the *P. monodi*.

Dr. Guinot comments that "It is an unique new specimen, it is neither present in Odhner's 1925 nor in my revision of this genus."

ACKNOWLEDGEMENTS

The author is thankful to Dr. B. K. Tikader, Director, Zoological Survey of India, Calcutta, for encouragement and placing the valuable collections of crab at her disposal and for the other facilities provided for this work.

She is indebted to Dr. Daniele Guinot, Museum National D'Histoire Naturelle, Paris, who is the author of the genus and who had revised its species, for her comments.

She is also thankful to Shri K. N. Reddy, Zoologist of the section for going through the manuscript and making valuable suggestions and to the photographers and typist of the Zoological Survey of India for their help.

REFERENCES

ALCOCK, A. 1898. Materials for a carcinological fauna of India No. 3. The Brachyura Cyclometopa. Part 1. The family Xanthidae. *J. Asiat. Soc. Beng.*, Calcutta, **67**, pt. 2 no. 1 : 67-233.

GUINOT, D. 1969. Sur Divers Xanthidae Notamment Sur *Actaea* De Haan et *paractaea* Gen. Nov. (Crustacea Decapoda Brachyura) *Extrait des Cahiers* du pacifique no. 13 : 223-267.

ODHNER, T. 1925. Monographierte Gattungen der Krabben families Xanthidae. 1. *Goteborgs Vet.—Och Vitt.—Samh. Handl.*, Ser. 4, **29**, no. 1 : 1-92.

RATHBUN, M. J. 1907. Reports on the scientific results of the expedition to the tropical pacific...U. S. Fish Commission Steamer "Albatross"...Brachyura, *Mus. Comp. Zool., Mem.* 35(2) ; 21-74.

DEB PLATE IV

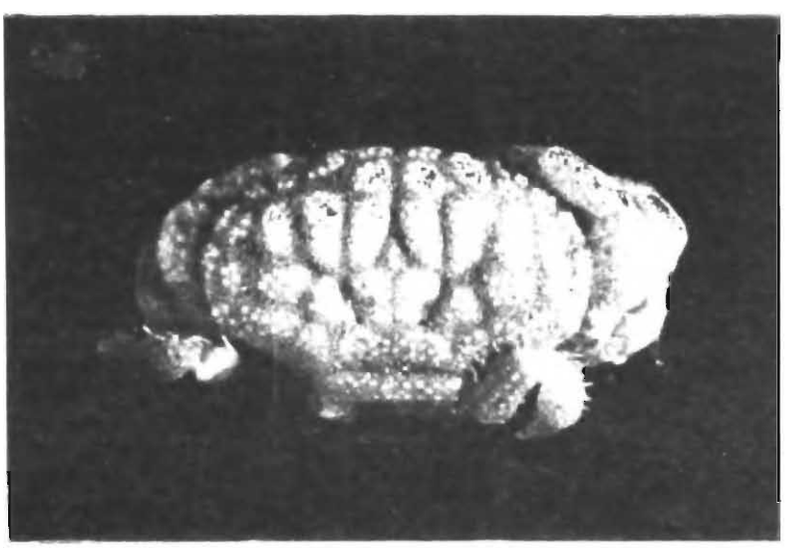


Fig. 1. *Paractaea indica* Deb.

Bull. zool. Surv. India, 7 (2-3) : 215-218, 1985

ON A FEW INTERESTING SPECIES OF THE FAMILY CHRYSOPIDAE (NEUROPTERA) FROM NORTH-WEST HIMALAYAS, INDIA

By

S. K. Ghosh

Zoological Survey of India, Calcutta

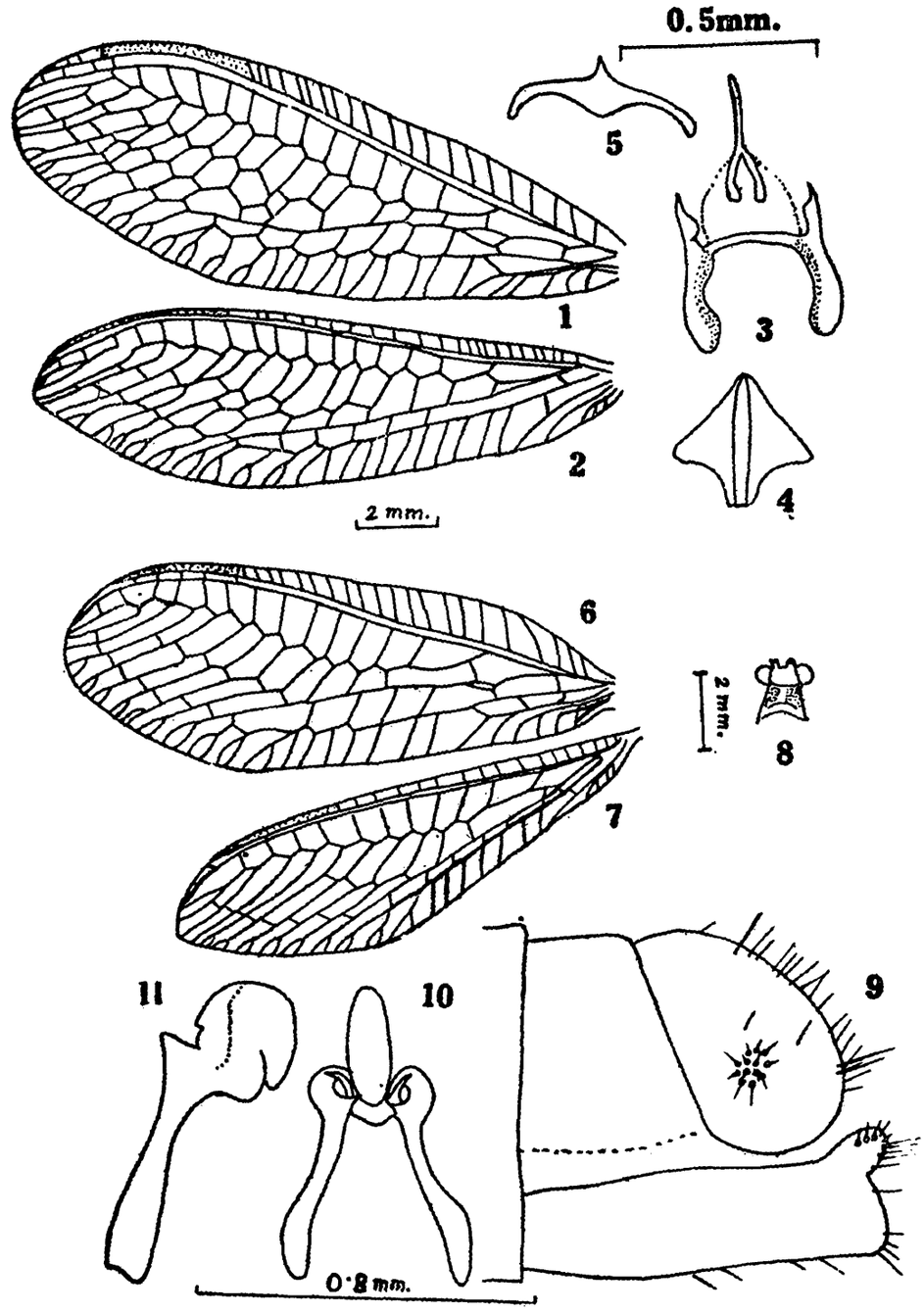
The species, dealt with here, were sent for identification by the Biosystematic Research Unit, Department of Zoology, Kalyani University, Kalyani. The species, at the time of collection from Garhwal, North-West Himalayas, were reported to be associated with aphids. Amongst a total of three species, two are described as new to science and both of them are not showing close affinity with any of the described species from India although some of them are with inadequate description. Another species, namely, *Chrysopa murreensis* Tjeder is recorded for the first time from India.

1. **Chrysopa himalayana**, n. sp.

Labrum : brownish. Clypeus : yellowish with narrow elongated stripe at lateral margin. Frons : yellow. Gena : with a rounded black spot. Vertex and antenna : yellow. Thorax : greenish yellow with median white vittata ; pronotum (fig. 8) longer than broad with anterior margin rounded and narrower than posterior and also with short white hairs. Wings : membrane hyaline without mark ; longitudinal veins pale greenish with white hairs ; pterostigma yellowish. Forewing (fig. 6) : 1st and 2nd radio-medial crossveins, crossvien between 1st and 2nd cubital cell and gradate crossveins completely black ; costals, crossveins between R and Rs, 3rd, 4th and 5th crossveins between Rs and Psm black at both ends ; all branches of Rs black at base ; number of gradates 6/8 ; apex of intra-median cell ending after first radio-medial crossvein. Hindwing (fig. 7) : costals and crossveins between R and Rs black at both ends ; gradates in the outer row black ; number of gradates 4/8. Legs : yellowish with brown tarsi and dark brown claws. Abdomen (fig. 9) : brown with a mid-dorsal white vittata from base to apex ; tergite 9+ ectoproct with posterior margin expanded than anterior ; callus cerci with trichobothria ; sternite 8+9, an elongated structure with a bulbous projection dorsally at apex carrying a number of black hairs ; gonarcus and arcessus as in fig. 10 and 11 ; tignum and gonapsis lacking.

Measurement : Length of forewing, 17mm and hindwing, 15 mm.

Material examined : 1 ♂ (Holotype), India, North-West Himalayas, Uttar Pradesh, Govindaghat, 15.ix.1982, coll. D. Ghosh, Z. S. I. Reg. No. $1167/H_{12}$.



Figs. 1-5. *Chrysopidia garhwalensis*, n. sp. 1. forewing 2. hindwing 3. gonarcus with arcessus (dorsal) 4. gonapsis 5. tignum.

Figs. 6-11. *Chrysopa himalayana*, n. sp. 6. forewing 7. hindwing 8. head and pronotum (dorsal) 9. tip of abdomen (lateral) 10. gonarcus with arcessus (dorsal) 11. gonarcus with arcessus (lateral).

2. **Chrysopa murreensis** Tjeder

1963. *Chrysopa murreensis* Tjeder, *Ent. Tidskr.* Arg. 84, Hafte, 1-2 : 125-128.

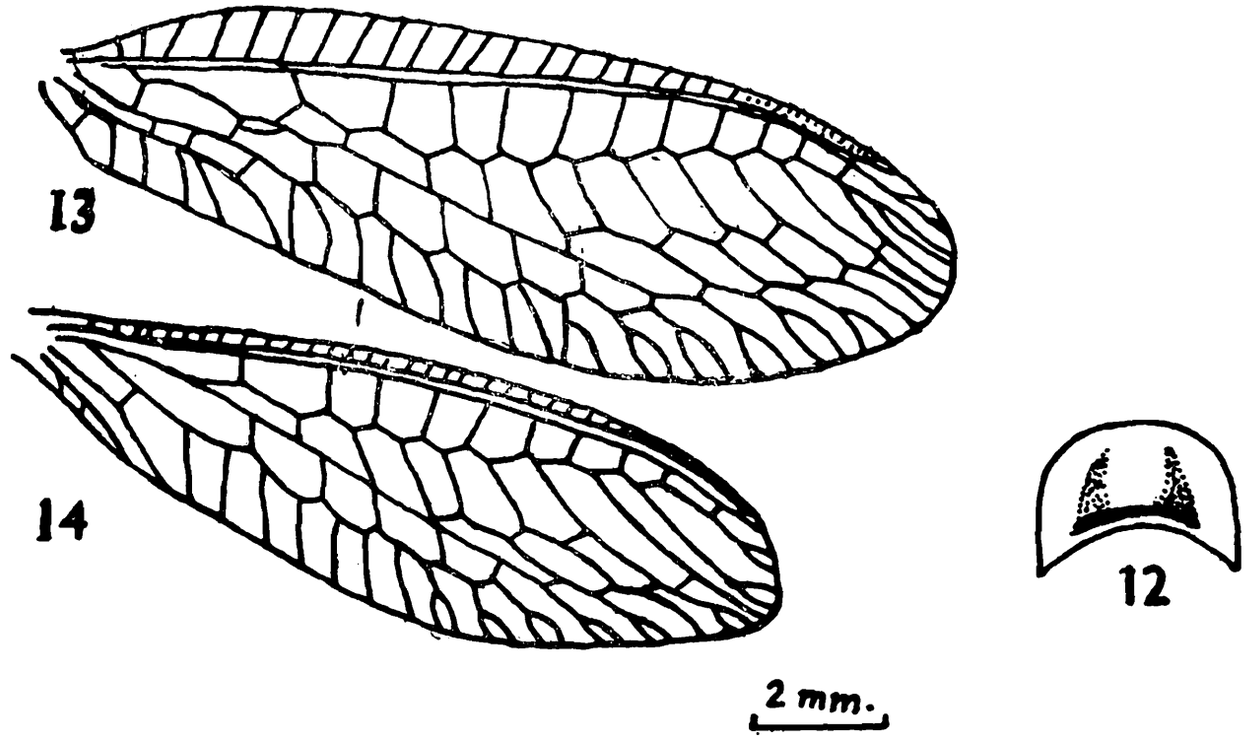
Measurement : Length of forewing, 13mm and hindwing, 11 mm.

Material examined : 1♂, India, North-West Himalayas, Uttar Pradesh, Gangotri, 3.x.1982, coll. D. Ghosh.

Remarks : Tjeder (1963) described the species from Murree in Pakistan. The species can be well recognised by a black streak over gena and lateral margins of clypeus, a broad, green, median longitudinal stripe and brownish shading lateral to this on pronotum (fig. 12), deep transverse furrow near base of pronotum, first intra-median cell extending beyond the first radio-medial crossvein (fig. 13), green abdomen with two black lateral lines and also by the structure of genitalia specially by a large gonapsis with long downwardly directed tooth. However, the species is for the first time recorded from India.

3. **Chrysopidia garhwalensis**, n. sp.

Labial palpi : brown with apex more dark. Maxillary palpi : brown with black apical segment. Labrum, clypeus, frons and vertex : yellow. Gena : with a black stripe. Antenna : scape and pedicel yellow ; flagellum brownish. Thorax : yellowish ; pronotum with reddish shade laterally. Wings : Membrane hyaline and unmarked ; longitudinal veins pale, greenish yellow. Forewing (fig. 1) : basal subcostal crossvein, costals before pterostigma, first radio-medial crossvein, first and second series of gradate crossveins and the crossvein between first and second cubital cell black ; pterostigma yellowish with a smoky patch at base ; intra-median cell elongate, large and its



Figs. 12-14. *Chrysopa murreensis* Tjeder, 12. pronotum (dorsal) 13. forewing 14. hindwing.

tip reaching beyond first radio-medial crossvein ; inner gradates extended basally ; number of gradates in three rows being 10 : 8 : 9 ; hairs on veins black and marginal fringes white. Hindwing (fig. 2) : costals black, all other crossveins mostly yellow ; number of gradates 9 : 2 : 8 ; hairs mostly black. Legs : yellowish with whitish hairs ; tarsal segments brown ; claws dark brown. Abdomen : brownish ; tergite 9+ ectoproct rather short structure with rounded tip ; sternite 8+9 elongate and its tip in lateral view rather narrow ; gonapsis large as in fig. 4 ; gonarcus, arcessus and entoprocessus as in fig. 3 and tignum as in fig. 5.

Measurements : Length of forewing, 18 mm and hindwing, 16 mm.

Material examined: 1 ♂ (Holotype), India, North-West Himalayas, Uttar Pradesh, Gangotri, 3.x.1982, coll. D. Ghosh, Z. S. I. Reg. no. 1166 /H_{12}.

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REFERENCE

TJEDER, B. 1963. A new *Chrysopa* from Pakistan (Neur. Chrysopidae). *Ent. Tidskr.*, Arg. **84**, Hafte, 1-2 : 125-128.

Bull. zool. Surv. India, 7 (2-3) : 219-223, 1985

DISTRIBUTIONAL RECORDS OF STALK-EYED FLIES (DIPTERA : DIOPSIDAE) PRESENT IN ZOOLOGICAL SURVEY OF INDIA, CALCUTTA

M. Datta and Mihir Biswas

Zoological Survey of India, Calcutta

ABSTRACT

The paper deals with 8 species under 5 genera of Diopsidae present in the National Collection of the Zoological Survey of India, Calcutta, revealing new distributional records of 2 species in Burma and India, 1 species in Sri Lanka and 2 species in certain other provinces of India.

Introduction

Brunetti (1907) first listed the species of stalk-eyed flies (Diopsinae) occurring in the Oriental Region. Subsequently, a good number of specimens had been accumulated in the collection of the Zoological Survey of India. While recently studying the collection, many specimens of certain species were found unrecorded from places of collection. The purpose of this present communication is to supplement distributional records to those cited in the latest and the most comprehensive catalogues : one with the World fauna (Steyskal, 1972) and the other with the Oriental fauna (Steyskal, 1977).

Systematic Account

Subfamily Diopsinae

Tribe Diopsini

1. Cyrtodiopsis dalmanni (Wiedemann)

1830. *Diopsis dalmanni* Wiedemann, *Aussereurop. Zweifl. Insekt.*, 2 : 560.

1972. *Cyrtodiopsis dalmanni* (Wiedemann) : Steyskal, *Stutt. Beitr. Naturk.*, No. 234 : 4.

Material examined : 1 ♂, 1 ♀ (ZSI Reg. Nos. 2381/H_2, 2383/H_2), India : East Himalaya, Darjeeling, Peshoke, 26.v-14.vi. 1916, Coll. F. H. Gravely ; 1 ♀ (Head missing) (ZSI Reg. No. 2385/H_2), Darjeeling, Peshoke, 11.vi.1916. Coll. L. C. Hartless ; 1 (Sex ?) (Abdomen missing) (ZSI Reg. No. 3030/H_1), Burma : Tenasserim Valley, Date not cited, Coll. W. Doherty ; 1 ♂, 1 ♀, 1 (Sex ?) (Abdomen missing) (ZSI Reg. No. 3029/H_1), Dawna Hills, Thingannyinaung to Sukli, 23-27.xi.1911, Coll. F. H. Gravely ; 1 ♀ (ZSI Reg. No. 6348/15), Java : Semarang, Date not cited, Coll. Jacobson.

Distribution : Borneo, Java, Malaya, Sumatra, Thailand.

Remarks : Wiedemann (1830) originally described this species from Java. This is recorded for the first time from Burma and India (West Bengal).

2. **Diopsis indica** Westwood

1837. *Diopsis indica* Westwood, *Trans. Linn. Soc. Lond* (Zool.), 17 : 299.

1972. *Diopsis indica* Westwood : Steyskal, *Stutt. Beitr. Naturk*, No. 234 : 9.

Material examined : 1 ♂ (Head missing), 1 ♀, 1 (Sex ?) (Head and abdomen missing) (ZSI Reg. Nos. $3015/H_1$—$3017/H_1$), INDIA : Arunachal Pradesh, Rotung, Abor Exp., 25.xii.1911, Coll. S. W. Kemp ; 3 ♀ ♀ (ZSI Reg. Nos. $3012/H_1$—$3014/H_1$), Assam, Dibrugarh, 17-19.xi.1911, Coll. S. W. Kemp ; 1 ♀ (ZSI Reg. No. $3011/H_1$), Darrang, Assam—Bhutan Frontier, Mangaldai, 26.xii.1910, Coll. S. W. Kemp ; 2 ♀ ♀ (Head missing) (ZSI Reg. Nos. $3030/H_1$, $3021/H_1$), Uttar Pradesh, Nainital, Maldhan, 12.iv.1908, Coll. R. H. (Mus. Collr.) ; 1 ♀ (ZSI Reg. No. $3018/H_1$), Uttar Pradesh, Kumaon, Malwatal, 7.v.1911, Coll. S. W. Kemp ; 1 ♂ (ZSI Reg. No. $3019/H_1$), Uttar Pradesh, Kumaon, Bhimtal, 2-10.v.1911, Coll. S. W. Kemp ; 3 ♂ ♂, 3 ♀ ♀ (ZSI Reg. Nos. not cited), Uttar Pradesh, Kumaon Hills, Bhimtal, grassy part of the dry bed of the lake, 17.v.1930, Coll. H. S. Pruthi ; 1 ♂ (ZSI Reg. No. $5151/H_6$), Gujarat, Ahwa, Bhwantha Godhnalla, 7.ii.1975, Coll. T. G. Vazirani ; 1 ♀, 1 ♂ (ZSI Reg. Nos. $2380/H_2$, $2381/H_2$), BURMA : Yawnghwe State, S. Shan States, top of gorge of Heho river, 7.iii.1917, Coll. F. H. Gravely.

Distribution : Bangladesh to Southern China, South to Java.

Remarks : The species was originally described from Bengal (=East Pakistan *sensu* Steyskal, 1972, now Bangladesh). The species has been recorded from Burma and India (Arunachal Pradesh, Assam, Gujarat, Uttar Pradesh and West Bengal (Vazirani and Rathore, 1976).

3. **Diopsis** nr **indica** Westwood

Material examined : 1 ♀ (ZSI Reg. No. $3024/H_1$), INDIA : Kerala, Nilgiri Hills, ?.ix.1910, Coll. H. I. Andrews ; 1 ♂, 1 ♀, (ZSI Reg. Nos. not cited), Kerala, Cochin, Parambikulam, 16-24.ix.1914, Coll. F. H. Gravely ; 1 (Sex?) (Abdomen missing) (ZSI Reg. No. not cited), Assam—Bhutan Frontier, Mangaldai, 26.xii.1910, Coll. S. W. Kemp ; 1 ♀ (Head missing) (ZSI Reg. No. not cited). Meghalaya, Tura, Garo Hills, 15.vi-15.vii. 1917, Coll. S. W. Kemp ; 1 ♂ (ZSI Reg. No. $3028/H_1$), BURMA : Rangoon, 25.ii.1908, Coll. N. Annandale.

Remarks : This species appears to be allied to *Diopsis indica* Westwood, but it is not possible now to determine the specific identity on the basis of old damaged specimens. The authors will, therefore, endeavour to obtain further fresh material for confirmation.

4. **Eurydiopsis subnotata** (Westwood)

1848. *Diopsis subnotata* Westwood, *Cab. orient. Ent.*, : 37.

1972. *Eurydiopsis subnotata* (Westwood) : Steyskal, *Stutt. Beitr. Naturk.*, No. 234 : 11.

Material examined : 1 ♂ (Head missing), 1 (Sex ?) (Abdomen missing) (ZSI Reg. Nos. 414/9, 422/9), INDIA : Assam, Margherita, date not cited, Coll. Anonymous ; 1(Sex ?) (Abdomen missing) (ZSI Reg. No. 5121/8, Assam, Sadiya, date not cited, Coll. M. Bigot ; 1 ♂ (ZSI Reg. No. $2179/H_2$), Meghalaya, Garo Hills, Tura, x.1917, Coll. S. W. Kemp ; 1 ♀ (ZSI Reg. No. $3022/H_1$), BURMA : Rangoon, 25.ii.1908, Coll. N. Annandale ; 1 ♀ (ZSI Reg. No. $2377/H_2$), Taung-gua Valley, Yawnghwe State, S. Shan States, 2.iii.1917,

Coll. F. H. Gravely ; 1(Sex ?) (Head and abdomen missing) (ZSI Reg. No. 3009/H_1), Tenasserim Valley, date not cited, coll. W. Doherty.

Distribution : Burma, India (Assam), Indonesia (Sumatra, Celebes), Philippines, New Guinea.

Remarks : The species was originally described from the Philippines. This is now recorded for the first time from Meghalaya in India.

5. **Teleopsis motatrix** Osten Sacken

1882. *Teleopsis motatrix* Osten Sacken *Berl. ent. Z.* 26 : 236.

1972. *Teleopsis motatrix* Osten Sacken : Steyskal, *Stutt. Beitr. Naturk.*, No. 234 : 11.

Material Examined : 1 ♀ (ZSI Reg. No. 3031/H_1), SRI LANKA : Kandy, date not cited, Coll. Anonymous.

Distribution : Philippines.

Remarks : The species was originally described from the Philippines. The species is recorded for the first time from Sri Lanka.

6. **Teleopsis quadriguttata** (Walker)

1856. *Diopsis quadriguttata* Walker, *J. Proc. Linn. Soc. Lond.*, Zool., 1 : 37.

1972. *Teleopsis quadriguttata* (Walker) : Steyskal, *Stutt. Beitr. Naturk.*, No. 234 : 12.

Material examined : 1 ♀ (ZSI Reg. No. 2389/H_2), INDIA : West Bengal, Sukna, 1.vii.1908, Coll. N. Annandale ; 1 ♂ (ZSI Reg. No. 2396/H_2), West Bengal, Darjeeling, Mongpu, Sureil, iv-v.1917, Coll. S. W. Kemp ; 1(Sex ?) (Abdomen missing) (ZSI Reg. No. 2398/H_2), West Bengal, E. Himalaya, Darjeeling, Peshoke, 26.v-14.vi.1916, Coll. F. H. Gravely ; 1 ♂, 1 ♀ (ZSI Reg. Nos. 2392/H_2, not cited), Meghalaya, Cherrapunji, 2-8.x.1914, Coll. S. W. Kemp ; 1(Sex ?) (Abdomen missing) (ZSI Reg. No. 5491/8), Assam, Margherita, Date not cited, Coll. Anonymous, 2 ♂ ♂ (ZSI Reg. Nos. not cited), Uttar Pradesh, Ranikhet, Reserve forest opposite Upat (bushes and trees on the sides of the streamlet) 26.v.1930, Coll. H. S. Pruthi ; 1 ♂ (Head missing) (ZSI Reg. No. 3075/H_1), BURMA : Moulmein, 17.xi-4.xii.-1911, Coll. F. H. Gravely ; 1 ♀ (ZSI Reg. No. 3078/H_1), Dawna Hills, 2-3.iii.1908, Coll, N. Annandale ; 1 ♀ (ZSI Reg. No. 2390/H_2), Khayon nr. Moulmein, 7.iii.1908, Coll. N. Annandale ; 2 ♀ ♀ (ZSI Reg. Nos. 2394/H_2, 2395/H_2), Yawnghwe State, S. Shan States, top of gorge of Heho river, 7.iii.1917, Coll. F. H. Gravely.

Distribution : China, Indonesia (Borneo), Malaysia, Tiwan.

Remarks : The species was originally described from Malacca (Malaysia). These are the first records for the species from Burma and India (Assam, Meghalaya, Uttar Pradesh and West Bengal).

7. **Teleopsis sykesii** (Westwood)

1837. *Diopsis sykesii* Westwood, *Trans. Linn. Soc. Lond.* (Zool), 17 : 310.

1972. *Teleopsis sykesii* (Westwood) : Steyskal, *Stutt. Beitr. Naturk.*, No. 234 : 12.

Material examined : 1 ♀, 1(Sex ?) (ZSI Reg. No. 2388/H_2), INDIA : Karnataka, North Kanara, Talewadi nr. Castle Rock, 3-16.x.1916, Coll. S. W. Kemp ; 1(Sex ?) (Abdomen missing), 1 ♂ (ZSI Reg. No. not cited, 3034/H_1), Kerala, Cochin, Parambikulam, 16-24.iv.1914, Coll. F. H. Gravely ;

1(Sex ?) (Head, Abdomen missing) (ZSI Reg. No. 3035/H_1), Kerala, Cochin, Forest Transway (mile 10-14), 28-29.ix.1914, Coll. F. H. Gravely ; 1(Sex ?) (Abdomen missing) (ZSI Reg. No. 3032/H_1), Coorg, 1913, Coll. Honnyngton ; 2 ♂♂, 1 ♀ (ZSI Reg. Nos. 3033/H_1, 3036/H_1, 3038/H_1), Maharashtra, Satara, Western Ghats, Nechal, 30.iv.1912, Coll. F. H. Gravely.

Distribution : India (Maharashtra), Indonesia (Java, Sumatra), Philippines.

Remarks : The species was originally described from Maharashtra in India. It is here recorded for the first time from Karnataka and Kerala.

8. **Sphyracephala hearseiana** (Westwood)

1845. *Diopsis hearseiana* Westwood, *J. Proc. ent. Soc. Lond.* For Jan. 1, 1844 : 99.

1972. *Sphyracephala hearseiana* (Westwood) : Steyskal, *Stutt. Beitr. Naturk.*, No. 234 : 13.

Material examined : 1 ♂ (ZSI Reg. No. 3043/H_1), BANGLADESH : Khushtia, 7.x.1909, Coll. Jenkins ; 3 ♂♂, 6 ♀♀ (ZSI Reg. Nos. 3040/H_1, 3050/H_1, 3051/H_1 Reg. No. not cited, 2580/H_6, 2592/H_6—2595/H_6), INDIA : West Bengal, Asansol, 13-14.ii.1910, Coll. Paiva and Counter ; 1 ♂ (Head missing) (ZSI Reg. No. 3071/H_1), West Bengal, Calcutta, Tollygunge, 18.viii.1908, Coll. N. Annandale ; 1 ♂ (ZSI Reg. No. 4051/15), Orissa, Chilka, Gopkuda Island, 7-15.viii.1907, Coll. (Mus. Collr.) ; 1 ♂, 1 ♀, (Head missing) (ZSI Reg. Nos. 3050/H_1, 3051/H_1), Uttar Pradesh, Allahabad, 13.viii.-14.viii.1908, Coll. B. Lord ; 1 ♂, 1 ♀, 2 (Sex ?) (Abdomen missing) (ZSI Reg. No. 3060/H_1, 3062/H_1, 2607/H_6, 2608/H_6), Uttar Predesh, Between Amausi and Harauni nr. Lucknow, 25-26.x.1911, Coll. J. W. C. ; 1 ♀ (Head missing) (ZSI Reg. No. 3059/H_1), Uttar Pradesh, Kanpur, Collectorguni, 14-15.x.1911, Coll. J. W. C. ; 2 ♀♀ (ZSI Reg. Nos. 2610/H_6, 3069/H_1), Uttar Pradesh, Lucknow, 10.ii.1908, Coll. R. H., 1 ♂, 3 ♀♀, 1 (Sex?) (Abdomen missing) (ZSI Reg. Nos. 3072/15, 3075/15, 3076/15, 3078/15, 3079/15), Uttar Pradesh, Lucknow, 21.iv.1907 Coll. N. Annandale ; 1 ♀ (ZSI Reg. No. 3070/H_1), Uttar Pradesh, Kumaon, Bhimtal, 22-27.ix.1906, Coll. N. Annandale ; 1 ♂, 2 ♀♀ (ZSI Reg. Nos. 3277/H_6, 3278/H_6), Reg. No. not cited), Uttar Pradesh, Agra, Botanical Garden, 5.xi.1960, Coll. J. L. Nayer ; 2 ♂♂, 1 ♀ (ZSI Reg. Nos. 2600/H_6—2602/H_6), Uttar Pradesh, Kanpur, ?.ii.1904, Coll. Anonymous ; 1 ♀, 1 (Sex ?) (Abdomen missing) (ZSI Reg. Nos. 2603/H_6, 2605/H_6), Uttar Pradesh, Kanpur, date not cited, Coll. Brunetti , 6 ♂♂, 3 ♀♀, 4 (Sex ?) (Abdomen missing) (ZSI Reg. Nos. 2614/H_6—2620/H_6, 2622/H_6—2625/H_6, 2627/H_6, 2628/H_6, 2619/H_7), Uttar Pradesh, Nainital, Bindukhera, 3.iv.1910, Coll. (Mus. Collr.) ; 2 ♂♂ (ZSI Reg. Nos. not cited), Madhya Pradesh, Burhanpur, Centr. Prov., 4-6.iii.1919, Coll. F. H. Gravely ; 4 ♂♂, 1 ♀ (ZSI Reg. Nos. 3554/H_6—3558/H_6), Madhya Pradesh, Jagdalpur, 17.i,1963, Coll. K. K. Verma ; 1 ♂, 4 ♀♀ (ZSI Reg. No. not cited), Madhya Pradesh, Rewa, Below Kapil Dhara fall, 19.xi.1927, Coll. S. L. Hora ; 1 ♂ (ZSI Reg. No. 5250/15, 5252/15), Maharashtra, Bombay, 23-24.xi.1907, Coll. N. Annandale ; 3 ♂♂, 1 ♀ (ZSI Reg. Nos. 3072/H_1), Maharashtra, Satara, Nechal, Western Ghats, 30.iv. 1912, Coll. F. H. Gravely ; 2 ♂♂, 3 ♀♀ (ZSI Reg. Nos. not cited), Maharashtra, Buldana, Berar, 2.1923, Coll. S. V. Rao ; 2 ♀♀ (ZSI Reg. Nos, 3694/H_6, 3695/H_6), Maharashtra,

Manjuri shed farm, 26.iv.1961, Coll. S. M. Katkar ; 8 ♂ ♂, 13 ♀ ♀, 3 (Sex ?) (Abdomen missing) (ZSI Reg. Nos. 2629/H_6—2633/H_6, 2635/H_6, 2637/H_6—2642/H_6, 3030/H_6, 3052/H_1—3054/H_1), Gujarat, Dharampur, 11.iv.1913, Coll. Phaku Ram ; 2 ♀ ♀ (ZSI Reg. Nos. 3055/H_1, 3056/H_1), Himachal Pradesh, Kalka, Base of Simla Hills, 19.viii. 1911, Coll. (Mus. Collr.) ; 2 ♂ ♂, 2 ♀ ♀, 1 (Sex ?) (Abdomen missing) (ZSI Reg. Nos. 3634/16—3637/16), In a gorge, Chanseli, Akrari Plateaux, W. Khandesh, x.1909, Coll. I. H. Burkill.

Distribution : Bangladesh, India.

Remarks : The species was originally described from India (most probably from Uttar Pradesh and adjoining areas).

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REFERENCES

BRUNETTI, E. 1907. Notes on oriental Diptera I. Note on *Sphyracephala hearseiana* Westwood, with a list of the Oriental species of Diopsinae. *Rec. Indian Mus.*, **1** : 163-166.

STEYSKAL, G. C. 1972. A Catalogue of species and key to the genera of the family Diopsidae (Diprera, Acalyptratae). *Stutt. Beitr. Naturk.*, No. 234 : 1-20.

STEYSKAL, G. C. 1977. Family Diopsidae. In *A Catalog of Diptera of the Oriental Region*, **3** : 32-36.

VAZIRANI, T. G. AND RATHORE, N. S. 1976. Note on *Diopsis indica* Westwood (Diptera : Diopsidae) from Gujarat. *Newsl. zool. Surv. India* **2** : 67-68.

Bull. zool. Surv. India, 7 (2-3) : 225-229, 1985

A NEW CLADOCERAN, *SIMOCEPHALUS VAMANI SP. NOV.*, FROM JABALPUR, M. P., INDIA

By

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ABSTRACT

A new species of genus *Simocephalus* Schodler, 1858 (Cladocera, Crustacea) is described from Jabalpur, Madhya Pradesh, India and compared with related species. *Simocephalus vamani* sp. nov. is described here only from females.

INTRODUCTION

Freshwater cladocera of Madhya Pradesh have been dealt with in detail by the author (Rane, 1983 a, b, c ; 1984 a, b, c ; 1985 a, b). Other works on freshwater cladoceran of India are all restricted to Northern India and Gujrat (Brehm, 1936, 1950, 1953 ; Biswas 1964, 1965, 1966, 1971, 1980 ; Gurney 1906, 1907 and Petkovski 1966). Earliar, the author described two other new species namely *Simocephalus vidyae* and *S. surekhae* from Jabalpur, India (Rane, 1983, 1985b). The present communication deals with yet another species of this genus. This study forms a part of research project on Taxonomy and Ecology of cladoceran fauna of Madhya Pradesh, approved by Director, Zoological Survey of India, Calcutta.

SYSTEMATIC ACCOUNT

Class	—	CRUSTACEA
Super Order	—	DIPLOSTRACA
Order	—	CLADOCERA
Sub Order	—	EUCLADOCERA
Super Family	—	CHYDOROIDAE
Family	—	DAPHNIIDAE
Genus	—	*Simocephalus* Schodler, 1858.

Simocephalus vamani sp. nov.*

(Figs. A—G)

(a) *Material* :

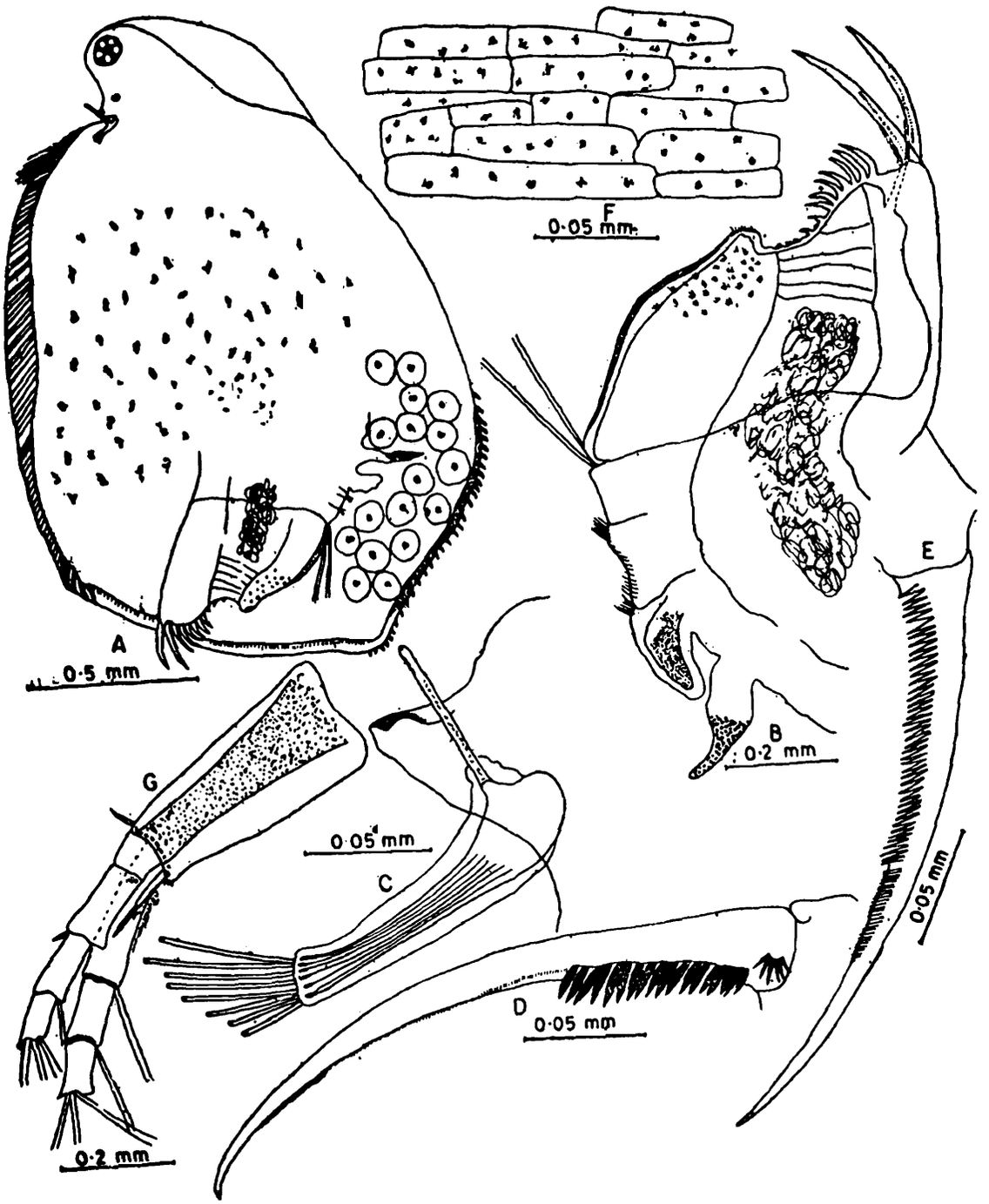
One glass bottle with several examples, preserved in formalin from Deotal tank, Nagpur Road, Jabalpur district, Madhya Pradesh, India, ***P. D. Rane*** Coll., 1980 and

* *Etymology* : Named after Sri Vaman Gajre.

present in the collection of Zoological Survey of India, Central Regional Station, Jabalpur (Field No. Cr 729).

(b) *Description* :

1. MALE : Unknown.
2. FEMALE : Carapace, seen laterally, sub-rhomboid in out line ; being only slightly expanded behind : dorsal margin almost straight in greater parts of its extent ; very small protuberance behind in the middle ; posterior dorsal margin evenly curved and situated just above the said protuberance (Fig. A). Posterior part of



Figs. A—G. *Simocephalus vamani* sp. nov.
A. Lateral view a female ; B. Postabdomen ; C. Anterior portion of head ; D. Outer view of claw ; E. Inner view of claw ; F. Marking on the valve ; G. Lateral view of Antenna.

the dorsal margin denticulate, the denticles being continued on terminal protuberance but not the hind edge of the valve. Posterior part of the ventral margin of valve also with very fine denticles at inner side. Anterior half of ventral margin with several feathered setae, 4 to 5 of them in the middle of ventral margin thickened and became tuft. Valve strongly punctate, marked with oblique striae, anastomosing irregularly and with cross-connection (Fig. F). Head comparatively small, though as usual having the fornix greatly expanded. Vertex rounded over. Rostrum projection small, pointed. Pair of antennules present below the rostrum with large lateral sensory papilla arise from knob like expansion ; 9 to 10 terminal sensary setae also present (Fig. C.). Antenna with very large basal segment. Outer ramus with four and inner ramus with 3 segments and several fine spinules present at the junction of these segments as in Fig. G. Setae formula $-\frac{0-0-1-3}{1-1-3}$. Eye comparatively large. Ocellus small, squarish or sometimes rounded in form. Tailpiece (Postabdomen) less broad, with supra-anal angle produced. Several grouped spines present near the supra-anal angle along with dorsal margin of postabdomen (Fig. B). Anal denticles about 7 to 9 on each side. Claw pectinate with teeth on both outer and inner margin. Outer margin of claw with two pectens. Distal pecten with large 17 to 18, widely spaced teeth ; proximal pecten, with 6 to 7 teeth, about 3/4 as long as longest teeth of distal comb, arranged in circle without separated at their bases. Fine denticles also present which extends from distal pecten to the terminal end of claw. Inner margin of claw with one pecten of 42 to 45 teeth, contiguous at their bases with teeth length decreasing distally. Teeth on the inner comb usually 1/2 to 2/3 as long as the longest teeth of distal comb at outer margin (Figs. D & E). Two abdominal process present situated not much far from each other. About 16 to 17 eggs present in the brood pouch. Length of female 2.17 mm.

(c) *Type specimens* : Holotype-female, from Deotal tank, in front of Hanuman mandir, Nagpur Road, Jabalpur, Madhya Pradesh, India, 7.vii.1980. coll. ***P. D. Rane***. Deposited in the National Zoological Collection, Zoological Survey of India, Calcutta, (Reg. No. , in formalin, in a vial).

Paratypes : Station data as for holotype. Deposited as follows (i) 13 examples (♀ ♀), in the National Collection of Zoological Survey of India, Calcutta, (Reg. No. in formalin, in a vial) ; (ii) 20 examples (♀ ♀) in the collection of Zoological Survey of India, Central Regional Station, Jabalpur (Reg. No. A. 1454) in formaline, in a vial).

Type locality and geographical distribution : India : Deotal, Jabalpur, Madhya Pradesh.

(d) *Affinities* : The literature reveals that three pectinate species of *Simocephalus* known up to date, namely *S. exspinosus* (Koch), *S. vidyae* Rane, 1983 and *S. congener* Schodler having only one pecten, with number of teeth 8 to 12 ; 13 to 15 and 17 to 30 respectively. *S. vamani* sp. nov. can be separated from all-above species in having two pectens—proximal pecten with 6 to 7 teeth and distal with 17 to 18 teeth. *S. exspinosus* and *S. vidyae* also differs from new species by their large size (about 3 mm.) and very large rostrum respectively. *S. australiensis* (Dana) in general

appearance look like *S. vamani* sp. nov. but can be easily separated by its upturned rostrum. The other recently described *S. surekhae* Rane has teeth on both outer and inner side of claw. This species can be isolated from new species by absence of rostrum ; proximal set with 28 to 30 teeth, distal set with 45 to 50 teeth on outer margin of claw and antennules with 3 to 4 spines on the lateral margin. Teeth at inner margin of claw in *S. surekhae* which extends from base to the terminal part of the claw but in *S, vamani* they are only present up to middle of claw. Also the teeth size in both species differs considerably.

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REFERENCES

BISWAS, S. 1964. A new species of Cladoceran genus *Latona* Straus, 1820 (Crustacea : Cladocera : Sididae) from Rajasthan, India. *Proc. zool. Soc. Calcutta*, **17** : 149-152.

BISWAS, S. 1965. A new species of genus *Chydorus* Leach, 1843 (Crustacea : Cladocera : Chydoridae) from Rajasthan, India. *Crustaceana*, **11** (2) : 113-114.

BISWAS, S. 1966. Five species of Daphnidae (Crustacea : Cladocera) from Simla Hills, in India, with a new record of *Alona costata* Sars from NEFA. *J. zool. Soc. India*, **16** (1 & 2) : 92-98.

BISWAS, S. 1971. Fauna of Rajasthan, India. Part Crustacea : Cladocera. *Rec. zool. Surv. India*, **63** (1-4) : 95-141.

BISWAS, S. 1980. Cladocerans (Crustacea : Branchiopoda) from Assam and adjacent hills states in North East India. *Rec. zool. Surv. India*, **76** : 93-113.

BREHM, V. 1936. Report on Cladocera (Yale North India Expedition). *Mem. Conn. Acad. Arts. Sci.*, **10** : 293-297.

BREHM, V. 1950. Contribution to the Freshwater Fauna of India, Part II. *Rec. Indian Mus.*, **48** (1) : 9-28.

BREHM, V. 1953. Indische Diaptomiden, Pseudodiptomiden und Cladocera. *Ost. zool. Z.*, **4**(3) : 241-345.

GURNEY, R. 1906. On some Freshwater Entomostracta in the collection of the Indian Museum, Calcutta. *J. Asiat. Soc. Beng.*, **2**(7) (N.S.) : 273-281.

GURNEY, R. 1907. Indian Freshwater Entomostraca. *Rec. Indian Mus.*, **1** : 21-33.

PETKOVSKI, T. K. 1966. Eine neue Cladoceran Gattung aus dem Westen Indiens *Indialona ganapati n. gen. et. sp. Fragmenta Balcanica musci Macedonici scientarum naturalium*, V., **22**(132) : 157-165.

RANE, P. D. 1983a. A new species of the genus *Latonopsis* Sars, 1888 (Crustacea : Cladoara : Sididae) from Madhya Pradesh, India. *Crustaceana*, **45**(1) : 82-84.

RANE, P. D. 1983b. A new species of genus *Simocephalus* Schodler, 1858 (Cladocera : Crustacea) from Madhya Pradesh, India. *Crustaceana*, **45**(2) : 154-156.

RANE, P. D. 1983c. A new species of *Indialona* Petkovski, 1966 (Family—Chydoridae) from India. *J. Bombay nat. Hist. Soc.*, **80**(1) : 194-195.

RANE, P. D. 1984a. A new species of the genus *Oxyurella* Dybowski and Grochowski, 1894 (Cladocera : Chydoridae) from India. *J. Bombay nat. Hist. Soc.*, **81**(3) : 665-667.

RANE, P. D. 1984b. A new species of the genus *Bosminopsis* Richard, 1895 (Crustacea : Cladocera : Bosminidae) from India. *J. Bombay nat. Hist. Soc.*, **81**(3) : 668-669.

RANE, P. D. 1984c. Occurrence of *Kurzia latissima* (Kurz), 1874 (Crustacea : Cladocera) in India. *J. Bombay nat. Hist. Soc.*, **80**(3) : 660-661.

RANE, P. D. 1985a. A new species of the genus *Camptocercus* Baird, 1843, (Cladocera : Chydoridae) from Madhya Pradesh India. *Crustaceana*, **48** (2) : 114-116.

RANE, P. D. 1985b. A new species of the genus *Simocephalus* Schodler, 1858 (Cladocera, Daphniidae) from Madhya Pradesh, India. *J. Bombay nat. Hist. Soc.*, **82**(1) : 159-162.

Bull. zool. Surv. India, 7 (2-3) : 231-236, 1985

NOTES ON BLACKFLIES (DIPTERA : SIMULIIDAE) FROM KASHMIR, INDIA

M. DATTA

Zoological Survey of India, Calcutta

INTRODUCTION

Edwards (1927) described two species, *viz.*, *Simulium stevensoni* and *S. kashmiricum*, and recorded another species, like European *S. equinum* L., from Kashmir. *S. kashmiricum* was, however, later synonymized with *S. indicum* Becher, by Lewis (1973). Puri (1932 a, b) described another two species, *viz.*, *S. chrystophersi* and *S. barraudi*. In 1977, the author collected five species including *indicum* and *barraudi*.

Kashmir lies in the Palaearctic region except its southwestern fringe which is in the Orient (See Map 1). It is, therefore, an unique area having assemblage of Oriental intruders in the Palaearctic fauna. The material reported here reflects on this zoogeographical proximation.

SYSTEMATIC ACCOUNT

Subfamily SIMULIINAE Newman

Tribe SIMULIINI Newman

Genus **Simulium** Latreille

1. **Simulium (Eusimulium) aureum** Fries

Simulium aureum Fries, 1824, *Observ. Ent.* 1 : 16 (♀, ♂) ; Puri, 1925, *Parasitology* 17 : 354 (pupa, larva).

Simulium (*Eusimulium*) *aureum* Fries : Puri, 1933, *Indian J. med. Res.* 21 : 7 (♂, ♀).

Material examined : 11 ♂ ♂, 4 ♀ ♀ (reared from pupae), 56 pupae, 9 pupal exuviae and 30 larvae, Kashmir, Srinagar, Shalimar Garden, irrigating channels full of floating grasses and trailing vegetation, 11.ix.1977, Coll. *M. Datta* ; 2 ♂ ♂, 3 ♀ ♀ (reared from pupae), 12 pupae, 5 pupal exuviae and 14 larvae, Kashmir, Srinagar, Nishat Garden, irrigating channels with floating grasses and trailing vegetation, 15.ix.1977, Coll. *M. Datta*.

Distribution : India : Himachal Pradesh ; Holarctic Region and ? Pakistan.

Remarks : This species originally described from Sweden, is the type-species of the subgenus *Eusimulium* Roubaud. This is recorded from Kashmir for the first time. The unique form of male genitalia shows striking resemblance with that of the species of the Palaearctic subgenus *Wilhelmia* Enderlein, but that does not, however, mean that there is close phyletic relationship between *Eusimulium* and *Wilhelmia* (Crosskey, 1969).

Although the Indian specimens have long been assigned to this species, *S.* (*E.*) *aureum* is known to be a species-complex (Crosskey, *op. cit.*), and these specimens may ultimately belong to a new species. In fact, that species may prove to be closer to *S.* (*E.*) *latizo-*

num (Rubtzov, 1956) or *S.* (*E.*) *rubzovianum* (Serban, 1961).

2. **Simulium (Wilhelmia) mediterraneum** Puri

Simulium equinum var. *mediterraneum* Puri, 1925, *Ann. Mag. nat. Hist.* **16** : 253 (pupa, larva).

Simulium (*Wilhelmia*) *equinum* var. *mediterraneum* Puri : Puri, 1933, *Indian J. med. Res.* **21** : 12 (♂, ♀).

Wilhelmia mediterraneum Puri : Rubtzov, 1956, *Fauna of U. S. S. R., Diptera* 6(6) : 558.

Simulium (*Wilhelmia*) *mediterraneum* Puri : Crosskey, 1967, *Trans. R. ent. Soc. Lond.* **119** : 28.

Material examined : 5 pupae, 1 pupal exuvia and 4 larvae, Kashmir, Srinagar, Shalimar Garden, irrigating channel with floating grasses, 11.ix.1977, Coll. *M. Datta*.

Distribution : India : Punjab ; Pakistan, North Africa, Mediterranean Europe and Middle East.

Remarks : This species was originally described from the North Africa and Macedonia. This is recorded for the first time by name from Kashmir because in all probability this may be the same species which appeared to Edwards (1927) indistinguishable from *S. equinum* L. Puri (1933) pointed out that neither the pupae nor the larvae of this species appear to have any noticeable distinction from those of *S.* (*W.*) *paraequinum* Puri. However, the present specimens from Kashmir agree well with *mediterraneum* following the key given by Lewis (1973). According to

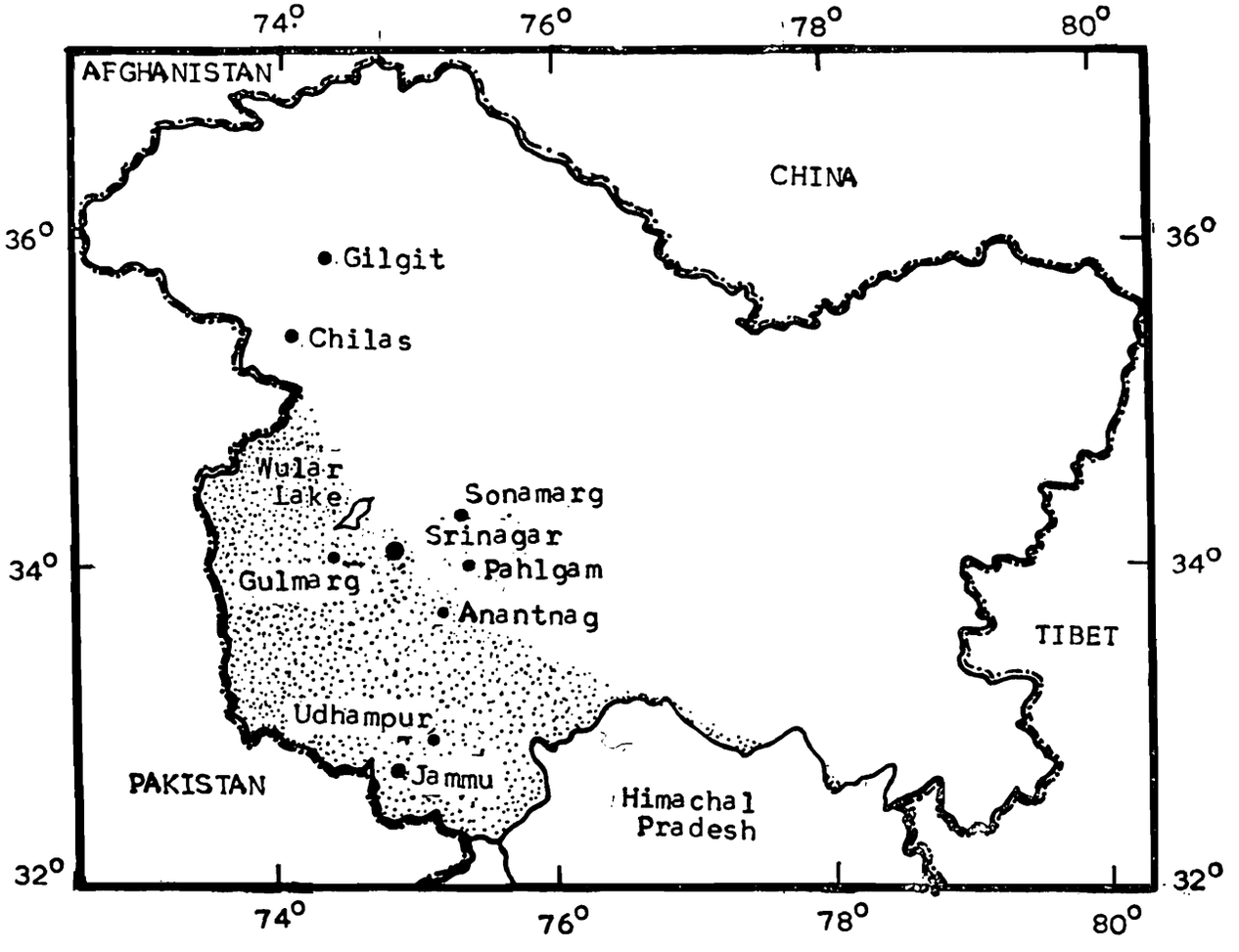

Fig. 1. Map of Jammu and Kashmir, showing places mentioned in the text ; shaded area Oriental region and unshaded area Palaearctie region.

Crosskey (1967, 1969) either of the two species *S. (W.) canariense* Séguy, 1921 and *S. (W.) pseudequiunm* Séguy, 1921, described from the Canary islands may possibly be a senior synonym of *mediterraneum*.

3. **Simulium (Himalayum) indicum** Becher

Simulium indicum Becher, 1885, *J. Asiat. Soc. Beng.* 53 : 199(♀).

Simulium kashmiricum Edwards, 1927, *Bull. ent. Res.* 18 : 169 (♀).

Simulium (Himalayum) indicum Becher : Lewis, 1973, *Bull. ent. Res.* 62 : 462 (♂, pupa, larva) ; Lewis, 1974, *Israel J. Ent.* 9 : 25 (♀ re-described).

Material examined : 1 ♀, 1 pupa, 1 pupal exuvia and 2 larvae, Kashmir, Pahalgam, stream mostly with trailing vegetation, 25.ix. 1977, Coll. *M. Datta*.

Distribution : India : Arunachal Pradesh, Assam, Himachal Pradesh, Kashmir, Manipur, Meghalaya, Nagaland, Sikkim, Uttar Pradesh, West Bengal ; Bangladesh ; Bhutan ; Burma ; China ; Nepal ; Pakistan and Thailand.

Remarks : This species was originally described from the erstwhile Assam (as per explanation of Datta, 1975) from a female specimen only which had pale abdominal terga 1 and 2. Lewis (1973), while synonymising *S. kashmiricum* Edwards, described the male, pupa and larva of this species. One would certainly hesitate to assign the present Kashmir material to *indicum*, since the female specimen has a less yellow abdominal base and an almost black hind femur as Edwards (1927) said. Lewis (1974), however, did admit this colour variation of Kashmir form and suggested that its position be reconsidered when immature stages be studied from various areas. Edwards (1928) synonymized with this another species *S. nigrogilvum* Summers, 1911, described from Thailand. Incidentally, Lewis (*op. cit.*) made a good attempt to compare *S. indicum* with the African *Simulium (Lewisellum) neavei* Roubaud both in respect of morphology and ecology.

4. **Simulium (Tetisimulium) stevensoni** Edwards

Simulium stevensoni Edwards, 1927, *Bull. ent. Res.* 18 : 169 (♀).

Tetisimulium stevensoni Edwards : Rubtzov, 1963, *Fliegen palaearkt. Reg.* III 4(14) : 500.

Simulium (Tetisimulium) stevensoni Edwards : Crosskey, 1967, *Trans. R. ent. Soc. Lond.* 119 : 42 ; Lewis, 1973, *Bull. ent. Res.* 62 : 463.

Distribution : India : Kashmir ; Pakistan.

Remarks : This species was originally described from female specimens from Kashmir and, the male and immature stages are still unknown. The present material does not contain any specimens of this species. It is, therefore, presumed that this species is confined only to Chilas (type-locality) areas (North-West) of Kashmir.

5. **Simulium (Odagmia) adventicium** Datta

Simulium (Odagmia) adventicium Datta, *Bull. zool. Surv. India* (In press).

Material examined : 6♂♂, 8♀♀ (reared from pupae), 39 pupae, 11 pupal exuviae and 32 larvae, Kashmir, Srinagar, Shalimar, Garden, irrigating channels full of floating grasses and trailing vegetation, 11.ix.1977, Coll. *M. Datta* ; 1♂, 4♀♀ (reared from pupae), 18 pupae, 6 pupal exuviae and 7 larvae, Kashmir, Nishat Garden, irrigating channel with floating grasses and trailing vegetation, 15.ix.1977, Coll. *M. Datta* ; 10 pupae and 11 larvae, Kashmir, Pahalgam, stream mostly with trailing vegetation, 25.ix.1977, Coll. *M. Datta*.

Distribution : India : Himachal Pradesh.

Remarks : The species was originally described from Himachal Pradesh (India). This is recorded for the first time from Kashmir. The occurrence of this species both in Himachal Pradesh and Kashmir appears likely on zoogeographical ground.

6. **Simulium (Simulium) chrystophersi** Puri

Simulium (*Simulium*) *chrystophersi* Puri, 1932, *Indian, J. med. Res.* 19 : 906 (♂, ♀, pupa).

Distribution : India : Kashmir and Himachal Pradesh.

Remarks : This species was originally described from Kashmir itself. However, the author was unable to collect it during his survey.

7. **Simulium (Simulium) barraudi** Puri

Simulium (*Simulium*) *barraudi* Puri, 1932, *Indian J. med. Res.* 19 : 1130 (♂, ♀, pupa).

Material examined : 1♂ (reared from pupa), 2 pupae and 1 pupal exuvia, Kashmir, Pahalgam, stream mostly with trailing vegetation, 25.ix.1977, Coll. *M. Datta.*

Distribution : India : Himachal Pradesh and Kashmir.

Remarks : The species was originally described from Kashmir. It closely resembles *S.* (*S.*) *novolineatum* Puri (Puri, 1932b). The male is, however, clearly distinguishable by its genital characters.

*Key to Species of Simuliidae from Kashmir**

(Males)

1.	Basal section of radius haired	2
	Basal section of radius bare ...	4
2.	Pleural membrane haired ...	(*Wilhelmia*) *mediterraneum*
	Pleural membrane bare	3
3.	Postnotum with scale patch ; genitalia with very small distimere and large basimere ...	(*Eusimulium*) *aureum*
	Postnotum bare ; genitalia with distimere much longer than basimere ...	(*Himalayum*) *indicum*
4.	Pleural membrane haired ; ventral plate with antero-ventral beak-like process ...	(*Odagmia*) *adventicium*
	Pleural membrane bare ; ventral plate as well as its process shaped otherwise ...	(*Simulium*) 5
5.	Ventral plate narrow with keel-like process ...	*chrystophersi*
	Ventral plate broad with tongue-like process ...	*barraudi*

(Females)

1.	Basal section of radius haired ...	2
	Basal section of radius bare ...	4
2.	Pleural membrane haired ...	(*Wilhelmia*) *mediterraneum*
	Pleural membrane bare	3
3.	Postnotum with scale patch ; tarsal claw with large basal tooth ...	(*Eusimulium*) *aureum*
	Postnotum bare ; tarsal claw with a small basal tooth ...	(*Himalayum*) *indicum*
4.	Pleural membrane haired	5
	Pleural membrane bare ...	(*Simulium*) 6
5.	Scutum with three broad dark vittae ; abdominal terga 6-8 entirely pollinose	(*Tetisimulium*) *stevensoni*

*The male, pupa and larva of *stevensoni*, and the larva of both *barraudi* and *chrystophersi* are unknown and, hence not placed in the key.

Scutum with paired horse-shoe-shaped pattern ; abdominal terga 6-8 shiny ... (*Odagmia*) *adventicium*

6. Scutellum black ; tarsal claw with subbasal tooth ... *chrystophersi*

Scutellum brownish black ; tarsal claw simple ... *barraudi*

(Pupae)

1. Abdominal terga without any trace of spine-combs 2

Abdominal tergum 8 invariably with spine-combs (often on terga 6-9 in addition) 3

2. Respiratory organ with 6 filaments ... (*Himalayum*) *indicum*

Respiratory organ with a pair of large inflated basal arms bearing 6 tubes between them ... (*Wilhelmia*) *mediterraneum*

3. Respiratory organ with 4 filaments ... (*Eusimulium*) *aureum*

Respiratory organ with more than 4 filaments 4

4. Respiratory organ with 6 filaments ... (*Simulium*) *chrystophersi*

Respiratory organ with 8 filaments 5

5. Abdominal tergum 8 only with spine-combs ; cocoon non-necked and non-fenestrate but with a large lateral aperture ... (*Simulium*) *barraudi*

Abdominal terga 7-8 with spine-combs ; cocoon fenestrate anteriorly and especially on neck ... (*Odagmia*) *adventicium*

(Larvae)

1. Postgenal cleft much longer than postgenal bridge 2

Postgenal cleft much shorter than postgenal bridge 3

2. Head-spots virtually negative ; thoracic and abdominal cuticle with fan-shaped scales ... (*Himalayum*) *indicum*

Head-spots distinct ; thoracic and abdominal cuticle bare (*Wilhelmia*) *mediterraneum*

3. Antenna 4-segmented ; respiratory histoblast with 4 filaments ; ventral papillae large and conical ... (*Eusimulium*) *aureum*

Antenna 4-segmented with a secondary annulation ; respiratory histoblast with 8 filaments ; ventral papillae inconspicuous ... (*Odagmia*) *adventicium*

SUMMARY

Seven hitherto known and newly recorded species of the Simuliidae (Diptera) from Kashmir are presented, with remarks on distribution. Keys to the species, based on ♂, ♀, pupa and larva, are also appended.

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References

Crosskey, R. W. (1967). A preliminary revision of the black-flies (Diptera : Simuliidae) of the Middle East. *Trans. R. ent. Soc. Lond.* **119** : 1-45.

Crosskey, R. W. (1969). A re-classification of the Simuliidae (Diptera) of Africa and its islands. *Bull. Brit. Mus. nat. Hist. Ent. suppl.* **14** : 1-195.

Datta, M. (1975). Simuliidae (Diptera) from Assam foot-hills, India. *Japanese J. sanit. Zool.* **26** : 31-40.

Datta, M. (1985). The subgenus *Odagmia* Enderlein (Diptera : Simuliidae) with a new species from Himachal Pradesh, India. *Bull. zool. Surv. India*, 7 : 25-32.

Edwards, F. W. (1927). Two new *Simulium* from Kashmir. *Bull. ent. Res.* **18** : 169-170.

Edwards, F. W. (1928). Diptera Nematocera from the Federated Malay States Museums. *J. fed. Malay States Mus.* **14** : 1-139.

Lewis, D. J. (1973). The Simuliidae (Diptera) of Pakistan. *Bull. ent. Res.* **62** : 453-470.

Lewis, D. J. (1974). Man-biting Simuliidae (Diptera) of Northern India. *Israel J. Ent.* **9** : 23-53.

Puri, I. M. (1932a). Studies on Indian Simuliidae. Part 2 : Descriptions of males, females and pupae of *Simulium rufibasis* Brunetti, its variety *fasciatum* nov. var. and of three new species from the Himalayas. *Indian J. med. Res.* **19** : 899-915.

Puri, I. M. (1932b). Studies on Indian Simuliidae. Part 3 : Descriptions of males, females and pupae of *S. griseifrons* Brunetti (1911) and of four new species with striped thorax. *Indian J. med. Res.* **19** : 1125-1143.

Puri, I. M. (1933). Studies on Indian Simuliidae. Part 9 : *S. equinum* var. *mediterraneum* Puri and *S. paraequinum* sp. n. *Indian J. med. Res.* **21** : 11-16.

Rubtzov, I. A. (1956). *Fauna of U. S. S. R.* (N.S.) No. 64, Diptera 6(6) (Simuliidae) : 1-860.

Séguy, E. (1921). Faune entomologique des Iles Canaries. Séjour de M. P. Lesne dans la Grande Canarie (1902-1903). II. Diptères piqueurs. *Bull. Mus. natn. Hist. nat., Paris* **27** : 291-295.

Serban, E. (1961). New and little-known species of blackflies of the group *Eusimulium aureum* Fries (Diptera, Simuliidae) from Rumania. *Ent. Obozr.* **40** : 677-685.

Summers, S. L. M. (1911). Notes from the entomological department of the London School of Tropical Medicine. No. II. Description of a new species of *Simulium* from the Siamese hills. *Ann. Mag. nat. Hist.* ser. 8, 7 : 586-588.

Bull. zool. Surv. India, 7 (2-3) : 237-239, 1985

ON A SMALL COLLECTION OF CONIOPTERYGIDAE (*NEUROPTERA*) FROM WEST BENGAL, INDIA

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AND

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Effort has been made to collect coniopterygids from West Bengal, as this group is so far unrecorded from the state, although only nine species are known from other states of India (*vide* Ghosh & Sen, 1977). In order to collect these pygmy insects, several host plants, namely, Citrus (*Citrus* sp.), Jack fruit (*Artocarpus* sp.) and Mango (Mangifera *indica*) in 24-Parganas and Nadia Districts were explored and as a result three species from several localities of the aforesaid districts were collected. Of these, hitherto unknown female of *Coniocompsa indica* Withycombe is for the first time recorded and described from India and this along with other two species dealt with here are new records for West Bengal.

1. **Conioeompsa indica** Withycombe

1925. *Coniocompsa indica* Withycombe, *Mem. Dep. Agric. India*, 9 : 18.

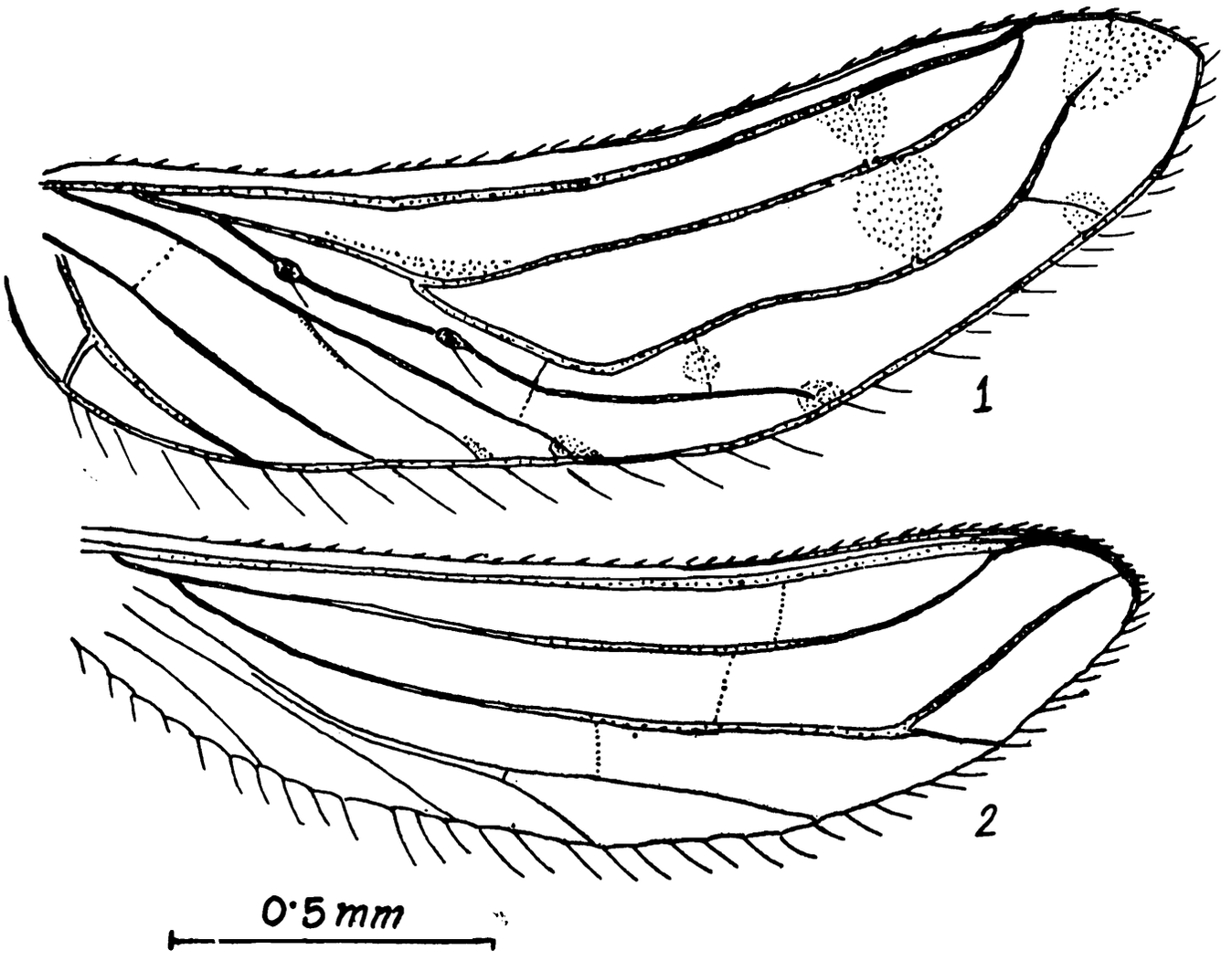
Female : Head : brown. Eyes : black. Palpi : pale brown. Antenna : 16-segmented ; scape and pedical yellowish brown ; flagellum dark brown. Pronotum : pale. Meso and metanotum : dark brown. Wings : hyaline and fringed with long hairs at the inner margin specially in the hindwing. Forewing (fig. 1) : membrane hyaline with brown spots at the end of longitudinal veins from Sc_1 to Cu_2 and distal crossveins ; two large bristles on the dark brown prominences of M. Hindwing (fig. 2) : hyaline and slightly tinged with pale fuscous in the space between Sc to Rs. Legs : brown. Abdomen : pale ; setae on the gonapophyses lateralis curved abruptly downwards.

Male : *Vide* description after Meinander (1972).

Measurement : Length of antenna, 0.52 mm ; forewing, 2.2 mm, hindwing, 2 mm.

Material examined : 3 ♀ ♀ , 1 ♂ : India, Nadia, Ranaghat, Purnanagar, 26.iv.1982. Coll. *D. R. Maulik*.

Biological notes : The species was collected in the early hours of the morning at about 6 a. m. from the leaves of mango and jack fruit trees infested with aphids. It may also be mentioned that a few larvae of the family Hemerobiidae were found to be associated with coniopterygids.



Figs. 1-2. *Coniocompsa indica* Withycombe, female. 1. forewing, 2. hindwing.

Distribution : India : Tamil Nadu, Bihar and West Bengal.

Remarks : The female is described for the first time from India.

2. **Coniopteryx (Coniopteryx) exigua** Withycombe

1925. *Coniopteryx exigua* Withycombe, *Mem. Dep. Agric. India*, 9 : 22.

1972. *Coniopteryx* (*Coniopteryx*) *exigua*, Meinander, *Acta zool. fenn.*, 136 : 242.

Material examined : 1♂, 1♀ : India : 24-Parganas, Habra, Kumra, 22.ix.1982, Coll. *D. R. Maulik*.

Distribution : India (Bihar, West Bengal, Jammu & Kashmir), Nepal and Pakistan.

Remarks : The species was collected from mango (*Mangifera indica*) in the early hours of the morning at about 5-30 a. m. The measurement of fore-and hindwing falls within the range given by Meinander (1972). However, the species constitutes a new locality record for West Bengal.

3. **Semidalis aleyrodiformis** (Stephens)

1836. *Coniopteryx aleyrodiformis* Stephens, *Illustrations* of *British Entomology*, Mandibulata, 6 : 116.

1937. *Semidalis aleyrodiformis*, Killington, The generic names for British Insects, 4 : 73.

Material examined : 8 ♀ ♀, 1 ♂ : India : West Bengal, 24-Parganas, Habra, Kumra, 21.iv.1982, Coll. *D. R. Maulik*. 10 ♂ ♂, 10 ♀ ♀, Nadia, Bagula, 8.iv.1983, Coll. *D. R. Maulik*.

Distribution : Palaearctic region : Norway, Sweden, Finland, Denmark, England, Scotland, Netherland, Luxembourg, France, Germany, Switzerland, Austria, Poland, Czechoslovakia, Jugoslavia, Rumania, Italy, Greece, Bulgaria, Turkey, Cyprus, USSR, Japan, China, Oriental region : Formosa, Nepal, India (Kashmir, Bihar and West Bengal), Thailand and Malaya.

Remarks : The measurements of the fore-and hindwings fall within the same range as indicated by Meinander (1972). The species, collected from Mango and citrus, is a new locality record for West Bengal.

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REFERENCES

GHOSH, S. K. & SEN, S. 1977. Check-list of Indian Planipennia (Order Neuroptera) *Rec. zool. Surv. India*, **73** : 277-326.

MEINANDER, M. 1972. A revision of the family Coniopterygidae (Planipennia). *Acta zool. fenn.*, **136** : 1-357.

Bull. zool. Surv. India, 7 (2-3) : 241-244, 1985

DESCRIPTION OF A NEW SPECIES, *PISODONOPHIS, ASSAMENSIS*, A NEW EEL FROM LOWER ASSAM WITH A KEY TO THE INDIAN OPHICHTHIDAE (FAMILY : OPHICHTHIDAE / GENUS : PISODONOPHIS)

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Introduction

During the course of my studies on a fresh lot of fish from Dolu River, Dt. Silchar, Lower Assam, I came across a well preserved eel measuring 21.4 cm. in total length. This specimen after detailed studies revealed to represent a hitherto unknown species belonging to the family *Ophichthidae* and genus *Pisodonophis*. A detailed description of this species along with a revised key to the genus *Pisodonophis* to accommodate it is given in the present paper.

Description

The body extremely elongate, compressed, snake-like, nearly cylindrical, narrowing down to a flattened and pointed tip of tail (Fig. 1). Length of head 11.8 times in total length, $4\frac{1}{4}$ *times in the distance between tip of snout and vent, equal to the distance between dorsal fin origin and pectoral fin base.* The distance between origin of dorsal fin and pectoral fin base is nearly *5 times* in the distance between tip of snout and vent. Mouth terminal, large, cleft of mouth wide—*3 times in head length* extending beyond the posterior margin of eye orbit. Jawas equal *with uniserial rows of pointed teeth* (Fig. 2). Branchiostegal rays closely fused together like fused bands of tapes crossed or overlapped at the centre forming closed chamber like structure (Fig. 3) in a characteristic pattern typically "consistent within Ophichthidae" (Mc Cosker, 1977). Gill-opening small, slit-like, crescent shaped, just above the broad base of pectoral fin. *Dorsal fin low, without spine, commences far behind the base of pectoral fin, continued up to in front of the pointed tip of tail, which is finless* ; *anal low, continuous, also does not extend on to the tip of the caudal* ; *no pelvic and caudal fins* ; pectoral fin somewhat round with broad base, slightly elongated in shape. No scales. Continued longitudinal groves along the dorsal, lateral and ventral sides of the body. Colour of the body light olive-green dorsally, creamy-white on the sides and below with black spots on the dorsal and lateral sides.

Diagnostic characters : (1) *Head length* $4\frac{1}{4}$ *times in* the distance between tip of snout and vent (2) Length of head *equal* to the distance between origin of dorsal fin and base of pactoral fin (3) *Uniserial pointed teeth on the jaws* (4) The distance between origin of dorsal fin and pectoral fin base nearly *5 times* in the distance between tip of

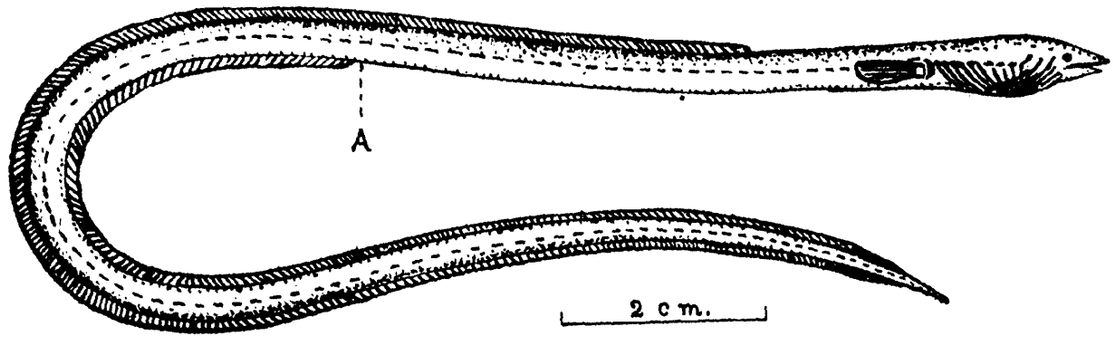

Fig. 1. Lateral view of *Pisodonophis assamensis* Sen, Holotype.

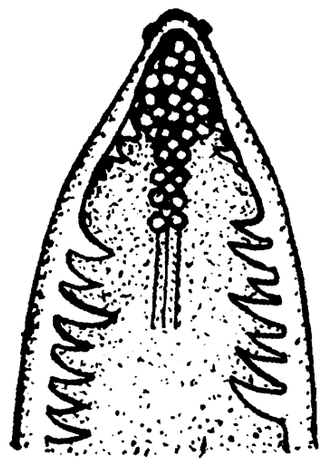

Fig. 2

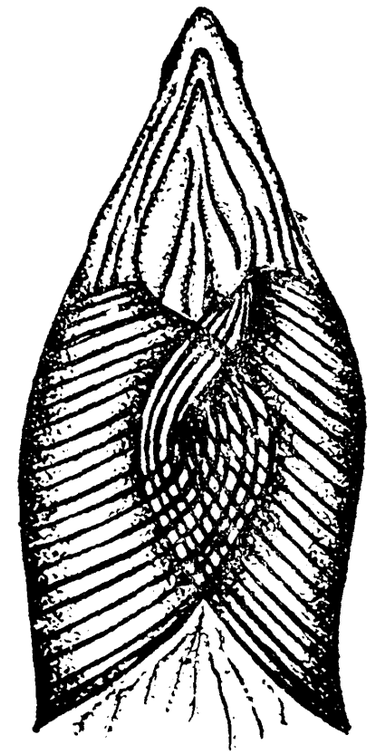

Fig. 3

Fig. 2. Arrangement of teeth on jaws and vomer in *Pisodonophis assamensis* Sen
Fig. 3. Ventral side of head—showing branchiostegal rays broadly crossed or overlapped along the ventral midline in a characteristic pattern.

snout and vent. (5) Origin of dorsal fin *more behind* the pectoral fin base.

Affinity : Altogether three valid Indian species under the genus *Pisodonophis viz.*, (1) *Pisodonophis boro* (Hamilton) (2) *Pisodonophis chilkensis* (Chaudhuri) (3) *Pisodonophis cancrivorous* (Richardson) have been so far described from Indian waters (Jayaram, 1981, and Talwar & Kacker, 1984). After detailed taxonomic studies it has been found that the *P. assamensis* significantly differs from all the predescribed Indian species mentioned above. It sharply differs with the *P. cancrivorous* in the position of the origin of dorsal fin, which is far behind the base of pectoral fin (*versus*, more or less commencing *above* the base of pectoral fin) ; it sharply differs with *P. chilkensis* in head length, which is $4\frac{1}{4}$ times in the distance between tip of snout and vent (*versus*, 5-5.5 times) ; with its nearest relative *P. boro*, it however, resembles in many characters,— profiles of head and body, colourations etc. but sharply differs with the following basic characters (*viz.*, (1) Head lenghth $4\frac{1}{4}$ times in the distance between tip of snout and vent (*versus*, 3.5 to 4 times) ; (2) Length of head *equal* to the distance between origin of dorsal fin and base of pectoral fin (*versus*, length of head greater in the distance between origin of dorsal fin and base of pectoral fin) ; (3) *Uniserial* rows of pointed teeth on the jaws (*versus*, grannular in patches and in several smaller rows) ; (4) Distance between origin of dorsal fin and base of pectoral fin nearly 5 times (*versus*, $6\frac{1}{2}$ to 7 times) ; (5) origin of dorsal fin *more behind* the base of pectoral fin (*versus*, slightly nearer to the pectoral fin base).

Material : Holotype, Regd. No. F F 2159. Total length 21.4 cm. Loc. Dolu River at Barakhola, Dt. Silchar, L. Assam. Date of Coll. 17th June, 1984. Coll. T. Chanda.

Key to the Indian Ophichthidae (Genus : **Pisodonophis**)

1.	Dorsal fin commencing more or less above the base of pectoral fin. ...	*P. cancrivorous* (Richardson)
—	Dorsal fin commencing behind the base of pectoral fin ...	2
2.	Head length 5-5.5 times in the distance between tip of snout and vent ...	*P. chilkensis* Chaudhuri
—	Head length 3.5 to 4 times in the distance between tip of snout and vent ; teeth grannular or sharply pointed, length of head equal or greater than the distance between dorsal fin origin and pectoral fin base	3
3.	Teeth grannular ; length of head greater than the distance between dorsal fin origin and pectoral fin base	*P. boro* (Hamilton)
—	Sharply pointed teeth on the jaws ; length of head equal to the distance between dorsal fin origin and pectoral fin base ; head length $4\frac{1}{4}$ times in the distance between tip of snout and vent ; ...	*P. assamensis* Sen

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References

JAYARAM, K. C. 1981. The freshwater fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka. *Handb. Zool. Surv. India* (2) : 1-475.

Mc COSKER, JOHN, E. 1977. The osteology, classification and relationships of the eel family Ophichthidae. *Proc. Calif. Acad. Sci.* (4) **41**(1) : 123.

TALWAR, P. K. & KACKER, R. K. 1984. Commercial Sea fishes of India. *Handb. Zool. Surv.* (4) : 1-997.

Bull. zool. Surv. India, 7 (2-3) : 245-249, 1985

"BIOSPELEOLOGICAL EXPLORATIONS IN INDIA"

By

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ABSTRACT

The present communication deals with the biological work carried out in the caves and subterranean waters of India. The zoological investigations are summarised and a list of literature dealing with biospeleological research in India is appended.

Biospeleology today has reached a new dimension and has become an autonomous science with its own requirement and following its own aims. Indian Zoologists have made notable contributions to our knowledge of the Indian subterranean fauna. Organised research on Indo-malayan caverns was pioneered by Nelson Annandale who can truly be called the father of unitory approach to biological problems in Asia. His summary in collaboration with Gravely (1914) of the fauna of the limestone caves of Burma and Malay peninsula undoubtedly promoted the investigations of the Siju caves of Assam by his colleagues, (Kemp and Chopra, 1924) the first extensive survey of its kind in the East.

In more recent years the fauna of caves in Dehradun district have been sampled (Glennie, 1947). His collections show (see e.g. Fage, 1946 ; Cameron, 1947) that there exist in India a more or less Palaearctic cave fauna quite different to the tropical fauna of the limestone caves that extend more from Assam to Malaya.

Indian ground (subterranean) water fauna dates back to the discovery of a blind Amphipod from a mine in West Bengal (Chilton, 1923 ; Stephensen, 1931), supplemented by the report of Entomostracan crustacea from a well at Lahore (Arora, 1931).

Still more recent works (Menon, 1950-52 ; Chopra and Tiwari, 1950 ; Tiwari, 1952-62 ; Lindberg, 1960 ; Pillai and Mariamma, 1963-64 ; Straskraba, 1966 ; Nath and Pillai, 1971-72, Tiwari and Lakshman Ram, 1972 ; Ram, 1972 ; Gupta, 1980, 1981, 1984, 1985) have enriched this field of work. Their taxonomical and biological studies have given new dimension to previous researches in India with their reports on subterranean fishes and crustaceans.

Nevertheless the larger portion of publications are devoted to taxonomic descrip-

tions and discussions and biological datas on these animals are almost nil.

Cave fauna

The cavernicolous fauna has been classified into three categories ; those which are strictly adapted for life in cave are called "troglobies" or troglobian, others which are frequent in caves but not totally confined to caves are called "troglophiles" and finally the occasional cavernicoles are called "trogloxene".

Siju cave fauna includes Mammals (5 spp), Amphibia (2 spp.), Pisces (8 spp.), Mollusca (4 spp.), Crustacea (7 spp.), Arachnida (12 spp.), Myriapoda (6 spp.), Insecta (52 spp.) and Oligochaeta (5 spp.). Out of 102 listed species the true Siju cave fauna consists of 86 species of these only 33 penetrate beyond a depth of 600 ft. Most of the species are not modified in response to their peculiar environment and the number of species showing definite adaptation to cavernicolous conditions is extremely small and of true "Troglobies" there are few or none. The only species in this category represented in the cave are :

Mollusca : Opeas cavernicola

Crustacea :

Decapoda : *Macrobrachium cavernicola*
Isopoda : *Philoscia dobakholi,*
Cubaris cavernosus.

The only species in this category known from other caves in Assam and other parts of the country are : *Setaphora kempi* (Collinge) a depigmented and anopthalmic isopod (Vandel, 1965) and *Diestrammena caeca* an orthopteran insect from caves in Assam and *Typhlomalota glenniei* a coleopteran from Simla caves (Cameron, 1947). Fage (1946) added four species of Araignees from Simla caves.

Recently Sinha (1983) has listed 9 spp. of cave dwelling bats from Rajasthan, which also occur in houses and monuments.

Ground water fauna

Entomostraca :

Arora (1931) described a cladoceran, *Mediomoina elliptica* and ten species of Ostracods from Lahore of which some were collected from wells but how far they exhibit subterranean adaptation is not clear. Hartmann (1964) described an Ostracod *Cypretta fontinalis* from Junagarh and Victor & Michael (1975) described 3 new ostracods *Potamocypris angularis*, *Physocypria minutus* and *Cypretta alagarkoilensis* from subterranean waters of Madurai area. Gupta (1984) described a new genus *Indocandona krishnakanti* from a well in *Monghyr*, Bihar.

Pillai and Mariamma (1963) described a mysid from a well from Kottayam in Kerala. This was described as *Keralomysis* Pillai and Mariamma and under taxonomic revisions transferred through *Speleomysis* to the *Lepidomysis longipes* (Pillai & Mariamma, 1964 ; Nath & Pillai, 1971). Nath & Pillai (1972) studied its digestive system throwing light on its food and feeding and subterranean habit and habitat.

Isopoda :

Chopra and Tiwari (1950) described an interesting isopod *Nichollsia kashiense* of the sub-order Phreatoicoidea, from wells at Allahabad and Varanasi in U. P. This finding lend faunistic support to the Gondwana land theory of continents, as the other members of the sub-order Phreatoicoidea

are found in Australian continent in the East and African continent on the West. Tiwari (1955) described *Nichollsia menoni*, another species from Monghyr in Bihar. *Nichollsia* is the only isopod genus reported from the subterranean waters of India. *Nichollsia kashiensis* and *N. menoni* has been thoroughly investigated for its anatomy, histology and biology by the senior author (L. P. G.). This study has revealed many features not only in its morphology and anatomy but also in its ecology and biology reflecting the effect of subterranean mode of life on the animal. The most affected organs are the antennae, the eyes, the nervous system, the circulatory system, the digestive system and also the respiratory metabolism. In reproductive biology the size and number of their eggs and encubation period could be significantly correlated with the subterranean mode of life.

Amphipoda :

Chilton (1923) for the first time reported the occurrence of a blind and colourless amphipod as *Niphargus indicus* from coal mines in West Bengal near Asansole. This animal was shifted to another genus *Neoniphargus* by Stephensen (1931) and finally it was placed in a new genus *Indoniphargus* by Straskraba (1966) including specimen from a well in Rohod near Chaibasa in South Bihar. It has also been collected from wells in Monghyr district in Bihar by one of us (L. P. G.).

Fishes :

Menon (1951a) described a remarkable blind clariid fish, *Horaglanis krishnai* from a well at Kottayam, Kerala. The fish is depigmented and internal organs affected are alimentary canal, liver, kidney, gonads, air bladder and accessary respiratory organs (Menon 1952). Discovery of this fish in subterranean water in India is of great zoogeographical interest (Menon 1951b). He has also emphasized that the fish is secondarily simplified.

From the above account it is evident that the cave fauna in India is far less specialised. A vast majority of the animals belong to the species which occure or may be expected to occure outside the caves. These cavernicoles are at the early stages of evolution. From the degree of specialization of the fauna it can be safely inferred that the caves are of comparatively recent origin.

The ground water fauna is least explored in this country but from taxonomic, evolutionary and zoogeographical considerations it has yielded most interesting and valuable results.

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REFERENCES

ANNANDALE, N., BROWN, J. C. and GRAVELY, F. H. 1914. The limestone caves of Burma and the Malay Peninsula. *J. Asiat. Soc. Bengal*, **9** : 391-423.

ARORA, H. L. 1931. Fauna of Lahore. 2. Entomostraca (Waterflies) of Lahore. *Bull. Deptt. of Zool., Punjab Univ.*, **1** : 62-100.

CAMERON, M. 1947. A new genus of blind Cavernicolous Staphylinidea from India. *Proc. R. ent. Soc. London*, (B) **16** : 30.

CHILTON, C. 1923. A blind Amphipod from a mine in Bengal. *Rec. Indian Mus.*, **25**(2) : 195-198.

Chopra, B. and TIWARI, K. K. 1950. On a new genus of Phreatoicid Isopod from wells in Banaras. *Rec. Indian Mus.* **47** : 277-290.

FAGE, L. 1946. Araignees cavernicoles de L' Inde. *Bull. Mus Nat. Hist. Paris*, (2) **18** : 382-388.

GLENNIE, E. A. 1947. Cave fauna. *J. Bombay Nat. Hist. Soc*,, **46** : 587-593.

GUPTA, L. P. 1980. Studies on the biology of subterranean Isopoda of the genus *Nichollsia* Chopra & Tiwari, 1950 (Crustacea : Isopoda : Phreatoicoidea). Ph. D. Thesis, Patna Univ. Patna.

—— 1981. On some anomalies in the abdominal region of *Nichollsia menoni* Tiwari 1955 (Isopoda : Phreatoicoidea). *Bull. Zool. Surv. India*, 4 (1) : 7-8.

—— 1984. *Indocandona krishnakanti* n. gen., n. sp. (Crustacea : Ostracoda : Candonidae) from Subterranean water of Bihar, India. *Rec. Zool. Surv. India*, **81** (3 & 4) : 291-298.

—— 1985. The setae of Subterranean Isopoda *Nichollsia menoni* Tiwari 1955 (Crustacea : Isopoda : Phreatoicoidea : Nichollsidae). *Bull. Zool. Surv. India*, **7** (1) : 93-101.

—— (in press) Monograph on *Nichollsia kashiensis* Chopra & Tiwari 1950 (Crustacea : Isopoda : Phreatoicoidea : Nichollsidae). *Mem. Zool. Surv. India*

——

HARTMANN, G. 1964. Asiatische Ostracoden Systametiche and Zoogeographische Unter suchungen. *Int. Rev. ges. Hydrobiol* ; Beihefte **3** : 115 pp.

KEMP, S. W. and CHOPRA, B. N. et al 1924. The Siju cave, Garo Hills, Assam. *Rec. Indian Mus.*, **26** : 3-135.

LINDBERG, K. 1960. Revue des recherches biospeologiques in Asie moyenne et dans le sud du continent asiatique. *Rass. Speleol. Ital.*, XII.

MENON, A. G. K. 1951a. On a remarkable blind siluroid fish of the family Clariidae from Kerala (India). *Rec. Indian Mus.*, **48** (1950) : 59-66.

MENON, A. G. K. 1951b. Dirtribution of clariid fishes and its significance in zoogeographical studies. *Proc. Nat. Inst. Sci. India.*, **17** : 291-299.

MENON, A. G. K. 1952. On certain features in the anatomy of *Horaglanis* Menon. *J. Zool. Soc. India.*, **3** : 240-253.

NATH, C. N. & PILLAI, N. K. 1971. Studies on the genus *Lepidomysis* Clarke. (Crustacea : Mysidacea). *Hydrobiologia*, **37** (2) : 285-300.

NATH, C. N. & PILLAI, N. K. 1972. On the alimentary canal of *Speleomysis longipes* (Crustacea : Mysidacea)., *J. Zool. Soc. India.*, **23** (2) (1971) : 95-108.

PILLAI, N. K. & MARIAMMA, T. 1963. On the discovery of the primitive mysidacean family Lepidomysidae in India., *Curr. Sci. Banglore*, **32** : 219-220.

PILLAI, N. K. & MARIAMMA, T 1964. On a new Lepidomysid from India. *Crustaceana*, **7** (2) : 113-124.

RAM, L. 1972. A note on an abnormality in *Nichollsia kashiensis* Chopra and Tiwari. 1950. (Isopoda Phreatoicoidea). *Crustaceana*. Suppl. **3** : 7-10.

SINHA, Y. P. 1983. Bats of Rajasthan. *Science Reporter*, **20** (7) : 423-424.

STADLER, H. 1927. Foerschritte in dere Erforsohung der tierischen Bewohnerschaft dere hohlen Sudasiens und Indonesiens., *Metteil. Hohl Karstf.* Heft. **3** : 92-101.

STEPHENSEN, K. 1931. *Neoniphargus indicus* (Chilton), an Indian freshwater amphipod. *Rec. Indian Mus.*, **33** : 13-19.

STRASKRABA, M. 1966. Re-examination of the taxonomic status of *Niphargus indicus* Chilton (Amphipoda, Gammaridae) and its zoogeographical relations. *Proc. Symp. on Crustacea*, Pt. I : 126-132.

TIWARI, K. K. 1952. The morphology of *Nichollsia kashiense* Chopra and Tiwari (Crustacea : Isopoda : Phreatoicoidea). *Proc. Indian Acad. Sci.*, **35**(2) B : 69-77.

TIWARI, K. K. 1955. Another new species of *Nichollsia* (Crustacea : Isopoda : Phreatoicoidea). *Rec. Indian Mus.*, **53** : (3 & 4) : 379-381.

TIWARI, K. K. 1955. Nichollsidae, a new family of Phreatoicoidea (Crustacea : Isopoda). *Rec. Indian Mus.*, **53** (1 & 2) : 293-396.

TIWARI, K. K. 1962. A note on the testes in *Nichollsia kashiense* Chopra and Tiwari (Crustacea : Isopoda : Phreatoicoidea : Nichollsidae). *Crustaceana*, **3**(3) : 247-248.

TIWARI, K. K. AND LAKSHMAN RAM 1972. The foregut of *Nichollsia kashiense* Chopra and Tiwari, 1949 (Crustacea : Isopoda : Phreatoicoidea). *J. zool. Soc. India*, **24**(1) : 69-79.

VANDEL, A. 1964. "Biospeleology" The biology of cavernicolous animals. (English Translation—B. E. Freeman, 1965, Pergamon Press Ltd. London).

VICTOR, R. AND MICHAEL, R. G. 1975. Nine new species of freshwater Ostracoda from Madurai area in Southern India. *J. nat. Hist.*, **9** : 361-376.

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MARINE WOOD-BORERS FROM THE MANGROVE ECOSYSTEM OF GREAT NICOBAR, ISLAND, INDIA

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ABSTRACT

Three species of teredinid borers, namely, *Dicyathifer manni* (Wright), *Lyrodus pedicellatus* (Quatrefages) and *Nausitora dunlopei* Wright, one species of pholadid borer, *Martesia striata* (Lammarck) and one species of isopod borer, *Sphaeroma terebrans* Bate are reported from the mangrove ecosystem of Great Nicobar Island. *D. manni*, *L. pedicellatus* and *S. terebrans* constitute new records for this island.

Introduction

Great Nicobar Island is located between 6°45′ and 7°15′ N latitudes and 93°37′ and 93°56′E longitudes. This island is topographically unique because it is the southernmost island of the Andaman and Nicobar group. Moreover, its southern tip, the Pygmalion Point, is the southernmost part of Indian territory and only 144 km from the Achin Head of Sumatra.

A perusal of literature reveals that there is no published account on the marine wood-borers of this island excepting a single paper (Rajagopal and Daniel, 1972) wherein a single species of teredinid borer, *Nausitora dunlopei* Wright has been reported from 25 km up Galathea river affecting submerged wooden structure. Therefore, there is no record of any marine wood-borer from the mangrove forest ecosystem of this island although a couple of papers have been published in recent years by Das and Dev Roy (1980, 1981 and 1984) and Tiwari *et al* (1980) dealing with this group from the mangroves of different islands of both the Andamans and the Nicobars. The present work is, therefore, attempted in order to fill up this gap. Altogether three species of teredinid borers (viz., *Dicyathifer manni*, *Lyrodus pedicellatus* and *Nausitora dunlopei*), one species of pholadid borer, *Martesia striata* and one species of isopod borer, namely, *Sphaeroma terebrans* were collected from the mangroves of this island. Excepting *N. dunlopei* and *M. striata* all the borers are reported for the first time from Great Nicobar.

Mention may be made here that while pholadid borers were collected from the drift wood in the mangrove area, all other borers were extracted from the dead stumps of

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Rhizophora mucronata and *R. stylosa* as well as roots of *R. mucronata* and *Bruguiera gymnorhiza*. Moreover, live pneumatophores and cable roots of *Sonneratia alba* were also found to be infested with teredinid borers. These borers were too immature to be identified. Absence of *Bactronophorous thoracites* in the present collection is noteworthy in view of the fact that this borer has been found to be very common in the mangroves of other islands of both the Andaman and the Nicobar groups studied so far (Das and Dev Roy, *op. cit.*).

Systematic Account

A. Molluscan borers

Family Teredinidae

1. **Dicyathifer manni** (Wright)

Material : 8 exs., Magar Nallah, Great Nicobar Is., Coll. *M. K. Dev Roy* ; 29.ix.83.

Distribution : India : Sundarbans ; Mahanadi estuary ; Visakhapatnam ; Madras Harbour ; Pulicat Lake ; Cochin ; Karnataka ; Bombay ; Goa ; Daman ; Gujarath ; South Andaman (Places around Port Blair) ; Middle Andaman (Bakultala) ; Ritchie's Archepelago ; Camorta Is. (Nicobar) and Great Nicobar (present record).

For distribution from outside India *see* Das and Dev Roy (1981).

Remarks : This species has been found to attack dead stumps and knee roots of the mangrove, *Bruguiera gymnorhiza* in Magar Nallah where salinity of the surrounding water was only $0.6^0/_{00}$ at the time of collection. This suggests that this borer can thrive even in almost freshwater condition.

From the distribution data it is evident that this species of teredinid is quite common in both the east and west coast of India as well as Andaman and Nicobar group of Islands.

2. **Lyrodus pedicellatus** (Quatrefages)

Material : 2 exs., Lakshman Beach, Great Nicobar Is., Coll. *M. K. Dev Roy* ; 2.x.83.

Distribution : Mahanadi estuary ; Visakhapatnam ; Madras ; Tondi ; Adiramapatnam ; Pamban ; Kayamkulam ; Cochin ; Mangalore ; Karwar ; Madvi esturry ; Zuari estuary ; Ratnagiri ; Bombay ; Daman ; Kolak ; Cambay ; Diu ; Veraval ; Okha ; Kandla ; Lakshadweep (Minicoy, Kadmal, Kavaratti, Cheriyam) ; South Andaman (places around Port Blair) ; Ritchie's Archepelago ; Little Andaman ; Camorta Is. (Nicobar) and Great Nicobar (present record).

For distribution from outside India *see* Das and Dev Roy (1981).

Remarks : This is also a common teredinid borer and found to be very active in the mangrove areas of Andaman and Nicobar group of Islands.

The present materials were extracted from the knee roots of *Bruguiera gymnorhiza* where salinity was $35^0/_{00}$. In Little Andaman this species has been reported to occur in salinities ranging from $16.7^0/_{00}$ to $32^0/_{00}$ (Das and Dev Roy, *op. cit.*).

3. **Nausitora dunlopei** (Wright)

Material : 4 exs. ; Magar Nallah, Great Nicobar Is., Coll. *M. K. Dev Roy* ; 29.ix.83.

Distribution : India : Calcutta ; Sundarban ; Mahanadi estuary ; Visakhapatnam ; Madras ; Cochin harbour ; Little Andaman ; Car Nicobar and Great Nicobar.

For distribution from outside India *see* Turner, 1966 and Rajagopal and Daniel (1972).

Remarks : *N. dunlopei* was extracted from the dead stumps of the mangroves, *Rhizophora mucronata* and *R. stylosa* in Magar Nallah where salinity was estimated to be $0.6^0/_{00}$ at the time of collection.

This species in general occurs in fresh and brackish water. But it is also found in marine environment. Wright (1864) who described this species for the first time obtained the specimens from the freshwater of Comer river. Rajagopal and Daniel (*op. cit.*) as well as the present authors collected this species in Great Nicobar in almost freshwater condition. Mohan (1981) recorded this species at salinities varying from $3.92^0/_{00}$ to $19.98^0/_{00}$ at Cochin. Das and Dev Roy (1984) reported this borer from Little Andaman at salinity $5.15^0/_{00}$.

Mention may be made here that in Andaman and Nicobar group of islands *N. dunlopei* has so far been recorded from Little Andaman, Car Nicobar and Great Nicobar.

Family Pholadidae

Martesia striata (Linnaeus)

Material : 15 exs. ; Campbell Bay, Great Nicobar Is. ; Coll. *M. K. Dev Roy* ; 24.ix.83.

Distribution : India : Throughout entire East and West Coast and all the Indian harbours (*see* Daniel and Subba Rao, 1982).

Outside India : Pacific, Indo-Pacific and Western Atlantic.

Remarks : This species was collected from drift wood in the mangrove area of Campbell Bay where salinity was $32^0/_{00}$. This borer can tolerate wide range of salinity varying from $0.5^0/_{00}$ to $35^0/_{00}$ (Balasubramanyan, 1968). Karande (1978), observed that this borer causes appreciable damage to submerged structures in water surrounding Port Blair.

B. Crustacean borer

Family Sphaeromidae

5. **Sphaeroma terebrans** Bate

Material : 66 exs. ; Magar Nallah, Great Nicobar Is. ; Coll. *M. K. Dev Roy* ; 29.ix.83.

Distribution : India : Kerala ; Karnataka ; South Andaman ; Ritchie's Archepelago ; Little Andaman and Great Nicobar (present record).

For distribution outside India *see* Das and Dev Roy (1984).

Remarks : This species was found to attack live knee roots of *Bruguiera gymnorhiza* and *Rhizophora mucronata* in large numbers in Magar Nallah were salinity was $0.6^0/_{00}$ at the time of collection. The present authors also collected this species in Little Andaman at salinity ranging from $5.15^0/_{00}$ to $32^0/_{00}$ (Das and Dev Roy, *op. cit.*). *S. terebrans* can also withstand freshwater for a considerable period. Mc Neil (1932) reported the occurrence of this species from the freshwater in Brisbane river.

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References

BALASUBRAHMANYAN, R. 1968. Studies on the pholadid marine wood-borer, *Martesia striata* (Linn.). *Proc. Symposium on Mollusca III, Mar. biol. Assoc. India* : 707-711.

DANIEL, A. and SUEBA RAO, N. V. 1982. Distribution pattern of *Martesia stariata* (Linnaeus) in estuarine system of the east and south-west Coast of India. *Rec. zool. Surv. India*, **79** : 303-310.

DAS, A. K. and DEV ROY, M. K. 1980. On the wood-boring molluscs of South Andaman, India. *Rec. zool. Surv. India*, **77** : 179–187.

DAS, A. K. and DEV ROY, M. K. 1981. On the teredinid borers of mangroves of Camorta Island, Nicobar, India. *Bull. zool. Surv. India.* **4** : 391-393.

DAS, A. K. and DEV ROY, M. K. (1984). Report on the marine wood-borers from the mangroves of Neil, Havlock and Peel Island, Ritchie's Archepalogo, Andaman, India. *Bull. zool. Surv. India*, **6** : 327-329.

DAS, A. K. and DEV ROY, M. K. (1984). Marine borers of mangroves of Little Andaman, India. *Bull. Zool. Surv. India*, **6** : 95-98.

KARANDE, A. A. 1978. Marine and timber deterioration in sub-oceanic islands of Andamans, *Indian J. Mar. Sci.* **7** : 39–43.

MC NEIL, A. F. 1932. Crustacean boring pests. *Publication Sydney Harbour Trust* 1932.

MOHAN, M. V. 1981. A new records of *Nausitora dunlopei* Wright (Mollusca : Teredinidae) from the West Coast of India. *Mahasagar—Bull. natn. Inst. Oceanogr.* **14** : 203-205.

RAJAGOPAL, A. S. and DANIEL, A. 1972. Boring organisms of the Great Nicobar island. Mollusca : Teredinidae. *J. Bombay nat. Hist. Soc.* **69** (3) : 676-678.

TIWARI, K. K., DAS, A. K., DEV ROY, M. K. and KHAN, T. N. 1980. On the wood-borers of mangroves of Andaman and Nicobar Islands, India with note on the gallery pattern of some insect borers. *Rec. zool. Surv. India*. **77** : 357–362.

TURNER, R. D. 1966. *A Survey and Illustrated Catalogue of the Teredinidae (Mollusca : Bivalvia)* : 1-265, 65 pls (Museum of the Comperative Zoology, Harvard University), Cambrige, Mass.

WRIGHT, E. P. 1864. On a new genus of Teredinidae. *Trans. Linn. Soc. Lond.*, **24** : 451–454.

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NOTES ON GENERA *ALLOSTOMACHICOLA* YAMAGUTI, 1958, *STOMACHICOLA* YAMAGUTI, 1934 AND *ATHERIA* HAFEEZULIAH, 1975 (DIGENEA : HEMIURIDAE) FROM MARINE FISHES OF INDIA

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ABSTRACT

Detailed discussions on the terminal genital ducts of the type species of three genera, *viz.*, *Allostomachicola* Yamaguti, 1958, *Stomachicola* Yamaguti, 1934 and *Atheria* Hafeezullah, 1975 have been furnished in view of some observations made by Gibson and Bray (1979) in respect of them. *Linguastomachicola* Srivastava and Sahai, 1978 is considered as a synonym of *Stomachicola* Yamaguti, 1934, and *Stomachicola pelamysi* Gupta, R. C. and Gupta, S. P., 1976 is considered conspecific with *S. muraenesocis* Yamaguti, 1934. The type species, *Allostomachicola secundus* (Srivastava, 1939) Yamaguti, 1958, is redescribed in view of new facts making explicitly clear that *Allostomachicola* is sound and valid as against *Stomachicola*, and thus disagreeing with Verma (1973), Gupta, R. C. and Gupta, S. P (1976) and Gupta, V. and Ahmad (1978). Consequently, *S. rauschi* Gupta, V. and Ahmad, 1978 from the fish *Chirocentrus dorab* is considered as a synonym of *A. secundus*, and *S. singhi* Gupta, V. and Ahmad, 1978 from the fish *Acanthurus triostegus* as a synonym of *S. muraenesocis*. *Atheria* Hafeezullah, 1975 is discussed at length *vis-a-vis Erilepturus* Woolcock, 1935 and *Uterovesiculurus* Skrijabin and Guschaskaja, 1954.

INTRODUCTION

The present study has been prompted by Gibson and Bray's (1979) monograph, a study of which reveals that some inaccuracies in the literature about certain hemiurid genera genereally oecurring in Indian seas remain, causing confusion to workers. An attempt has been made here to dispel such confusions, to remedy the errors and to correct the records in the literature.

The material on which this paper is based was collected from various places along the west and east coasts of India. The specimens were first kept in normal saline till relaxed, killed in AFA under cover glass using additional pressure with the tip of a needle, dehydrated in grades of alcohol, stained with Borax Carmine, and mounted in Canada balsam. The specimens have been deposited with the Zoological Survey of India, Calcutta. All the measurements are in microns unless otherwise stated. Drawings have been made with the aid of a camera lucida. Scientific and English names of host fishes have been used according to Chan, Chan and Bathia, Chan & Talbot, Langham Nielsen, and Whitehead (1974) in FAO Species Identification Sheets for Fishery Purposes.

The author has already indicated largely through illustrations in his paper (1980) that *Allostomachicola* Yamaguti, 1958 is distinct from *Stomachicola* Yamaguti 1934 in the details of terminal genital ducts and the

associated structures, position of seminal vesicle with respect to the acetabulum, position and extent of pars prostatica, and lobed and unlobed nature of the ovary. In the light of these differences, he has disagreed with Verma (1973) who maintained that the two genera are congeneric. By the same reasoning, he also disagreed with Gupta, R. C. and Gupta, S. P. (1976) and Gupta, V. & Ahmad (1978) for considering *Allostomachicola secundus* (Srivastava, 1939) in the genus *Stomachicola*. When the manuscript of the author's paper (1980) was sent to press, Gibson & Bray's (1979) remarkable study on the superfamily Hemiuroidea Looss, 1989 had not appeared. They have pointed out that *Stomachicola lepturusi* Gupta, R. C. & Gupta, S. P., 1976 described on the basis of a single specimen recovered from the larval eel *Uroconger lepturus* appears to belong to *Allostomachicola*. Apparently, they have given credence to the pattern of terminal genitalia and the preacetabular position of the seminal vesicle. It seems that this species has not been adequately studied and described in respect of terminal genitalia, number of vitalline tubules and lobation of the ovary due to lack of sufficient material. In *Allostomachicola* the nature of vitelline tubules is such that the tubules of each side (4 on right and 3 on left) get closely intertwined and after pressing during processing give the appearnce of only one tubule on each side. Probably this had happened with the material of Srivastava (1939) collected from the fish *Hemiramphus limbatus*, but when Chauhan (1954) restudied a para/ topotype he discovered that the specimen did have 7 vitelline tubules. Similarly, lobation gets obliterated when the lobes overlap and the specimen is ltoo heavily squashed as might have happened in Gupta and Gupta's (1976) single specimen. Their material, however, needs rechecking. Mamaev (1970) reported *A. secundus* from the fish host *Chirocentrus dorab* in the South China Sea. *Stomachicola rauschi* Gupta and Ahmad, 1978 from *Chirocentrus dorab* in the Bay of Bengal is a synonym of *A. secundus*, and *Stomachicola singhi* Gupta and Ahmad, 1978 from the fish *Acanthurus triostegus* in the Bay of Bengal is a synonym *S. muraenesocis*.

Systematic Account

While defining *Allostomachicola*, Gibson and Bray (1979) chose to include "permanent sinus organ apparently absent. Ovary renifrom ; may be indistinctly lobed". The fact is that a well developed permanent sinus organ is easily detectable even in the young adults as has been shown by the author (1980, Fig. 2). The ovary is distinctly lobed even in immature specimens as shown in Fig. 2 of the present paper. The late Dr. H. W. Manter was once consulted in connection with the specimens having a well developed, sometimes coiled, sinus organ in a thin-walled tumbler-shaped genital atrium, which the present author had identified as *Allostomachicola secundus*. He had strongly suggested the erection of a new genus for such specimens distinct from *Allostomachicola* on this basis only. But in view of Chauhan's (1954) restudy of the para / topotype of *A. secundus*, the author still maintains that such specimens are nothing but *A. secundus*. The detailed shortcomings of the original description by Srivastava (1939) and restudy by Chauhan (1954) are as follows :

Srivastava (1939) did not show the details of terminal genital ducts with the original description of *Stomachicola secundus*. He showed it to be a very short duct. Chauhan (1954) showed in some detail the anterior genitalia in his fig. 13(b) and gonads in fig. 12(c), but he missed the muscular sinus organ lying in the large tumbler-shaped genital atrium. However, a somewhat coiled hermaphroditic duct within the sinus sac and the vitelline tubules 7 instead of two were shown. In the original desceiption the absence of a seminal receptacle has been mentioned but Chauhan (1954) detected its presence. In the opinion of the author Juel's organ is present. On the whole, it largely agrees with the combined descriptions and illustrations of Srivrstava (1939) and Chauhan (1954) except mainly the sttucture of the sinus organ. The author has not been able to examine the holotype or paratype of *A. secundus*, but neveretheless he is inclined to believe that the present material represents *A. secundus*. The confusion about certain structures in this species and ihe new facts about it necessitate its redescription which is provided below :

Allostomachicola secundus (Srivastava, 1939) Yamaguti, 1958

Syn. *Stomachicola rauschi* Gupta, V. and Ahmad, 1978 n. syn. (Figs. 1, 2)

Host : *Chirocentrus dorab* (Forskal), Dorab wolf herring, (Pisces : Chirocentridae)

Location : Stomach

Number of specimens : 2 mature from Bombay (Arabian Sea), collected by Prof. Ather H. Siddiqi of AMU, Aligarh in May, 1963; 1 young adult from Ennore (Bay of Bengal), collected in March, 1975 ; 1 still young from Pondicherry (Bay of Bengal), collected in December 1975 ; 1 immature specimen ftom Visakhapatnam (Bay of Bengal), collected in January, 1966.

Specimens deposited : Z.S.I. Reg. Nos. W 7477/1 to W 7481/1. Description (based on 5 specimens but with measurements on 2 fully mature ones) : Body proper 5.296-7.954 mm long, 1.147-1.498 mm wide at acetabular level, subcylindrical, muscular ; ecsoma 7.114-11.408 mm long, 0.675-1.39 mm wide. Tegument smooth, thick, slight denticulations at places on body proper due to contraction ; tegument of ecsoma smooth ; body plications absent. Acetabulum 931-1242 in diameter, spherical, at 972-1674 from anterior end of body. Oral sucker 495-688 in diameter, spherical, subterminal. Sucker ratio 1 : 1.85-2.0. Pharynx 297-418 long, 255-351 wide, oval. slightly overlapped by oral sucker ; oesophagus short, followed by 'Drüsenamagen' ; caeca forming shoulder, ascending a little anteriorly after bifurcation and then descending into posterior part of body, extending up to posterior end of ecsoma, at places winding ; internal wall of caecum thrown into raised spiral coils.

Testes 445-637, entire, diagonal, globular or oval, immediately posterior to acetabulum. Seminal vesicle 513-876, by 108-256, elongate

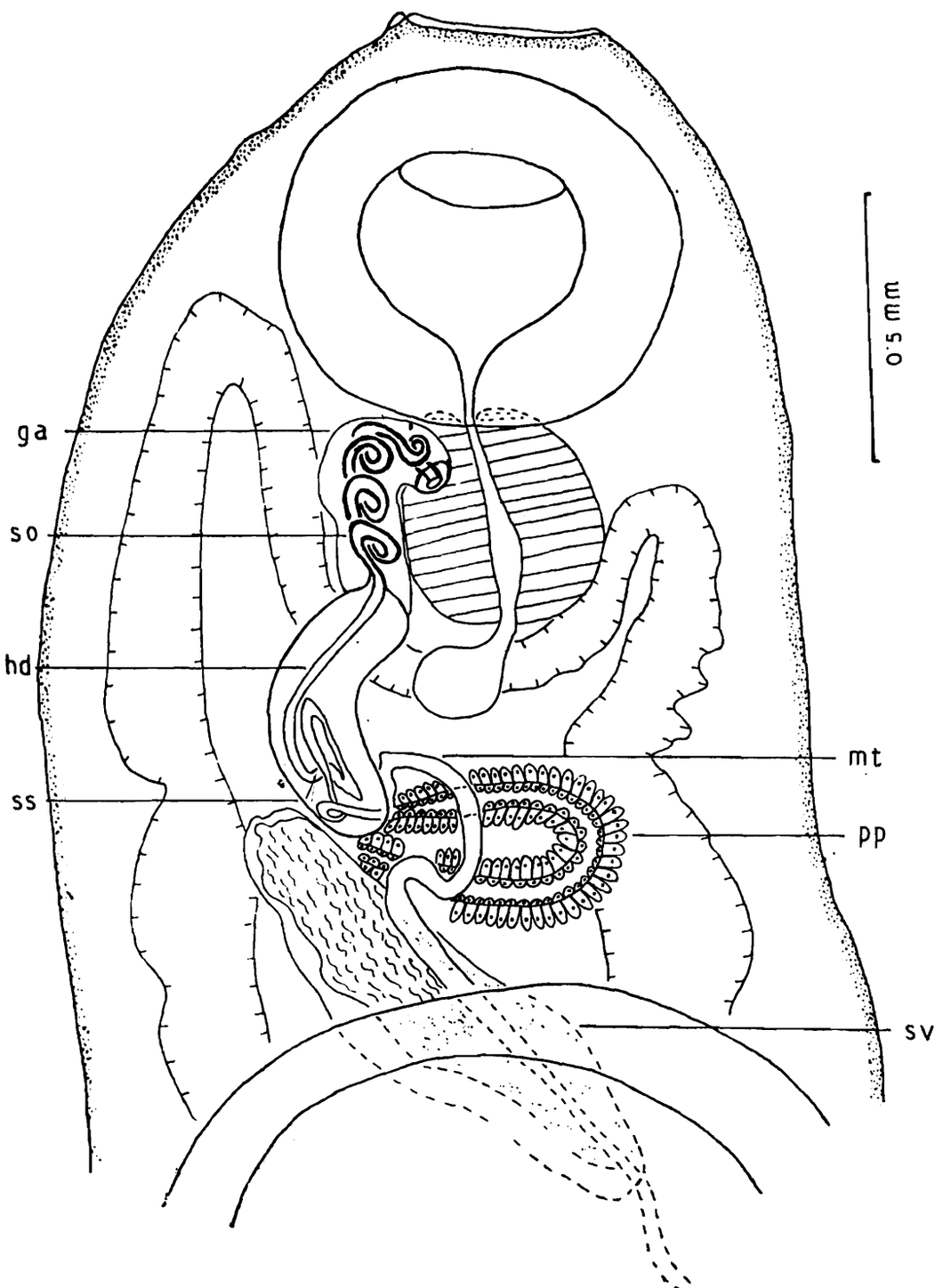

Fig. 1. Forebody of *Allostomachicola secundus* showing details of terminal genital ducts.

oval, thin-walled, straight, dorsal or antero-dorsal to acetabulum ; pars prostatica well developed, highly muscular, curved, surrounded by well developed prostate cells, connected to seminal vesicle by a short aglandular duct ; sinus sac elongate with thin muscular wall, enclosing long, narrow, coiled hermaphroditic duct forming into a long, wide, highly muscular, much coiled (may be straight in young adult specimens) permanent sinus organ, usually lying into long, thin-walled, tubular genital atrium. Genital pore ventral to base of oral sucker to anterior part of pharynx.

Ovary 432-607 by 351-486, distinctly four-lobed, (lobes separate and joined only in centre even in immature specimens (Fig. 3), post-acetabular, post-testicular, median. Fully developed. Juel's organ present immediately posterior to ovary. Uterine seminal receptacle also formed near oviduct immediately posterior to Juel's organ. Vitelline tubules 7, 4 on right and 3 on left, very long, narrow, much convoluted, sometimes interwined closely and tightly, some extending anterior while others posterior to ovary, sometimes descending into ecsoma also. Intricate coils of uterus mosly intercaecal, median, descending

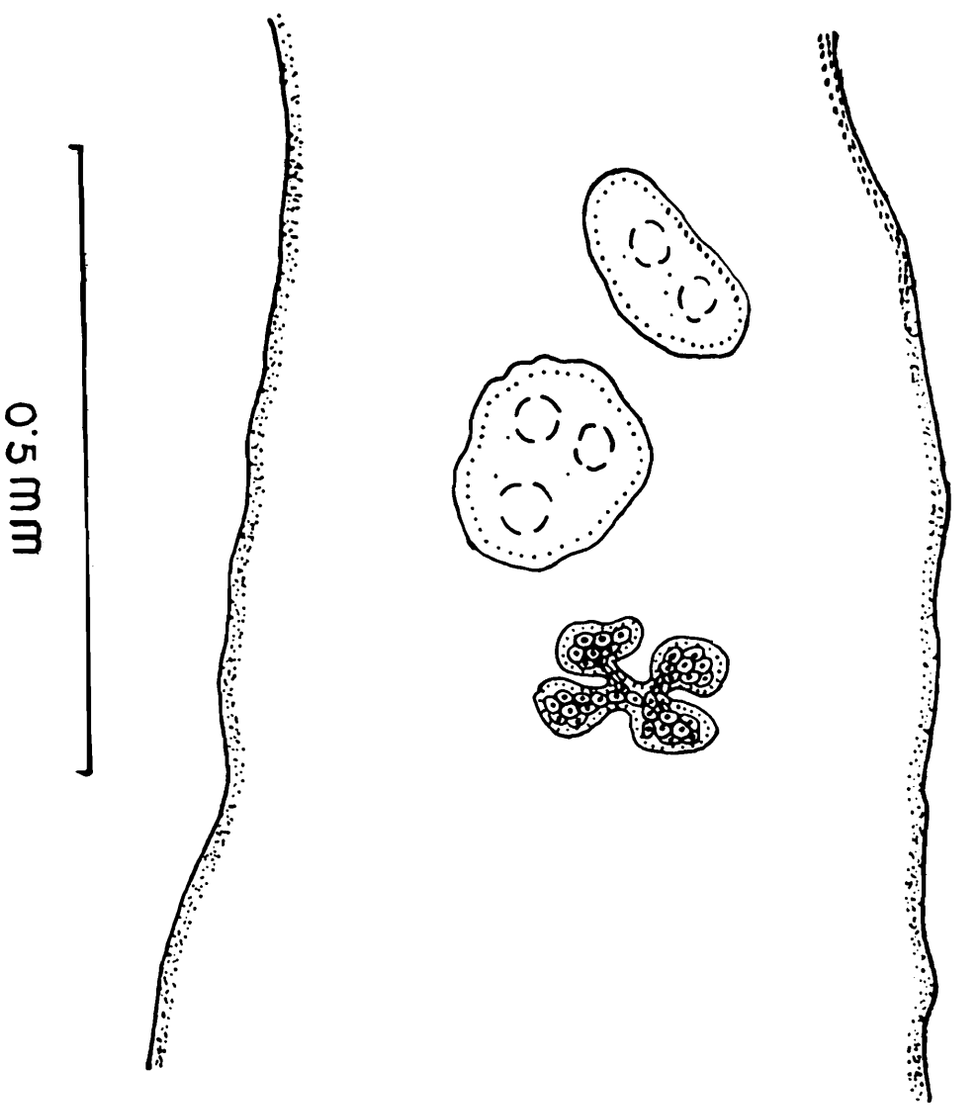

Fig. 2. Anterior part of hindbody of an immature specimen of *A. secundus* showing lobed ovary.

into ecsoma to varying extents. Metraterm differentiated, uniting with anterior end of pars prostatica at base of sinus sac to form hermaphroditic duct. Eggs 14-19 by 7-8. Excretory vesicle Y-shaped, arms uniting dorsal to oral sucker : excretory pore terminal.

It is to be noted that Srivastava (1939) collected the specimens of *A. secundus* from *Hemiramphus limbatus* Cuv. & Val., but the present author collected only from *Chirocentrus dorab* from the Arabian Sea and the Bay of Bengal, although almost all the species of *Hemiramphus* occurring along the west and east coasts of India were examined.

Thus, the diagnosis of *Allostomachicola* Yamaguti, 1958 should include the presence of a permanent sinus organ and distinctly lobed ovaty.

Stomachicola Yamaguti, 1934

Syn. *Pseudostomochicola* Skrjabin and Guschanskaja, 1954
Acerointestinecola Jehan, 1970
Cameronia Bilquees, 1971
Segmentatum Bilqees, 1971
Cestodera Bilqees, 1971
Indostomachicola Gupta and Sharma, 1973
Linguastomachicola Srivastava and Sahai, 1978 n. syn.

Stomachicola muraenesocis Yamaguti, 1934

(Fig. 3)

Syn. *Pseudostomachicola rubea* (Linton, 1910)
P. magna (Manter, 1931)
Acerointestinecola karachiensis Jahan, 1970
Cameronia octovitellarii Bilquees, 1971
C. pakistani Bilquees, 1971
Segmentatum karachiensis Bilqees, 1971
S. qadrii Bilqees, 1971
S. cinerensis Bilqees, 1971
S. magnaesophagustum Bilqees, 1971
Cestodera gastrocecus Bilqees, 1971
C. unicecus Bilqees, 1971
Indostomachicola kinnei Gupta and Sharma, 1973
Stomachicola mastacembeli Verma, 1973
Stomachicola pelamysi Gupta and Gupta, 1976
Stomachicola chauhani Pandey and Tiwari, 1984 n. syn.
Linguastomachicola serpentina Srivastava and Sahai, 1978 n. syn.

Hosts and localities : *Congresox talabonoides* (Bleeker), Indian pike-conger, (Pisces : Muraenesocidae)

Syn. : *Muraenesox talabonoides* (Bleeker) ; examined at Bombay (Arabian Sea) by Prof. Ather H. Siddiqi of AMU, Aligarh in May, 1963 ; *Muraenesox cinereus* (Forskàl), Daggertooth pike-conger, (Pisces : Muraenesocidae) ; examined at Veraval and Kandla (Arabian Sea), Chandipur, Machilipatnam, Kakinada and Yanam (Bay of Bengal) in May, 1965, November, 1978,

May 1972, and January-February 1975 respectively.

Location : Stomach

No. of specimens : 2+2+1+3+2+9+1 from respective localities, on 15 slides.

Specimens deposited : Z. S. I. Reg. Nos. W 7482/1 to W 7496/1

This is the type species of the genus *Stomachicola* Yamaguti, 1934. It has smooth body surface ; postacetabular seminal vesicle ; enormously long, winding, tubular pars prostatica connected to seminal vesicle by a short aglandular duct surrounded by well developed prostatic gland cells becoming less developed on only a short distal part a short hermaphroditic duct in a short sinus sac near pharyns ; sinus organ not distinct, may be rudimentary, in several specimens of this species the author has examined so far the formation of distinct sinus organ was not detected ; and an unlobed reniform or oval ovary. The so-called seminal receptacle just

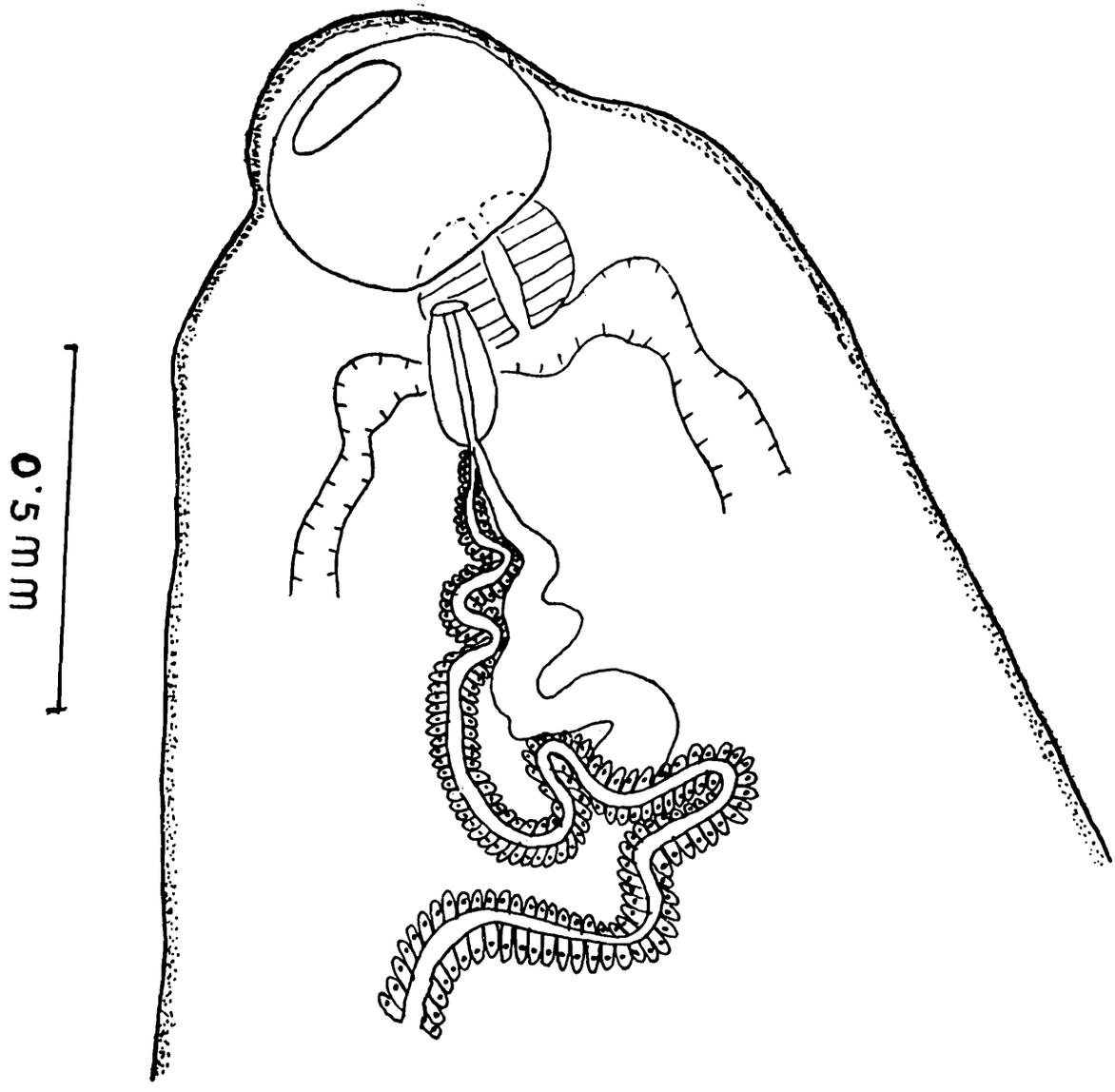

Fig. 3. Forebody of *Stomachicola muraenesocis* showing details of terminal genital ducts.

adjacent to the ovary posteriorly is probably 'Juel's organ' Vitelline reservoir located between ovary and 'Juel's organ ; vitellaria 7, very long winding (not intertwining) tubules descending into ecsoma laterally to a great extent, one or two tubules ascending ; uterine coils close, descending into ecsoma to varying distances. The genital opening usually lies in the pharyngeal area or even behind it depending on state of contraction or relaxation at the time of fixation. Excretory arms are united dorsal to oral sucker.

Stomachicola pelamysi Gupta, R. C. and Gupta, S. P., 1976, has been reported from the tuna, *Pelamys chilensis*, from Quilon, Arabian Sea. It has been described on the basis of only one specimen, and differentiated from the type species *S. muraenesocis* in two characters only ; the genital opening behind caecal bifurcation and diagonal testes. As these characters show up in some badly preserved specimen of the type species also, *S. pelamysi* is considered nothing but *S. muraenesocis*. *Linguastomachicola* Srivastava and Sahai (1978) from the eel *Muraenesox talabonoides* from the Arabian Sea, is based on a tongue-like structure associated with the oral sucker. This structure is almost certainly an artifact. Thus, *Linguastomachicola* is considered congeneric with *Stomachicola*, and *L. serpentina* Srivastava and Sahai, 1978 conspecific with *S. muraenesocis*. Pandey and Tiwari (1984) described *Stomachicola chauhani* in the fish *Formio* sp. from Bombay coast. This species has been differentiated from the type in the position of genital pore only, which character is considered as variation only. Therefore this also falls a synonym of the type species, *S. muraenesocis*.

Atheria Hafeezullah, 1975

Atheria zakiae Hafeezullah, 1975

(Fig. 4)

Hosts and localities : *Pomadaysis hasta* (Bloch), lined silver grunt, (Pisces : Pomadaysidae), from Visakhapatnam (Bay of Bengal) ; examined in October 1964 ; *Johnius carutta* Bloch, karut croaker, (Pisces ; Sciaenidae), from Madras (Bay of Bengal) ; examined in November 1964 ; *Sillago sihama* (Forskål), silver sillago, (Pisces : Sillaginidae), from Puri (Bay of Bengal) ; examined in June 1972 ; *Therapon jarbua* (Forskål). jarbua therapon, (Pisces : Theraponidae), from Gopalpur (Bay of Bengal) ; examined in November 1973.

Location : Stomach

No. of specimens : 2+1+1+1 from respective localities, on 5 slides.

Specimens deposited : Z. S. I. Reg. Nos. W7497/1 to W7501/1

Gibson and Bray's (1979) views made the author re-examine the material of this species. Certain discrepancies inadvertently occurred in the original description of this species in respect of the hermaphroditic duct and the genital atrium as well as the true nature of the seminal receptacle. The terminal part of uterus is differentiated as a

metraterm which is highly muscular and a part of it swollen as a side outpocket. The metraterm then continues as a tube to join the pars prostatica to form a short hermaphroditic duct enclosed in a sinus sac. The hermaphroditic duct ultimately enters a sinus organ lying in a tubular genital atrium. The sinus sac and the genital atrium jointly give the appearance of a barrel-shaped structure. In all the five specimens the nature of the seminal receptacle is (as against original report) that there is an isolated globular mass of sperm cells surrounded by a muscular wall behind the ovary and very near to the Mehlis' gland complex and that it is not like the one present in *S. muraenesocis*, *A. secundus* and *Uterovesiculurus* spp. It is connected to the ovary by a short duct. In one specimen it is lying anterior to the ovary. By all possibilities and at best it can be called 'blind seminal receptacle'. Moreover, there is no indication of the formation of uterine seminal receptacle in this species. Unfortunately there is no additional material for serial sectioning.

Hafeezullah (1975) proposed *Atheria*. It was compared with and distinguished from the closely allied genera *Erilepturus* Woolcock,

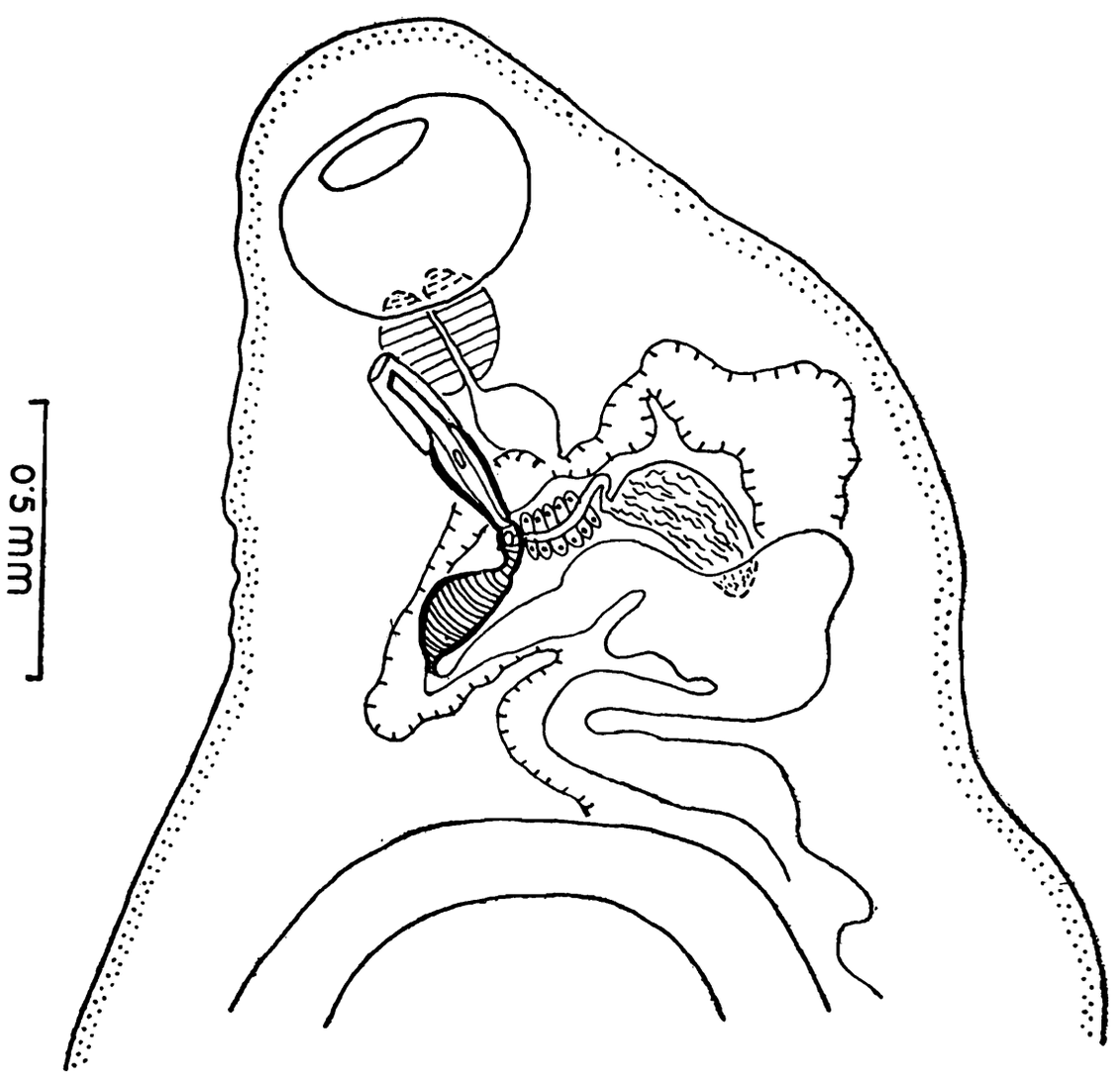

Fig. 4. Forebody of *Atheria zakiae* showing details of terminal genital ducts.

1935 and *Uterovesiculurus* Skrjabin and Guschankaja, 1954. In view of the opinion of Gibson & Bray (1979), it may be added that the gulf of difference between the terminal uterine swelling in the genera *Uterovesiculurus* and *Atheria* is quite wide. In the former the swelling is vesicular, its wall being as thin as that of uterus itself and abruptly joins the male duct whereas in the latter a fairly large portion of the uterus is differentiated as a highly muscular metraterm initially with the muscular swelling as a side outpocket and later again continues as a tube before it joins the male duct to form the hermaphroditic duct. In *Uterovesiculurus* and *Erilepturus*, probably 'Juel's organ' is present and there is a distinct tendency for the formation of uterine seminal receptacle whereas in *Atheria* the 'Juel's organs' is not present and the tendency for the formation of uterine seminal receptacle is lacking. It may also be emphasised that the shortening of the length of the aglandular part of the pars prostatica is associated with the preacetabular position of seminal vesicle. The tubular shape of the base of sinus sac in *Atheria* as compared to the swollen base of this structure in *Uterovesiculurus* and *Erilepturus* is another character which can be used to distinguish the former from the latter.

Acknowledgements

Thanks are due to Dr. B. K. Tikader, Director, Zoological Survey of India, Calcutta for providing laboratory facilities, and to Dr. A. K. Ghosh, Deputy Director, for taking interest in the study. The author is grateful to Prof. Ather H. Siddiqi of AMU, Aligarh, India, for providing some material which has been used in the preparation of this paper. Special thanks are due to Dr. D. I. Gibson of the British Museum, London, for his valuable suggestions in the finalisation of this study.

References

Chan, W. 1974. In : *FAO Species Identification Sheets for Fishery Purposes.* Vol. IV, Family Theraponidae. Food and Agricutural Organization of the United Nations, Rome.

Chan, W. and Bathia, U. 1974. In : *FAO Species Identificatiou Sheets for Fishery Purposes.* Vol. III, Family Sciaenidae Food and Agricultural Organization of the United Nations, Rome.

Chan, W. and Talbot, F. 1974. In : *FAO Spccies Identification Sheets for Fishery Purposes.* Vol. III, Family Pomadaysidae Food and Agricultural Organization of the United Nations, Rome.

Chauhan, B. S. 1954, Studies on the trematode fauna of India. Part IV. Subclass Digenea (Prosostomata), (a revision of Hemiuroidea from Indian region). *Rec. Indian Mus.*, **51** : 281-393.

Gibson, D. I. and Bray, R. A. 1979. The Hemiuroidea : terminology, systematics and evolution. *Bull. Br. Mus*, (Nat. Hist). **36** : 35-146.

Gupta, R. C. and Gupta, S. P. 1976. On two new species of genus *Stomachicola* Yamaguti, 1934 from the stomach of fishes from Quilon, Kerala. *Indian J. Zoot.*, (1974), **15** : 7-10.

GUPTA, V. and AHMAD, J. 1978. Digenetic trematodes of marine fishes, IX. On two new species of the genus *Stomachicola* Yamaguti. 1934 (Trematode : Hemiuridae) from marine fishes of Puri, Orissa. *Acta Parasitol. pol.*, **25** : 211-215.

HAFEEZULLAH, M. 1975. Two new trematodes (Digenea : Hemiuridae) of marine fishes from east coast of India. *Dr. B. S. Chauhan Comm. Vol.* : 203-210.

HAFEEZULLAH, M. 1980. On the status of some genera of the subfamilies Stomachicolinae Yamaguti, 1958. Dinurinae Looss, 1907 and Prolecithinae Yamaguti 1971. (Digenea : Hemiuridae). *Bull. zool. Surv, India*, **3** : 69-76.

LANGHAM, N. 1974. In : *FAO Species Identification Sheets for Fishery Purposes.* Vol. IV, Family Sillaginidae. Food and Agricultural Organization of the United Nations, Rome.

MAMAEV, YU. L. 1970. Helminths of fish of the Gulf of Tonkin. In : *Helminths of Animals of South-East Asia.* Izdat. Nauk, Moscow, 127-190. (In Russian).

NEILSEN, J. 1974. In : *FAO Species Identification Sheets* for *Fishery Purposes.* Vol. III, Family Muraenisocidae. Food and Agricultural Organization of the United Nations, Rome.

PANDEY, K. C. and TIWARI, S. K. 1984. On three new digenetic trematodes from marine fishes from Bombay coast, India. *J. zool. Soc. India*, (1973), **35** (1 & 2) 8 : 60-65.

SRIVASTAVA, H. D, 1939. A new parasite—*Stomachicola secundus* of the subfamily Dinurinae Looss, 1907. *Indian J. Vet. Sc. Anim. Husb.*, **9** : 77-79.

SRIVASTAVA, H. D. and SAHAI, D. 1978. Trematodes of Indian fishes. Part 4. Four new genera, one subfamily and one new species of *Ophiorchis* Srivastava, 1933 (Family Hemiuridae Luhe, 1901). *Proc. Nat. Acad. Sci. India.* B **48** : 39-52.

VERMA, S. L. 1973. Helminth parasites of freshwater fishes. Part XI. On a new trematode, *Stomachicola mastacembeli* n. sp. from the intestine of freshwater fish *Mastaeembelus armatus. Zool. Anz.* Leipzig. **190** : 167-170.

WHITEHEAD, P. J. P. 1974. In : *FAO Species Identification Sheets for Fishery purpose.* Vol. I, Family Chirocentridae. Food and Agricultural Organization of the United Nations, Rome.

ABBREVIATIONS

ga : genital atrium
hm : hermaphroditic duct
pp : pars prostatica
so : sinus organ
ss : sinus sac
sv : seminal vesicle
ut : uterus

Bull. zool. Surv. India, 7 (2-3) : 267-270, 1985

FIRST REPORT ON THE CENTIPEDES COLLECTED FROM UTTAR PRADESH TERAI, INDIA (CHILOPODA : SCOLOPENDRIDAE)

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ABSTRACT

Present paper deals with the seven species of Scolopendrid centipedes collected during mopping up survey of Lakhimpur Kheri and Pilibhit districts of U. P. Terai, India.

INTRODUCTION

As a sequel to the policy of the Department to conduct 'mopping up survey' of the fauna of U. P. Terai, India, the authors made their first centipede hunt in the distts Lakhimpur Kheri and Pilibhit during February-March 1984, and Second in March, 1985.

Centipede fauna of India in general and Uttar Pradesh, in particular has received very little attention after Attems (1930). Recently Khanna and Kumar (1984) have given an annotated list of Indian species of Scolopendrid centipedes, alongwith the centipede fauna of Western Himalayas, U. P. None of the species, so far known from the Indian continent, had been reported from U. P. Terai except *Scolopendra morsitans* Linn. which has a cosmopolitan status of distribution.

During the present survey 96 examples of scolopendrid centipedes have been collected and are referrible to four genera and seven species, out of which 5 species are a new record from the region and one *R. I. lithobiodes*, a new addition to the Indian Scolopendrid fauna.

Terai (or Tarai) (i.e. "Moist Land") the name given to the strip of formerly marshy land stretching parallel to lower Himalayas in the Northern India. It extends roughly from Jamuna (Yamuna) river on the west to Brahmputra, in the east, and a large portion of it lies in Nepal. The name is also officially used for subdivision of Nainital district, in Uttar Pradesh. At its northern edge, where the often riverless forest tract of "bhabar" (coarse gravel deposits) ends, a series of springs burst from the surface and these increasing and uniting in their progress, forms the numerous streams that intersect the Terai and were responsible for its marshy character. The Gagra (Ghagra) is the great river of the Terai proper and is navigable from the Himalayas Foot Hills. Terai in

Bengal (both west and northern part of Bangla Desh) is known as 'Duars'. (*Encyclopaedia Britannica*, Vol. 21, p. 860).

Terai, in Uttar Pradesh comprises of eight districts viz. Gorakhpur, Bahraich, Gonda, Lakhimpur Kheri, Pilibhit, Sitapur, Basti, and Deoria, in addition to lower parts of district Nainital.

Collection data :

Sl. no.	Date	Place	Dist.	No. of Exs.	Remarks
1.	10.3.1984	Vill. Ramapura	Lakhimpur Kheri	40	Old Brick Kiln
2.	11.3.1984	,,	,,	20	,,
3.	13.3.1984	Vill. Chhachu	,,	1	,,
4.	12.3.1984	Sitapur Road	,,	16	,,
5.	22.2.1984	Berreilly Rd.	Pilibhit	4	under stones
6.	23.2.1984	,,	,,	9	,,
7.	27.2.1984	Kasua (Puranpur)	,,	4	2

All *J. C. Tripathi* Coll.

1. **Scolopendra amazonica** (Bucherl), 1946

**Material examined* : 1(2)

Remarks : A controversial species, widely distributed, occurring sympatrically with *S. morsitans* Linn. The validity of this species has been experimentally proved, by Lewis (1966, 1969 and 1970) and systematically advocated by Jangi (1955 and 1959) but taxonomically rejected by Wurmli (1975). However, Jangi and Dass (1984) still regard it as a separate species. The present authors have collected only one specimen of this species, which is characterised, and separated from *morsitans*, by the absence of a tarsal spur on 20th pair of walking legs, from dist. Lakhimpur Kheri, U. P. Terai, for the first time.

2. **Scolopendra morsitans** Linnaeus, 1758

Material examined : 3(2) ; 7(3).

The only species that was already on record from U. P. Terai (Gravely, 1910) from dist. Gorakhpur, is now collected from dist. Lakhimpur Kheri.

Distribution : Cosmopolitan.

3. **Cormocephalus dentipes** Pocock, 1891

Material examined : 35(1) ; 11(2) ; 1(3) ; 16(4) ; 5(6) and 4(7).

Cormocephalus dentipes is a dark purplish black endemic species (Type Locality : Bengal) redescribed by Jangi and Dass (1980), now finds its range extended to U. P. Terai.

Note : Recovery of 72 examples of *C. dentipes*, by the authors from U. P. Terai, during the month of Feb-March 1984, again confirms the authors observation on seasonal incidence within the genus *Cormocephalus* (Khanna and Tripathi, 1984).

Distribution : West Bengal : Calcutta & Parasnath ; Delhi ; U. P. Himalayas : Pauri, Nainital and Dehradun ; U. P. Terai ; Pilibhit and Lakhimpur Kheri distt. ; Madhya

* figures outside brackets under material examined denote the number of examples studied and those within parentheses are the serial numbers of locality of collection tabulated above.

Pradesh ; Balaghat ; Orissa : Koenjharghar and Phulbani distt.

4. **Rhysida nuda immarginata** (Porat), 1876

Material examined : 1(1) ; 1(2) ; and Chautora Vill., Gonda Road, Bahraich dist, 22.iii.85, 1 ex ; *J. C. Tripathi*, Coll.

A polytypic species *R. nuda* found throughout the tropical world, is not confined in India, only to Western Ghats in Deccan as stated by Jangi and Dass (l. c.) but way back in 1910, Gravely recorded it from U. P. and Bengal ; and from Andaman Isls by Ahmed (1980). Now the present authors record subspecies *R. n. immarginata* from U. P. Terai for the first time.

Distribution : West Bengal : Darjeeling, Punkhabari, Calcutta, Jessore : and Nareil ; Andaman Isls ; Assam : Sureil ; U. P. : Nainital and Chamoli (Gowcher) ; U. P. Terai, Lakhimpur Kheri, Bahraich.

5. **Rhysida longipes longipes** (Newport), 1845

Material examined : 2(4) ; 4(5) ; 3(6).

A cosmopolitan species, recorded for the first time from U. P. Terai, India.

Distribution : Madhya Pradesh : Durg dist. ; Maharashtra : Amrawati and Nagpur ; Karnataka : Kumta and Coondapur ; Goa, West Bengal ; Calcutta ; Andaman Isls ; U. P. Plains : Lucknow, Ranigunge ; U. P. Terai ; Lakhimpur Kheri and Pilibhit.

6. **Rhysida lithobiodes lithobiodes** (Newport), 1845

Material examined : 1(6).

Of the 5 known subspecies of *R. lithobiodes* (Newport) viz. *R. l. paucidens*, *R. l. abeyssinica*, *R. l. longopito*, *R. l. trispinosus* and *R. l. lithobiodes* only two were, so far, reported to occur in India. The present studies reveals the occurence of *R. l. lithobiodes*, hitherto unknown from India, now from dist. Pilibhit, U. P. Terai, India.

Distribution : India, China, Burma.

7. **Otostigmus ruficeps** Pocock 1890

Material examined : 1(2).

Hitherto known only from Tamil Nadu (Madras), now collected from Dist. Lakhimpur Kheri.

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LITERATURE CITED

ATTEMS, G. 1930. Scolopendromorpha, *Das Tierr.*, **54**(2) : 1-308.

AHMED, S. 1980. On a collection of centipedes (Scolopendromorpha : Scolopendridae and Cryptopidae) from Andaman and Nicobar Isls. *Rec. Zool. Surv. India*, **77** : 25-30.

GRAVELY, E. H. 1910. The distribution of Oriental Scolopendridae. *Rec. Indian Mus.*, **5**(1) : 161-172.

GRAVELY, F. H. 1912. Zoological results of Abhor Expedition (1911-12). v. Scolopendridae) *Rec. Indian Mus.*, **7**(1) : 69-73.

JANGI, B. S. 1955. On some aspects of morphology of centipipede *Scolopendra morsitans* Linn. (Scolopendridae), *Ann. mag. nat. Hist.*, **8** : 597-607.

JANGI, B. S. 1959. Further notes on the taxonomy of the centipede *Scolopendra morsitans* Linnaeus (Scolopendridae) *Ent. News.*, *LXX*(10) : 253-257.

JANGI, B. S. AND DASS, C. M. S., 1980. Revisional notes on the taxonomy of Indian centipede *Cormocephalus dentipes* Pocock, with redefinition of species (Chilopoda : Scolopendromorpha : Scolopendridae). *J. nat. Hist.*, **14** : 49-53.

JANGI, B. S. AND DASS, C. M. S., 1984. Scolopendridae of Decan. *J. scient. ind. Res.*, **43** : 27-54.

KHANNA, V. AND KUMAR, A., 1984. Scolopendrid centipeds of Western Himalayas (U. P.), with an annotated list of Indian species (Chilopoda : Scolopendromorpha : Scolopendridae). *Uttar Pradesh J. Zool.*, **4**(1) : 83-98.

KHANNA, V. AND TRIPATHI, J. C. 1984. Observations on the seasonal incidence within the centipede genus *Cormocephalus* (Chilopoda : Scolopendridae). *Uttar Pradesh J. Zool.*, **4**(2) : 217-219.

LEWIS, J. G. E., 1966. The taxonomy and biology of the centipede *Scolopendra amazonica* in Sudan. *J. Zool. Lond.*, **149** : 188-203.

LEWIS, J. G. E., 1968. Individual variations in the population of the centipede *Scolopendra amazonica* from Nigeria and its implications for methods of taxonomic discrimination in the Scolopendridae. *J. Linn. Soc.*, (Zool.), **47** : 315-326.

LEWIS, J. G. E., 1970. The biology of *Scolopendra amazonica* in Nigerian Guinea Savannah. *Bull. Mus. Nat. Hist. nat.*, **2**(4) (2) : 85-90.

WURMLI, M., 1975. Systemetische Krieterien in der Gruppe von *Scolopendra morsitans* Linne, 1758 (Chilopoda : Scolopendridae). *Dtsch Ent. Z., N. F.* 22 (I-III) : 201-206.

Bull. zool. Surv. India, 7 (2-3) : 271-284, 1985

A TAXONOMIC REVISION OF THE NEMATODE SPECIES (DORYLAIMIDA) REPORTED BY KHERA (1970) FROM INDIA

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Zoological Survey of India, Calcutta

ABSTRACT

Out of 11 nematode species reported by Khera (1970) from the bank of still and running water from India, the specimens of 5 species are available in the National Zoological Collections of the Zoological Survey of India, Calcutta. These specimens were re-examined and it was noted that the taxonomical status of some needed revision. Moreover, the descriptions and illustrations as provided by Khera were also inadequate. The present paper reports the changes in the taxonomical status of the following species : *Dorylaimus stagnalis* Dujardin, 1845 from Jodhpur as *Laimydorus finalis* Thorne, 1975 ; *Dorylaimus ruwenzorii* apud Khera, 1970 as *Mesodorylaimus* sp, ; *Dorylaimus multialaeus* Khera, 1970 transferred to *Laimydorus*. The male of *Eudorylaimus odhneri* apud Khera, 1970 along with an unidentified female on the same slide represents a new species *Laimydorus kherai*.

The status of *Dorylaimus stagnalis* apud Khera, 1970 partim from Lucknow, a single female of *Eudorylaimus odhneri* and *Actinolaimus omercooperi* remains unchanged.

INTRODUCTION

Khera (1970) reported 11 nematode species including two new of the Order Dorylaimida from the banks of still and running waters in Uttar Pradesh, Rajasthan and Kerala. These species were inadequately described and illustrated and for some only the body dimensions were provided. The specimens were deposited in the Nematode Collection of the Zoology Museum of Jodhpur University, Rajasthan where Dr. Khera was a Reader in the Zoology Department till 1969. However, in the same year he joined the Zoological Survey of India, Calcutta. Subsequently he shifted most of his nematode slides from Jodhpur and registered the same in the National Zoological Survey of India, Calcutta.

The present author was able to trace some of the registered specimens of five species reported by Khera (1970). A study of these revealed that the identification of some species was not correct. Unfortunately, the majority of the specimens were not properly preserved.

The present paper reports the revised identification of the specimens of five species, out of 11, reported by Khera (1970). The following table provides the present status of

all the species. The asterisk indicates that the specimens of the species are not traceable. The status of the nontraceable species has not been changed except *Labronema* sp. which was identified only on a single juvenile specimen.

Status of the species reported by Khera (1970)

Past	Present
1. *Dorylaimus stagnalis* Dujardin, 1845 from Lucknow and Jodhpur	(i) Lucknow population = *D. stagnalis*
	(ii) Jodhpur population = *Laimydorus finalis* Thorne, 1975
2. *Dorylaimus ruwenzorii* de Coninck, 1935 (= *Mesodorylaimus ruwenzorii*) from Pachhapadra (Rajasthan)	*Mesodorylaimus* sp.
3. *Dorylaimus multialaeus* Khera, 1970 from Lucknow	*Laimydorus multialaeus* (Khera, 1970) N. Comb.
4. *Mesodorylaimus biroi** (Daday, 1899) Andrássy, 1959	*M. biroi*
5. *Mesodorylaimus centrocercus** (de Man, 1880) Geraert, 1966	*M. centrocercus*
6. *Eudorylaimus odhneri* (Allgen, 1950) Andra'ssy, 1959	(i) *Eudorylaimus odhneri*
	(ii) *Laimydorus kherai* n. sp.
7. *Eudorylaimus udaipuriensis** Khera, 1970	*Eudorylaimus udaipuriensis*
8. *Labronema* sp. (juvenile)	?
9. *Actinolaimus omercooperi* Filipjev, 1931	*Actinolaimus omercooperi*
10. *Actinolaimus costatus** Schneider, 1935	*Actinolaimus costatus*
11. *Nygolaimus intermedius** (de Man, 1880)	*Nygolaimus intermedius*

Dorylaimus stagnalis Dujardin, 1845

(Fig. 1, E-H)

Measurements :

Females (4) : L = 3.79-4.35 mm ; a = 38-46 ; b = 4.5-5.6 ; c = 17-20 ; V = $^{14\text{-}15}_{40\text{-}44}{}^{12\text{-}17}$.

Males (3) ; L = 3.04-3.30 mm ; a = 30-33 ; b = 4.2-4.8 ; c = 78-87 ; T = 59-65.

DESCRIPTION

Female : Body straight or slightly ventrally curved posterior to vulva, tapering gradually towards both extremities. Cuticle finely striated, 5-9 μm thick (thickest on tail), marked with 32-34 longitudinal lines in the middle and at base of oesophagus. Lateral chords $\frac{1}{4}$th-$\frac{1}{3}$rd of the corresponding body-width near middle. Dorsal and ventral body pores 6-8 and 25-27 respectively. Lateral body pores 89-99 (2 females), of which 18-21 in oesophageal region, 68-76 in intestine and prerectum region and 3 in caudal region.

Lip region rounded, slightly marked by a depression, 1/1.45-1/5.5 body-width at base

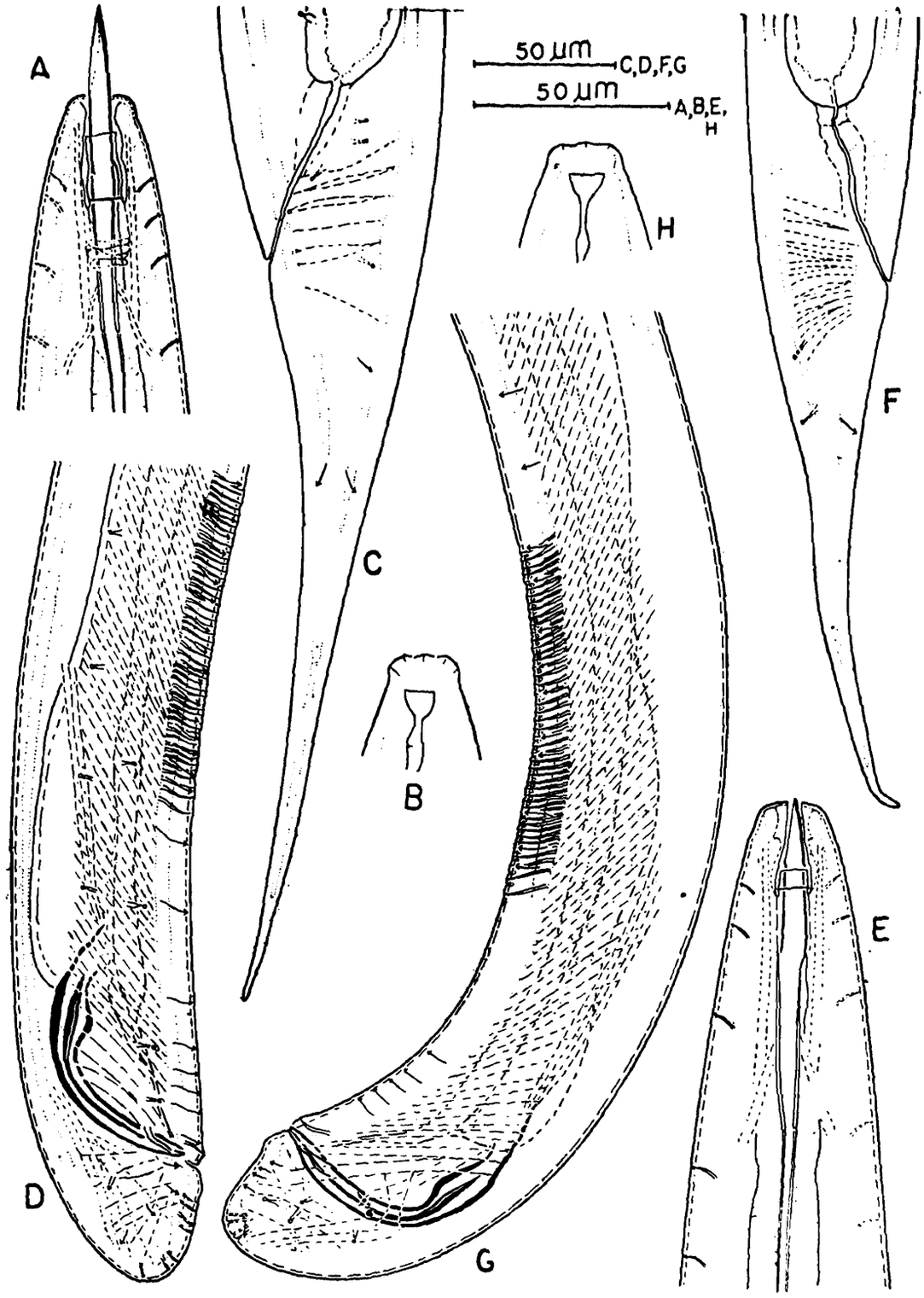

Fig. 1. A—D : *Laimydorus finalis* Thorne, 1975, A—Anterior end; B—Surface view of anterior end, C—Female tail, D—Posterior region of male. E—H : *Dorylaimus stagnalis* Dujardin, 1845, E—Anterior end, F—Female tail, G—Posterior region of male, H—Surface view of anterior end.

of oesophagus. Lips amalgamated bearing the usual number of papillae. Amphids stirrup-shaped, apertures occupying 9-10 μm or slightly less than half of the corresponding body-width and 7-8 μm from anterior end. Sensillar pouches 16-18 μm from amphidial slits.

Odontostyle 40-45 μm or 2.0-2.2 lip region-widths long, aperture 16-18 μm or 35-41% of the odontostyle length. Guiding ring 22-24 μm or 1.0-1.1 lip region-width from anterior end. Odontophore 46-53 μm or about 1.0-1.2 times the odontostyle length. Basal expanded part of oesophagus occupies 51-53% of the oesophageal length. The locations of the oesophageal gland nuclei and their orifices could not be observed. Nerve ring 186-200 μm or 24-26% of the neck region from anterior end. Oesophago-intestinal disc present. Cardia-conoid, enveloped by intestinal tissue. Prerectum 230-295 μm or 5.0-7.0 anal body-widths long. Rectum 60-65 μm or 1.3-1.4 anal body-widths long.

Vulva transverse. Vagina 43-45 μm or extending less than half way across body. Reproductive system amphidelphic. Uterus and oviduct separated by a sphincter. Oocytes arranged in a single row except in the growth region. Tail elongate, tapering gradually, 200-222 μm or about 5 anal body-widths long, with 3 caudal pores on each side.

Male : Similar to female in general shape and morphology except for the tail and male reproductive system. Odontostyle 42-45 μm or 2.0-2.2 lip region-widths long, aperture 15-17 μm or 34-38% of odontostyle length. Odontophore 45-49 μm or about 1.1 times the odontostyle length. Reproductive system typical. Supplements consist of an adanal pair and a series of 42-48 contiguous ventromedians. The first ventromedian supplement situated at about 2.5 anal body-widths from the cloacal opening. Subventral papillae 17-21, irregularly spaced. Spicules 98-108 μm or 1.7-2.1 anal body-widths long when measured along the curved median line. Lateral guiding pieces 18-21 μm long. Copulatory muscles 68-80, extending beyond the supplement region. Prerectum 350-440 μm or 6.4-8.6 anal body-widths long. Tail bluntly rounded, 35-39 μm or 0.6-0.7 anal body-width long, with 10-12 caudal pores on each side.

Habitat and locality : From the banks of ditches at Nadwa and Pyagpur House area, Lucknow (U. P.)

Remarks : Khera (1970) identified these specimens as *D. stagnalis* from Lucknow and reported them along with the misidentified population from Jodhpur. The present study of the Lucknow population confirms that this population may be accommodated under *D. stagnalis*. However, these specimens differ from *D. stagnalis* in having slightly rounded lip region and shorter odontostyle.

Mesodorylaimus sp.

Syn. **Dorylaimus ruwenzorii** apud Khera, 1970

Nec **Dorylaimus ruwenzorii** De Coninck, 1935

= **Mesodorylaimus ruwenzorii** (De Coninck, 1935) Andrássy, 1959

(Fig. 4, A-B)

Measurements :

Female (1) : L = 1.22 mm ; a = 42 ; b = 5.0 ; c = 18.4 ; $V = {}^{12}44.4{}^{15}$.

DESCRIPTION

Female : Body irregularly curved upon fixation, tapering gradually towards both ends. Cuticle about 2 μm thick, finely striated transversely. Lateral chords 1/3.5 of body-width near middle. Ventral, dorsal and lateral body pores not seen.

Lip region offset from body by a constriction, about $\frac{1}{4}$th of body-width at base of oesophagus. Amphidial pouches not seen. Odontostyle 13 μm or 1.8 lip region-widths long, aperture 4.5 μm or about 35% of the odontostyle length. Guiding ring 7.2 μm or 0.9 lip region-width from anterior end. Odontophore 15.5 μm or about 1.2 times the odontostyle length.

Basal expanded part of oesophagus occupying about 40% of the neck region. Oesophageal gland neclei and their orifices not visible. Cardia short, rounded. Nerve ring 85 μm or about 33% of the neck region from anterior end. Prerectum 66 μm or about 4.5 anal body-widths long. Rectum 21 μm or 1.5 anal body-widths long.

Vulva transverse, flushed with body. Vagina 15 μm or slightly less than $\frac{1}{2}$ of the corresponding body-width. Reproductive system amphidelphic. Uterus and oviduct separated by a sphincter. Oocytes arranged in a single row except in the growth region.

Tail elongate-conoid, 67 μm or about 4.7 anal body-widths long. Caudal pores not seen.

Habitat and locality : From the banks of sline ditch at Pachhapadra, Rajasthan.

Remarks : Since *D. ruwenzorii* de Coninck, 1935 had already been transferred by Andrássy (1959) to his newly proposed genus *Mesodorylaimus*, Khera (1970) must have reported Pachhapadra population (3 ♀ ♀) as *M. ruwenzorii*. Out of 3 females, only one female, mounted on slide W 7192/1 along with juvenile of some unidentified dorylaim species, was available which confirms that the longitudinal ridges (32) reported by Khera (l.c.) are not present. The present study also reveals that the single available female belongs to the genus *Mesodorylaimus* but it differs from *M. ruwenzorii* in having shorter odontostyle, odontophore and tail (odontostyle 16 μm, odontophore about 1.5 times the odontostyle length and c=10 in *M. ruwenzorii*). However, Khera had measured the odontostyle 10-11 μm and calculated the value of c=9 – 13.5.

Unfortunately, it was not possible to identify this specimen to species level because of bad preservation. Hence, it has been reported as *Mesodorylaimus* sp.

Laimydorus multialaeus (Khera, 1970) N. Comb.

Syn. **Dorylaimus multialaeus** Khera, 1970

(Fig. 2)

Measurements :

Females (3) : L=2.42-2.58 mm ; a=35-38 ; b=5.3-5.9 ; c=10.0-12.4 ; $V=^{15\text{-}18}_{43\text{-}47}{}^{21\text{-}23}$

Males (2) : L=2.01-2.17 mm ; a=37-39 ; b=4.4-4.8 ; c=96-109 ; T=64-66.

DESCRIPTION

Female : Body slightly ventrally curved in the posterior half, tapering gradually towards both extremities. Cuticle finely striated transversely, 3-6 μm thick (thickest on tail). Lateral chords slightly less than 1/3rd of

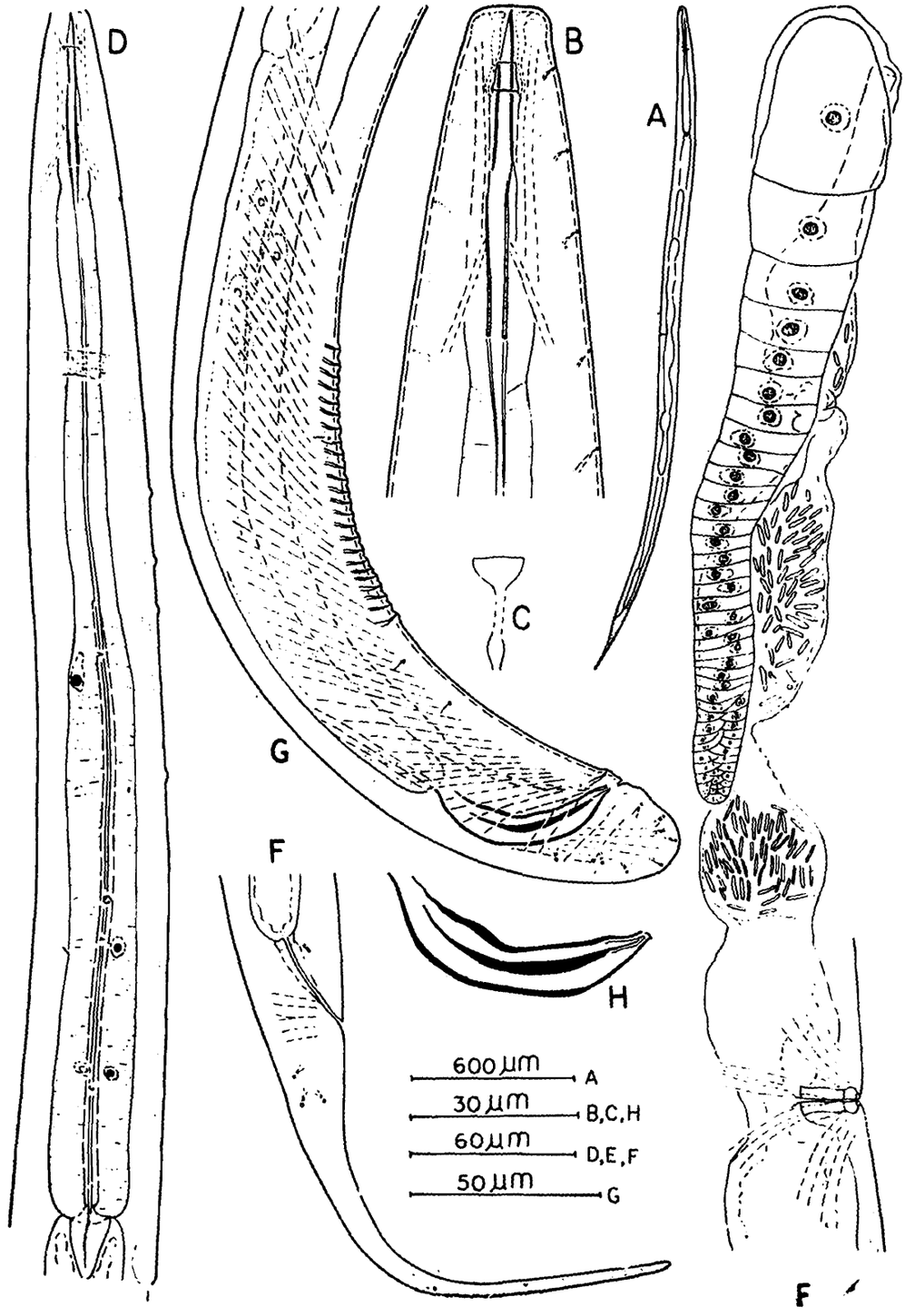

Fig. 2. A—H : *Laimydorus multialaeus* (Khera, 1970) n. comb., A—Entire female, B—Anterior end, C—Amphid, D—Anterior region, E—Anterior female reproductive system, F—Female tail, G—Posterior region of male, H—Spicule and lateral guiding piece.

body-width near middle. Lip region marked by a slight depression, bearing the usual number of papillae. Amphids stirrup-shaped, slits occupying 8-9 μm or 60% of the corresponding body-width, 6-7 μm from anterior extremity. Sensillar pouches 17-18 μm from amphidial slits. Odontostyle 25-28 μm or 1.6-1.9 lip region-width long ; aperture 10-12 μm or 36-42% of the odontostyle length. Odontophore 28-31 μm or about 1.1 odontostyle length. Guiding ring 14-15 μm or about one lip region-width from anterior extremity.

Basal expanded part of oesophagus occupying 48-51% of the neck region. Position of the oesophageal gland neclei and their orifices as follows :

DO = 52.6-53.9 S_1N_1 = 70-73 S_2N = 85-88
DN = 54.6-56.3 S_1N_2 = 75-77 S_2O = 87-90
DO-DN = 2.0-2.4

Nerve ring 125-138 μm or 27-30% of oesophageal length from anterior end. Cardia elongate conoid, about $\frac{1}{4}$th-$\frac{1}{3}$rd of the corresponding body-width long, enveloped by intestinal tissue. Oesophago-intestinal disc present. Prerectum 123-180 μm or 4-6 anal body-widths long. Rectum 37-38 μm or 1.2-1.5 anal body-width long.

Vulva transverse. Vagina 23-25 μm or about $\frac{1}{3}$rd of corresponding body-width long, sclerotized pieces present at vulva-vagina junction. Gonads amphidelphic. Uterus much longer than oviduct, spermatheca-like structure present, filled with sperms. Sperm 9-14 μm long. Egg 70-90 × 40-43 μm. Oocytes arranged in a single row except in the growth region.

Tail elongate-conoid, 200-256 μm or 7-10 anal body-widths long, with 3 caudal pores on each side.

Male : Similar to female in general shape and morphology except for the more curved posterior part of the body and differently shaped tail. Male reproductive system typical. Three pairs of ejaculatory glands in the prerectum region. Spicules 50-53 μm or 1.8-1.9 anal body-widths long medially. Lateral guiding pieces more or less rod-shaped, 9-11 μm long. In addition to one adanal, 23-24 contiguous ventromedian supplements present. Subventral papillae not visible except two between adanal and ventromedian supplement region. Prerectum starting anterior to the copulatory muscles, 232-320 μm or 8-13 anal body-widths long. Tail convex-conoid with rounded terminus, 20-21 μm or 0.7-0.8 anal body-width long, with 6-7 caudal pores on each side.

Habitat and locality : From the banks of a freshwater drain connected to a river near office of the Registrar, Lucknow University, Lucknow (U. P.).

Remarks : Khera (1970) described a new species, *D. multialaeus*, from Lucknow. Three female and 2 male paratypes are available in the National Collection of Zoological Survey of India on slide W. 7183 and W. 7184. The study of these paratypes confirms that they do not belong to the genus *Dorylaimus* Dujardin, 1845 because of the absence of the cuticular longitudinal lines and should be accommodated under the genus *Laimydorus* Siddiqi, 1969. Since these specimens do not fit with the descriptions of known species of the genus *Laimydorus*, a new combination is being proposed. *Laimydorus multialaeus* (Khera, 1970) n. comb. comes very close to *L. baldus* Baqri & Jana, 1982 but differs in the absence of pseudo 'Z' organs and presence of spermatheca-like structure in the uteri,

and slightly wider and differently shaped amphids.

Khera (1970) has reported the length of odontophore 38-42 μm and prerectum in female 100-108 μm which has been confirmed here as 28-31 μm and 123-180 μm respectively.

Laimydorus finalis Thorne, 1975

Syn. **Dorylaimus stagnalis** apud Khera, 1970 partim (Jodhpur population)

Nec **Dorylaimus stagnalis** Dujardin, 1845

(Fig. 1, A-D)

Measurements :

Female (1) : L=4.11 mm ; a=33 ; b=5.4 ; c=15 ; V=$^{14}40^{19}$.

Male (1) : L=3.14 mm ; a=35 ; b=4.4 ; c=90 ; T= ?

Description

Female : Body slightly ventrally curved upon fixation and tapering towards both ends. Cuticle 5-8 μm thick (thickest at tail). Lateral hypodermal chords about $\frac{1}{3}$rd of body-width near middle. Dorsal, ventral and lateral body pores numerous but difficult to count precisely. Lateral body pores 136 or more, 35 in the oesophageal and 4 in the caudal region.

Lip region marked by a slight depression, about $\frac{1}{5}$ th of body-width at base of oesophagus. Amphids stirrup-shaped, apertures occupying 8-9 μm or slightly less than half of the corresponding body-width and 9-10 μm from anterior end. Sensillar pouches 17 μm from amphidial slits.

Odontostyle 45 μm or 2.0 lip region-width long ; aperture 21 μm or 47% of the odontostyle length. Guiding ring 28 μm or 1.3 lip region-width from anterior end. Odontophore 44 μm or about equal to odontostyle length. Basal expanded part of oesophagus occupies 53% of the oesophageal length. Locations of the oesophageal gland nuclei and their orifices could not be observed. Nerve ring 172 μm or 22% of the neck region from anterior end. Cardia with rounded tip, enveloped by intestinal tissue. Oesophagointestinal disc present. Prerectum 250 μm or 4.8 anal body-widths long. Rectum 64 μm or slightly more than anal body-width long.

Vulva a longitudinal slit. Vagina 58 μm long or 45% of the corresponding body-width, surrounded by sphincter, with moderately scelrotized distal region. Reproductive system amphidelphic. Uterus filled with oval sperms, 4-6 μm long. Uterus and oviduct separated by sphincter. Ovaries reflexed, oocytes arranged in a single row, double row and then in multiple rows at the region of growth.

Tail elongate conoid, 268 μm or 5.1 anal body-widths long, with 4 caudal pores on each side.

Male : Similar to female in general morphology except the tail shape and male reproductive system. Odontostyle 46 μm or 2.2 lip region-widths long, aperture 22 μm or 48% of the odontostyle length. Odontophore 40 μm or 0.9 of the odontostyle length. Reproductive system typical. Supplements consist of an adanal pair and a series of 47 contiguous ventromedians. The first ventromedian supplement situated at about 2.5 anal body-width from the cloacal opening. Subventral papillae 24, irregularly spaced,

Spicules 105 μm or 2.1 anal body-widths long when measured along with curved median line. Lateral guiding pieces 14 μm long. Copulatory muscles extending beyond the supplement region. Prerectum 318 μm or 6.3 times the anal body-width. Tail bluntly rounded, 35μm or 0.7 anal body-width long, with 12 caudal pores on each side.

Habitat and locality : From the bank of Kailana Lake, Jodhpur, Rajasthan.

Remarks : Khera (1970) reported 7 females and 6 males of *D. stagnalis* from Kailana Lake, Jodhpur but for the present study only a single female and a male (slide No. W 7188/1) were available. The study shows that Khera (l. c.) had misidentified Jodhpur population as *D. stagnalis* because these actually belong to *Laimydorus finalis* Thorne, 1975 and not *D. stagnalis*. The strong musculature was perhaps misinterpreted as longitudinal cuticular linings.

Laimydorus kherai n. sp.

Syn. **Eudorylaimus odhneri** apud Khera, 1970 partim (male)

Nec. **Dorylaimus odhneri** Allgen, 1951

= **Eudorylaimus odhneri** (Allgen, 1951) Andra'ssy, 1959

(Fig. 3, C—H)

Khera (1970) identified one female and a male as *Eudorylaimus odhneri* (Allgen, 1951) Andrássy, 1959 from Suraj Kund, Lucknow. These two specimens along with two other females marked as unidentified dorylaims have been found on slide W 7193/1. The present study shows that the male reported by Khera (l. c.) as that of *Eudorylaimus odhneri* actually belongs to *Laimydorus*. This male and one unidentified female on the same slide represent a new species which is named as *L. kherai* n. sp. The second unidentified female on the same slide also belongs to *Laimydorus* but the identification could not be confirmed because it has shifted below the sealing material of the cover slips.

Measurements :

Holotype female (1) : L = 2.92 mm ; a = 45 ; b = 5.1 ; c = 12 ; $V = {}^{19.6}_{44}{}^{21.4}$.

Paratype male (1) : L = 2.49 mm ; a = 50 ; b = 4.2 ; c = 12 ; T = 59.

DESCRIPTION

Female : Body ventrally curved posterior to vulva upon fixation and tapering towards both ends. Cuticle finely striated ; 4-6 μm thick (thickest at tail). Lateral hypodermal chords about $\frac{1}{3}$rd of corresponding body-width near middle. Dorsal, ventral and lateral body pores could not be counted because of the dorsoventral position of the specimen in the posterior region.

Lip region almost continuous. Amphids stirrup shaped, apertures occupying 7 μm or about half of the carresponding body-width and 6.5 μm from anterior end. Sensillar pouches could not be observed. Odontostyle 31 μm or 1.7 lip region-width long ; aperture 11.5 μm or 27% of the odontostyle length. Guiding ring 18 μm or one lip region width from anterior extremity. Odontophore 35 μm or 1.1 times the odontostyle length. Basal expanded part of oesophagus occupies 44% of the oesophageal length. Locations of oesophageal gland nuclei and their orifices not clear. Nerve ring 172 μm or 33% of the neck region from anterior end. Cardia

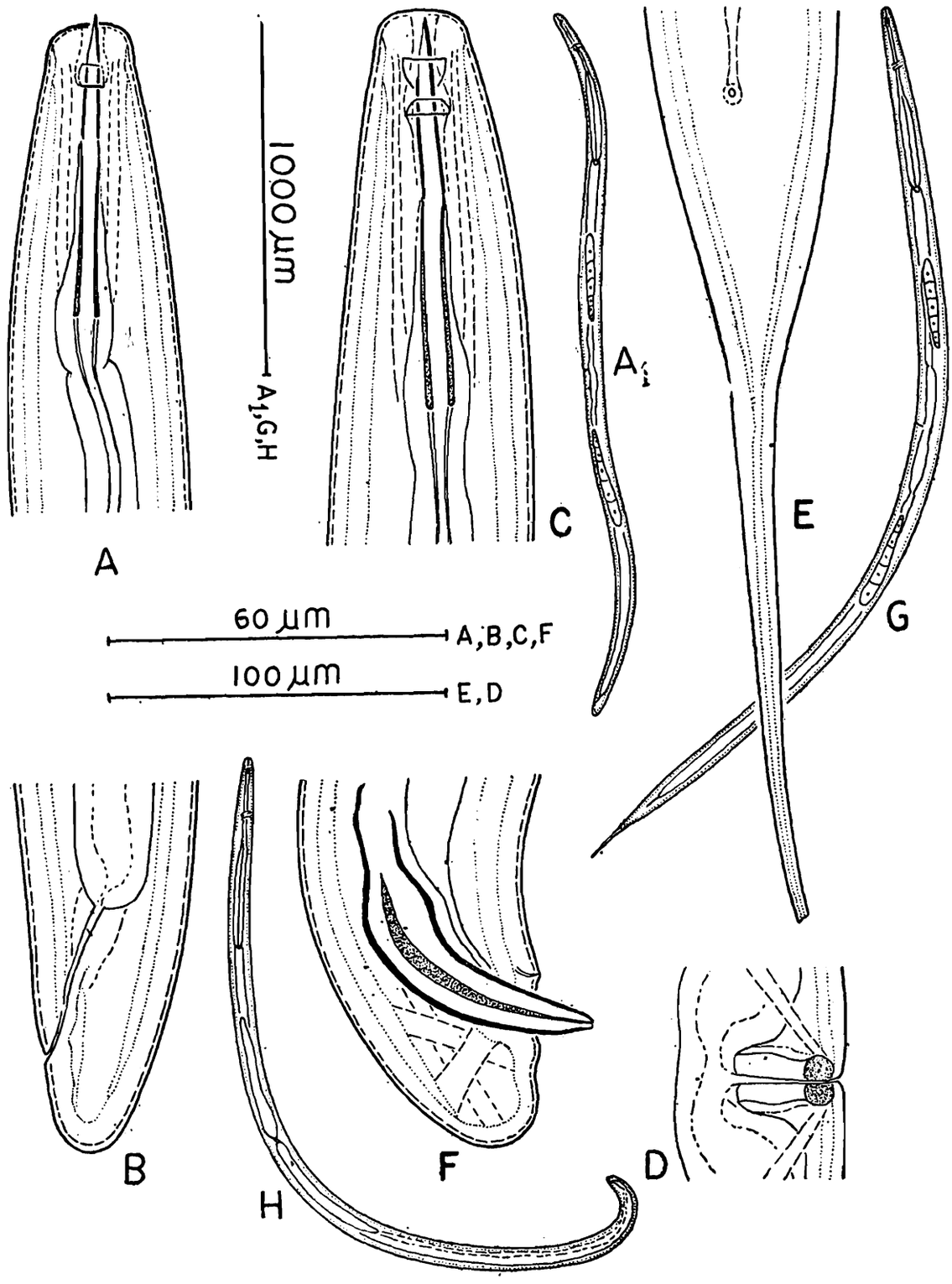

Fig. 3. A_1 & A—B ; *Eudorylaimus odhneri* (Allgen, 1950) Andrassy, 1959, A_1—Entire female, A—Anterior end, B—Female tail. C—H : *Laimydorus kherai* n. sp., C—Anterior end, D—Vulva and Vagina, E—Female tail, F—Male tail, G—Entire female.

appears to be tongue-shaped, but has become distorted due to flattenning of the specimen. Oesophago-intestinal disc present. Prerectum 150 μm or about 3 anal body-widths long. Rectum length could not be measured because of the dorso-ventral position of the nematode.

Vulva a transverse slit. Vagina 30 μm or 45% of the corresponding body-width, with a moderately sclerotized distal region. Uterus and oviduct separated by sphincter, uteri filled with sperms. Ovaries reflexed ; oocytes arranged in a single row, double row and then in multiple rows at the region of growth.

Tail 245 μm long, elongate filiform, tip broken. Caudal pores not seen.

Male : Similar to female in general morphology except for tail shape and male reproductive system. Odontostyle 31 μm or about 2 lip region-widths long. Odontophore 36 μm or about 1.2 times the odontostyle length. Guiding ring 17.5 μm or 1.2 lip region-widths from anterior extremity. Gonads typical. Supplements consist of an adanal pair and a series of 26 contiguous ventromedians. The first ventromedian supplement situated 2.3 anal body-widths from cloacal opening. Subventral papillae not seen. Spicules 65 μm or 2.1 anal body-widths long along curved median line. Lateral guiding pieces present. Tail bluntly rounded, 20 μm or 0.65 anal body-width long. Caudal pores present.

Differential diagnosis : *Laimydorus kherai* n. sp is close to *L. conurus* (Thorne, 1939) Siddiqi, 1969 and *L. baldus* Baqri & Jana, 1982. From the former it differs in having shorter body and odontostyle, more posteriorly situated guiding ring (L=1.6 mm ; odontostyle and guiding ring=19 μm and 13 μm respectively as calculated from Thorne, 1939). The male further differs from *L. conurus* in having more ventromedian supplements and longer spicules (ventromedian supplements 21 and spicules 50 μm long). *L. kherai* has longer odontostyle and odontophore, more posteriorly situated guiding ring and longer spicules than *L. baldus* (odontostyle 24-25 μm, odontophore 29-30 μm, guiding ring 14-15 μm, and spicules 53 μm in *L. baldus*).

Type habitat and locality : From the banks of stagnant freshwater tank, Surajkund, Lucknow, U. P.

Type specimens : Collected by Dr. S. Khera in April, 1967. Holotype along with male paratype mounted on slide W 7193/1.

Eudorylaimus odhneri (Allgen, 1950) Andràssy, 1959

(Fig. 3 : A_1, A-B)

Measurements :

Female (1) : L=2.11 mm ; a=47 ; b=5.0 ; c=125 ; V= $^{18}49.5^{23.5}$

DESCRIPTION

Body irregularly curved upon fixation, tapering gradually towards both ends. Cuticle 2.5-5 μm thick (thickest on tail), finely transversely striated. Lateral chords about $\frac{1}{3}$rd of body-width near middle. Ventral, dorsal and lateral body pores not seen.

Lip region marked by a slight depression. Odontostyle 23 μm or about 1.5 lip region-widths long, aperture about 8 μm or about 35% of odontostyle length. Guiding ring 12 μm or 0,8 lip region-width from anterior

end. Odontophore 30 μm or about 1.3 times the odontostyle length.

Basal expanded part of oesophagus about 55% of oesophageal length. Oesophageal gland nuclei and their orifices not seen. Cardia short, rounded. Nerve ring 112 μm or about 25% of oesophageal length from anterior end. Prerectum about two anal body-widths long. Rectum 25 μm or 1.4 anal body-widths long.

Vulva a transverse slit. Vagina 22 μm or about half of corresponding body-width. Reproductive system amphidelphic. Uterus and oviduct separated by sphincter.

Tail bluntly rounded, 16.5 μm or 0.9 anal body-width long. Caudal pores not observed.

Habitat and locality : From the banks of stagnant freshwater tank, Surajkund, Lucknow, U. P.

Actinolaimus omercooperi Filipjev, 1931

(Fig. 4, C—E)

Measurements :

Female (1) : L = 2.80 mm ; a = 33 ; b = 5.0 ; c = 12 ; V = 45

DESCRIPTION

Body irregularly curved and tapering gradually towards both extremities. Cuticle 3-4 μm thick (thickest at tail), marked with longitudinal striae. Lateral chords $\frac{1}{7}$th of body-width near middle. Dorsal, ventral and lateral body pores not seen.

Lip region with amalgamated lips, almost continuous with body. Vestibule a sclerotized structure, armed with 4 onchia, denticles absent. Amphids stirrup-shaped, slits 8 μm wide and 12 μm from anterior end. Sensillar pouches 19 μm from amphidial slit. Odontostyle 27 μm or 1.2 lip region-widths long, aperture 11.5 μm or about 43% of the odontostyle length. Guiding ring 18 μm or 0.8 lip region-width from anterior end. Odontophore 33 μm or 1.2 times the odontostyle length. Anterior slender part of oesophagus and ellipsoidal swelling of odontophore region offset by a constriction at their junction. Basal expanded part of oesophagus occupying about 48% of the neck region. Position of the orifices of oesophageal glands as follows : DO = 51.7 ; S_1O_1 = 68 ; S_1O_2 = 72.5 ; S_2O = 6. Oesophageal gland nuclei not observed. Cardia bulntly rounded, enveloped by intestinal tissue. Prerectum 220 μm or about 6 anal body-widths long. Rectum could not be measured.

Vulva pore like. Length and shape of vagina not observed because of dorsoventral position of the specimen. Reproductive system amphidelphic, with all the usual parts.

Tail elongate conoid, 235 μm or 4.7 anal body-widths long.

Male : The reported male specimen not traced.

Remarks : Khera (1970) identified 3 females and 3 males as *Actinolaimus omercooperi* Filipjev, 1931 from Happy Valley, below Taragarh, Ajmer (Rajasthan) and Padakulam pond, Cranganore, district Trichur (Kerala). Only one badly flattened dorsoventrally mounted female on slide W 7194/1 from Ajmer was available for study, and it is correctly identified as *Actinolaimus omercooperi*.

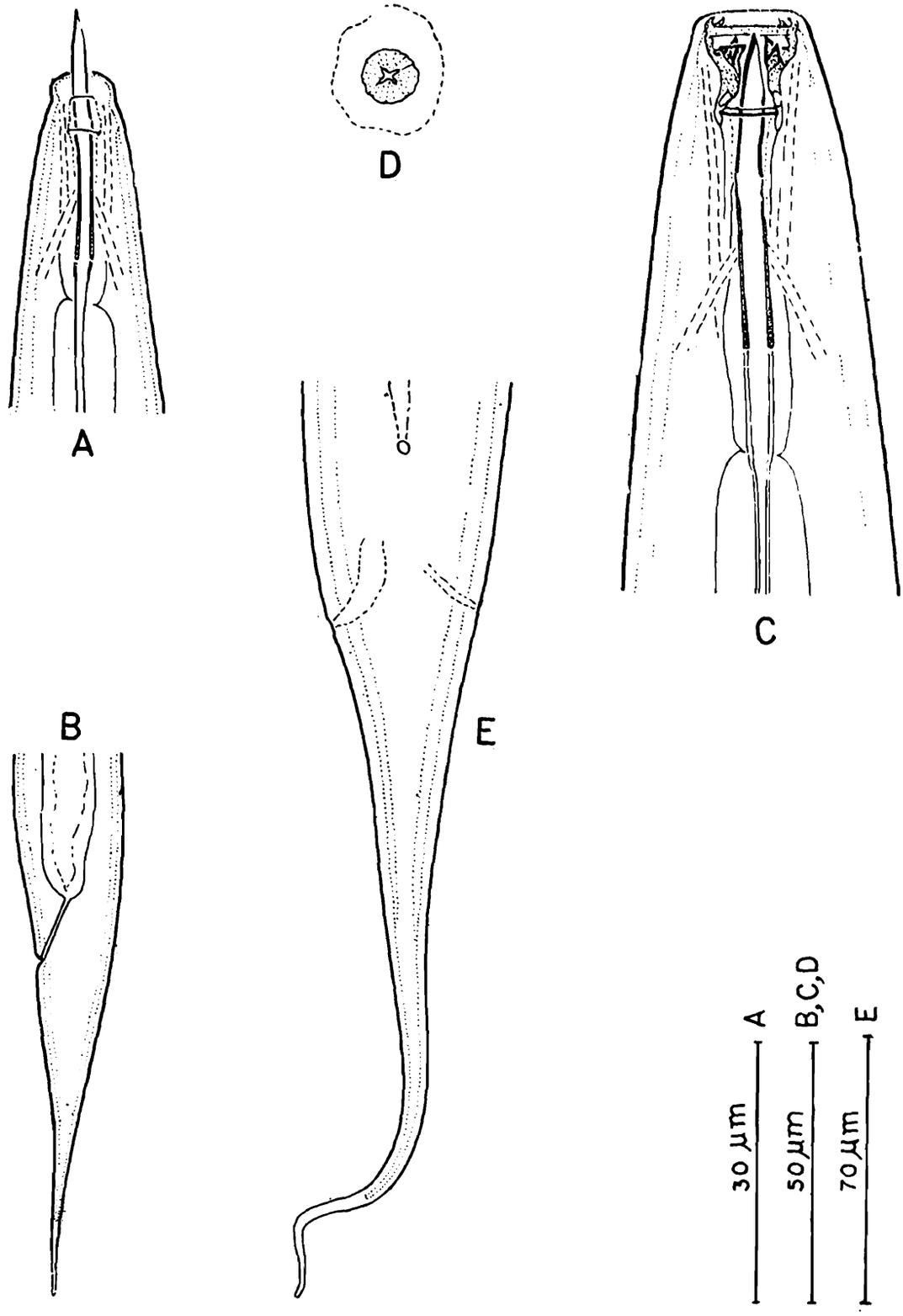

Fig. 4. A—B : *Mesodorylaimus* sp., A—Anterior end, B—Female tail. C—E : *Actinolaimus omercooperi* Filipjev, 1931, C—Anterior end, D—Vulva opening (dorso-ventral position), E—Female tail.

ACKNOWLEDGEMENT

The author thanks Dr. B. K. Tikader, Director, Zoological Survey of India, Calcutta for providing research facilities.

REFERENCES

ANDRA'SSY, I. 1959. Taxonomische iibersicht der Dorylaimen (Nematoda). I. *Acta. zool. hung.* **5** (3-4) : 191-240.

BAQRI, Q. H. & JANA, A. 1982. Nematodes from West Bengal (India) XII. Four new species of Dorylaimidae, with a key to the species of *Laimydorus* Siddiqi, 1969 (Dorylaimida). *Nematologica*, **28** : 192-205.

KHERA, S. 1970. Nematodes ftom the banks of still and running waters. X. Order Dorylaimida. *Indian J. Helminth.*, **XXII** : 120-135.

THORNE, G. 1975. Nematodes of Northern Great Plains, No. 2. *Errata. Nematology News Letter*, **21** : 5.

Bull. zool. Surv. India, 7(2-3) : 285-290, 1985

ON A NEW SPECIES OF THE GENUS *LYTOCESTOIDES* BAYLIS, 1928 (CESTOIDEA : CARYOPHYLLIDEA : LYTOCESTIDAE) FROM A COBITID FISH, *LEPIDOCEPHALUS GUNTEA* (HAM.), FROM WEST BENGAL

By

D. K. KUNDU

Zoological Survey of India, Calcutta

ABSTRACT

A new species of monozotic cestode, *Lytocestoides lepidocephali*, is described from a freshwater fish *Lepidocephalus guntea* (Hamilton) (family Cobitidae) examined at Garapota, 24-Parganas, West Bengal. It is distinguished from the type species, *Lytocestoides tanganyikae* Baylis, 1928 and other existing species on the basis of far less number, arrangement, disposition and much shorter extent of distribution of testes. *Lytocestoides aurangabadensis* var. *minor* Shinde, 1970 and *L. aurangabadensis* var. *Minuta* Shinde, 1970 are considered as synonyms of *L. aurangabadensis* Shinde, 1970.

INTRODUCTION

The genus *Lytocestoides* was established by Baylis (1928) and the type species, *Lytocestoides tanganyikae* Baylis, 1928 was described from "a fish (probably *Alestes* sp.)" from Kirando, Tanganyika lake, Tanganyika. Shinde (1970) described *L. aurangabadensis* from a cyprinid fish *Puntius collus* (=*Barbus collus*) from Godavari river at Paithan and added two varieties *L. aurangabadensis* var. *minor* and *L. aurangabadensis* var. *minuta* from *Puntius Collus* (=*Barbus collus*) and *Labeo calbasu* respectively. Shinde and Deshmukh (1975) further added one species, *L. paithanensis*, from a catfish *proeutropiichthys taakree* (Sykes) (=*Pseudeutropius taakree*) from the same locality. Mackiewicz (1981) personally examined the type specimens of *L. aurangabadensis* and *L. paithanensis*. He found that the two species were described from decomposed and compressed specimens, and therefore, he could not adequately determine their genus. Whatever the conclutions of Mackiewicz (1981) one thing is certain that if the above mentioned two species have testes in the postovarian zone they cannot belong to the genus *Lytocestoides* Baylis, 1928. It is suspected that they are postovarian set of vitelline follicles as is found in the genus *Lytocestoides*, and not testes. Kanth, Sinha and Srivastava (1983) presented the account of a new species, *Lytocestoides fossilis* in the 2nd. National Convention of Indian Helminthologists held in October, 1983 at

Bodh-Gaya, Gaya, Bihar, in the fish *Heteropneustes fossilis* and differentiated it from the type species, *L. tanganyikae* only. They did not compare their species with *L. aurangabadensis* and *L. paithanensis* probably due to unawareness of the reports on these two species. They (1984) however published the full details of the species later on.

All measurements are in millimeters. Diagrams have been made with the help of a camera lucida. The material on the basis of which this paper has been written is deposited with the Zoological Survey of India, Calcutta. The system of classification as followed by Mackiewicz (1972) has also been followed in this paper.

Systematic Account

Class : CESTOIDEA RUDOLPHI, 1808
Order : CARYOPHYLLIDEA VAN BENEDEN (in Carus, 1863)
Family : Lytocestidae Wardle and Mcleod, 1952
Genus : **Lytocestoides** Baylis, 1928

Lytocestoides lepidocephali n. sp.
(Fig. 1-4)

Host : *Lepidocephalus guntea* (Ham.), Loach, (Pisces : Cobitidae).

Location : Intestine

Locality : Garapota, 24-Parganas, West Bengal.

No. of specimens : 5 mature, 2 young adults plus fragments of broken specimens on 6 slides specimen deposited : Z. S. I. Regd. No. W 7548/1 to W 7552/1

Description

(With measurements on one mature and good specimen) : The body is 4.77 long and 0.72 broad. Scolex is usually globular, may be variable in shape, generally larger in diameter than the width of the area immediately behind it and thus distinguishable from the rest of the body. Its surface is smooth and free from wrinkles, longitudinal folds or depression. Neck present. From the tip of the scolex up to about 0.63 posteriorly no organ of reproductive system are present ;

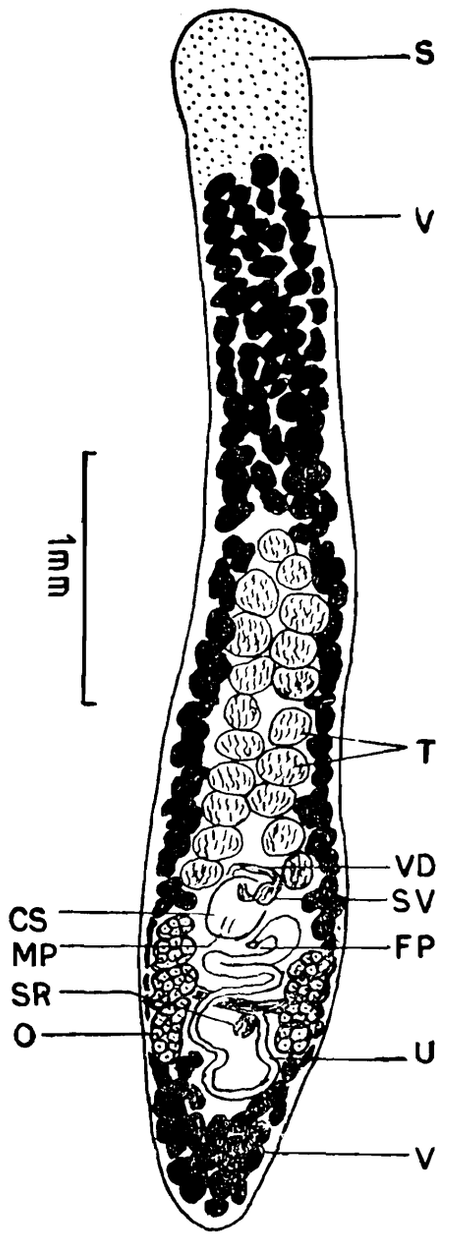

FIG. 1

Fig. 1. *Lytocestoides lepidocephali* n. sp. Holotype

beyond that upto the posterior end of the body extend vitellaria in the cortex surrounding the medullary testicular zone. It appears that initially the vitellaria are granular as is evident in the immature or young adult specimens, but later on, as the worm matures, the granules grow to form follicles. Testes 16-20, larger than vitelline follicles, disposed in two adjacent longitudinal rows in peripheral medulla one on either side of the median line extending from in front of the cirrus sac to almost middle of preovarian extent of vitellaria, follicles measuring 0.14-0.19 in diameter. In compressed specimens the longitudinal rows of testes are disturbed. Vas deferens immediately post testicular, coiled. Seminal vesicle not formed. Cirrus sac large, globular or oval, muscular, median, or submedian, opening by male pore at level of anterior margin of ovary. Genital atrium not clearly seen. Ovary in posterior part of body, distinctly H-shaped with two follicular lobes in the peripheral medullary region connected by an isthmus. The ovarian lobes measure 0.38-0.45 by 0.23-0.27, distance of bigger lobe from the posterior end being 0.81. Seminal receptacle formed in proximal part of vagina behind isthmus. Uterus long coiled, containing many eggs, decends into postovarian region and then ascends into the preovarian region. Vaginal course not clearly seen. Female genital pore opening posterior to the male pore. Post ovarian set of vitelline follicles present and are continuous with the preovarian set laterally in the ovarian zone. Eggs oval, measuring 0.04-0.05 × 0.02-0.03.

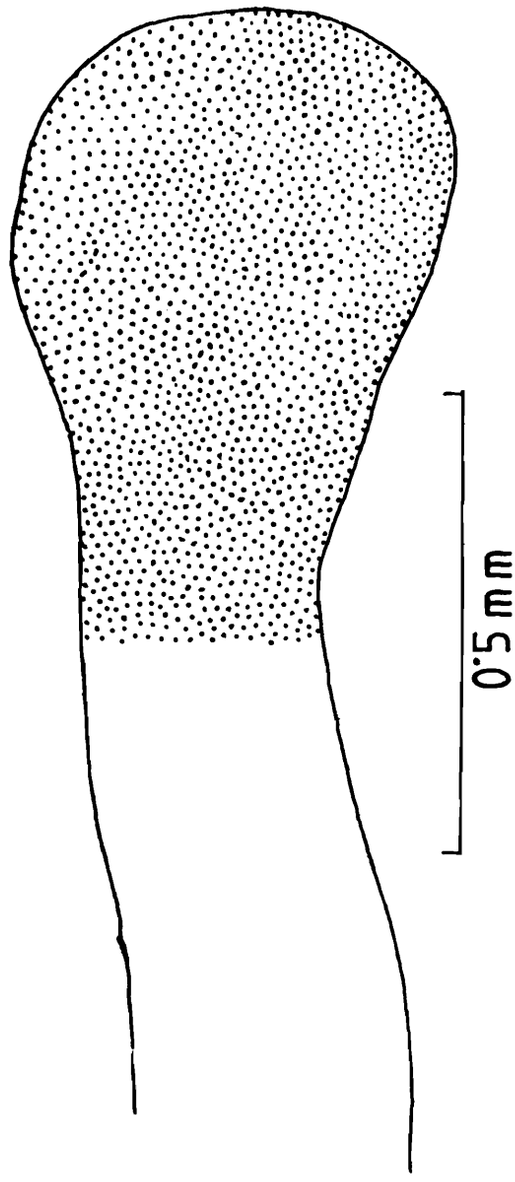

FIG. 2

Fig. 2. *Lytocestoides lepidocephali*, paratype, Scolex

DISCUSSION

As stated under introduction, Mackiewicz (1981) checked the type specimens of *Lytocestoides aurangabadensis* Shinde, 1970 and its two varities *minor* and *minuta* as well as *L. paithanensis* Shinde and *Deshmukh*, 1975. He could not adequately determine their genus due to the decomposed and compressed condition of their specimens. Moreover, if at all, a post-ovarian set of testes is present in *L. aurangabadensis* and *L. paithanensis*, they should belong to the

genus yet to be proposed. It seems that vitellaria in them are follicular and not granular as originally described, the follicles receiving the same intensity of stain as the testicular follicles.

Lytocestoides tanganyika Baylis, 1928 was described from material which was "in very indifferent condition, owing, apparently, to maceration". This explains why this form is inadequately known so far as the musculature, nervous system, seminal vesicle definite shape and structure of the ovary and the course of the vagina are concerned. The formation of a so-called constriction producing a fan-shaped appearance of the posterior end of the body in *L. aurangabadensis* and its two varieties *minor* and *minuta* and the shipping in of the follicles of testes into the region of scolex in *L. aurangabadensis* var. *minor* indicate that their specimens were overpressed during processing. The varieties *minor* and *minuta* of *L. aurangabadensis* have been compared and differentiated from the species proper on the basis of characters which either developed due to overpressing or they are characters of insignificance. Therefore, they should be regarded as synonyms of the species proper *L. aurangabadensis*. The appearance of longitudinal grooves or furrows on the scolex, and a constriction at some level of the body of the worm are not the characters of significance. They may or may not appear when treated with the fixature. These so-called characters should not be utilized for differentiating species. *L. aurangabadensis* Shinde, 1970 and *L. paithanensis* Shinde and Deshmukh, 1975 differ from *L. tanganyikae* mainly in the egg size, presuming of course, that the former two species have posttesticular vitellarian follicles instead of testicular follicles.

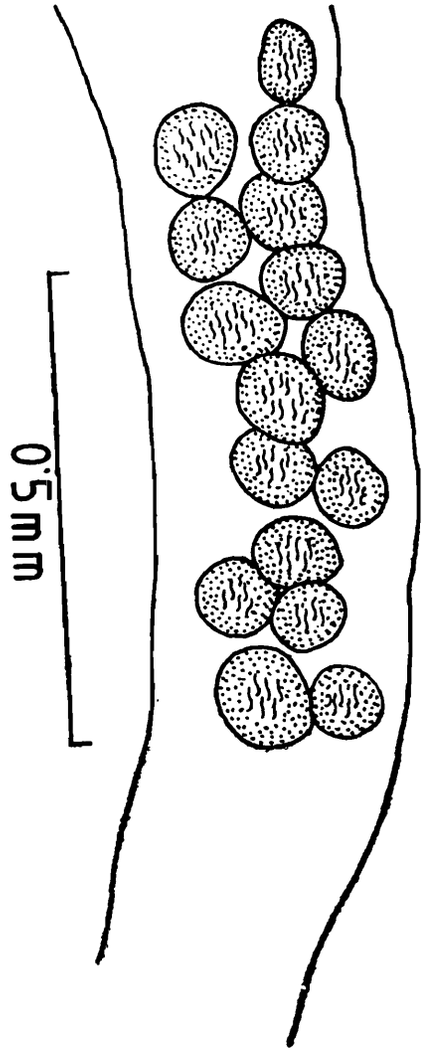

FIG. 3

Fig. 3. *L. lepidocephali*, paratype showing 16 testes

Thus, *Lytocestoides* has *L. aurangabadensis*, *L. paithanensis* and *L. fossilis* Kanth *et al.* besides the type species *L. tanganyika*. The present new species, *Lytocestoides lepidocephali* mainly differs from them in the (i) far less number, (ii) arrangement and (iii) extent of distribution of testes. It differs from the type species in the amaller size of the eggs also (in *L. tanganyika* the eggs are 0.11×0.08).

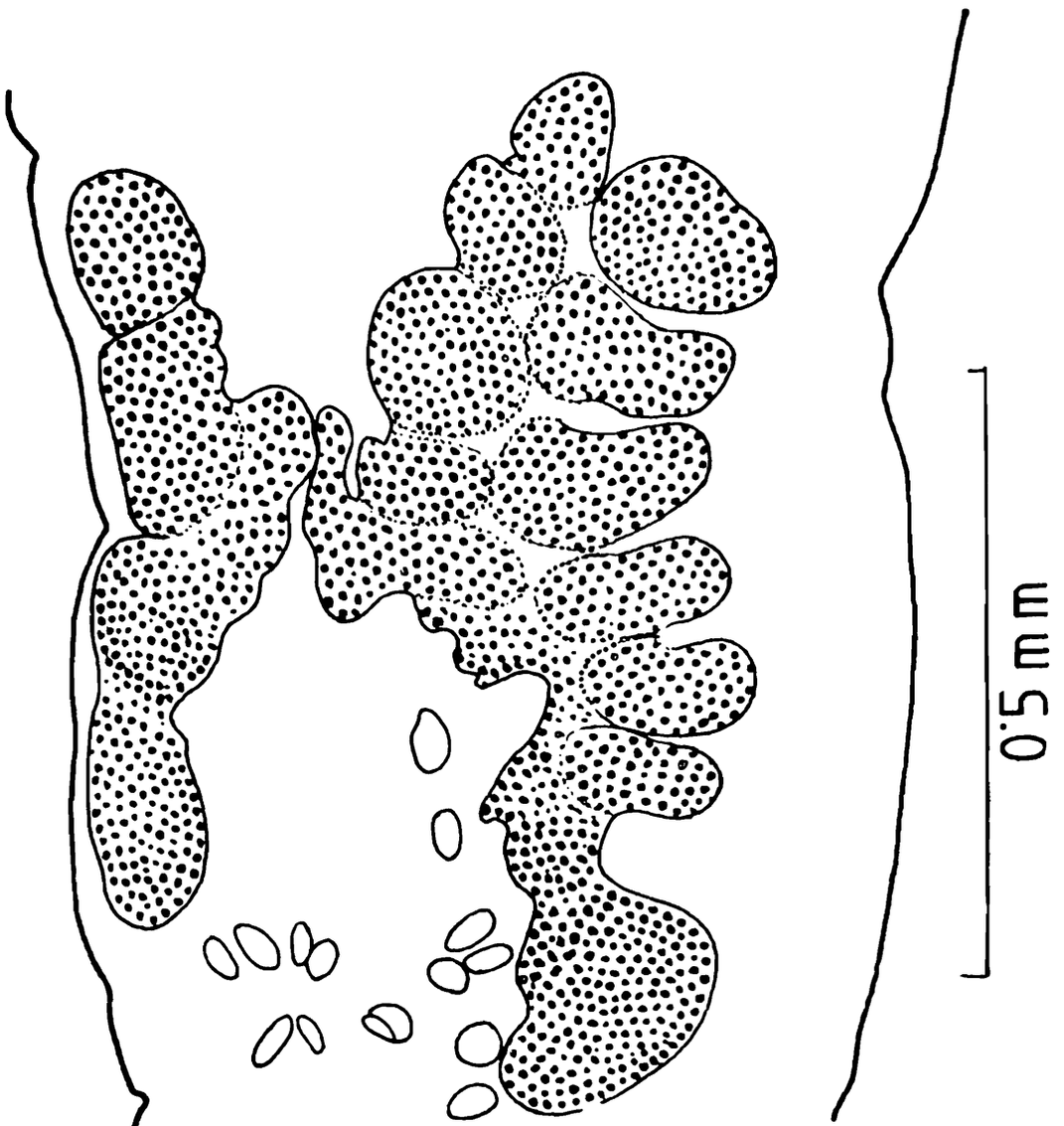

FIG. 4

Fig. 4. *L. lepidocephali*, paratype showing follicular ovary

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REFERENCES

BAYLIS, H. A. 1928. On some parasitic worms from lake Tanganyika. *Ann. Mag. Nat. Hist.*, (**10**), 1 : 557-562.

KANTH, L. K., SINHA, K. P. and SRIVASTAVA, P. 1983. The morphology of *Lytocestoides fossilis* n. sp. (Cestoda : Caryophyllidea) from the intestine of *Heteropneustes fossilis* (Bloch). *2nd nath. Conv. Indian Helminthologist. Bodh Gaya*, Abst. No **40** p. 32.

KANTH, L. K., SINHA, K. P. and SRIVASTAVA, L. P. 1984. The morphology of *Lytocestodies fossilis* n. sp. (Cestoda : Caryophyllidea) from the intestine of *Heteropneustes fossilis* (Bloch) *Indian J. Helminth* (*N. S.*), 1 1(/2) : 26-29.

MACKIEWICZ, J. S. 1972. Parasitological Review. Caryophyllidea (Cestoidea) : A review. *Expt. Parasit.*, **31** : 417-512.

MACKIEWICZ, J. S. 1981. Synoptic review of Caryophyllidea (Cestoidea) of India, Pakistan and Nepal. *Himalayan J. Sci.*, **1** (1) : 1-14.

SHINDE, G. B. 1970. A new species and two new varisties of the genus *Lytocestoides* Baylis, 1928 in freshwater fishes in *Maharashtra*, India. *Marathwada Univ. J. Sci.* **9** : 173-178.

SHINDE, G. B. and DESHMUKH. R. A. 1975. On a new species of *Lytocestoides* Baylis, 1928 from a freshwater fish in Maharashtra, India, *Nat. Sci. J. Marathwada Univ.*, Aurangabad, **14** (7) : 233-236.

ABBREVIATIONS

CS=Cirrus sac FP=Female pore ; MR=Male pore ; O=Ovary ; S=Scolex ; SR=Seminal receptacle ; SV=Seminal Vesicle ; T=Testes ; U=Uterus ; V=Vitellaria ; VD=Vas deferens

Bull. zool. Surv. India, 7 (2-3) : 291-296, 1985

THREE NEW SPECIES OF GRASSHOPPER (*ORTHOPTERA : ACRIDIDAE*) FROM INDIA

By

H. K. Bhowmik

Zoological Survey of India, Calcutta-16

(With 17 figures and 3 plates)

ABSTRACT

Three new species of grasshopper, viz., Dnopherula (*Aulacobothrus jaganathi* (Subfamily : Gomphocerinae), *Xenocatantops japabandhui* and *Diabolocatantops sukhadae* (Subfamily : Catantopinae), are described from India, with illustrations. Their affinities are also discussed.

Introduction

While working on the grasshopper fauna of India, I have come across with some interesting collections. These were sent to Dr. N. D. Jago, O/C Acridid Taxonomy, of the Tropical Development and Research Institute, London, for confirmation. Dr. Jago has kindly confirmed these three species as new to science, the descriptions of which follow in this communication. The descriptions have been further elaborated with photographic profiles so as to make the identity of the species more authentic. Suitable measurements and affinities of the species are also provided under the heading "Discussion".

The types are with the author which will ultimately be deposited to the national collections of Z. S. I.

Description

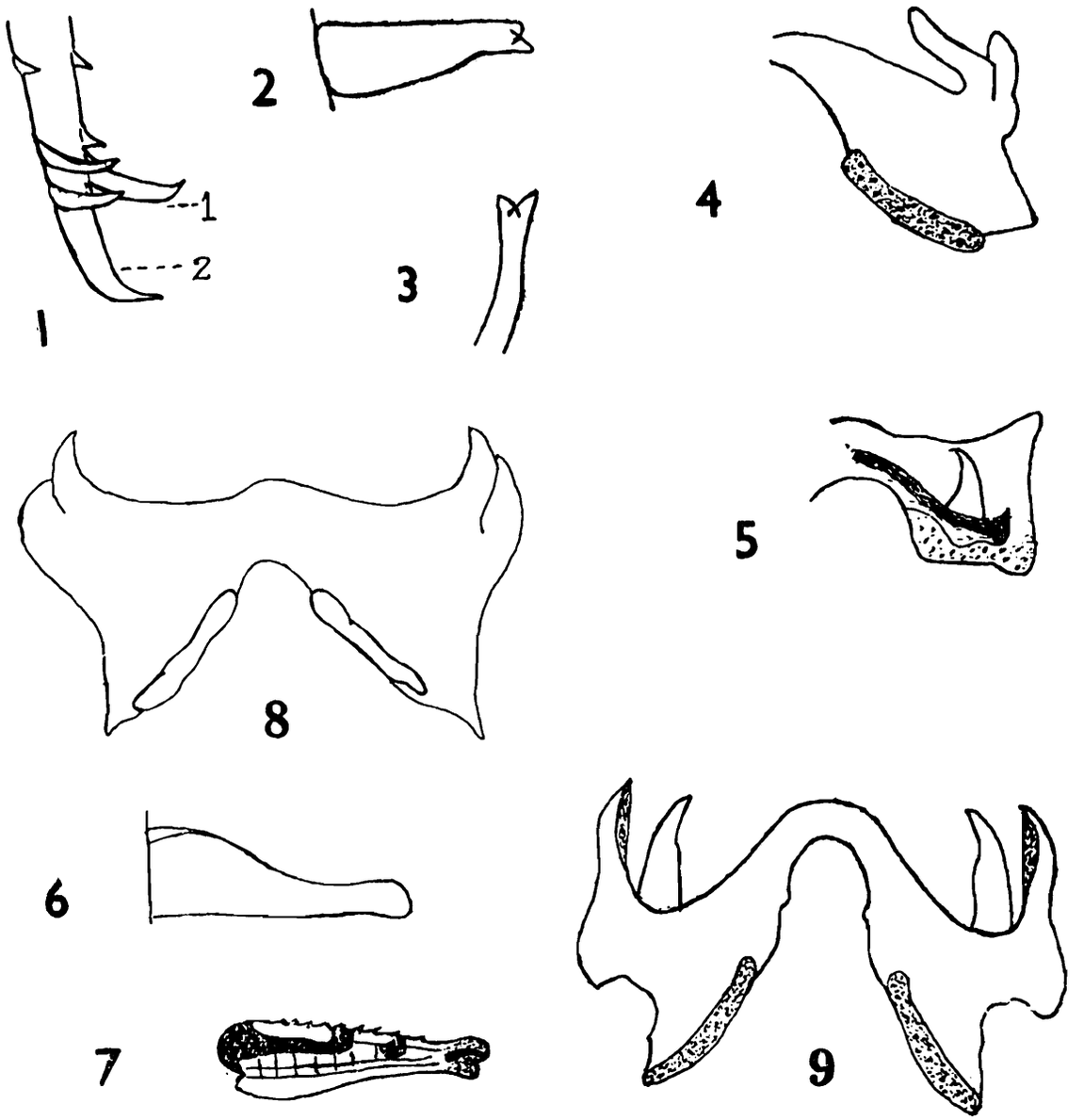
Dnopherula (Aulacobothrus) jaganathi sp. nov. (Fig. 1 ; Plate V, figs 10-11)

Holotype : 1 ♀ ; Balugaon, Puri, Orissa : 30.9.83 ; *H. K. Bhowmik* coll.

Paratypes : 2 ♀ ; same data as for the holotype.

Females : Size moderate. Antenna almost as long as head and pronotum taken together, filiform. Fastigium of vertex broadly angulate at apex, shallowly concave, with a distinct median, transverse sulcus ; lateral carinulae coverging between eyes and prolonged into two parallel but wavy occipital carinulae, reaching pronotum ; median carinula starts beyond transverse sulcus, rather distinct and prolonged up to pronotum. Temporal foveola small, rather shallow, elongate-rhomboidal,

well marginated. Frontal ridge convex, parallel-sided, with or without a little impression after median ocellus ; sparsely punctate. Pronotum rounded anteriorly, distinctly tricarinate ; median carina prominent, straight, crossed by posterior sulcus only, almost at middle ; lateral carinae converge up to 2nd sulcus, then gradually diverge posteriorly up to postero-lateral margin of pronotal disc ; 1st transverse sulcus restricted to lateral lobes, 2nd crosses lateral carinae and impressed on disc but does not cut median carina, 3rd



D. (*A.*) *jaganathi* sp. nov.

Figs. 1-9. 1. Tip of post-tibia showing internal spurs (1 & 2). *X. jagabandhui* sp. nov. 2. Male anal cercus (lateral view). 3. Same, as seen from dorsum. 4. Epishallus, right side, (dorsal view). 5. Same, from ventral side.

D. sukhadae sp. nov. 6. Male anal cercus (lateral view). 7. Inside of post-femur showing colour-pattern 8. Epiphallus, (dorsal view). 9. Same, from ventral side.

sulcus just crosses lateral carinae, 4th clearly impressed and crosses median carina ; metazona deeply impress-punctate, a little shorter than prozona, its posterior margin obtuse angulate ; lateral lobes higher than long with both fore-and hind margins linear. Tegmen as long as apex of post-knee, with rounded apex, costal area a little expanded, with a series of veinlets and a distinct pre-costal vein ; costal vein reaches almost half length of tegmen and subcostal vein up to a little bebind apical end ; subcostal area with a series of oblique veinlets in major portion and with straight veinlets at apical end ; medial area reaching to middle of tegmen, and with a weak intercalated vein ; vanal vein 2 weak but with a series of lateral oblique veinlets. Wing a little shorter than tegmen. hyaline, a little clouded at apex. Posterior tibia shorter than post-femur, with 12 external and 11 internal spines ; outer apical spurs about half in size of inner spurs ; out of two inner spurs upper inner one (no. 2) longest, both of them hook-like. Valves of ovipositor short, somewhat hooked. Mesosternal interspace narrow, lobes much wider than long, with their inner-lower margins obliquely rounded ; metasternal lobes contiguous.

Male : Unknown.

Colouration : General colouration yellowish variegated with brown. Basal half of antennae yellowish, apical half darkish. Lateral pronotal lobes brownish with two to three small yellowish spaces. Eyes brown. Tegmen yellowish with brownish spots—subcostal area with a series of spots, arranged in a longitudinal pattern ; medial and radial areas with 8 dark spots which are gradually small to larger towards apical end. Wing hyaline, a little infumate at apex. Posterior tibia testaceous, with spines tipped with black.

Measurements : Body 22-23 ; antenna 6.5-6.75 ; pronotum 4.75-5.0 ; tegmen 17-18 ; post. femur 14.0-14.25 ; post. tibia 11.0-11.5 ; ratio of length / depth of post femur 3.4-3.5.

DISCUSSION

This new species bears very close resemblances to *Aulacobothrus bolivari* Uvarov (1921) described from Chapra (Bihar) and Koilpati (Tamil Nadu) and later recorded from E. Afganistan (Cejhan, 1969). But it is distinguishable by its somewhat larger size, colouration of tegmina (brown spots) and lesser dilatation of medial area with the false vein having transverse veinlets etc.

The species is named after Lord Jaganath of Puri, Orissa.

Xenocatantops jagabandhui sp. nov.

(Figs. 2-5 ; Plate VI, figs. 12-14)

Holotype : 1♂ ; Mandi, Himachal Pradesh ; 19.9.1980 ; *H. K. Bhowmik* coll.

Paratypes : 1♂ ; Mandi, Himachal Pradesh ; 22.9.1980 ; *H. K. Bhowmik* coll. ; 1♀ ; Barchawar, Bilaspur, H. P. ; 2.4.1972 ; M. Chandra coll. ; 5♂, 5♀ ; Mathili, Koraput, Orissa ; 17-19.10.84 ; *H. K. Bhowmik* coll.

Males : Size small. Antenna longer than head and pronotum taken together, filiform. Frontal ridge convex above, beyond median ocellus flat or a little depressed in middle ; parallel sided, sparsely punctate ; lateral carinae almost linear. Interocular distance very narrow, marginated by prolonged lateral

carinulae of fastigium of vertex. Head very small ; eyes very prominent, projecting and almost border pronotum. Pronotum with only a weak median carina, crossed by usual three transverse sulci ; prozona longer than metazona, both densely but finely punctured. Tegmen exceeds posterior knee. Anal cercus gradually conical, a little incurved, apex showing little bifurcate texture (figs 2, 3). Epiphallus as figured (4, 5). Posterior femur stout, with length to depth ratio 3.3-3.4, strongly attenuated at apex ; posterior tibia a little shorter than post. femur, pilose, with 9 to 10 internal and 8 external spines.

Females : Very similar to males except larger in size. Ratio of length to depth of post. femur 2.5-3.1. Supra anal plate somewhat tongue-shaped, with a median sulcation at basal area. Valves of ovipositor short, curved. Anal cercus conical.

Colouration : General colouration pale brownish with yellow stripes. Most characteristic one is post ocular dark-brown band which prolonged behind over superior part of lateral lobes of pronotum up to posterior sulcus, slightly bordered with yellow above and below ; posterior femur testaceous externally, with two oblique black bands, paler on upper surface of which, on external side, larger one at middle, obsolete near lower carinula, smaller one near apex, stretched between upper and lower carinulae and lower outer carinula with 6 to 8 black spots ; lower marginal area indistinct brownish ; inner side of post. femur red with three small black markings, besides, incomplete black ring at base of posterior knee ; of three markings, one is on upper basal lobe, other two in continuation of oblique bands. Posterior tibia red-rose, with one small black spot near base, and a little further off three spots, almost in a linear fashion.

Measurements : Body ♂ 16-17, ♀ 19-23 ; antenna ♂ 6.5-7, ♀ 7.5-8 ; pronotum ♂ 4-4.25, ♀ 5-5.5 ; tegmen ♂ 15. 5-16, ♀ 19-22 ; post. femur ♂ 10-11, ♀ 11.5-14 ; depth of post. femur ♂ 3-3.25, ♀ 4-4.5 ; post. tibia ♂ 8.5-9, ♀ 10-12.

Discussion

Dr. Jago, who has confirmed the identification of the species opines that this interesting new species is near to *X. karnyi* (Kirby, 1907), known from the entire India except eastern India. In fact, the shape of male cercus as well as male genitia are very akin to *X. karnyi* (for compassion vide Jaco, 1982, figs. 59 and 73). Ratio of length to depth of post. femur in males of the new species is less than 3.4 which brings it again closer to *X. brachycerus* (Willemse, 1932), recorded from China, Taiwan, Bhutan, Sikkim, Nepal and N. India, while the new species resembles *X. henryi* (Bolivar, 1918), known so far from western and southern India and Northern Burma, in its red inner femoral area as well as hind tibia and with a clearly bifurccate male cercus. The species is, howerer, unique in having the characteristic colour patterns of lateral pronotal lobes and that of external posterior femoral ones.

The male genitalia and male cercus are also distinctive from all known species of the genus.

The species is named after author's late father.

Diabolocatantops sukhadae sp. nov.
(Figs. 6-9 ; Plate VII, figs. 15-17)

Holotype : 1 ♂ ; Dhungri, Manali, Kulu,

BHOWMIK PLATE V

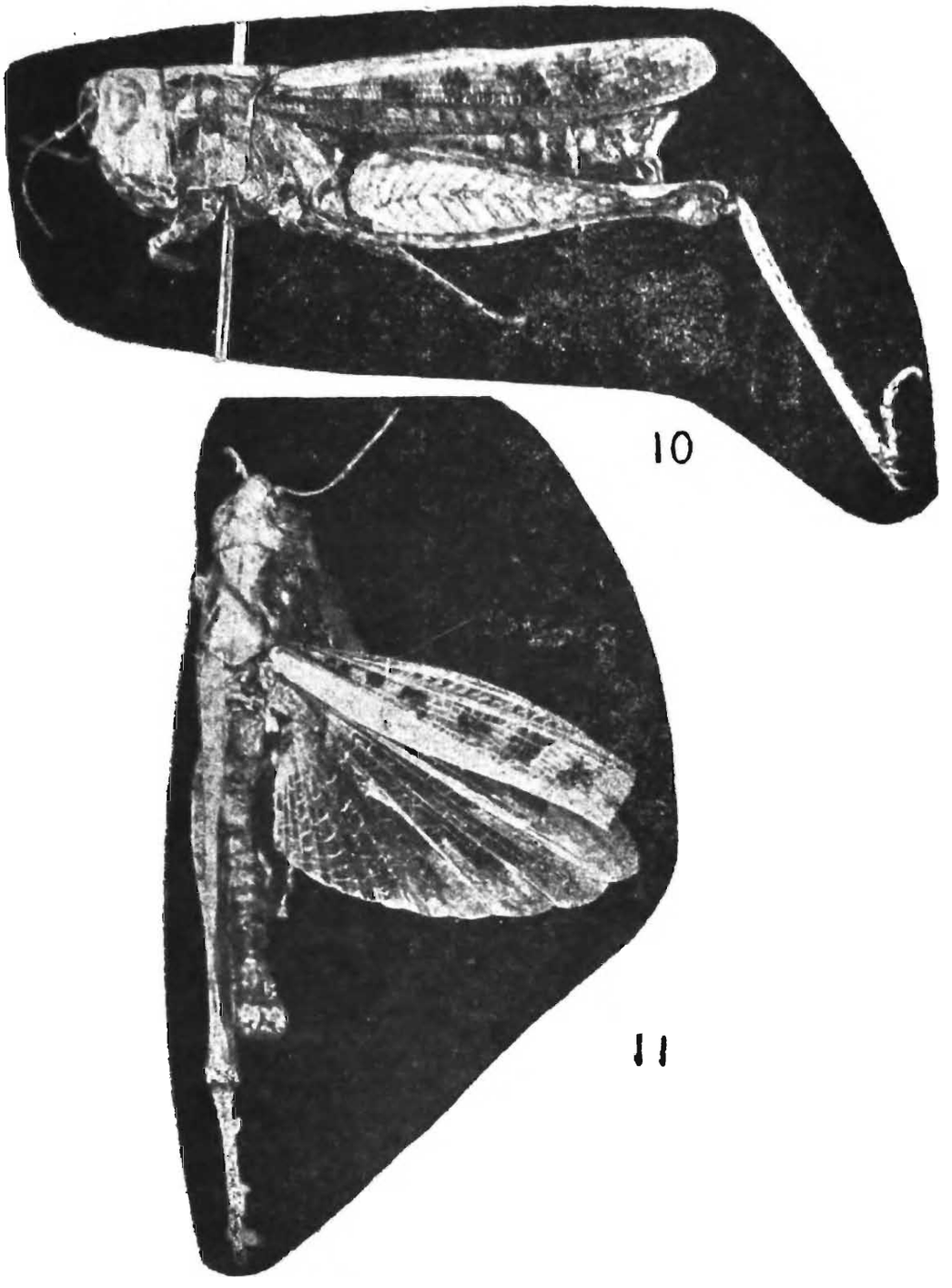


Fig. 10. *D.* (*A.*) *jaganathi*, female (lateral) ... Length of body (in mm) 22
Fig. 11. Same, (dorsal view) 22

BHOWMIK PLATE VI

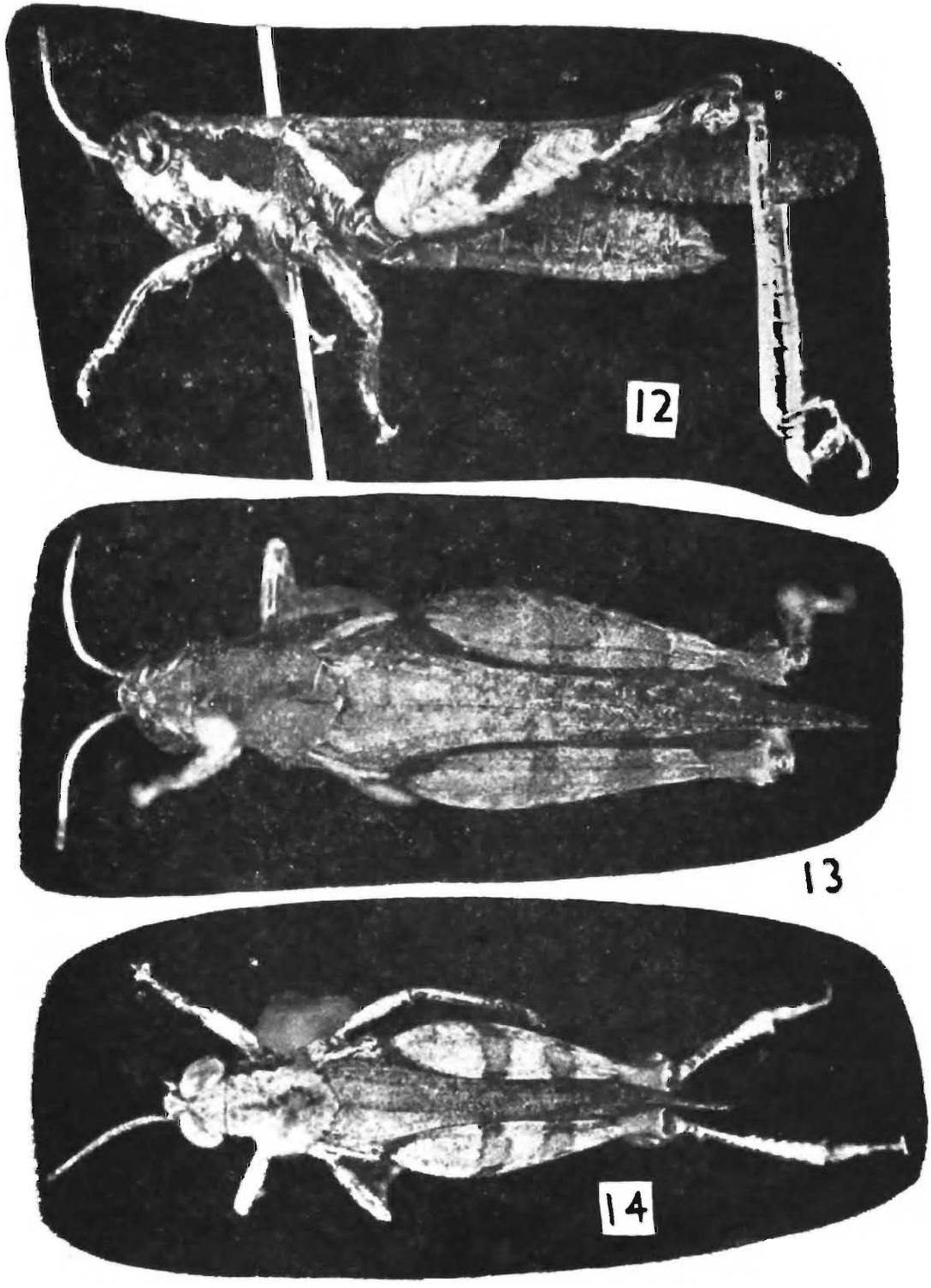


Fig. 12. *X. jagabandhui*, female lateral view 22
Fig. 13. Same, (dorsal view) 22
Fig. 14. Same, male (dorsal view) 16

BHOWMIK PLATE VII

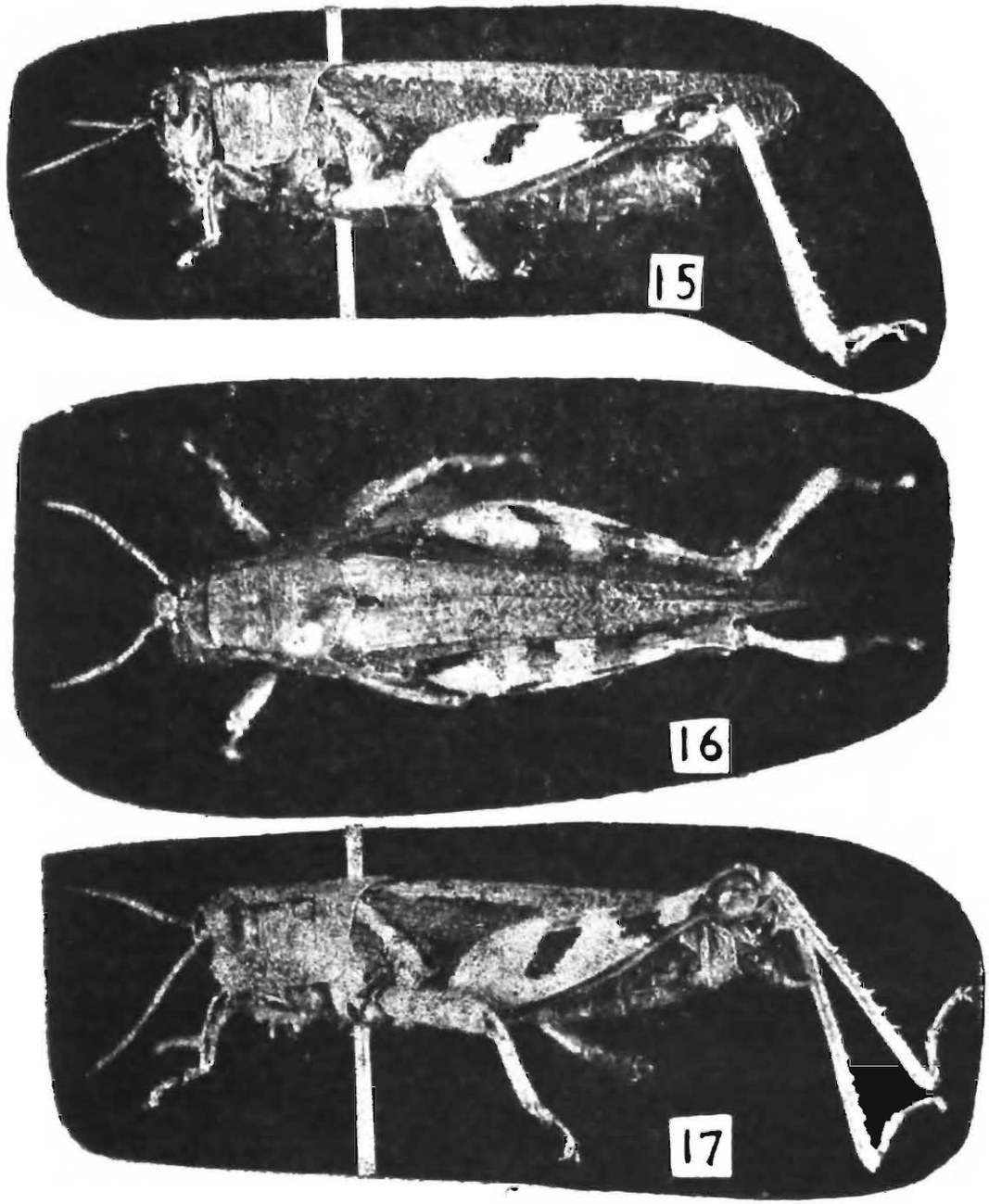


Fig. 15. *D. sukhadae*, female (lateral view) 27
Fig. 16. Same, (dorsal view) 27
Fig. 17. Same, male (lateral view) 20

Himachal Pradesh ; 27.9.1980 ; *H. K. Bhowmik* coll.

Paratype : 6♀ ; same data as for the holotype.

Male : Size small. Antenna slightly shorter than head and pronotum taken together, strongly built, 23 segmented, filiform. Frontal ridge almost parallel-sided except above ocellum where it is a little expanded, convex ; below ocellus shallowly sulcated ; sparsely punctured. Pronotum with a very weak median carina, crossed by 3 well defined sulci, almost parallel-sided in prozonal area, a little expanded in metazona, lateral carinae feebly indicated ; lateral lobes typical. Tegmen exceeds tip of post-knee. Prosternal spine short, obtuse ; mesosternal lobes separated by narrow interspace ; metasternal lobes contiguous. Supra-anal plate tongue-shaped, with a deep median, longitudinal sulcation ; anal cercus as figured (6). Epiphallus as shown in figure (8, 9). Posterior femur moderately stout, its ratio of length to depth 3.66 ; post. tibia slightly shorter than post. femur, with 9 external and 11 internal spines.

Females : Very similar to male except larger in size. Expansion of frontal ridge, above ocellum, more pronounced. Posterior tibia with 8 to 10 external and 11 internal spines. Anal cercus short, straight, conical. Valves of ovipositor curved. Ratio of length to depth of post. femur 3.76 to 4.

Colouration : General body colouration brownish ; legs specially posterior legs yellowish. Posterior femur with two characteristic black bands, 1st band oblique and extends a little more of middle of extero-median area, pale on upper carina, 2nd one in form of an incomplete ring extending from outer inner carinula to interior inner carinula. Inner side of post. femur yellowwish ; with an oblique band, on inner side which forms a pattern (fig. 7) : it crosses upper carinula about its middle, runs forward as a stripe up to upper basal lobe. Beside, these two bands, sides of post. knee also more or less spotted with black. Lower marginal area somewhat dark-brownish. Post-tibia testaceous with black tipped spines. Pronotum with its lateral lobes unicolourous, brownish except a very thin, irregular dark-brown post-ocular band running along super margin of lobe and edge of pronotal disc up to hind sulcus ; sometimes this band very insignificant and difficult to detect.

Measurement : Body ♂ 20, ♀ 25-27 : antenna ♂ 6. 5, ♀ 7-7. 5 ; poronotum ♂ 5, ♀ 6.5-7 ; tegmen ♂ 15, ♀ 21-22 ; post. femur ♂ 11, ♀ 14-15 ; depth of post-femur ♂ 3, ♀ 3.5-4 ; post-tibia ♂ 9.5, ♀ 12-12.5.

DISCUSSION

The genus *Diabolocatantops* Jago, 1984, has several species known from Madagascar and that *D. pulchellus* (Walker, 1870) and *D. consobrinus* (Karny, 1907) are two species in the new genus from India, though the latter is currently known only from the type.

The present species is more akin to *D. consobrinus* than *D. pulchellus* and can be at once separated from the latter species which has "wing iridescent hyaline, brick-red towards the base along the veins", and "a moderately broad blackish band runs behind the eye to the extremity of the deflexed lobes" and by its bigger size (37 mm). The new species has, on the other hand, hyaline wings, with a little infumation

at apices (no distinct coloration) and the post ocular band running along up to hind sulcus, is very thin, irregular and often hard to detect. These features with its body size, again, however, brings the species very close to *D. consobrinus*. Only a critical and careful study can differentiate them.

In *D. consobrinus* the lateral lobes of the pronotum unicolourous, that means, there is no colour stripe as noticed in other two Indian species. The oblique band of post. femur "very slightly extending into the externo-median area, and all carinae specially the lower ones, spotted with black" in *consobrinus*, whereas in the new species, the oblique stripe exceeds more than the middle of medial area (and also having a colour design in the inner side) and all the carinae are spotless (unicoloruous with other yellowish parts of the femur).

The species is named after author's mother.

Acknowledgements

The author is deeply indebted to Dr. B. K. Tikader, Ph.D., D.Sc., Director, Zoological Survey of India, for facilities provided ; to Dr. Jago for confirming the identification of the species, and to Sri N. K. Sen for the photos.

References

Cejchan, A. 1969. Beitrage. Zun Kenntnis der fauna Afghanistan. *Acta. Mus. Mor. Suppl:*, **54** : 229-276.

Jago, N. D. 1982. The African genus *Phaeocatantops* Dirsh, and its allies in the old world tropical genus *Xenocatantops* Dirsh, with description of new species (Orth. : Acrididae). *Trans. Amer. ent. Soc.*, **180**(3) : 430-456.

Jago, N. D. 1984. The alate genera of east African Catantopinae (Orth. : Acridoidea) including revision of the genus *Catantops* Schaum. *Trans. Amer. ent. Soc.*, **110** : 353-345, 370-371.

Uvarov, B. P. 1921. Records and descriptions of Indian Acridiae. *Ann. Mag. nat. Hist.*, 7(9) : 480-509.

Bull. zool. Surv. India, 7 (2-3) : 297-304, 1985

NEMATODES FROM WEST BENGAL (INDIA) XV. ON THE SPECIES OF SOME RARE GENERA HAVING NARROW ODONTOSTYLE OF THE SUPERFAMILY DORYLAIMOIDEA (DORYLAIMIDA)

By

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ABSTRACT

Lenonchium oryzae Siddiqi, 1965 and *Cephalodorylaimus papillatus* Jairajpuri, 1967 are being reported from Burdwan and 24-Parganas districts respectively. *Kochinema longicaudatum* sp. n. and *Chrysonemoides distinctus* sp. n. are described from Midnapur district (W. Bengal). *Kochinema longicaudatum* sp. n. 0.90-0.97 mm long, has a lip region marked by a constriction, odontostyle 9-10 μm long, odontophore 15-17 μm long, guiding ring about 1/2 lip region-width from anterior end and female tail 12-14 anal body-widths long. *Chrysonemoides distinctus* sp. n. 0.94-1.00 mm long, has a wider lip region than adjoining body, odontostyle 10-11 μm long, odontophore 14-16 μm long, guiding ring about 1/2 lip region-width from anterior end and female tail 6.6-7.1 anal body-widths long.

INTRODUCTION

This fifteenth paper of the series on the nematodes from West Bengal (India) reports two known and two new species of rather rare genera of the superfamily Dorylaimoidea. *Lenonchium oryzae* Siddiqi 1965, the type and only species, is being reported from district Burdwan. *Cephalodorylaimus papillatus* Jairajpuri 1967, also a type and only species, is reported from district 24-Paraganas. *Kochinema longicaudatum* sp. n. and *Chrysonemoides distinctus* sp. n. are being described from around roots of Cashew nut, Midnapur district, West Bengal.

MATERIALS AND METHODS

All the type specimens have been registered and deposited with the National Zoological Collection, Zoological Survey of India. *K. longicaudatum* : Holotype female on slide W. N. 493 (a) and four paratype females on slide W. N. 493 (b). *C. distinctus* : Holotype female on slide W. N. 494 (a) and five paratype females on slide W. N. 494 (b).

The specimens were fixed in hot 4% formalin and mounted in anhydrous glycerine.

Lenonchium oryzae Siddiqi, 1965

(Fig. 1, A-D)

Measurements : Female (1) : L = 2.22 mm ; a = 48 ; b = 6.7 ; c = 9.0 ? ; V = 154614.

Male (1) : L = 2.18 mm ; a = 52 ; b = 6.2 ; c = 14.6 ; T = 62.

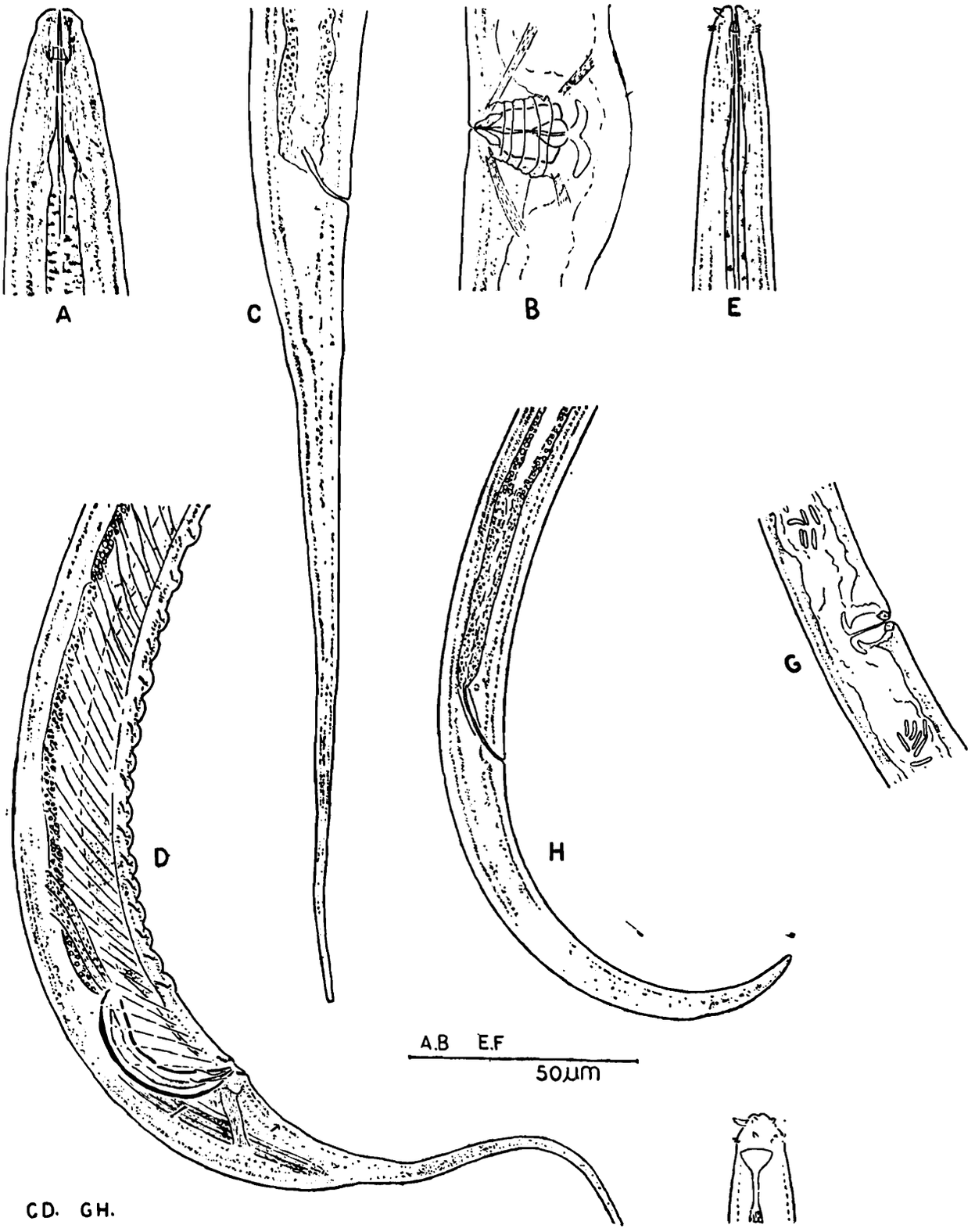

Fig. 1. A—D. *Lenonchium oryzae* Siddiqi, 1965 : A—Anterior end, B—Vulva region, C—Female tail, D—Posterior region of male. E—F. *Cephalodorylaimus papillatus* Jairajpuri, 1967 : E—Antirior end, F—Head end (surface view), G—Vulva region, H—Female tail.

DESCRIPTION

Female : Body slightly ventrally curved. Cuticle loose, finely striated transversely. Lateral chords about $\frac{1}{3}$rd of the corresponding body-width near middle. Lip region marked by a constriction. Amphids stirrup-shaped ; apertures about 6 μm wide. Odontostyle 18-19 μm long. Guiding ring 11-12 μm from anterior end. Odontophore 18-19 μm long. Basal expanded part of oesophagus occupies 55-60% of the neck region. Vulva a transverse slit ; vagina about 22 μm long with two moderately sclerotized pieces at the distal region. Female reproductive system amphidelphic. Prerectum obscure. Tail elongate-filiform, about 4.5 ? (tip broken) anal body-widths long. Caudal pores not seen.

Male : Similar to female in general shape and morphology except the more ventrally curved posterior region and male reproductive system. In addition to an adanal pair, 14 contiguous and the last four slightly spaced ventromedian suppliments present. Spicules 56 μm in length along the curved median line. Lateral guiding pieces 12 μm long. Prerectum about four anal body-widths long. Tail elongate-filiform with a rounded terminus, about 5 anal body-widths long, with one caudal pore on each side.

Habitat and locality : Soil around roots of paddy, *Oryza sativa* L. at Panchra, district Burdwan.

Cephalodorylaimus papillatus Jairajpuri, 1967

(Fig. 1, E-H)

Measurements : Female (1) : L – 1.33 mm ; a = 50 ; b = 4.8 ; c = 9.3 ; V = $^{12}47^{13}$.

DESCRIPTION

Female : Body tapering towards both ends and ventrally more curved in posterior region. Cuticle marked by very fine striations. Lateral chords about $\frac{1}{4}$th of body-width near middle. Lip region amalgamated, elevated, and slightly offset from body. Amphids stirrup-shaped, apertures more than 7 μm wide. Odontostyle thin, 16 μm long. Guiding ring about 6 μm from anterior end. Odontophore cuticularised, 17 μm long. Basal expanded part of oesophagus occupies about 44% of the neck region. Vulva transverse ; vagina 15 μm long with sclerotized distal region. Female reproductive system amphidelphic, typical. Sperms present in the uteri, elliptical, 5-7 μm long. Prerectum about four anal body-widths long. Tail ventrally arcuate, elongate-conoid, about 8 anal body-widths long. Caudal pores not visible.

Habitat and locality : Soil around roots of coconut, *Cocos nucifera* at Lakshipur, district 24-Parganas.

Kochinema longicaudatum sp. n.

(Fig. 2)

Measurements : Female (Holotype) : L = 0.95 mm ; a = 43 ; b = 4.6 ; c = 5.5 ; V = $7.7_{43}7.0$

4 ♀ ♀ (Paratypes) : L = 0.90-0.97 mm ; a = 39-44 ; b = 4.1-4.6 ; c = 5.1-5.5 ; V = $6.7\text{-}7.7_{42\text{-}44}7.0\text{-}7.9$

DESCRIPTION

Female : Body ventrally curved upon fixation and gradually tapering towards both

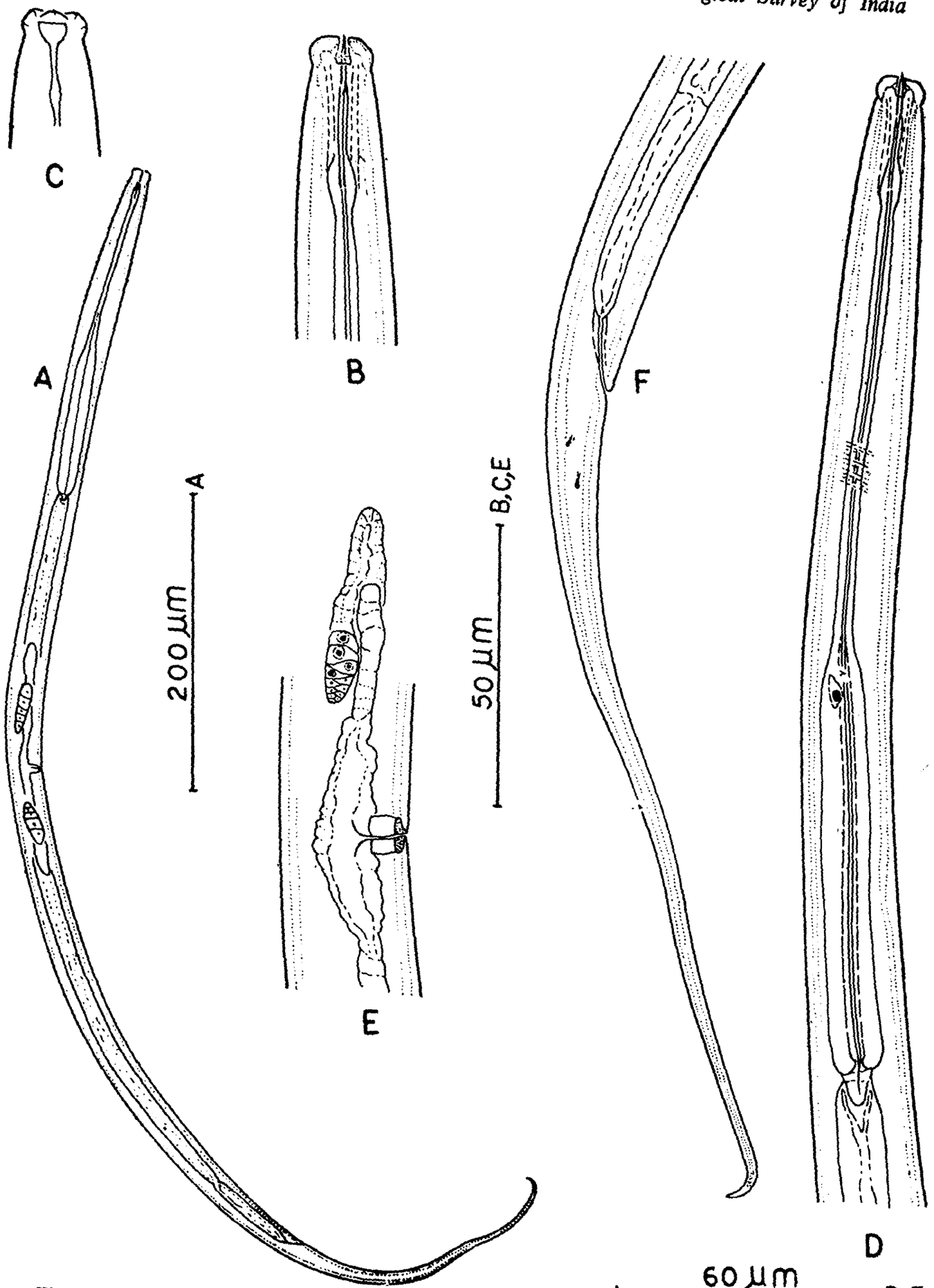

Fig. 2. *Kochinema longicaudatum* sp. n. : A—Entire female, B—Anterior end, C—Head end (surface view), D—oesophgeal region, E—Anterior sexual branch, F—Posterior region of female.

ends. Cuticle transversely striated ; its thickness 2-3 μm (thickest at tail). Lateral chords granular, 1/2.3-1/2.1 of the body-width near middle. Dorsal, ventral and lateral body pores indistinct.

Lip region offset by a constriction, wider than adjoining body, and about half of the body-width at base of oesophagus. Amphids typically labial in position, stirrup-shaped ; apertures 5-6 μm wide or about half of the corresponding body-width and about 2 μm from anterior end. Sensillar pouches 12-13 μm from amphidial slits.

Odontostyle 9-10 μm or 1.2-1.3 head-width long ; aperture 4.0-4.5 μm or 44-46% of the odontostyle length. Guiding ring 5 μm or about 1/2 lip region-width from anterior end. Odontophore simple rod-like, 15-17 μm or 1.6-1.7 times the odontostyle length. Basal expanded part of oesophagus occupies 44-46% of the neck region. Locations of the oesophageal gland nuclei and their orifices obscure.

Nerve ring at 70-77 μm or 31-36% of the neck region from anterior end. Cardia tongue-shaped, 7-9 μm long, enveloped by intestinal tissue. Oesophago-intestinal disc present. Prerectum 42-55 μm or 3-4 anal body-widths long. Rectum 17-21 μm or 1.2-1.5 anal body-width long.

Vulva a transverse slit. Vagina 7-9 μm, extending 35-40% of the corresponding body-width, sclerotized distally. Female reproductive system amphidelphic. Uterus and oviduct not distinctly separated. Ovaries reflexed ; oocytes arranged in a single row except the region of multiplication.

Tail filiform with rounded terminus, 167-188 μm or 12-14 anal body-widihs long, with 2-3 caudal pores on each side.

Male : Not found.

Differential diagnosis : *Kochinema longicaudatum* sp. n. differs from the only existing species *K. proamphidium* Heyns, 1963 in having shorter odontostyle, unequal length of odontostyle and odontophore, anteriorly situated vulva, and filiform tail (odontostyle twice the width of lip region, odontostyle and odontophore equal in length, V = 56-59 and tail convex-conoid in *K. proamphidium*).

Remarks : Darekar and Khan (1979) proposed the genus *Indokochinema* and distinguished it from *Kochinema* Heyns, 1963 in having the following characters : Shorter odontostyle with wider lumen, monoopisthodelphic reproductive system and sclerotized vulva-vagina junction (odontostyle 2 head-widths long, didelphic reproductive system and vulva-vagina junction not sclerotized in *Kochinema*). Interestingly, the present new species, *K. longicaudatum*, shares the characters of both the genera, i.e., slender odontostyle and didelphic reproductive system like *Kochinema* while shorter odontostyle length and sclerotized vulva-vagina junction like *Indokochinema*. However, we prefer to place the new species under *Kochinema* because of slender odontostyle and didelphic reproductive system.

Type habitat and locality : Soil around roots of cashew nut, *Anacardium occidentale* L., at Hinari, block Ramnagar, district Midnapur, W. Bengal.

Chrysonemoides distinctus sp. n.

(Fig. 3)

Measurements :

Female (Holotype) ; L = 0.96 mm ; a = 48 ; b = 4.1 ; c = 11 ; V = $^{10.3}_{49.5}{}^{7.7}$

5 ♀ ♀ (Paratypes) : L = 0.94-1.00 mm ; a = 48-54, b = 4.1-4.2 ; c = 11.0-11.6 ; V = $^{7.9\text{-}9.3}_{46\text{-}49}{}^{6.7\text{-}9.9}$.

Description

Female : Body ventrally curved upon fixation and tapering gradually towards both ends. Cuticle finely striated tranversely ; its thickness 1-2 μm thick (thickest at tail). Lateral chords 1/2.6-1/2.4 body-width near middle. Dorsal, ventral and lateral body pores inconspicuous. Lip region wider than adjoining body, 1/1.6-1/1.4 body-width at base of oesophagus. Amphids stirrup-shaped ; apertures 4-5 μm wide or 36-40% of the corresponding body-width and about 5 μm from anterior end. Sensillar pouches 13-14 μm from amphidial slits.

Odontostyle 10-11 μm or 0.8-1.0 head-width long ; aperture about 2.5 μm or 22-25% of the odontostyle length. Guiding ring 5-6 μm or about 1/2 lip region-width from anterior end. Odontophore rod-like, 14-16 μm or 1.4-1.6 times the odontostyle. Basal expanded part of oesophagus occupies 45-48% of the neck region. Locations of oesophageal gland nuclei and their orifices are not clearly visible, except in a single specimen (Fig. 3, D) which are as follows :

DO = 58.8	S_1N = 72.6	S_2N = 85.9
DN = 62.8		S_2O = 87.8
DO-DN = 4.0		

Nerve ring at 84-92 μm or 35-39% of the neck region from anterior end. Cardia tongue-shaped, 6-8 μm long, enveloped by intestinal tissue. Oesophago-intestinal disc present. Prerectum 50-65 μm or 4-5 anal body-widths long. Rectum 14-17 μm 1.0-1.3 anal body-width long.

Vulva a transverse slit. Vagina 8-10 μm long, extending 45-55% of the corresponding body-width and sclerotized distally. Female reproductive system amphidelphic. Uterus and oviduct are not distinctly separated. Ovaries reflexed ; oocytes arranged in a single row except in the region of multiplication.

Tail ventrally curved, elongate-conoid with rounded terminus, 84-88 μm or 6.6-7.1 anal body-widths long, with 2-3 caudal pores on each side.

Male : Not found.

Differential diagnosis : *Chrysonemoides distinctus* sp. n. comes close to *C. holsaticus* (Schneider, 1925) and *C. limigenus* Siddiqi, 1970. From the former the present new species differs in having shorter body length and differently shaped lip region (L = 1.3-2.6 mm ; lip region distinctly offset from the body with angular lips in *C. holsaticus*). From *C. limigenus* it differs in having shorter body length, odontostyle and odontophore (L = 2.4-3.0 mm ; odontostyle = 13-14 μm and odontophore = 23-25 μm long in *C. limigenus*).

Type habitat and locality : Soil around roots of cashew nut, *Anacardium occidentale*, from Hinari, Block Ramnagar, district Midnapur, W. Bengal.

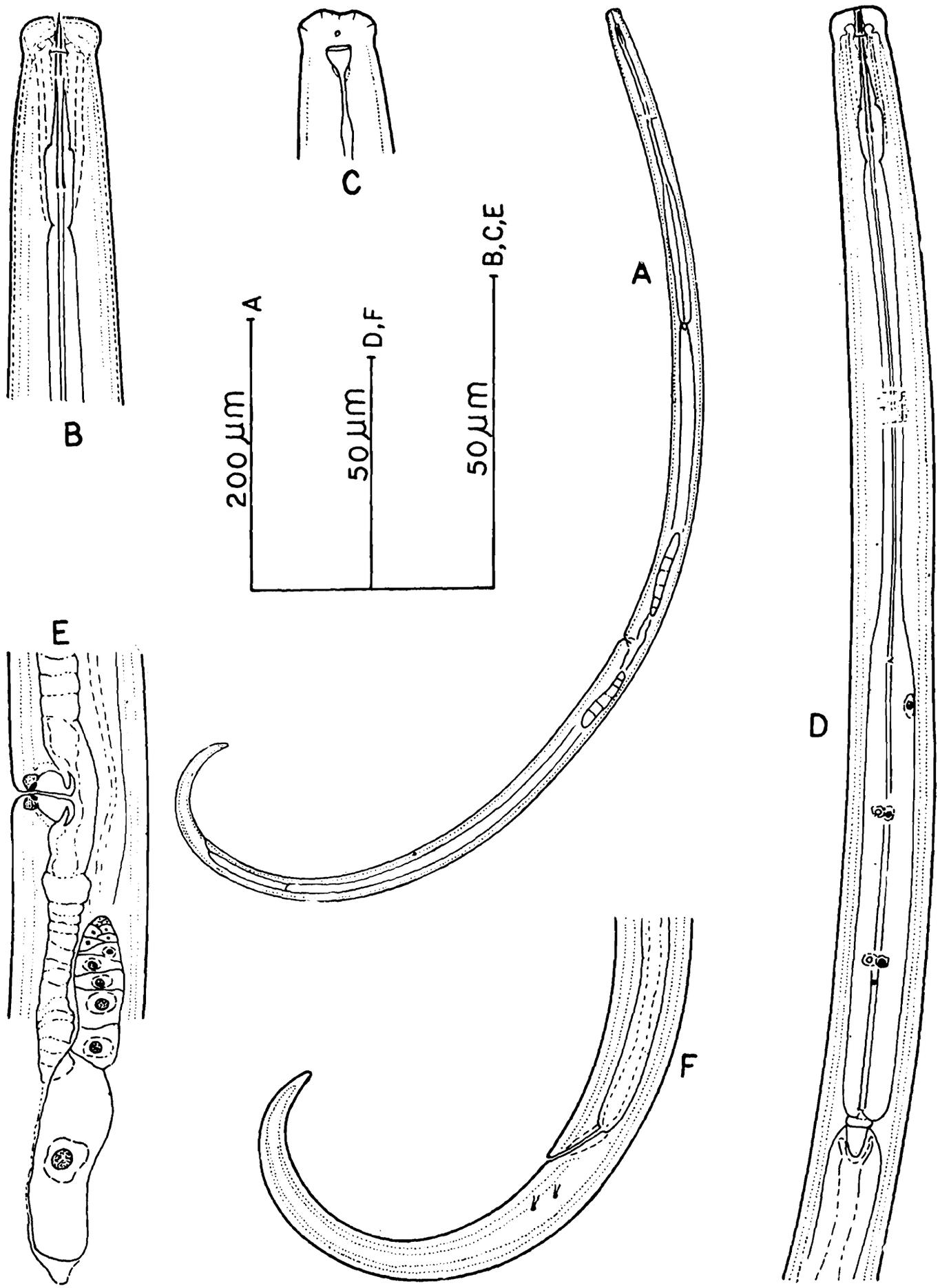

Fig. 3. *Chrysonemoides distinctus* sp. n. A—Entire female, B—Anterior end, C—Head end (surface view), D—Oesophageal region, E—Posterior sexual branch, F—Female tail.

Acknowledgement

We are thankful to Dr. B. K. Tikader, Director of Zoological Survey of India, Calcutta, for providing research facilities.

References

Darekar, K. S. and Khan, E. 1979. Soil and plant parasitic nematodes from Maharashtra, India, VII. *Indokochinema conicauda* n. gen, n. sp. and Kochinematidae n. fam. (Dorylaimida : Nematoda). *Indian J. Nematol.*, **8** : 140-143.

Heyns, J. 1963. New species of the superfamily Dorylaimoidea (Nematoda) from South African soils, with a description of a new genus *Kochinema*. *S. Afr. J. agric. Sci.* **6** : 289-302.

Siddiqi, M. R. 1969. *Crateronema* n. gen. (Crateronematidae n. fam.), *Poronemella* n. gen. (Lordellonematinae n. subfam.) and *Chrysonemoides* n. gen. (Chrysonematidae n. fam), with a revised classification of Dorylaimoidea (Nematologica, **15** : 81-100.

Bull. zool. Surv. India, 7 (2-3) : 305-309, 1985

A NEW SPECIES OF *OPPIA* (ACARI : ORIBATEI : OPPIIDAE) FROM DARJEELING, INDIA

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AND

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ABSTRACT

A new species of the genus *Oppia* Koch (Acari : Oribatei : Oppiidae), viz., *O. cryptomeriae* is described from forest soils in the district of Darjeeling, West Bengal, India.

The genus *Oppia* was established by Koch (1836) with *Oppia nitens* Koch, 1836 as the type-species. It is well represented in India and has been reported previously by Prasad (1965) from Bhagalpur, Bihar, Bhaduri and Raychaudhuri (1967) from Calcutta, West Bengal, Singh and Mukharji (1971) from Varanasi, U. P., Hafeez-Kardar (1976) from Aligarh, U. P., Chakrabarti, Bhaduri and Raychaudhuri (1977) from West Bengal, Mishra, Bhaduri and Raychaudhuri (1980) from Orissa and by Bhattacharya (1980) from Santiniketan, West Bengal. All measurements are in microns.

Oppia cryptomeriae sp. nov.

(Figs. 1-2)

Female : Colour deep brown ; length of the body : 715-745 ; width of the body : 395-440.

Prodorsum longer than broad, dorsomedially with irregular scattered foveolations, tectopodium I and posterolateral margin granular, posterior region with many small light spots ; the tip of rostrum cut deeply into three parts ; rostral setae glabrous, slightly elbowed at the middle, with pointed tips, 65-70 long, 3 times as long as their mutual distance, inserted dorsally on a thin transverse ridge, a little beyond the tip of rostrum ; lamellar setae smooth, slightly curved, 28-30 long, as long as their mutual distance, located on a strongly developed arch-like ridge on the middle field of prodorsum ; interlamellar setae smooth, extremely long, 130-140 in length, more than 3 times as long as their mutual distance, situated anterior to the posterior light spots of prodorsum ; exobothridial setae 1 pair, smooth, moderately long, 40-50 in length, about $1\frac{1}{2}$ times longer than the lamellar setae, inserted anterolaterally to the bothridium ; bothridium cup-shaped, directed anterolaterad ; sensillus with a narrow stalk and club-shaped head beset with two distal

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threads, the posterior one being 5 times as long as the anterior one, 140-155 long, directed postero-laterad.

Notogaster oval, a little longer than broad, anterior margin rounded, with scattered irregular foveoles and light spots ; notogastral setae 10 pairs, glabrous, curved, with pointed tips, 50-110 long, setae *ta* antero-lateral, *te*

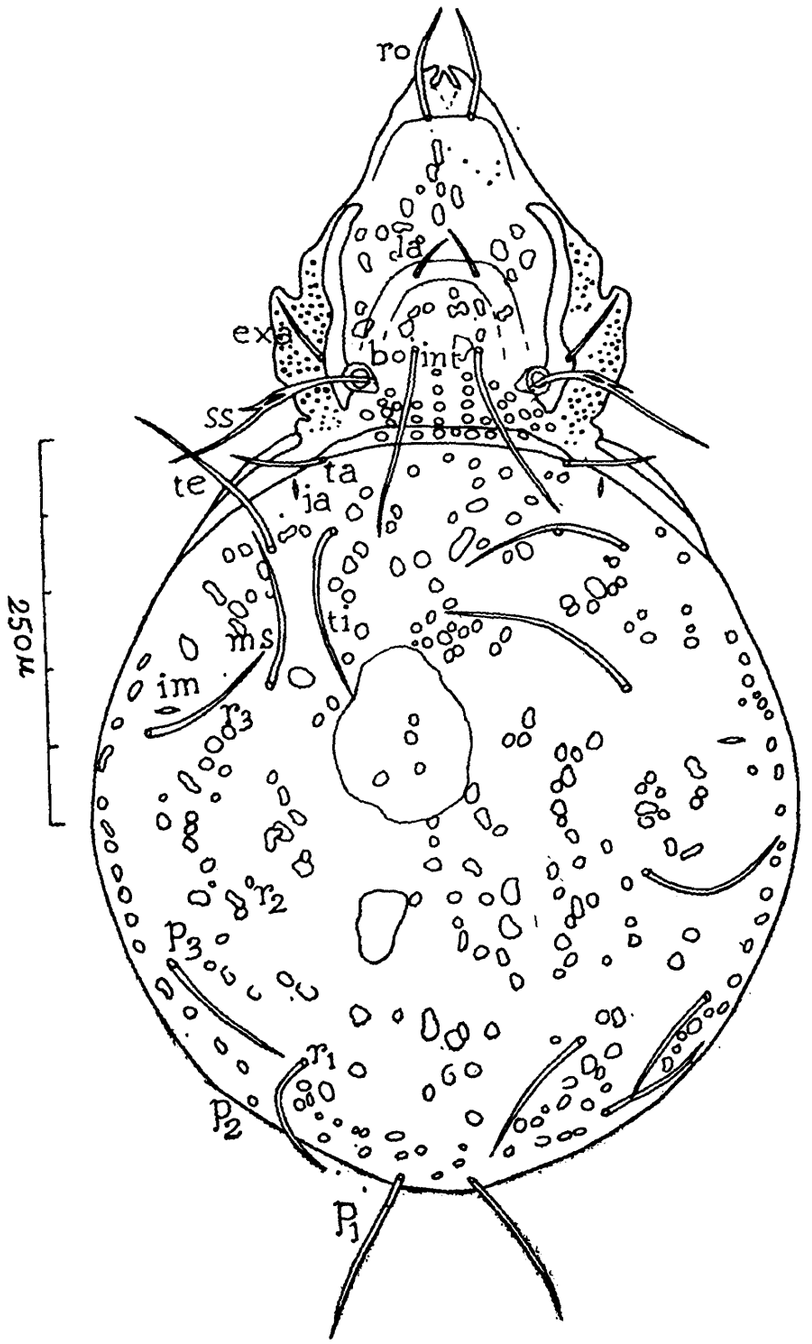

Fig. 1. *Oppia cryptomeriae* sp. nov. (Dorsal view), *ro*=rostral seta, *la*=lamellar seta, *int*=interlamellar seta, *exa*=anterior exobothridial seta, *ss*=sensillus, *bo*=bothridium, *ta*, *te*, *ti*, *ms*, r_1, r_2, r_3, p_1, p_2, p_3=notogastral setae, *ia*, *im*=dorsal fissures.

and *ti* antero-dorsal, *ms*, r_2 mid-dorsal, r_3 medio-lateral, r_1 postero-dorsal, and p_1, p_2, p_3 postero-marginal ; humeral setae *ta* well-developed being smallest, setae *te* longest among the notogastral setae ; distance *ti*—*ti* $<r_1—r_1<ms—ms<r_2—r_2$; distance *ta*—*ta* $<te—te<r_3—r_3$; setae *ms* situated a little closer to *ti* than to r_2 ; the fissure *ia* a longitudinal slit, located immediately behind *ta* ; lyrifissure *im* aligned transversely in front of setae r_3.

Ventral plate with a few scattered irregular foveoles and light spots ; each anal plate about $3\frac{1}{2}$ times as long as wide, with

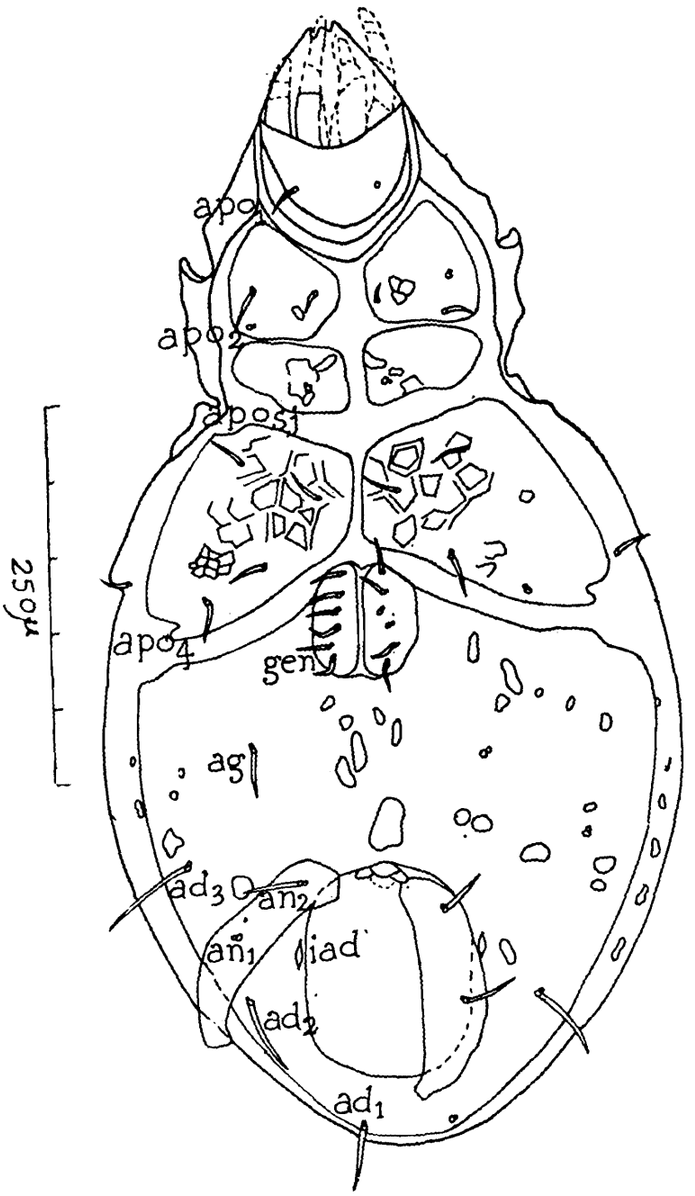

Fig. 2. *Oppia cryptomeriae* sp. nov. (Ventral view), an_1, an_2=anal setae, ad_1, ad_2, ad_3=adanal setae, *iad*=adanal fissure, *gen*=genital plate, *ag*=aggenital seta, apo_1, apo_2, apo_{sj}, apo_4=apodemata.

2 smooth, homotrichous setae, 29-30 long, an_1 inserted at about the middle and an_2 anteriorly on anal plate, their mutual distance about 1½ times as long as their individual length ; adanal setae 3 pairs, smooth, 40-65 long, ad_1 postero-marginal, ad_2 mid-lateral and ad_3 antero-marginal to anal aperture ; setae $ad_3 > ad_2 > ad_1$, distance $ad_1—ad_1 < ad_2—ad_2 < ad_3—ad_3$; *iad* a distinct slit, aligned closely parallel to the lateral border of anal aperture medially ; each genital plate about 2 times as long as broad, with 6 small, homotrichous setae, 14-15 long, arranged equidistantly in a linear fashion on the middle of the genital plate ; aggenital setae 1 pair, smooth, simple, 25-30 long, situated close to the genital than to the anal aperture, their mutual distance twice the maximum width of the genital plates.

Epimeral region reticulated ; sternal ridges completely developed in epimeres I, II, III and IV ; apo_1, apo_2, apo_{3j}, apo_4 distinct, apo_3 absent ; epimera I and II completely separated, III and IV fused ; epimeral setae simple, smooth, 10-20 long ; setal formula of epimerata 3-1-2-3.

All legs monodactylous, claws slightly curved.

Holotype : Adult ♀, INDIA : W. Bengal : Darjeeling, Darjeeling forest Div., Tonglu forest range, Palmajua forest bunglow area (from rotten leaves of *Cryptomeria japonica*), 2300 m., 16.viii.1977 (*B. K. Mondal* Coll.) ; paratypes : 2 adult ♀ ♀, same data as for holotype ; paratype : adult ♀, INDIA : W. Bengal : Darjeeling, Darjeeling forest Div., Ghum-Simana forest range, Sukiapokhri forest block (from decomposed leaves of *Cryptomeria japonica*), 2100 m., 21.ix.1978 (*B. K. Mondal* Coll.) ; deposited in the laboratory of the Department of Zoology, Presidency College, Calcutta.

This new species approaches close to *Oppia arcualis* Berlese, 1913, in body shape, in the nature of rostrum, in the arrangement of prodorsal ridges, location of lamellar, interlamellar, exobothridial and notogastral setae, in the structure of the sensilla, position of anal, adanal, aggenital setae, situation of *iad* and general configuration of the epimeral region, besides a few other characters. It can easily be separated from Berlese's (1913) species in having long interlamellar setae, posterior distal 'thread' of sensillus 5-times as long as the anterior one, long, smooth, curved notogastral setae, genital setae arranged equidistantly and medially on genital plates and in the absence of 4 large light spots between the interlamellar setae.

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REFERENCES

BERLESE, A. 1913. Acari nuovi. Manipoli—VII-VIII. *Redia*, 9 : 77-111.

BHATTACHARYA, T. 1980. Climate, Soil and Soil Inhabiting arthropods of Santiniketan and adjacent areas. *Visva-Bharati J. Res. Sci.*, 1978-'79, 3(2) : 21-22.

BHADURI, A. K. AND RAYCHAUDHURI, D. N. 1967. A note on Soil Oribatid Mites from Calcutta, West Bengal. *Sci. Cult.*, **33** : 450.

CHAKRABARTI, D. K., BHADURI, A. K. AND RAYCHUDHURI, D. N. 1977. A new species and a few new records of soil oribatid mites (Acari, Oribatei) from West Bengal. *Sci. Cult.*, **43**(4) : 178-180.

HAFEEZ-KARDAR, M. A. 1976. Four new species of *Oppia* (Oribatei : Oppiidae) from India. *Indian J. Acarol.*, **1**(1/2) : 6-10.

KOCH, C. L. 1836. Deutschlands Crustaceen, Myriapoden und Arachniden. 1836, vols. 1-9.

MISHRA, S., BHADURI, A. K. AND RAYCHUDHURI, D. N. 1980. New records of soil oribatid mites (Acari, Oribatei) from Orissa, India. *Sci. Cult.*, **46**(6) : 225-227.

PRASAD, V. 1965. Soil mites of Sabour (Bhagalpur). *Sci. Cult.*, **31** : 495-496.

SINGH, J. AND MUKHARJI, S. P. 1971. Qualitative composition of soil Arthropods in some fields at Varanasi (India). *Oriental Ins.*, **5** : 487-494.

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AN ANNOTATED LIST OF SEPTATE GREGARINES (APICOMPLEXA : SPOROZOEA) FROM INSECTS IN INDIA

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ABSTRACT

The present paper brings together all the species of septate gregarines (Apicomplexa : Sporozoea) so far described from insects in India, which comprise 94 species belonging to 27 genera and 9 families.

It is hoped that the present paper will be of great help for the future workers in this line.

Introduction

One of the major groups of protozoan parasites in the gut of insects is the septate gregarines which is at present included in the Phylum Apicomplexa and the Class Sporozoea (Levine *et. al.*, 1980). The adults of these parasites have an anchoring organ known as the epimerite, in addition to the protomerite and the deutomerite, the latter being the largest segment of the body and containing the single vesicular nucleus.

Extensive researches on the group have been made in our country as well as outside India as a result of which a number of species have been established. These gregarines were generally believed to be harmless to their hosts. But interest in them increased when Lipa (1967) reported that some of these gregarines are harmful to their hosts and may be used for biological control of harmful and noxious insects. We have undertaken to compile all the septate gregarines described from insects in India which will help future workers carrying out researches on the problems of biological control. In a recent communication we (Haldar *et al.*,1984) gave a list of gregarines from arthroped hosts. In the present paper the list has been prepared on the basis of the hosts.

A Brief History of Research on the Septate Gregarines in India

The history of the gregarines may be traced from the time of Redi who, in 1708, made the discovery of what was possibly a gregarine (Watson, 1 16). However, Dufour (1828) gave an authentic report of 'gregarinosis' in an arthropod host and established the genus *Gregarina*. The history of research on gregarines was summarised by Watson (1916), Lipa (1967) and Nelson (1970). It is, however, not our intension to review the

literature on the subject but only to mention some salient points of research on the group in India.

Bhatia and Setna (1924) first carried out researches on septate gregarines in India. In his "Fauna of British India", Bhatia (1938) listed several species. In a series of publications, Chakravarty (1934, 1935, 1936, 1938, 1939) described many new species including a new family Monoductidae. Chakravarty (1959) also proposed a new classification of the sub order 'Cephalina'.

List of Septate Gregarines from Indian Insects

A list has been presented in the following pages giving the names of the insect hosts with their orders and families (where available) and their gregarine parasites with their families and the author(s). At the end of the list detailed references have also been compiled. For insects, the classification of Mani (1974) and for the gregarines the classification of Chakravarty (1959) have been followed in the preparation of the list.

Host (s)	Order of Host	Family of Host	Parasite	Family	Author (s)
			Order—Coleoptera		
Aulacophora foveicollis	Coleoptera	Chrysomelidae	*Caulocephalus crenata*	Didymophyidae	Bhatia and Setna (1924)
Gallerucida bicolor	Do	Do	*Quadruhyalodiscus gallerucidae*	Do	Kundu and Haldar (1984)
Gonocephalum brachyelytra	Do	Tenebrionidae	*Stylocephalus bahli*	Stylocephalidae	Misra (1941)
Opatroides vicinis	Do	—	*S. indicus*	Do	Misra (1942)
Gonocephalum brachyelytra	Do	Tenebrionidae	*S. gonocephali*	Do	Bhushana Rao (1962)
Alphitobius piceus	Do	Do	*S. alphitobiusae*	Do	Sarkar and Chakravarty (1969)
Anoplogenius microgonius	Do	—	*S. microgonusae*	Do	Do
Mesomorphus velliger	Do	Tenebrionidae	*Gregarina mesomorphi*	Gregarinidae	Devdhar and Deshpande (1971a)
Do	Do	Do	*G. cylindrica*	Do	Do
Gonocephalum hoffmannseggi	Do	Do	*Stylocephalus serpentula* (Subgenus—*Xiphocephalus*)	Stylocephalidae	Devdhar and Amoji (1977)
Gonocephalum hoffmannseggi	Coleoptera	Tenebrionidae	*S. karnatakanensis* (Subgenus—*Xiphocephalus*)	Stylocephalidae	Devdhar and Amoji (1977)
Do	Do	Do	*S. hoffmannseggi* (Subgenus—Stylocephalus S. Str.	Do	Do

Host (s)	Order of Host	Family of Host	Parasite	Family	Author (s)
Amblyrrhinus sp.	Coleoptera	Curculionidae	*Gregarina crescentica*	Gregarinidae	Haldar and Chakraborty (1978b)
Alcides sp. nr. *leopardus*	Do	Do	*Gregarina alcidessi*	Do	Do
An unidentified beetle	Do	Do	*G. sprague*	Do	Do
Rhytinota impolita	Do	Tenebrionidae	*Cystocephalus devdharii*	Stylocephalidae	Patil and Amoji (1979a)
Gonocephalum sp.	Do	Do	*Stylocephalus apapillatus*	Do	Haldar and Chakraborty (1979a)
Rhytinota impolita	Do	Do	*Leidyana gnyanagangai*	Leidyanidae	Patil and Amoji (1979b)
Myllocerus sp. 1	Do	Curculionidae	*Hirmocystis bengalensis*	Didymophyidae	Haldar and Chakraborty (1979b)
Xanthoprochilus sp.	Do	Do	*H. pitcharis*	Do	Do
Myllocerus sp. 2	Coleoptera	Curculionidae	*H. pseudoductis*	Didymophyidae	Haldar and Chakraborty (1979b)
Rhytinota tristis	Do	Tenebrionidae	*Cystocephalus rhytinotus*	Stylocephalidae	Patil and Amoji (1980)
Longitarsus sp.	Do	Chrysomelidae	*Gregarina bilobosa*	Gregarinidae	Kundu and Haldar (1981a)
Hoplasoma unicolor	Do	Do	*Hirmocystis hoplasomae*	Didymophyidae	Kundu and Haldar (1981b)
Stethorus sp.	Do	—	*Brustiospora indicola*	Brustiosporidae	Kundu and Haldar (1981c)
Lepropus sp.	Do	Curculionidae	*Hirmocystis lepropi*	Didymophyidae	Haldar and Chakraborty (1981)
Raphidopalpa (=Aulacophora) *foveicollis*	Do	Chrysomelidae	*Retractocephalus raphidopalpae* (Haldar and Chakraborty, 1976)	Do	Haldar, Chakraborty and Kundu (1982)
Monolepta signata	Do	Do	*R. spinosus*	Do	Do
Haltica sp.	Do	Do	*R. halticus*	Do	Do
Aulacophora intermedia	Do	Do	*R. aulacophorae*	Do	Do
Lema sp.	Coleoptera	Chrysomelidae	*R. spatulatus*	Didymophyidae	Haldar, Chakraborty and Kundu (1982)
Cryptophagus sp.	Do	—	*Stylocystis chowdhurya*	Actinocephalidae	Sarkar and Majumdar (1983b)
			Order—ISOPTERA		
Capritermes incola	Isoptera	—	*Hirmocystis capritermis*	Didympohyidae	Uttangi and Desai (1961)

Host(s)	Order of Host	Family of Host	Parasite	Family	Author(s)
Capritermes incola	Isoptera	—	*H. incola*	Didympohyidae	Uttangi and Desai (1961)
Do	Do	—	*H. indica*	Do	Do
Speculitermes cyclops sinhalensis	Do	—	*H. speculitermis*	Do	Uttangi and Desai (1962)
Do	Do	—	*H. dharwarensis*	Do	Do
Do	Do	—	*Steinina termitis*	Actinocephalidae	Do
Capritermes incola	Do	—	*Sphaerocystis termitis*	Sphaerocystidae	Desai and Uttangi (1962)
Macrotermitis estherae	Do	—	*Gregarina macrotermitis*	Gregarinidae	Kalavati and Narasimhamurti (1978)
Odontotermes sp.	Do	—	*Anthorhynchus hanumanthi*	Sphaerocystidae	Do
Coptotermes heimi	Isoptera	—	*Steinina coptotermi*	Actinocephalidae	Kalavati and Narasimhamurti (1978)
Odontotermes sp.	Do	—	*Sphaerocystis odontotermi*	Sphaerocystidae	Kalavati and Narasimhamurti (1980)
			Order—Odonata		
Ceriagrion coromandelianum	Odonata	Coenagriidae	*Actinocephalus ceriagrionae*	Actinocephalidae	Sarkar and Chakravarty (1969)
Agrioenemis sp.	Do	Do	*Menospora nonacantha*	Do	Devdhar and Despande (1971b)
Ceriagrion coromandelianum	Do	Do	*Dendrorhynchus keilini*	Dactylophoridae	Nazeer Ahamed and Narasimhamurti (1979)
Do	Do	Do	*Ancyrophora ceriagrioni*	Actinocephalidae	Do
Bradinopyga geminata	Do	Libellulidae	*Actinocephalus bradinopygi*	Do	Narasimhamurti and Nazeer Ahmed (1980)
Enallagma parvum	Do	Coenagriidae	*Menospora enallagmae*	Do	Sarkar and Haldar (1980b)
Coenagrion dyeri	Do	Do	*M. coenagrii*	Do	Do
Agrioenemis pygmaea	Odonata	Coenagriidae	*Hoplorhynchus ramidigitus*	Actinocephalidae	Sarkar and Haldar (1980c)
Brachythemis contaminate	Do	Libellulidae	*Odonaticola hexacantha*	Do	Sarkar and Haldar (1981a)
Diplacodes trivalis	Do	Do	*O. longicollara*	Do	Do
Orthetrum sabina	Do	Do	*O. orthetri*	Do	Do
Neurothemis t. tulbia	Do	Do	*O. rodgii*	Do	Do
Ceriagrion coromandelianum	Do	Coenagriidae	*Tetractinospora victoris*	Do	Sarkar and Haldar (1981b)

Host(s)	Order of Hosts	Family of Hosts	Parasite	Family	Author(s)
C. cerinorubellum	Odonata	Coenagiidae	*Acanthospora bengalensis*	Actinocephalidae	Sarkar and Haldar (1981c)
Ischnura senegalensis	Do	Do	*Ancyrophora ischnurae*	Do	Sarkar and Haldar (1981d)
I. delicata	Do	Do	*A. ovoides*	Do	Do
I. delicata	Do	Do	*Actinocephalus ellipsoidus*	Do	Sarkar and Haldar (1981e)
Ceriagrion olivacum	Do	Do	*Ramicephalus olivacus*	Do	Sarkar and Haldar (1981f)
Enallagma sp.	Do	Do	*Mukundaella undulatus*	Do	Sarkar (1981)
Crocothemis S. servilia	Odonata	Libellulidae	*Odonaticola elliptica*	Actinocephalidae	Sarkar (1981)
Crocothemis servilia	Do	Do	*O. crocothemis*	Do	Kori and Amoji (1983)
			Order—ORTHOPTERA		
Gryllus sp.	Orthoptera	Gryllidae	*Gregarina cornwalli*	Gregarinidae	Bhatia and Setna (1924)
Do	Do	Do	*Leidyana gryllorum*	Leidyanidae	Do
Poecilocerus pictus	Do	Acrididae	*Gregarina poecilocerum*	Gregarinidae	Ganapati and Mrutyunjaya Devi (1954)
Aelopus sp.	Do	Do	*Quadruspinospora aelopii*	Actinocephalidae	Sarkar and Chakraborty (1969)
Phleoba antennata	Do	Do	*Phleobum gigantinum*	Monoductidae	Haldar and Chakraborty (1974)
Spathosternum sp.	Do	Do	*Quadruspinospora chakravartyei*	Actinocephalidae	Haldar and Chakraborty (1975)
Aiolopus sp.	Do	Do	*Q. indoaiolopii*	Do	Haldar and Chakraborty (1976)
Acrida exaltata	Do	Do	*Q. acridii*	Do	Do
Trilophidia annulata	Orthoptera	Acrididae	*Quadruspinospora megaspinosa*	Actinocephalidae	Haldar and Chakraborty (1976)
Attaractomorpha crenulata	Do	Pyrgomo-phidae	*Q. attractomorphii*	Do	Haldar and Chakraborty (1978a)
Aiolopus tamulus	Do	Acrididae	*Q. chakravartyei*	Do	Haldar, Sarkar and Datta (1979)
Pteronemobius concolor	Do	Gryllidae	*Leidyana linguata*	Leidyanidae	Haldar and Sarkar (1979)
Gryllodes sp.	Do	Do	*Gregarina gryllodesii*	Gregarinidae	Haldar and Sarkar (1980)
Plebeogryllus guttiventris	Do	Do	*G. guttiventra*	Do	Do
Pteronemobius fascipense	Do	Do	*G. levinii*	Do	Do

Host (s)	Order of Hosts	Family of Hosts	Parasite	Family	Author (s)
Gryllotalpa africana	Orthoptera	Gryllotalpidae	*Hirmocystis theodoridesi*	Didymophyidae	Kundu and Haldar (1981b)
Spathosternum prasiniferum prasiniferum	Do	Acrididae	*Quadruspinospora dichotoma*	Actinocephalidae	Kundu and Haldar (1983)
			Order—Thysanura		
Lepisma saccharina	Thysanura	Lepismatidae	*Gregarina aciculata*	Gregarinidae	Cornwall (1915)
Ctenolepisma sp.	Thysanura	Lepismatidae	*Lepismatophila karnataki*	Stylocephalidae	Nimbargi and Rodgi (1974)
C. nigra	Do	Do	*L. rhombocephala*	Do	Haldar and Chakraborty (1977)
			Order—Hemiptera		
Pirates quadrinotatus	Hemiptera	—	*Schneideria quadrinotata*	Sphaerocystidae	Amoji and Rodgi (1973)
Lygus hospes	Do	Lygaeidae	*Gregarina lygeusi*	Gregarinidae	Haldar, Ray and Gupta (1982)
			Order—Blattodea		
Supella supellectilium	Blattodea	Blattellidae	*Gregarina cylindrosa*	Do	Haldar and Kundu (1977)
Nymphal stage of an unidentified insect	Do	Do	*G. discocephala*	Do	Kundu and Haldar (1981a)
			Order—Dermaptera		
Forficula ambigua	Dermaptera	Forficulidae	*Gregarina megaspora*	Do	Amoji and Rodgi (1976)
Do	Do	Do	*G. ambigua*	Do	Do
Nala lividipes	Dermaptera	Labiduridae	*Gregarina nalae*	Gregarinidae	Datta and Haldar (1984)
			Order—Dictyoptera		
Infection found in Nymphal stage of an unidentified Insect	Dictyoptera	Blattellidae	*Gregarina mukundai*	Do	Haldar and Kundu (1980)
Ischnoptera sp.	Do	Do	*G. ischnopterae*	Do	Datta and Haldar (1984)
			Order—Psocoptera		
Liposcelis sp.	Psocoptera	—	*Liposcelisus coronatus*	Didymophyidae	Sarkar and Haldar (1980a)
			Order—Hymenoptera		
Xylocopa aestuans	Hymenoptera	Xylocopidae	*Leidyana xylocopae*	Leidyanidae	Bhatia and Setna (1924)

ADDENDUM

Since the paper was accepted for publication, a number of new species of gregarines have been descr bed. There are listed below :

Host (s)	Order of Host	Family	Parasite	Family	Author (s)
Gallerucida bicolor	Coleoptera	Chrysomelidae	*Quadruhyalodiscus gallerucidae*	Didymophyidae	Kundu and Haldar (1984)
Acrotelsa collaris (Fabricius)	Thysanura	Lepismatidae	*Lepismatophila cruszi*	Stylocephalidae	Do
Tribolium castaneum	Coleoptera	Tenebrionidae	*Gregarina basi-constrictonea*	Gregarinidae	Ghose, Sengupta and Haldar (1985)
T. castaneum	Do	Do	*Hirniocystis oxeata*	Didymophyidae	Do
Gonocephalum depressum (F.)	Do	Do	*Xiphocephalus gonocephali*	Stylocephalidae	Patil and Amoji (1985)
Scleron reitteri G. B.	Do	Do	*X. reitterae*	Do	Do
S. latipes (GUER)	Do	Do	*X. latipes*	Do	Do
Palorus sp.	Do	Do	*Steinina palorusi*	Actinocephalidae	Gupta and Haldar (1986)
Larva of *Tribolium castaneum*	Do	Do	*Eliptocystis triboli*	Gregarinidae	Sengupta, Ghose and Haldar (1986)

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REFERENCES

AMOJI, S. D. AND RODGI, S. S. 1973. Occurrence of an Actinocephalid Gregarine in the gut of Hemiptera *Pirates quadrinotatus* Fabr., Curr. Sci. **42**(21) : 755.

AMOJI, S. D. AND RODGI, S. S. 1976. Two new species of Cephaline Gregarines in the ear wig, *Forficula ambigua Burr. Riv. Parasit.*, XXXVII(1) : 43-56.

BHATIA, B. L. 1938. Fauna of British India Sporozoa. London.

BHATIA, B. L. AND SETNA, S. B. 1924. On some new Cephaline Gregarines—*Parasitol.*, **16** : 279-288.

BHUSHANA RAO, K. S. P. 1962. On a new Cephaline Gregarine (Protozoa) from the gut of the beetle, *Gonocephalum brachyelytra. Proc. All India Congr. Zool.*, Pt. **2** : 265-269.

CHAKRAVARTY, M. M. 1959. Systematic position of some genera and classification of the suborder Cephalina Delage and Hérouard. *Proc. Zool. Soc. Calcutta*, **12** : 71-81.

CHAKRAVARTY, M. M. 1961. D. Sc. Thesis, Calcutta University.

CORNWALL, J. W. 1915. *Lepisma saccharina*, its life-history and its Gregarine Parasites. *Ind. Jour. Med. Res.*, 3(1) : 116-131.

DATTA, S. C. AND HALDAR, D. P. 1984. Studies on two new species of Cephaline Gregarines (Apicomplexa : Sporozoea) of the genus *Gregarina* Dufour, 1828 from *Insects*. *Arch. Protistenk.*, **128** : 89-98.

DESAI, R. N. AND UTTANGI, J. C. 1962. On a new Gregarine *Sphaerocystis termitis*, n. sp., from the Indian termite, *Capritermes incola Wasm*. *J. Animal Morphol. Physiol.*, IX(2) : 110-114.

DEVDHAR, M. J. AND AMOJI, S. D. 1977. *Stylocephalus* Gregarines found in Tenebrionid Beetle, *Gonocephalum hoffmannseggi*. *Stev. Arch. Protistenk.*, **119** : 75-85.

DEVDHAR, M. J. AND DESHPANDE, S. B. 1971a. On two new Gregarines of the genus *Gregarina* from *Mesomorphus villiger*, Blanc. (Coleoptera : Tenebrionidae) from Dharwar, *India*, *Ind. Zool.* **2** : 27-34.

DEVDHAR, M. J. AND DESHPANDE, S. B. 1971b. On a New Gregarine *Menospora nonacantha* n. sp. from the Odonate *Agrioenemis* sp. (Fam. Coena griidae) from Dharwar, India. *Ind. Zool.* **2** : 41-45.

DUFOUR, L. 1828. Note sur la Gregarine nouveaugenre de ver pui vit en tropeau dans les intestines de elivers insects. *Ann. Sci. Nat.*, 13(1) : 366-368.

GANAPATI, P. N. AND MRUTYUNJAYA DEVI, C. S. 1954. On the life-history of a new cephaline gregarine, *Gregarina poecilocerum* sp.nov. from the gut of the Grasshopper, *Poecilocerus pictus* (Fabr.) *J. Zool. Soc. Ind.*, **6** : 133-144.

GHOSE, S., SENGUPTA, T. AND HALDAR, D. P. 1985. Two new septate gregarines (Apicomplexa : Sporoxoea), *Gregarina basiconstrictonea* n. sp. and *Hirmocystis oxeata* n. sp. from *Tribolium castaneum*. Acta Protozool., **25**(1) (In Press).

GUPTA, S. K. AND HALDAR, D. P. 1986. *Steinina palorusi* n. sp., a new species of septate gregarines (Apicomplexa : Sporozoea) from the larva of a tenebrionid beetle. Arch. Protistenk., (In Press).

HALDAR, D. P. AND CHAKRABORTY, N. 1974. A new Cephalline Gregarine, *Phleobum gigantinum* n. gen., (Protozoa : Sporozoa) from grasshopper. *Proc.* Third International Congress of Parasitology, **1** : 8.

HALDAR, D. P. AND CHAKRABORTY, N. 1975. Morphology and life-history of Cephaline Gregarine, *Quadruspinospora chakravartyei* Chakraborty & Haldar (Protozoa : Sporozoa). Geobios, **2** : 104-106.

HALDAR, D. P. AND CHAKRABORTY, N. 1976. Observations on the morphology and life-history of three new species of Cephaline Gregarines (Protozoa : Sporozoa) from grasshopper of West Bengal. *Proc. Zool. Soc., Calcutta*, **29** : 73-81.

HALDAR, D. P. AND CHAKRABORTY, N. 1977. Observations on the Cephaline Gregarine, *Lepismatophila rhombocephala* n. sp. (Protozoa : Sporozoa) from Silverfish *Arch. Protistenk.*, **119** : 361-366.

HALDAR, D. P. AND CHAKRABORTY, N. 1978a. A New Cephaline Gregarine (Protozoa : Sporozoa) from grasshopper. *Ind. J. Zool.*, **6**(1) : 43-47.

HALDAR, D. P. AND CHAKRABORTY, N. 1978b. Observations on three New Species of Cephaline Gregarines (Protozoa : Sporozoa) from Insects. *Acta Protozool.*, **17**(2) : 233-242.

HALDAR, D. P. AND CHAKRABORTY, N. 1979a. Observations on a new Cephaline Gregarine, *Stylocephalus apapillatus* n. sp. (Sporozoa : Protozoa) from a beetle, *Gonocephalum* sp. *Arch.* Protistenk., **122** : 154-163.

HALDAR, D. P. AND CHAKRABORTY, N. 1979b. Observations on three new species of Cephaline Gregarines (Protozoa : Sporozoa) of the Genus *Hirmocystis* Labbé from Coleopteran Insects. *Z. Parasitenkd.*, **59** : 121-130.

HALDAR, D. P. AND CHAKRABORTY, N. 1981. Observations on the morphology and life-history of a cephaline gregarine *Hirmocystis lepropi* n. sp. from the gut of the beetle, *Lepropus* Sp. *Proc. Indian Acad. Sci.* (*Anim. Sci.*), **90**(3) : 315-320.

HALDAR, D.P. AND KUNDU, T.K. 1982. Studies in Cephaline Gregarines (Protozoa : Sporozoa) from Insects : Life-history of *Retractocephalus raphidopalpae* Haldar and Chakraborty, 1976 and four new species of the Genus *Retractocephalus*. *Arch. Protistenk.*, **125** : 41-62.

HALDAR, D. P. AND KUNDU, T. K. 1977. Observations on the Cephaline Gregarine, *Gregarina cylindrosa* sp. n. from *Supella supellec- tilium* (Blattodea), found in India. *Ves. Cs. Spol. Zool.*, XLI(4) : 248-252.

HALDAR, D. P. AND KUNDU, T. K. 1980. Studies in the morphology and life-history of a new Cephaline Gregarine, *Gregarina mukundai* n. sp. from an Insect. *Arch. Protistenk.*, **123** : 342-348.

HALDAR, D. P., RAY, S. K. AND GUPTA, S. K. 1982. Studies in the morphology and life-history of *Gregarina lygeusi* n. sp., a new Cephaline Gregarine (Apicomplexa : Sporozoea) from *Lygaus hospes* Fabricius. *Jour. Beng. Nat. Hist. Soc.*, **1**(2) : 17-22.

HALDAR, D. P. AND SARKAR, N. K. 1979. Cephaline Gregarine *Leidyana linguata* sp. n. parasite of a Gryllid *Pteronemobius concolor* Walker from India. *Acta Protozool.*, **18**(3) : 435-440.

HALDAR, D. P. AND SARKAR, N. K. 1980. Studies in three new species of Cephaline Gregarinesof the Genus *Gregarina* Dufour, 1828from Indian Gryllids. *Arch. Protistenk.*, **123** : 61-71.

HALDAR, D. P., SARKAR, N. K. AND DATTA, S. C. 1979. New host for *Quadruspinospora chakravartyei* Chakraborty and Haldar, 1974 (Protozoa : Sporozoa). *Curr. Sci.*, **48**(14) : 656.

HALDAR, D. P. AND SENGUPTA, T. 1984. An annotated list of septate Gregarines (Apicomplexa : Sporozoea) from the Indian Arthropods. *Proc. 71st Ind. Sci. Cong.* Part III (Abstracts) : 110.

KALAVATI, C. AND NARASIMHAMURTI, C. C. 1978. Three new species of Cephaline Gregarines from Termites. *Proc. Indian Acad. Sci.*, **87**B(12) : 397-404.

KALAVATI, C. AND NARASIMHAMURTI, C. C. 1980. A new species of Septate Gregarine, *Sphaerocystis odontotermi* n. sp. from the gut of a xylophagus termite, *odontotermes* sp. *Proc. Indian Acad. Sci.*, **89**(1) : 25-28.

KORI, S. S. AND AMOJI, S. D. 1983. On the life-history of a new actinocephalid gregarine, *Odonaticola crocothemis*, sp. nov. from the mid gut of an odonate insect, *Crocothemis servilia* (Drury). *The Indian Zoologist*, 7(1 & 2) : 155-158.

KUNDU, T. K. AND HALDAR, D. P. 1981a. Observations on two new species of Cephaline Gregarines (Protozoa : Sporozoa) of the Genus *Gregarina* Dufour, 1828 from Insects. Z. Parasitenkd., **65** : 217-223.

KUNDU, T. K. AND HALDAR, D. P. 1981b. Observation on two new species of Cephaline Gregarines (Protozoa : Sporozoa) of the genus *Hirmocystis* Labbé from *Insects. Acta, Protozool.* **20**(3) : 323-335.

KUNDU, T. K. AND HALDAR, D. P. 1981c. Observation on a new Cephaline Gregarine (Protozoa : Sporozoa), *Brustiospora indicola* gen. nov., sp. nov. from a Coccinellid Beetle, *Stethorus* sp. Arch. Protistenk., **124** : 471-480.

KUNDU, T. K. AND HALDAR, D. P. 1983. Observation on a new species of Cephaline Gregarine of the Genus *Quadruspinospora* Sarkar and Chakravarty, 1969 from a Grasshopper, *Spathosternum prasiniferum prasiniferum. Arch, Protistenk.*, **127** : 97-102.

KUNDU, T. K. AND HALDAR, D. P. 1984. Observations on *Quadruhyalodiscus gallerucidae* gen. nov., sp. nov. (Apicomplexa : Sporozoea) from a Chrysomelid Beetle, *Gallerucida bicolor. Arch. Protistenk.* **128** : 327-334.

KUNDU, T. K. AND HALDAR, D. P. 1984. *Lepismatophila cruszi* sp. n. New cephaline Gregarine from silver-fish *Acrotelsa collaris* (Fabricius) of West Bengal, India. Acta Protozool., **23**(4) : 255-262.

LEVINE, N. D. 1979. New Genera and Higher Taxa of Septate Gregarines (Protozoa, Apicomplexa). *J. Protozool.*, **26**(4) : 532-536.

LEVINE, N. D. (Chairman) 1980. A newly revised classification of the Protozoa. *J. Proto- zool.*, **27**(1) : 37-58.

LIPA, J. J. 1967. Studies on gregarines (Gregarinomorpha) of arthropods in Poland. *Acta. Protozool.*, **5**(8) : 97-179.

MANI, M. S. 1974. Modern classification of Insects. Dr. W. Junk bv Publishers, *The Hauge*, 331 pp.

MISRA, P. L. 1941. Observations on a new gregarine *Stylocephalus bahli* sp. nov. from the alimentary canal of an Indian beetle, *Gonocephalum helepioides. Proc. Ind. Mus.*, **43** : 43-72.

MISRA, P. L. 1942. A new cephaline gregarine, *Stylocephalus indicus*, sp. nov. from a beetle. *Proc. Ind. Mus.*, **44** : 339-340.

NARASIMHAMURTI, C. C. AND NAZEER AHAMED, S. 1980. A new septate gregarine, *Actinoccphalus bradinopygi* sp. n. from the dragonfly, *Bradinopyga geminata* Rambur. *Acta Protozool.*, **19**(1) : 61-66.

NAZEER AHAMED, S. AND NARASIMHAMURTI, C. C. 1979. Two new septate gregarines, *Dendrorhynchus keilini* sp. n. and *Ancyrophora ceriagrioni* sp. n. from the midgut of the Damsel Fly, *Ceriagrion coromandelianum* (Fabr.). *Acta Protozool.*, **18**(3) : 441-450.

NELSON, J. K. 1970. Gregarines from some Coleoptera of Colorado *Univ. Wyo. Publ.*, **32**(2) : 15-35.

NIMBARGI, P. M. AND RODGI, S. S. 1974. A new species of gregarine, *Lepismatophila karnataki*, sp. nov., from the silver fish, *Ctenolepisma* sp. *Karnataka Univ. Jour. Sci.* XIX : 42-48.

PATIL, C. C. AND AMOJI, S. D. 1979a. Eugregarine parasites of Coleoptera from North East Region of Karnataka. I. *Cystocephalus devdharii*, n. sp., found in the Gut of *Rhytinota impolita* Fairm. *Arch. Protistenk.*, **122** : 333-339.

PATIL, C. C. AND AMOJI, S. D. 1979b. Eugregarine parasites of Coleoptera from North-East Region of Karnataka. II. *Leidyana gnyanagangai* n. sp., found in the gut of *Rhytinota impolita* Fairm. *Curr. Sci.*, **48**(16) : 736-737.

PATIL, C. C. AND AMOJI, S. D. 1980. Eugregarine parasites of Coleoptera from north-east region of Karnataka III. *Cystocephalus rhytinotus* sp. n. found in the gut of *Rhytinota tristis* (Kr.). *Acta Protozool.*, **19**(3) : 287-292.

PATIL, C. C. AND AMOJI, S. D. 1985. Eugregarine Parasites of Coleoptera from North-East Region of Karnataka VI. *Xiphocephalus* spp. found in Tenebrionid Beetles. Arch. Protistenk., **129** : 191-197.

Redi, F. 1708. De Animalculis vivis quiln corpordus Animalium Vivorum reperiuntur. observations. Amstelodami.

SARKAR, A. AND CHAKRAVARTY, M. M. 1969. Gregarines (Protozoa : Sporozoa) from Insects. I. New Cephaline Gregarines of the family Actinocephalidae. *Proc. Zool. Soc., Calcutta*, **22** ; 17-29.

SARKAR, N. K. 1981. On some Actinocephalid Gregarines (Apicomplexa : Eugregarinida) of Odonate insects from West Bengal, India. *Proc. Indian Acad. Sci.*, **90**(6) : 640-657.

SARKAR, N. K. AND HALDAR, D. P. 1980a. Observations on *Liposcelisus coronatus* n. gen., n. sp. (Sporozoa : Didymophyidae) from a Psocopteran insect (Insecta : Psocoptera). *Riv. Parassitol.*, XLI(2) : 219-224.

SARKAR, N. K. AND HALDAR, D. P. 1980b. Observations on the two new species of Cephaline Gregarines (Protozoa : Sporozoa) from odonates in West Bengal. *Proc. Zool. Soc., Calcutta*, **33** : 17-27.

SARKAR, N. K. AND HALDAR, D. P. 1980c. Cephaline Gregarine, *Hoplorhynchus ramidigitus* sp. n. (Protozoa : Sporozoa), Parasite of an Odonate *Agrioenemis pygmaea* (Rambur) from India. *Acta Protozool.*, **19**(4) : 345-350.

SARKAR, N. K. AND HALDAR, D. P. 1981a. Observations on 4 new species of Actinocephalid Gregarines (Protozoa : Sporozoa) under a new Genus *Odonaticola* from Odonate Insects. *Arch. Protistenk.*, **124** : 288-302.

SARKAR, N. K. AND HALDAR, D. P. 1981b. Cephaline Gregarine *Tetractinospore victoris* gen. n., sp. n., parasite of an Odonate *Ceriagrion coromandelianum* (Fabricius) from India. *Acta Protozool.*, **20**(2) : 193-200.

SARKAR, N. K. AND HALDAR, D. P. 1981c. Observations on a new Cephaline gregarine (Protozoa : Sporozoa), *Acanthospora bengalensis* n. sp. from an Odonate Insect. *Arch. Protistenk.* **124** : 378-384.

SARKAR, N. K. AND HALDAR, D. P. 1981d. Observations on two new species of Cephaline Gregarine (Protozoa : Sporozoa) of the Genus *Ancyrophora* Léger, 1892 from Odonate Insects. *Z. Parasitenkd.*, **65** : 217-223.

SARKAR, N. K. AND HALDAR, D. P. 1981e. Cephaline Gregarine *Actinocephalus ellipsoidus* sp. n. parasite of an Odonate *Ischnura delicata* Hagen from India. *Acta Protozool.*, **20**(1) : 121-128.

SARKAR, N. K. AND HALDAR, D. P. 1981f. Cephaline Gregarine (Protozoa : Sporozoa) *Ramicephalus olivacus* sp. n. parasite of an Odonate *Ceriagrion olivacum* Laidlow from India. *Acta Protozool.*, **20**(2) : 185-192.

SARKAR, N. K. AND MAZUMDAR, S. K. 1983a. Two new species of Cephaline Gregarines from Odonata of West Bengal, India (Protozoa, Apicomplexa, Eugregarinida : Actinocephalidae). *Odonatologica,* **12**(2) : 173-178.

SARKAR, N. K. AND MAZUMDAR, S. K. 1983b. Observations on a new species of Cephaline Gregarine *Stylocystis chowdhurya* n. sp. (Apicommplexa : Eugregarinida) from *Cryptophagus* sp. (Insecta : Coleoptera). *Arch. Protistenk* : **127** : 189-192.

SENGUPTA, T., GHOSE, S. AND HALDAR, D. P. 1986. The biology of *Eliptocystis triboli* n. gen., n. sp. infecting the larvae of *Tribolium castaneum* (HERBEST) in walnuts. Arch. Protistenk., (In Press).

THÉODORIDÈS, J. AND JOLIVET, P. 1959. Eugregarines parasites de Coléopterès. Exploration du Parc. *National Albert*, 2^{e} Série, fasc. 8, 95 p. Bruxelles.

UTTANGI, J. C. AND DESAI, R. N. 1961. On some new Gregarines (Protozoa) found in the Gut of termites from Dharwar, India, *J. Karnataka Univ.*, **6** : 77-78.

UTTANGI, J. C. AND DESAI, R. N. 1962. On some Gregarines from the Nonxylophagus termite, *Speculitermes cyclops sinhalensis* from Dharwar, India. *J. Anim. Morphol. Physiol.*, **9** : 97-109.

WATSON, M. E. 1916a. Studies on Gregarines Ill. *Biol. Mongr.*, **2** : 11-258.

Bull. zool. Surv. India, 7 (2-3) : 323-324, 1985

STUDIES ON THE LAND SNAIL, *GLESSULA GEMMA* (REEVE) [MOLLUSCA : GASTROPODA] II. POPULATIONS

In connection with studies on the bioecology of the land snail *Glessula gemma*, Subba Rao *et al* (1985) reported the growth rates under laboratory conditios. The present communication describes the population density of the same species observed in an agri-horticultural garden at Baranagar, North Calcutta, over a period of two years, 1980 and 1981.

To study the population density, the garden was divided into five pockets irrespective of snail population. From each pocket snails occuring in a square metre area was counted on the 15th of each month and an average of five readings was considered to be the actual snail population of the garden. Attention was given to estimate the reproductive and prereproductive population separately during each sampling. Snail measuring upto 5 mm. (shell length) were considered as prereproductive and above that as reproductive (Subba Rao *et al*, 1985).

G. gemma were found active during monsoon or in summer following repeated premonsoon showers. In 1980, monsoon kissed the study area on 18th June and the snails became active within few hours following rain. The snails thrived well upto October. By the first week of November they entered into their aestivating homes and became active by April next year following heavy showers in the gangetic West Bengal, They were active upto September. The population data is limited to those of active period. The populationdensity with number of reproductive and prereproductive individuals for both the years have been shown in Table I.

Table I shows that the population density was lowest, 9.5 per m^2 and 17 per m^2 in the

TABLE I. Data on population of *G. gemma* from April-October during 1980 and 1981 per square metre area at Baranagar, North Calcutta.

Months	No. of Prereproductive individuals		No of Reproductive individuals		Total	
	1980	1981	1980	1981	1980	1981
April	—	5	—	29	—	34
May	—	30	—	24.5	—	54.5
June	4	48	11	11	15	59
July	23	39	32	33.5	55	72.5
August	33.5	20	38.5	48.5	72	68.5
September	6.5	—	33	27.5	39.5	27.5
October	—	—	32	—	32	—

months of June and April in 1980 and 1981 respectively. This was followed by a gradual increase and the peak was reached by August (35.75 per m^2) and June (34.25 per m^2) in 1980 and 1981 respectively. Of those, in 1980, 47.14% were prereproductive and 52.86% were reproductive populations. The percentages for the same were 29.41 and 69.59 respectively in 1980 and 1981. On the whole, the percentages of prereproductive and reproductive populations were 31.45 and 68.55, and 44.93 and 55.07 respectively during 1980 and 1981. Considering the total snail populations in both the years, it appears that in *G. gemma* the ratio between prereproductive and reproductive population is 2 : 3.

Information on the population of land snails is limited to *Achatina fulica* and *Macrochlamys indica* (Raut, 1979). Subba Rao *et al* (1980) reported the fecundity of *Opeas gracile* under laboratory conditions. Since *G. gemma* is ovoviviparous its recruitment rate would be less than those of oviparous snails. The ratio between prereproductive and reproductive population in this species resembles the diminishing population model of Bodenheimer (Kormondy, 1971), This indicates that the birth-rate in *G. gemma* is drastically reduced, the reproductive groups increasing unexpectedly and showing a population structure that is dying off. If no adequate measure is taken immediately, within a few years, *G. gemma* may have to be declared extinct.

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REFERENCES

KORMONDY, E. J. 1971. Concepts of ecology. Pentice Hall of India, P. Ltd., New Delhi.

RAUT, S. K. 1979. Distribution and population of two pestiferous land snails, *Achatina fulica* Bowdich and *Macrochlamys indica* Godwin-Austin, in West Bengal. *Bull. zool. Surv. India.* **2** (1) : 7-16.

SUBBA RAO, N. V., RAUT, S. K. & MITRA, S. C. 1980. Observation on the fecundity of the garden snail, *Opeas gracile* (Hutton) [Pulmonata : Subulinidae], *J. zool. Soc. India,* **32** (1-2) : 107-110.

SUBBA RAO, N. V., RAUT, S. K. & MITRA, S. C. 1985. Studies on the land snails, *Glessula gemma* (Reeve) [Mollusca : Gastropoda] I. Growth rate. *Bull. zool. Surv. India,* **6**(1-3) : 335-336.

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SHORT COMMUNICATION

Bull. zool. Surv. India, 7 (2-3) : 325-326, 1985

AN INSTANCE OF ABNORMAL FINS IN A SPECIMEN OF NOEMACHEILINE LOACHES (COBITIDAE : CYPRINIFORMES)

While studying the morphological characters of Noemacheiline loaches of Meghalaya, the author has come across a very interesting specimen of *Physoschistura elongata* Sen and Nalbant (Singh *et al.* 1981 ; Plate I A) having extra anal fin and caudal fin rays.

Morphological abnormality in fishes has been reported on various characters (Sarkar and Kaushik, 1960 ; Tandon, 1965 ; Gopalan, 1971 and Sen, 1978), but the occurence of such an abnormality is being recorded for the first time. Gopalan (op. cit.) has recorded in the double-headed shark (*Carcharias walbeehmi* (Bleeker) from Gujarat, an additional pair of dorsal fin as an abnormality.

The abnormal anal fin encountered here differ significantly from the normal one in respect of its disposition, fin ray counts and also being divided into three distinct finlets. It comprises of 22 total finrays *vs* 7 in normal anal fin. The anterior most finlet containing 5 rays is located 1 mm ahead of the two posterior finlets (Plate II C ; Fig. 1, ad.). The posterior finlets are displaced laterally at their proximal ends and converge posteriorly to join each other distally. As a result a prominent cavity is formed at the base (Plate I B, Fig. 1. cn.). The right side posterior finlet consists of 10 fin rays (Fig. 1. ex.) *vs* 7 in the left side (Fig. 1, n.).

Likewise, the caudal fin is also bifurcated in two lateral finlets at its lower hypural end. However, dorsally and posteriorly the two finlets are jointed consequential of which a distinct cavity is formed at the ventral side of caudal fin (plate II D, Fig. 1, cv.).

The causes of deformities in fishes are numerous and no single factor is sufficient to explain it (Gemmil, '52.)

The author is thankful to Dr. B. K. Tikadar, Director, Zoological Survey of India, Calcutta, for his kind permission to undertake the present work. The author is also thankful to Officer-in-Charge, Eastern Regional Station, Zoological Survey of India, Shillong and Dr. J. R. Dhanze of the same station for kindly going through the manuscript and valuable suggestions.

REFERENCES

CEMMIL, J. F. (1952) : *The teratology of fishes,* Glasgow.

GOPALAN, U. K. (1971) : On two abnormal sharks from Gujarat. *J. Bombay nat. Hist. Soc.* **68** : 465-467.

SARKAR, H. L. And KAUSHIK, N. K. (1960) : On the absence of ventral and anal fins in two carps, *Cirrhina mrigala* (H.) and *Catla Catla* (H.) *Proc. 47th Indian Sci. Congr. Calcutta*, pt. 3 (Abst.) : 476.

SEN, N. (1978) : Abnormal colouration and variable morphometrics in specimens of *Clarias batrachus* (Linn.) from Meghalaya, India (Pisces : Clariidae) *Sci. Cult.* **44**(10) : 470-471.

SINGH, A : SEN, N. ; BANARESCU, P. M. AND NALBANT, T. (1981) : New Noemacheiline loaches from India (Pisces Cobitidae). *Trav. Mus. Hist. nat. "Grigore Antipa"* XXXIII, 201-212.

TANDON, K. K. (1965) : Absence of the right pelvic fin in *channa punctata* (Bl.) *Res. Bull. Panjab. Univ. Sci.* (N. S.), Chandigarh, **15** : 351-352.

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Bull. zool. Surv. India, 7 (2-3) : 327, 1985

OCCURRENCE OF *PISCICOLA OLIVACEA* HARDING (ANNELIDA : HIRUDINEA) IN LADDAK, J. & K., INDIA

In the course of our study on the leech fauna from Jammu and Kashmir we have come across two specimens of *P. olivacea* which are new records of parasitic on the fish, *Schizopygopsis stoliczkae* Steindachner. They are collected from the Suru River, a tributory of the Indus near Kargil in Laddak District. These leeches conform to the description by Harding (1927) excepting for the variation observed in the shape of the eyes which are circular rather than linear, as stated in the original description.

Material : 2 exs., Ando village near Kargil, district Laddak, J. & K. coll. *Raj Tilak*, Date 4.ix. 1977 Alt. 3000 m. (34.30 N, 76.13E) from *Schizopygopsis stoliczkae* Steindachner.

This species is recorded earlier from Chilka lake (19.50 N, 85.30E) and from Soochow (31.21 N, 120.40 E). The species is known to inhabit estuarine habitats and a freshwater pond in the Barkuda Island, Chilka lake (Harding, 1927). Moore (1924) reported this species from a river at Soochow. For the first time it is now recorded also from an altitude of 3,000 m. from the alpine coldwater of temperate climatic conditions.

We are thankful to Dr. B. K. Tikader, Director and Joint Director, Zoological Survey of India, and to the Officer-in-Charge High Altitude Zoology Field Station, Zoological Survey of India, Solan for the facilities provided.

REFERENCES

HARDING, W. A., 1927. *Fauna of British India, Hirudinea* : 48-52.

MOORE, J. P., 1924. Notes on the some Asiatic leeches (Hirudinea), principally from China, Kashmir and British India. *Proc. Acad. nat. Sci, Philadelphia* **76** : 343-388.

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SHORT COMMUNICATION

Bull. zool. Surv. India, 7(2-3) : 329-330, 1985

ON A NEW RECORD OF MAUPASELLA NOVA CÉPEDÈ, 1910 (PROTOZOA : CILIATA) FROM A NEW HOST, PERIONYX EXCAVATUS PERRIER FROM INDIA

In India not much work has been done on the parasitic ciliates occurring in the digestive tract of oligochaetes particularly of the family Maupasellidae under order Astomatida. Only available reference in extant literature on the subject is Bhatia and Gulati (1927).

We have been engaged for some time on researches on one of the highly controversial groups of ciliates, namely, astomates, commonly found in the alimentary canal and coelome of oligochaeta. During the course of these investigations we came across one species of astomatous ciliate, namely, *Maupasella nova* Cépedè in the alimentary canal of an oligochaete, *Perionyx excavatus* Perrier, from Barrackpore near Calcutta, West Bengal, India.

Since original description on this species is inadequate, so an attempt has been made to redescribe it in the present communication. The description is based partly on the observations on the living form and partly on stained specimens. The material was fixed in Schaudinn's fluid, stained in Heidenhain's iron haematoxylin and counter stained in Eosin.

Maupasella nova Cépedè, 1910

1910. *Maupasella nova* Cépedè, *Zool. exp. gen.* (5), III : 408-410.

Description : Body ovoidal, dorsoventrally flattened ; anterior side broader, bluntly rounded. Posterior portion gradually narrowing downwards as tapering end. The ciliary lines arranged in longitudinal rows ; the cilia fine and densely formed. Contractile vacuoles eight to ten in numbers, arranged in two separate rows. The fixation apparatus triradiate. The macronucleus elongated, ribbon shaped, granular, lying four-fifth of the body ; micronucleus fusiform, placed near middle of the *M. nova*. Body measuring 60μm in length. Breadth, 17μm ant.—15μm post. Length of *M. nova* 48 μm – 66μm.

Material : 5 exs. on slides ; Reg. No. Pt. 86, 87, H. A. Z. Fd. Stn., ZSI, Solan, Himachal Pradesh.

Host : *Perionyx excavatus* Perrier

Locality : Barrackpore, Dist : 24 Parganas, West Bengal. Coll. *Asim Chakrabarti* ; Date of colln. 16.4.1971.

Remarks : Since its discovery by Cépedè

(1910) *Maupasella nova* has been reported from three species of oligocheata, viz., *Allolobophora caliginosa* Sav. by Keilin (1920) from Paris, France and *Metaphrya posthuma* (L. Vaill), *M. hawayana* (Rosa) from Lahore, Pakistan by Bhatia & Gulati (1927). So far as we could gather, there is no other record of this rare species in available literature. Thus, the occurrence of this species from common earthworm *Perionyx excavatus* Perrier, is of considerable interest. Incidentally, this species is recorded for the first time from the host, *P. excavatus* and constitutes new record from Eastern India.

The authors are deeply indebted to Dr. J. M. Julka, Shri K. N. Nair and Dr. A. K. Das, for guidance. Thanks are also due to Dr. B. K. Tikader, Director, Zoological Survey of India, for the facilities afforded.

References

Bhatia, B. L. & Gulati, A. N. 1927. On some parasitic ciliates from Indian frogs, toads, earthworms and cockroaches. *Arch. Protistenk.* **57** : 100-102.

Cépedè, C. 1910. Recherches sur les Infusoires astomes. *Zool. exp. gen.* (5) III : 408-410.

Keilin, D. 1920. On the occurrence of a supplementary chromatic body in *Maupasella nova* Cépedè (Ciliata : Astomata), an intestinal parasite of earthworms (*Allolobophora calignosa* Savigny). *Parasitology* **12** : 92-94.

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SHORT COMMUNICATION

Bull. zool. Surv. India, 7 (2-3) : 331, 1985

ON A SYNONYMY OF THE GENUS BOTHRIOCHLOAMYIA (DIPTERA : CECIDOMYIIDAE)

This note is written to report new synonymy of the genus *Bothriochloamyia* Rao and Sharma.

Rao and Sharma (1977) erected a new genus *Bothriochloamyia* and *orientalis* as a type species for the midges bred from earheads of the grass *Bothriochloa pertusa* (L.) A. Camus. Close revision of the specimens and the perusal of the recent literature, especially Harris (1979), reveals that this genus is a synonym of *Contarinia* Rondani.

Further Drs. R. J. Gagne, P. Grover and K. M. Harris have also pointed out (per. comm.) that this genus is a synonym of *Contarinia*.

The proposed synonymy is as follows :

Cecidomyia subg. *Contarinia* Rondani, 1860 *Atti Soc. Ital. Sci. nat.* 2 : 289. Type species : *Tipula loti* de Geer, by original designation.

Stictodiplosis Kieffer, 1894, *Ann Soc. ent. Fr.* 63 (*Bull.*) : 28. Type species : *Contarinia* (*Stictodiplosis*) *aequalis* Kieffer, by subsequent monotype (Kieffer 1898 : 61).

Sissudiplosis Mani, 1942, *Indian J. Ent.* 4 : 44. Type species : *Chatterjeei* Mani by original designation.

Bothriochloamyia Rao and Sharma, 1977, *Entomon.* 2 : 237. Type species : *Orientalis* Rao and Sharma by original designation New Synonym.

REFERENCES

HARRIS, K. M. 1979. Descriptions and Host ranges of the Sorghum midge *contarinia sorghicola* (coquillett) (Diptera : Cecidomyiidae) and of eleven new species of *contarinia* reared from Graminae and Cyperaceae in Australia. *Bull. ent. Res.*, **69** : 161-182.

RAO, S. N. AND SHARMA, R. M. 1977. A new Indian grass gall-midge (Itonididae : Cecidomyiidae : Diptera). *Entomon*, **2** : 237-240.

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Bull. zool. Surv. India, 7 (2-3) : 333-334, 1985

AN APPEAL FOR WHEREABOUTS OF THE TYPE SPECIMENS OF *HAEMOPROTEUS* SPP. (PROTOZOA : HAEMOSPORINA) FROM INDIAN BIRDS

The initiation of malaria research in India was due to Sir Ronald Ross. It is revealed in his memoirs (1923) that he examined the blood of pigeons, doves, parakeets, finches, sparrows, crows, and larks, and many of them were infected with protozoans belonging to the genus *Haemoproteus* Kruse, 1890. Since then reports on the blood parasites of birds are available in this country. Bhatia (1938) includes 33 named species of *Haemoproteus* from Indian birds. Later, Chakravarty and Kar (1945 a, b,), Zargar (1945) and Grewal (1964) described a few more species from this sub-continent. The whereabouts of the type-slides of these species, if any, are not known.

At present we know 45 presumably valid species of *Haemoproteus* from Indian avifauna but the descriptions given, in many cases, are virtually unusable taxonomically and are not documented by type specimens. Deposition of type materials in well known repositories is essential and indispensible for research purposes. From the taxonomic point of view, a type specimens is the final court of appeal in case of dispute in specific identities, and preservation of original specimens, holotype/ paratype etc., is a must in taxonomy. According to international code of nomenclature it is necessary to select neotypes when the types are lost.

For a proper understanding of the taxonomy of *Haemoproteus* spp. from India the author appeals to all concerned scientists, institutions and museums for an announcement through publication or otherwise of the whereabouts of the type-slides of *Haemoproteus* species of I. Froilano de Mello and his associates (1916-1937 ; *vide* Bhatia, 1938) from Goa, in particular and of other workers.

REFERENCES

BHATIA, B. L. 1938. *The Fauna of British India, including Ceylon and Burma. Protozoa : Sporozoa.* Taylor & Francis, London.

CHAKRAVARTY, M. M. AND KAR, A. B. 1945a. Studies on Haemosporidia from Indian birds. *J. asiat. Soc. Bengal* (series 1), **11** : 36-39.

CHAKRAVARTY, M. M. AND KAR, A. B. 1945b. Studies on Haemosporidia from Indian birds. Series II. *Proc. Indian Acad. Sci.*, **22B** (2) : 63-69.

GREWAL, M. S. 1964. Studies on the blood parasites of the white throated munia, *Lonchura malabarica* (Linnaeus). Status of *Haemoproteus wenyoni* Sergent and Sergent, 1948 (Protozoa : Sporozoa). *Proc. zool. Soc. Calcutta*, **17** : 21-25.

ROSS, R. 1923. *Memoirs ; with a full account of the great malaria problem and its solution.* John Murray, London. 547. pp.

ZARGAR, S. L. 1945. On two new haemoproteids of Indian birds. *Proc. Indian Acad. Sci.* (Sect. B), **21** : 124-127.

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NEW RECORD OF A COLUBRID SNAKE FROM ENNORE ESTUARY, TAMILNADU

Order SQUAMATA
Suborder SERPENTES
Family COLUBRIDAE

Acrochordus granulatus (Schneider)

WART SNAKE

Material : 1 ex. Ennore estuary, Chingleput district, 19.6.1964, Sivaprakasam & party.

Measurements : Snout to vent 96.2cm, tail 5.2 cm.

Distribuiion : India : The coasts of West Bengal, Orissa, Bombay and Nicobar Island. This is recorded for the first time from the coast of Tamil Nadu, Elsewhere : The coasts of Ceylon, Indo-China, Cochin China, Indo-Australian Archipelago, north coast of Australia and the Solomon Islands.

Remarks : This is a preserved specimen. The colour of the body is brown instead of grey (Smith), 10 scales on a line between the eyes ; body covered with darkgrey wide bands (69) from behind the head to tail.

REFERENCE

SMITH, M. A. 1943. The Fauna of British India including Ceylon and Burma. Reptilia and Amphibia. Vol. III-Serpentes, xii + 583 pp., figs.,[1] map.

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ON A HILL STREAM LOACH, NOEMACHEILUS RUPECULA (McCLELLAND) WITH BIFURCATED ROSTRAL BARBEL AND DEFORMED CAUDAL FIN

During a recent ichthyological survey of Chakrata hills, District Dehra Dun, Uttar Pradesh, the author came across an adult specimen of a hill stream loach *Noemacheilus rupecula* (Mc Clelland) with a bifurcated right rostral barbel and the deformed caudal fin is thick at the base and bifurcated upto nearly half way into two branches.

The cause of bifurcation of the barbel has been explained variously during the past. According to Tandon and Sharma (1971) and Datta and Ghosh (1975) it might be due

Fig. 1. Lateral view of *Noemacheilus rupecula* (Mc Clelland) showing bifurcated rostral barbel and deformed caudal fin.

(Fig. 1). The specimen under study is normal in other characters.

BIFURCATED ROSTRAL BARBEL

The presence of bifurcated or forked barbel in some siluroid fishes has been reported by Boulenger (1907), Tandon and Sharma (1971), Ovais (1974), Dutta and Ghosh (1975), Ram (1976) Thakur and Munnet (1982) etc. but there is no record of such an amomaly among cobitid fishes. The barbel of the right side to some injury. Tandon and Sharma (1971) tried to explain this in a catfish, *Heteropneustes fossilis*, through experimental regeneration although they failed to produce a forked barbel. Gvais (1974) quoted a personal communication by Greenwood (1972), according to which the abnormality might be congenital or the result of regeneration. The present author also assumes that the existance of such a morphological divergence could be due to congenital defects. It is hard to

conjecture that such a bifurcation could occur by accidental or mechanical injury and a subsequent regeneration.

Deformed Caudal Fin

The deformity of the fins in carps, catfishes, perches, clupeids etc. has been reported by Hora (1937), Sathyanesan (1962). Sundersingh (1975), Rahman and Raghavan (1977), Nammalwar and Krishnapillai (1977), Baburao and Reddy (1982), Somvanshi and Bapat (1982), Thakur and Munnet (1982), etc. but no reference on loaches is available.

The caudal fin of normal *N. rupecula* is emarginate with rounded corners or lobes. In the present specimen, the upper lobe is sharply pointed while the lower one is cut short with rounded margin. This type of deformity could cettainly occur by some accidental amputation or some injury or by some predatory attack as suggested by Sathyanesan (1962) and Thakur and Munnet (1982).

Such fortuitous variations met in a single specimen, pose taxonomic problems. Hence, it is suggested that such morphological divergences should always be recorded as additional information to taxonomists of a relevant group.

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References

Boulenger, G. A. 1970. *Fishes of the Nile*, Egyptian Government : 374.

Baburao, M. and Reddy, Y. S. 1982. On an abnormal specimen of *Heteropneustes* Muller (Pisces : Heteropneustidae) from polluted water of Hyderabad, India, —*Sci. Cult.*, **48**(7) : 258-259, fig. 1.

Datta, A. K. and Ghosh, A. 1975. Bifurcated barbel in a catfish *Heteropneustes fossilis* (Bloch). —*Curr. Sci*, **44**(11) : 389, fig. 1.

Greenwood, G. A, 1972. Personal communication (*vide* Ovais, 1974).

Hora, S. L. 1937. Notes on fishes in the Indian Museum. XXVIII. On three collections of fish from Mysore and Coorg, South India. —*Rec. Indian Mus.*, **39**(1) : 5-28.

Nammalwar, P. and Krishnapillai, S. 1977. Instances of caudal fin deformity in some fishes of Bombay water. *Sci. Cult.*, **43**(7) : 326-327.

Ovais, M. 1974. On the presence of a forked barbel in a catfish *Clarias batrachus* (Linnaeus). —*Curr. Sci.*, **43**(4) : 125-126. fig-1.

Rahman. M. F. and Raghavan, S. L. 1977. Record of a tail less *Clarias batrachus* (Linnaeus) from Habbal tank. —*J. Inland Fish. Soc.*, **8** : 124.

Ram, L. 1976. On a catfish, *Clupisoma garua* (Hamilton) with a bifurcated barbel. —*Newsl. zool. Surv. India*, **2** (4) : 126.

Sathyanesan, A. G. 1962. On the abnormal dorsal fin of the teleost, *Labeo calbasu* (Ham.). —*Sci. Cult.* **28**(12) : 588-589.

SOMVANSHI, V. S. AND BAPAT, S. S. 1982. An interesting case of caudal fin abnormality in a hill stream fish. *Garra mullya* (Sykes). —*Sci. Cult.* **48**(8) : 283-285. figs. 1-2.

SUNDARSINGH, M. 1975. Record of a specimen of *Mystus montanus* (Jerdon) with stunted pectoral spine. —*Curr. Sci.*, **44**(11) : 388-389. fig. 1.

TANDON, K. K. AND SHARMA, K. 1971. A specimen of *Callichrous macrophthalmus* (Blyth) with a forked right barbel. —*Curr. Sci.*, **40**(16) : 438 fig. 1.

THAKUR, N. K. AMD MUNNET, S. K. 1982. Occurrence of teratolotical manifestations in the air breathing catfish. *Heteropneustes fossilis* (Bloch). —*Sci. Cult.*, **48** (3) : 104-105, fig. 1.

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BOOK REVIEW

LALL'S COMMENTERIES ON WATER AND AIR POLLUTION LAWS. 2ND EDITION, 1986—Revised by K. B. ASTHANA, S. K. GADI and S. K. GHOSH. *Law Publishers, Allahabad 211001*—Price Rs. 200·00 (Hardbound)

The unprecedented developments in Science and Technology during 20th Century, have contributed among myriad of other changes, to an immense scale to the changing profile of environment. The natural environment of the planet Earth, admittedly, has changed there than one single reason, but almost all the causes can be traced back to a phenomenon called "Human interference". Since Man has now realised the short term gains that have been achieved against long term disaster, due to activities of its own kins, a global concern can be evident to bring out a rational policy for sustainable utilisation of natural resources, without endangering the very habitat where *Homo sapiens* evolved. The causes of environmental degradation, more commonly termed pollution and its effects have been discussed on a series of excellent publications in recent times. However, most of the literature on the subject of Pollution have their origin on western experience and data, generated through intensive studies in the temperate region of the world.

The causes, once identified, can however be assessed at a national level with obvious shift in items of the list of such causes which lead to pollution. To curb the level of pollution from existing sources or practices, the law-makers' role become of supreme importance. The laws to prevent and control pollution may be multidimensional, based on basic and vital parameters such as Water, Air, Landuse, Forest, Fisheries, Wildlife, Food, and use of safety measures in Atomic energy, Factories, Pesticide and Poisonous substances, etc.

In India, a series of enactments, both at the State and Central levels, promulgamated during 1897 to 1981 can be traced (excluding the latest Environment Act, 1986) and 'Lall's commenteries'—although apparently deal with Water and Air Pollution Laws, a useful reading through the pages will reveal a list of other related and pertinant information. The present volume has been divided into Parts I-V ; Part-I deals with the details of, the water (Prevention and Control of Pollution) Act, 1974 including terms and condition of boards, constitution, rules and procedure for transactions of business, Cess act, 1977 and Cess Rules 1978 and Amendment of the Act, 1978, under 11 chapters ; Part II likewise, deals with the Air (Prevention and Control of Pollution) Act, 1981 under seven chapters. While both these chapters reproduce details from published documents, Part III provides an important and useful account of pollution and allied laws as interpreted by various courts under 28 chapters. These chapters include brief history, offences by Partnership Firms and Co-operative Societies, jurisdiction of court, procedure on application of accused after receipt of summons in warrant trials and summons trials, immunity from legal proceedings, grant of injunction and other relief, constitutional validity of the act of 1977 and rules made thereunder, along with citations of court cases in such areas like 'taking of samples' for

analysis ; Part IV of the book covers such diverse areas as water pollution problem in India and abroad, effect of pollution, types of industrial wastes and treatment methods, sampling of water, sewage and industrial wastes and standards in India and abroad, defination, sources and effect of air pollution, the subject of dust pollution, (asbestos, toxic dusts), land pollution, water supply and health hazard, helminth (parasites) effect on human and removal by treatment, industrial solid wastes and their effect etc. The last and final part V, deals with "State Rules" (Andhra Pradesh ; Gujrat, Uttar Pradesh, Maharastra and West Bengal) totaling 11, but also include new parts of Merchant Shipping (Amendment) Act of 1983 dealing with marine pollution and civil liability for oil pollution damage ; the last one must be a central enactment.

The present volume as such fills up a long felt gap of informations, in a comprehensive manner, on such vital areas of environmental planning as 'pollution control laws', as existant in the country. Very often than not, non-availably of government acts in printed form has been a plea, perhaps justifiably, for non-campliance of pollution control laws. In a seminar of Council of Industrial Development Corporation with environmentalist held in New Delhi in 1984, dons of industries requested the organisers to ensure easy availability of all state and central enactments and amendments so as to utilise the same to avoid any penal measure.

One may however debate over the style followed in the book to present such an wealth of information. It would have been more desirable to introduce the readers with general subject of pollution (Part IV, chapter I-IX), followed by central enactments (Part I and II), state enactments (Part IV) and interpretation (Part III). The entire volume could have been more useful if a continuous pagination system was followed rather than separate pagination for Parts or even for chapter. I have failed to locate any reference to minimum Indian National Standard (MINAS) set up for a number of most polluting industries by Central Board for Prevention and Control of Water and Air Pollution or of 'Camprehensive Industry Document' which can help industrial houses to follow recommended procedure. Sometime Indian Standards (IS) are referred by numbers and year while in other cases like 'Standards of drinking water' (page 269 and 278) no specific reference could be noted. A list of publication of Central Board would have been of much use to the reader to get complete information on source, status and control of pollution. Since Environment Act, 1986 has been passed by the Parliament after publication of the 2nd edition of Lall's commentary, a reader has to consult the same to take cognizance of the changes imposed by the said act. The table of cases following the content and the alphabetical index at the end will be most useful as also the bibliography appended at the end of some chapters. While there are scope for a better edited and updated volume in future, this volume will be undoubtedly useful for a large target-readership and anyone who is interested in ensuring a better quality of life.

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