STATE FAUNA SERIES 3

FAUNA OF WEST BENGAL

Part 12

[PROTOZOA]



ZOOLOGICAL SURVEY OF INDIA
1993

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FAUNA OF WEST BENGAL

Part 12

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FREELIVING PROTOZOA

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INTRODUCTION

The protozoa are unicellular eukaryotic organisms. They are not a natural group, but have been placed together as a matter of convenience (Levina *et. al.*, 1980). According to newly revised classification (Levine *et. al., op. cit.*) the protozoa have been considered as subkingdom under the kingdom Protista. Under the subkingdom Protozoa seven phyla have been included in the above stated classification, of which the freeliving protozoa of West Bengal, the subject matter of the present communication, represent only two phyla, namely, Sarcomastigophora and Ciliophora.

The first report of freeliving protozoa from West Bengal dates back to 1842 when Cantor referred about the occurrence of six species of freshwater protozoa from Calcutta based on an unpublished observation of G.W. Grant. Incidentally this is also the first report of freshwater protozoa from India. Subsequently Wallich (1864) recorded four species of *Difflugia* from Gangetic Sundarbans of Lower Bengal without citing any specific locality. Simmons (1889, 1891 a) reported the occurrence of 12 genera of freeliving ciliates from Calcutta without mentioning any specific identification of those forms. He (1891 b,c) also referred about a reticulated amoeba, *Biomyxa vagans* from Calcutta. In 1907 Annandale recorded two species of ciliates from the fresh and brackish water ponds of Port Canning, South 24-Parganas. Subsequently Ghosh (1918 - 1929) published a series of papers reporting 29 species of freeliving ciliates and one species of testacid rhizopod from Calcutta and its nearby localities. Out of the said 29 species of ciliates 18 are from pond water and the rest are either from sewer water or from 'vegetable infusion' Nair (1960, 1966, 1971) reported the occurrence of one heterotrichous, one hymenostomatous and two peritrichous ciliates from Calcutta including a new species, *Disematostoma bengalensis*. Mahajan and Nair (1965) published the occurrence of 19 species of freeliving ciliates from Calcutta and its vicinity. Nair and Mukherjee (1968 a,b) and Nair, Das and Mukherjee (1971) also reported 12 species of rhizopods and 20 species of rhizopods and heliozoans respectively from Calcutta and its environs. In 1971 Das described a new species, *Leptopharynx chlorophagus* from West Bengal. Subsequently Nair and Das (1974) published the description of another new species, *Drepanomonas hooghlyensis* and two rare species of freshwater ciliates, *Pseudomicrothorax agilis* and *P. dubius* from the state.

Freeliving flagellates of West Bengal are least studied. Whatever published information is available on this group is intermingled with the algal or planktonic study. During his studies on the Myxophyceae of Lower Bengal, Banerjee (1936) reported the occurrence of *Euglena viridis* from various parts of the district 24-Parganas (West Bengal) as well as from the districts Jessore, Faridpur,

Dacca and Mymensingh (all the four districts presently in Bangladesh). In the course of qualitative and quantitative studies of phytoplankton in the Hugli river around Falta (Dist. Haora) Roy (1949, 1955) recorded a chrysomonadid flagellate belonging to *Monas* sp. along with a testacean rhizopod, *Difflugia* sp. and a tintinnid ciliate, *Codonella* sp. While studying the distribution and fluctuation of plankton throughout the 290 km tidal stretch of the Hugli-Rupnarayan estuary and upper part of the Matla estuary Shetty, Saha and Ghosh (1961) collected 17 species of protozoa of which 8 are flagellates, 6 rhizopods and 3 ciliates. Excepting three species, namely, *Ceratium hirundinella, C. tripos* and *Noctiluca miliaris* specific identification of the rest 14 species could not be made by them. Mandal (1985) observed *Ceratium* sp. and *Noctiluca* sp. as the common component of the planktonic samples of the Hugli-Maltal estuary and collected a chrysomonadid flagellate *Mallomonas* sp. from the Bidyadhari river near Kulti (South 24-Parganas).

Recently Ghosh and Choudhury (1989,1987) isolated two species of *Acanthamoeba* from the soils of Sagar island (Dist. South 24-Parganas) and Basu *et.al.* (1987 and *in press*) have reported the occurrence of 14 species of aerobic amoebae from several districts of West Bengal. These are also been dealt with in this paper.

In the course of the faunal surveys of West Bengal undertaken by ZSI scientists during the years 1984-87 freeliving protozoa belonging to diversified groups have been collected from 17 districts of the state. These collections as well as those already present in the National Collections of the Zoological Survey of India including the reports of the earlier workers are being dealt with in the present communication. Altogether 248 species comprising 24 species of flagellates, 85 species of rhizopods and 139 species of ciliates have been reported from West Bengal, the majority of which have been collected by different survey parties of the Zoological Survey of India during 1964-70 and 1983-88. A complete systematic list is presented in the paper in order to indicate their placement in the newly revised classification by Levine *et. al.* (1980). Further, key to the families, genera and species is also incorporated in this paper for the aid in identification of protozoan species occurring in West Bengal.

MATERIAL AND METHODS

Water samples collected from various ponds, puddles and water bodies along with some algae, water weeds, flocculent matter and bottom oozes were kept in the laboratory for some days for considerable increase in protozoa population in them. Those smaples were then thoroughly examined under the microscope from time to time. The freeliving flagellates, rhizopods, heliozoans and ciliates occurring in them were isolated and examined in living condition by keeping them in a drop of natural medium. 'Methocyl' was used for slowing down the fast moving ciliates and Lugol's solution was used as a killing agent and also for detecting peripheral organellae. For making permanent slides of freeliving protozoa (excepting testacean rhizpods) Schaudinn's fixative, Carnoy's fluid and Buin's fluid were used. The first one is very effective particularly for keeping the exact shape of the specimen. For staining Heidenhain's iron haematoxylin, Delafield's haematoxyling and sometimes Borax Carmine

were used. Dry silver impregnation method was employed in some cases for studying the ciliates. Slides were mounted in DPX.

For making permanent slides of testacean rhizopods empty tests which are frequently found in abundance in the bottom ooze were isolated. These were then air dried after two or three washings in absolute alcohol and mounted in DPX.

Large number of samples of ground moss, wall moss and tree mosses were collected from different places and brought to the laboratory. These were kept in pretty dishes and sprinkled regularly with sufficient water. After a day or two aquous drops drawn from the moss by means of micropipette were kept on slides and examined thoroughly. Any protozoa observed therein was fixed, stained and mounted in the same manner as stated earlier for freeliving protozoa.

MORPHOLOGY AND TERMINOLOGY

The present paper deals with large number of higher taxa of protozoa, comprising 2 phyla, 2 subphyla, 7 classes, 29 orders, 76 families and 124 genera. It is, therefore, not possible to give any generalised morphology which could cover basic diagnostic features of all the said groups of protozoa. However, some diagramatic illustrations (Pls. I-V) are included and widely used terminologies with explanations are listed below so that the beginers of the subject may conveniently use the key to the families, genera and the species given in the present paper for identification of diversified groups of freeliving protozoa.

Adoral Zone of Membranellae : Three or more serially arranged membranellae along the left side of the oral area; found in peritrichous and in many spirotrichous ciliates.

Annulus : Girdles, ring-like structures or markings on the pellicle of the dinoflagellates or on that of the zooids of some peritrichous ciliates.

Arboroid colony : Colony of zooids formed in a tree-like manner members of which are interconnected by either stalks or loricae.

Atrium : Shallow depression found in close proximity to or around the cytostome of certain hypostomatous ciliates.

Buccal cavity : Depression or pouch located usually at or near apical end of the body and/or on the ventral surface, leading ultimately to cyto-pharyngeal complex; found in many oligohymenophoran ciliates.

Buccal overture : Distal or outer aperture or opening of the buccal cavity, though unrecognisable when buccal cavity is everted or flattened out; found in many hymenostomes.

Caudal cilium : A distinctly longer cilium (sometimes more than one) present near the posterior end of the body.

Ciliary girdle : Encircling band of somatic ciliature found in peritrichous ciliates and some *Didinium* like gymonstomatous ciliates.

Cirrus : A thick conical locomotor organellae occurs in lines or in groups in definite patterns on the ventral surface of the hypotrichous ciliates; classified and named by their location e.g. buccal, frontal, fronto-ventral, midventral, anal, caudal, marginal.

Contractile vacuole pore : Minute permanent opening(s) in the pellicle through which contents of contractile vacuole are to be thrown outside the body; these are characteristically stable in mumber and location.

Cyrtos or Cytopharyngeal basket : Tubular cytopharyngeal apparatus, the walls of which are arranged by longitudinally arranged nematodesmata derived from apically located kinetosomes and lined with extensions of postciliary microtubules; typical in hypostomatous ciliates.

Cytopharynx : Nonciliated tubular passage, long or short, leading from the cytostome proper into the inner cytoplasm of the unicellular animal.

Cytostome : An aperture, usually permanently open (when present) through which food material of the organism passes into its inner cytoplasm via cytopharynx.

Epicone or epitheca : Part of the shell (of dinoflagellates) anterior to the annulus.

Haptocyst : Minute extrusive organellae found in the suctorial tentacles of suctorians.

Hypotheca or hypocone : Part of the shell (of dinoflagellates) posterior to the annulus.

Infraciliature : Whole of somatic and orally located kinetosomes together with associated subpellicularly located microfibrillar and microtubular structures; argentohpilic in nature.

Infundibulum : Posterior, inner or lower part of the buccal cavity usually funnel-shaped or long tubular, found particularly in peritrichous ciliates.

Kinetosome : Tubular cylinder of nine longitudinally oriented peripheral structures, each composed of three microtubules; structures are subpellicularly located, equally spaced and skewe.

Kinety : A single row of single or paired kinetosomes together with cilia and other associated cortical organelles and structures.

Lorica : Envelope or test secreted and/or assembled by many ciliates; commonly found in tintinnids, folliculinids and peritrichs.

Nematodesmata : Kinetosome - associated birefringent bundle of paralled microtubules; it strengthens the walls of cytopharyngeal apparatus of gymnostomes and hypostomes.

Oral apparatus : General term to denote mouth *sensu lato.*

Paroral membrane : Membrane lying along the right side or border of the buccal cavity in oligo and polyhymenophoran ciliates.

Pectinelle : One of a circumferential band of cilia which are closely appeared and oriented at an oblique angle to the long axis of the body.

Pedicel : Very short attachment stalk as found in chonotrichous ciliates.

Peduncle : Stalk but usually refers to long and distincly visible stalks as found in peritrichous ciliates and suctorians.

Pellicle : Outer living covering of the ciliate.

Peniculus : Compound buccal ciliary organellae in the form of a long band of usually short and apparently fused cilia.

Peristome : Entire oral area of those ciliates in which buccal ciliature encircles the major portion of the anterior end of the organism; found in peritrichous and many spirotrichous ciliates.

Prebuccal area : Oral groove lined wth somatic or slightly modified somatic ciliature and leading to buccal cavity.

Rhabdos : Tubular cytopharyngeal apparatus, the walls of which are strengthened on the outside by bundles of nematodesmata, often lined longitudinally by transverse microtubules - derived from circumoral kinetosome.

Stigma : Usually a reddish or brownish red dot or short rod (also colourless in exceptional cases) usually found in chromatophore bearing flagellates.

Sulcus : A furrow run from end to end or from one end of the body to the annulus; found in dinoflagellates.

Thigmotactic ciliature : A zone of more or less specialised cilia functionally modified to serve tactile or adhering function.

Trichite : Hollow rod-like skeletal structures radially arranged beneath the pellicle; found in large number in certain oligotrichous ciliates; in older sense cytopharyngeal rod.

Trichocyst : Spindle-shaped, non-toxic explosive organellae located in the subpellicle of some ciliates (e.g. *Paramecium*).

Vestibulum : Depression located at either pole and leading directly to cytostome-cytopharyngeal complex covered with more or less complex somatic ciliature, exclussively found in the members of the subclass Vestibulifera.

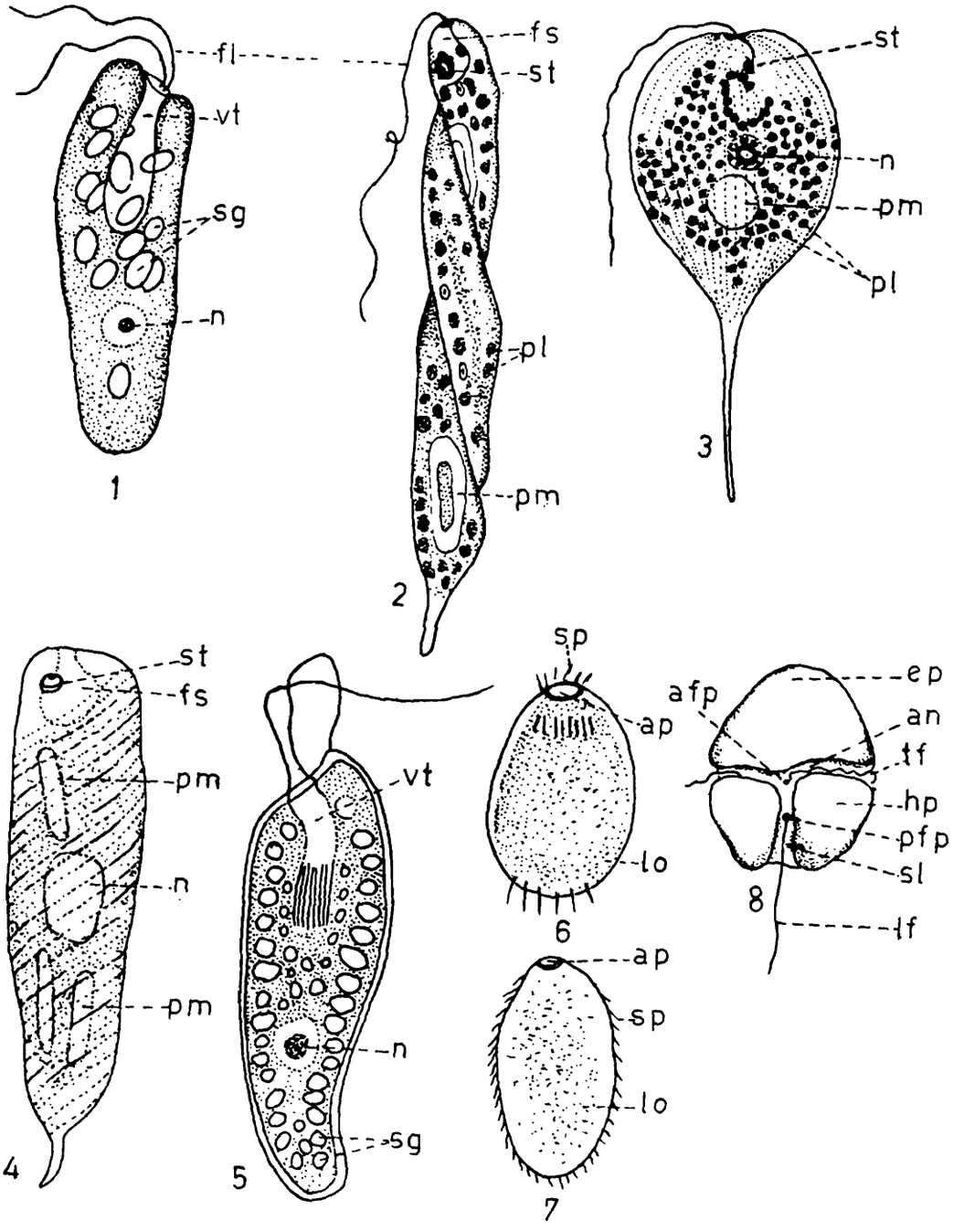


Plate 1. Showing general structures of flagellates

Fig. 1. *Chilomonas paramecium* Ehrenberg; Fig. 2. *Euglena oxyuris* Schmadra; Fig. 3. *Phacus longicauda* (Ehrenberg); Fig. 4. *Euglena* sp (diagrammatic); Fig. 5. *Chilomonas* sp (diagrammatic); Fig. 6. *Trachelomonas armata* Salinario; Fig. 7. *Trachelomonas richmondiae* (Playfair); Fig. 8. A typical naked dinoflagellate.

(afp – anterior flagellar pore; an – annulus; ap – aperture; ep – epicone; fl – flagellum; fs – flagellar sac; hp – hypocone; lf – longitudinal flagellum; lo – lorica; n – nucleus; pfp – posterior flagellar pore; pl – plastid; pm – paramylon; sg – starch granules; sl – sulcus; sp – spine; st – stigma; tf – transverse flagellum; vt – vestibulum).

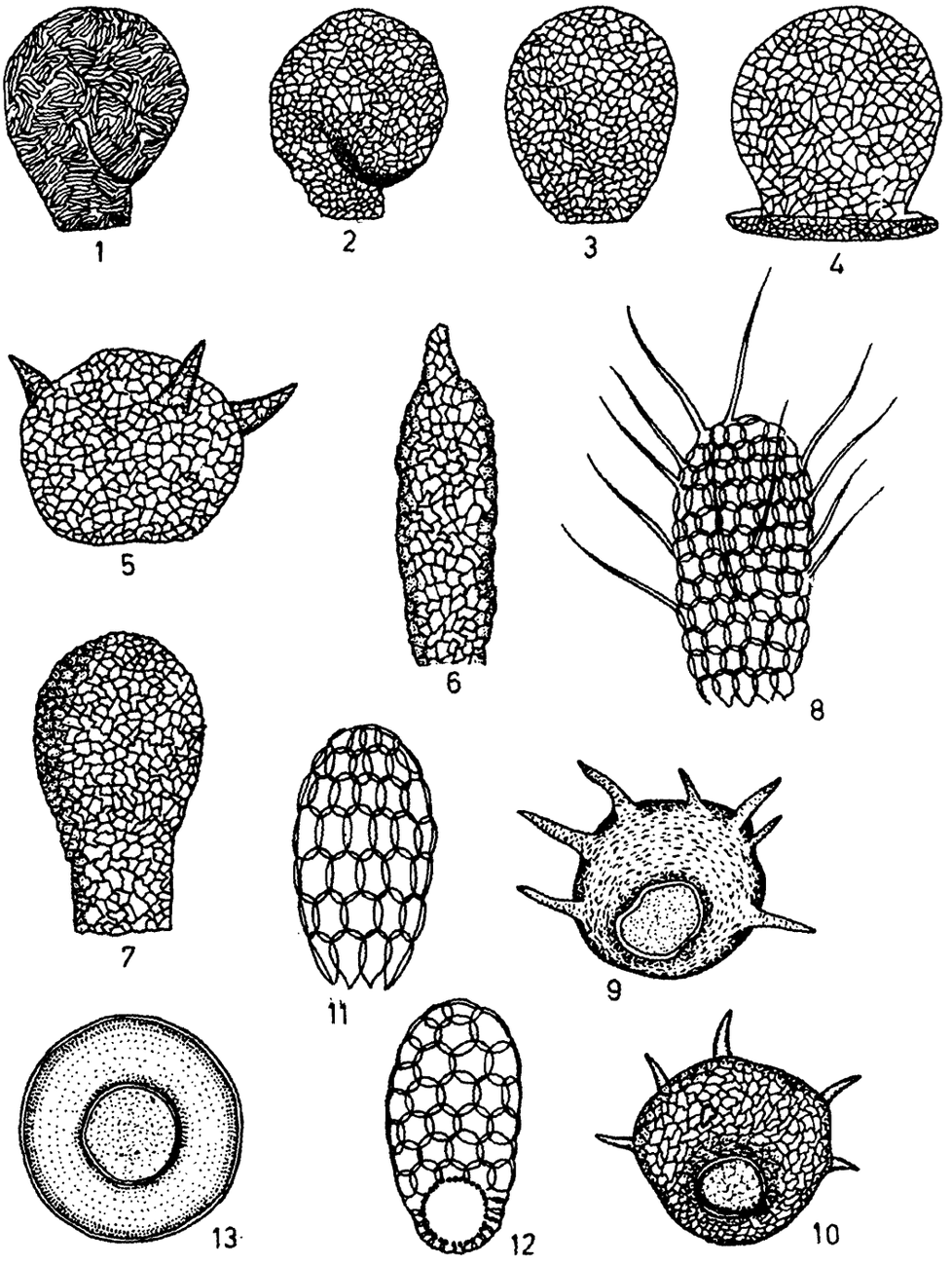


Plate 2. Showing structure and sculpture of tests of different testacid rhizopods

Fig. 1. *Lesquereusia spiralis* (Ehrenberg); Fig. 2. *Lesquereusia modesta* Rhumbler; Fig. 3. *Difflugia lobostoma* Leidy; Fig. 4. *Difflugia urceolate* Carter; Fig. 5. *Difflugia corona* Wallich; Fig. 6. *Difflugia acuminata* Ehrenberg; Fig. 7. *Difflugia pyriformis* Perty; Fig. 8. *Euglypha acanthophora* (Ehrenberg); Fig. 9. *Centropyxis spinosa* (Cash & Hopkinson); Fig. 10. *Centropyxis aculeata* (Ehrenberg); Fig. 11. *Euglypha tuberculata* Dujardin; Fig. 12. *Trinema enchelys* (Ehrenberg); Fig. 13. *Arcella discoides* Ehrenberg.

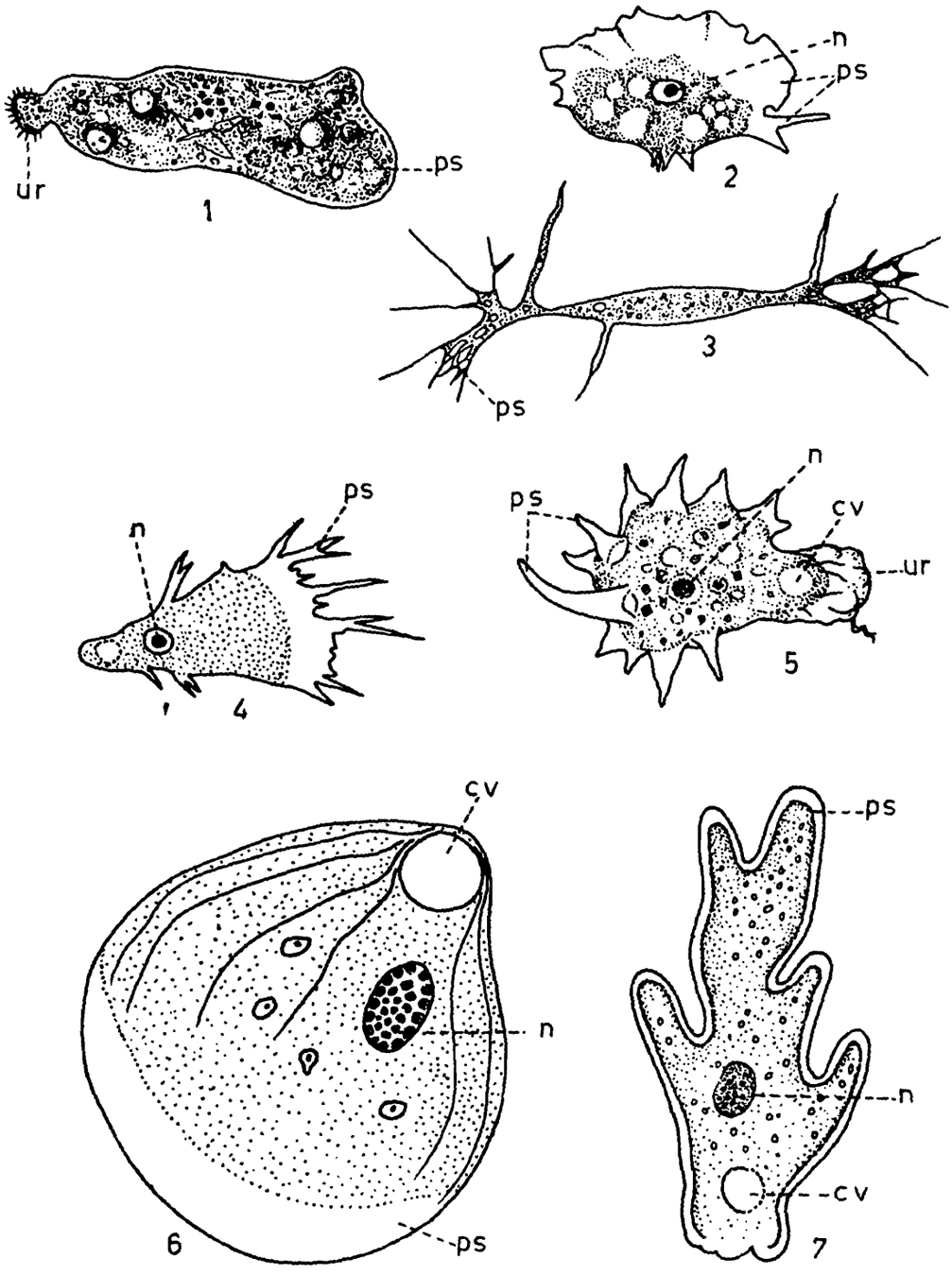


Plate 3. Showing general structures of gymnamoeba and granuloreticulosea particularly their pseudopodial types

Fig. 1. *Pelomyxa palustris* Greef; Fig. 2. *Vannella* sp; Fig. 3. *Biomyxa vagans* Leidy; Fig. 4. *Acanthamoeba* sp (diagrammatic); Fig. 5. *Mayorella* sp (diagrammatic); Fig. 6. *Thecamoeba soli* (Sing & Hanumaiah); Fig. 7. *Amoeba* sp (diagrammatic).

(cv – contractile vacuole; n – nucleus; ps – pseudopodia; ur – uroid).

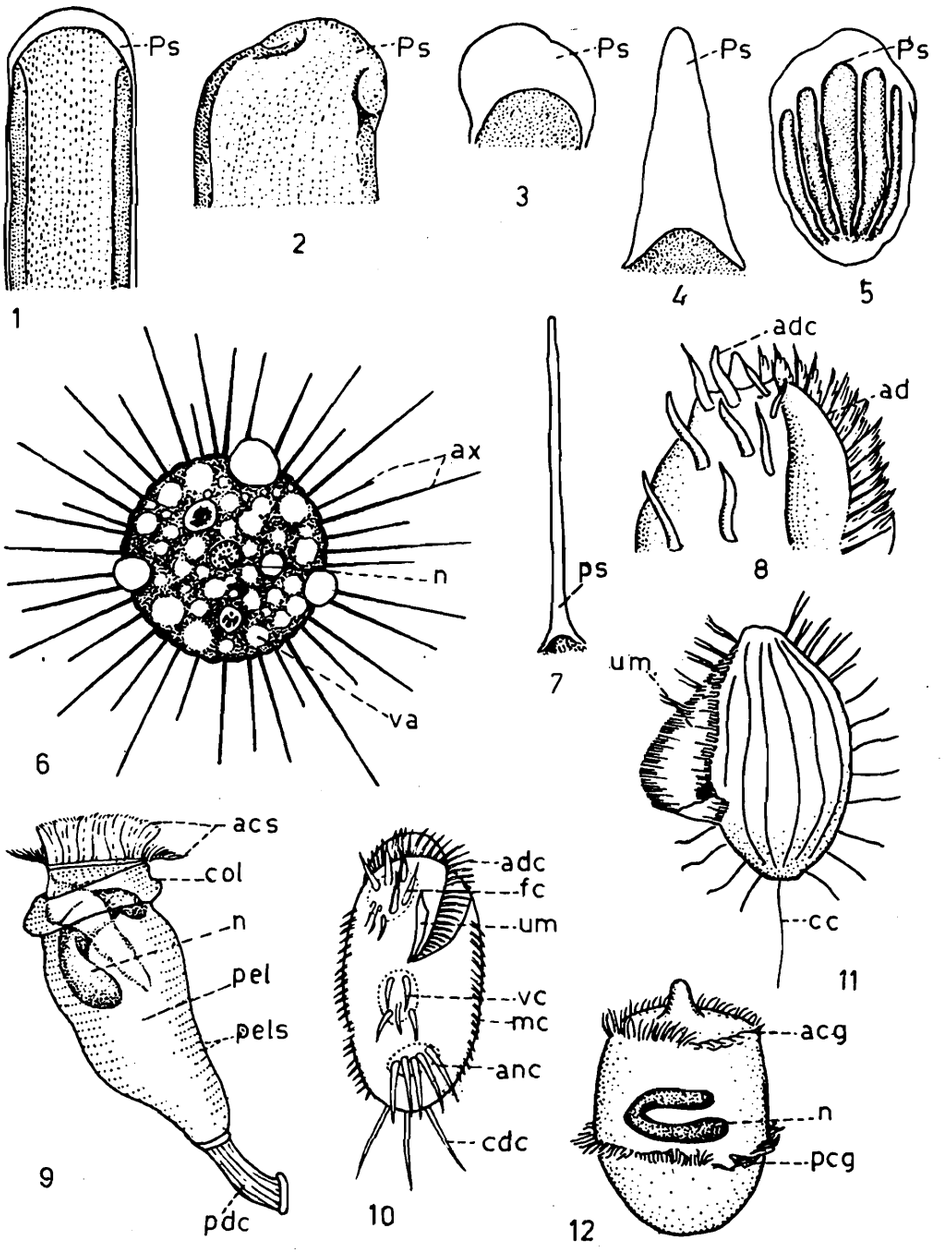


Plate 4. Figs. 1–5, 7 : Showing pseudopodial types (diagrammatic) of gymnamoeba

1. Cylindroid type (in Amoebidae); 2. Hemispheroid granular 'eruptive' type (in Pelomyxidae); 3. Hemispheroid clear 'eruptive' type of (in Hartmannellidae); 4. Short, conical, clear pseudopodium of some Paramoebidae; 5. Pseudopodial bulges of Thecamoebidae; 6. *Actinophrys sol* Ehrenberg showing axopodia; 7. Long, conical clear pseudopodium of Paramoebidae; Figs. 8–12 : Common external ciliary structures; 8, 10. *Euplotes* sp (hypotrich); 9. *Epistylis* sp (peritrich); 11. *Cylidium* sp (Scuticociliate); 12. *Didinium* sp (gymnostome).

(acg – anterior ciliary girdle; acs – adoral ciliary spiral; ad – adoral zone of membranellae; adc – adoral cirri; anc – anal cirri; ax – axopodia; cc – caudal cilia; cdc – caudal cirri; col – collar; fc – frontal cirri; mc – marginal cirri; n – nucleus; pcg – posterior ciliary girdle; pdc – peduncle; pel – pellicle; pels – pellicular striae; ps – pseudopodia; um – undulating membrane; va – vacuole; vc – ventral cirri).

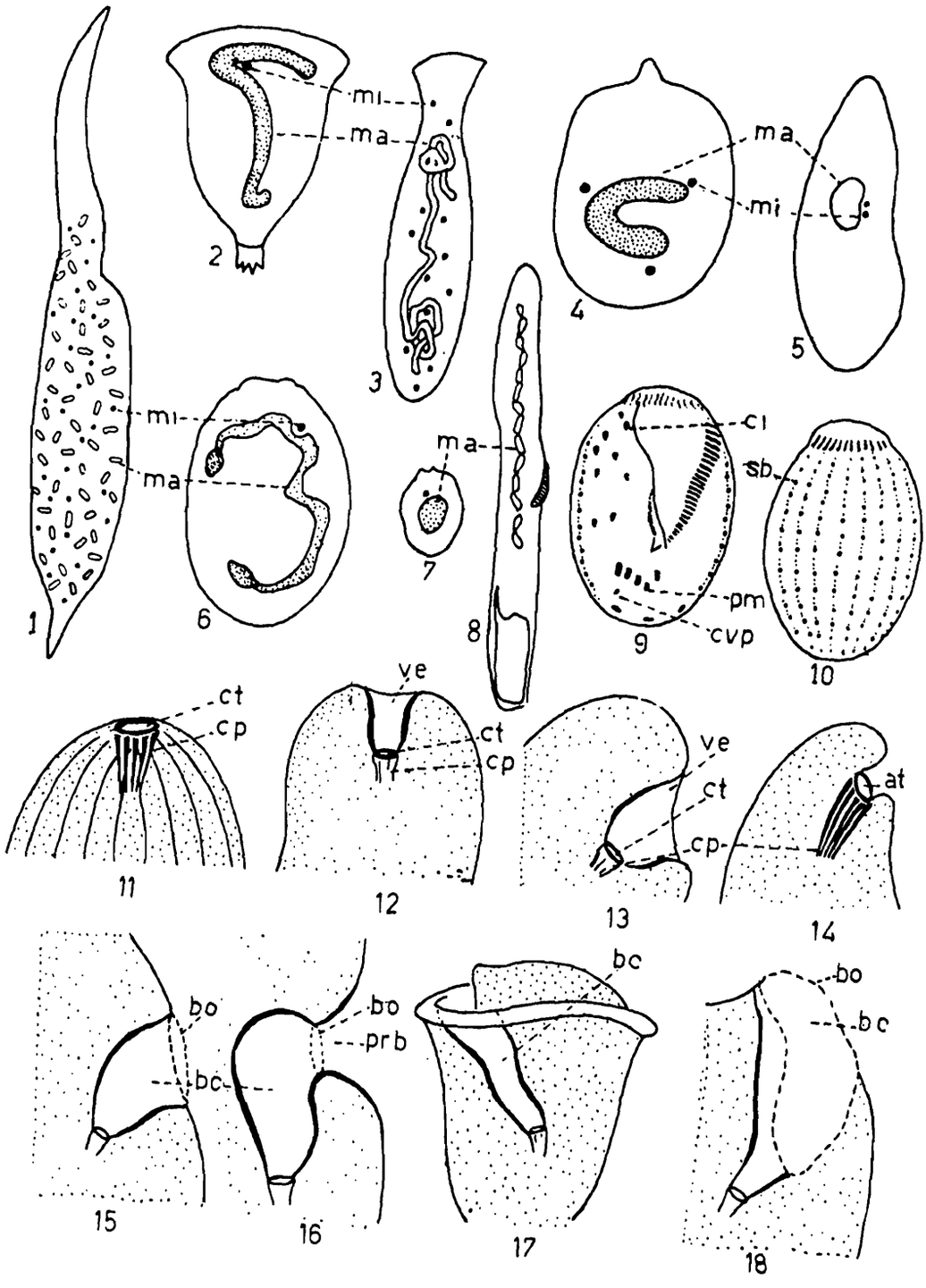


Plate 5. Figs. 1–8. Showing diversified shape of nucleus in freeliving ciliates

1. *Dileptus* sp; 2. *Vorticella* sp; 3. *Spathidium* sp; 4. *Didinium* sp; 5. *Paramecium* sp; 6. *Euplotes* sp; 7. *Urotricha* sp; 8. *Spirostomum* sp; Figs. 9–10. Showing infraciliature in *Euplotes*. (a hypotrichous ciliate) by silver impregnation method after Chatton – Lwoff). 9. ventral view; 10. dorsal view; Figs. 11–18. Oral areas arranged in postulated phylogenetic sequence (after Corliss).

(at – atrium; bc – buccal cavity; bo – buccal overture; ci – cirrus; cp – cytopharynx; ct – cytostome; cvp – contractile vacuole pore; ma – macronucleus; mi – micronucleus; pm – paroral membrane; prb – prebuccal area; sb – sensory bristle; ve – vestibulum).

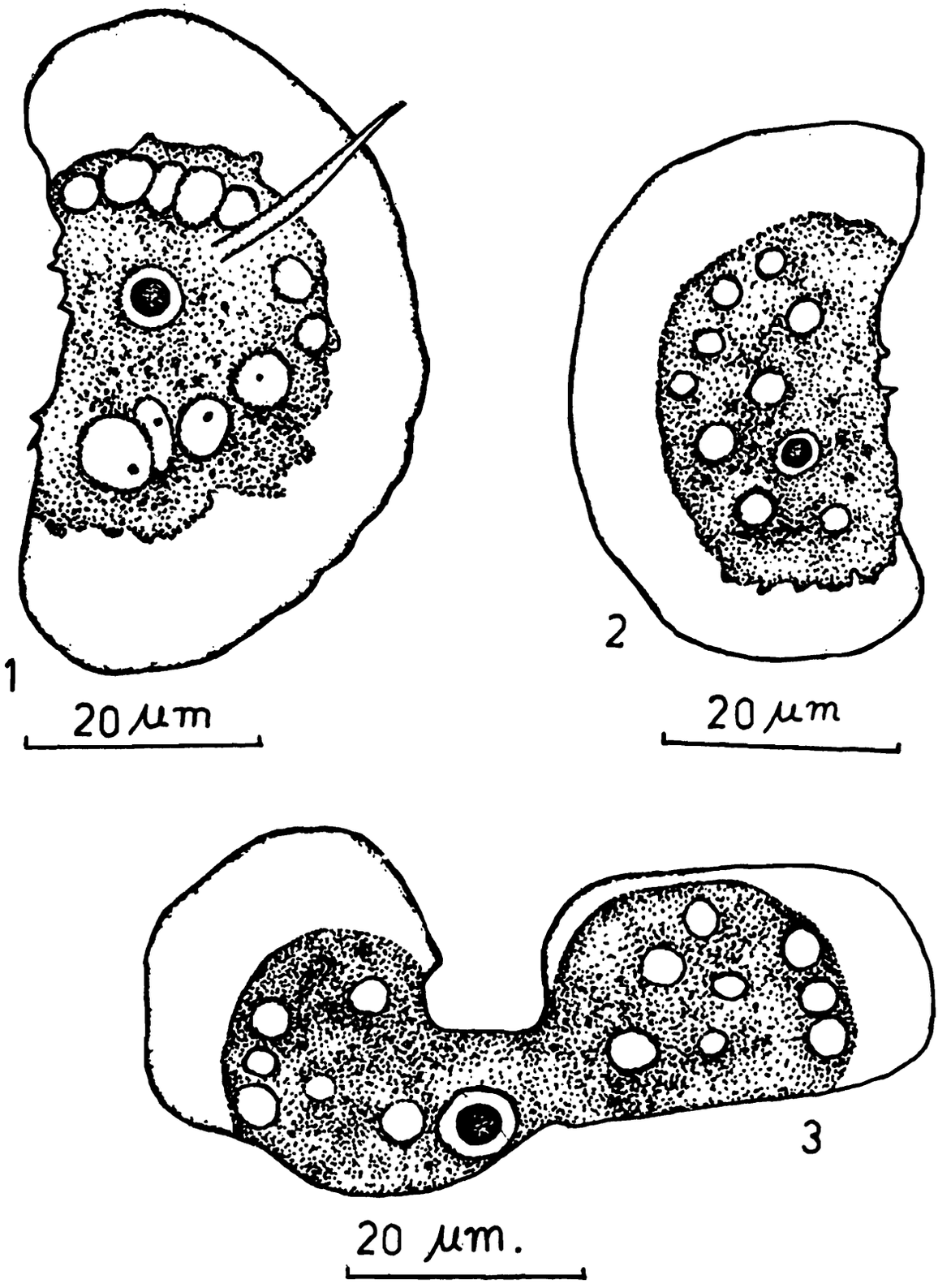


Plate 6. *Vannella bengalensis* sp. nov.
1–2. Locomotive form; 3. dividing form

SYSTEMATIC LIST OF FREELIVING PROTOZOA HITHERTO REPORTED FROM WEST BENGAL

Subkingdom PROTOZOA
Phylum SARCOMASTIGOPHORA
Subphylum MASTIGOPHORA
Class PHYTOMASTIGOPHOREA
Order CRYPTOMONADIDA
Family CRYPTOMONADIDAE

1. *Chilomonas paramecium* Ehrenberg

Order DINOFLAGELLIDA
Family NOCTILUCIDAE

2. *Noctiluca miliaris* Suriray

Family PERIDINIIDAE

3. *Ceratium hirundinella* Muller
4. *Ceratium tripos* Nitzsch
5. *Peridinium tabulatum* Claparede & Lachmann
6. *Peridinium* spp.

Order EUGLENIDA
Suborder EUGLENINA
Family EUGLENIDAE

7. *Euglena acus* Ehrenberg
8. *Euglena oxyuris* Schmadra
9. *Euglena viridis* Ehrenberg
10. *Euglena* sp.
11. *Phacus acuminata* Stokes
12. *Phacus longicauda* (Ehrenberg)
13. *Phacus pleuronectes* (Muller)
14. *Phacus* sp.
15. *Trachelomonas armata* var. *ovata* Swirenko
16. *Trachelomonas hispida* (Perty)
17. *Trachelomonas richmondiae* (Palyfair)
18. *Trachelomonas* sp.

Family ANISONEMIDAE

19. *Entosiphon ovatum* Stokes
20. *Entosiphon sulcatum* (Dujardin)
21. *Peranema trichophorum* (Ehrenberg)

Order CHRYSOMONADIDA
Family CHROMULINIDAE

22. *Mallomonas* sp.

Family OCHROMONADIDAE

23. *Monas* sp.
24. *Dinobryon* sp.

Subphylum SARCODINA
Superclass RHIZOPODA
Class LOBOSEA
Subclass GYMNAMOEBIA
Order AMOEBIDA
Suborder TUBULINA
Family AMOEBIDAE

25. *Amoeba discoides* Schaeffer
26. *Trichamoeba villosa* (Wallich) (= *Amoeba villosa* Wallich)

Family HARTMANNELLIDAE

27. *Hertmannella crumpae* Singh & Hanumaiah
28. *Hartmannella vermiformis* Page

Suborder THECINA
Family THECAMOEBIDAE

29. *Thecamoeba soli* (Singh and Hanumaiah)
30. *Thecamoeba striata* (Penard) (= *Amoeba striata* Penard)
31. *Vannella bengalensis* sp.nov.
32. *Vannella cutleri* Singh & Hanumaiah
33. *Vannella* sp.

Suborder CONOPODINA
Family PARAMOEBIDAE

34. *Mayorella vespertilio* (Penard) (= *Amoeba vespertilio* Penard)

35. *Mayorella* sp.

Suborder ACANTHOPODINA

Family ACANTHAMOEBIDAE

36. *Acanthamoeba astronyxis* (Ray & Hayes)
37. *Acanthamoeba culbertsoni* (Singh & Das)
38. *Acanthamoeba glebae* (Dobell)
39. *Acanthamoeba palestinensis* (Reich)
40. *Acanthamoeba rhysodes* (Singh)

Family ECHINAMOEBIDAE

41. *Echinamoeba exundans* (Page)

Order SCHIZOPYRENIDA

Family VAHLKAMPFIIDAE

42. *Vahlkampfia russelli* (Singh)
    (= *Schizopyrenus russelli* Singh)
43. *Naegleria gruberi* (Schardinger)
44. *Naegleria thortoni* (Singh)
    (= Didascalus thortoni Singh)
45. *Tetramitus rostratus* (Perty)

Order PELOBIONTIDA

Family PELOMYXIDAE

46. *Pelomyxa palustris* Greef

Subclass TESTACEALOBOSIA

Order ARCELLINIDA

Family ARCELLIDAE

47. *Arcella conica* (Playfair)
48. *Arcella discoides* Ehrenberg
49. *Arcella gibbosa* Penard
50. *Arcella hemispherica* Perty

51a. *Arcella vulgaris* var. *angulosa* (Perty)

51b. *Arcella vulgaris* forma *undulatum* Deflandre

52. *Diplochlamys leidyi* Greef
53. *Lesquereusia modesta* Rhumbler
54. *Lesquereusia spiralis* (Ehrenberg)
55. *Pseudochlamys patella*
    Claparede & Lachmann
56. *Pyxidicola operculata* (Agardh)

Family COCHLIOPODIIDAE

57. *Cochliopodium bilimbosum* (Auerbach)

Family DIFFLUGIIDAE

58. *Centropyxis aculeata* (Ehrenberg)
59. *Centropyxis aerophila* Deflandre
60. *Centropyxis arcelloides* Penard
61. *Centropyxis cassis* (Wallich)
62. *Centropyxis ecornis* (Ehrenberg)
63. *Centropyxis minuta* Deflandre
64. *Centropyxis penardi* Deflandre
65. *Centropyxis spinosa* (Cash & Hopkinson)
66. *Cucurbitella mespiliformis* Penard
67. *Difflugia acuminata* Ehrenberg
68. *Difflugia acutissima* Deflandres
69. *Difflugia amphoralis* Hopkinson
70. *Difflugia arcula* Leidy
71. *Difflugia bacillariarum* Perty
72. *Difflugia brevicolla* Cash
73. *Difflugis capreolata* Penard
74. *Difflugia corona* Wallich
75. *Difflugia curvicaulis* Penard
76. *Difflugia difficilis* Thomas
77. *Difflugia elegans* Penard
78. *Difflugia globularis* (Wallich)
79. *Difflugia globulosa* Dujardin
80. *Difflugia globulus* (Ehrenberg)
81. *Difflugia gramen* Penard
82. *Difflugia lismorens*is Playfair
83. *Difflugia lithophila* (Penard)
84. *Difflugia lobostom*a Leidy
85. *Difflugia muriculata*
    Gauthier-Lievre & Thomas
86. *Difflugia muriformis*
    Gauthier-Lievre & Thomas
87. *Difflugia oblonga* Ehrenberg
88. *difflugia pyrifomis* Perty

89. *Difflugia tuberculata* (Wallich)
90. *Difflugia urceolata* Carter
91. *Heliopera sylvatica* Penard
92. *Phryganella hemispherica* Penard
93. *Plagiopyxis callida* Penard

Class FILOSEA
Order GROMIIDA
Family EUGLYPHIDAE

94. *Euglypha acnthophora* (Ehrenberg)
94a. *Euglypha acanthophora* var. *flexusa* Penard
95. *Euglypha denticulata* Brown
96. *Euglypha loevis* (Ehrenberg)
97. *Euglypha rotunda* Wailes
98. *Euglypha scutigera* Penard
99. *Euglypha tuberculata* Dujardin
100. *Paraeuglypha indica* Nair & Mukherjee
101. *Placocysta lens* Penard
102. *Trecheleuglypha* dentata (Vejdowsky) (= Euglypha dentata Vejdowsky)
103. *Trinema enchelys* (Ehrenberg)
104. *Trinema lineare* Penard

Class GRANULORETICULOSEA
Order ATHALAMIDA
Family BIOMYXIDAE

105. *Biomyxa vagans* Leidy

Order MONOTHALAMIDA
Family LIEBERKUHNIIDAE

106. *Lieberkuhnia paludosa* (Cienkowsky)

Superclass ACTINOPODA
Class HELIOZOEA
Order DESMOTHORACIDA
Family CLATHRULINIDAE

107. *Clathrulina elegans* Cienkowski

Order ACTINOPHRYIDA
Family ACTINOPHRYIDAE

108. *Actinophrys sol* Ehrenberg

Order CENTROHELIDA
Family ACANTHOCYSTIDAE

109. *Acanthocystis spinifera* Greef

Phylum CILIOPHORA
Class KINETOFRAGMINOPHOREA
Subclass GYMNOSTOMATIA
Order PROSTOMATIDA
Suborder PROSTOMATINA
Family HOLOPHRYIDAE

110. *Holophrya annandalei* Ghosh
111. *Holophrya bengalensis* Ghosh

Suborder PRORODONITINA
Family PRORODONTIDAE

112. *Prorodon discolor* (Ehrenberg)
113. *Prorodon edentatus* Claparede & Lachmann
114. *Prorodon stewarti* Ghosh
115. *Prorodon teres* Ehrenberg
116. *Pseudoprorodon lieberkuhni* Butschli
117. *Urotricha* sp.

Family COLEPIDAE

118. *Cloeps hirtus* (Muller)

Suborder HAPTORINA
Family ENCHELYIDAE

119. *Lacrymaria minima* Kahl
120. *Lacrymaria olor* (Muller)
121. *Lacrymeria pupula* (Muller)
122. *Enchelys* sp.

Family SPATHIDIIDAE

123. *Bryophyllum spathidiodes* V. Gelei
124. *Spathidium moniliforme* Bhatia
125. *Spathidium muscicola* Kahl

Family TRACHELIIDAE

126. *Dileptus anser* (Muller)
127. *Dileptus monilatus* (Stokes)
128. *Trachelius gutta* (Cohn)
129. *Trachelius ovum* Ehrenberg

Family DIDINIIDAE
130. *Didinium nasutum* (Muller)
Family ACTINOBOLINIDAE
131. *Actinobolina radians* Stein
Order PLEUROSTOMATIDA
Family AMPHILEPTIDAE
132. *Amphileptus* sp.
133. *Loxophyllum levigatum* Sauerby
134. *Loxophyllum nimeccense* (Stein)
135. *Loxophyllum undulatum* Sauerbrey
136. *Litonotus fasciola* (Ehrenberg)
137. *Litonotus infusionus* Ghosh
138. *Litonotus procera* Penard
(= Hemiophrys procera Penard)
139. *Litonotus similis* Ghosh
Order KARYORELICTIDA
Family TRACHELOCERCIDAE
140. *Trachelocerca* sp.
Family LOXODIDAE
141. *Loxodes magnus* Stokes
142. *Loxodes striatus* (Engelmann)
143. *Loxodes vorax* Stokes
144. *Loxodes* sp.
Subclass VESTIBULIFERIA
Order TRICHOSTOMATIDA
Suborder TRICHOSTOMATINA
Family PLAGIOPYLIDAE
145. *Plagiopyla nasuta* Stein
Order COLPODIDA
Family COLPODIDAE
146. *Colpoda aspera* Kahl
147. *Colpoda cucullus* Muller
148. *Colpoda maupasi* Enriques
149. *Colpoda* sp.
Family CYRTOLOPHOSIDIDAE
150. *Cyrtolophosis* (= *Balantiophorus*) *elongatus* (Schewiakoff)
151. *Cyrtolophosis* (= *Balantiophorus*) *minutus* (Schewiakoff)
152. *Opisthostomatella* (= *Opisthostomum*) *bengalensis* (Ghosh)
Subclass HYPOSTOMATIA
Superorder NASSULIDEA
Order SYNHYMENIIDA
Family ORTHODONELLIDAE
153. *Orthodonella banerjeei* (Ghosh)
Family SCAPHIDIODONTIDAE
154. *Chilodontopsis bengalensis* (Ghosh)
Order NASSULIDA
Suborder NASSULINA
Family NASSULIDAE
155. *Nassula ornata* Ehrenberg
Suborder MICROTHORACINA
Family LEPTOPHARYNGIDAE
156. *Leptopharynx chlorophagus* Das
157. *Leptopharynx sphagnetorum* (Levander)
158. *Leptopharynx torpens* (Kahl)
159. *Pseudomicrothorax agilis* Mermod
160. *Pseudomicrothorax dubius* (Maupas)
Family MICROTHORACIDAE
161. *Microthorax pusillus* Engelman
162. *Drepanomonas dentata* Fresenius
163. *Drepanomonas hooghlyensis* Nair & Das
164. *Drepanomonas revoluta* Penard
Superorder PHYLLOPHARYNGIDEA
Order CYRTOPHORIDA
Suborder CHLAMYDODONTINA
Family CHILODONELLIDAE
165. *Chilodonella cucullulus* (Muller)
166. *Chilodonella spiralidentis* (Bhatia & Mallik)

167. *Chilodonella uncineta* (Ehrenberg)
168. *Chilodonella* sp.
Subclass SUCTORIA
Order SUCTORIDA
Suborder EXOGENINA
Family PODOPHRYIDAE
169. *Podophrya bengalensis* Ghosh
170. *Podophrya sandi* Collin
Suborder ENDOGENINA
Family DENDROSOMATIDAE
171. *Tokophrya bengalensis* Ghosh
172. *Tokophrya cyclopum* (Claparede & Lachmann)
173. *Tokophrya infusorium* (Stein)
Class OLIGOHYMENOPHOREA
Subclass HYMENOSTOMATIA
Order HYMENOSTOMATIDA
Suborder TETRAHYMENINA
Family TETRAHYMENIDAE
174. *Stegochilum ovale* Ghosh
175. *Tetrahymena pyriformis* (Ehrenberg)
Family GLAUCOMIDAE
176. *Glaucoma pyriformis* (Ehrenberg)
Suborder OPHRYOGLENINA
Family OPHRYOGLENIDAE
177. *Ophryoglena flava* (Ehrenberg)
Suborder PENICULINA
Family PARAMECIIDAE
178. *Paramecium caudatum* Ehrenberg
179. *Paramecium* sp.
Family FRONTONIIDAE
180. *Disematostoma bengalensis* Nair
181. *Frontonia depressa* (Stokes)
182. *Frontonia leucas* (Ehrenberg)
Family UROCENTRIDAE
183. *Urocentrum turbo* (Muller)
Family NEOBURSARIDIIDAE
184. *Neobursaridium gigas* Nech
Order SCUTICOCILIATI
Suborder PHILASTERINA
Family LOXOCEPHALIDAE
185. *Loxocephalus plagius* (Stokes)
Family CINETOCHILIDAE
186. *Cinetochilum margaritaceum* Perty
187. *Sathrophilus* (= *Saprophilus*) *chlorophagus* (Kahl)
Suborder PLEURONEMATINA
Family PLEURONEMATIDAE
188. *Pleuronema crassum* Dujardin
Family CYCLIDIIDAE
189. *Ctedoctema acanthocrypta* Stokes
190. *Cyclidium glaucoma* Muller
Subclass PERITRICHIA
Order PERITRICHIDA
Suborder SESSILINA
Family VORTICELLIDAE
191. *Carchesium polypinum* (Linnaeus)
192. *Carchesium* sp.
193. *Vorticella campanula* Ehrenberg
194. *Vorticella globosa* Ghosh
195. *Vorticella patellina* Ehrenberg
196. *Vorticella subcylindrica* Ghosh
197. *Vorticella submicrostoma* Ghosh
198. *Vorticella subprocubens* Ghosh
199. *Vorticella subsinuata* Ghosh
200. *Vorticella* sp.
201. *Zoothamnium horai* Khajuria and Pillai
Family EPISTYLIDIDAE
202. *Epistylis anastatica* (Linnaeus)
203. *Epistylis* sp.
Family VAGINICOLIDAE
204. *Cothurinia* sp.

205. *Platycola decumbens* (Ehrenberg)
206. *Platycola striata* (Fromental)
207. *Platycola* sp.
208. *Pyxicola affinis* Kent
209. *Vaginicola crystallina* Ehrenberg
210. *Vaginicola* sp.

Family LAGENOPHRYIDAE

211. *Lagenophrys labiata* Stokes

Class POLYHYMENOPHOREA
Subclass SPIROTRICHIA
Order HETEROTRICHIDA
Suborder HETEROTRICHINA
Family SPIROSTOMIDAE

212. *Blepharisma intermedium* Bhandary
213. *Blepharisma undulans* Stein
214. *Spirostomum ambiguum* Ehrenberg
215. *Spirostomum teres* Claparede and Lachmann

Family METOPIDAE

216. *Bothrostoma extenta* (Kahl)
217. *Bothrostoma nasuta* (Da Cunha)
218. *Bothrostoma mirabilis* (Kahl)
219. *Brachonella campanula* (Kahl)
220. *Brachonella spiralis* (Smith)
221. *Metopus daphnides* Jankowski
222. *Metopus es* Muller
223. *Metopus fuscus* Kahl
224. *Metopus ovalis* Kahl
225. *Metopus rostratus* Kahl
226. *Metopus striatus* McMurrich

Family CONDYLOSTOMATIDAE

227. *Bryometopus pseudochilodon* Kahl

Family STENTORIDAE

228. *Stentor* (=*Stentorella*)*polymorphus* (Muller)
229. *Stentor* (= *Stentorella*)*viridis* (Ghosh)

Family BURSARIIDAE

230. *Bursaria truncatella* Muller

Suborder ARMOPHORINA

Family CAENOMORPHIDAE

231. *Caenomorpha lata* Kahl
232. *Caenomorpha medusula* Perty

Suborder COLIPHORINA

Family FOLLICULINIDAE

233. *Folliculina ampula* (Muller)

Order ODONTOSTOMATIDA

Family EPALXELLIDAE

234. *Saprodinium dentatum* Lauterborn

Order OLIGOTRICHIDA
Suborder OLIGOTRICHINA

Family HALTERIIDAE

235. *Halteria grandinella* (Muller)

Family STROBILIDIIDAE

236. *Strobilidium gyrans* (Stokes)

Order HYPOTRICHIDA
Suborder STICHOTRICHINA

Family SPIROFILIDAE

237. *Hypotrichidium conicum* Ilowaisky
238. *Stichotricha socialis* Gruber

Family ?

239. *Balladinopsis nuda* Ghosh

Suborder SPORADOTRICHINA

Family OXYTRICHIDAE

240. *Oxytricha falax* Stein
241. *Pleurotricha grandis* Stein
242. *Stylonichia mytilus* (Ehrenberg)

Family ASPIDISCIDAE

243. *Aspidisca bengalensis* (Ghosh)
244. *Aspidisca costata* (Dujardin)

Family EUPLOTIDAE

245. *Euplotes leticiensis* Bovee
246. *Euplotes gracilis* Kahl
247. *Euplotes patella* (Muller)
248. *Euplotes plumipes* Stokes

SYSTEMATIC ACCOUNT

Subkingdom PROTOZOA
Phylum SARCOMASTIGOPHORA
Class PHYTOMASTIGOPHOREA
Order CRYPTOMONADIDA
Family CRYPTOMONADIDAE

Body truncate anteriorly with a distinct oblique vestibulum near anterior region.

Genus ***Chilomonas*** Ehrenberg

Body colourless, elliptical, truncate anteriorly and covered with a firm pellicle, flagella two and subequal, an oblique furrow near anterior region, 'cytopharynx' deep.

1. *Chilomonas paramecium* Ehrenberg

1931. *Chilomonas paramecium* Ehrenberg. *Adh. preuss. Akad. wiss.*, Berlin, 2, p. 64, pl. 4, fig. 6.

Material examined : Sev. exs, (3 slides), Rabindra sarobar, Calcutta, 19.ix.1961, 9.x.1961, K. N. Nair.

Diagnosis : Body elliptical, posteriorly narrowed and slightly bent dorsally; vestibulum deep; chloroplast absent; dimensions 15-21 µm x 6-8 µm.

Distribution : India : West Bengal (Calcutta district), Rajasthan, first record form the state.

Remarks : This species is universal in stagnant water with putrid vegetation infusion.

Order DINOFLAGELLIDA

Two families under this order have so far been reported/collected from this state.

Key to the families

1(2) Naked or covered by a single piece of cellulose membrane with sulcus and annulus, contractile tentacle arising from sulcus area and extending posteriorly.....NOCTILUCIDAE

2(1) Covered by shell consisting of numerous plates; shell composed of epitheca, annulus and hypotheca, plates variously sculptured and finely perforated, annulus usually at equator and covered by a plate, contractile tentacle absent.....PERIDINIIDAE

Family NOCTILUCIDAE
Genus ***Noctiluca*** Suriray

Body spherical and bilaterally symmetrical, cytostome with a well developed tentacle and short flagellum, cytoplasm vacuolated and cytoplasmic strands connect the central mass with periphery.

2. *Noctiluca miliaris* Suriray

1973. *Noctiluca miliaris* Suriray; Grell, *Protozoology*, Springer-Verlag, p.376. fig. 325a.

Diagnosis : Body almost spherical, without girdle, with deep sulcus; posterior portion drawn out into a tentacle; transverse flagellum attached to pellicle forming a tooth like process; diameter 400 1000 μm.

Distribution : India : West Bengal (Hugli, Medinipur, Nadia and South 24-Parganas districts); in seas and ocean.

Remarks : Gopalkrishnan (1971) reported this species from the Zones I (Nabadwip to Konnagar), III (Diamond Harbour to the mouth of Hugli river), IV (Rupnarayan tributary) and V (Matla, Gosaba and Raimangal) of the Hugli-Rupnarayan-Matla estuary. During the present investigation the authors have also observed this species in considerable number in the near shore water of Digha beach (Mednipur district).

This species is universal in seas and ocean.

Family PERIDINIIDAE

Under this family two genera, namely, *Peridinium* and *Ceratium* have been recorded in this state.

Key to the genera

1(2) Body spherical to ovoid, annulus slightly spiral with projecting rims, horn-like protrusion absent ..... ***Peridinium***

2(1) Body flattened with horn-like protrusions ..... ***Ceratium***

Genus *Ceratium* Schrank.

Key to the species

1(2) Epicone with one and hypocone with 2 or 3 horns, the horn of the epicone being longest ..... *C. hirundinella*

2(1) Epicone with two and hypocone with one long horn of almost same length ..... *C. tripos*

3. *Ceratium hirundinella* Muller

1973. *Ceratium hirundinella* Muller; Grell, *Protozoology*, Springer Verlag, p. 380, fig. 327.

Diagnosis : Shell with 3 or more horns of unequal length; hypocone with one considerably long horn and epicone with 2 or 3 shorter horns.

Distribution : India : West Bengal (Hugli-Rupnarayan-Matla estuary covering Hugli, Nadia and, North and South 24-Parganas districts).

Remarks : This is mainly a freshwater form. Gopalkrishnan (1971) reported this species from Zone I to Zone V of the Hugli-Rupnarayan - Matla estuary, the Zone V of which is mostly estuarine or marine.

4. *Ceratium tripos* Nitzsch

1973. *Ceratium tripos* Nitzsch; Grell, *Protozoology*, Springer Verlag, p. 380, fig. 328.

Diagnosis : Shell with 3 long horns of almost equal length; epicone with two and hypocone with one horn.

Distribution : India : West Bengal (Hugli-Matla estuary covering the districts Hugli, North and South 24-Parganas districts).

Remarks : This is a salt water species reported from Zones II, III and V of the Hugli-Malta estuary by Gopalkrishnan (1971).

Genus ***Peridinium*** Ehrenberg

5. ***Peridinium tabulatum*** Claparede and Lachmann

1973. *Peridinium tabulatum* Claparede and Lachman; Grell, *Protozoology*, Springer Verlag, p. 380. fig. 329.

Material examined : 3 exs., Diamond Harbour, South 24-Parganas, 11.i.1966, K. N. Nair.

Distribution : India : West Bengal (South 24-Parganas district). First record from the state.

Remarks : This species is universal in freshwater ponds and lakes.

6. ***Peridinium*** spp.

Distribution : India : West Bengal (Hugli-Malta estuary covering the districts Hugli, Nadia, North and South 24-Parganas districts).

Remarks : Gopalkrishnan (1971) recorded several species of *Peridinium* (without ascertaining specific names of the forms) in different parts of the Hugli estuary starting from Nabadwip to the mouth of the river Hugli as well as well as Malta estuary.

Order EUGLENIDA

Key to the families

1(2) One flagellum emerging from the 'cytostome' and directed anteriorly, stigma usually present..... .....EUGLENIDAE

2(1) Two flagella emerging from the cytostome, one directed anteriorly and the other usually posteriorly, chromatophore and stigma absent.....ANISONEMIDAE

Family EUGLENIDAE

Three genera under this family have been reported so far from this state.

Key to the genera

1(4) Baby naked

2(3) Body spindle-shaped, chromatophores discoid, fusiform or band-shaped, pyrenoids present..... .....***Euglena***

3(2) Body highly flattened, chromatophores discoid and green and without pyrenoid.....***Phacus***

4(1) Body overed with lorica, (often with numerous spines, a single long flagellum protruding from anterior aperture, the rim of which frequently thickened to form a collar, chromatophores either two curved plates or numerous discs) .....***Trachelomonas***

Genus *Euglena* Ehrenberg

Key to the species

1(2) Body spindle-shaped, flagellum long, paramylon bodies rod-shaped, 8-10 in number.....*E. acus*

2(1) Body cylindrical, flagellum short, paramylon bodies irregular or ring-shaped

3(4) Larger species (200-270 μm long), with clear spike like projection at the posterior end, paramylon bodies ring-shaped .....*E. oxyuris*

4(3) Species of medium size (70-110 μm long), with a munute tail, paramylon bodies irregular ....*E. viridis*

7. *Euglena acus* Ehrenberg

1832. *Euglena acus* Ehrenberg, *Abh. preuss.Akad.Wiss.*, Berlin, p.39.

Material examined : Sev.exs.(1 side), Barrackpur, North 24-Parganas, 31.v.1966, K.N. Nair.

Diagnosis : Body elongate, spindle-shaped, posterior end pointed, flagellum long; paramylon bodies 8 to 10 in number, rod-shaped and arranged in two groups in either half of the body; dimensions 60-98 μm x 9-14 μm.

Distribution : India : West Bengal (Calcutta district); in fresh water pond. New record from the state; Andhra, Rajasthan.

8. *Euglena oxyuris* Schmadra

1913. *Euglena oxyuris* Schmadra; Lammermann, *Eugleninae*, p.130, fig. 207.

Material examined : Sev.exs. (1 slide), Narapara, Diamond Harbour, South 24-Parganas district, 11.vii.1967, K.N. Nair.

Diagnosis : Body cylindrical, long, somewhat flattened, almost always twisted, with clear spike-like projection at the posterior end; flagellum short; two oval ring-shaped paramylong bodies, one on either side of the nucleus; dimension 200-270 μm x 30 - 35 μm.

Distribution : India : West Bengal (Sough 24-Parganas district), in freshwater pond. New record from West Bengal; Andhra.

9. *Euglena viridis* Ehrenberg

1832. *Euglena viridis* Ehrenberg, *Abh. preuss. Akad. Wiss.*, Berlin, p. 29.

Diagnosis : Body more less cylindrical, blunt in front and rapidly attenuated behind to from a minute tail, flagellum very short, paramylon bodies irregular; dimensions 70-110 μm x 14-16 μm.

Material examined : India : West Bengal (24-Parganas district).

Remarks : Banerjee (1936) reported this species from 'various parts of 24-Parganas district' without mentioning any locality.

10. *Euglena* sp

Distribution : India : West Bengal (in Hugli-Malta estuary in Hugli, Nadia and North and South 24-Parganas districts).

Remarks : Gopalkrishnan (1971) recorded *Euglena* sp form the plankton samples collected from the zones I, II and III of the Hugli-Malta estuary (i.e., the zones extending from Nabadwip, Dist. Nadia to the mouth of the Hugli river). Ray and Mitra (1980) have also recorded *Euglena* sp as the prominent protozoan species in the plankton samples at the outfall, from 1.5 to 0.7 km above the outfall and from 1.5 to 2.5 km below the outfall of Tribeni Tissue and Pulp Mill at Hazinagar (Dist. Hugli).

Genus ***Phacus*** Dujardin

Key to the species

1(2) A prominent ridge present on the convex side of the body extending upto posterior end..... .....*P. pleuronectes*

2(1) Convex side of the body without any ridge

3(4) Caudal projection long, flagellum shorter than the body.....*P. longicauda*

4(3) Caudal projection short, acuminate, flagellum as long as body.....*P. acuminata*

11. ***Phacus acuminata*** Stokes

1885. *Phacus acuminata* Stokes, *see* Lammermann, 1910 in : *Krypt.- Flora der Mark Brandenburg.*, 3, p.512.

Material examined : 2 exs., Barrackpur, North 24-Parganas district, 31.v.66, K.N. Nair.

Diagnosis : Nearly circular in outline, longitudinally striated; caudal projection short; flagellum as long as body; one small paramylum body; dimensions 40 - 52 µm × 20 - 25 µm.

Distribution : India : West Bengal (North 24-Parganas district); common in fresh water pond, New record from West Bengal; Andhra.

12. ***Phacus longicauda*** (Ehrenberg)

1838. *Euglena longicauda* Ehrenberg, *Die Infusionsthierchen als Vollkommene Organismen*, Berlin, pl. 7.

Material examined : Sev. exs. (6 slides), Tribeni, Hugli district; 12.xii.1966, K.N. Nair.

Diagnosis : Body sometime slightly twisted, longitudinally striated with a long caudal projection; flagellum about one-half the body length; paramylum body single, discoid and central; dimensions 150-180 µm × 50-72 µm.

Distribution : India : West Bengal (Hugli district), in fresh water pond. First report from West Bengal.

13. ***Phacus pleuronectes*** (Muller)

1773. *Cercaria pleuronectes* Muller, *Vermium hist.*, p.36.

Material examined : 1 ex., Barrackpur, North 24-Parganas district; 31.v.1966, K.N. Nair; 1 ex., Deula, South 24-Parganas district, 3.i.1969, K.N. Nair.

Diagnosis : A prominent ridge on the convex side, extending to posterior end; longitudinally striated; short posterior prolongation slightly curved; paramylum body single, circular and located near centre; dimentsions 70- 80 μm × 40-60 μm.

Distribution : India : West Bengal (North and South 24-Parganas districts); in freshwater pond. First report from West Bengal; Andhra.

14. *Phacus* sp.

Distribution : India : West Bengal (in Hugli-Matla estuary).

Remarks : Gopalkrishnan (1971) observed *Phacus* sp in the plankton samples collected from all the zones of the Hugli-Matla estuary. He, however, could not determine the specific identity of this species.

Genus *Trachelomonas* Ehrenberg

Key to the species

1(2) Shell ovate, aperture for flagella covered with spines, spines at lower part robust and slightly curved ..... *T armata*

2(1) Shell oval or long elliptical, aperture for flagella not covered with spine, entire shell covered with sharp pointed spines

3(4) Shell oval with rounded ends, aperture for flagella wide..... *T hispida*

4(3) Shell long elliptical, slightly rounded at upper part and abruptly cuneate at lower part, aperture for flagella narrow ..... *T. richmondiae*

15. *Trachelomonas armata* var. *ovata* Swirenko

1925. *Trachelomonas armata* (Ehrenberg) Stein var. *ovata* Swirenko; Skvortzov, *New Phytol*, p.4, pl.3, fig. 48.

Material examined : 2 exs., Adisaptagram, Hugli, 5.i.1967, K.N. Nair.

Diagnosis : Shell ovate, broadly rounded at ends, brown to dark brown; aperture for flagella covered with spines; spines at lower part robust and slightly curved; chromatophores numerous.

Distribution : India : West Bengal (Hugli district); in fresh water among plankton sample. First report from West Bengal.

16. *Trachelomonas hispida* (Perty)

1925. *Trachelomonas hispida* (Perty) Stein; Skvortzov, *New Phytol*, p.300.

Material examined : 7 exs., Adisaptagram, Hugli, 5.i.1967, K.N. Nair.

Diagnosis : Shell brown, oval with rounded ends; covered with distinct sharp pointed spines; aperture for flagella wide and not covered with spine.

Distribution : India : West Bengal (Hugli district); in fresh water among plankton sample. First report from West Bengal.

17. ***Trachelomonas richmondiae*** (Playfair)

1926. *Trachelomonas richmondiae* (Playfair); Deflandre, Monographie du genre Trachelomonas Ehrenberg, p.55.

Material examined : 1 ex., simurali, Nadia, 14.xi.1967, K.N. Nair.

Diagnosis : Shell brown, long elliptical, slightly attenuate and rounded at upper part and abruptly cuneate at lower part, aperture for flagella narrow and not covered with spine; shell covered with sharp pointed spines; chromatophores numerous.

Distribution : India : West Bengal (Nadia district), in fresh water among plankton sample. First report from West Bengal.

18. ***Trachelomonas*** sp.

Distribution : India : West Bengal (in Hugli-Matla estuary)

Remarks : Gopalkrishnan (1971) observed this species in the plankton smaples collected from Zone I extending from Nabadwip, Dist. Nadia to Konnagar, Dist. Hugli and Zone IV (Rupnarayan tributary, Dist. Mednipur) of the Hugli-Matla estuary.

Family ANISONEMIDAE

Under this family the following two genera have been found in this state.

Key to the genera

1(2) Elongate, with a broad or truncate posterior end during locomotion, cytostome with a thickened ridge and two oral rods at anterior end; cytopharynx not visible, one free flagellum and the second flagellum adhered to the pellicle ..... ***Peranema***

2(1) Oval, flattened, more or less rigid body, cytostome not visible, oral rods absent, cytopharynx a long conicle tubule almost reaching posterior end, one free flagellum and the second one trailing flagellum ..... ***Entosiphon***

Genus ***Entosiphon*** Stein

Key to the species

1(2) Anterior end rounded with 10-12 longitudinal striae..... *E. ovatum*

2(1) Anterior end with prominent depression of cytopharynx, body ridged longitudinally .... *E. sulcatum*

19. ***Entosiphon ovatum*** Stokes

1885. *Entosiphon ovatus* Stokes, *Ann. Mag. nat. Hist.*, London (5) 15, p.440, pl. 15.fig. 12.

Material examined : 2 exs., Rabindra Sarobar, Calcutta, 30.iv.1961, K.K. Mahajan & party.

Diagnosis : Anterior end rounded; 10-12 longitudinal striae; dimensions 20-25 µm long.

Distribution : India : West Bengal (Calcutta); among fresh water plankton. First report from West Bengal.

20. ***Entosiphon sulcatum*** (Dujardin)

1841. *Anisonema sulcatum* Dujardin, *Histoire naturelle des zoophytes,* Paris.

Material examined : 5 exs., Rabindra Sarobar, Calcutta, 13.x.1961, 4 & 11.xi.1961; 8.x.1965, K.N. Nair; 1 ex., Sibpur, Haora district, 8.x.1965; K.N. Nair. 1 ex., Barddhaman town, Barddhaman district, 12.xi.1965. A.K. Das.

Diagnosis : Body ridged longitudinally, posterior end rounded; cytopharynx prominent; dimensions 15-20 µm long.

Distribution : India : West Bengal (Calcutta, Barddhaman and Haora districts); among freshwater plankton. First report from West Bengal, Rajasthan.

Genus ***Peranema*** Dujardin

21. ***Peranema trichophorum*** (Ehrenberg)

1938. *Trachelius trichophorum* Ehrenberg, *Die Infusionsthierchen Volkommene Organismen,* Leipzig, p. 322, pl. 33, fig. 11.

Material examined : 1 ex., Kalyani, Nadia district, 9.xi.1964, K.N. Nair.

Diagnosis : Body cylindrical, posterior end usually truncate; small and numerous paramylum bodies present; dimentions 20-55 µm long.

Distribution : India : West Bengal (Nadia district); among freshwater plankton. First report from West Bengal.

Order CHRYSOMONADIDA

Key to the families

1(2) With a single dominant emergent flagellum; naked or with sculptured shell.....
.....CHROMULINIDAE

2(1) With two nuequal emergent flagella; with or without delicate test.....OCHROMONADIDAE

Family CHROMULINIDAE

Genus ***Mallomonas*** Perty

Body elongated, siliceous thorns originate at the cell envelop, two chromatophores rod-shaped.

22. ***Mallomonas*** sp.

Distribution : India : West Bengal (South 24-Parganas district).

Remarks : Mandal (1985) observed *Mallomonas* sp from the Bidyadhari river (a tributary of the Hugli river) near Kulti (South 24-Parganas). This species is enlarged with siliceous thorns originating at the cell envelop. Its average dimension is 20 - 25 µm x 6 - 8 µm.

Family OCHROMONADIDAE

Under this family two genera have been reported so far from this state.

Key to the genera

1(2) Solitary or colonial, body surface delicate, posterior surface often drawn out for attachment, chromatophores lacking.....***Monas***

2(1) Solitary or colonial, individuals ith vase-like hyaline and sometimes yellow cellulose test drawn out at the base, one or two lateral chromatophores present.....***Dinobryon***

Genus ***Monas*** Muller

23. ***Monas*** sp.

Distribution : India : West Bengal (in Hugli-Matla estuary); Universal in fresh and salt water.

Remarks : In the course of qualitative and quantittive studies of phytoplankton in the Hugli river Roy (1949, 1955) reported the occurrence of *Monas* sp around Falta (South 24-Parganas district). He, however, could not confirm the specific identify of this form.

Genus ***Dinobryon*** Ehrenberg

24. ***Dinobryon*** sp.

Distribution : India : West Bengal (in Hugli-Matla estuary); universal in freshwater bodies.

Remarks : Gopalkrishnan (1971) reported the occurrence of this species from the planktonic samples collected from Zone I and Zone II of the Hugli-Matla estuary (extending from Nabadwip, Dist. Nadia to Diamond Harbour, Dist. South 24-Parganas).

Subphylum SARCODINA
Superclass RHIZOPODA
Class LOBOSEA
Order AMOEBIDA

Under this order six families have been dealt with in the paper.

Key to the families

1(8) Locomotive form not producing subpseudopodia

2(5) Body a branched or unbranched cylinder, with or without hyaline cap, no rolling movement, body without pellicle

3(4) Usually polypodial, body in locomotion tubulate or cylindroid with rounded lobose pseudopodia, pseudopodia of radiate floating form granular in most length with clear hemispherical tips, if monopodial in locomotion then commonly with villous-bulb uroid.....
..... AMOEBIDAE

4(3) Monopodial, body in locomotion more or less tubular, limaciform, pseudopodia granular, more or less hemispherical, locomotion generally by steady flow, sometimes with gently anterolateral bulging, but never with hyaloplasm infected back along side, villous-bulb uroid lacking.....HARTMANNELLIDAE

5(2) Body flattened, oval, oblong, discoid or flabellate, pellicle like layer usually with longitudinal or irregular folds, with rolling movement, without any posterior granular mass.....
.....THECAMOEBIDAE

6(7) Body usually oval, oblong or flabellate, longer than broad, symmetrical, pellicle-like layer with longitudinal or irregular folds, without any posterior or central granular mass or conical pseudopodia.....THECAMOEBIDAE

7(6) Body discoid or fan-shaped, usually broader than long, without pellicle-like layer, with posterior or central granular mass, sometimes with conical hyaline pseudopodia.....
.....HYALODISCIDAE

8(1) Locomotive form producing subpseudopodia

9(10) Subpseudopodia hyaline, conical but not filose, cysts seldom formed.....PARAMOEBIDAE

10(9) Subpseudopodia hyaline, more or less finely tipped, sometimes filose, often furcate, cysts usually formed

11(12) Subpseudopodia numerous, short and spiny, sometimes furcate, cysts with inner wall often polygonal or stellate, outer wall often rippled or wrinkled, with operculum.....
.....ACANTHAMOEBIDAE

12(11) Subpseudopodia few to many, filose or microspines produced from a distinct hyaline zone, cysts round, smooth and without operculum..... ECHINAMOEBIDAE

Family AMOEBIDAE

Under this family two genera are dealt with in this paper.

Key to the genera

1(2) Commonly polypodial but one pseudopodium dominant at one time, with somewhat shorter pseudopodia originating from the main stem, villous-bulb uroid not reported..... ***Amoeba***

2(1) Almost always monopodial, with villous-bulb uroid..... ***Trichamoeba***

Genus *Amoeba* Bory

25. *Amoeba discoides* Schaeffer

1916. *Amoeba discoides* Schaeffer, *Arch. Protistenk.*, Jena, **37**, p.218, fig. 5a,b.

Material examined : 1 ex., Kalyani, Nadia district, 5.xi.1962, K.N. Nair; 1 ex., Paikpara (Sahid colony), Calcutta, 27.xii.1962, K.N. Nair.

Diagnosis : Locomotive form large (264-338 μm long), with few blunt, smooth pseudopodia; crystals abundant; coarse granules distributed all over the cytoplasm.

Distribution : India : West Bengal (Calcutta and Nadia districts); in freshwater.

Remarks : Nair, Das and Mukherjee (1971) reported this species for the first time from India, that too, from West Bengal.

Genus ***Trichamoeba*** Fromentel

26. ***Trichamoeba villosa*** (Wallich)

1863. *Amoeba villosa* Wallich, *Ann. nat. Hist.* (3) 9, p.336, pl.9.

Material examined : 1 ex., Champahati, South 24-Parganas, 11.vii.1967, A.K. Das.

Diagnosis : Large (upto 400 µm long), limax amoeba with prominent villous-bulb uroid; length-breadth ratio usually three, nucleus granular.

Distribution : India : West Bengal (South 24-Parganas district) in still freshwater. First report from India.

Family HARTMANNELLIDAE

A single genus, *Hartmannella* under this family has been collected so far from this state.

Genus ***Hartmannella*** Alexieff

Limax amoebae with hyaline cap practically always present in continuing locomotion, villous-bulb uroid or extensive filamentous adhession uroid absent.

Key to the species

1(2) Cysts single walled with an outer gelatinous layer..... *H. crumpae*

2(1) Cysts double walled, outer one being irregular..... *H. vermiformis*

27. ***Hartmannella crumpae*** Singh and Hanumaiah

1979. *Hartmannella crumpae* Singh and Hanumaiah, *Monograph No.1, J. microbiol.*, p.34, figs. 133-145.

Diagnosis : Cysts rounded or spherical, single-layered with an outer gelatinous layer, 6.3 - 9.8 µm in diameter; during excystation amoeba detaches itself from the cyst wall; preformed pore lacking.

Distribution : India : West Bengal (Bankura district); in soil, mud and sewage sludge; Gujarat, Maharashtra, Utter Pradesh.

Remarks : Basu *et al (in press)* recorded this species from the soil of Pratappur, Dist Bankura, West Bengal.

28. ***Hartmannella vermiformis*** Page

1967. *Hartmannella vermiformis* Page, *J. Protozool.*, 14, p.514, fig.112.

Diagnosis : Cysts spherical or slightly ovoid, with ectocyst somewhat separated in majority; cysts 5.6 - 9.8 µm in diameter; during excystation inner cyst wall dissolves and amoeba moving inside the outer wall; no pore reported.

Distribution : India : West Bengal (Mednipur district); Gujarat, and Uttar Pradesh; in soil, mud, sewage sludge, freshwater and leaf litter.

Remarks : Basu *et al (in press)* reported this species from the saline soil collected from the 'Jhau forest' area of Digha, Mednipur district, West Bengal. Earlier, this species has been reported to inhabit freshwater and leaf litter in England, Sweden and U.S.A. (*see* Page, 1976).

Family THECAMOEBIDAE

Two genera under this family are dealt with in this paper.

Key to the genera

1(2) Pellicle-like surface with conspicuous folds or wrinkles, hyaloplasm as crescent at anterior end, extending posteriorly along sides, but with granuloplasm not set off as thicker separate mass, outline more or less oval.....***Thecamoeba***

2(1) Surface wrinkles absent, flattened hyaloplasm occupying approximately anterior quarter to half, usually extending around sides of thicker granuloplasmic mass, outline flabellate, spatulate, occasionally oval.....***Vannella***

Genus *Thecamoeba* Fromentel

Key to the species

1(2) Body oval with several parallel folds, nucleus with 2-4 nucleoli .....*T. striata*

2(1) Body oval, elliptical or sometimes semicircular, several parallel folds present, nucleus with many nucleoli.....*T soli*

29. *Thecamoeba soli* (Singh and Hanumaiah)

1979. *Greeffia soli* Singh and Haumaiah, *Monograph No.1, Association of Microbiologists of India, Ind. J. Microbiol.*, p.22, figs. 76-79.

Diagnosis : Body oval, elliptical or sometimes semicircular in shape with several distinct parallel folds, nucleus spherical containing many nucleoli filling the whole space of nucleus.

Distribution : India : West Bengal (South 24-Parganas District); in soil and leaf litter; Uttar Pradesh.

Remarks : Singh and Hanumaiah (1979) erected the genus *Greeffia* and accommodated one of their newly described species *G. soli* under that genus. The characteristic features of the genus *Greeffia* as mentioned by the authors are : i) flattened amoebae whose outline during locomotion nearly fan-shaped, oval, oblong or somewhat elongated; ii) possess thickened pellicle and iii) resting nucleus with Feulgen-negative nucleolus which during mitosis forms 'polar masses' All these features are also found in an earlier described genus *Thecamoeba* Fromentel. The only difference between the two genera as pointed out by Singh and Hanumaiah (1979) is that the resting nucleus of *Greeffia* 'contains several Feulgen-negative nucleoli' whereas resting nucleus of the genus *Thecamoeba* possesses 'single Feulgen-negative nucleolus' This difference can not be considered as sound taxonomic character for establishment of a separate genus (see Bovee *et al.* 1973 for more clarification). Hence, the genus *Greeffia* is treated as the synonym of the genus *Thecamoeba* and *G. soli* as that of *T. soli.*

Basu *et al.* (1987) have reported this species under the name *Greeffia soli* from a sewage ditch at Harinavi, South 24-Parganas, West Bengal.

30. *Thecamoeba striata* (Penard)

1890. *Amoeba striata* Penard, *Mem.Soc.Phys. Genive*, **31**, p.127.

Material examined : 2 exs., Kamarkundu, Hugli district, 3.ix.1968, A.K. Das.

Diagnosis : Outline oval; with several parallel dorsal folds extending far anteriorly; nucleus round with fragmented endosome.

Distribution : India : West Bengal (Calcutta and Hugli districts); in soil and freshwater. First record from India.

Genus *Vannella* Bovee

Key to the species

1(2) Cyst spherical, single-walled with an outer gelatinous layer, maximum dimension 196 µm; reported from soil ..... *V. cutleri*

2(1) Cyst not known, maximum dimension of locomotive form 60 µm, reported from leaf litter in freshwater ..... *V. bengalensis* sp. nov.

31. *Vannella bengalensis* sp. nov.
(Pl. VI)

Diagnosis : Locomotive form flattened, somewhat reniform and at times spatulate, usually broader than long; dimensions of larger forms 50-60 µm; endoplasmic hump distinct, vacuolated, occupying the posterior portion of the body, surrounded anteriorly or laterally by fan-shaped hyaline ectoplasmic veil; nucleus vesicular,more or less oval, 3.5 - 5 µm in dimension; floating from usually with central granular mass and several radiate pseudopodia with pointed end.

Type material : *Holotype* 1 ex., on slide (Reg no. pt. 1360) Barasat, North 24-Parganas, West Bengal, India, 6.xii.1965, A.K. Das, collected from leaf litter in a small fresh water pond with sparse aquatic vegetation. *Paratypes* : 3 exs., on slide (Reg. No. pt 1359), other data as for the holotype.

Remarks : The present species resembles *V. platypoda* only to some extent in general appearance and in the characteristic feature that it attaches well to glass substratum. Both the species have also been found to occur in fresh water and grow out from leaf litter. *V. bengalensis*, however, differs from *V. platypoda* in larger dimension (50-60 µm *vs* 10-25 µm) and that its locomotive form is broader than long (*vs.* longer than broad).

32. *Vennella cutleri* Singh and Hanumaiah

1979. *Vannella cutleri* Singh and Hanumaiah, *Monograph No.1* J. *microbiol.*, p.48, figs. 222-237.

Diagnosis : Outline flabellate with broad flattened hyaline ecotoplasmic veil preceeding raised endoplasmic hump; breadth usually greater than length; cysts single walled, spherical with an outer gelatinous layer; dimention 8.4-196 µm.

Distribution : India : West Bengal (Puruliya); in soil; Gujarat, Maharashtra.

Remarks : Basu et al (*in press*) have collected this species from the grassy soil of Puruliya district, West Bengal. *V. cutleri* has been found to produce cysts in culture (Basu *et al, op. cit.*). But such behaviour has not been found in any other species of *Vannella.*

33. *Vanella* sp.

Material examined : 3 exs., Paikpara (Sahid Colony), Calcutta, 27.xii.1962; 1 ex., Rabindra Sarobar Calcutta, 8.x.1965., R.N. Mukherjee.

Distribution : India : West Bengal (Calcutta).

Remarks : This species was earlier identified and reported from West Bengal by Nair, Das and Mukherjee (1971) under the name *Amoeba radiosa.* But *A. radiosa* is no longer a valid species (Bovee and Jahn, 1973) because radiate state of amoebae (the character on which this species was erected) is almost universal, if naked lobose amoebae are disturbed (*see* Bovee and Jahn, *op. cit.*). *A. radiosa* is thus nothing but a conglomeration of various species of floating or disturbed amoebae.

In light of above findings the slides bearing Registration Nos. pt.849, pt. 912-914 identified and reported earlier as *Amoeba radiosa* (Nair, Das and Mukherjee, 1971) have been critically re-examined and found to be the floating froms of *Vannella* sp. These forms possess rounded central mass with slender, hyaline, radiate and thickly helical pseudopodia. Howerer, from the floating from its specific identification could not be made.

Family PARAMOEBIDAE

Genus *Mayorella*

A few digitiform or mamilliform conical, blunt, hyaline, nonfurcate subpseudopodia of similar lengths, usually produced from a hyaline lobe; amoebae long and rather flattened.

34. *Mayorella vespertilio* (Penard)

1901. Amoeba vespertilio Penard, Rev. Suisse. Zool., **9**, p.237.

Material examined : 2 exs., Botanical Garden, Haora district, 21.ix.. & 27.x.1961, K.N. Nair; 2 exs., Rabindra Sarobar, Calcutta, 6.xii.1965 & 7.i.1966, A.K. Das; 1 ex., Barasat, North 24-Parganas district, 6.x.1965, A.K. Das.

Diagnosis : Small amoeba (52 - 62 µm in diameter), often with short and conical pseudopodia on sides, producing hyaline web between the pseudopodia during active locomoting, number of pseudopodia four to six.

Distribution : India, West Bengal (Calcutta, Haora and North 24-Parganas districts), Rajasthan.

Remarks : This species was reported from Rajasthan by Mahajan (1965) and West Bengal by Nair, Das and Mukherjee (1971) under the name *Amoeba vespertilio* Penard.

35. *Mayorella* sp.

Material examined : 1 ex., Barasat, North 24-Parganas district, 6.x.1965, A.K. Das.

Distribution : India : West Bengal (North 24-parganas district).

Remarks : A floating form of this species was idnetified and reported by Nair, Das and Mukherjee (1971) from West Bengal under the name *Amoeba radiosa* as has been done for *Vanella* sp referred earlier in this paper.

The slide (Reg.No. Pt.848) has been critically examined and reidentified as a floating form of *Mayorella* sp because it possesses hyaline tappering pseudopodia of more or less similar length on a cell mass which is not a regular sphere. From the floating from, however, its specific identification was not possible.

Family ACANTHAMOEBIDAE

This family possesses a single genus, *Acanthamoeba* whose characteristic features are the same as those of its family.

Genus *Acanthamoeba* Volkonsky

Key to the species

1(2) Cysts rounded or spherical and appearing to be single walled, operculum lacking.....*A. glebae*

2(1) Cysts double walled and both the walls clearly visible, operculum present

3(6) Endocysts stellate or polygonal

4(5) Ectocysts circular, gently rippled or smooth, endocyst stellate, with tips of rays approximately at general level of ectocyst .....*A. astronyxis*

5(4) Ectocysts wrinkled, endocyst markedly polygonal or stellate, with tips of rays usually in depression of wrinkled ectocyst .....*A. rhysodes*

6(3) Endocyst more or less rounded or with only slight angles

7(8) Ectocyst slightly wrinkled and closely apposed to endocysts .....*A. palestinensis*

8(7) Ectocyst noticeably wrinkled and pathogenic to mice by nasal installation.....*A. culbertsoni*

36. *Acanthamoeba astronyxis* (Ray and Hayes)

1954. *Hartmannella astronyxis* Ray and Hayes, *J. Morph.*, **95**, p.159, pls.1-9.

Diagnosis : Cysts biconvex, ectocysts more or less circular, endocysts stellate with tips of rays contacting ectocysts approximately in the same plane.

Distribution : India : West Bengal (Hugli, Maldah, Murshidabad and South 24-Parganas districts) in soil and sewage sludge; Gujarat and Uttar Pradesh.

Remarks : Ghosh and Choudhury (1987) isolated *A. astronyxis* strains from the soils of intertidal belts of Sagar Island (South 24-Parganas, West Bengal) facing Bay of Bengal. Basu *et al.* (1987 and *in press*) also reported this species from a sewage ditch at Harinavi, South 24-Parganas and subsequently from the soils of Mayapur (Hugli district), Khagra (Murshidabad district) and English Bazar (Maldah District).

37. *Acanthamoeba culbertsoni* (Singh and Das)

1970. *Hartmannella culbertsoni* Singh and Das, *Phil. Trans. roy. Soc.* (B), **259**, pp.451-455, Figs. 87-98.

Diagnosis : Cysts rounded or oval, ectocyst considerably wrinkled or sometimes circular; endocyst rounded or with slight angles; endocyst in contact with the ectocyst only at the point of eperculum.

Distribution : India : West Bengal (South 24-Parganas district);in soil and sewage sludge. Gujarat, Maharashtra, Uttar Pradesh.

Remarks : Singh and Das (1970) isolated strains of *A. culbertsoni* from the soil collected from four stations of Baroda (Gujarat) - three from different gardens and one from a cultivated field. So far as its occurrence in West Bengal this is to mention that Ghosh and Choudhury (1986) isolated the strains of this species from the soil smaples of 3-5 cm depth of sand silt beds of the 'lowest littoral zone' of the beach of Sagar island (South 24-Parganas) facing the Bay of Bengal. Subsequently Basu *et al (in press)* reported this species from Kakdwip (South 24-Parganas) from the soil of a paddy field. This species is pathogenic to mice by nasal installation.

38. *Acanthamoeba glebae* (Dobell)

1914. *Amoeba glebae* Dobell, *Arch. Protistenk.*, **34**, p.160.

Diagnosis : Cysts rounded or spherical and appearing to be single walled; cyst wall smooth; operculum absent.

Distribution : India : West Bengal (North 24-Parganas district); in soil and freshwater.

Remarks : Basu *et al (in press)* reported this species from the soil of a manured jute field. Mention is to be made here that except the character that *A. glebae* produces acanthopodia (one of the important characteristic features of the genus *Acanthamoeba* as defined by Page, 1967b) it considerably differs from all other congeneric species in the cyst character (another important character of the genus) and mode of excystment.

39. *Acanthamoeba palestinensis* (Reich)

1933. *Mayorella palestinesis* Reich, *Arch. Protisstenk*, **79**, p.76.

Diagnosis : Ectocyst fairly thick, very irregular and wrinkled and closely apposed to endocyst; endocyst similar to that of *A. culbertsoni* and sometimes retaining contact with ectocyst at the points of operculum.

Distribution : India : West Bengal (South 24-Parganas district); in soil and freshwater.

Remarks : Basu *et at* (1987 and *in press*) recorded this species from a sewage ditch at Harinavi and from the soil of Sagar island (South 24-Parganas), West Bengal respectively.

40. *Acanthamoeba rhysodes* (Singh)

1952. *Hartmannella rhysodes* Singh, *Phil Trans. roy. Soc. Lond.*, B, **236**, p.405.

Diagnosis : Endocyst stellate or irregularly polyhedral; ectocyst rippled or wrinkled and loosely applied to endocyst.

Distribution : India : West Bengal (South 24-Parganas and West Dinajpur districts); in soil, mud and sewage sludge; Gujarat, Maharashtra, Uttar Pradesh.

Remarks : Singh and Das (1970) isolated *A. rhysodes* strains from the soils of flower gardens and Gomti river bank, Lucknow (U.P.) and cultivated fields of Baroda (Gujarat). Ghosh, Choudhury and Bhattacharjya (1987) isolated the strains of this species from the soils of intertidal belt of Sagar

island (South 24-Parganas) facing the Bay of Bengal. Subsequently Basu *et al* (1987 and *in press*) reported this species from a sewage ditch at Harinavi (South 24-Parganas) from the soil of a Mango garden in West Dinajpur, West Bengal respectively.

Singh and Das (1970) found this species pathogenic to mice but its pathogenicity is less than that of *A. culbertsoni.*

Family ECHINAMOEBIDAE

Genus ***Echinamoeba*** Page

Short spine-like projections (microspines) usually produced from extensive anterior hyaline zone, but sometimes temporarily absent in rapid locomotion, no eruptive hemispherical pseudopodia.

41. ***Echinamoeba exundans*** (Page)

1967. *Hartmannells exundans* Page, *J. Protozool.*, **14**, p.515, fig. 113.

Diagnosis : Flattened, triangular to elongate and limax-like, with irregular anterior edge; cysts smooth, spherical or ovoid, ectocyst closely apposed to endocyst, occasionally raised at some points.

Distribution : India : West Bengal (South 24-Parganas, Medinipur and Koch Behar districts); in soil, mud and sewage sludge; Gujarat, Maharashtra, Uttar Pradesh.

Remarks : Basu *et al* (1987 and *in press*) reported this species from a sewage ditch at Harinavi and from soils of Digha (Medinipur district) and Brahmanpara (Koch Behar district), West Bengal respectively.

Order SCHIZOPYRENIDA

A single family, Vahlkampfiidae under this order is reprented from this state.

Family VAHLKAMPFIIDAE

Limax amoebae with locomotion by successive eruptive, hyaline, hemispherical waves, often alternating to either side at anterior end, with hyaloplasm sometimes spilling rearward along side, nuclear division promitotic.

Three genera under this family have been reported from West Bengal.

Key to the genera

1(2) Pseudopods eruptive and explosive, locomotion rapid, flagellate stage absent..... ..... ***Vahlkampfia***

2(1) Pseudopods similar to *Vahlkampfia* but flagellate stage present

3(4) Normally biflagellate; flagellate stage without cytostome like opening..... ***Naegleria***

4(3) Quadriflagellate, flagellate stage with cytostome like opening..... ***Tetramitus***

Two species of *Naegleria* and one species each of *Vahlkampfia* and *Tetramitus* have been reported from West Bengal.

Genus ***Vahlkampfia*** Chatton & Lalung-Bonnaire

42. ***Vahlkampfia russelli*** (Singh)

1952. *Schizopyrenus russelli* Singh, *Phil. Trans. roy. Soc. B*, **236**, p. 405.

Diagnosis : Monopodial during active locomotion; cytoplasm with circular and cylindrical refractive granules; nucleus vesicular with central nucleolus; cysts usually spherical or ovoid and double walled; ectocyst widely separated from endocyst except at some points of contact; in some specimens ectocyst wavy.

Distribution : India : West Bengal (Medinipur district); in soil, mud and sewage sludge; Gujarat, Maharashtra, Uttar Pradesh.

Remarks : Singh (1952) described *Schizopyrenus russelli* and erected the genus *Schizopyrenus* under the family Schizopyrenidae to accommodate this species. Amoebae possessing polar masses during nuclear division but not having any flagellate stage were included in the abovesaid genus. But, earlier Calkins (1913) suggested the said characteristic features for the genus *Vahlkampfia*. Page (1967 a, 1976), therefore, rightly included *Schizopyrenus* under *Vahlkampfia*. Mention is to be made here that subsequently Singh and Hanumaiah (1979) have retained the genus *Schizopyrenus* and described a species *S. horticolus* without commenting on Page's revision (1976).

Basu *et al (in press)* have reported this species from the soils of 'Jhau forest' at Digha (Medinipur district), West Bengal under the name *Schizopyrenus russelli*.

Key to the species of ***Naegleria***

1(2) Cysts usually smooth walled, but with thin outer wall separated in strains, several pores containing plugs discernable with light microscope, usually a perinuclear layer of coarse granules present ..... *N. gruberi*

2(1) Cysts smooth-walled, with fairly thick gelatinous layer, distinct plugs not discernible in unstained cysts with light microscope; no perinuclear layer of granules reported .... *N. thortoni*

Genus ***Naegleria*** Alexeieff

43. ***Naegleria gruberi*** (Schardinger)

1899. *Amoeba gruberi* Schardinger, *Sber. Akad. Wiss. Wien*, **108**, p.713.

Diagnosis : Cysts round or slightly oval and smooth-walled; sometimes outer wall with irregular archetecture can be separated; several pores with plugs; flagellate stage easily produced.

Distribution : India : West Bengal (Haora district); in soil, mud and sewage sludge: Gujarat, Maharashtra, Uttar Pradesh.

Remarks : Basu *et al (in press)* reported this species from the soils of a seed farm at Uluberia (Haora district), West Bengal.

44. *Naegleria thortoni* (Singh)

1952. *Didascalus thortoni* Singh, *Phil.Trans. roy.Soc. Lond. B*, **236**, p.405.

Diagnosis : Cysts round, smooth, covered with thick gelatinous outer layer; no distinct plugs visible; flagellate transformation rare.

Distribution : India : West Bengal (South 24-Parganas district); in soil and mud; Uttar Pradesh.

Remarks : Singh (1952) erected the genus *Didascalus* to accommodate his species *D. thotoni*. He separated *Dadascalus* from *Naegleria* on the basis of absence of interzonal bodies during mitosis. But this genus has been synonymised by Page (1967a, 1976) under *Naegleria*. Basu *et al (in press)*, however, reported this species from the soils of some grassy field of Sagar island (South 24-Parganas), West Bengal under the name *Didascalus thortoni*. Singh and Hanumaiah (1979) have also retained the name *D. thortoni* without any comment on Page's revision. In light of discussion made by Bovee and Jahn (1973) Page's revision (1967a, 1976) seems to be justified.

45. *Tetramitus rostratus* (Perty)

1976. *Tetramitus rostratus* (Perty, 1852); Page, *Freshwater Biological assoc., Sci. Publ.*, **34**, p.68, fig. 19.

Material examined : 2 exs., Barrackpur, North 24-Parganas, 31.v.66, K.N. Nair.

Diagnosis : Amoebae sometimes spreading anteriorly, with a distinct rostrum; flagellate with an anteriorly broad cytostomal groove, a distinct rostrum and four equal flagella; cysts spherical or ovoid, with outer wall often slightly raised in one or two places and inner wall smooth.

Distribution : India : West Bengal (Darjiling and North 24-Parganas district); universal in soil, frewhwater and sewage sludge; Uttar Pradesh.

Remarks : This species has been collected from a stagnant fresh water body in Barrackpore (North 24-Parganas district). In this connection it is worth mentioning that Bunting (1926) found this species in the cultures of the coecal contents of rats. Recently Basu *et al (in press)* recorded this species from the soils of tea plantation in Darjiling district West Bengal.

Order PELOBIONTIDA

Only a single family, Pelomyxidae under this order is known from this state.

Family PELOMYXIDAE

Amoebae with thick limax-like form, usually without hyaline cap and with a villous uroid; usually multinucleate.

A single genus with a single species, *Pelomyxa palustris* under this family has been collected so far from this state.

Genus ***Pelomyxa*** Greeff

Large to very large amoebae, moving slowly by fountain streaming or hemispherical eruption of cytoplasm, usually multinucleate, rarely bi - or mono-nucleate.

46. ***Pelomyxa palustris*** Greeff

1874. *Pelomyxa palustris* Greef, *Arch. f. mikr. Anat.*, **10**, p.51, pls. 3-5.

Material examined : 5 exs., Garia, South 24-Parganas, 8.ii.1965, K.N. Nair.

Diagnosis : Amoeba with usually hundreds of nuclei; cytoplasm opaque possessing a lot of assorted type of crystals; no contractile vacuole.

Distribution : India : West Bengal (North 24-Parganas district); in freshwater.

Remarks : Nair, Das and Mukherjee (1971) reported this species from West Bengal for the first time. Specimens encountered in this state are very large and range from 150 μm to 560 μm in length during locomotion.

Order ARCELLINIDA

Three families are dealt with under this order.

Key to the families

1(2) Test thin flexible, expansible and contractile.....COCHLIOPODIIDAE

2(1) Test thin or thick, flexible or rigid but not expansible or contractile

3(4) Test simple and without foreign bodies.....ARCELLIDAE

4(3) Test with foreign bodies.....DIFFLUGIIDAE

Family ARCELLIDAE

Five genera have been dealt with under this family.

Key to the genera

1(6) Test rigid

2(3) Test semispiral in appearance, with curved or vermiform pellets (or with sand grains in single species).....***Lesquereusia***

3(2) Test hemispherical, oval, circular or patelliform but not semispiral and without any pellet or sand grain as stated above

4(5) Test hemispherical, oval or circular with hexagonal markings, aperture circular, central and not covering the entire diameter of the test.....***Arcella***

5(4) Test patelliform, punctate, without any hexagonal markings, aperture circular and covering the entire diameter of the test.....***Pyxidicola***

6(1) Test flexible

7(8) Test discoid, flexible when young, pseudopodia finger like, nucleus single and central.....
.....***Pseudochlamys***

8(7) Test hemispherical or cup-shaped, with a double envelop, pseudopodia few, short, digitate or pointed, nuclei many (upto 100).....***Diplochlamys***

Genus *Arcella* Ehrenburg

Five species of Arcella have so far been found in this state.

Key to the species

1(6) Test hemispherical

2(3) Surface with more or less deep fine 'areoles' ..... *A hemispherica*

3(2) Surface with large 'areoles'

4(5) 'Areoles' serrated on the oral surface while approaching mouth..... *A. gibbosa*

5(4) 'Arcoles' not serrated..... *A. vulgaris*

6(1) Test spherial or pyramidal

7(8) Test spherical, planoconvex in profile ..... *A. discoides*

8(7) Test pyramidal and sometimes angular in fromt view ..... *A. conica*

47. *Arcella conica* (Playfair)

1918. *Arcella costata* var. *conica* Playfair, *Proc. Linn. Soc.*, New South Wales, p.34, figs. 16,17.

Material examined : 3 exs., Champahati, South 24-Parganas, 11.vii.1967, A.K. Das; 2 exs., Bishnupur, Bankura, 25.ix.1984, A.K. Das.

Diagnosis : Test pyramidal, sometimes angular in front view, with holes of 4-8 faces; mouth circular, proportionately small and without buccal tube.

Distribution : India : West Bengal (Bankura and Calcutta districts); in freshwater amongst bottom ooze. First record from West Bengal; Andhara.

48. *Arcella discoides* Ehrenberg

1843. *Arcella discoides* Ehrenberg, *Abh. preuss. Akad, Wiss.*, Berlin, p.139.

Material examined : 2 exs., Barddhaman, 9 & 27.vii.1965, A.K. Das; 2 exs., Kalyani, Nadia, 29.ix.1965. K.N. Nair; 1 ex., Adisaptagram, Hugli, 12.xii.1966, K.N. Nair; 1 ex., Champahati, South 24-Parganas, 11.vii.1967, A.K. Das; 1 ex., Gaur, Maldah, 16.iii.1984, A.K. Das; 2 exs., Tulshihata, Maldah, 19.iii.1984, A.K. Das; 1 ex., Kandi, Murshidabad, 28.iii.1984, A.K. Das; 2 exs., Bakreswar, Birbhum, 6.iv.1984, A.K. Das; 1 ex., Bolpur, Birbhum, 10.iv.1984, A.K. Das; 2 exs., Jhargram, Medinipur, 7.x.1985, & 18.i.1988, N.C. Sarkar; 2 exs., Ghatal, Medinipur, 13.x.1985, & 24.ii.1988, N.C. Sarkar; 1 ex., Tamluk, Medinipur, 11.x.1985, N.C. Sarkar; 1 ex., Durgachak (Haldia), Medinipur, 12.x.1985, N.C. Sarkar; 1 ex., Uluberia, Haora, 15.x.1985, N.C. Sarkar; 1 ex., Jalpaiguri town, 21.iii.1986, A.K. Das; 2 exs., Maynaguir, Jalpaiguri, 24.iii.1986, A.K. Das; 3 exs., Koch Behar town; 10.iv.1986, A.K. Das; 2 exs., Haldibari, Koch Behar, 28.iii.1986, A.K. Das; 2 exs., Mathabhanga, Koch Behar, 13.iv.1986, A.K. Das; 2 exs., Simlapal, Bankura, 27.ix.1986, A.K. Das; 2 exs., Puruliya town, 1.x.1986, A.K. Das; 1 ex., Balarampur, Puruliya, 2.x.1986, A.K. Das; 1 ex., Raigunj, West Dinajpur, 29.x.1987, A.K. Das; 1 ex., Hilli, West Dinajpur, 30.x.1987, A.K. Das; 1 ex., Belda, Medinipur, 18.i.1988, N.C. Sarkar.

Diagnosis : Test spherical, planoconvex in profile and circular in front view; height of the dome about one-fourth to one-third of the diameter of the test.

Distribution : India : West Bengal (Bankura, Birbhum, Barddhaman, Koch Behar, Hugli, Haora, Jalpaiguri, Maldah, Medinipur, Murshidabad, Nadia, Puruliya, South 24-Parganas and West Dinajpur districts); in freshwater amongst bottom ooze.

Remarks : Nair, Das and Mukherjee (1971) recorded this species for the first time from West Bengal. This species is very common in West Bengal waters.

49. *Arcella gibbosa* Penard

1890. *Arcella gibbosa* Penard, *Mem, Soc. Phys. Geneve*, **31**(2), p.155, pl.5, figs. 96-99, pl.6, figs. 1.

Material examined : 2 exs., Jagannathpur, Falta, South 24-Parganas, 11.vii.1967, K.N. Nair; 1 ex., Hilli, West Dinajpur, 30.x.1987, A.K. Das.

Diagnosis : Test almost hemispherical; oral face with a charateristic s-shaped curvature, surface with a large regular 'areoles' being smaller and serrated on the oral surface while approaching mouth.

Distribution : India : West Bengal (South 24-Parganas West Dinajpur); in freshwater amongst submerged vegetation; Andhra.

Remarks : Nair, Das and Mukherjee (1971) reported this species from West Bengal for the first time.

50. *Arcella hemispherica* Perty

1852. *Arcella hamispherica* Perty, *Zur kenntnis Kleinster Lebensformen*, Bern., p. 9, fig. 5.

Material examined : 2 exs., Gocharan, South 24-Parganas, 21.viii.1967, K.N. Nair; 3 exs., Tuffangung, Koch Bihar, 13.iv.1986, A.K. Das; 1 ex., Meghia, Bankura, 28.ix.1986. A.K. Das.

Diagnosis : Test distinctly hemispherical and circular in front view; surface with more or less fine 'areoles'; mouth without or with short buccal tube.

Distribution : India : West Bengal (Bankura, Koch Bihar and South 24-Parganas districts); in freshwater amongst submerged vegetation and bottom ooze; Andhra, Orissa.

51. *Arcella vulgaris* Ehrenberg

1832. *Areella vulgaris* Ehrenberg, *Abh. K. Acad. Wis.*, Berlin, p.40 pl.1, fig. 6.

Material examined : 1 ex., Diamond Harbour, South 24-Parganas, 10.viii.1964, K.N. Nair; 2 exs., Barddhaman, 12.xi.1965, A.K. Das; 1 ex., Adisaptagram, Hugli, 5.i.1967, K.N. Nair; 6 exs., Jagannathpur (Falta), South 24-Parganas 11.vi. & 31.ix.1967, K.N. Nair; 2 exs., Gopalnagar (Lakshmikantapur), South 24-Parganas, 2.xi.1966, K.N. Nair; 1 ex., Gaur, Maldah, 16.iii.1984, A.K. Das; 2 exs., Tulshihata, Maldah, 19.iii.1984, A.K. Das; 2 exs., Laldighi, Baharampur, Murshidabad, 25.iii.1984, A.K. Das; 1 ex., Kandi, Murshidabad, 28.iii.1984, A.K. Das; 2 exs., Sainthia, Birbhum, 3.iv.1984, A.K. Das; 2 exs., Maynaguir, Jalpaiguri, 24.iii. 1984, A.K. Das; 2 exs., Koch Bihar town, 10.iv.1984; A.K. Das; 1 ex., Satmail (Contai), Medinipur, 6.x.1985, N.C.

Sarkar; 1 ex., Panskura, Medinipur, 9.x.1985, N.C. Sarkar; 2 exs., Simlapal, Bankura, 27.ix.1986, A.K. Das; 1 ex., Meghia, Bankura, 28.ix.1986, A.K. Das; 2 exs., Islampur, West Dinajpur, 31.x.1987, A.K. Das; 1 ex., Belda, Medinipur, 18.i.1988, N.C. Sarkar.

Diagnosis : Test hemispherical, evenly convex and its height about 1/2 of its diameter; surface with very large 'areoles', mouth circular, central and often without buccal tube.

Distribution : India : West Bengal (Birbhum, Barddhaman, Hugli, Koch Bihar, Maldah, Medinipur, Murshidabad, South 24-Parganas and West Dinajpur districts); in freshwater amongst bottom ooze and submerged vegetation.

Remarks : Nair, Das and Mukherjee (1971) reported the occurrence of some specimens, the tests of which were similar to those of var. *angulosa* and forma *undulatum* of the species *A. vulgaris*. This species is common in West Bengal waters.

Genus ***Diplochlamys*** Greef

52. ***Diplochlamys leidyi*** Greef

1966. *Diplochlamys leidyi* Greef; Kudo, *Protozoology*, pp.576-577, fig. 205 i.

Material examined : 2 exs., Gocharan, South 24-Parganas, 28.vii.1967, K.N. Nair; 5 exs., Maidan tank, Calcutta, 14.x.1967, K.N. Nair.

Diagnosis : Test hemispherical, covered by double membrance, outer one rigid and brown while inner one delicate, gray and inverted funnel-shaped in distented condition; aperture of outer membrane circular and that of inner membrane oviform with a neck like constriction below and a slightly expanded collar above.

Distribution : India : West Bengal (Calcutta and South 24-Parganas districts).

Remarks : Nair and Mukherjee (1968) have reported this species for the first time from West Bengal. They collected the specimens from the mosses intermixed with lichens on banyan tree at Calcutta. This species has also been collected from freshwater amongst bottom ooze from the localities shown in the *Material examined* column.

Genus ***Lesquereusia*** Schlumberger

Key to the species

1(2) Test encrusted with quartz crystals ..... *L. modesta*

2(1) Test composed of vermiform pellets arranged very closely ..... *L. spiralis*

53. ***Lesquereusia modesta*** Rhumbler

1895. *Lesquereusia modesta* Rhumbler, *Zeits. Wiss. Zool.*, **61**(1), p.101, pl.4, fig. 2.

Material examined : 1 ex., Barrackpur, North 24-Parganas, 25.i.1967, A.K. Das; 1 ex., Simurali, Nadia, 14.xi.1967, K.N. Nair; 1 ex., Jalpaiguri town, 21.iii.1986, A.K. Das; 1 ex., Belda, Medinipur, 18.i.1988, N.C. Sarkar.

Diagnosis : Test opaque, hemispherical in appearance and encrusted with quartz crystals.

Distribution : India : West Bengal (Jalpaiguri, Medinipur, Nadia, North and South 24-Parganas districts); in freshwater amongst bottom ooze.

Remarks : Nair, Das and Mukherjee (1971) reported this species for the first time from West Bengal.

54. ***Lesquereusia spiralis*** (Ehrenberg)

1840. *Difflugia spiralis* Ehrenberg, *Monatsb. Akad. Wiss.*, Berlin, p.199.

Material examined : 5 exs., Diamond Harbour, South 24-Parganas, 10.vii.1964, K.N. Nair and P. Parui; 9 exs., Kalyani, Nadia, 14.ix. & 7.xii.1964, K.N. Nair; 3 exs., Barrackpur, North 24-Parganas, 15.i.1967, A.K. Das; 1 ex., Jarda river, Maynaguri, Jalpaiguri, 24.iii.1986, A.K. Das; 1 ex., Belda, Medinipur, 18.i.1988, N.C. Sarkar.

Diagnosis : Test transparent, hemispherical and composed of closely arranged vermiform pellets.

Distribution : India : West Bengal (Jalpaiguri, Medinipur, Nadia, North 24-Parganan and South 24-Parganas districts); in freshwater amongst bottom ooze; Andhra.

Remarks : This species has already been reported from West Bengal by Nair, Das and Mukherjee (1971).

Genus ***Pseudochlamys*** Claparede and Lachmann

55. ***Pseudochlamys patella*** Claparede and Lachmann

1966. *Pseudochlamys patella* Claparede and Lachman; Kudo, *Protozoology*, p.572, Fig. 204c.

Material examined : 5 exs., Champahati, South 24-parganas, 11.vii.1967, K.N. Nair.

Diagnosis : Test hyaline when young but rigid and brown when old; a short finger like pseudopodium between folds.

Distribution : India : West Bengal (South 24-Parganas); in freshwater amongst vegetation.

Genus ***Pyxidicola*** Ehrenberg

56. ***Pyxidicola operculata*** (Agardh)

1966. *Pyxidicola operculata* (Agardh); Kudo, *Protozoology*, pp.571-572, Fig. 204, a-b.

Material examined : 1 ex., Gocharan, South 24-Parganas, 12.viii.1967, K.N. Nair; 3 exs., Kamarkundu, Hugli, 3.ix.1968, A.K. Das; 1 ex., Belmuri, Hugli, 10.x.1968, K.N. Nair.

Diagnosis : Test smooth, colourless to brown; nucleus single and vesicular; pseudopodia short, lobose or digitate.

Distribution : India : West Bengal (Hugli and South 24-Parganas districts); in freshwater amongst vegetation.

Family COCHLIOPODIDAE

Under this family a single genus, *Cochliopodium* is known so far from this state.

Genus *Cochliopodium* Hertwig and Lesser

Central or post central granular mass surrounded by a thin hyaloplasmic veil when in locomotion; spherical or bell shaped when inactive; flexible closely adherent tectum on dorsal surface often appearing as double lined layer when seen on the hump in side view.

57. *Cochliopodium bilimbosum* (Auerbach)

1976. *Cochliopodium bilimbosum* (Auerbach); Page, *Freshwater Biological Association,* Cambridge, *Scientific Publication,* 34, p.80. fig.25. A-B.

Material examined : 2 exs., Champahati, South 24-Parganas, 11.vii.1967, A.K. Das; 2 exs., Simurali, Nadia, 14.xi.1967, A.K. Das.

Diagnosis : Distinct tubular configuration of tectum around pseudopodial bases of floating form; scales clearly visible in light microscope; pseudopodia sometimes furcate and often produced from anterior margin.

Distribution : India : West Bengal (Nadia and South 24-Parganas districts); in freshwater and sewage sludge.

Family DIFFLUGIIDAE

Under this family six genera are reported/collected so far from West Bengal.

Key to the genera

1(2) Test composed of cemented quartz sand, diatomes and other foreign bodies, aperture terminal, pseudopodia cylindrical, simple or branching ..... ***Difflugia***

2(1) Test usually with sand grains and sometimes with diatomes and occasionally with quartz crystals, pseudopodia digitate or sharply pointed

3(4) Aperture eccentric ..... ***Centropyxis***

4(3) Aperture terminal

5(6) Aperture surrounded by a four-lobed annular collar ..... ***Cucurbitella***

6(5) Aperture not surrounded by any annular collar

7(8) Pseudopodia sharply pointed and radiating ..... ***Phryganella***

8(7) Pseudopodia digitate or branching

9(10) Test oval, compressed, surface covered with scales of various size and shape, aperture truncate. ..... ***Heliopera***

10(9) Test broadly hemispherical to ovoid, not covered by any scale, aperture linear or lunate ..... ***Plagiopyxis***

Genus *Centropyxis* Stein

Key to the species

1(12) Test swollen at posteiror part, oral aperture not exactly centrally located

2(5) Test beset with spines

3(4) Oral aperture usually circular, spines few and resembling scrap or strap ..... *C. aculeata*

4(3) Oral aperture irregularly circular with invaginated borders, spines many and frequently curved..... *C. spinosa*

5(2) Test without spines

6(9) Oral aperture circular or round

7(8) Test more or less elliptical, discoid or oval in ventral view, mature shell large, with dimensions 195-267 µm × 85-102 µm..... *C. ecornis*

8(7) Test circular in ventral view, mature shell small, 65-70 um ..... *C. minuta*

9(6) Oral aperture semicircular

10(11) Test elliptical in ventral view, with widely rounded posterior part..... *C. cassis*

11(10) Test oval in ventral view, with spheroidal or little elliptical posterior part ..... *C. aerophila*

12(1) Test regularly arched, oral aperture centrally located

13(14) Test hemispherical, brown, covered with small flat scales, 100-110 µm in diameter..... ..... *C. arcelloides*

14(13) Test nearly hemispherical formed of flat sandy particles, clothed in a chitinoid colourless marix, 300-400 µm in diameter..... *C. penardi*

58. *Centropyxis aculeata* (Ehrenberg)

1832. *Arcella aculeata* Ehrenberg, *Abh. preuss. Akad. Wiss.*, Berlin, p.40.

Material examined : 1 ex., Diamond Harbour, South 24-Parganas, 14.viii.1964, K.N. Nair; 6 exs., Bandel, Hugli, 27.viii. & 19.xi.1964, K.N. Nair; 2 exs., Garia, South 24-Parganas, 8.ii.1965, K.N. Nair; 2 exs., Barddhaman town, 7.viii.1968, R.N. Mukherjee; 4 exs., Barasat, North 24-Parganas, 6.xii.1965, R.N. Mukherjee; 1 ex., Naihati, North 24-Parganas, 17.x.1966, K.N. Nair; 1 ex., Naihati, 3.xii. 1968, A A.K. Das; 2 exs., Gaur, Maldah, 16.iii.1984, A.K. Das; 1 ex., Harishchandrapur, Maldah, 19.iii.1984, A.K. Das; 2 exs., Tulshihata, Maldah, 19.iii.1984, A.K. Das; 1 ex., Laldighi, Baharampur (Murshidabad), 25.iii.1984, A.K. Das; 1 ex., Sainthia, Birbhum, 4.iii.1984, A.K. Das; 1 ex., Bakreshwar, Birbhum, 6.iv.1984, A.K. Das; 1 ex., Bolpur, Birbhum, 10.iv.1984, A.K. Das; 4 exs., Malbazar, Jalpaiguri, 22.iii.1968, A.K. Das; 2 exs., Maynaguri, Jalpaiguri, 24.iii.1968, A.K. Das; 2 exs., Koch Bihar town, 10.iv.1986, A.K. Das; 1 ex., Dinhata, Koch Bihar, 11.iv.1986, A.K. Das; 2 exs., Bishnupur, Bankura, 25.ix.1986, A.K. Das; 1 ex., Meghia, Bankura, 28.ix.1986, A.K. Das; 1 ex., Raigunj, West Dinajpur, 29.x.1987, A.K. Das; 1 ex., Hilli, West Dinajpur, 30.x.1987, A.K. Das; 1 ex., Islampur, West Dinajpur, 31.x.1987, A.K. Das; 1 ex., Belda, Mednipur, 18.i.1988, A.K. Das; 1 ex., Jhargram, Medinipur, 28.i.1988, A.K. Das.

Diagnosis : Test usually with quartz crystals and sometimes with admixture of diatomes, fistules and sand particles; spines few and usually resembling a scrap; oral aperture usually circular.

Distribution : India : West Bengal (Bankura, Barddhaman, Birbhum, Hugli, Koch Bihar, Maldah, Medinipur, Murshidabad, North and South 24-Parganas and West Dinajpur districts); in freshwater pond amongst vegetation. Andhra, Rajasthan, Sikkim, Himalayas.

Remarks : Nair, Das and Mukherjee (1971) reported this species for the first time from West Bengal.

59. *Centropyxis aerophila* Deflandre

1929. *Centropyxis aerophila* Deflandre, *Arch. Protistenk.*, Jena, **67**, p.330. figs. 11-21.

Material examined : 4 exs., Gocharan, South 24-Parganas, 21.viii.1967, K.N. Nair; 3 exs., Bankura town, 24.ix.1986, A.K. Das; 2 exs., Belghoria, North 24-Parganas, 11.ix.1986, N.C. Sarkar.

Diagnosis : Test with spheroidal posterior portion and its dorsal face very much flattened towards mouth; in ventral view test ovoidal; oral aperture semicircular.

Distribution : India : West Bengal (Bankura, North and South 24-Parganas districts); very common in wall and tree mosses.

Remarks : In many occasions tests of *C. aerophila* have been found to be adhered with vegetable fragments and transparent crystals.

60. *Centropyxis arcelloides* Penard

1902. *Centropyxis arcelloides* Penard, *Faune Rhiz. du bass. du Leman,* p. 309, Fig. 1-4.

Material examined : 1 ex., Jhalda, Puruliya, 2.x.1986, A.K. Das.

Diagnosis : Test hemispherical, brown, chitinous, covered with flat scales; oral aperture very wide, centrally located, diameter of which about half of that of the test.

Distribution : India : West Bengal (Puruliya district); from the bottom ooze of a freshwater pond. First report from India.

61. *Centropyxis cassis* (Wallich)

1864. *Difflugia cassis* Wallich (?), *Ann. Mag. nat. Hist.*, **13**.

Material examined : 5 exs., Calcutta, 14.viii & 14.xi.1964 & 14.v. & 18.v.1967, K.N. Nair; 2 exs., Simurali, Nadia, 14.xi.1967, K.N. Nair.

Diagnosis : In general form test quite analogous to that of *C. aerophila*; in ventral view test elliptical and widely rounded at the posterior part; oral aperture semicircular; oral margin usually provided with well oriented thicker pebbles.

Distribution : India : West Bengal (Calcutta and Nadia districts); in moss, soil and freshwater; Andhra, Orissa.

62. *Centropyxis ecornis* (Ehrenberg)

1843. *Arcella ecornis* Ehrenberg, *Abh. preuss. Akad, Wiss.*, Berlin, p. 368, pl. 1, fig. 9, pl. 3, fig. 46.

Material examined : 1 ex., Lakshmikantapur, South 24-Parganas, 31.viii.1964, K.N. Nair; 4 exs., Konnagar, Hugli, 3.x.1967, A.K. Das; 1 ex., Tulshihata, Maldah, 19.iii.1984, A.K. Das; 2 exs., Laldighi (Baharampur), Murshidabad, 25.iii.1984, A.K. Das; 1 ex., Sainthia, Birbhum,

4.iii.1984, A.K. Das; 2 exs., Dhupguri, Jalpaiguri, 22.iii.1986, A.K. Das; 3 exs., Haldibari, Koch Bihar, 12.iii.1986, A.K. Das; 1 ex., Tuffangunj, Koch Bihar, 12.iv.1986, A.K. Das; 2 exs., Bankura town, 24.ix.1986, A.K. Das; 1 ex., Bishnupur, Bankura, 25.ix.1986, A.K. Das; 2 exs., Simlapal, Bankura, 27.ix.1986, A.K. Das; 2 exs., Meghia, Bankura, 28.ix.1986, A.K. Das; 1 ex., Puruliya town, 1.x.1986, A.K. Das; 2 exs., Balarampur, Puruliya & 1 ex., Jhalda, Puruliya, 2.x.1986, A.K. Das; 1 ex., Raigunj, West Dinajpur, 29.x.1987, A.K. Das; 2 exs., Hilli, West Dinajpur, 30.x.1987, A.K. Das; 1 ex., Islampur, West Dinajpur, 31.x.1987, A.K. Das; 1 ex., Belda, Medinipur, 18.i.1988, A.K. Das; 2 exs., Jhargram, Medinipur, 28.i.1988, A.K. Das.

Diagnosis : Nature and texture of the test analogous to *C. minuta* but spine lakcing; oral aperture circular.

Distribution : India : West Bengal (Bankura, Birbhum, Hugli, Koch Bihar, Jalpaiguri, Maldah, Medinipur, Murshidabad, Puruliya, South 24-Parganas and West Dinajpur districts); in freshwater amongst vegetation and in bottom ooze; Sikkim Himalayas.

63. *Centropyxis minuta* Deflandre

1929. *Centropyxis minuta* Deflandre, *Arch. Protistenk,* Jena, **67**, p.366, figs. 148-152.

Material examined : 4 exs., Simurali, Nadia, 14.xi.1967, K.N. Nair; 2 exs., Bankura town, 24.ix.1986, A.K. Das; 3 exs., Calcutta, 9.viii.1988, A.K. Das; 2 exs., Belghoria, North 24-Parganas, 26.x.1988, N.C. Sarkar.

Diagnosis : Test circular in ventral view and subspehrical in lateral view; size minute (local specimens 65-70 μm in diameter), oral apperture circular.

Distribution : India : West Bengal (Bankura, Calcutta, Nadia, North 24-Parganas districts); in ground and wall moss and also in freshwater.

Remarks : Nair and Mukherjee (1968) collected this species from ground moss of Nadia district, West Bengal. Subsequently Guru and Das (1983) reported this species from the soils of Orissa. The present authors could collect this species from the ground and wall moss in Calcutta, North 24-Parganas and Bankura districts of West Bengal.

This species closely resembles the immature form of *C. ecornis*. But careful observation would reveal that it considerably differs in ventral view as mentioned in the key to the species and usual habitat of *C. minuta* is ground moss or soil whereas that of *C. ecornis* is freshwater.

64. *Centropyxis penardi* Deflandre

1929. *Centropyxis penardi,* Deflandre, *Arch. Protistenk.,* Jena, **67**, p.368, figs. 159, 160.

Material examined : 2 exs., Simlapal, Bankura, 27.ix.1986, A.K. Das; 1 ex., Meghia, Bankura, 28.ix.1986, A.K. Das.

Diagnosis : Test nearly hemispherical formed of small flat sandy particles covered with colourless chitinoid matrix; oral aperture centrally located, occupying more than half of the diameter of the shell.

Distribution : India : West Bengal (Bankura district); in the bottom ooze of freshwater ponds. First report from India.

65. *Centropyxis spinosa* (Cash and Hopkinson)

1905. *Centropyxis aculeata* var. *spinosa* Cash and Hopkinson, *The british Freshwater Rhiz. & Heliozoa*, **1**, p.135, pl.16, Fig.15 & Text. fig.28.

Material examined : 1 ex., Garia, South 24-Parganas, 5.x.1964, K.N. Nair; 1 ex., Barddhaman town, 9.viii.1965, R.N. Mukherjee; 1 ex., Adisaptagram Hugli, 5.i.1967, K.N. Nair; 1 ex., Barasat, North 24-Parganas, 28.ii.1967, A.K. Das; 2 exs., Jalpaiguri town, 21.iii.1986, A.K. Das; 2 exs., Haldibari, Koch Bihar, 28.iii.1986, A.K. Das; 2 exs., Koch Bihar town, 10.iv.1986, A.K. Das; 3 exs., Bankura town, 24.ix.1986, A.K. Das; 1 ex., Bishnupur, Bankura, 25.ix.1986, A.K. Das; 1 ex., Balarampur, Puruliya & 1 ex., Jhalda, Puruliya, 2.x.1986, A.K. Das; 2 exs., Raigunj, West Dinajpur, 29.x.1987, A.K. Das; 2 exs., Hilli, West Dinajpur, 30.x.1987, A.K. Das; 1 ex., Islampur, West Dinajpur, 31.x.1987, A.K. Das; 1 ex., Belda, Medinipur, 18.i.1988, N.C. Sarkar; 1 ex., Birsingha (Ghatal), Medinipur, 24.i.1988, A.K. Das.

Diagnosis : Test chitinous with few quartz crystals or diatom fistules; spines six to eight in number and frequently curved; oral aperture irregularly circular with invaginated borders.

Distribution : India : West Bengal (Bankura, Barddhaman, Hugli, Koch Bihar, Jalpaiguri, Medinipur, North 24-Parganas, Puruliya, Sourh 24-Parganas and West Dinajpur districts); in freshwater among vegetation and in bottom ooze.

Remarks : This species is very common in the bottom ooze of freshwater bodies of West Bengal and closely resembles *C. aculeata* which is also common in the same habitat. These two species, however, differs from each other in the shape of oral aperture and nature of spines; it is sometimes very difficult to isolate them particularly when the specimens are collected from the water samples kept for long in the laboratory.

Genus *Cucurbitella* Penard

66. *Cucurbitella mespiliformis* Penard

1966. *Cucurbitella mespiliformis* Penard, Kudo, *Protozoology*, p. 579, fig. 206 i.

Material examined : 2 exs., Chandkhali (Taldi), South 24-Parganas, 5.xi.1968, K.N. Nair.

Diagnosis : Test ovoid with sand grains, not compressed; oral aperture terminal, circular and surrounded by a four-lobed annular collar.

Distribution : India : West Bengal (South 24-Parganas district); in freshwater in the bottom ooze. First report from India.

Genus *Difflugia* Leclerc

Key to the species

1(22) Test without collar

2(9) Test terminated by one or more 'horn' like extention

3(4) Test adhered with diatom fistules.....*D. bacillariarum*

4(3) Test not adhered with diatom fistules

5(8) Test cylindrical with a single pointed tubular extension at the base

6(7) Pointed extension of the base usually straight, quartz crystals of the test big and some of them projecting out of the margin of the test.....*D. acuminata*

7(6) Pointed extension of the base curved and test more or less transparent .....*D. cuvicaulis*

8(5) Test pear-shaped with usually one but occasionally three pointed tubular extensions near the base.....*D. elegans*

9(2) Test not terminated by any spinous structure or 'horn'

10(13) Pseudostome normally quadrilobed in the form of a cross but very often trilobed

11(12) Test hemispherical with a slightly concave base and covered with sandy and muddy particles. .....*D. arcula*

12(11) Test ovoidal, without any concave base and covered with angular quartz particles..... .....*D. lobostoma*

13(10) Pseudostome circular

14(19) Test hemispherical, ovoidal or ovoid globular

15(16) Test hemispherical.....*D. globulus*

16(15) Test not hemispherical

17(18) Test ovoidal.....*D. globularis*

18(17) Test ovoid-globular.....*D. globulosa*

19(14) Test pyriform or oblong

20(21) Test typically pyriform with smooth margins and small angular quartz crystals..... .....*D. pyriformis*

21(20) Test chracteristically oblong with smooth margins and big angular quartz crystals..... .....*D. oblonga*

22(1) Test with collar

23(28) Test bearing many disc-shaped protruberances or tubercals

24(25) Pseudostome hexagonal, test ovoidal.....*D. tuberculata*

25(24) Pseudostome usually 3-lobed, occasionally 4-lobed

26(27) Test spherical with protruberances of feeble amplitude.....*D. muriformes*

27(26) Test subcylindrical with prominent protruberances.....*D. muriculata*

28(23) Test without bearing any protruberances

29(32) Margin of collar around pseudostome recurved or rolled towards exterior

30(31) Test ovoidal, base of the test sometimes provided with 2 or 3 'horn' like projection ....*D. amphoralis*

31(30) Test spherical or ovoido-spherical and never provided with any 'horn' like projection .... *D. urceolata*

32(29) Margin of collar never recurved towards exterior or interior

33(46) Test with short collar or straight pad

34(41) Pseudostome circular or oval

35(36) Test fusiform with base gradually terminating to horn-like structure ..... *D. acutissima*

36(35) Test spherical, subspherical, ovoid or subglobose without any 'horn' like extension at the base

37(38) Test elongate to ovoidal with a 'ogivale' base..... *D. difficilis*

38(37) Test spherical to subglobose with rounded base

39(40) Test spherical or subspherical and covered with irregular mineral scales or diatome .... *D. brevicolla*

40(39) Test spherical to subglobose and covered with well arranged stony particles..... *D. lithophila*

41(34) Pseudostome lobed or crenulated

42(43) Pseudostome crenulated, crenulation varying from 10-12 in number..... *D. corona*

43(42) Pseudostome lobed but not crenulated

44(45) Pseudostome trilobed..... *D. gramen*

45(44) Pseudostome characteristically 5 - lobed ..... *D. lismorensis*

46(33) Test with long collar formed by flanks which initially converging and then becoming parallel..... *D. capreolata*

67. *Difflugia acuminata* Ehrenberg

1838. *Diffugia acuminata* Ehrenberg, *Infustionsthierchen,* p.131, pl.9, fig.3.

Material examined : 1 ex., Patipukur, Calcutta, 21.iv.1964, K.N. Nair; 7 exs., Diamond Harbour, South 24-Parganas, 10.viii & 9.ix.1964, K.N. Nair; 6 exs., Ghoshpara (Kalyani), Nadia, 14.iv.1964, K.N. Nair; 2 exs., Adisaptagram, Hugli, 5.i.1967, K.N. Nair; 2 exs., Harishchandrapur, Maldah, 19.iii.1984, A.K. Das; 1 ex., Laldighi (Baharampur), Murshidabad, 25.iii.1984, A.K. Das; 2 exs., Bolpur, Birbhum, 6.iv.1984, A.K. Das; 1 ex., Hilli, West Dinajpur, 30.x.1987, A.K. Das; 1 ex., Islampur, West Dinajpur, 31.x.1987, A.K. Das; 2 exs., Kaliagunj, West Dinajpur, 1.xi.1987, A.K. Das; 1 ex., Belda, Medinipur, 18.i.1988, N.C. Sarkar.

Diagnosis : Test cylindrical, without any collar and with pointed 'horn' like extension at the base; spine straight and differentiated from the base; quartz crystals of the test big and some of them projecting out of the margin of the test giving an irregular appearence of test margins.

Distribution : India : West Bengal (Birbhum, Calcutta, Hulgi, Maldah, Medinipur, Murshidabad, Nadia, South 24-Parganas and West Dinajpur districts); in bottom ooze of freshwater ponds; Andhra.

68. ***Difflugia acutissima*** Deflandre

1931. *Difflugia acutissima* Deflandre, *Ann. Protistologie*, **3**, p.84, pl.12, 1-3,fig. 40a-d.

Material examined : 1 ex., Jhalda, Puruliya, 2.x.1986, A.K. Das.

Diagnosis : Test fusiform with slight indication of collar; base gradually terminating to a 'horn' like structure, 'horn' not differentiated from the base; pseudostome circular; quartz crystals of the test small.

Distribution : India : West Bengal (Puruliya district); in bottom ooze of a freshwater pond. First report form India.

69. ***Difflugia amphoralis*** Hopkinson

1958. *Difflugia amphoralis* Hopkinson; Gauthier-Lievre & Thomas, *Arch. Protistink*, Jena, **103**, p.303, Fig. 29.

Material examined : 1 ex., Haldibari, Koch Bihar, 28.iii.1986, A.K. Das; 1 ex., Raigunj, West Dinajpur, 29.x.1987, A.K. Das.

Diagnosis : Test ovoidal, pseudostome wide, collar rolled towards exterior; base of the test provided with two or three spines.

Distribution : India : West Bengal (Koch Bihar and West Dinajpur districts); in freshwater among vegetation and in bottom ooze. First record from India.

Remarks : The local specimens are quite similar to *D. amphoralis* var. *cornuta* described by Gauthier - Lievre and Thomas (1958) from Ivory Coast, Africa.

70. ***Difflugia arcula*** Leidy

1879. *Difflugia arcula* Leidy, *Freshwater Rhizopods of North America*, p.116, pl. 16, Figs. 30.31.

Material examined : 1 ex., Shibpur, Haora, 3.ix.1959, K.N. Nair.

Diagnosis : Test hemispherical, with slightly concave base and regularly arched crown; mouth irregularly trilobed, roughtly quadrangular or even triangular; test encrusted with fine sandy and muddy particles.

Distribution : India : West Bengal (Haora districts); in freshwater amongst bottom ooze; Sikkim Himalayas.

71. ***Difflugia bacillariarum*** Perty

1958. *Difflugia bacillariarum* Perty; Gauthier Lievre & Thomas, *Arch. Protistenk.*, Jena, **103**, p. 327, Fig. 45 b,c.

Material examined : 6 exs., Makalpur (Belmuri), Hugli, 10.x.1968, K.N. Nair.

Diagnosis : Test top-shaped, ovoid globular; its base provided with an elongated axial spine; both test and spine thickly encrusted with frustules of diatomes, some of which may extend beyond the margin; pseudostome circular.

Distribution : India : West Bengal (Hugli district); in freshwater among vegetation and bottom ooze. First record from India.

72. *Difflugia brevicolla* Cash

1909. *Difflugia brevicolla* Cash, *The British Freshwater Rhizopod and Heliozoa*, **2**, p.38, pl.19, Fig. 12-13.

Material examined : 2 exs., Makalpur (Belmuri), Hugli, 10.x.1968, K.N. Nair; 1 ex., Belda, Medinipur, 18.i.1988, N.C. Sarkar.

Diagnosis : Test spherical or subspherical, with short but distinct collar; pseudostome circular, test chitinoid and covered by irregular mineral scales or diatomes.

Distribution : India : West Bengal (Hugli and Medinipur districts); in freshwater from the bottom ooze. First report from India.

73. *Difflugia capreolata* Penard

1902. *Difflugia capreolata* Penard, *Fauna rhizopodique du bassin du Leman.*, Geneve, p.222, Fig. 1 & 4, p.228.

Material examined : 1 ex., Bandel, Hugli, 7.xi.1964, K.N. Nair; 2 exs., Kalyani, Nadia, 29.ix. & 7.xii.1964, K.N. Nair; 1 ex., Adisaptagram, Hugli, 5.i.1967, K.N. Nair; 1 ex., Chinsura, Hugli, 5.xi.1969, A.K. Das; 1 ex., Simlapal, Bankura, 27.ix.1986, A.K. Das.

Diagnosis : Test resembling a flower vase, with broad and short collar; submedian region preceeding collar constricted; collar first swelling up and then constricted near pseudostome; pseudostome circular; its diameter almost equal to that fo the constiicted part below the collar; chitinoid test covered by a row of small regular stones.

Distribution : India : West Bengal (Bankura, Hugli and Nadia districts); in freshwater amongst bottom ooze. First report from India.

74. *Difflugia corona* Wallich

1864. *Difflugia corona* Wallich, *Ann. Mag. nat. Hist.* (3) **13**, p.244, pl.15, figs. 4 b,c, pl.16, figs. 19,20.

Material examined : 5 exs., Monohar Das tadak, Calcutta, 8.x. & 14.x.1963, K.N. Nair; 1 ex., Diamond Harbour, South 24-Parganas, 10.viii.1964, K.N. Nair & P. Parui; 1 ex., Barddhaman town, 7.viii.1965, R.N. Mukherjee; 6 exs., Kalyani, Nadia, K.N. Nair & P. Parui; 2 exs., Barasat, North 24-Parganas, 6.xii.1965, R.N. Mukherjee; 1 ex., Naihati, North 24-Parganas, 17.x.1966, A.K. Das; 2 exs., Kandi, Murshidabad, 28.iii.1984, A.K. Das; 1 ex., Giagunj, Murshidabad, 29.iii.1984, A.K. Das; 1 ex., Bakreshwar, Birbhum, 6.iv.1984, A.K. Das; 1 ex., Koch Bihar town, 10.iv.1986, A.K. Das; 1 ex., Raigunj, West Dinajpur, 29.x.1987, A.K. Das; 1 ex., Hilli, West Dinajpur, 30.x.1987, A.K. Das.

Diagnosis : Test more or less spherical, slightly narrow near pseudostome but widened at the base with the presence of 5 - 10 spines; surfaces of test spines smooth formed by quartz erystals; pseudostome wide, about half the diameter of the test, crenulated; crenulations varying from 8 to 12, sometimes more.

Distribution : India : West Bengal (Birbhum, Barddhaman, Calcutta, Koch Bihar, Murshidabad, Nadia, North and South 24-Parganas, West Dinajpur districts); in freshwarer amongst vegetation and in bottom ooze.

75. *Difflugia curvicaulis* Penard

1899. *Difflugia curvicaulis* Penard, *Rev. Suisse Zool.*, 7(1), p.36, pl.3, figs, 2-6.

Material examined : 1 ex., Diamond Harbour, South 24-Parganas, K.N. Nair; 2 exs., Naihati, North 24-Parganas, 17.x.1966, A.K. Das; 1 ex., Bolpur, Birbhum, 10.iv.1984, A.K. Das.

Diagnosis : Shape and texture of the test similar with those of *D. acuminata*; but spine not exactly terminal, one of its side convex and in continuity of the curvature of one side of the flank, while other side concave; test transparent, having very few crystals; pseudostome circular.

Distribution : India : West Bengal (Birbhum, North and South 24-Parganas districts); in freshwater in bottom ooze.

76. *Difflugia difficilis* Thomas

1954. *Difflugia difficilis* Thomas, *Bull.Soc.Hist.nat.Toulouse*, **89**, p.254, figs. 4-5, pl.I.

Material examined : 1 ex., Jhalda, Puruliya, 2.x.1986, A.K. Das.

Diagnosis : Test elongate to ovoidal with 'ogivale' base; flanks converge imperceptibly towards the pseudostome forming less elevated but distinct collar; pseudostome circular, about half or two-third the diameter of the test.

Distribution : India : West Bengal (Puruliya district); in freshwater amongst bottom ooze; Andhra.

77. *Difflugia elegans* Penard

1890. *Difflugia elegans* Penard, *Mem.Soc.phys.Hist.Nat.Geneve*, **31**,p.140, pl.4, figs. 4-11.

Material examined : 4 exs., Chinsura, Hugli, 5.xi.1969, A.K. Das; 1 ex., Belda, Medinipur, 18.i.1988, N.C. Sarkar.

Diagnosis : Test elongate to ovoidal, its base simply acuminate, most often elongated forming a narrow tube of variable length, straight or curved with leathery point; pseudostome circular, flanks towards the pseudostome widened without forming any collar; test covered with angular quartz particles which often surpass the margin.

Distribution : India : West Bengal (Hugli and Medinipur districts); in freshwater amongst bottom ooze; First report from India.

78. *Difflugia globularis* (Wallich)

1909. *Difflugia globularis* (Wallich); Cash, *The British Freshwater Rhizopods and Heliozoa*, 2.

Material examined : 1 ex., Kalianibas (Barrackpur), North 24-Parganas, 25.i.1967, A.K. Das; 1 ex., Haldibari, Koch Bihar, 28.iii.1986, A.K. Das.

Diagnosis : Test generally ovoid-globular and more elongated than that of *D. globulosa*; pseudostome circular and bordered with minute particles; its diameter about two-thirds of that of the test; test composed of angular stony particles making it gray.

Distribution : India : West Bengal (Koch Bihar and North 24-Parganas districts); in freshwater amongst bottom ooze. First report from India.

79. *Difflugia globulosa* Dujardin

1837. *Difflugia globulosa* Dujardin, *Ann.Sci.nat.zool.* (2) **8**, p.310, pl.9. fig.1.

Material examined : 1 ex., Haldibari, Koch Bihar, 28.iii.1986, A.K. Das.

Diagnosis : Test slightly ovoidal and less elongated than that of *D. globularis*; pseudostome circular; its diameter about half of that of the test; diversified material like clay, mineral platelets, vegetable fragments etc, embeded in brownish chitinous membrane.

Distribution : India : West Bengal (Koch Bihar district); in freshwater bottom ooze; Andhra, Rajasthan.

80. *Difflugia globulus* (Ehrenberg)

1990. *Difflugia globulus* (Ehrenberg); Cash, *The British Freshwater Rhizopods and Heliozoa*, **2**, pp.33,37, pl.21, Figs. 5-9.

Material examined : 1 ex., Gocharan, North 24-Parganas, 21.viii.1967, K.N. Nair; 2 exs., Indian Museum tank, Calcutta, 23.viii. & 3.x.1967, K.N. Nair; 1 ex., Simurali, Nadia, 14.xi.1967, K.N. Nair; 1 ex., Calcutta, 14.xi.1967, K.N. Nair.

Diagnosis : Test hemispherical, gray to pale yellow with few brown particles; pseudostome circular.

Distribution : India : West Bengal (Calcutta, Nadia and North 24-Parganas districts); in freshwater in bottom ooze; also in moss.

81. *Difflugia gramen* Penard

1902. *Difflugia gramen* Penard, *Fauna rhizopodique du Bassin du Leman*, Geneve, p.281, fig.1, p. 282, fig. 6.

Material examined : 6 exs., Simurali, Nadia, 14.xi.1967, K.N. Nair; 1 ex., Simlapal, Bankura, 27.ix.1986, A.K. Das.

Diagnosis : Test ovoid, rarely spherical with a collar; pseudostome trilobed, with rounded or angular lobes; test hyaline covered with stones; nucleus spherical with a unique central karyosome.

Distribution : India : West Bengal (Bankura and Nadia districts); in freshwater bottom ooze; Andhra.

82. *Difflugia lismorensis* Playfair

1917. *Difflugia lismorensis* Playfair, *Proc.Linn.Soc. New South Wales.*, **28**, p. 633.

Material examined : 1 ex., Kalyani, Nadia, 14.ix.1964, K.N. Nair; 5 exs., Pyradanga, Nadia, 5.xii.1969, A.K. Das.

Diagnosis : Test globular or slightly ovoid, formed of quartz particles; pseudostome very small and characteristically pentalobular; lobe constituting a less prominent collar.

Distribution : India : West Bengal (Nadia district); in freshwater amongst vegetation and in bottom ooze; First report from India.

83. ***Difflugia lithophila*** (Penard)

1902. *Difflugia hydrostatica* var. *lithophila* Penard, *Fauna rhizopodique du bassin du Leman, Geneve,* p.274, Fig.1.

Material examined : 1 ex., Barddhaman town, 8.vii.1966, K.N. Nair; 4 exs., Champahati, South 24-Parganas, 11.vii.1967, A.K. Das; 2 exs., Dhupguri, Jalpaiguri, 23.iii.1986, A.K. Das; 1 ex., Meghia, Bankura, 28.ix.1986, A.K. Das; 1 ex., Islampur, West Dinajpur, 31.x.1987, A.K. Das; 2 exs., Kaliagunj, West Dinajpur, 1.xi.1987, A.K. Das ; 1 ex., Ghatal, Medinipur, 13.x.1985, N.C. Sarkar; 1 ex., Belda, Medinipur, 18.i.1988, N.C. Sarkar; 1 ex., Jhargram, Mednipur 28.i.1988, N.C. Sarkar.

Diagnosis : Test ovoid-globular or sub-globular drawn out to the pseudostome in the form of short collar; pseudostome circular, test covered with well arranged stony particles.

Distribution : India : West Bengal (Bankura, Bardhaman, Jalpaiguri, Medinipur, South 24-Parganas and West Dinajpur districts); in freshwater in bottom ooze.

84. ***Difflugia lobostoma*** Leidy

1879. *Difflugia lobostoma* Leidy, *Freshwater Rhiz.N.America,* p.112, pl.15, figs. 1-14, 20-24, pl.16, figs. 25-29.

Material examined : 1 ex., Diamond Harbour, South 24-Parganas, 10.viii.1964, K.N. Nair; 1 ex., Garia, South 24-Parganas, 14.ix.1964; K.N. Nair; 1 ex., Bandel, Hugli, 9.xi.1964, K.N. Nair; 1 ex., Barddhaman town, 9.viii.1965, R.N. Mukherjee; 2 exs., Barddhaman. 14.ii.1966, A.K. Das; 1 ex., Tribeni, Hugli, 12.xii.1966; 1 ex., Barrackpur, North 24-Parganas, 25.i.1967, K.N. Nair; 1 ex., Dankuni, Haorah, 3.x.1967, A.K. Das; 1 ex., Konnagar, Hugli, 3.i.1968, A.K. Das; 1 ex., Makalpur (Belmuri), Hugli, 10.x.1968, K.N. Nair; 1 ex., Maldah town, 15.iii.1984, A.K. Das; 1 ex., Gaur, Maldah, 16.iii.1984, A.K. Das; 1 ex., Harishchandrapur, Maldah & 1 ex., Tulshihata, Maldah, 19.iii.1984, A.K. Das; 1 ex., Laldighi (Baharampur), Murshidabad, 25.iii.1984, A.K. Das; 1 ex., Giagunj, Murshidabad, 29.iii.1984, A.K. Das; 1 ex., Sainthia, Birbhum, 3.iv.1984, A.K. Das; 1 ex., Bakreshwar, Birbhum, 6.iv.1984, A.K. Das; 1 ex Bolpur, Birbhum, 10.iv.1984, A.K. Das; 1 ex., Jalpaiguri Town, 21.iii.1986, A.K. Das; 3 exs., Dhupguri, Jalpaiguri, 23.iii.1986, A.K. Das; 3 exs., Haldibari, Koch Bihar, 28.iii.1986, A.K. Das; 1 ex., Sukhna, Darjiling 5.iv.1986, A.K. Das; 1 ex., Dinhata, Koch Bihar, 11.iv.1986, A.K. Das; 4 exs., Toofangunj, Koch Bihar, 12.iv.1986, A.K. Das; 1 ex., Bankura town, 24.ix.1986, A.K. Das; 1 ex., Bishnupur, Bankura, 25.ix.1986, A.K. Das; 1 ex., Simlapal, Bankura, 27.ix.1986, A.K. Das; 1 ex., Meghia, Bankura, 28.ix.1986, A.K. Das; 1 ex., Hilli, West Dinajpur, 30.x.1987, A.K. Das; 1 ex., Islampur, West Dinajpur, 31.x.1987, A.K. Das; 1 ex., Belda, Medinipur, 18.i.1988, A.K. Das; 1 ex., Birshingha (Ghatal), Medinipur, 24.i.1988, A.K. Das; 1 ex., Jhargram, Medinipur, 28.i.1988, A.K. Das.

Diagnosis : Test ovoidal, pseudostome usually quadrilobed but very often trilobed; not enclosed by collar; test covered with angular quartz particles.

Distribution : India : West Bengal (Bankura, Barddhaman, Birbhum, Darjiling, Haora, Hugli, Jalpaiguri, Koch Bihar, Maldah, Medinipur, Murshidabad, North and South 24-Parganas and West Dinajpur districts); in freshwater amongst vegetation and in bottom ooze.

Remarks : *D. lobostoma*, particularly its juvenile form resembles *D. gramen* to a great extent. Former differs from the latter by lacking collar around the pseudostome and that it possesses a nucleus with many karyosomes while *D. gramen* possesses a collar around the pseudostome and a nucleus with a unique central karyosome.

85. *Difflugia muriculata* Gauthier-Lievre and Thomas

1958. *Difflugia muriculata* Gauthier-Lievre & Thomas, *Arch. Protistenk*, Jena, **103**(2), p.270, figs. 8 a-c.

Material examined : 6 exs., Kalyani, Nadia, 17.xi. & 7.xii.1964, A.K. Das; 1 ex., Deula, South 24-Praganas, 5.xii.1969, K.N. Nair.

Diagnosis : Test elongate, subcylindrical with a short collar around pseudostome; pseudostome with 3-4 well developed rounded (rarely angular) lobes; test bearing many prominent disc-shaped or mammae-shaped protruberances; test hyaline and covered by stony particles.

Distribution : India : West Bengal (Nadia and South 24-Parganas districts); in freshwater amongst bottom ooze.

86. *Difflugia muriformis* Gauthier-Lievre and Thomas

1958. *Difflugia muriformis* Gauthier-Lievre and Thomas, *Arch. Protistenk.* Jena, **103**(2), p.271, pl.10, figs. a-c.

Material examined : 1 ex., Bandel, Hugli, 17.xi.1964, K.N. Nair.

Diagnosis : Test spherical with a short collar around pseudostome; pseudostome usually trilobed (sometimes 4 or 5 lobed); test covered with disc-shaped protruberances of feeble amplitude; test with a brownish or yellowish tinge.

Distribution : India : West Bengal (Hugli and Nadia districts); in the bottom ooze of freshwater ponds.

Remarks : At a causal look *D. muriformis* very much resembles *D. muriculata* because both the species possess mammae-like protruberances from the test. But the former differs from the latter by the presence of spherical test with brownish or yellowish tinge and feebly developed protruberances.

87. *Difflugia oblonga* Ehrenberg

1838. *Difflugia oblonga* Ehrenberg, *Infusionsthierchen*, p.131, pl.2, figs. 3 a-d.

Material examined : 2 exs., Kalyani, Nadia, 9.xi.1964, K.N. Nair; 1 ex., Konnagar, Hugli, 3.i.1968, A.K. Das.

Diagnosis : Test typically oblong with rounded base and composed of big angular quartz crystals; pseudostome circular.

Distribution : India : West Bengal (Hugli and Nadia districts); Andhra; in freshwater amongst vegetation and in bottom ooze.

88. *Difflugia pyriformis* Perty

1848. *Difflugia pyriformis* Perty, *Mitthail. Naturf. Gessells.*, Bern, p.168.

Material examined : 2 exs., Diamond Harbour, South 24-Parganas, 10.viii.1964, K.N. Nair; 2 exs., Kalyani, Nadia, 14.ix.1964, K.N. Nair; 1 ex., Barddhaman town, 14.ii.1966, A.K. Das; 1 ex., Simlapal, Bankura, 29.ix.1986, A.K. Das; 1 ex., Raigunj, West Dinajpur, 29.x.1987, A.K. Das; 1 ex., Hilli, West Dinajpur, 30.x.1987, A.K. Das; 1 ex., Bendla, Medinipur, 18.i.1988, N.C. Sarkar.

Diagnosis : Test pyriform or flask-shaped; small angular quartz crystals and mud particles encrusted on the chitinous membran of the test; pseudostome circular.

Distribution : India : West Bengal (Bankura, Barddhaman, Medinipur, Nadia, South 24-Parganas and West Dinajpur districts); Rajashthan; in the bottom ooze of freshwater bodies.

89. *Difflugia tuberculata* (Wallich)

1864. *Difflugia proteiformis* sub sp. *globularis* var. *tuberculata* Wallich, *Ann. Mag. nat. Hist.* (3)13, p.241, pl.15, fig. 48 and pl. 16, fig. 18.

Material examined : 1 ex., Garia, South 24-Parganas, 5.x.1964, K.N. Nair; 1 ex., Barrackpur, North 24-Parganas, 25.i.1967, A.K. Das.

Diagnosis : Test ovoidal with wide base; pseudostome hexagonal in outline with obtuse angles surrounded by a short collar; test yellowish or chocolate brown, covered with tubercles or disc-shaped protruberances and composed of small platelets perfectly uniting the tubercles.

Distribution : India : West Bengal (North and South 24-Parganas districts); in the bottom ooze of freshwater bodies.

Remarks : Although *D. tuberculata* resembles *D. muriformis* to some extent in its external appearance still it can conveniently be differentiated from the latter by the presence of hexagonal pseudostome and tubercles which are more or less united with one another by endogenous platelets of the test (while in *D. muriformis* tubercles are almost discrete bodies).

90. *Difflugia urceolata* Carter

1864. *Difflugia urceolata* Carter, *Ann. Mag. nat. Hist.* (3)13, pp.27,37, pl. 1,fig.7.

Material examined : 1 ex., Diamond Harbour, 10.viii.1964, K.N. Nair; 4 exs., Akna village (Bandel), Hugli, 9.xi.1964, K.N. Nair; 2 exs., Kalyani, Nadia, 7.xii.1964 & 8.ii.1965, K.N. Nair; 2 exs., Champahati, South 24-Parganas, 11.vii.1967, A.K. Das; 1 ex., Tulshihata, Maldah, 19.iii.1984, A.K. Das; 1 ex., Koch Bihar town, 10.iv.1986, A.K. Das; 1 ex., Simlapal, Bankura, 27.ix.1986, A.K. Das; 1 ex., Puruliya town, 1.x.1986; A.K. Das.

Diagnosis : Test spherical or ovoido-spherical; pseudostome circular; margin of the collar around pseudostome recurved or rolled towards exterior; test composed of angular quartz crystals and also diatomes; quartz crystals on the rim smaller than those of the spherical part of the test.

Distribution : India : West Bengal (Bankura, Hugli, Koch Bihar, Maldah, Nadia, Puruliya and South 24-Parganas districts); in freshwater amongst vegetation and in bottom ooze.

Genus ***Heliopera*** Leidy

91. ***Heliopera sylvatica*** Penard

1909. *Heliopera sylvatica* Penard; Cash, *The British Freshwater Rhizopod and Heliozoa*, **2**, pp.136-137, pl.29, figs.10-12.

Material examined : 4 exs., Calcutta maidan, 14.x.1967, K.N. Nair; 4 exs., Gocharan, South 24-Parganas, 20.xi.1967, K.N. Nair; 1 ex., Indian Museum Campus, Calcutta, 7.xi.1969, K.N. Nair.

Diagnosis : Test oval in broad view, compressed with smooth crown and sides; test membrane transparent with small scales on its surface having varied shapes and sizes; mouth convex with a narrow border devoid of any scale.

Distribution : India : West Bengal (Calcutta and South 24-Parganas districts); Kerala; in mosses.

Remarks : Nair and Mukherjee (1968) reported this species from the tree mosses mixed with lichens which were collected from South 24-Parganas, West Bengal. Subsequently Nair (1984) recorded this species from the mosses grown on the tree trunks of Calcutta as well as on wall tops at Calicut (Kerala) and studied its morphological variations.

Genus ***Phryganella*** Penard

92. ***Phryganella hemispherica*** Penard

1902. *Phryganella hemispherica* Penard, *Fauna Rhiz. Leman*,. p.421, figs.1-5.

Material examined : 4 exs., Champahati, South 24-Parganas, 11.vii.1967, A.K. Das.

Diagnosis : Test hemispherical, yellowish or brownish, covered with amorphous scales and sometimes sparsely with sand grains; mouth concentric, occupying two-third the oral side of the test; pseudopodia sharply pointed and radiating.

Distribution : India : West Bengal (South 24-Parganas district); in freshwater amongst bottom ooze; first report from India.

Genus ***Plagiopyxis*** Penard

93. ***Plagiopyxis callida*** Penard

1919. *Plagiopyxis callida* Penard; Cash & Wailes, *The British Freshwater Rhizopoda and Heliozoa*, 4, pp.46-47, pl.67, fig.7.

Material examined : 1 ex., Indian Museum compound, Calcutta, 22.viii.1967, K.N. Nair; 5 exs., Simurali, Nadia, 14.xi.1967, K.N. Nair.

Diagnosis : Test broadly hemispherical to ovoid in shape with a shallow depression on ventral side; aperture long, narrow with a concave upper lip and a more or less straight lower lip.

Distribution : India : West Bengal (Calcutta and Nadia districts); among ground mosses; Orissa.

Remarks : Nair and Mukherjee (1968) reported the occurrence of this species from the ground moss of Calcutta and Simurali (Dist. Nadia). Subsequently Guru and Das(1983) recorded this species from the soil of Orissa.

Class FILOSEA
Order GROMIIDA
Family EUGLYPHIDAE

Test composed of siliceous scales or plates cemented together. Five genera under this family have been collected/reported from this state.

Key to the genera

1(2) Test hyaline, aperture rugged or slightly expanded outwards.....***Paraeuglypha***

2(1) Test hyaline, aperture neither rugged nor expanded outwards

3(4) Aperture circular, oblique, invaginate, test compressed only anteriorly.....***Trinema***

4(3) Aperture of various shape, not oblique or invaginate, test compressed in general

5(6) Aperture wide, linear, with flexible undulate borders, test with oval subcircular silicious scales.....***Placocista***

6(5) Aperture linear, bordered with denticulated scales or transparent membrane, test with circular, oval or scutiform silicious scales

7(8) Scales circular, overlapping, overlapping edges of scales very prominent, aperture bordered with transparent chitinous membrane drawn out into finger-shaped process.....
.....***Tracheleuglypha***

8(7) Scales of various shape, imbricated and arranged in longitudinal rows, aperture borbered with regularly arranged denticulate scales.....***Euglypha***

Genus ***Euglypha*** Dujardin

Key to the species

1(6) Pseudostome bordered with one or two rows of finely dentate scales

2(3) Base of test with 3-8 scales prolonged into spines, body scales elliptical..... *E. acanthophora*

3(2) Test spineless, body scales oval or scutiform

4(5) Scales of the test oval, rarely circular, pseudostome usually bordered with one and occasionally with two rows of finely dentate scales..... *E. tuberculata*

5(4) Scales of the test scutiform, pseudostome bordered with two rows of finely dentate scales.....
.....*E. scutigera*

6(1) Pseudostome not bordered with dentate scales

7(8) Scales bordering pseudostome terminated by a single semicircular projection .....*E. rotunda*

8(7) Scales bordering pseudostome without any semicircular projection

9(10) Scales of the test less visible, pseudostomal scales pointed and always shiny at their margin ... .*E. loevis*

10(9) Scales of the test clearly visible, pseudostomal scales unevenly denticulated and not shiny at their margin .....*E. denticulata*

94. *Euglypha acanthophora* (Ehrenberg)

1842. *Difflugia acanthophora* Ehrenberg, *Abh. Acad. Berlin*, pp.413, 414, pl.4, i, fig. 36.

Material examined : 8 exs., Barasat, North 24-Parganas, 6.ix. & 6.xii.1965, A.K. Das; 3 exs., near Hridaypur Rly. Stn., North 24-Parganas, 18.x.1965, K.N. Nair; 2 exs., Adisaptagram, Hugli, v.i.1967, K.N. Nair; 4 exs., Dankuni, Haora, 3.x.1967, A.K. Das; 3 exs., Makalpur (Belmuri), Hugli, 10.x.1968, K.N. Nair; 2 exs., Bishnupur, Bankura, 25.ix.1986, A.K. Das; 1 ex., Simlapal, Bankura, 27.ix.1986, A.K. Das; 1 ex., Meghia, Bankura, 28.ix.1986, A.K. Das; 1 ex., Balarampur, Puruliya, 2.x.1986, A.K. Das; 1 ex., Raigunj, West Dinajpur, 29.x.1987, A.K. Das; 1 ex., Hilli, West Dinajpur, 30.x.1987, A.K. Das; 1 ex., Islampur, West Dinajpur, 29.x.1987, A.K. Das; 1 ex., Hilli, West Dinajpur, 30.x.1987, A.K. Das; 1 ex., Islampur, West Dinajpur, 31.x.1987, A.K. Das; 1 ex., Belda, Medinipur, 18.i.1988, N.C. Sarkar.

Diagnosis : Test ovoidal, pseudostome bordered with one or occasionally two rows of finely dentate scales; scales of the test elliptical or rarely circular; some scales at the base of the test and at posterior half prolonged into spines.

Distribution : India : West Bengal (Bankura, Haora, Hugli, Medinipur, North 24-Parganas, Puruliya and West Dinajpur districts); in freshwater bodies amongst vegetation and in bottom ooze; Andhra.

Remarks : The specimens collected from West Bengal mostly resemble *E. acanthophora* var. *flexuosa* Penard by the presence of flexuous spines. Some specimens with two to three tiers of flexuous spines at varying intervals are observed and reported earlier by Nair, Das and Mukherjee (1971).

95. *Euglypha denticulata* Brown

1912. *Euglypha denticulata* Brown, *Scottish Naturalist.*, p.181.

Material examined : 7 exs., Indian Museum campus, Calcutta, 11.ix.1969, K.N. Nair.

Diagnosis : Test glabrous, oval, aperture small, scales bordering aperture unevenly denticulated.

Distribution : India : West Bengal (Calcutta); in ground moss; First report from India.

Remarks : This species could so far be collected from the ground moss grown within the Indian Museum campus, Calcutta.

96. *Euglypha loevis* (Ehrenberg)

1845. *Difflugia loevis* Ehrenberg, *Ber. Acad.*, p. 307.

Material examined : 5 exs., Indian Museum campus, Calcutta, 19.viii. & 20.ix.1968, K.N. Nair.

Diagnosis : Test oviform; scales bordering pseudostome pointed terminally always shiny at their margin and having wider gap in between their free ends.

Distribution : India : West Bengal (Calcutta); in ground moss; Andhra.

Remarks : This species was reported from West Bengal for the first time by Nair and Mukherjee (1968).

97. *Euglypha rotunda* Wailes

1911. *Euglypha rotunda* Wailes, *Proc. roy, Irish. Acad.*, **31**, p.17, pl.4.

Material examined : 7 exs., Indian Museum campus, Calcutta, 14,17 & 23.viii.1967, K.N. Nair.

Diagnosis : Test oval, eight scales brodering pseudostome having a semicicular denticulate projections in each; imbrication of test scales displaying a hexagonal or rectangular pattern on the surface.

Distribution : India : West Bengal (Calcutta); in ground moss.

Remarks : Nair and Mukherjee (1968) reported this species from West Bengal for the first time.

98. *Euglypha scutigera* Penard

1911. *Euglypha scutigera* Penard, *Proc. roy. Irish Acad.*, **31**, pp.41-42, pl. 41, fig. 20.

Material examined : 1 ex., Bankura town, 24.ix.1986, A.K. Das; 1 ex., Bishnupur, Bankura, 25.ix.1986, A.K. Das.

Diagnosis : Test oviform, without spine; scales of the test scutiform, disposed in alternate longitudinal rows; two rows of finely dentate scales on the mergin of the pseudostome numbering 8-10 in each row.

Distribution : India, West Bengal (Bankura district); in freshwater ponds amongst bottom ooze; First reporte form India.

99. *Euglypha tuberculata* Dujardin

1841. *Euglypha tuberculata* Dujardin, *Zooph. Infus.*, pp. 251-252.

Material examined : 4 exs., Barasat, North 24-Parganas, 7.i, 6.ix. & 6.xii. 1965, K.N. Nair & A.K. Das; 1 ex., Naihati, North 24-Parganas, 6.xi.1965, A.K. Das; 1 ex., Barrackpur, North 24-Parganas, 25.i.1967; A.K. Das; 1 ex., simurali, Nadia, 14.xi.1967; K.N. Nair; 1 ex., Konnagar, Hugli, 3.i.1968, A.K. Das; 4 exs., Synchal Lake, Darjiling, 2.iv.1986, A.K. Das; 1 ex., Meghia, Bankura, 28.ix.1986; A.K. Das; 1 ex., Hilli, West Dinajpur, 30.x.1987, A.K. Das; 1 ex., Islampur, West Dinajpur, 31.x.1987, A.K. Das.

Diagnosis : Closely resembles *E. acanthophora* in shape, nature of pseudostomal scales and test scales but spines absent.

Distribution : India : West Bengal (Bankura, Darjiling, Hugli, Nadia, North 24-Parganas and West Dinajpur districts); in freshwater amongst vegetation and in bottom ooze.

Genus ***Paraeuglypha*** Penard

100. ***Paraeuglypha indica*** Nair and Mukherjee

1968. *Paraeuglypha indica* Nair and Mukherjee, *J. Zool. Soc. India,* 120 (1 & 2), p. 124, fig. 1 A-B.

Material examined : 5 exs., Gopalnagar (Lakshmikantapur), South 24-Parganas, 2.xi.1966, K.N. Nair.

Diagnosis : Test hyaline, small, delicate, roughly spindle-shaped, with horn like projection at the posterior end; pseudostome with a slightly expanded rim, test composed of small hexagonal plates, having a reticulated appearance.

Distribution : India : West Bengal (South 24-Parganas district); in freshwater.

Remarks : Nair and Mukherjee (1968) described this species from the bottom ooze of a freshwater pond in the locality mentioned in the column material examined.

Genus ***Placocista*** Leidy

101. ***Placocista lens*** Penard

1902. *Placocista lens* Penard, *Faune Rhiz Leman,* pp.514-515, 3 figs.

Material examined : 3 exs., Gopalnagar, Lakshmikantapur, South 24-Parganas, 2.xi.1966, K.N. Nair.

Diagnosis : Test very much compressed, broadly oval, covered with small oval shaped silicious scales; pseudostome bordered by a delicate membrane.

Distribution : India : West Bengal (South 24-Parganas district); in the bottom ooze of freshwater ponds.

Genus ***Tracheleuglypha*** Deflandre

102. ***Tracheleuglypha dentata*** (Vejdowsky)

1953. *Tracheleuglypha dentata* (Vejdowsky); Deflandre, *Traite de Zoologie,* 1(2), p.133, fig. 94 G.

Material examined : 5 exs., Indian Museum campus, Calcutta, 28.viii.1967, K.N. Nair; 5 exs., Dankuni, Haora, 3.x.1967, A.K. Das; 1 ex., Kamarkundu, Hugli, 3.ix.1968, A.K. Das.

Diagnosis : Test oval, hyaline, test scales circular, overlapping edges of test scales very prominent due to extra thickness of cement; pseudostome bordered by transparent chitinous membrane drawn out into finger like process.

Distribution : India : West Bengal (Calcutta, Haora and Hugli districts); in ground moss and in freshwater; Andhra.

Remarks : This species is commonly found in ground moss. Only in one occasion it has been collected among vegetation in a freshwater pond at Kamarkundu, Hugli district.

Genus ***Trinema*** Dujardin

103. ***Trinema enchelys*** (Ehrenberg)

1838. *Difflugia enchelys* Ehrenberg, *Infusionsthierchen*, p.132, pl.9, fig. 4 a,b.

Material examined : 2 exs., Barasat, North 24-Parganas, 6.xii.1965, K.N. Nair; 2 exs., Adisaptagram, Hugli, 5.i.1967, K.N. Nair; 2 exs., Dankuni, Haora, 11.vii.1967, A.K. Das; 1 ex., Champahati, South 24-Parganas, 11.vii.1967, A.K. Das; 2 exs., Indian Museum campus, Calcutta, 28.viii.1967, K.N. Nair; 2 exs., Bura River, Toofangunj, Koch Bihar, 12.iv.1986, A.K. Das; 1 ex.. Simlapal, Bankura, 27.ix.1986, A.K. Das; 2 exs., Manbazar, Puruliya, 3.x.1986, A.K. Das; 1 ex., Belda, Medinipur, 18.i.1988, N.C. Sarkar.

Diagnosis : Test small, ovoid, anteriorly compressed, scales circular and imbricated; pseudostome circular bordered by small incurved silicious plates.

Distribution : India : West Bengal (Bankura, Calcutta, Koch Bihar, Haora, Hugli, Medinipur, North 24-Parganas, Puruliya, South 24-Parganas districts); in freshwater amongst vegetation and in bottom ooze as well as on ground moss; Sikkim Himalayas.

104. ***Trinema lineare*** Penard

1890. *Trinema lineare* Penard, *Mem. Soc. Geneve*, **31**(1 & 2), p. 187, pl.11, figs. 5-17.

Material examined : 4 exs., Barasat, North 24-Parganas, 6.xii.1965, K.N. Nair.

Diagnosis : Shape of the test closely resembles that of *T enchelys*, but scales of test not distinct.

Distribution : India : West Bengal (North 24-Parganas district); in freshwater amongst vegetation and bottom ooze.

Remarks : Nair, Das and Mukherjee, (1971) reported this species from West Bengal for the first time. Since then no further collection of this species from the state could be made.

Class GRANULORETICULOSEA

Order ATHALAMIDA

Under this order a single family Biomyxidae is represented from this state.

Family BIOMYXIDAE

Body shape inconstant; initial form spherical, cytoplasm colourless, finely granulated, capable of expanding and extending in any direction forming numerous freely branching reticulopodia. Monogereric family with the genus *Biomyxa* which exhibits all the characters of the family.

Genus ***Biomyxa*** Leidy

105. ***Biomyxa vagans*** Leidy

1875. *Biomyxa vagans* Leidy, *Proc. Acad. nat. Sci. Philad.*, p.125.

Material examined : 1 ex., Barasat, North 24-Parganas, 6.x.1965, A.K. Das; 1 ex., Simurali, Nadia, 14.xi.1967, A.K. Das.

Diagnosis : Shape of the main part of the body greatly variable, numerous small contractile vacuoles in body and pseudopodia.

Distribution : India : West Bengal (Calcutta, North 24-Parganas and Nadia districts); in sphagnous swamps and bog water.

Remarks : Simmons (1891 b, c) was the first to report this species form Calcutta. Subsequently *B. vagans* has been collected from 24-Parganas and Nadia districts during the local surveys.

Order MONOTHALAMIDA

Under this order also a single and monogeneric family Lieberkuhniidae with the genus *Lieberkuhnia* is known so far from the state.

Family LIEBERKUHNIIDAE

Test ovoidal or spherical, aperture usually single, lateral or subterminal, pseudopodia formed from a long peduncle, reticulate and often enveloping test.

Genus ***Lieberkuhnia*** Claperede and Lachmann

Exhibits all the characters of the family.

106. ***Lieberkuhnia paludosa*** (Cienkowsky)

1876. *Gromia paludosa* Cienkowsky, *Arch. micr. Anat.*, **12**, p.32.
1967. *Lieberkuhnia paludosa*; Penard, *Arch. Protistenk.*, Jena, **7**, p.226, figs.1-14.

Material examined : 1 ex., Indian Museum campus, Calcutta, 31.viii.1967, K.N. Nair.

Diagnosis : Test ovoidal with an uniform test membrane, aperture subterminal, oblique, pseudopodia originating from a peduncle, reticulate and anastomosing; primary contractile vacuole located at the base of peduncle followed by three small accessory vacuoles arranged close to each other.

Distribution : India : West Bengal (Calcutta); in freshwater amongst vegetation and sometimes in ground moss.

Remarks : Nair and Mukherjee (1968) reported this species from the ground moss of Calcutta.

Superclass ACTINOPODA
Class HELIOZOEA
Order DESMOTHORACIDA
Family CLATHRULINIDAE

Body enclosed in usually spherical, latticed organic capsule stalked in most species, microtubular stiffening elements not discernable as axonemes.

Genus ***Clathrulina*** Cienkowsky

Envelope spherical, homogeneous, with numerous regularly arranged openings, with stalk, protoplasm central, not filling the capsule.

107. *Clathrulina elegans* Cienkowsky

1867. *Clathrulina elegans* Cienkowsky, *Arch. mikr. Anat,* **3**, p.311, pl.18, figs. 1-15.

Material examined : 1 ex., Bandel, Hugli, 9.xi.1964, K.N. Nair; 2 exs., Barasat, North 24-Parganas, 6.xii.1965, K.N. Nair; 1 ex., Koch Bihar town, 10.iv.1986, A.K. Das.

Diagnosis : Envelope colourless to brown, perforated by many large circular or polygonal openings; solitary or colonial.

Distribution : India : West Bengal (Hugli, Koch Bihar, North 24-Parganas districts); in submerged vegetation of freshwater bodies.

Remarks : This species was first reported by Nair, Das and Mukherjee (1971) from West Bengal. During the recent survey colonies with 6-7 individuals were observed and collected from Koch Bihar district.

Order ACTINOPHRYIDA

Family ACTINOPHRYIDAE

Axopods radiating, cytoplasm highly vacuolated, skeletal structure lacking. A single genus, *Actinophrys* is dealt with in the paper.

Genus *Actinophrys* Ehrenberg

Axopodia straight, numerous, axial filaments terminating at surface of nucleus, nucleus central.

108. *Actinophrys* sol Ehrenberg

1830. *Actinophrys sol* Ehrenberg, *Abh. preuss. Akad,* Berlin, p.42, pl.2, fig. 4.

Material examined : 1 ex., Indian Museum tank, Calcutta, 28.i.1960, Sectional Party; 2 exs., Wellington Square, Calcutta 3.ii.1960, K.N. Nair; 1 ex., Botanical garden, Shibpur, Haora, 4.ii.1960, Sectional party; 1 ex., Adisaptagram, Hugli, 28.ii.1967, A.K. Das.

Diagnosis : Spherical, ectoplasm vacuolated, endoplasm granulated and with many small vacuoles.

Distribution : India : West Bengal (Calcutta, Haora and Hugli districts); in longstanding still water amongst vegetation.

Order CENTROHELIDA

Under this order also a single family Acanthocystidae with the single genus *Acanthocystis* has so far been recorded from this state.

Family ACANTHOCYSTIDAE

Frequently with skeletal structure of sliceous plates and/or spines or of organic spicules.

Genus *Acanthocystis* Carter

A distinct central granule in which axial filaments terminate, siliceous scales arranged tangentially, radiating siliceous spines with pointed or bifurcated ends.

109. *Acanthocystis spinifera* Greef

1869. *Acanthocystis spinifera* Greef, *Arch. mikr. Anat.*, **5**, p.493, pl. 27, figs. 20-23.

Material examined : 3 exs., Adisaptagram, Hugli, 5.i.1967, K.N. Nair.

Diagnosis : Body spherical with numerous slightly curved radiating spines of unequal length; nucleus eccentric; contractile vacuole single.

Distribution : India : West Bengal (Hugli district); in standing still freshwater bodies amongst vegetation.

Phylum CILIOPHORA
Class KINETOFRAGMINOPHOREA
Subclass GYMNOSTOMATIA
Order PROSTOMATIDA
Suborder PROSTOMATINA

Under this suborder a single family Holophryidae with single genus *Holophrya* is represented from West Bengal.

Family HOLOPHRYIDAE

Body radially symmetrical, ciliation uniform, cytopharyngeal apparatus simple rhabdos type.

Genus ***Holophrya*** Ehrenberg

Cytostome round, simple and without any ciliary ring around it, cytopharynx absent or a short simple tube with or without trichites.

Key to the species

1(2) Macronucleus single, spindle-shaped; contractile vacuole single, subterminal close to one side ..... *H. bengalensis*

2(1) Macronuclei two, spherical, contractile vacuole single, lateral and located at anterior half ..... *H. annandalei*

110. *Holophrya annandalei* Ghosh

1919. *Holophrya annandalei* Ghosh, *Rec. Indian Mus.*, **16**, p.41.

Diagnosis : Body cylindrical with rounded ends; cytostome subapical and circular; cytopharynx a slight depression; macronuclei two, spherical; contractile vacuole single, lateral and located at anterior half.

Distribution : India : West Bengal (Calcutta); in freshwater.

Remarks : This species is not reported since its first description by Ghosh (1919). Bhatia (1936) pointed out that position of macronuclei is very unusual for a species of this genus.

111. ***Holophrya bengalensis*** Ghosh

1919. *Holophrya bengalensis* Ghosh, *Rec. Indian Mus.*, **16**, p.41, fig.1.

Diagnosis : Body cylindrical, rounded at both ends; cytostome apical and circular; cytopharynx absent; macronucleus single, spindle-shaped; contractile vacuole single, subterminal and close to one side.

Distribution : India : West Bengal (Calcutta); in freshwater, Rajasthan.

Remarks : Based on the examination of a single specimen Ghosh (1919) described this species (*see* Bhatia 1936). Subsequently Mahajan (1965) recorded this species from Rajasthan and created a subspecies *minor* on the size difference (75 µm × 37 µm in *bengalensis* verses 34.2 - 48.9 µm × 16-19.5 µm in *bengalensis minor*).

Suborder PRORODONTINA

Key to the families

1(2) Body barrel-shaped bearing armoured plates in longitudinal rows, cytostome round, without any prominent ciliation near anterior end..... COLEPIDAE

2(1) Body oval to elengate, without bearing any armoured plate, cytostome and ciliation as above... .....PRORODONTIDAE

Family PRORODONTIDAE

Under this family three genera are dealt with.

Key to the genera

1(4) Body oval to cylindrical, symmetrical, contractile vacuole near posterior end, large terminal vacuole absent, macronucleus spherical or oval (in one species horse-shoe shaped)

2(3) Uniform ciliation throughout the body, oral basket made up of double trichites, cytostome not surrounded by ring of heavier cilia .....***Prorodon***

3(2) Ciliation uniform but posterior region may be without cilia; cytostome surrounded by a ring of heavier cilia, oral backet not visible or made up of double tichites..... ***Urotricha***

4(1) Body ovoidal to vermiform, asymmetrical, contractile vacuoles with several pores, large terminal vacuole may be present, macronucleus usually long and attenuate..... .....***Pseudoprorodon***

Genus ***Prorodon*** Ehrenberg

Key to the species

1(6) Pharyngeal tube with trichites, extending usually upto one-fourth and sometimes upto one-third of the body

2(3) Macronucleus horse-shoe shaped..... *P. stewarti*

3(2) Macronucleus spherical

4(5) Body oval, narrowed posteriorly ..... *P. discolor*

5(4) Body ovoid with truncated anterior end and rounded posterior end ..... *P. teres*

6(1) Pharyngeal tube without trichites, extending upto middle of the body ..... *P. endentatus*

112. *Prorodon discolor* (Ehrenberg)

1835. *Holophrya discolor* Ehrenberg, *Abh. Preuss. Akad. Wiss.*, Berlin, p.251.

1930. *Prorodon (Holophrya) discolour* Kahl, *Urtiere oder Protozoa*, (in : Dahl's *Tuerwelt Dtsch.*), Jena, pt. 18, p.76, fig. 8(4).

Material examined : 1 ex., Wellington Square, Calcutta, 20.vi.1960, K.N. Nair.

Diagnosis : Body oval, narrower posteriorly, mouth terminocentral, pharyngeal tube with trichites extending above one-fourth of the body; macronucleus single, rounded; contractile vacuole single and situated near posterior end.

Distribution : West Bengal (Calcutta); in freshwater.

Remarks : The only specimen was collected and reported from West Bengal by Mahajan and Nair (1971).

113. *Prorodon edentatus* Claparede and Lachmann

1858. *Prorodon edentatus* Claparede and Lachmann, *Mem. Inst. Genevois, Geneve*, **6**, pp.320-321. pl. 18, fig.4.

Material examined : 2 exs.; Wellington Square, Calcutta, 24.v. & 27.v.1969, K.N. Nair.

Diagnosis : Body ovoid or ellipsoidal; mouth terminal and eccentric; pharyngeal tube without trichites, extending diagonally upto middle of the body; macronucleus signle, oval and elongate, contractile vacuole single and located at posterior end.

Distribution : India : West Bengal (Calcutta); in freshwater.

Remarks : Mahajan and Nair (1971) reported the occurrence of this species from West Bengal and India for the first time.

114. *Prorodon stewarti* Ghosh

1928. *Prorodon stewarti* Ghosh, *J. roy. micr. Soc.*, p. 382, fig. 1.1.

Diagnosis : Body elongately oval, rounded at both ends; mouth terminal and slightly lateral, pharyngeal tubes with trichites, extending one-fourth to one-third the length of the body; macronucleus horse-shoe shaped, contractile vacuoles two in number and located at the posterior half of the body.

Distribution : India : West Bengal (Calcutta); in freshwater.

Remarks : This species has never been reported since its first description by Ghosh (1928). Its horse-shoe shaped nucleus and position of contractile vacuole make it unique from its other congeneric species. Kahl (1930) and Bhatia (1936), however, doubt its placement under the genus *Prorodon*.

115. ***Prorodon teres*** Ehrenberg

1838. *Prorodon teres* Ehrenberg, *Die Infusionsthierchen als Vollkommene organismen,* Leipzig, p. 316, pt. 32, fig. 11.

Material examined : 2 exs., Wellington Square, Calcutta; 20.vi.1960, K.N. Nair.

Diagnosis : Body ovoid, anterior end slightly narrowed and posterior end considerably rounded; mouth terminal, pharyngeal tube slightly conical and with trichites, extending about one-fourth of the body length; contractile vacuole single and terminal, macronucleus spherical.

Distribution : India : West Bengal (Calcutta); in freshwater bodies.

Remarks : This species was reported from West Bengal by Mahajan and Nair (1971).

Genus ***Pseudoprorodon*** Blochmann

116. ***Pseudororodon lieberkuhni*** Butschli

1889. *Pseudoprorodon (Prorodon) lieberkuhni* Butschli, Protozoa in *"Bronns Klassen and Ordnungen"* p.1585.

Material examined : 1 ex., Gopal Nagar (Lakshmikantapur), South 24-Parganas, 2.xi.1966, K.N. Nair; 1 ex., Falta, South 24-Parganas, 20.viii.1965, K.N. Nair.

Diagnosis : Body slender vermiform, 600-800 µm in length, anterior end distinctly flattened and posterior end rounded; contractile vacuole in 4 to 5 series.

Distribution : India : West Bengal (South 24-Parganas); first record from India.

Remarks : This species has been collected from Gopalnagar (Lakshmikantapur, South 24-Parganas) from a medium sized freshwater pond. The specimen collected from Falta (South 24-Parganas) and identified as *Peseudoprorodon gigas* da Cunha (ZSI Reg. No. pt. 1564) also belongs to *P. lieberkuhni* (*see* Kahl, 1930).

Genus ***Urotricha*** Claparede & Lachmann

117. ***Urotricha*** sp.

Distribution : India : West Bengal (Calcutta).

Remarks : Chaudhuri (1929) recorded *Urotricha* sp from soils of Calcutta, without mentioning any specific identify.

Family COLEPIDAE

Under this family a single genus *Coleps* is known from West Bengal.

Genus ***Coleps*** Nitzsch

Body barrel-shaped, with regularly arranged ectoplasmic plates, anterior end truncate, posterior end rounded often with spinous projections, cytostome apical and terminal, surrounded with slightly larger cilia.

118. *Coeps hirtus* (Muller)

1786. *Cercaria hirta* O.F. Muller, *Hafniae et Lipsiae*, p.128, pl.19, figs. 17-18.

1817. *Coleps hirtus 3*, Nitzsch, *Neue Schrift d. naturf. Ges. in Helle*, p.4.

Material examined : 2 exs., Wellington Square, Calcutta, 8.ii.1960, K.N. Nair; 3 exs., Sibpur, Haora, 12.ix. & 7.x.1961 & 15.xi.1962, K.N. Nair; 1 ex., Jadavpur, Calcutta, 20.i.1960, K.N. Nair; 2 exs., Krishnasayar, Barddhaman town, 7.viii.1965, A.K. Das; 2 exs., Rabindra Sarobar, Calcutta, 7.i.1966, R.N. Mukherjee; 3 exs., Barrackpur, North 24-Parganas, 25.i.1967, A.K. Das; 1 ex., Champahati, South 24-Parganas, 11.vii.1967, A.K. Das; 2 exs., Simurali, Nadia, 14.xi.1967, A.K. Das; 2 exs., Kamarkundu, Hugli, 3.ix.1968, A.K. Das; 1 ex., Gaur, Maldah, 16.iii.1984, A.K. Das; 2 exs., Laldighi (Baharampur), Murshidabad, 25.iii.1984, A.K. Das, 1 ex., Sainthia, Birbhum, 4.iii.1984, A.K. Das; 1 ex., Maynaguri, Jalpaiguri, 24.iii.1986, A.K. Das; 2 exs., Sukhna, Darjiling, 5.iv.1986, A.K. Das; 3 exs., Koch Bihar town, 10.iv.1986, A.K. Das; 1 ex., Simlapal, Bankura, 27.ix.1986, A.K. Das; 2 exs., Balarampur, Puruliya, 2.x.1986, A.K. Das; 1 ex., Hilli, West Dinajpur, 30.x.1987, A.K. Das; 2 exs., Birsinha (Ghatal), Medinipur, 24.i.1988, N.C. Sarkar.

Diagnosis : Ectoplasmic plates 18-20; anterior margin denticulate, posterior end with three spinous projections.

Distribution : India : West Bengal (in all 17 districts); Rajasthan; Jammu & Kashmir.

Suborder HAPTORINA

Under this suborder five families are dealt with

1(8) Cytostome apical

2(3) Retractile non-suctorial tentacles widely distributed over the body in addition to uniform holotrichous body ciliature.....ACTINOBOLINIDAE

3(2) Holotrichous body ciliature present but tentacles absent

4(5) Ciliation reduced to one or more circumferential bands on the body.....DIDINIIDAE

5(4) Ciliation uniform

6(7) Body usually flask-shaped and flattened, with truncate anterior end, cycostome on apical non-ciliated ridge.....SPATHIDIIDAE

7(6) Body of variable shape, but anterior end not truncate, cytostome in many species located at distal end of long flexible neck.....ENCHELYIDAE

8(1) Cytostome at the base of the proboscis, located at considerable distance from anterior end of the body.....TRACHELIIDAE

Family ENCHELYIDAE

Key to the genera

1(2) Body, cylindrical, spindle or flask-shaped with a long contractile proboscis, cytostome round and located on the summit of the proboscis.....***Lacrymaria***

2(1) Body flask-shaped, anterior end truncate, without any contractile proboscis; cytostome slit like, rarely round and aplically located ..... ***Enchelys***

Genus ***Lacrymaria*** Ehrenberg

Key to the species

1(2) Body elongate, neck very long and highly contractile with well developed oral cone ..... *L. olor*

2(1) Body cylindrical, neck ill deviloped and almost non contractile

3(4) Body cylindrical with rounded posterior end, cytoplasm with characteristic dumble-shaped granules ..... *L. pupula*

4(3) Body more or less cylindrical with abruptly pointed posterior end, cytoplasm colourless, hyaline with out any characteristic granule ..... *L. minima*

119. ***Lacrymaria minima*** Kahl

1927. *Lacrymaria minima* Kahl, *Arch. Protinstenk,* Jena, **60**, p.103.

Material examined : 1 ex., Adisaptagram, Hugli, 5.i.1967, K.N. Nair,

Diagnosis : Body cylindrical, slender, with abruptly pointed posterior end; neck small, non-contractile, cytoplasm colourless, hyaline, contractile vacuole single, located near posterior end, macronucleus single, oval.

Distribution : India : West Bengal (Hugli district); in freshwater; new record from India.

120. ***Lacrymaria olor*** (Muller)

1786. *Vibrio olor* Muller, *Animalc, fluviat et. marina.* etc., *Havniae et Lipsiae,* p. 75, pl.10. figs. 12-15.

1832. *Lacrymaria olor,* Ehrenberg, *Abh. preuss. Akad. Wiss.,* Berlin, p.105.

Material examined : 1 ex., Sibpur Botanical Garden, Haroa, 25.ix.1961, Sectional staff; 3 exs., Jadavpur, calcutta, 8.x.1962, Sectional Staff; 2 exs., Barasat, North 24-Parganas, 6.xii.1965, R.N. Mukherjee; 1 ex., Barddhaman town, 14.ii.1966, A.K. Das; 2 exs., Falta, South 24-Parganas, 11.ix.1967, K.N. Nair; 3 exs., Bandel, Hugli, 9.xi.1969, K.N. Nair; 1 ex., Bairagi dighi, Koch Bihar, 10.v.1986, A.K. Das; 1 ex., Vill. Nimta (Bishnupur), Bankura, 25.ix.1986, A.K. Das.

Diagnosis : Body elongate, posterior portion cylindrical with pointed posterior end; neck long, highly contractile, oral cone well developed, contractile vacuoles two in number and located on either end of cylindrical body portion; macronucleus with two rounded parts united together.

Distribution : India : West Bengal (Bankura, Barddhaman, Calcutta, Hugli, Koch Bihar, South 24-Parganas districts); in freshwater. Orissa, Rajasthan.

121. ***Lacrymaria pupula*** (Muller)

1786. *Enchelys pupula* Muller, *Animalc. fluviat et. marina.* etc., *Havniae et Lipsiae,* p.75.

Material examined : 2 exs., Mohanpukur (Belmuri), Hugli, 10.x.1986, K.N. Nair.

Diagnosis : Body cylindrical with rounded posterior end, neck ill developed and non contractile and seen in stretched forms only; cytoplasm with chracteristic dumble-shaped granules; longitudinally

arranged fine granules in the alveolar layer; contractile vacuole single and terminal; macronucleus single and ellipsoidal.

Distribution : India : West Bengal (Hugli district); in freshwater; new record from India.

Genus ***Enchelys*** O.F. Muller

122. ***Enchelys*** sp.

Distribution : India : West Bengal (Haora district); in soil.

Remarks : Choudhuri (1929) reported this form from the soils of cultivated fields of Sibpur (Haora).

Family SPATHIDIIDAE

Key to the genera

1(2) Cytostome slit-like, located anteriorly but not at the anterior tip, ventral ridge with closely arranged trichocysts.....***Bryophyllum***

2(1) Cytostome slit-like and occupy anterior end almost completely, ventral ridge lacking..... .....***Spathidium***

Genus ***Bryophyllum*** Kahl

123. ***Bryophyllum spathidioides*** V. Gelei

1933. *Bryophyllum spathidioides* Gelei J.V., *Arch. Protistenk.*, Jena, **81**, p.206, figs. 5-7.

Material examined : 4 exs., Mohanpukur (Belmuri), Hugli, 10.x.1968, K.N. Nair.

Diagnosis : Body flask-shaped, flattened, hyaline with feeble dorsal elvation; ventral ridge with closely set trichocyst continuing upto to the opposite side to some distance; 15-16 ciliary rows, big elongated nucleus.

Distribution : India : West Bengal (Hugli district). New record from India.

Remarks : Majority of the species under the genus *Bryophyllum* are moss-inhabiting. But the present species has been collected from a freshwater pond of Belmuri (Hugli district) on the surface scum with full bacterial growth as well as from decaying pistea leaf.

Genus ***Spathidium*** Dujardin

Under this genus two species have been collected from West Bengal.

Key to the Species

1(2) Macronucleus resembling a long chain of small beads, beads of which sometimes disjointed, inhabit freshwater.....*S. moniliforme*

2(1) Macromucleus long, band form, posterior portion often recurved; moss inhabiting..... .....*S. muscicola*

124. ***Spathidium moniliforme*** Bhatia

1920. *Spathidium spathula* var. *moniliforme* Bhatia, *J. roy. micr. Soc.*, p. 259.

1930. *Spathidium moniliforme;* Kahl, *Urtiere oder Protozoa* (in : Dahl's *Tierwelt Ditisch.*), Jena, pt.18, p. 158, fig, 22, 3.

Material examined : 6 exs., Adisaptagram. Hugli, 5.i.1967, K.N. Nair; 1 ex., Pond in Maldah College Compound, Maldah, 15.iii.1984, A.K. Das; 1 ex., Dogara vill (Gour), Maldah, 16.iii.1984, A.K. Das; Lavpur vill, Birbhum, 8.iv.1984, A.K. Das.

Diagnosis : Body elongated, flask-shaped, anterior end obliquely truncate; cytostome narrow slit-like occupying anterior end almost completely; macronucleus moniliform, beads of which sometimes disjointed; contractele vacuole single and located at posterior end.

Distribution : India : West Bengal (Birbhum, Hugli and Maldah districts); in freshwater. New record from India.

125. *Spathidium muscicola* Kahl

1930. *Spathidium muscicola* Kahl, *Arch. Protistenk*, Jena, **70**, p 377, figs. 378 a,b.

Material examined : 6 exs., Indian Museu campus, Calcutta, 25.vii & 22.viii.1968, K. N. Nair; 1 ex., Victoria falls, Darjiling, 2.iv.1986, A. K. Das.

Diagnosis : Body flask-shaped with truncated anterior end; cytostome, resembling those of *S. moniliforme;* macronucleus long, bandform, posterior portion of which often recurved.

Distribution : India : West Bengal (Calcutta and Darjiling districts); from ground and rock moss. New record from India.

Family TRACHELIIDAE

Key to the genera

1(2) Body elongate, anterior end with very conspicuous neck-like prolongation, posterior end sharply pointed or drawn out into a tail-like process (occasionally cuspidate).....***Dileptus***

2(1) Body oval to spherical, anterior end with a short fingerlike process, posterior end rounded..... .....***Trachelius***

Genus *Dileptus* Dujardin

Key to the species

1(2) Macronucleus divided into 100 or more discoid bodies.....*D. anser*

2(1) Macronucleus moniliform.....*D. monilatus*

126. *Dileptus anser* (Muller)

1773. *Vibrio anser* O. F. Muller, *Animalc. Infusoria fluviat. et. marina, etc. Havniae et Lipsiae.* pp. 73, 74, pl. 10. figs. 7-11.

Material examined : 1 ex., Monohardas tadak, Calcutta, 8.x.1963, K. N. Nair; 5 exs., Bandel, Hugli, 9.xi.1964, K. N. Nair; 4 exs., Falta, South 24-Parganas, 20.viii.1965, K. N. Nair; 1 ex., Barasat. North 24-Parganas, 6.ix.1965, A.K. Das; 1 ex., Kamarkundu, Hugli, 3.ix.1968, A. K. Das; 1 ex., Karola river near the bridge at Dinbazar, Jalpaiguri, 21.iii.1986, A. K. Das; 2 exs., Bairagidighi, Koch Bihar town, 10.iv.1986, A. K. Das; 1 ex., Meghia, Bankura, 24.ix.1986, A. K. Das; 1 ex., Hilli, West Dinajpur, 29.x.1987, A. K. Das.

Diagnosis : Body elongate with a tail-like projection at the posterior end, neck elongated, contractile and one-half to as long as total length of the trunk; cytostome funnel-shaped and located at the base of the neck; macronuclei many, discoid in shape and scattered, contractile vacuoles also many and arranged in a row.

Distribution : India : West Bengal (Bankura, Calcutta, Hugli, Jalpaiguri, Koch Bihar, North and South 24-Parganas and West Dinajpur districts); Rajasthan.

127. ***Dileptus monilatus*** (Stokes)

1986. *Amphileptus monilatus* Stokes, *Ann. Mag. nat. Hist,* (5) **17.**

Material examined : 1 ex., Bandel, Hugli, 9.xi.1964, K. N. Nair.

Diagnosis : Body elongated, posterior end uniformly cuspidate, neck elongated contractile and about one-fourth to one-half the length of the trunk; cytostome resembling previous species; macronucleus moniliform, contractile vacuole many.

Distribution : India : west Bengal (Hugli district); in freshwater; new record from India.

Genus ***Trachelius*** Schrank

Key to the species

1(2) Spheroidal to ellipsoid in shape, anterior end with distinct finger-like proboscis, macronucleus sausage-shaped.....*T ovum*

2(1) Elongated-pyriform, anterior extremity pointed but without any proboscis, macronucleus numerous and scattered .....*T gutta*

128. ***Trachelius gutta*** (Cohn)

1866. *Amphileptus gutta* Cohn, *Z.wiss.D. Zool.*, **16**, p.269, pl.15, fig. 50.

Diagnosis : Elongated-pyriform in shape with rounded posterior end; anterior extremity pointed and curved dorsally without any proboscis, macronucleus numerous and scattered, contractile vacuole single and posteroterminal.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh (1920a, 1921a) recorded this species from putrefying vegetable infusions in Calcutta. Bhatia (1936), however, doubted the correctness of this identification.

129. ***Trachelius ovum*** Ehrenberg

1833. *Trachelius ovum* Ehrenberg, *Abd. preuss. Akad. Wiss.*, Berlin, 1835, pp. 265, 277.

Material examined : 4 exs., Jadavpur, Calcutta 2.i.1962 & 4.i.1963, K. N. Nair; 1 ex., Bandel, Hugli, 28.xi.1964, K. N. Nair.

Diagnosis : Body spheroidal to ellipsoid, anterior end with finger like proboscis curved dorsally and posterior end broadly rounded; cytostome located at the base of the proboscis, macronucleus sausage shaped; contractile vacuole many.

Distribution : India : West Bengal (Calcutta and Hugli districts); in freshwater. Rajasthan.

Family DIDINIIDAE

Genus ***Dudinium*** Stein

Barrel-shaped body with rounded posterior end; girdles of cilia one to several; cytostome expansible and located at the tip of the probosics, macronucleus horse-shoe shaped.

130. ***Didinium nasutum*** (Muller)

1773. *Vorticella nasuta* O. F. Muller, *verminum terret, et. fluviatil S. animal infusor etc., historia, Hafniae et Lipsiae,* pp. 102-104.

Material examined : 4 exs., Wellington Square, Calcutta, 22.vii & 10.viii.1959, K. N. Nair; 1 ex., Dogara vill. (Gour), Maldah, 16.iii.1984, A. K. Das.

Diagnosis : Body barrel-shaped, two girdles of cilia - one near the base of the proboscis, the other below posterior half; macronucleus horse-shoe shaped, contractile vacuole single and located at posterior end.

Distribution : India : West Bengal (Calcutta and Maldah districts); in freshwater. Rajasthan.

Family ACTINOBOLINIDAE

Genus ***Actinobolina*** Strand

Ovate or spherical in shape, macronucleus band like and curved, contractile vacuale single and terminal.

131. ***Actinobolina radians*** Stein

1851. *Actinobolina radians* Stein, *Z. Wiss. Zool.* **3**, p.479.

Material examined : 3 exs., Jadavpur, Calcutta, 14.xii.1961, K. N. Nair.

Diagnosis : Ovoid, posterior end broadly rounded, cytostome subapical, prominent; cytopharynx with distinct trichites; cilia at lower spiral rib dense, long and very delicate, retractile tentacles distinctly visible, macronucleus sausage shaped with several micronuclei.

Distribution : India : West Bengal (Calcutta). New record from India.

Order PLEUROSTOMATIDA

Under this order single family Amphileptidae is represented from this state.

Family AMPHILEPTIDAE

Body lanceolate and laterally compressed; slit-like cytostome located at the convex ventral border of the anterior part of the of the body. Under this family three genera as follows are represented from this state.

Key to the genera

1(3) Ciliation uniform and complete

2. Body lanceolate, contracile, cytostome slit-like, located on the convex border of the body, without trichocyst, contractile vacuole many, macronucleus two or more.....***Amphileptus***

3(1) Ciliation only on right side

4(5) Body elongated, often curved in 'S'-shaped manner, with a neck at anterior part and without trichocyst borders, cytostome similar to that of *Amphileptus* but with trichocysts, contractile vacuole one to many, macronucleus bipartite.....***Litonotus***

5(4) Body leaf-like, flattened, contractile and pointed at both ends, presence of a hyaline border on ventral side, reaching posterior end bearing trichoysts, cytostome as in previous genus; contractile vacuole one to many, macronucleus single or moniliform .....***Loxophyllum***

Genus ***Amphileptus*** Ehrenberg

132. ***Amphileptus*** sp.

Distribution : India : West Bengal (Calcutta).

Remarks : Simmons (1891) reported this species from a freshwater pond of Calcutta wthout mentioning its specific identity.

Genus ***Loxophyllum*** Dujardin

1(2) Macronuclei two in number, usually asymmetrical in shape .....*L. niemeccense*

2(1) Macronuclei many, symmetrical in shape

3(4) Body leaf-like with smooth border, macronuclei 7-15 in number, globular and scattered ....*L. levigatum*

4(3) Body leaf-like with undulating border, macronuclei many, elliptical and arranged along ventral line.....*L. undulatum*

133. ***Loxophyllum levgatum*** Sauerbey

1928. *Loxophyllum levigatum* Sauerbey, *Arch. Protistenk.*, Jena, **62**, p. 377.

Material examined : 3 exs., Gopalnagar (Lakshmikantapur), South 24-Parganas, 2.xi.1966, K. N. Nair.

Diagnosis : Body leaf-like, anterior end with distinct beak, posterior end rounded; body margin smooth; macronuclei 7-15 in number, globular and scattered; contractile vacuole single and located at posterior end on dorsal side.

Distribution : India : West Bengal (South 24-Parganas district); in freshwater. New record from India.

134. ***Loxophyllum niemeccense*** (Stein)

1859. *Opisthodon niemeccense* Stein, *Der organismus der Infusionsthier*, Leipzig, I.

Material examined : 5 exs., Adisaptagram, Hugli, 5.i.1967, K. N. Nair; 1 ex., Gaigunj, Murshidabad, 29.iii.1984, A. K. Das; Sev. exs., Lavpur vill, Birbhum, 8.iv.1984, A. K. Das.

Diagnosis : Body flat, leaf-like, asymmetrical, anterior end acuminate, posterior end somewhat blunt; macronuclei two in number; contractile vacuole single and located at the middle of the body on dorsal side.

Distribution : India : West Bengal (Birbhum, Hugli and Murshidabad districts); in freshwater. New record from India.

135. *Loxophyllum undulatum* Sauerbrey

1928. *Loxophyllum undulatum* Sauerbery, *Arch. Protistenk.*, Jena, **62**, p. 378.

Material examined : 1 ex., Sibpur, Haora, 31.v.1966, K. N. Nair.

Diagnosis : Body flat, leaf-like, distinct beak at anterior end, posterior end very broadly rounded, body margin undulating; macronuclei many, elliptical and arranged along ventral line; contractile vacuole single, its location same as in *L. levigatum.*

Distribution : India : West Bengal (Haora district); in freshwater. New record from India.

Genus *Litonotus* Wrzesniowski

Under this genus following four species are reported from West Bengal.

Key to the species

1(4) Macronucleus single

2(3) Macronucleus reniform, contractile vacuole single ..... *L. infusionus*

3(2) Macronucleus bilobed, contractile vacuole 5-6, arranged in two rows ..... *L. similis*

4(1) Macronucleus consisting of two discrete lobes

5(6) Two lobes of macronucleus spherical and united to one another by a thread, contractile vacuole single ..... *L. fasciola*

6(5) Two lobes of macronucleus elliptical united together by a thread or discrete, contractile vacuole several and arranged in two rows ..... *L. procera*

136. *Litonotus fasciola* (Ehrenberg)

1838. *Amphileptus fasciola* Ehrenberg, *Die Infusionsthierchen als vollkommene organismen*, Leipzig, p. 356, pl. 38, fig. 17.

Diagnosis : Body lanceolate, non contractile, neck not always sharply distinguihed from body; macronucleus subcentral, consisting of two spherical lobes united to one another by a thread; contractile vacuole single and located near the posterior end of the body.

Distribution : India : West Bengal (Calcutta), Maharastra, Rajasthan, Jammu & Kashmir.

Remarks : Ghosh (1921 a) reported this species from dirty water of Calcutta.

137. *Litonotus infusionus* Ghosh

1920. *Litonotus infusionus* Ghosh, *Report Sci. Convention Indian assoc. Cult. Sci.* for 1918, pp. 146-147, fig. 3.

Diagnosis : Body lanceolate, with widest mid portion and rounded posterior end; macronucleus single and reniform located at the anterior end of body; contractile vacuole single and located near the posteior and of the body.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh (1920a) described this species from hay infusion and pond water from Calcutta. This species could not be collected since its original description.

138. *Litonotus procera* Penard

1922. *Litonotus procera* Penard, *Etudes Sur les Infusoires dieau douce,* Geneve, p. 69, fig. 75.

Material examined : 2 exs., Belmuri, Hugli, 5.i.1967, K. N. Nair; 1 ex., Ramkeli vill. (Peasbari), Maldah, 20.iii.1984, A. K. Das.

Diagnosis : Flask-shaped, elongated, posterior end tail-like, anterior end with a distinct neck; macronucleus consisting of two elliptical lobes which may be discrete or united by a fine thread; contractile vacuole many and arranged in two lateral rows.

Distribution : West Bengal (Hugli and Maldah districts); in freshwater. Rajasthan.

Remarks : Mahajan (1971) was the first to report this species from India (Rajasthan) under the name, *Hemiophrys procera* (Penard). Specimens collected from West Bengal quite resemble Rajasthan form excepting that lobes of macronucleus are elliptial in the present material (vs spherical lobes in Rajasthan form). The basic characteristic feature of ciliation and shape of macronucleus fit well with the generic characters of *Litonotus*. This observation is quite in conformity with Kudo (1966). Corliss (1979), however, indicated a probability of placement of the genus *Hemiophrys* under the genus *Amphileptus*. But characteristic features of *H. procera* do not support this proposition. Therefore, this the present species is placed under the genus *Litonotus* for the reasons as stated above.

139. *Litonotus similis* Ghosh

1921. *Litonotus similis* Ghosh, *Bull. Carmichael Med. Coll.*, **2**, p. 8. fig. 3.

Diagnosis : Body lanceolate, widest behind middle, with bluntly rounded posterior end; macronucleus bilobed, contractile vacuole 5-6 in number and arranged in two rows.

Distribution : Ghosh (1921 a) described this species from vegetable infusions of Calcutta. This species has not been collected since its description.

Order KARYORELICTIDA

Under this order two families are dealt with.

Key to the families

1(2) Body fragile, usually extremely elongate, thigmotactic cilia primarily on ventral side, cytostome apical ..... TRACHELOCERCIDAE

2(1) Body elongate or lancet-like, laterally compressed, ciliation on right side only, cytostome when present slit-like located on concave body surface.....LOXODIDAE

Family TRACHELOCERCIDAE

Genus ***Trachelocerca*** Ehrenberg

Elongated, vermiform or flask-shaped with drawn out anterior end, cytostome apical surrounded by a circlet of cilia, no neck or any constriction marking off the anterior portion, no spiral striation when constricted.

140. ***Trachelocerca*** sp.

Distribution : India : West Bengal (Calcutta).

Remarks : Simmons (1891) reported this form from 'pond water' of Calcutta without giving any specific identification. This generic identification seems to be doubtful as all the species of *Trachelocerca* reported so far are known from marine waters only.

Family LOXODIDAE

Under this family single genus *Loxodes* has been reported so far from this state.

Genus ***Loxodes*** Ehrenberg

Leaf-like, flattened, anterior end with beak curved ventrally, right surface slightly convex, uniform ciliation on several longitudinal rows, macronuclei two or more, 2-25 strongly refractile Muller's vesicles in dorsal region.

Key to the species

1(4) Macronuclei two in number

2(3) Body leaf-like with rounded posterior end; both the mcronuclei lying close to each other..... ..... *L. vorax*

3(2) Body leaf-like with pointed posterior end, both macronuclei 35-50 µm apart from each other... .....*L. striatus*

4(1) Macronuclei many and scattered in endoplasm.....*L. magnus*

141. ***Loxodes magnus*** Stokes

1887. *Loxodes magnus* Stokes, *Ann. Mag. nat. Hist.*, London, **20**, pp. 104-114, pl. 1.

Material examined : 5 exs., Jadavpur, Calcutta, 30.x. & 30.xi.1961, 4.i.1963, K. N. Nair; 4 exs., Garia, South 24-Parganas, 8.ii.1965, K. N. Nair; 2 exs., Barrackpur, North 24-Parganas, 25.i.1967, A. K. Das; 1 ex., Bairagidighi, Koch Bihar town, 10.iv.1986, A. K. Das; 1 ex., Balarampur, Puruliya, 2.x.1986, A. K. Das; 1 ex., Raigunj, West Dinajpur, 29.x.1987, A. K. Das.

Diagnosis : Large in size (400 µm - 750 µm) leaf-like, flattened, anterior end beak-like and curved ventrally, posterior end rounded; macronuclei many and scattered in endoplasm; 10-20 Muller's vesicles visible.

Distribution : India : West Bengal (Calcutta, Koch Bihar, Puruliya, North & South 24-Parganas and West Dinajpur districts); in freshwater.

Remarks : Mahajan and Nair (1965) were the first to report this species from India, that too, from Calcutta.

142. *Loxodes striatus* (Engelmann)

1862. *Drepanomonas striatum* Engelmann, *Z.Wiss. Zool., Leipzig*, **11**, pp. 382-383, pl. 21, fig. 7.

Material examined : 8 exs., Sahid Colony (Paikpara), Calcutta, 18.xii. 1962, K.N. Nair; 1 ex., Barasat, North 24-Parganas, 6.xii.1965, R.N. Mukherjee; 1 ex.. Damodar river near Meghia ghat, Bankura, 28.ix.1986, A.K. Das; 1 ex., Jhalda, Puruliya, 2.x.1986, A.K. Das.

Diagnosis : General shape as in *L. magnus* but smaller in dimension (120 µm × 47 µm), posterior end pointed; macronuclei two in number and lying about 35-50 qm apart from each other; few (4 to 7) Muller's vesicles observed.

Distribution : India : West Bengal (Bankura, Calcutta and North 24-Parganas and Puruliya districts); in freshwater. Jammu & Kashmir, Rajasthan.

Remarks : This species was earlier reported from West Bengal by Mahajan and Nair (1965).

143. *Loxodes vorax* Stokes

1885. *Loxodes vorax* Stokes, *Amer. Mon. micr. J.*, **6**, pp.121-127.

Material examined : 2 exs., Barrackpur, North 24-Parganas, 31.v.1966, K.N. Nair.

Diagnosis : General body shape and size as in *L. striatus* but posterior end rounded; macronuclei two in number and lying vary close to each other; Muller's vesicles not observed.

Distribution : India : West Bengal (North 24-Parganas district); in freshwater. New record from India.

144. *Loxodes* sp.

Distribution : India : West Bengal (Calcutta).

Remarks : Simmons (1891) reported this form from pond water, of Calcutta without mentioning its specific identity.

Subclass VESTIBULIFERIA

Order TRICHOSTOMATIDA

Suborder TRICHOSTOMATINA

Family PLAGIOPYLIDAE

Body dorsoventrally flattened with uniform ciliation, cytostome and vestibulum anteriorly located.

Genus *Plagiopyla* Stein

Vestibulum a broad ventrally opened groove from which body ciliation begins, vestibular cilia short excepting at the anterior end where a tuft of longer cilia present.

145. *Plagiopyla nasuta* Stein

1860. *Plagiopyla nasuta* Stein, *S.B. bohn. Ges Wiss.*, Prague, p.58.

Material examined : 4 exs., Minto Square, Calcutta, 15.ii.1963, Sectional Staff; 1 ex., Garia, South 24-Parganas, 20.x.1964, K.N. Nair; 1 ex., Bandel, Hugli, 17.xi.1964, K.N. Nair.

Diagnosis : Body reniform or ovoid, narrower anteriorly; cytostome situated near median line at the end of peristome; cytopharyx long; single and terminal contractile vacuole; macronucleus round.

Distribution : India : West Bengal (Calcutta, Hugli and South 24-Parganas districts); in fresh and brackish water. Orissa.

Remarks : Nair and Mahajan (1965) reported this species for the first time from India, that too from Calcutta. Subsequently Das and Nair (1987) recorded this species from the Chilka Lagoon, Orissa. *P. nasuta* has been collected from freshwater bodies of different districts of West Bengal (Nair and Mahajan, 1965 and present report) as well as from brackishwater of Chilka Lagoon, Orissa (Das and Nair, *op. cit*).

Order COLPODIDA

Key to the families

1(2) Body typically reniform, with distorted ciliary rows, no conspicuous ciliary tuft at anterior end ..... COLPODIDEA

2(1) Body narrow-ovoid, ciliation uniform but sparse, with conspicuous anterior ciliary tuft ..... CYRTOLOPHOSIDIDAE

Family COLPODIDAE

Under this family single genus *Colpoda* has been reported/collected from this state.

Genus *Colpoda* Muller

Body kidney-shaped, cytostome present in the ventral depression, leading into peristomeal cavity and giving rise to a diagonal groove at dorsal side, a ciliated area present in the right edge of the cytostome.

Key to the species

1(2) Cytostome located at about middle of the flattened ventral side, 8-10 frontal dentations and 29-34 meridians present ..... *C. cucullus*

2(1) Cytostome located at about one-third to one-fourth from the anterior end; 6-7 frontal dentations and 14-18 meridians present

3(4) Cytostome at about one-third from the anterior end, 6-7 frontal dentations and 14-16 meridians present ..... *C. aspera*

4(3) Cytostome at about one-fourth from the anterior end, 6-7 frontal dentations but 16-18 meridians present ..... *C. maupasi*

146. *Colpoda aspera* Kahl

1926. *Colpoda aspera* Kahl, *Arch. Protistenk.*, Jena, **55**, pp.322-323, fig. 10(a-c).

Material examined : 2 exs., Sahid colony (Paikpara), Calcutta, 18.xii.1962, K.N. Nair; 1 ex., Gajirmor (Baharampur), Murshidabad, 26.iii.1984, A.K. Das.

Diagnosis : Body somewhat bean shaped; cytostome at about one-third from the anterior end; frontal dentations 6-7 and meridians 14-16, macronucleus spherical, contractile vacuole single and posterior.

Distribution : India : West Bengal (Calcutta, and Murshidabad districts); in freshwater.

Remarks : Mahajan and Nair (1965) were the first to report this species from West Bengal.

147. *Colpoda cucullus* Muller

1773. *Colpoda cucullus* O.F. Muller, *Verminum terrest et. fluviatil S. animal infusor. etc. historia., Hafniae et Lipsiae*, I & II.

Material examined : 2 exs., Indian Museum Campus, Calcutta, 14 & 16.viii.1968, K.N. Nair.

Diagnosis : Body typically kidney-shaped, cytostome located about middle of the body, frontal dentations 8-10 and meridians 29-34; macronucleus oval; contractile vacuole as in *C. aspera*.

Distribution : India : West Bengal (Calcutta). Andhra Pradesh, Assam, Karnataka, Jammu & Kashmir, Maharastra, Madhya Pradesh, Orissa, Punjab, Tamil Nadu, Uttar Pradesh.

Remarks : This species has earlier been reported from soil, vegetable infusion and freshwater with hay infusions from different states of India as stated above. The present material has been collected from the ground moss grown within the Indian Museum campus, Calcutta.

148. *Colpoda maupasi* Enriques

1908. *Colpoda maupasi* Enriques, *Arch. Zool. exp. gen., Notes et Rev.* (4)**8**, pp.7-11, figs.3-5, 9.

Diagnosis : Body oval and cylindrical, cytostome located at about one-fourth of the body from the anterior end, frontal dentations 6-7 and meridians 16-18, macronucleus spherical.

Distribution : India : 'Bengal' (exact locality not cited) (*see* Sandon, 1927).

149. *Colpoda* sp.

Distribution : India : West Bengal (Calcutta).

Remarks : Knowles(1927) observed this form in cultures of *Paramecium* and reported as *Colpoda* sp. without mentioning its specific identity.

Family CYROTOLOPHOSIDIDAE

Under this family two genera have been reported from this state.

Key to the genera

1(2) Peristome short, located at the anterior margin of the ventral surface, left posterior and right margins of the peristome with a bag-like undulating membrane, which may be withdrawn into the peristome..... ***Crytolophosis***

2(1) Peristome narrow, posteroterminal surrounded by ventral, left dorso-lateral and a right dorso-lateral lobe and, with a row of well developed membranellae.....***Opisthostomatella***

Genus ***Cyrtolophosis*** Stokes

Key to the species

1(2) Body elongate and narrow, cilia long, sparsely scattered and not arranged in longitudinal rows.. .....*C. elongatus*

2(1) Body ovoid with broadly rounded posterior end, cilia short, uniform and arranged in distinct longitudinal rows .....*C. minutus*

150. ***Cyrtolophosis elongatus*** (Schewiakoff)

1893. *Balantiophorus elongatus* Schewiakoff, *Mem. Acad. Sci. de st. Petersb.*, (7) 41, pp. 56-57. pl. 4, fig. 50.

Diagnosis : Body elongate and narrow with long sparsely scattered cilia not arranged in longitudinal rows; macronucleus oval and centrally located; contractile vacuole single and posterior.

Distribution : West Bengal (Calcutta and Haora districts). Assam, Bihar, Karnataka, Jammu & Kashmir, Maharastra, Madhya Pradesh, Orissa, Punjub, Tamil Nadu, Uttar Pradesh.

Remarks : This is a very small ciliate (28-30 μm × 10 μm) reported by Chaudhuri (1929) from soils of Calcutta and Sibpur (Haora) under the name *Balantiophorus elongatus.*

151. ***Cyrtolophosis minutus*** (Schewiakoff)

1889. *Balantiophorus minutus* Schewiakoff, *Beitrage zur Kenntniss der holotriches Ciliaten. Biblioth. Zoolog.*, (Leuckart u. chun), 5, pp. 64-65, pl. 7, figs. 99-101.

Diagnosis : Body ovoid with narrow anterior and broadly rounded posterior end; short and uniform cilia arranged in distinct longitudinal rows; macronucleus spherical and central, contractile vacuole single and posterolateral.

Distribution : India : West Bengal (Calcutta and Haora districts). Bihar, Maharastra, Punjab, Tamilnadu, Uttar Pradesh.

Remarks : This is also a soil inhabiting ciliate reported by Chaudhury (1929) from West Bengal under the name *Balantiophours minutus.*

Genus ***Opisthostomatella*** Corliss

152. ***Opisthostomatella bengalensis*** (Ghosh)

1928. *Opisthostomum bengalensis* Ghosh, *J. roy. micr. Soc.*, p.383, figs. 2, 3.

Diagnosis : Body elongately or irregularly oval, uniformly ciliated, cilia on the left side longer; macronucleus large, oval and located at the posterior half of the body.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh described this species from sewer water of Calcutta under the name *Opisthostomum bengalensis,* and created a genus *Opisthostomum* to accommodate this species. But,

Corliss(1960) proposed new name *Opisthostomatella* for this monotypic genus with the remarks that this is 'perhaps bonafide genus in the trichostomatid family Marynidae' (Corliss, 1979). This view is quite in conformity with Kahl (1931). Further study of this species is essential for ascertaining its exact systematic position.

Subclass HYPOSTOMATIA

Order SYNHYMENIIDA

Under this order two families have been reported from this state.

Key to the families

1(2) Body more or less ovoid with asymmetrical lobe or beak to the left, hypostomial frange with single lengthy "membrane" .....ORTHODONELLIDAE

2(1) Body with broad anterior and gently tapered posterior end, hypostomial frange as above but simpler and less conspicuous..... SCAPHIDIODONTIDAE

Family ORTHODONELLIDAE

Genus ***Orthodonella*** Bhatia

Body lanceolate or elongate oval, dorsoventrally flattened with a more or less prominent beak on the anterior end, opening of trichites directed to the right.

153. ***Orthodonella banerjeei*** (Ghosh)

1921. *Orthodon banerjeei* Ghosh, *Bull. Carmicheal Med. Coll.*, **2**, pp. 8-9, fig. 5.

Diagnosis : Body oval, anterior end narrowed with a blunt beak and posterior end broadly rounded; cytostome located at one-fourth of body length from anterior end; cytopharynx elongated, conical and bent forward posteriorly; macronucleus oval.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh (1921a) described this species from 'tank water' of Calcutta. This species is of doubtful toxonomic status (*See* Kahl, 1931 and Bhatia, 1936).

Family SCAPHIDIODONTIDAE

Genus ***Chilodontopsis*** Blochmann

Body elongate, ventrally flattened and dorsally slightly bulging, with weakly developed beak-like structure at the anterior end, opening of trichites median.

154. ***Chilodontopsis bengalensis*** (Ghosh)

1921. *Chlamydodontopsis bengalensis* Ghosh, *Bull. carmichael Med. Coll.*, **2**, p.8, fig. 4.

Diagnosis : Body elongated oval, with slightly narrower anterior end terminating with a weakly developed beak; posterior end broadly rounded; cytopharynx short, trichite rod opening median.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh (1921a) described this species under the name *Chlamydodontopsis bengalensis* from 'vegetable infusion' in Calcutta. From the general shape and structure of this species, it appears that it belongs to the genus *Chilodonella* as opined by Kahl (1931).

Order NASSULIDA

Suborder NASSULINA

Under this suborder single family, single genus and single species are dealt with.

Family NASSULIDAE

Body ciliated all over the body, ciliation usually denser on ventral side than on dorsal one, hypostomial frange short but multiple, cytopharyngeal apparatus prominent.

Genus *Nassula* Ehrenberg

Body oval to elongate with flat ventral surface and convex dorsal durface; cytostome provided with well developed trichites and located at about one-third to one-fourth from the anterior end, macronucleus spherical or oval and centrally located.

155. *Nassula ornata* Ehrenberg

1833. *Nassula ornata* Ehrenberg, *Abh. preuss. Akad. Wiss.*, Berlin, p. 169, pl. 1, fig. 2.

Material examined : 6 exs., Wellington Square, Calcutta, 3 & 28.viii.1959 & 17.ii.1960, K.N. Nair; 1 ex., Kandi, Murshidabad, 28.iii.1984, A.K. Das; Syndap Water pool, Darjiling, 4.iv.1986, A.K. Das.

Diagnosis : Body broadly oval, both end broadly rounded, macronucleus round or slightly elliptical, contractile vacuole single, located little below the middle of the body.

Distribution : India : West Bengal (Calcutta, Darjiling and Murshidabad districts); in freshwater. Rajasthan.

Suborder MICROTHORACINA

Under this suborder two families are dealt with.

Key to the families

1(2) Hypostomial frange bears three 'pseudomembranelles' on left side of oral area, cytopharynx usually tubular.....LEPTOPHARYNGIDAE

2(1) Hypostomial frange bears few 'pseudomembranelles' and sometimes set in a shallow atrium, cytopharynx simple or lacking.....MICROTHORACIDAE

Family LEPTOPHARYNGIDAE

Under this family two genera have been reported from this state.

Key to the genera

1(2) Body more or less compressed, body surface marked with a broad longitudinal ridge with cross striation, furrows canal like.....***Pseudomicrothorax***

2(1) Body compressed, body surface with longitudinal furrows but without cross striations, canal like furrow absent.....***Leptopharynx***

Genus ***Leptopharynx*** Mermod

Key to the species

1(2) Pharyngeal basket tubular, ventral ridges not joining to form any anterior beak, moss-inhabiting.....*L. sphagnetorum*

2(1) Pharyngeal basket lacking, ventral ridges join together to form an anterior beak, inhabiting freshwater

3(4) Cytoplasm heavily laden with characteristic green ingested food material, no spine near the cytostome.....*L. chlorophagus*

4(3) Spines present at the beginning of the cytostome, cytoplasm without green ingested food material as stated above.....*L. torpens*

156. ***Leptopharynx chlorophagus*** Das

1971 *Leptopharynx chlorophagus* Das, *Curr. Sci.*, **40**, pp.195-196, fig.1.

Material examined : 4 exs., Kamarkundu, Hugli, 3.ix.1968; A.K. Das.

Diagnosis : Small, ovoid, right margin convex, left margin straight, ventral ridges join to form a short beak at the anterior end; pharyngeal basket lacking; macronucleus single, round or slightly ovoid, located below the middle of the body; contractile vacuoles two, both of which located below the middle; cytoplasm heavily laden with green ingested food material.

Distribution : India : West Bengal (Hugli district); in freshwater.

157. ***Leptopharynx sphagnetorum*** (Levander)

1900. *Trichopelma sphagnetorum* Levander, *Acta pro Fauna et Flora fenn.*, **18**.

Material examined : 12 exs., Indian Museum campus, Calcutta, 24.vii.1968 & 23.ix.1969, K.N. Nair.

Diagnosis : Body more or less ovoid and considerably flattened, right margin slightly convex, left margin slightly concave, ventral ridges join near preoral slope, but without forming any beak; pharyngeal basket tubular, macronucleus and contractile vacuole as in *L. chlorophagus;* cytoplasm colourless and transparent.

Distribution : India : West Bengal (Calcutta). New record from India.

Remarks : This is a moss inhabiting form collected from the ground moss of Indian Museum campus, Calcutta.

158. *Leptopharynx torpens* (Kahl)

1931. *Trichopelma torpens* Kahl, *Urtiere oder Protozoa* (in Dahl's *Tierwelt Disch.*), Jena, pt. 21, p. 303, fig. 51.

Material examined : 2 exs., Kamarkundu, Hugli, 3.ix.1968, A.K. Das.

Diagnosis : Ovoid in shape, with convex right margin and more or less straight ventral margin; ventral ridges unite to form a distinct beak near anterior end, pharyngeal basket lacking, presence of spines at the beginning of the cytosome; macronucleus oval; contractile vacuole two and located below middle of the body; cytoplasm without green ingested food matter.

Distribution : India : West Bengal (Hugli district).

Remarks : Das (1971) was the first to report its occurrence from India, that too from Kamarkundu, (Dist. Hugli, West Bengal) as one of the associate species of *L. chlorophagus.*

Genus *Pseudomicrothorax* Mermod

Key to the species

1(2) Oval, comparatively large in dimention, 56-73 µm × 35-44 µm, number of ciliary meridian 13, macronucleus rod-shaped.....*P. dubius*

2(1) Oval, small (25-31 µm × 16-20 µm), ciliary meridian 12 in number, macronucleus spherical.. .....*P. agilis*

159. *Pseudomicrothorax agilis* Mermod

1914. *Pseudomicrothorax agilis* Mermod, *Rev. Suisse Zool.*, **22**.

Material examined : 3 exs., Naihati, North 24-Parganas, 17.x.1966, A.K. Das; 1 ex., pond in Indian Museum campus, Calcutta, 3.x.1968, K.N. Nair.

Diagnosis : Oval, smaller in dimension, ciliary meridian 12 in number (8 ventral and 4 dorsal), macronucleus spherical and located at the posterior half.

Distribution : India : West Bengal (Calcutta and North 24-Parganas districts); in freshwater.

Remarks : Nair and Das (1974) were the first to report this species from West Bengal and also from India.

160. *Pseudomicrothorax dubius* (Maupas)

1883. *Chilodon dubius* Maupas, *Arch. zool. exper* (2), **1**.

Material examined : 5 exs., Simurali, Nadia, 14.xi.1967, A. K. Das; 4 exs., Chandkhali (Taldi), South 24-Parganas, 5.xi.1968, K. N. Nair.

Diagnosis : Oval, comparatively large in dimension, ciliary meridian 13 in number (9 ventral and 4 dorsal), macronucleus rod-shaped and located in the middle.

Distribution : India : West Bengal (Nadia and South 24-Parganas district); in freshwater.

Remarks : Nair and Das (1974) reported this species for the first time from West Bengal and also from Asia.

Family MICROTHORACIDAE

Under this family two genera have been dealt with.

Key to the genera

1(2) Body more or less oval with delicate keeled armour, oral depression posterior - ventral, with a stiff ectoplasmic lip on right side and a small tooth on left margin, cytopharynx lacking ..... ***Microthorax***

2(1) Body semilunar or sickle-shaped with longitudinal furrow, oral field groove-like located little above the middle of the body, cytopharynx tubular..... ***Drepanomonas***

Genus *Microthorax* Engelmann

161. *Microthorax pusillus* Engelmann

1862. *Microthorax pusillus* Engelmann, *Zeitschr. f.wiss.zool., 11,* pp. 347-393.

Material examined : 2 exs., Pond near Park Street - Chowringhee junction, Calcutta, 18.x.1965, K. N. Nair; 3 exs., Barddhaman town, 12.xi.1968 A. K. Das; 1 ex., Kamarkundu, Hugili, 5.xi.1968, A. K. Das.

Diagnosis : Body small, ovoid, with left border slightly sigmoid and right border more or less straight; oral depression on the dorsal side at the viscinty of ventral border; macronucleus spherical; contractile vacuole two in number and located below the middle half of the body.

Distribution : India : West Bengal (Calcutta, Barddhaman and Hugli districts); in freshwater. New record from India.

Genus *Drepanomonas* Fresenius

Key to the species

1(2) Body semilunar and sharply pointed at either end; two longitudinal ciliated grooves present on the dorsal side..... *D. dentata*

2(1) Body broadly semilunar with broad posterior end, one longitudinal furrow present on the dorsal side

3(4) Macronucleus oviform and situated very close to peristomal angle; body colourless without any zoochlorellae..... *D. hooghlyensis*

4(3) Macronucleus spherical and situated considerably far from peristomal angle, body with zoochlorellae..... *D. revoluta*

162. *Drepanomonas dentata* Fresenius

1858. *Drepanomonas dentata* Fresenius, *Abh. Senkenb. naturf. Ges.* **21**, pp. 216-217, pl. 10, figs, 25-28.

Diagnosis : Body semilunar, dorsal margin convex, ventral margin concave and both anterior and posterior ends sharply pointed; two longitudinal ciliated grooves present on the dorsal side; macronucleus spherical and situated a little behind or above the peristome.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh (1920a) reported this species from 'vegetable infusions' in Calcutta.

163. *Drepanomonas hooghlyensis* Nair and Das

1974. *Drepanomonas hooghlyensis* Nair and Das, *Proc. Zool. Soc., Calcutta*, **27**, pp. 36-37, Text-Fig. 1 a,b.

Material examined : Sev. exs., Adisaptagram, Hugli, 28.ii.1967, A. K. Das.

Diagnosis : Body colourless, broadly semilunar in shape, with convex dorsal margin and slightly concave or attenuate ventral margin, posterior end broadly rounded; single broad longitudinal ciliated groove, macronucleus single, oviform, situated very close and dorsal to peristomal angle, zoochlorellae absent.

Distribution : India : West Bengal (Hugli district); in freshwater.

164. *Drepanomonas revoluta* Panard

1922. *Drepanomonas revoluta* Panard, *Etudes sur les Infusories d'eau douce (Zusammenfassendes Hauptwerk, Verf.)*, Geneva, 128.

Material examined : Sev. exs., Adisaptgram, Hugli, 5.i.1967, K. N. Nair & 28.ii.1967, A. K. Das.

Diagnosis : Shape of the body, number and position of longitudinal ciliated groove resemble *D. hooghlyensis*; macronucleus single, spherical and situated considerably far from peristomal angle; cytoplasm with zoochlorellae.

Distribution : India : West Bengal (Hugli district); in freshwater. New record from India.

Order CRYPTOPHORIDA

Suborder CHLAMYDODONTINA

Family CHILODONELLIDAE

Body with a distinct beak to the left, thigmotactic zone broad.

Genus *Chilodonella* Strand

Ovoid, dorsal surface convex, ventral surface flat and with ciliary rows, a cross-row of bristles on anteriorly flattened dorsal surface.

Key to the species

1(2) Cytopharynx straight, contractile vacuole several and scattered ..... *C. cucullulus*

2(1) Cytopharynx curved at posterior end, contractile vacuole one to three

3(4) Macronucleus somewhat oval surrounded by a clear space, contractile vacuole three in number ..... *C. spiralidentis*

4(3) Macronucleus oval but not surrounded by any clear space, contractile vacuole single and terminally located..... *C. uncinata*

165. *Chilodonella cucullulus* (Muller)

1883. *Kolpoda cucullulus* Muller, *Verminum terrest. et. fluviatil S. animal infusor., etc. historia, Hafniae et Lipsiae,* p. 158.

Material examined : 1 ex., Wellington Square, Calcutta, 14.i.1960, K. N. Nair; 1 ex., Sahid Colony (Paikpara), Calcutta, K. N. Nair; 2 exs., Bandel, Hugli, 9.xi.1964, K. N. Nair; 1 ex., Barddhaman town, 14.ii.1966, R. N. Mukherjee; 1 ex., Ramkeli vill. (Peasbari), Maldah, 20.iii.1984, A. K. Das; 2 exs., Rajbaridighi, Jalpaiguri town, 21.iii.1986, A. K. Das; 1 ex., Victorial falls, Darjiling, 2.iv.1986, A. K. Das; 1 ex., Tank in Bankura Christian College Compound, Bankura town, 24.ix.1986, A. K. Das; 1 ex., Nimta vill. (Bishnupur), Bankura, 25.ix.1986, A. K. Das.

Diagnosis : Body dorso-ventrally flattened, cytopharynx long and straight, macronucleus oval, contractile vacuole many and scattered.

Distribution : India : West Bengal (Bankura, Barddhaman, Calcutta, Darjiling, Hugli, Jalpaiguri and Maldah districts); Jammu & Kashmir, Maharastra, Rajasthan.

166. *Chilodonella spiralidentis* (Bhatia & Mullick)

1930. *Chilodon spiralidentis* Bhatia and Mullick, *Arch. Protistenk,* Jena, **57**, pp. 394-395, fig. 2.

Material examined : 1 ex., Sibpur, Haora, 10.ii.1959, K. N. Nair.

Diagnosis : Body flattened and oval, cytopharynx wider in front, narrow behind and spirally curved; macronucleus somewhat oval and surrounded by a clear space, contractile vacuole three, termal vacuole largest.

Distribution : India : West Bengal (Haora). Jammu & Kashmir.

167. *Chilodonella uncinata* (Ehrenberg)

1838. *Chilodon uncinata* Ehrenberg, *Abh. preuss. Akad. Wiss.,* Berlin, p. 337.

Material examined : 1 ex., Wellington Square, Calcutta, 16.i 1960, K. N. Nair; 2 exs., Sibpur, Haora, 6.x.1960, K. N. Nair; 1 ex., Garia, South 24-Parganas, 5.x.1964, K. N. Nair.

Diagnosis : Body dorsoventrally flattened, cytopharynx as in *C. spiralidentis*, macronucleus oval and not surrounded by any clear soace, contractile vacuole single and terminal.

Distribution : India : West Bengal (Calcutta, Haora and South 24-Parganas districts); in freshwater.

168. *Chilodonella* sp.

Distribution : India : West Bengal (Calcutta, Haora).

Remarks : Simmons (1889) and Chaudhuri (1929) reported *Chilodonella sp.* from freshwater pond of Calcutta and soils of Sibpur (Haora district) respectively without mentioning their specific identity.

Subclass SUCTORIA
Order SUCTORIDA
Suborder EXOGENINA
Family PODOPHRYIDAE

Adults small, pyriform or spherical, tentacles apical or evently distributed, usually with stalk or lorica.

Genus ***Podophrya*** Ehrenberg

Usually with rigid stalk, suctorial tentacles evenly distributed or arranged in fascicles.

Key to the species

1(2) Body spherical, pedicle dilated at its proximal end, no contractile vacuole..... *P. bengalensis*

2(1) Body pyriform, pedicle straight, contractile vacuole single and eccentric..... *P. sandi*

169. ***Podophrya bengelensis*** Ghosh

1929. *Podophrya bengalensis* Ghosh, *J. roy. micr. Soc.*, p. 223, fig. 2.

Diagnosis : Body spherical with pedicle slightly dialated at its proximal end; tentacles many, straight, knobbed and unequal in length, and arranged radially; macronucleus spherical and subcentral; contractile vacuole absent.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh (1929c) described this species from sewer water of Calcutta. The present authors, however, could not collect this species.

170. ***Podophrya sandi*** Collin

1912. *Podophrya sandi* Collin, *Arch. Zool. exp. gen.*, **51**, pp, pp. 398-401, fig. 105.

Diagnosis : Body pyriform with straight pedicle; tentacles numerous, knobbed and unequal in length distributed uniformly of in one to three bundles; macronucleus spherical or oval and central, contractile vacuole single and concentric.

Distribution : India : West Bengal (Calcutta).

Remarks : Simmons (1889) collected this species from pond water of Calcutta (for details *see* Bhatia, 1936).

Suborder ENDOGENINA
Family DENDROSOMATIDAE

Body shape pyriform to truncate to branching, suctorial tentacles arranged in clusters, with or without stalk, aloricate.

Genus ***Tokophrya*** Butchli

Pyriform or pyramidal, tentacles arranged in one to four sometimes five clusters on anterior surfaces, stalk delicate and of uniform thickness.

Key to the species

1(2) Macronucleus pyramidal, stalk long..... *T bengalensis*

2(1) Macronucleus oval or spherical, stalk comparatively short

3(4) Pyramidal in shape, tentacles arranged in 2 clusters, macronucleus oval ..... *T infusorium*

4(3) Oval to spherical in shape, tentacles arranged in 2-5 clusters, macronucleus spherical .... *T cyclopum*

171. *Tokophrya bengalensis* Ghosh

1929. *Tokophrya bengalensis* Ghosh, J. roy micr. Soc., p.222, fig.1.

Diagnosis : Body more or less pyramidal, with a cuplike depression at narrow fixed end; stalk long, tentacles arranged in two clusters; macronucleus pyramidal; contractile vacuole single located at the anterior end.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh (1929c) described this species from sewer water of Calcutta.

172. *Tokophrya cyclopum* (Claparede and Lachmnn)

1858-61. *Podophrya cyclopum* Claparede and Lachmenn, *Etudes sur les infusoires et les rhizopodes,* Genive, p. 382.

Material examined : 2 exs., Wellington Square, Calcutta, 28.xi & 25.xii.1958, K. N. Nair.

Diagnosis : Body oval to spherical; stalk short, suctorial tentacles arranged in 2-5 clusters; macronucleus spherical, contractile vacuoles one to two.

Distribution : India : West Bengal (Calcutta). New record from India.

Remarks : This species has been collected from a freshwater pool in the locality stated above and found to be attached on the antenna of *Cyclops sp.*

173. *Tokophrya infusorium* (Stein)

1966. *Tokophrya infusorium* (Stein); Kudon, *Protozoology,* p.1038.

Material examined : 2 exs., Wellington Square, Calcutta, 20.xii.1958 & 4.i.1959, K. N. Nair.

Diagnosis : Body pyramidal, stalk of moderate length, suctorial tentacles arranged in 2 clusters, macronucleus oval, contractile vacuole two.

Distribution : India : West Bengal (Calcutta); in freshwater. New record from India.

Class	OLIGOHYMENOPHOREA
Subclass	HYMENOSTOMATIA
Order	HYMENOSTOMATIDA
Suborder	TETRAHYMENINA

Key to the families

1(2) Body pyriform, elongate-ovoid or cylindrical, buccal cavity small, membranellar bases with uniform width, 1-3 post oral kinetics ..... TETRAHYMENIDAE

2(1) Body ovoid or ellipsoidal, buccal cavity large, infraciliary bases of second or third membranellae much wider, 5-10 post roal Kineties ..... GLAUCOMIDAE

Family TETRAHYMENIDAE

Key to the genera

1(2) Pyriform in shape, cytostome close to anterior end, inconspicuous ectoplasmic ridge or flange on the left margin.....***Tetrahymena***

2(1) Body elongately-oval, cytostome in the anterior half of the body without any ectoplasmic ridge, outer membrane inserted in the left and enclosed the mouth in a cap-like manner..... .....***Stegochilum***

Genus ***Stegochilum*** Schewiakoff

174. ***Stegochilum ovale*** Ghosh

1921. *Stegochilum ovale* Ghosh, *Bull. Carmichael Med. Coll.*, **2**, p.9, fig. 7.

Diagnosis : Body elongately oval, rounded at both ends; undulating membrane attached to the left, anterior or right margin of the cytostome; macronucleus oval and centrally located, contractile vacuole single.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh (1921a) described this species from 'vegetable infusions' in Calcutta.

Genus ***Tetrahymena*** Furgason

175. ***Tetrahymena pyriformis*** (Ehrenberg)

1966. *Tetrahymena pyriformis* (Ehrenberg); Kudo, *Protozoology*, p. 895, figs. 325 a,d.

Material examined : 1 ex., Calcutta, 18.xii.1962, K. N. Nair.

Diagnosis : Pyriform in shape, cytostome pyriform and about one-tenth of the body-length; ciliary meridian 17-23; macronucleus ovoid, contractile vacuole single.

Distribution : India : West Bengal (Calcutta). New record from the India.

Remarks : This species with a single representative has been collected from hay infusion.

Family GLAUCOMIDAE

Genus ***Glaucoma*** Ehrenberg

Ellipsoid in shape, cytostome near the anterior end, extending about one-fourth of the length of the body and with conspicuous undulating membrane on right and three membranellae on left.

176. ***Glaucoma pyriformis*** (Ehrenberg)

1838. *Leucophrys pyriformis* Ehrenberg, *Die Infusionsthierchen als Vollkommene organismen*, Veipzig., pp.312-313, pl.32, fig. 4.

Material examined : 1 ex., St. Paul's Cathedral tank, Calcutta, 11.ix.1963, K. N. Nair.

Diagnosis : Body ellipsoid, cytostome located at anterior one-third of the body and placed little obliquely; macronucleus more or less round and centrally located; contractile vacuole single and lying in posterior one-fourth of the body.

Distribution : India : West Bengal (Calcutta). Jammu & Kashmir.

Suborder OPHRYOGLENINA

Family OPHRYOGLENIDAE

Body uniformly ciliated, peristome runs as a sickle-shaped ciliated cleft, perpendicular to surface of the body.

Genus *Ophryoglena* Ehrenberg

Body ellipsoidal with both ends rounded or attenuated, preoral depression in the form of '6' due to an ectoplasmic membrane extending from the left edge.

177. *Ophryoglena flava* (Ehrenberg)

1833. *Bursaria flava* Ehrenberg, *Abhandl. d. Koniql. Akad. d. Wissensch. zu Berlin*, p. 233.

Material examined : 1 ex., Bandel, Hugli, 1.xii.1964, K. N. Nair; 1 ex., Diamond Harbour, South 24-Parganas, 12.xi.1965, K. N. Nair; 1 ex., Barrackpur, North 24-Parganas, 31.v.1966, K. N. Nair; 1 ex., Ramkeli vill. (Peasbari), Maldah, 20.iii.1984, A. K. Das; 1 ex., Laldighi (Baharampur), Murshidabad, 25.iii.1984, A. K. Das; 1 ex., Sainthia, Birbhum, 3.iv.1984, A. K. Das; 1 ex., Meghia, Bankura, 28.ix.1986, A. K. Das; 1 ex., Jhalda, Puruliya, 2.x.1986, A. K. Das; 1 ex., Islampur (near Panchayat office), West Dinajpur, 3.x.1987, A. K. Das.

Diagnosis : Body ellipsoidal, cytostome on ventral side and situated at about one-third of body length from anterior end; macronucleus elliptical, contractile vacuole two, with long radiating canals.

Distribution : India : West Bengal (Bankura, Birbhum, Hugli, Maldah, Murshidabad, North 24-Parganas, Puruliya, South 24-Parganas and West Dinajpur districts); in freshwater. Maharastra, Rajasthan.

Suborder PENICULINA

Key to the families

1(2) Body short with girdless of cilia and an eccentric posterior ciliary tuft.....UROCENTRIDAE

2(1) Body large, neither ciliary girdles nor posterior ciliary tuft present

3(4) Buccal area large, with an extensive false adoral zone of membranellae covering much of apical and ventral surface of the body .....NEOBURSARIDIIDAE

4(3) Buccal area not large or with any adoral zone of membranellae

5(6) Prebuccal cavity conspicuous leading to equatorially located buccal cavity, two peniculi in buccal cavity, cytostome not expansible, contractile vacuole two.....PARAMECIIDAE

6(5) Prebuccal area shallow or absent, three peniculi in buccal cavity, cytostome expansible, contractile vacuole single..... FRONTONIIDAE

Family PARAMECIIDAE

Genus ***Paramecium*** Hill

Cigar-shaped, peristome long, broad and slightly oblique, cytopharynx moderatly long, with a row of very fine cilia attached to its dorsal wall.

178. ***Paramecium caudatum*** Ehrenberg

1833. *Paramecium caudatum* Ehrenberg, *Abhandl. d. Koniql. Akad. d. Wissensch. Zu Berlin*, pp. 268, 323, pl. 3, fig. 2.

Material examined : Sev. exs., Calcutta, 2.i.1963, K. N. Nair; 2 exs., Barddhaman town, 12.xi.1965, A. K. Das; 1 ex., Naihati, North 24-Parganas, 17.x.1966, A. K. Das; 2 exs., Adisaptagram, Hugli, 28.ii.1967, A. K. Das; 3 exs., Champahati, South 24-Parganas, 11.vii.1967, A. K. Das; Sev. exs., Dankuni Haora, 3.x.1967, A. K. Das; 1 ex., Simurali, Nadia, 14.xi.1967, A.K. Das; 2 exs., Gour, Maldah, 16.iii.1984, A. K. Das; 1 ex., Gargari vill. (Harishchandrapur), Maldah, 19.iii.1984, A. K. Das; 1 ex., Madhupur (near Baharampur Bostal School), Murshidabad, 25.iii.1984, A. K. Das; 2 exs., Kandi, Murshidabad, 26.iii.1984, A. K. Das; 2 exs., Giagunj, Murshidabad, 29.iii.1984, A. K. Das; 1 ex., Sainthia, Birbhum, 3.iv.1984, A. K. Das; 1 ex., Dubrajpur, Birbhum, 5.iv.1984, A. K. Das; 2 exs., Bakreshwar, Birbhum, 6.iv.1984, A. K. Das; 2 exs., Bolpur, Birbhum, 10.iv.1984, A. K. Das; Sev. exs., Jalpaiguri town, 21.iii.1986, A. K. Das; 1 ex., Malbazar, Jalpaiguri, 22.iii.1986, A. K. Das; 2 exs., Dhupguri, Jalpaiguri, 23.iii.1986, A. K. Das; 2 exs., Sukna, Darjiling, 5.iv.1986, A.K. Das; 1 ex., Dolabari (Dinhata), Koch Bihar, 11.iv.1986, A. K. Das; 2 exs., Bura river at Tuffangunj, Koch Bihar, 12.iv.1986, A. K. Das; 2 exs., Alipurduar, Jalpaiguri, 14.iv.1986, A. K. Das; 2 exs., Bankura town, 24.ix.1986, A. K. Das; 1 ex., Nimta vill. (Bishnupur), Bankura, 25.ix.1986, A. K. Das; 1 ex., Meghia, Bankura, 28.ix.1986, A. K. Das; 2 exs., Jhalda, Puruliya, 2.x.1986, A. K. Das; 2 exs., Balarampur, Puruliya, 2.x.1986, A. K. Das; 1 ex., Hilli, West Dinajpur, 30.x.1987, A. K. Das; 1 ex., Islampur, West Dinajpur, 31.x.1987, A. K. Das; 2 exs., Belda, Medinapur, 18.i.1988, N. C. Sarkar.

Diagnosis : Cigar-shaped, anterior end broader and rounded and posterior end gradually tapering; micronuclei single and compact, lying close to massive and egg-shaped macronucleus; contractile vacuoles two.

Distribution : India : West Bengal (in all 17 districts); in freshwater as well as hay infusion. Orissa, Rajasthan, Uttar Pradesh, Jammu & Kashmir.

179. ***Paramecium*** sp.

Distribution : India : West Bengal (Calcutta).

Remarks : Simmons (1891) reported this species from pond water of Calcutta without mentioning its species-status.

Family FRONTONIIDAE

Key to the genera

1(2) Ovoid to ellipsoid with both the ends rounded, no dorsal ridge in the posterior region of the body, macronucleus oval.....***Frontonia***

2(1) Body pyriform with broadly rounded anterior end and bluntly pointed posterior end, a dorsal ridge present in the posterior region of the body, macronucleus sausage-shaped..... .....***Dissematostoma***

Genus ***Dissematostoma*** Lauterborn

180. ***Dissematostoma bengalensis*** Nair

1971. *Disemastoma* (Sic) *bengalensis* Nair, *Proc. Indian Acad.*, 73B, pp.74-77, fig. 1.

Material examined : 5 exs., Samchi vill. (Deula), South 24-Parganas; 3.i.1969, K. N. Nair.

Diagnosis : Body roughly pyriform, broadly elliptical; peristome measuring one-fourth of its body-length located in the middle of anterior third on the ventral ide; macronucleus horse-shoe shaped located around the peristome; contractile vacuole single located towards the middle of the body and having 8-10 radiating channels.

Distribution : India : West Bengal (South 24-Parganas districts); in freshwater.

Genus ***Frontonia*** Ehrenberg

Key to the species

1(2) Body elongated or ovoid, rounded at both ends, macronucleus ellipsoid, with several micronucleus, inhabiting freshwater.....*F. leucas*

2(1) Body oval, flattened, macronucleus short, sausage shaped with single micronucleus, inhabiting moss.....*F. depressa*

181. ***Frontonia depressa*** (Stokes)

1886. *Colpoda depressa* Stokes, *Ann. Mag. nat. Hist.*, (5) **17.**

Material examined : 5 exs., Indian Museum campus, Calcutta, 23.ix.1969, K. N. Nair.

Diagnosis : Body ovoid, flattened, body size small, 50-65 µm × 30-40 µm in dimension; contractile vacuole single with strong radiating canals and located below the middle, macronucleus short, sausage-shaped with single micronucleus, inhabiting moss.

Distribution : India : West Bengal (Calcutta); in ground moss. New record from India.

182. ***Frontonia leucas*** (Ehrenberg)

1838. *Bursaria leucas* Ehrenberg, *Die. Infusionsthierchen als Volkommene organismen, Leipzig*, p. 329, pl. 34, fig. 8.

Material examined : 2 exs., Wellington Square, Calcutta, 12.viii.1959 & 18.viii.1961, K. N. Nair; 1 ex., Botanical Garden, Sibpur, Haora, 25.vi.1959, K. N. Nair; 1 ex., Barasat, North 24-

Parganas, 6.xii.1965, R. N. Mukherjee; 2 exs., Indian Museum tank, Calcutta, 2.iv.1976, R. Roy; 1 ex., Pond in Maldah College campus, Maldah town, 15.iii.1984, A. K. Das; 2 exs., Gour, Maldah, 16.iii.1984, A. K. Das;1 ex., Madupur (near Baharampur Bostal School), Murshidabad, 25.iii.1984, A. K. Das; 1 ex., Lavpur vill., Birbhum, 8.iv.1984, A. K. Das; 1 ex., Bairagidighi, Koch Bihar, 10.iv.1986, A. K. Das; 1 ex., Tuffangunj, Koch Bihar, 12.iv.1986, A. K. Das; 1 exs., Simlapal, Bankura, 27.ix.1986, A. K. Das; 1 exs., Purulia town, 1.x.1986, A. K. Das; 1 ex., Raigunj, West Dinajpur, 29.x.1987, A. K. Das; 1 ex., Hilli, West Dinajpur, 29.x.1987, A. K. Das; 1 ex., Hilli, West Dinajpur, 30.x.1987, A. K. Das; 1 ex., Isalampur (near Panchyat Office), West Dinajpur, 31.x.1987, A. K. Das.

Diagnosis : Body elongated or ovoid, rounded at both ends, body size larger, 250-300 μm × 140-150 μm in dimension; contractile vacuole single with long radiating canals and located at the middle of the body; macronucleus ellipsoid with several micronuclei.

Distribution : India : West Bengal (Bankura, Birbhum, Calcutta, Haora, Koch Bihar, Maldah, Murshidabad, North 24-Parganas, Puruliya and West Dinajpur districts); in freshwater. Jammu & Kashmir, Rajasthan, Maharastra.

Family UROCENTRIDAE

Genus ***Urocentrum*** Nitzsch

183. ***Urocentrum turbo*** (Muller)

1786. *Cercaria turbo* Muller, *Animalc. Infusoria fluviat. et. marina etc., Hafniae et Lipsiae,* pp. 123-124, pl. 26, figs. 13-16.

Material examined : 2 exs., Jadavpur, Calcutta, 20.x.1959, K. N. Nair; 1 ex., Wellington Square, Calcutta, 21.x.1959, K. N. Nair; 1 ex., Kalyani, Nadia, 5.x.1964, K. N. Nair; 1 ex., Bandel, Hugli, 9.xi.1964, K. N. Nair; 1 ex., Garia, South 24-Parganas, 6.ix.1965, K. N. Nair; 1 ex., Barasat, North 24-Parganas, 14.xii.1966, A.K. Das; 1 ex., pond in Maldah College campus, Maldah town, 15.iii.1984, A. K. Das; 1 ex., Laldighi (Baharampur town), Murshidabad, 25.iii.1984, A. K. Das; 1 ex., Lavpur vill., Birbhum, A.K. Das; 1 ex., Balarampur, Puruliya, 2.x.1986, A. K. Das; 2 exs., Hilli, West Dinajpur, 30.x.1987, A. K. Das.

Diagnosis : Body resembling two spheres, closely oppressed, each encircles with a broad ciliary girdle, caudal tuft of cilia very conspicuous, no depressed prebuccal area, buccal cavity subequatorial in position; contractile vacuole single, with multiple collecting canals and posteriorly located; macronucleus horse-shoe-shaped.

Distribution : West Bengal (Calcutta, Hugli, Maldah, Murshidabad, Nadia, North 24-Parganas, Puruliya, South 24-Parganas and West Dinajpur district); in freshwater. Rajasthan, Maharastra, Jammu & Kashmir.

Family NEOBURSARIDAE

Genus ***Neobursaridium*** Balech

184. ***Neobursaridium gigas*** Balech

1941. *Neobursaridium gigas* Balech, *Physis Buenos Aires,* **49**, pp. 29-35.

Material studied : 10 exs., Jadavpur, Calcutta 4.i.1963, K. N. Nair.

Diagnosis : Body broadly ovate and purse-shaped, anterior end truncated; peristome large and conspicuous ending in a conical cytopharynx, false adoral zone of membranellae short and situated on left side of the peristome; macronucleus long, dumbel-shaped and located in the middle of the body; contractile vacuole two, each with several long radiating canals.

Distribution : India : West Bengal (Calcutta); in freshwater.

Remarks : Mahajan and Nair (1971) recorded this species for the first time from Asia that too from Calcutta. Since then no further report on this species from India is published.

Order SCUTICOCILIATIDA

Suborder PHILASTERINA

Key to the families

1(2) Body elongated oval, generally uniformly ciliated, buccal cavity small, anteroventral in position.....LOXOCEPHALIDAE

2(1) Body small, flattened, ovoid to ellipsoidal, with sparse ciliature limited to ventral surface; oral area sometimes disproportionately large, midventral in position ..... CINETOCHILIDAE

Family LOXOCEPHALIDAE

Genus ***Loxocephalus*** Eberhard

Body ovoid to cylindrical, cytostome crescentric located at a slightly flattened area near anterior end, with zone of cilia around the body and with one or more long caudal cilia.

185. ***Loxocephalus plaguis*** (Stokes)

1885. *Dexiotricha plagius* Stokes, *Amer. Nat.*, **19**, pp. 433-443.

Material studied : 2 exs., Diamond Harbour, South 24-Parganas, 11.i.1965, K. N. Nair; 1 ex., Birnagar, Nadia, 3.xii.1966, A. K. Das.

Diagnosis : Body slender, nearly cylindrical, 15-16 ciliary rows, single long caudal cilium, contractile vacuole just behind middle of the body, endoplasm usually dark coloured.

Distribution : India : West Bengal (Nadia and South 24-Parganas districts); in freshwater. Orissa.

Family CINETOCHILIDAE

Key to the genera

1(2) Body oval to ellipsoid, highly flattened, cilia on flat ventral surface only, cytostome right of median line of posterior half, with a membrane on both edges, forming a packet, with 3-4 caudal cilia.....***Cinetochilum***

2(1) Body oval to pyriform, compressed, ciliation uniform, tetrahymenal cytostome located at anterior one-third to one-fourth of the body, caudal cilia may or may not present ....***Sathrophilus***

Genus ***Cinetochilum*** Petry

186. ***Cinetochilum margaritaceum*** Petry

1852. *Cinetochilum margaritaceum* Petry, *Mitth. nat. Ges.*, Bern, 1849, p. 29.

Material studied : 1 ex., Rabindra Sarobar, Calcutta, 12.x.1965, A. K. Das; 2 exs., Barasat, North 24-Parganas, 6.xii.1965, A. K. Das; 1 ex., Adisaptagram, Hugli, 5.i.1967, A. K. Das; 2 exs., Kamarkundu, Hugili, 3.ix.1968, A. K. Das; 1 ex., Birnagar, Nadia, 3.xii.1968, A. K. Das; 2 exs., pond in Maldah College campus, Maldah, 15.iii.1984, A. K. Das; 1 ex., Pokabandh, (Bishnupur), Bankura, 25.ix.1986, A. K. Das.

Diagnosis : Body small, oval and highly flattened cytostome as described in the genus; macronucleus spherical and central, caudal cilia long, contractile vacuole terminal.

Distribution : India : West Bengal (Bankura, Calcutta, Hugli, Maldah, Nadia and North 24-Parganas districts); in freshwater. Rajasthan.

Genus ***Sathrophilus*** Corliss

187. ***Sathrophilus chlorophagus*** (Kahl)

1931. *Saprophilus chlorophagus* Kahl, *Urtiere order Protozoa*, (in Dahl's *Tierwest Dtsch.*) Jena, pt. 21, p. 349, fig. 33.

Material studied : 5 exs., Adisaptagram, Hugli, 22.ii.1967, A. K. Das.

Diagnosis : Body slender, oval, cilia long, cytostome located at anterior one-third of the body; cytoplasm heavily leden with irregular green food material; contractile vacuole terminal.

Distribution : India : West Bengal (Hugli district); in freshwater. New record from India.

Suborder PLEURONEMATINA

Key to the families

1(2) Paroral membrane very prominent, sometimes present as stiff velum and distinctly curling around subequatorial cytostome; body ciliation comparatively dense... PLEURONEMATIDAE

2(1) Buccal ciliatures less prominent; paroral membrane without any velum, body ciliation spares; .....CYCLIDIIDAE

Family PLEURONEMATIDAE

Genus ***Pleuronema*** Dujardin

Ovoid to ellipsoid; peristome extending from anterior end to two third of the body; conspicuous membrane at both edges, a semicircular swelling to left near oral area.

188. ***Pleuronema crassum*** Dujardin

1841. *Pleuronema crassa* Dujardin, *Histoire nat. des. Zoophytes Infusoires*, Paris, pp. 474-475, pl. 6, fig. 1, pl. 14, fig. 2.

Material studied : Sev. exs., Wellington Square, Calcutta, 9.vi.1960, Sectional party.

Diagnosis : Body irregularly ovoid, peristome prominent, undulating membrane very distinct and narrow anteriorly, and rapidly widening posteriorly; macronucleus round with adjacent micronucleus, located at the anterior half of the body; contractile vacuole single and posterodorsal.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh (1921 a) collected *Pleuronema chrysalis* from hay infusions of Calcutta. But, Kahl (1931) considered this species as *Paramecium chrysalis*. If the species collected by Ghosh (*op. cit*) belong to the genus *Pleuronema*, from his description (*see* Bhatia, 1936) it appears that it belongs to *P. crassum*. Subsequently, *P. crassum* has been collected from a freshwater pool of Calcutta by the Zoological Survey of India party.

Family CYCLIDIIDAE

Key to the genera

1(2) Body long, ovoid, with a caudal cilium, peristome near right side, a membrane occurs on its right edge, forming a pocket around cytostomal groove.....***Cyclidium***

2(1) Body similar as above, peristome nearer median line, diagonally right to left; right peristomal ridge with a sail-like membrane which surrounds cytostome at its posterior end..... .....***Ctedoctema***

Genus *Ctedoctema* Stokes

189. *Ctedoctema acanthocrypta* Stokes

1884. *Ctedoctema acanthocrypta* Stokes, *Amer. Nat.*, **27**, pp. 659-60.

Material examined : 8 exs., Indian Museum campus, Calcutta, 29.vii.1968, K. N. Nair.

Diagnosis : Body long, ovoid with a frontal plate, body cilia long, dense and well spread; peristome occupying about three-fourth of body-length, macronucleus round lying in the anterior half of the body, contractile vacuole single, located at the posterior half of the body.

Distribution : India : West Bengal (Calcutta). New record from India.

Remarks: This species has been collected from ground moss from the locality as stated above.

Genus *Cyclidium* Muller

190. *Cyclidium glaucoma* Muller

1786. *Cyclidium glaucoma* Muller, O. F., *Animalc.infusoria fluviat, et. marinea, etc., Hafniae et Lipsiae*, p.80, pl.11, figs.6-8.

Diagnosis : Body ovoid with posterior end broadly rounded; a long caudal cilium conspicuous; undulating membrane prominent; macronucleus round and lying at the middle of the body; contractile vacuole single and postero-terminal.

Distribution : India : West Bengal (Haora district). Rajasthan.

Remarks : Choudhury (1929) reported this species from the soils of Sibpur (Haora), West Bengal.

Subclass PERITRICHIA

Order PERITRICHIDA

Suborder SESSILINA

Key to the families

1(4) Usually stalked and without any lorica

2(3) With contractile stalk, colonial (except in two genera), in colonial forms zooids not independently contractile (except in one species).....VORTICELLIDAE

3(2) Usually stalked, with stalk often noncontractile (but body may be highly contractile)..... .....EPISTYLIDIDAE

4(1) With or without stalk, loricate

5(6) Solitary, with or without stalk, attachment not at the opening.....VAGINICOLIDAE

6(5) Solitary, stalkless, attachment is only at opening.....LAGENOPHRYIDAE

Family VORTICELLIDAE

Key to the genera

1(2) Inverted bell form, solitary, may be in clusters but not in colonies ..... ***Vorticella***

2(1) Shape similar to above, but colonial

3(4) Each branch contractile as an independent unit.....***Carchesium***

4(3) The whole conony contracts at the same time .....***Zoothamnium***

Genus ***Carchesium*** Ehrenberg

191. ***Carchesium polypinum*** (Linnaeus)

1767. *Vorticella polypina* Linnaeus, *Systema Naturae*, 13*th* ed., p.1317.

Diagnosis : Body campanulate, broadly expanded in front; peristomial border everted and recurved; macronucleus form an arc in the longitudinal plane, colony comprising large number of individuals.

Distribution : India : West Bengal (South 24-Parganas). Karnataka.

Remarks : Annandale (1907) collected this species from backish and freshwater ponds of Port Canning (South 24-Parganas).

192. ***Carchesium*** Sp.

Distribution : India : West Bengal (Calcutta).

Remarks : Simmons (1891) collected this form from pond water of Calcutta.

Genus *Vorticella* Linnaeus

Key to the species

1(10) Cuticular surface of the body smooth

2(5) Body conical or elongate, stalk comparatively short in length ranging from 1 to 2 times the length of the body

3(4) Body elongated and cylindrical, length-breadth radio 3 : 1, stalk as long as body..... ..... *V. subcylindrica*

4(3) Body more or less vase-shaped, length-breadth ratio 2 : 3, stalk twice as long as body..... ..... *V. subsinuata*

5(2) Body not elongate and cylindrical, stalk longer, about 3 to 7 times the length of the body

6(9) Body more or less campanulate

7(8) Body broadly companulate, peristomial margin widely dilated, stalks vary long, sometimes 6 to 7 times longer than the body ..... *V. campanula*

8(7) Body conical-campanulate, widest at the anterior border and then tapering in a straight line to form a cone, stalk 3 to 4 times the length of the body..... *V. patellina*

9(6) Body spheroidal, with posterior end tapering abruptly to a point, peristomial margin half the greatest diameter of the body, stalk 4-5 times the length of the body..... *V. globosa*

10(1) Cuticular surface of the body transversely annulated

11(12) Body subpyriform, peristomial margin widely everted and slightly less than greatest body diameter in the middle, stalk less than twice the body length..... *V. submicrostoma*

12(11) Body curved, obliquely conical-campanulate; peristomial margin placed obliquely and slightly everted; stalk 4 to 5 times the body length..... *V. subprocubens*

193. *Vorticella campanula* Ehrenberg

1831. *Vorticella campanula* Ehrenberg, *Abhandl. d. Konigl. Akad. d. Wissensch. zu Berlin,* 1831 (1832) p.92.

Material examined : Sev. exs., Rabindra Sarobar, Calcutta, 12.x.1965, A. K. Das; Sev. exs., Barasat, North 24-Parganas, 6.xii.1965, A. K. Das; Sev. exs., Adisaptagram, Hugli, 28.ii.1967, A. K. Das; Sev. exs., Champahati, South 24-Parganas, 11.vii.1967, A. K. Das; Sev. exs., Dankuni, Haora, 3.x.1967, A. K. Das; Sev. exs., pond in Maldah College Campus, Maldah, 15.iii.1984, A. K. Das; Sev. exs., Madhupur (near Baharampur Bostal School), Murshidabad, 5.iii.1984, A. K. Das; Sev. exs., Kandi, Murshidabad, 28.iii.1984, A. K. Das; Sev. exs., Giajung, Murshidabad, 29.iii.1984, A. K. Das.

Diagnosis : Body usually broadly campanulate, but shape considerably variable; peristomial margin thick and much dialated, cuticular surface smooth and highly elastic; macronucleus band from; stalk thick and about 4 to 7 times the length of the body.

Distribution : India : West Bengal (Calcutta, Haora, Hugli, Maldah, Murshidabad, North and South-24 Parganas districts) : in freshwater. New record from India.

194. *Vorticella globosa* Ghosh

1922. *Vorticella globosa* Ghosh, *Bull. Carmichael Med. Coll.*, 3, p.8, pl. 1, fig.3.

Diagnosis : Body spherical, with posterior end tapering considerably to join with the stalk; peristomial margin half the greatest diameter of the body and raised vertically like a collar; cuticular surface smooth, macronucleus horse-shoe shaped; stalk 4-5 times the length of the body.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh (1922) described this species from 'pond water' of Calcutta.

195. *Vorticella patellina* O. F. Muller

1777. *Vorticella patellina* (?) O. F. Muller, *Zoologies danicae S. animal. Danie et Norvergiae rac. ac. minus notor. icones., Hafnae et Lipsiae,* p. 281.

Diagnosis : Body conical-campanulate, widest at the anterior border, peristomial margin thin, cuticular surface smooth, macronucleus resembling an arc, stalk thin 3 to 4 times the length of the body.

Distribution : India : West Bengal (Calcutta).

Remarks : Grant (*see* Cantor, 1842) observed this species in pond water of Calcutta.

196. *Vorticella subcylindrica* Ghosh

1922. *Vorticella subcylindrica* Ghosh, *Bull. Carmichael Med. Coll.*, p. 8, pl. 1, fig. 2.

Diagnosis : Body elongated, cylindrical, length-breadth ratio 3 : 1, tapering at aboral end to join with the stalk; peristomial margin slightly everted and raised; cuticular surface smooth; macronucleus band form; stalk thin and about as long as the body.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh (1922) described this species from pond water of Calcutta.

197. *Vorticella submicrostoma* Ghosh

1922. *Vorticella submicrostoma* Ghosh, *Bull. Carmichal Med. Coll.*, p.8, pl.1, fig. 1.

Diagnosis : Body subpyriform tapering towards aboral end, body constricted behind peristome, peristomial margin considerably everted, cuticular surface transversely annulated; macronucleus horse-shoe shaped; stalk stout less than twice the length of the body.

Distribution : India : West Bengal (Calcutta).

Remarks : This species has also been described by Ghosh (1922) from pond water of Calcutta. Kahl (1935) regarded this species as the larger variety of *V. octava* Stokes.

198. *Vorticella subprocubens* Ghosh

1922. *Vorticella subprocubens* Ghosh, *Bull, Carmichael Med. Coll.*, p.9, pl.1, fig. 4.

Diagnosis : Body conical-campanulate and curved obliquely, peristomial margin placed obliquely and slightly everted, cuticular surface transversely annulated, stalk 4 to 5 times the body length.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh (1922) described this species from pond water of Calcutta. Kahl (1935) considered it as a doubtful species.

199. ***Vorticeda subsinuata*** Ghosh

1922. *Vorticella subsinuata* Ghosh, *Bull, Carmichael Med. Coll.*, p.9 pl.1, fig. 4.

Diagnosis : Body resembling a vase, length-breadth ratio 2 : 3, peristomial margin slightly everted; cuticular margin smooth, stalk about 2 times the body length.

Distribution : India : West Bengal (Calcutta).

Remarks : This species has also been described by Ghosh (1922) from pond water of Calcutta.

200. ***Vorticella*** sp.

Distribution : India : West Bengal (Calcutta).

Remarks : Simmons (1891) reported this form from 'pond water' of Calcutta.

Genus ***Zoothamnium*** Bory de St. Vincent

201. ***Zoothamnium horai*** Khajuria and Pillai

1951. *Zoothamnium horai* Khajuria and Pillai, *Rec. Indian Mus.* **48**; p.55.

Diagnosis : Zooids colonial, homomorphic, strongly marked with transverse ridges and furrows; zooids globular, peristome narrow, nucleus longer.

Distribution : India : West Bengal (Medinipur district).

Remarks : Khajuria and Pillai (1951) described this species after collecting the specimens from a freshwater tank at Contai (Dist. Medinipur), West Bengal. The specimens were found attached to the scales on the latero-ventral surface of one specimen of fish *Mugil tade*.

Family EPISTYLIDIDAE

Key to the genus

Individuals on non-contractila branched stalk, forming large colonies..... ***Epistylis***

Genus ***Epistylis*** Ehrenberg

202. ***Epistylis anastatica*** (Linnaeus)

1767. *Vorticella anastatica* Linnaeus, *Systema Naturae*, 13*th* ed., p.1317.

Material examined : 2 exs., Wellington Square, Calcutta, 6.ii.1961, K.N. Nair.

Diagnosis : Body conical-campanulate, length-breadth ratio 3 : 1, cuticular surface smooth or finely and transversely striated; stalk moderately thick and entirely smooth.

Distribution : India : West Bengal (Calcutta). New record from India.

Remarks : This species was collected from freshwater around a fountain in Wellington Square, Calcutta during 1961. The specimens were found attached to some aquatic vegetation.

203. *Epistylis* sp.

Distribution : India : West Bengal (Calcutta).

Remarks : Simmons (1891) recorded this form from pond water of Calcutta, without giving any specific identify.

Family VAGINICOLIDAE

Key to the genera

1(4) Lorica without any stalk

2(3) Lorica attached to a submerged substratum, object directly with its posterior end ..... ***Vaginicola***

3(2) Lorica usually with neck-like constriction anteriorly and attached to the submerged substratum by its lateral side..... ***Platycola***

4(1) Lorica with stalk

5(6) Locira without any operculum and remaining open during contraction ..... ***Cothurnia***

6(5) Lorica with operculum beneath the border of peristome and remaining closed with lorica during contraction..... ***Pyxicola***

Genus *Cothurnia* Ehrenberg

204. *Cothurnia* sp.

Distribution : India : West Bengal (Calcutta).

Remarks : Simmons (1891) reported this form from pond water of Calcutta.

Genus *Platycola* Kent

Key to the species

1(2) Lorica wihout distinct collar and without any transverse striations ..... *P. decumbens*

2(1) Lorica with short collar and usually with eight transverse striations ..... *P. striata*

205. *Platycola decumbens* (Ehrenberg)

1830. *Vaginicola decumbes* Ehrenberg, *Abh. preuss. Akad. Wiss.*, Berlin, p.41.

Material examined : 1 ex., Indian Museum tank, Calcutta, 8.x.1963, K.N. Nair.

Diagnosis : Lorica broadly oval, without any distinct collar or any transverse striation, colourless to yellow in colour.

Distribution : India : West Bengal (Calcutta).

Remarks : Mahajan and Nair (1965) recorded this species from a freshwater pond of Calcutta.

206. *Platycola striata* (Fromentel)

1874. *Vaginicola striata* Fromentel, *Etudes sur les Microzoaires*, Paris.

Material examined : 2 exs., Indian Museum tank, Calcutta, 30.i.1962, K.N. Nair; 1 ex., Falta, South 24-Parganas, 2.viii.1965, K.N. Nair.

Diagnosis : Lorica elliptical with very short collar and usually with eight transverse striations in a regular distance, yellowish to brown in colour.

Distribution : India : West Bengal (Calcutta).

Remarks : Nair (1966) recorded this species for the first time from India, that too, from West Bengal and found this species to be attached on the zoecium of a bryozoan encrustation on *Valisnaria* leaves.

207. *Platycola* sp.

Distribution : India : West Bengal (Calcutta).

Remarks : Simmons (1891) reported this species from 'pond water' of Calcutta.

Genus *Pyxicola* Kent

208. *Pyxicola affinis* Kent

1881. *Pyxicola affinis* Kent, A mannual of the Infusoria, London, p.727, pl. 40, figs. 28,29.

Material examined : 3 exs., Indian Museum tank, Calcutta, 8.x.1963, K.N. Nair.

Diagnosis : Lorica urceolate, slightly curved at anterior end and little narrowed beneath aperture end, colourless or deep brown; animalcule when fully extended an operculum clearly visible on anterolateral surface of a conical protruberance.

Distribution : India : West Bengal (Calcutta).

Remarks : This species has already been reported by Mahajan and Nair (1965) from West Bengal.

Genus *Vaginicola* Lamarck

209. *Vaginicola crystallina* Ehrenberg

1830. *Vaginicola crystallina* Ehrenberg, *Abh. preuss. Akad. Wiss.*, Berlin, p.41.

Material examined : 1 ex., Indian Museum tank, Calcutta, 8.x.1963, K.N. Nair.

Diagnosis : Lorica transparent, vase-like, usually with two individuals, one of them being invariably shorter.

Distribution : India : West Bengal (Calcutta).

Remarks : Mahajan and Nair (1965) were the first to report this species from West Bengal.

210. *Vaginicola* sp.

Distribution : India : West Bengal (Calcutta).

Remarks : Simmons (1891) reported this species from pond water of Calcutta.

Family LAGENOPHRYIDAE

Key to the genus

Lorica with short neck and flattened adhering surface.....***Lagenophrys***

Genus ***Lagenophrys*** Stein

211. ***Lagenophrys labiata*** Stokes

1887. *Lagenophrys labiata* Stokes, *J. roy. micr. Soc.*, 7, pp. 35-40, pl.5.

Material examined : 3 exs., Jadavpur, Calcutta 21.ix.1966, K.N. Nair.

Diagnosis : Lorica oval in side profile, orifice of lorica with two labial flaps through which peristome bearing portion protrudes.

Distribution : India : West Bengal (Calcutta).

Remarks : Nair (1966) reported this species from the freshwater pond of Calcutta and found it to be attached on the branchial vesicles of *Gammarus* sp.

Class	POLYHYMENOPHOREA
Subclass	SPIROTRICHIA
Order	HETEROTRICHIDA
Suborder	HETEROTRICHINA

Key to the families

1(2) Anterior part of the body uniquely twisted to left and posterior part sometimes tailed and/or bearing tuft of longer cilia.....METOPIDAE

2(1) Anterior part of the body not twisted as above

3(4) Oral ciliature spiralling clock wise about 360° around flared out anterior end, body highly contractile, trumpet-shaped and elongate.....STENTORIDAE

4(3) Oral ciliature not spiralling as above and body not trumpet-shaped

5(6) Body large, elongate and cylindrical or pyriform, highly contractile, peristomial field long and narrow.....SPIROSTOMIDAE

6(5) Body large, elongate but not highly contractile, periostomial field funnel-like and prominent

7(8) Body large elongate or nearly ellipsoidal, macronucleus usually long and moniliform..... .....CONDYLOSTOMATIDAE

8(7) Body large, broad with round posterior end, macronucleus elongate and rod-like..... .....BURSARIIDAE

Family SPIROSTOMIDAE

Key to the genera

1(2) Elongated cylindrical, peristome without any twist or undulating membrane; contractile vacuole very large, terminal and extending forward as straight canal.....***Spirostomum***

2(1) Body usually pyriform or ellipsoidal somewhat narrowed anteriorly, peristome twisted to right at posterior end and connected with oral funnel without membrane, contractile vacuole terminal and without any straight canal.....***Blepharisma***

Genus ***Blepharisma*** Perty

Key to the species

1(2) Cytoplasm pink coloured, peristome extending about one-third the length of the body, macronucleus elongated .....*B. intermedium*

2(1) Cytoplasm colourless, peristome extending about half the length of the body, macronucleus consisting of two to six nodes connected by a thin strand.....*B. undulans*

212. ***Blepharisma intermedium*** Bhandary

1962. *Blepharisma intermedium* Bhandary, *J. Protozool.*, **9**, p.437, figs. 1 & 7.

Material examined : 3 exs., Jadavpur, Calcutta, 19.ii.1963, K.N. Nair; 2 exs., Deula, South 24-Parganas, 3.i.1969, A.K. Das.

Diagnosis : Body flattened, ellipsoidal, cytoplasm pink coloured; undulating membrane not very prominent, extending about one-third the length of the body, macronucleus cylindrically elongated, number of micronuclei 6 to 30.

Distribution : India : West Bengal (Calcutta and South 24-Parganas districts); in freshwater. Karnataka.

Remarks : Mahajan and Nair (1971) were the first to report this species from West Bengal.

213. ***Blepharisma undulans*** Stein

1859. *Blepharisma undulans* Stein, *Der organismus der Infusionsthiere II. Wilheln Engelmann*, Leipzig, p.186.

Material examined : 2 exs., Jadavpur, Calcutta, 22.iii.1963, Sectional Staff; 1 ex., Rabindra Sarobar, Calcutta, 14.ii.1966, K.N. Nair; 1 ex., Pokabandh (Bishnupur), Bankura, 25.ix.1986, A.K. Das; 3 exs., Hugli, West Dinajpur, 30.x.1987, A.K. Das.

Diagnosis : Body flattened, cylindrical, cytoplasm colourless, undulating membrane prominent, extending about half the length of the bdoy; macronucleus consisting of macronuclei two to six nodes, connected by a thin strand.

Distribution : India : West Bengal (Bankura, Calcutta and West Dinajpur districts); in freshwater. Rajasthan.

Genus ***Spirostomum*** Ehrenberg

Key to the species

1(2) Very large in size (500-3000 µm or more), cytostome usually extending beyond the middle of the body, macronucleus monilifrom.....*S. ambiguum*

2(1) Moderate in length (150-400 μm); cytostome usually not extending upto the middle; macronuclous oval.....*S. teres*

214. *Spirostomum ambiguum* Ehrenberg

1835. *Spirostomum ambiguum* Ehrenberg, *Abhandl. d. Konigl. Akad. d. Wissensch. zu Berlin,* 1835 (1837), p. 165.

Material examined : 2 exs., Jadavpur, Calcutta, 25.xii.1958, K.N. Nair; 2 exs., Monohardas Tadak, Calcutta, 17.iii.1959, K.N. Nair; 2 exs., Barddhaman town, 14.ii.1966, A.K. Das; 1 ex., Naihati, North 24-Parganas, 17.x.1966, A.K. Das; 1 ex., Tulsihata, Maldah, 19.iii.1984, A.K. Das; 1 ex., Hilli, West Dinajpur, 30.x.1987, A.K. Das.

Diagnosis : Body elongate and cylindrical, length more than ten times the width, peristome extending upto or even beyond the middle of the body; macronucleus elongated and moniliform; contractile vacuole very large and terminal with a straight canal.

Distribution : India : West Bengal (Barddhaman, Calcutta, Maldah, North 24-Parganas and West Dinajpur districts); in freshwater. Jammu & Kashmir.

215. *Spirostomum teres* Claparede & Lachmann

1858-61. *Spirostomum teres* Claparede and Lachmann, *Etudes sur les infusoires et les rhizopodes,* Geneve, p.233, pl.11, figs. 1-2.

Material examined : 2 exs., Alipurduar, Jalpaiguri, 14.iv.1986, A.K. Das; 1 ex., Simlapal, Bankura, 27.ix.1986, A.K. Das.

Diagnosis : Body elongated, posterior end truncated; cytostome not usually extending upto the the middle of the body; macronucleus oval or spindle shaped and located at the middle; contractile vacuole as in the preceeding species.

Distribution : India : West Bengal (Bankura and Jalpaiguri districts); in freshwater. Jammu & Kashmir.

Family METOPIDAE

Key to the genera

1(2) Body elongated, flattened dorsoventrally and narrow anteriorly, body torsion very slight at left side of the anterior end, undulating membrane prominent, peristome not spiraling ....***Bothrostoma***

2(1) Body elongated, ovoid or pyriform, body torsion very strong at left side of the anterior end, undulating membrane not very prominent, peristome may or may not spiraling

3(4) Anterior body part shorter than or equal to posterior body part, buccal vavity not very large, peristome never spiraling, cytostome subanterior or subequatorial.....***Metopus***

4(3) Anterior body part greatly enlarged and posterior body part reduced in length, peristome spiraling, buccal cavity extremely developed shifting the cytostome to posterior extremity..... .....***Brachonella***

Genus *Bothrostoma* Stokes

Key to the species

1(2) Anterior end of the body with a large rostrum-like continuation, macronucleus crescent-shaped ..... *B. nasuta*

2(1) Body without any rostrum-like continuation at anterior end, macronucleus sausage-shaped or ellipsoid

3(4) Anterior and posterior end of the body slightly attenuated, undulaing membrane short..... ..... *B. extenta*

4(3) Anterior end often with a short beak, posterior end retracted, undulating membrane very much developed..... *B. mirabilis*

216. *Bothrostoma extenta* (Kahl)

1926. *Metopus extentus* Kahl, *Arch. Protistenk., 55*, p. 127, fig. 1a-e.

Material examined : 2 exs., Sahid colony (Paikpara), Calcutta, 14.ii.1963, K. N. Nair.

Diagnosis : Body elongated, slightly flattened, anterior and posterior ends slightly attenuated; buccal cavity well developed; cytostome reaching about two-third of the ventral body surface; macronucleus ellipsoid or sausage-shaped; contractile vacuole occupying the posterior end.

Distribution : India : West Bengal (Calcutta); in freshwater. First record from India.

Remarks : Jankowski (1963) has placed *Metopus extentus* Kahl under the genus *Bothrostoma* Stokes.

217. *Bothrostoma nasuta* (Da Cunha)

1915. *Metopus nasutus* Da Cunha, *Brazil Med.*, Rio de Janeiro, p. 129.

Material examined : 1 ex., Sahid colony (Paikpara), Calcutta, 5.x.1962, K. N. Nair.

Diagnosis : Body elongated, slightly flattened, anterior end with a rostrum-like prolongation, posterior end retracted; buccal cavity well developed, undulating membrane very large, cytostome extending slightly below the equatorial line; macronucleus crescent-shaped; contractile vacuole located at the posterior end.

Distribution : India : West Bengal (Calcutta); in freshwater.

Remarks : Mahajan and Nair (1965) reported this species from West Bengal under the name *Metopus nasutus*.

218. *Bothrostoma mirabilis* (Kahl)

1927. *Metopus mirabilis* Kahl, *Arch. Protistenk.*, Jena, **57**, p. 129, fig. 2a-e.

Material examined : 2 exs., Sahid colony (Pakipara), Calcutta 5.xi.1963, K. N. Nair; 1 ex., Adisaptagram, Hugli, 5.i.1967, K. N. Nair.

Diagnosis : Body elongated, flattened, anterior end often with a short beak and posterior end retracted; buccal cavity and undulating membrane strongly developed, cytostome extended almost to posterior extremity; macronucleus sausage-shaped or ovoid; contractile vacuole as in *B. nasuta.*

Distribution : India : West Bengal (Calcutta and Hugli districts); in freshwater. First report from India.

Genus ***Brachonella*** Jankowski

Key to the species

1(2) Anterior body part much exceeds the posteior body part; AZM beginning anteriorly and ending posteriorly ..... *B. spiralis*

2(1) Anterior and posterior body parts almost equal in length but lower body part narrow; AZM equatorial beginning and ending in same level ..... *B. campanula*

219. ***Brachonella campanula*** (Kahl)

1927. *Metopus intercendes* Kahal, *Arch. Protistenk.*, Jena **57**, p. 165, fig. 23.

Material examined : 3 exs., Sibpur, Haora, 19.viii.1959, K. N. Nair.

Diagnosis : Body ovoid to pyriform with anterior and posterior body parts almost equal in length, but anterior body part wide and posterior body part narrow; AZM ring-like, equatorial, beginning and ending in same level; buccal cavity equatorial and cytostome posteriorly shifted; macronucleus round; contractile vacuole located at posterior end.

Distribution : India : West Bengal (Haora district); in freshwater. First record from India.

220. ***Brachonella spiralis*** (Smith)

1897. *Metopus spiralis* Smith, *Trans. Amer. micr. Soc.*, **19**, p. 19, p. 62, pl.1, fig. 13.

Material examined : 3 exs., Shibpur, Haora, 32.viii.1959, K. N. Nair.

Diagnosis : Body broadly oval, brownish, anterior body parts much exceeding posterior one and resembling the 'Shield' of *Caenomorpha;* posterior end bearing tuft of lng caudal cilia; AZM beginning anteriorly and ending posteriorly; cytostome shifted to posterior pole dorsally; macronucleus round or ovoid; contractile vacuole occupying posterior end.

Distribution : India : West Bengal (Calcutta and Haora districts); in freshwater. Rajasthan.

Remarks : Nair (1960) and Mahajan and Nair (1965) reported this species from West Bengal under the name *Metopus spiralis.*

Genus ***Metopus*** Claparede and Lachmann

Key to the species

1(10) Body elongated, anterior body-part much shorter than posterior body part

2(5) Contractile vacuole large, posterior end with raising edges

3(4) Body of clear brownish tint and irregular shape, posterior extremity flattened ..... *M. fuscus*

4(3) Body slightly reddish, oval, both anterior and posterior end rounded.....*M. ovalis*

5(2) Contractile vacuole comparatively small, posterior end without any raising edge

6(7) Body flattened, oblong-oval, anterior left side tortion of the body very much pronounced to forming a beak.....*M. rostratus*

7(6) Body sigmoid, anterior left side tortion of the body not forming any beak

8(9) Body comparatively large, its anterior left side tortion well pronounced, pellicular striations prominent.....*M. es.*

9(8) Body small, its anterior left side tortion not well developed, pellicular striations absent.....*M. daphnides*

10(1) Body rhomboid or ovoid, with rounded anterior and acute posterior ends, anterior part equal to posterior part.....*M. striatus*

221. *Metopus daphnides* Jankowski

1964. *Metopus dephnides* Jankowski, *Acta Protozool.*, **2** : 33.

Material examined : 2 exs., Diamond Horbour, South 24-Parganas, 11.ix.1964, K. N. Nair; 2 exs., Lake town, Calcutta, 17.xii.1964, K. N. Nair.

Diagnosis : Body more or less sigmoid, small in dimension (55-70 µm × 25-40 µm), with canvex right and concave left lateral sides; cytoplasm clear yellowish, pellicular striations absent, macronucleus single, long and ovoid, contractile vacuole without any raising edge and located at the posterior end.

Distribution : India : West Bengal (Calcutta and South 24-Parganas districts); in freshwater. New record from India.

222. *Metopus es* Muller

1786. *Metopus es* Muller, *Animalc. infusoria fluviat. et marina etc., Hafniae and Lipsiae*, p. 126.

Material examined : 3 exs., Indian Museum tank, Calcutta, 29.viii.1961, K. N. Nair; 2 exs., Sahid colonoy (Paikpara), Calcutta, 2.i. & 10.i.1963, K. N. Nair.

Diagnosis : Body characteristically sigmoid, comparatively large and slender (92 µm × 26 µm), cytoplasm colourless, pellicular striations prominent, macronucleus single and sausage-shaped; contractile vacuole as in *M. dephnides*.

Distribution : India : West Bengal (Calcutta); in freshwater. Andhra Pradesh, Rajasthan.

Remarks : Mahajan and Nair (1965) reported this species from West Bengal for the first time.

223. *Metopus fuscus* Kahl

1927. *Metopus fuscus* Kahl, *Arch. Protistenk.*, Jena, **57**, p. 147, fig. 14 a-d.

Material examined : 10 ex., Diamond Harbour, South 24-Parganas, 27.ix.1964, K. N. Nair; 2 exs., Barrackpur, North 24-Parganas, 31.v.19 66, K. N. Nair.

Diagnosis : Body of clear brownish tint and irregular in shape, posterior extremity flattened, pellicular striations fine, anterior left side tortion conspicuous, macronucleus single, oval or slightly reniform and sharply outlined; contractile vacuole large, with raising edges and located posteriorly.

Distribution : India : West Bengal (North and South 24-Parganas districts); in freshwater. Rajasthan.

224. *Metopus ovalis* Kahl

1927. *Metopus ovalis* Kahl, *Arch. Protistenk.* Jena., 57, p. 142, figs. 11 a, b.

Material examined : 1 exs., Diamond Harbour, South 24-Parganas, 27.viii. 1964, K. N. Nair.

Diagnosis : Body oval, anterior and posterior ends, rounded, pellicular striations large and wide; macronucleus single, ovoid and not sharply outlined; contractile vacuble with raising edges and located at the posterior end.

Distribution : India : West Bengal (South 24-Parganas district); in freshwater. Rajasthan.

225. *Metopus rostratus* Kahl

1927. *Metopus rostratus* Kahl, *Arch. Protistenk.*, Jena, 57, p. 136, fig. 6 a.

Material examined : 2 exs., Sahid colony, Calcutta, 19.i.1963, K. N. Nair; 3 exs., Chandkhali (Taldi), South 24-Parganas, 22.viii & 5.xi.1968, K. N. Nair.

Diagnosis : Body flattened, oblong-oval, anterior left side body tortion very much pronounced to form a beak resembling *Loxophyllum* or *Litonotus* in shape; macronucleus single, ellipsoid; contractile vacuole without any raising edge and located at the posterior end.

Distribution : India : West Bengal (Calcutta and North 24-Parganas districts); in freshwater. First record from India.

226. *Metopus striatus* Mc Murrich

1884. *Metopus striatus* Mc Murrich in Kahl, 1932, *Urtiere oder Protozoa* (in : Dahl's Tiewelt Dtsch.), Jena, pt. 25, p. 25 p. 421, fig. 24.

Material examined : 6 exs., Barrackpur, North 24-Parganas, 31.v.1966, K.N. Nair.

Diagnosis : Body rhomboid and triangular, flattened dorsoventrally, with rounded anterior and acute posterior ends, anterior body part equal to posterior body part but posterior one much wider; cytoplasm brownish; macronucleus single, rounded or slightly ovoid; contractile vacuole occupying the posterior end of the body.

Distribution : India : West Bengal (North 24-Parganas); in freshwater. New record from India.

Family CONDYLOSTOMATIDAE

Genus *Bryometopus* Kahl

Body flat, oval or ellipsoidal, undulating membrance absent, macronucleus round or oval with several micronuclei, contractile vacuole single, located near ventral side near posterior two third of the body, moss inhabiting.

227. *Bryometopus pseudochilodon* Kahl

1932. *Bryometopus pseudochilodon* Kahl, *Urtiere oder Protozoa* (in : Dahl's *Tierwelt Dtsch.)*, Jana, pt. 25, p. 434, Fig. 20-22.

Material examined : 9 exs., Indian Museum campus, Calcutta, 29.vii.1968, K.N. Nair.

Diagnosis : Body ellipsoidal, flat, contour resembling that of *Chilodon*; protoplasm colourless and glossy, macronucleus oval, micronuclei several and adjascent to macronucleus, contractile vacuole single and terminal.

Distribution : India : West Bengal (Calcutta). New record from India.

Remarks : This is a moss-inhabiting form and is collected from ground moss grown around Indian Museum tank in Calcutta.

Family STENTORIDAE

Genus *Stentor* Oken

Large, trumpet-shaped or cylindrical, highly contractile, peristome very conspicuous occupying almost whole of the anterior end, macronucleus round, oval, elongated or moniliform.

Key to the species

1(2) Body trumpet-shaped when fully expanded, macronucleus moniliform not extending entire length of the body ..... *S. polymorphus*

2(1) Body elongately conical in fully expanded condition, macronucleus ribbon-shaped and coiled, extending entire length of the body ..... *S. viridis*

228. *Stentor polymorphus* (Muller)

1773. *Vorticella polymorpha* Muller, *Hafniae et Lipsiae, parts I & II*, p. 98.

Diagnosis : Body colourless, yellow or sometimes green, trumpet-shaped in fully expanded condition; hair-like bristles present along the margin of the body; macronucleus moniliform; contractile vacuole situated near the mouth.

Distribution : India : West Bengal (Calcutta). Jammu and Kashmir.

Remarks : Ghosh (1921a) collected this species from Calcutta and observed it to be attached to submerged aquatic plant.

229. *Stentor viridis* Ghosh

1921. *Stentor viridis* Ghosh, *Bull. Carmichael Med. Coll.*, **2**; p.15, fig.9.

Diagnosis : Body yellow in colour, shape elongately conical with truncate apical end; macronucleus ribbon-shaped and coiled extending througout the entire length of the body, contractile vacuole located just beneath the pseudostome with a backward canal presenting a fusiform dialation.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh (1921a) collected this species from freshwater pond of Calcutta among *Vorticella* and *Epistylis* colonies.

Family BURSARIIDAE

Genus ***Bursaria*** Muller

Very large, ovoid, anterior end truncate, posterior end broadly rounded, peristome deep and wide extending about the middle of the body, cytostome bent to the left, macronucleus band shaped with numerous micronuclei.

230. ***Bursaria truncatella*** Muller

1773. *Bursaria truncatella* O.F. Muller, *Hafnie et Lipsiae*, p.62.

Material examined : 12 exs., Ghoshpara, Kalyani, Nadia, 14.ix.1964, K.N. Nair & P. Parui; 4 exs., garia, South 24-Parganas, 5.x., 22.x. & 8.ii.1965, K.N. Nair; 2 exs., Barddhaman town, Barddhaman, 12.xi.1965, A.K. Das.

Diagnosis : Body ovate, purse-shaped, dorsal surface convex, ventral surface flat; peristome and nucleus as in the genus; contractile vacuoles many and distributed all over the body.

Distribution : India : West Bengal (Barddhaman, Nadia and South 24-Parganas districts); in freshwater. First report from India.

Suborder ARMOPHORINA

Family CAENOMORPHIDAE

Body top-shaped, pellicle rigid, cytostome near antepical pole, AZM usually encircling the body, spiralling posterior.

Genus ***Caenomorpha*** Perty

Body top-shaped, with a long caudal spine, a dense spiral field present around the caudal prolongation, strong marginal zone of about eight rows of cilia.

Key to the species

1(2) Body medusoid, more or less hemispherical, spine not exceeding the body length, macronuclei 3-4 in number.....*C. medusula*

2(1) Body medusoid umbrella-shaped, spine usually exceeding the body length, macronuclei always 2 in number.....*C. lata*

231. ***Caenomorpha lata*** Kahl

1927. *Caenomorpha medusula* var. *lata* Kahl., *Arch. Protistenk.*, Jena, **57**, p. 171, fig. 270.

Material studied : 1 ex., Sibpur, Haora, 15.x.1962, K.N. Nair; 2 exs., Sahid colony (Paikpara), Calcutta, 30.xi.1962, K.N. Nair.

Diagnosis : Body diffused, bell shaped; caudal spine long and stout; macronucleus bi-articulate, micronucleus single and located below the connective strand of the ends of macronucleus; subpellicular granule stout.

Distribution : India : West Bengal (Calcutta and Haora districts); in freshwater. New record from India.

232. *Caenomorpha medusula* Perty

1852. *Caenomorpha medusula* Perty, *Zur Kenntnis Kleinster Lebenstormen*, Bern., p.140.

Material studies : 3 exs., Botanical Garden, Haora, 8.xi.1962, Sectional staff; 2 exs., Sahid colony (Paikpara), Calcutta, 30.xi.1962, K.N. Nair; 2 exs., Krishna Sagar, Barddhaman town, 7.viii.1965, R.N. Mukherjee.

Diagnosis : Body dense, more or less hemispherical or bell-shaped with a long caudal projection; disposition of nucleus as in previous species, subpellicular granules very delicate.

Distribution : India : West Bengal (Barddhaman, Calcutta and Haora districts); in freshwater. Rajashthan.

Remarks : Mahajan and Nair (1971) were the first to record this species from India, that too from Calcutta.

Suborder COLIPHORINA
Family FOLLICULINIDAE

Lorica pseudochitinous, 'peristomial wings' extending out from lorica; peristomial surface ciliated, undulating membrane lacking.

Genus *Folliculina* Lamarck

Body contractile and remains fixed to the lorica by its posterior extremity, peristomial cilia very long, peristomial wing very prominent.

233. *Folliculina ampulla* (O.F. Muller)

1786. *Vorticella ampula* O.F. Muller, *Hafniae et Lipsiae*, pp.283-285, pl. 40, figs. 4-7.

Diagnosis : Lorica blue green, flask-shaped with neck upwards, attached laterally, body large, peristomial wings 3-6 times as long as broad, with sharply or bluntly pointed end, macronucleus spherical.

Distribution : India : West Bengal (South 24-Parganas).

Remarks : Annaldale (1907) collected this species from the brackishwater pond at Port Canning, South 24-Parganas district.

Order ODONTOSTOMATIDA
Family EPALXELLIDAE

"Chunky" forms, usually with short posterior spines and without cirri, anterior row of cilia on the left side.

Genus ***Saprodinium*** Lauterborn

Right carapace with one dorsal and one ventral ciliary row in posterior region; median teeth usually 4, sometimes 2 or 3, some anal teeth with and some without spine.

234. ***Saprodinium dentatum*** Lauterborn

1901. *Saprodinium dentatum* Lauterborn, *Zeitschr.f. Fischerei*, 9.

Material examined : 4 exs., Adisaptagram, Hugli, 5.i.1967, K.N. Nair.

Diagnosis : Very flat, translucent, front provided with a long thin tooth, frontal band with 2 projecting marginal ridge; peristomial cover broad and prominent, macronuclei 2 to 3 in number.

Distribution : India : West Bengal (Hugli district). First report from India.

Order OLIGOTRICHIDA

Suborder OLIGOTRICHINA

Key to the families

1(2) Circle of apical membranellae 'open'.....HALTERIIDAE

2(1) Circle of apical membranellae 'closed'.....STROBILIDIIDAE

Family HALTERIIDAE

Genus ***Halteria*** Dujardin

Small, spherical or broadly fusiform, oral aperture terminal, eccentric and associated with large cilia, equatorial zone with long stiff springing bristles.

235. ***Halteria grandinella*** (Muller)

1773. *Trichoda grandinella*, O.F. Muller, *Hafniae et Lipsiae*, p.77.

Material examined : 2 exs., Jadavpur, Calcutta, 21.xi. & 4.xii.1959, K.N. Nair; 1 ex., Barddhaman town, 14.ii.1966, R.N. Mukherjee; 2 exs., Mansai river, Mathabhanga, Koch Bihar, 15.iv.1986, A.K. Das; 1 ex., Raigunj, West Dinajpur, 29.x.1987, A.K. Das.

Diagnosis : Body broadly fusiform, sometimes globose, about 7 bristle-bearing grooves present in the equatorial zone, each bearing 3 long bristles; macronucleus oval; contractile vacuole single and located at the anterior half.

Distribution : India : West Bengal (Barddhaman, Calcutta, Koch Bihar, and West Dinajpur districts); in freshwater. New Record from India.

Family STROBILIDIIDAE

Genus ***Strobilidium*** Schewiakoff

Turnip-shaped, oral aperture apical and without cytopharynx, macronucleus horse-shoe shaped and located at the anterior end.

236. *Strobilidium gyrans* Stokes

1887. *Strombidium gyrans* Stokes, *J. roy. micr. Soc.*, 7, pp.35-40.

Material examined : 1 ex., Patipukur, Calcutta, 21.iv.1964, K.N. Nair; 1 ex., Rabindra Sarobar, Calcutta, 7.i.1966, K.N. Nair; 1 ex., Chandkhali (Taldi), South 24-Parganas, 5.xi.1968, K.N. Nair; 2 exs., Victoria falls, Darjiling, 2.iv.1986, A.K. Das; 2 exs., Waterpool near Synchal lake, Darjiling, 4.iv.1986, A.K. Das; 1 ex., Meghia, Bankura, 28.ix.1986, A.K. Das; 1 ex., Jhalda, Puruliya, 2.x.1986, A.K. Das;

Diagnosis : Body turnip-shaped or pyriform, posterior end truncate or with a knob-like projection, macronucleus as in the genus, contractile vacuole single and located below the middle of the body.

Distribution : India : West Bengal (Bankura, Calcutta, Darjiling, Puruliya and South 24-Parganas districts); in freshwater. Rajasthan.

Order HYPOTRICHIDA

Suborder STICHOTRICHINA

Family SPIROFILIDAE

Ventral cirri inconspicuous and in quite numerous and/or helically spiralled rows.

Key to the genera

1(2) Body pyriform, posterior end resembling a short tail, peristome large extending one-half the body length.....***Hypotrichidium***

2(1) Body slender, peristome bearing part beak-like/narrowed peristome extending over one-fourth but usually not up to one-half of the body-length .....***Stichotricha***

Genus *Hypotrichidium* Ilowaisky

237. *Hypotrichidium conicum* Ilowaisky

1921. *Hypotrichidium conicum* Ilowaisky, *Arb. der biol. Wolgastat*, 6.

Material examined : 3 exs., Barasat, 24-Parganas, 6.ix.1965, A.K. Das.

Diagnosis : Body pyriform, posterior, part arched and posterior end resembling a short tail; peristome large and deep; three long rows of cirri on the ventral side; macro and micronuclei two in number.

Distribution : India : West Bengal (North 24-Parganas); in freshwater. New Record from India.

Genus *Stichotricha* Perty

238. *Stichotricha socialis* Gruber

1880. *Stichotricha socialis* Gruber, *Zeit. Schr. f. Wiss. Zool.*, 33.

Material examined : 8 exs., Bhola vill.(Kamarkundu), Hugli, 3.ix.1968, A.K. Das.

Diagnosis : Body slender, ovoid, posterior end rounded and anterior end gradually attenuated; peristome extending more than half of the body; four spiral rows of ventral cirri present; living in gelatinous colonial tubes.

Distribution : India : West Bengal (Hugli district); in freshwater. New record from India.

239. *Balladinopsis nuda* Ghosh

1921. *Balladinopsis nuda* Ghosh, *J. roy. micr. Soc.*, p. 248, fig. 1.

Diagnosis : Body rigid, elliptical, with narrower anterior and wide posterior end; peristome narrow extending two thirds the body-length, three ventral cirri present and located near the peristomial margin at the anterior half of the body; anal cirri five, long and protruding beyond the posterior margin of the body; macronuclei oval and two in number.

Distribution : India : West Bengal (Calcutta).

Remarks : Ghosh (1921b) established the genus *Balladinopsis* and described a monotypic species *B. nuda*. Corliss (1979) considers this genus as *incertae sedis* under the suborder Stichotrichina.

Suborder SPORADOTRICHINA

Key to the families

1(2) Distinctive rows of right and lelf marginal cirri, (adoral zone of membranellae restricted to anterior third or quarter of the elongated body) ..... OXYTRICHIDAE

2(1) Marginal cirri absent or greatly reduced

3(4) Adoral zone poorly developed, cirri reduced in number and limited to frontals and anals ..... ASPIDISCIDAE

4(3) Adoral zone well developed, transverse and frontoventral cirri often tremendously developed, anals of 5 cirri conspicuous ..... EUPLOTIDAE

Family OXYTRICHIDAE

Key to ther genera

1(2) Marginal cirri continuous, three to four rows of ventral cirri between ventrals and marginals, seven anals, of which two more posteriorly located ..... ***Pleurotricha***

2(1) Marginal cirri may or may not continuous, five ventral cirri and five anals present

3(4) Short or no caudal cirri ..... ***Oxytricha***

4(3) Three well developed caudal cirri ..... ***Slylonychia***

Genus *Oxytricha* Bory de St. Vincent

240. *Oxytricha fallax* Stein

1859. *Oxytricha fallax* Stein, *Der organismus der Infusionsthier*, Leipzig, **1**, p.189, pl.12, figs. 12-15.

Material examined : 1 ex., Indian Museum tank, Calcutta, 19.iii.1962, K.N. Nair; 2 exs., Tank in Maldah College campus, Maldah, 15.iii.1984, A.K. Das; 3 exs., Gour, Maldah, 16.iii.1984, A.K. Das; 2 exs., Gargari vill. (Harishchandrapur), Maldah, 19.iii.1984, A.K. Das; 2 exs., Gargari vill. (Harishchandrapur), Maldah, 19.iii.1984, A.K. Das; 1 ex., Ramkeli vill (Piasbari), Maldah, 20.iii.1984, A.K. Das; 3 exs., Kandi, Murshidabad, 28.iii.1984, A.K. Das; 3 exs., Giagunj, Murshidabad, 29.iii.1984, A.K. Das; 2 exs., Lalbag, Murshidabad, 30.iii.1984, A.K. Das; 2 exs., Sainthia, Birbhum, 3.iv.1984, A.K. Das; 3 exs., Tarapith, Birbhum, 4.iv.1984, A.K. Das; 2 exs., Dubrajpur, Birbhum, 5.iv.1984, A.K. Das; 2 exs., Bakreshwar, Birbhum, 6.iv.1984, A.K. Das; 1 ex., Lavpur, Birbhum, 8.iv.1984, A.K. Das; 2 exs., Bolpur, Birbhum, 10.iv.1984, A.K. Das; 2 exs., Dhupguri, Jalpaiguri, 23.iii.1986, A.K. Das; 1 ex., Victorial falls, Darjiling, 2.iv.1986, A.K. Das; 2 exs., Sukna, Darjiling, 5.iv.1984, A.K. Das; 2 exs., Dolabari (Dinhata), Koch Bihar, 11.iv.1986, A.K. Das; 2 exs., Bura river, Tuffangunj, Koch Bihar, 12.iv.1986, A.K. Das; 1 ex., Mathabhanga, Koch Bihar, 13.iv.1986, A.K. Das; Tank in Bankura Christain College campus, Bankura town, 24.ix.1986, A.K. Das; 1 ex., Nimta vill. (Bishnupur), Bankura, 25.ix.1986, A.K. Das; 2 exs., Meghia, Bankura, 28.ix.1986, A.K. Das; 2 exs., Kusumbandh, Puruliya town, 1.x.1986, A.K. Das; 1 ex., Jhalda, Puruliya, 2.x.1986, A.K. Das; 2 exs., Raigunj, West Dinajpur, 29.x.1987, A.K. Das; 2 exs., Hilli, West Dinajpur, 30.x.1987, A.K. Das; 2 exs., Islampur, West Dinajpur, 31.x.1987, A.K. Das.

Diagnosis : Ellipsoidal, posterior region broadly rounded; arrangement of cirri as in the genus; macronuclei usually in two parts; contractile vacuole single and located at the anterior end.

Distribution : India : West Bengal (Bankura, Birbhum, Calcutta, Darjiling, Jalpaiguri, Koch Bihar, Maldah, Murshidabad, Puruliya, West Dinajpur districts); in freshwater. Rajasthan.

Genus *Pleurotricha* Stein

241. *Peurotricha grandis* Stein

1859. *Pleurotricha grandis* Stein, *Lotos*, 9, p.4.

Diagnosis : Elliptical in shape and widest at little behind the middle; five ventral cirri stout; macronuclei two in number; contractile vacuole single and located close to the posterior angle of peristome.

Distribution : India : Maharastra, Madhya Pradesh, United Province, West Bengal (Haora).

Remarks : The only record of this species from this state has been made by Chaudhury (1929) from the soils of Sibpur, Haora district.

Genus *Slytonichia* Ehrenberg

242. *Stylonichia mytilus* Ehrenberg

1838. *Stylonichia mytilus* Ehrenberg, *Die Infusionsthierchen als vollkimmene Organismen*, Liepzig.

Material examined : 3 exs., Garia, South 24-Parganas, 8.ii.1965, K.N. Nair; 2 exs., Victorial falls, Darjiling, 2.iv.1986, A.K. Das.

Diagnosis : Ovoid in shape with anterior part broader than posterior one, ventral surface flat and dorsal surface convex; macronuclei oval, two in number, contractile vacuole single and located at the anterior half.

Distributon : India : West Bengal (Darjiling and South 24-Parganas districts). New record from India.

Family ASPIDISCIDAE

Genus ***Aspidisca*** Ehrenberg

Small, ovoid or shield-shaped, dorsal surface conspicuously ridged, cirri strong and long; macronucleus curved or horse shoe-shaped.

Key to the species

1(2) Peristome obliquely crescentric occupying posterolateral portion of ventral surface, four frontal, five ventral and five anal cirri present.....*A. bengalensis*

2(1) Peristome starting from anterior end reaching up to anal cirri, seven fronto-ventral and five anal cirri present.....*A. costata*

243. ***Aspidisca bengalensis*** (Ghosh)

1921. *Aspidiscopsis bengalensis* Ghosh, *J. roy. micr. Soc.*, pp.249-250, fig. 2.

Diagnosis : Body broadly ovate with a shallow notch just behind the anterior end; dorsal surface convex with six to seven longitudinal ridges; peristome obliquely crescentic, occupying postero lateral portion of ventral surface; four frontal, five ventral and five anal cirri present; contractile vacuole single posterior.

Distributon : India : West Bengal (Calcutta).

Remarks : Ghosh (1921b) described this species from the pond water of Calcutta. Since then no further report on this species is available till date.

244. ***Aspidisca costata*** (Dujardin)

1841. *Aspidisca costata* Dujardin, *Histoire nat des zoophytes infusoires*, p.446, pl.10. fig.1.

Material examined : 1 ex., Indian Museum tank, Calcutta, 27.i.1970, K.N. Nair.

Diagnosis : Body more or less ovate, rounded at both ends; dorsal surface convex with five to six distinct longitudinal ridges, peristome starting from the anterior end of the body extending up to the anal cirri, seven fronto-ventral and five anal cirri present; macronucleus curved, contractile vacuole single posterior.

Distributon : India : West Bengal (Calcutta).

Family EUPLOTIDAE

Genus ***Euplotes*** Ehrenberg

Body ovoid, peristome well developed and broadly triangular; frontoventral cirri more than nine, anal cirri well developed and five in number, caudal cirri four and scattered.

Key to the species

1(2) Oval with a triangular wing on left, two right caudals furcated ..... *E. leticiensis*

2(1) Subcircular, ellipsoid or asymmetrical, without any triangular wing, caudals not furcated

3(4) Macronucleus 'C' - shaped ..... *E. patella*

4(3) Macronucleus not 'C' - shaped

5(6) Body ellipsoid, macronucleus 3 - shaped ..... *E. plumipes*

6(5) Body asymmetrical, macronucleus bent near posterior portion resembling 'S' to some extent... ..... *E. gracilis*

245. *Euplotes leticiensis* Bovee

1957. *Euplotes leticiensis* Bovee, *J. Protozool,* 4, p.124.

Material examined : 1 ex., Barddhaman town, 14.vii.1966, K.N. Nair; 2 exs., Gour, Maldah, 16.iii.1984. A.K. Das.

Diagnosis : Body oval, peristome large with a triangular wing on left; frontoventral cirri nine, caudals four, out of which two right caudals furcated.

Distribution : India : West Bengal (Birbhum and Barddhaman districts); in freshwater. New record from India.

246. *Euplotes gracilis* Kahl

1932. *Euplotes gracilis* Kahl, *Urtiere order Protozoa* (in Dahl's *Tierwelt Dtsch.*), Jena, p.635, figs. 5. 630, 21, 22.

Material examined : 4 exs., Diamond Harbour, South 24-Parganas, 11.i.1965, K.N. Nair; 1 ex., Bura river, Tuffangunj, Koch Bihar, 12.iv.1986, A.K. Das.

Diagnosis : Body asymmetrical with two dorsal furrow; peristome narrow; frontoventral nine, caudals four nonfurcated; macronucleus bent near posterior end resembling 'S' to some extent.

Distribution : India : West Bengal (Koch Bihar and South 24-Parganas districts); in freshwater. New record from India.

247. *Euplotes patella* (Muller)

1786. *Kerona patella* (?) Muller, *Animalc Infusoria fluviat. et marina* etc., *Hafniae et Lipsiae,* p.238, pl.23, figs., 14-17.

Material examined : 1 ex., Maidan pond, Calcutta, 24.ii.1959, K.N. Nair; 1 ex., Dolabari (Dinhata), Koch Bihar, 11.iv.1986, A.K. Das; 1 ex., Alipurduar, Koch Bihar, 14.iv.1986, A.K. Das.

Diagnosis : Body subcircular to elliptical with narrow peristome, frontoventral cirri nine, caudals four nonfurcated, macronucleus 'C' - shaped.

Distribution : India : West Bengal (Calcutta, and Koch Bihar districts); in freshwater. Rajasthan.

248. *Euplotes plumipes* Stokes

1884. *Euplotes plumipes* Stokes, *Amer. mon. micr. J.*, Washington, 5, p.229, pl. 12, figs. 7,8.

Material examined : 1 ex., Garia, South 24-Parganas, 30.x.1964, K.N. Nair; 3 exs., Krishnasayar, Barddhaman town, 7.viii.1965, A.K. Das; 1 ex., Diamond Harbour, South 24-Parganas, 1.xi.1965, K.N. Nair; 1 ex., tank in Maldah College campus, Maldah town, 15.iii.1984; 1 ex., Laldigi, (Baharampur), Murshidabad, 25.iii.1984, A.K. Das; 1 ex., Alipurduar, Koch Bihar, 14.iv.1986, A.K. Das; 1 ex., Balarampur, Puruliya, 2.x.1986, A.K. Das.

Diagnosis : Body ellipsoid with wide and deep peristome, frontoventrals 9-10, caudals 4 non-furcated, macronucleus '3' - shaped.

Distribution : India : West Bengal (Barddhaman, Koch Bihar, Maldah, Murshidabad, Puruliya and South 24-Parganas districts); in freshwater. Rajasthan.

GENERAL REMARKS ON DISTRIBUTION

Freeliving protozoa occurring in each of 17 districts of West Bengal is shown in Map No.1 while district - wise distribution of each species has already been mentioned under the systematic account of the respective species.

A perusal of this distribution list reveals that out of 248 species only two species, both ciliates, viz., *Coleps hirtus* and *Paramecium caudatum* have been reported from all the 17 districts and seven other species as follows have been found from 10 or more districts of the state. Out of these seven species, five are rhizopods, *viz., Arcella discoides, Centropyxis aculeata, Centropyxis ecornix, Centropyxis spinosa* and *Difflugia lobostoma* and, two ciliates, *viz., Frontonia leucas* and *Oxytricha fallax*. This fact is interesting but misleading because the number of cosmopolitan species will invariably increase to a great extent if intensive collections and studies are made from the least surveyed districts.

For the convenience of analysis, district-wise distribution of protozoa of West Bengal reported/collected so far, is shown in the table.

From the table it is quite evident that number of freeliving protozoan species collected from Calcutta is considerably large compared to any other district of West Bengal. This is followed by the districts South 24-Parganas, Hugli and North 24-Parganas from where fifty or more species have been collected. This may be due to the reason that Hugli and erstwhile 24-Parganas were surveyed by ZSI scientists periodically and frequently from 1959 to 1967 for the collection and taxonomic study of freeliving protozoa. Furthermore, Simmons (1889-91) and Ghosh (1918-1929) collected a considerable number of protozoan species from the freshwater ponds, sewages and vegetable infusions of Calcutta. To the contrary, what has been reported from other districts is mostly the result of a single visit and single sampling, that too, from a very limited number of habitats. It is, therefore, quite probable that number of species occurring in those districts *vis-a-vis* West Bengal is many more than what is dealt with in this paper.

Name of district	No. of species of			
	Flagellates	Rhizopods	Ciliates	Total
Bankura	—	20	13	33
Barddhaman	1	8	10	19
Birbhum	—	8	9	17
Calcutta	3	20	98	121
Darjiling	—	3	8	11
Haora	1	9	15	25
Hugli	9	24	26	59
Jalpaiguri	—	7	7	14
Koch Bihar	—	15	9	24
Maldah	—	8	15	23
Medinipur	1	18	3	22
Murshidabad	—	8	12	20
Nadia	8	21	7	36
North 24-Parganas	9	23	18	50
Puruliya	—	10	10	20
South 24-Parganas	13	37	27	77
West Dinajpur	—	16	12	28

SUMMARY

A comprehensive taxonomic account of freeliving protozoa known so far from West Bengal is presented in the paper. In all 248 species of protozoa, belonging to 2 phyla, 2 subphyla, 7 classes, 29 orders, 76 families and 124 genera are dealt with. One new species, *Vannella bengalensis* n.sp. (Class Lobosea, order Amoebida, and Family Thecamoebidae) is described and taxonomic status of a rhizopod genus *Greeffia* Singh end Hanumaiah along with the species *G. soli* Singh and Hanumaiah discussed. Further, key to the families, genera and species is given. In addition to these, diagnostic feature of each species, its detail locality record and district - wise distribution in West Bengal are also incorporated.

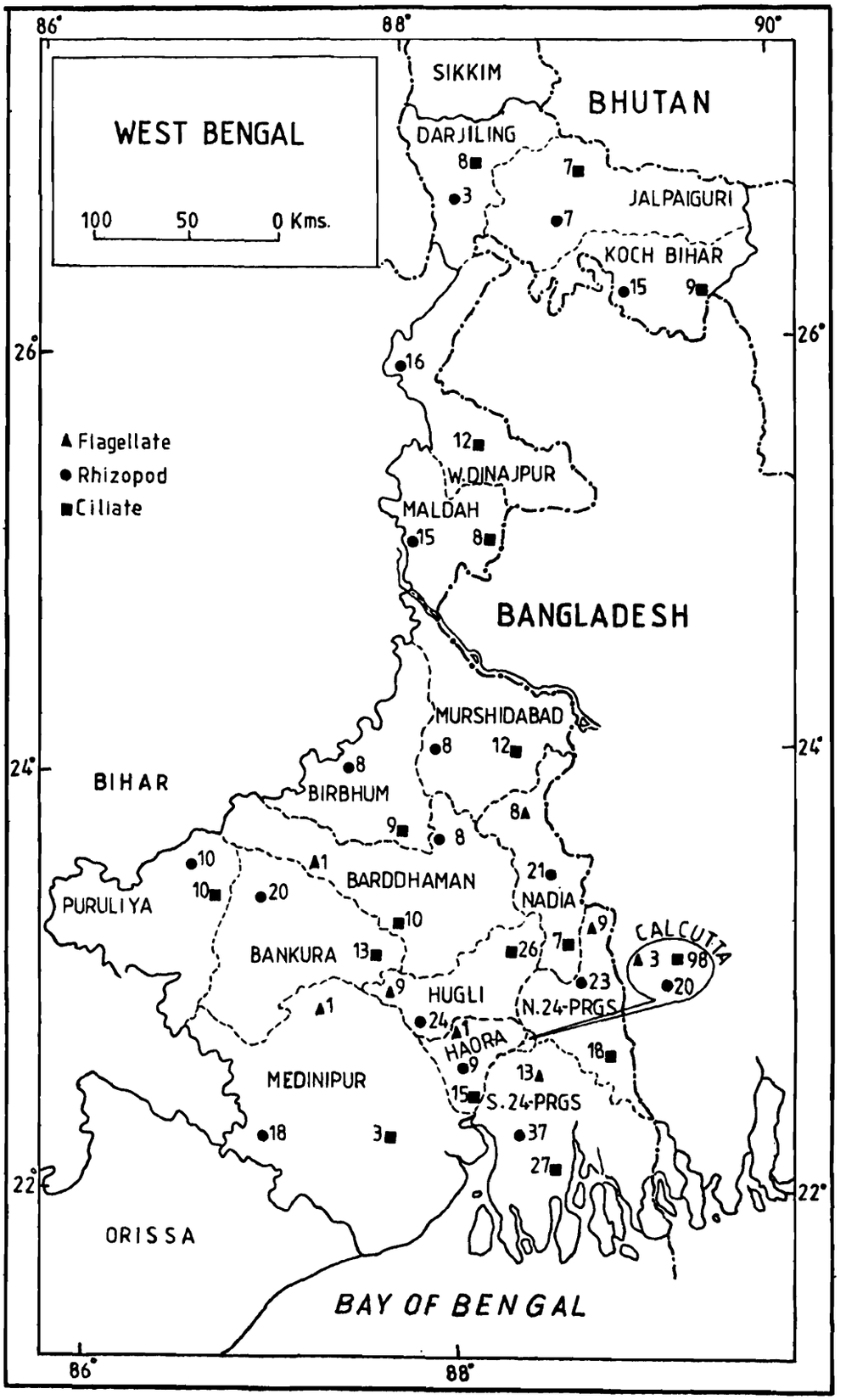
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LEGENDS OF MAPS

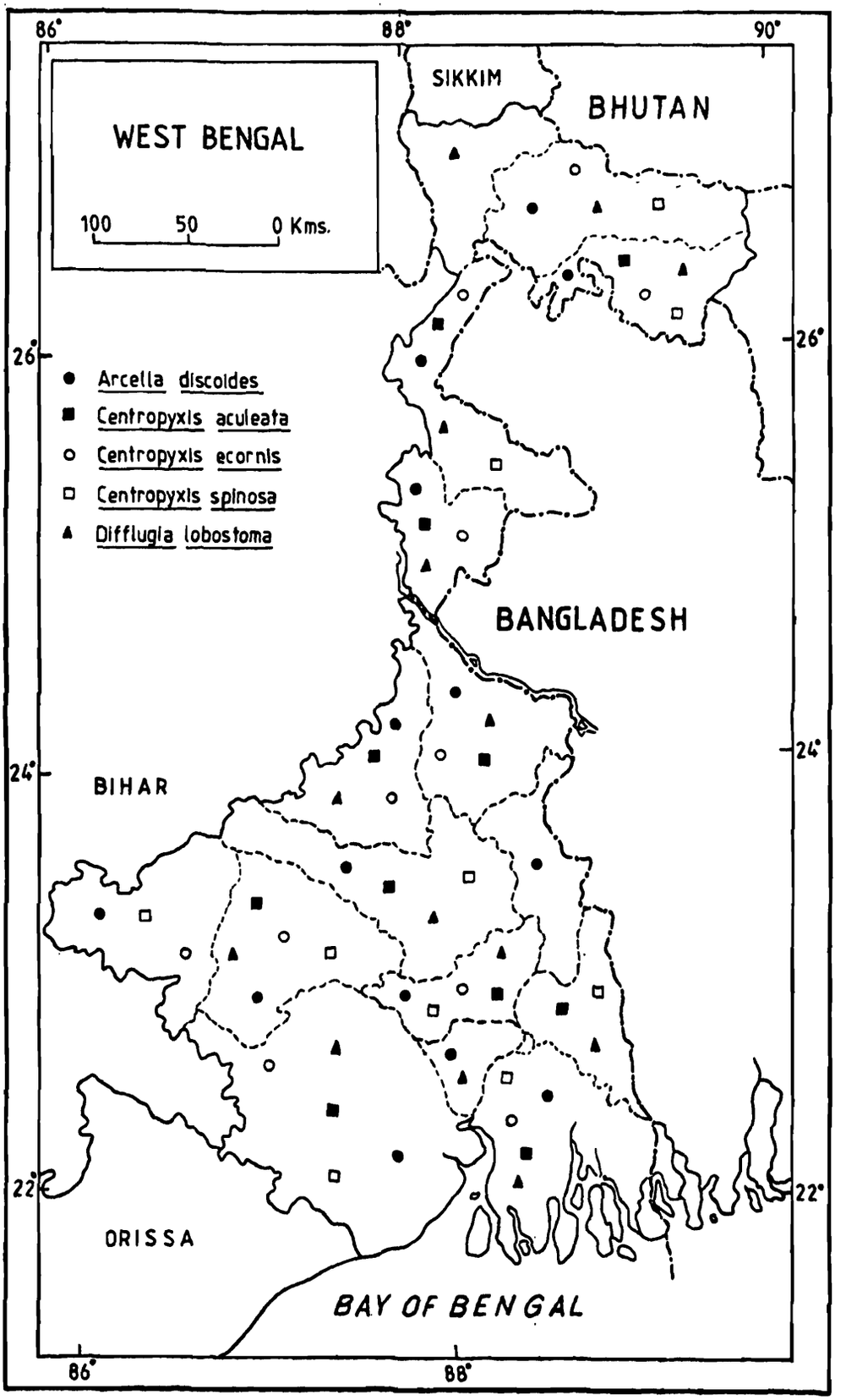
Bankura	Rh (27, 47, 48, 50, 58, 59, 62, 63, 64, 65, 73, 81, 83, 84, 88, 90, 94, 98, 99, 103); Cl (118, 120, 126, 142, 165, 177, 178, 182, 186, 213, 215, 236, 240).
Barddhaman	Fl (20); Rh (48, 51, 58, 65, 74, 83, 84, 88); Cl (118, 161, 165, 178, 214, 230, 232, 235, 245, 248).
Birbhum	Rh (48, 51, 58, 62, 67, 74, 75, 84); Cl (118, 120, 124, 134, 177, 178, 182, 240, 245).
Calcutta	Fl (1, 19, 20); Rh (25, 30, 32, 34, 47, 52, 61, 63, 67, 74, 80, 91, 93, 95, 96, 97, 102, 103, 106, 108); Cl (110, 111, 112, 113, 114, 115, 117, 118, 120, 125, 126, 128, 129, 130, 131, 132, 136, 137, 139, 140, 141, 142, 144, 145, 146, 147, 149, 150, 151, 152, 153, 154, 155, 157, 159, 161, 162, 165, 167. 168, 169, 170, 171, 172, 173, 174, 175, 176, 178, 179, 181, 182, 183, 184, 186, 188, 189, 192, 193, 194, 195, 196, 197, 198, 199, 200, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 217, 218, 219, 222, 223, 225, 226, 227, 228, 229, 231, 232, 235, 236, 239, 240, 243, 244, 247).
Darjiling	Rh (45, 84, 99); Cl (118, 125, 155, 165, 178, 236, 240, 242).
Haora	Fl (20); Rh (34, 43, 48, 70, 84, 94, 102, 103, 108) Cl (118, 120, 122, 135, 150, 151, 167, 178, 182, 190, 193, 221, 231, 232, 241).
Hugli	Fl (2, 4, 5, 6, 10, 12, 14, 15, 16); Rh (30, 36, 48, 51, 56, 58, 62, 65, 67, 71, 72, 73, 77, 84, 86, 87, 90, 94, 99, 102, 103, 107, 108, 109); Cl (118, 119, 120, 121, 123, 124, 126, 127, 129, 134, 138, 145, 156, 158, 161, 163, 164, 165, 177, 183, 186, 187, 193, 222, 234, 238).
Jalpaiguri	Rh (48, 53, 54, 62, 65, 83, 84); Cl (118, 126, 165, 178, 215, 218, 240).
Koch Bihar	Rh (41, 48, 50, 51, 58, 62, 65, 69, 74, 78, 79, 84, 90, 103, 107); Cl (118, 120, 126, 178, 182, 235, 240, 246, 247).
Maldah	Rh (36, 48, 51, 58, 62, 67, 84, 90); Cl (118, 124, 130, 138, 165, 177, 178, 182, 183, 186, 193, 214, 218, 240, 248).
Mednipur	Fl (2); Rh (28, 41, 42, 48, 51, 53, 54, 58, 62, 65, 67, 72, 77, 83, 88, 94, 103) Cl (118, 178, 201).
Murshidabad	Rh (36, 48, 51, 58, 62, 67, 74, 84); Cl (118, 134, 146, 155, 177, 178, 182, 183, 193, 218, 240, 248).
Nadia	Fl (2, 4, 5, 10, 14, 17, 21, 24); Rh (25, 48, 53, 54, 57, 61, 63, 67, 73, 74, 80, 81, 82, 85, 86, 87, 88, 90, 93, 99, 105); Cl (118, 160, 178, 183, 185, 186, 230).
North 24-Parganas	Fl (4, 5, 6, 7, 10, 11, 13, 14, 24); Rh (33, 34, 35, 38, 45, 53, 54, 58, 59, 63, 65, 74, 75, 78, 80, 84, 89, 94, 99, 103, 104, 105, 107); Cl (118, 120, 126, 141, 142, 143, 159, 177, 178, 182, 184, 186, 193, 214, 216, 220, 227, 237).
Purulia	Rh (31, 48, 60, 62, 65, 68, 76, 90, 94, 103); Cl (118, 141, 142, 177, 178, 182, 184, 236, 240, 248).
South 24-Parganas	Fl (2, 3, 4, 5, 6, 8, 9, 10, 13, 14, 22, 23, 24); Rh (26, 29, 36, 37, 39, 40, 41, 44, 46, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 62, 65, 66, 67, 74, 83, 84, 85, 88, 89, 90, 91, 92, 100, 101, 103); Cl (116, 118, 120, 126, 133, 141, 145, 160, 167, 177, 178, 180, 184, 185, 191, 193, 206, 212, 217, 220, 224, 225, 230, 233, 236, 242, 246).
West Dinajpur	Rh (40, 48, 49, 51, 58, 62, 65, 67, 69, 74, 75, 83, 84, 88, 94, 99); Cl (118, 126, 141, 178, 182, 184, 213, 214, 232, 235, 240, 248).

** The numerical number in the parenthesis indicates the serial number of the species given in the systematic list in pages 12-17.

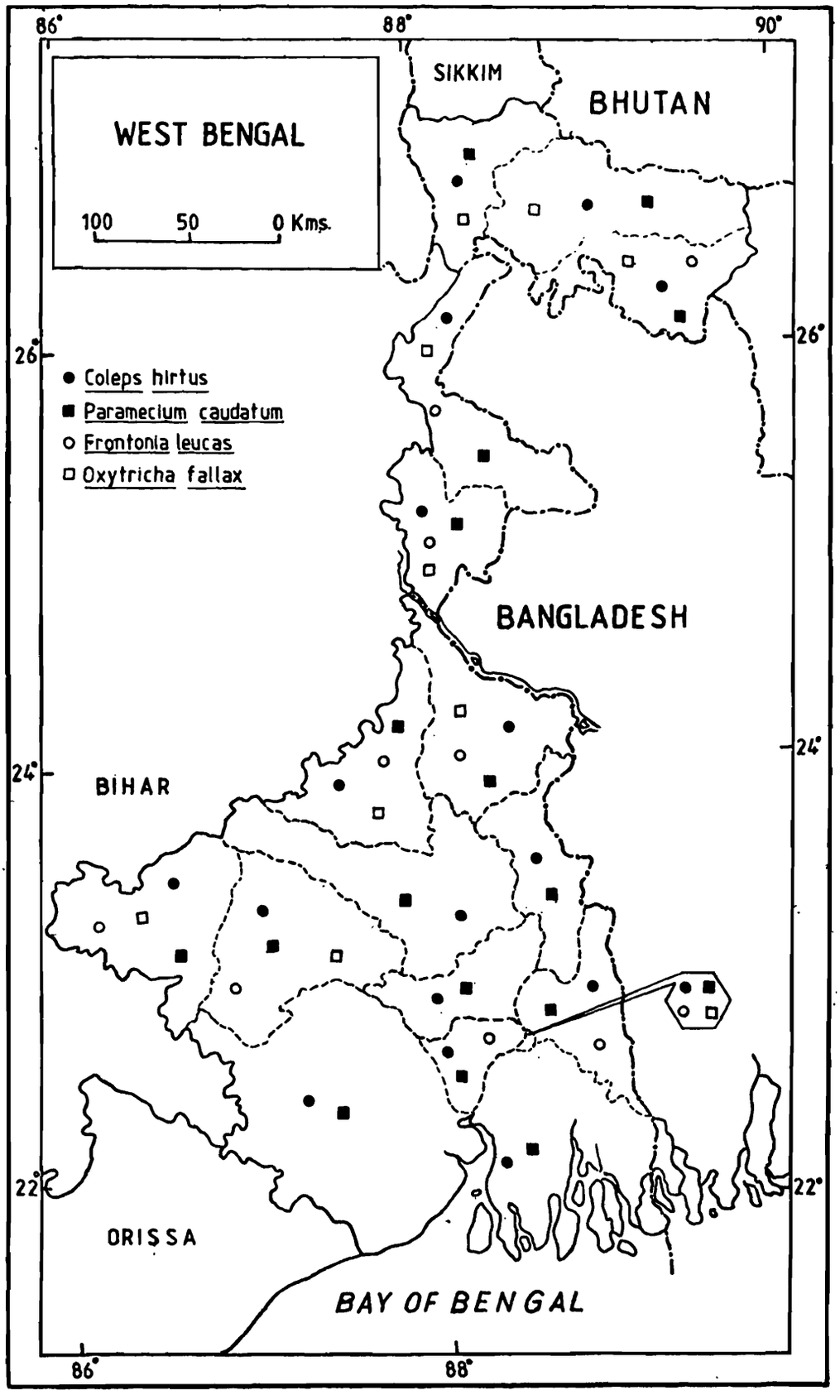


Map. 1. Showing district-wise distribution of freeliving flagellates, rhizopods and ciliates (in number of species); numerical number indicates number of species of concerned group.

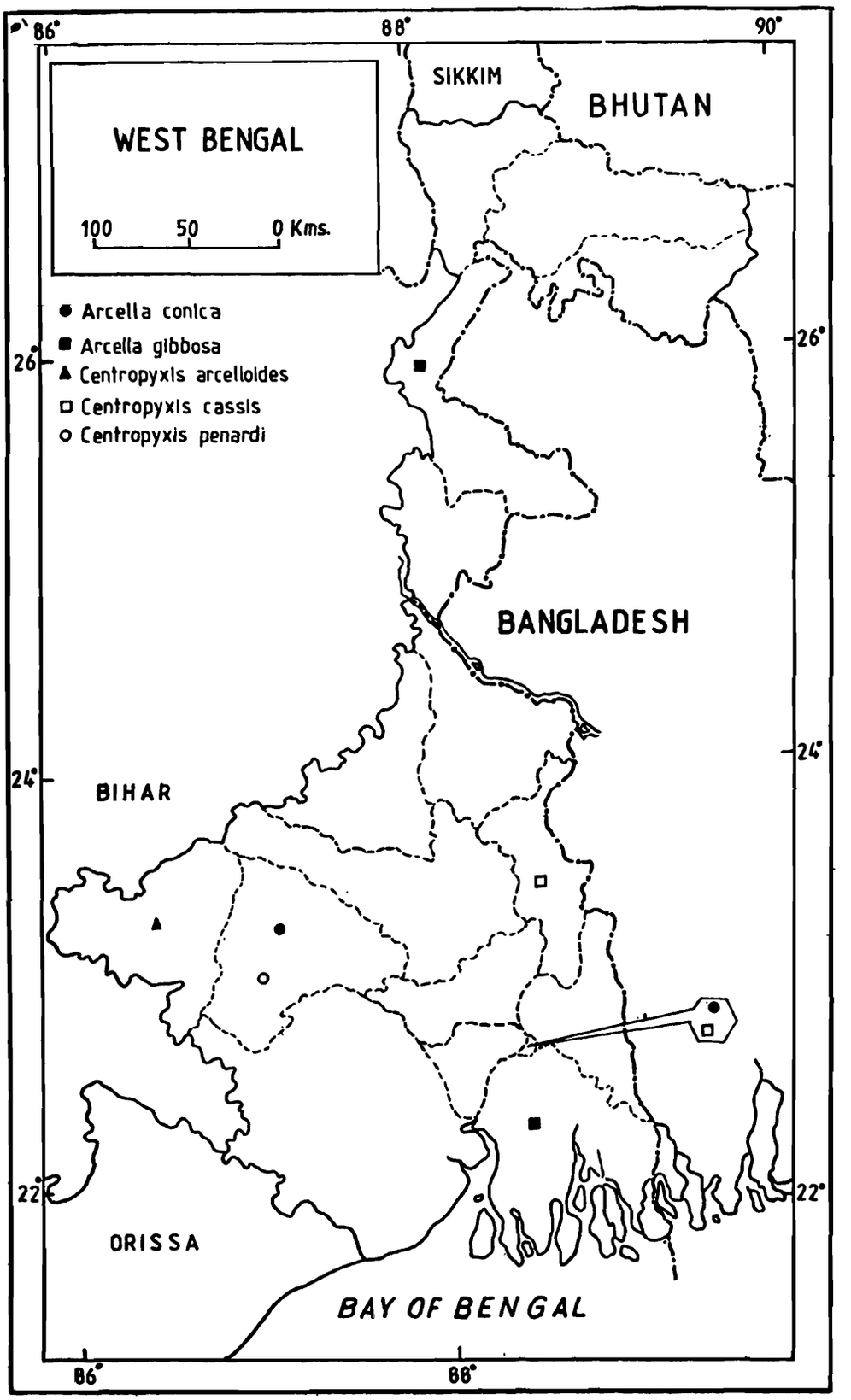
Fl – Flagellate; Cl – Ciliate; Rh – Rhizopod.



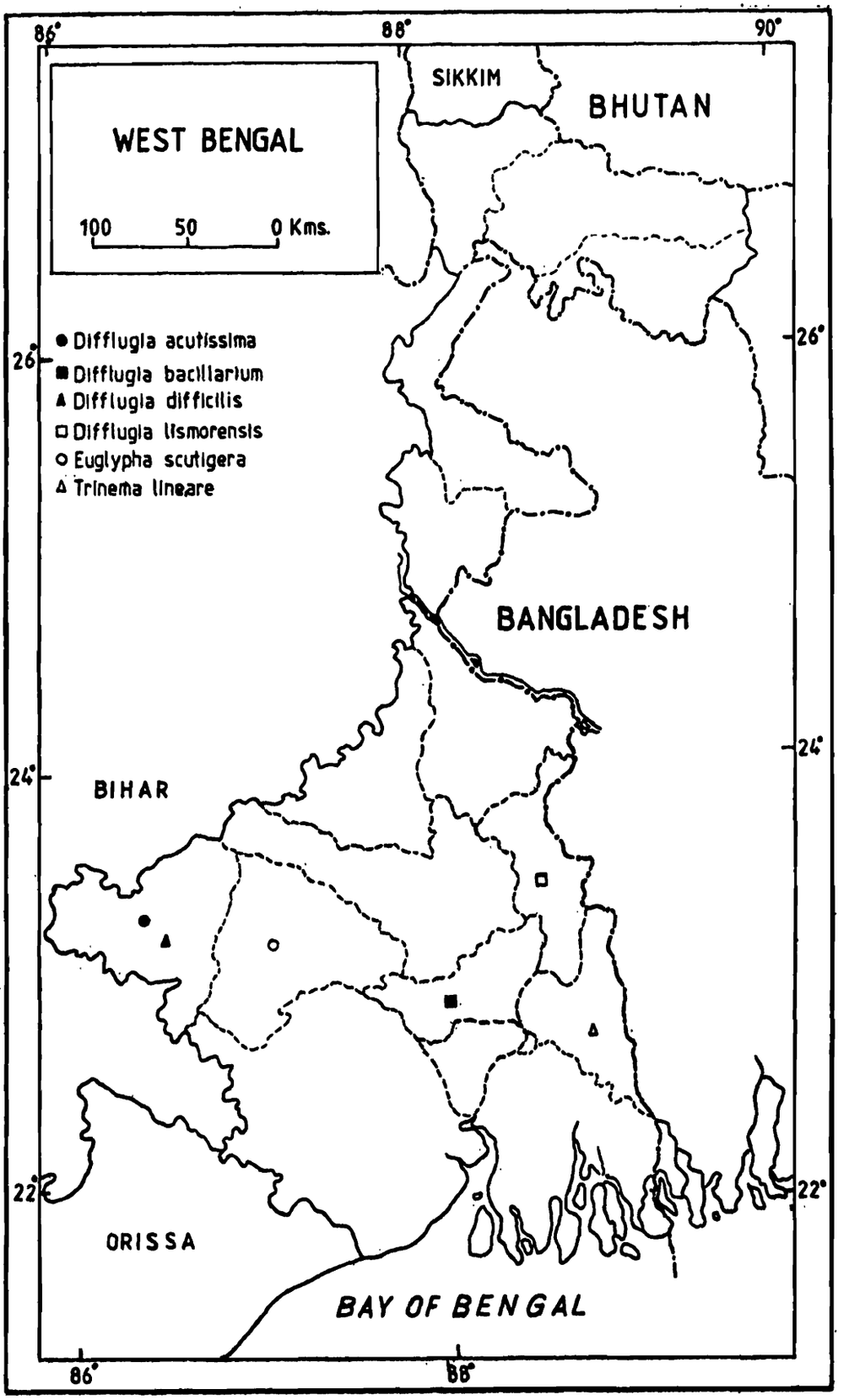
Map. 2. Distribution of some common species of testacean rhizopods in West Bengal.



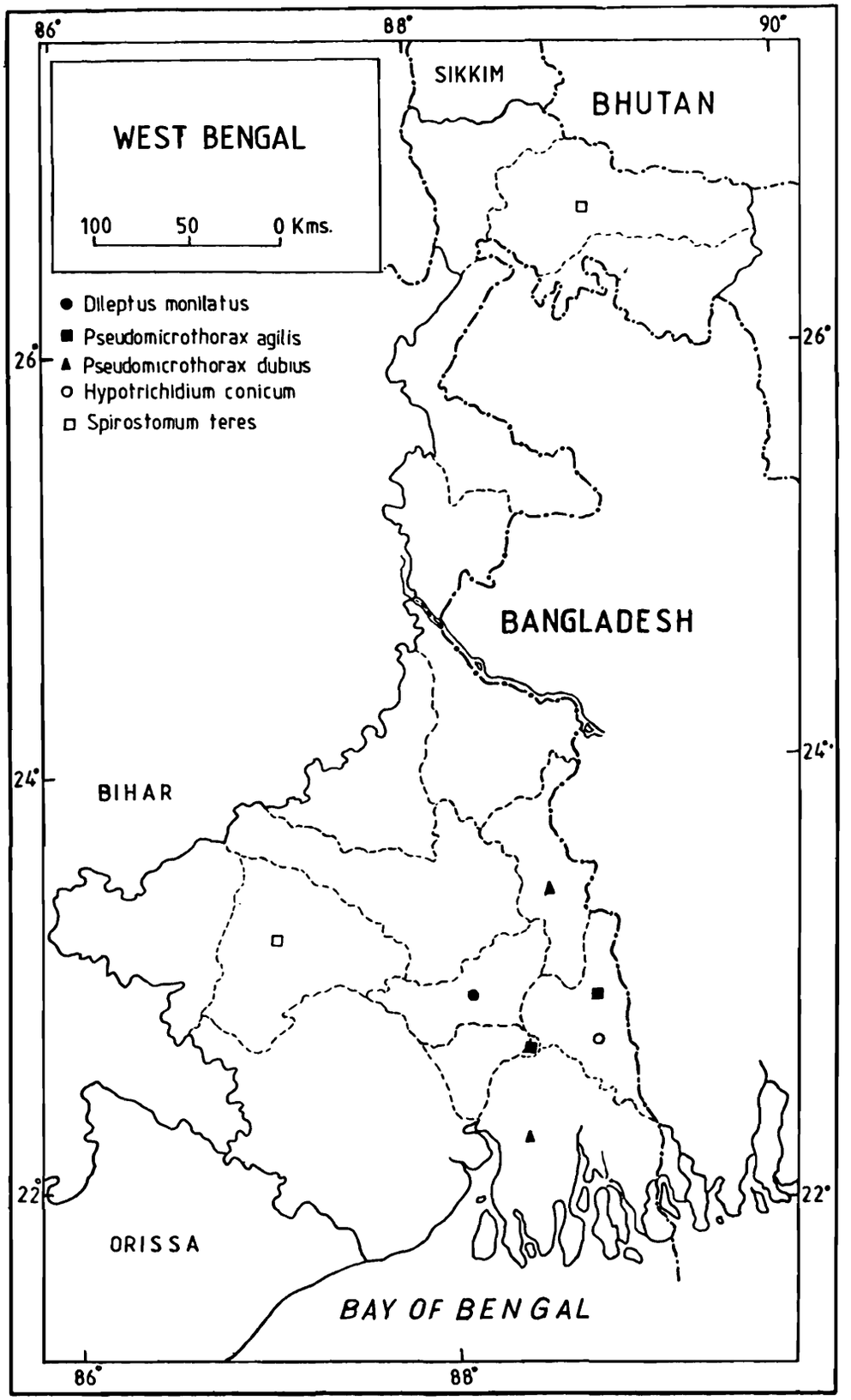
Map. 3. Distribution of some common species of freeliving ciliates in West Bengal.



Map. 4. Distribution of some rare species of testacean rhizopods in West Bengal.



Map. 5. Distribution of some rare species of testacean rhizopos in West Bengal.



Map. 6. Distribution of some rare species of freeliving ciliates in West Bengal.

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PARASITIC PROTOZOA

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INTRODUCTION

The present communication is the second part of a treatise on the protozoa fauna of West Bengal, the first part of which deals with 248 species of freeliving protozoa of the state (Das, Mandal and Sarkar, 1992). Parasitic protozoa compared to their freeliving counter part are more extensively studied throughout the globe including West Bengal. This may be due to the reason that man himself along with his livestock and other animals around him is sometimes severely affected by these organisms. In West Bengal, so also in India Lewis (1870) was probably the first to observe the cyst of a parasitic protozoa, *Entamoeba coli* from the faecal sample of man while he had been working on cholera evacuation programme at Calcutta. In subsequent years he (1878, 1879) found some flagellated organisms in blood of man, rat and other animals.These flagellates were ultimately placed under *Trypanosoma lewisi.*

Among flagellated parasites, trypanosomes have been studied comparatively thoroughly in West Bengal by several workers, more specially, Das Gupta and his co-workers (1972 onwards), Misra and his collaborators (1973-76), Mandal and his associates (1975-88) and Ray and his collaborators (1983 onwards). Mention is to be made here that Ray and Choudhury (1983) and Mandal (1984) published technical monographs on amphibian and fish trypanosomes respectively. Other groups of flagellated parasites and amoeba from man have been studied by Chatterjee (1915-23), while he was working in the Medical College, Calcutta.

Sarcodine and opalinate parasites of West Bengal are least studied. Ghosh (1919-22) and Chatterjee *(op.cit)* contributed on the subject. It is worth mentioning here that Mandal and Chowdhury (1986) reported *Entamoeba histolytica* in rhesus monkey from this State.

Parasitic protozoa belonging to the phylum Apicomplexa are extensively studied in West Bengal by large number of workers. Researches on septate gregarines were made by Ghosh (1923), Ray and Chakravarty (1933-36), Chakravarty (1933-59) and Haldar, Chakraborty, Sarkar, Kundu and others (1974 onwards). Aseptate gregarines were studied by Misra and Ray Choudhury (1973), Pradhan and Das Gupta (1980-82), Sarkar (1983) and, Roy Chowdhury and Haldar (1984).

In West Bengal work on haemospordians which include malaria and related parasites was initiated by Sir Ronald Ross (1898a,b). He *(op.cit.)* elucidated the life cycle of malarial parasites and their transmissin by *Culex pipens* in Calcutta. Misra, Haldar and Chakravarty (1972) and Mandal *et al* (1985) reported the occurrence of this group from Indian fishes, Ray and Choudhury (1981) from a frog, *Rana limnocharis,* Sarkar and Ray (1972), Nandi and Mandal (1977 onwards) and, Pal and Das Gupta (1980) from birds and, Nandi and Mandal (1976) from bat.

Coccidian parasites are well studied in this state. Knowles and Das Gupta (1934) recorded coccidial infection in man. Subsequently Ray and his collaborators (1935-73), Chakravarty and his co-workers (1943-65), Mandal (1963 onwards) and Bandyopadhyay (1982-87) recorded and described large number of coccidian species from different vertebrate hosts. Mandal (1987) made a significant contribution by publishsing a fauna on Eimeriidae in the Fauna of India series. In addition, Ray (1983) described *Lankesterella* from frogs, Sarkar and Haldar (1979) and, Kundu and Haldar (1984) reported *Dactylosoma* from fishes and, Ray and Sarkar (1969) recorded a species of *Gordonella* (which is now synonymised with *Schellackia*) from a lizard, *Colotes versicolor*. So far as haemogregarines are concerned Mandal et al. (1985) reported this group from fishes, Ray and Choudhury (1984) published a monograph on this group from amphibia, Misra and his collaborators (1974-76), Sinha (1977 onwards) and, Ray and Bhattacharjee (1984) from reptilian hosts.

Myxozoan parasites of fishes are also elaborately searched in West Bengal by several workers among whom Chakravarty and his co-workers (1937-70), Haldar and his collaborators and, Sarkar and his associates (1982-89) deserve special mention. Besides, Mandal and Nair (1975) and, Choudhury and Nandi (1973) also reported some protozoa of this group from fishes. A single species of myxozoan parasites of frog, *viz., Myxidium haldari* has been reported so far from amphian host (Sarkar, 1982) from this state, so also from India.

Microsporidian parasites have received inadequate attention from this state. Sen (1941) recorded 3 species of *Thelohania* from anopheline larvae collected in Calcutta and its vicinity.

Anderson (1889) was the first to describe a parasitic ciliate from West Bengal, namely, *Anoplophrya aelosomatis* from earthworms. Later Ghosh (1919-22), Ray (1932), Chatterjee and his associates (1919-35) worked on this group in this state. Subsequently Chakravarty and Chatterjee (1957), Das and Mukherjee (1974), Mukherjee and his collaborators (1974-90) and, Jamadar and Choudhury (1988) reported several species of parasitic ciliates from different invertebrate and vertebrate hosts.

All the parasitic protozoa reported so far from West Bengal and collected presently from 17 districts of this state in the course of mopping survey during the years 1984-88 as well as those already present in the National Collections of the Zoological Survey of India are being dealt with in the present communication excepting some microsporidians and 2 species of *Plasmodium*. These microsporidians were recorded by Ghosh (1989) from a Coleopteran stored - grain pest, *Sitophilus oryzae* collected from Hugli district. But, Ghosh *(op.cit)* could not determine their generic status and proposed a 'collective name' *Microsporidian sitophili* for them. Two species of *Plasmodium*, viz., *P. cynomolgi* and *P. gallinaceum* are not included in this paper since these are recovered/studied from intermediate/experimental hosts (former from *Anopheles anularis* and *A. cucilifacis* and the latter from *Aedes aegypti*) but not from any definitive host.

The present communication includes taxonomic account of 596 species belonging to 5 phyla, 10 classes, 22 orders, 63 families and 131 genera recovered from 353 host-species. The systematic list of these species, a host-parasite list with collecting localities/districts and key to the families, genera and species are also incorporated. Further, district-wise distribution of these parasites is included in this paper in order to indicate the extent of work done on each group of protozoan parasites from each district of this state.

MATERIAL AND METHODS

The various parasitic protozoans collected from all the 17 districts of West Bengal during the course of mopping survey 1984-88 in addition to those already present in the National Zoological Collections of this department as well as other protozoan parasites reproted so far from this state provided the materials for this study. The host samples, both invertebrates and vertebrates, collected from the fields, were brought to the camp laboratory where they were dissected and thoroughly examined for various parasitic groups from different organs/microhabitats viz., lumen of the digestive tract, body-cavity, blood, gills, gall bladder, lung, liver, spleen and other tissues. Gut-contents were examined after diluting them with physiological saline. Organ-smears and blood-smears were drawn on clean and grease-free slides, air-dried, fixed and/or stained mostly with Giemsa and Leishman's stains. The lumen-dwelling forms as and when observed in physiological saline were usually fixed in Schaudinn's fixative and stained with Heidenhain's iron haematoxylin stain. Faecal samples were kept in 2.5% potassium dichromate solution for subsequent sporulation of the coccidial oocysts, if any. Dry silver impregnation technique was employed in some cases for stydying the ciliary lines of some endocummensal ciliates.

Temporary preparations were often made for the detection different organelles with neutral red, methylene blue, Lugols iodine, ink in very dilute solutions. Extrusion of polar filaments was achieved in some cases with 5% to 10% KOH solution. Permanent preparatins were made through staining, differentiation, dehydration and mounting of slides in a neutral medium with DPX. Histological preparations were made in a few cases following standard histological procedure. For further details Mandal, Das and Nandi (1990) may be referred.

Observations were made under the oil immersion of Olympus/Carl Zeis microscope. Figures were drawn with the aid of a camera lucida. Linear measurements were taken with a calibrated ocular micrometer and expressed in micrometer (μm) after calibrating with a stage micrometer scale.

Area measurements were obtained by drawing the specimens on a graph paper (mm division) and by calibrating and counting the number of squares covered.

GENERAL TERMINOLOGY

As stated earlier, parasitic protozoa of this state represent diversified phyla, orders, classes and families. Therefore, some common terminologies used in the keys and the diagnostic features (plates 1-4) of these parasites are explained below for the convenience of the workers of this group. Moreover, some common protozoan parasites occurring in different group of hosts from this state are shown in plates 5-13.

Acephaline	:	A gregarine lacking an epimerite
Anisogamy	:	Conjugation between two dissimilar gametes.
Apical complex	:	Ultra structural complex structure at the apex of merozoite/sporozoite.
Association	:	A group formed by the attachment of two or more sporonts.

Biassociative	:	An association formed by the attachment of two sporonts.
Cephaline	:	A gregarine possessing an epimerite
Conoid	:	A truncated hollow cone of spirally fibrillar ultra structure, havng 6-8 fibrils.
Cyst	:	Impervious membrane surrounding an organism or a pair of associated sporozoites at the beginning of reproduction
Deutomerite	:	The posterior portion of cephaline gregarine which is separated from the protomerite by a septum.
Disporous	:	Producing two spores.
Epimerite	:	Usually a knob-like structure used for attachment with the host-cell by the young gregarine.
Gamete	:	Specialised cells, tend to meet and fuse in conjugation.
Gametocyst	:	The cyst which surrounds two sporonts or gametocytes in associative stage.
Gametocyte	:	The mother cell that gives rise to a number of gametes.
Gametogony	:	The process of production of gametocytes or gametes by a gamont.
Gamont	:	An individual that tends to form gamete; also known as sporont.
Isogamete	:	Gametes which are similar in shape and size.
Isogamy	:	Conjugation between isogametes or similar gametes.
Macrogamete	:	The larger non-motile gamete of an anisogamous type of reproduction.
Macrogametocyte	:	The mother cell of macrogamete.
Merozoite	:	A product of asexual schizogony.
Microgamete	:	The smaller and motile gamete in anisogamous type of reproduction.
Microgametocyte	:	The mother cell of microgamete.
Micronemes	:	Small osmiophilic convoluted cord-like ultra structure at the anterior region of sporozoite/merozoite.
Micropore	:	An ultra structural organellae formed by the pellicle.
Microtubules	:	Ultra structural subpellicular fibrills originating at the polar ring and extending posteriorly.
Oocyst	:	A cyst containing conjugated gametes.
Ookinete	:	The motile zygote in Haemosporina.
Pellicle	:	Cell boundary of sporozoite and merozoite having outer and inner mebranes closely associated with one another (ultra structure).

Polar capspule	:	A sac-like structure containing polar filament in the spore of Myxozoa and Microspora.
Polar filament	:	A thread-like structure present coiled inside the polar capsule.
Polar ring	:	An osmiophilic ultra structural thickening formed by the inner membrane of the pellicle.
Primite	:	The first sporont in the association of a gregarine.
Protomerite	:	The portion preceding the septum of a cephaline gregarine.
Rhotries	:	Ultra structural paired organelles having electron dense club-shaped structure located in the anterior region of sporozoite/merozoite.
Satellite	:	The sporont(s) attached behind the primite.
Scizogony	:	Asexual or agamic reproduction by equal, unequal or multiple division.
Schizont	:	The stage which is about to divide into a number of parts called merozoites.
Septate	:	In gregarines, it indicates a type which is having a septum between the protomerite and deutomerite.
Spore	:	The body into which the zygote develops after acquisition of a resistant outer coating.
Sporoduct	:	A tubular growth from the cyst of a gregarine through which spores are liberated.
Sporoblast	:	A cell which gives rise to spore.
Sporocyst	:	A cyst containg the spores.
Sporogony	:	Development of spores from the sporont.
Sporont	:	See gamont.
Sporozoite	:	The ultimate individual falciform bodies produced/ released from a spore.
Syzygy	:	An association of two or more sporonts in a linear fashion.
Trophozoite	:	The young feeding and growing stage.
Zygote	:	The cell formed by the fusion of two gametes.

SYSTEMATIC LIST OF PARASITE PROTOZOA

Subkingdom	PROTOZOA
Phylum	SARCOMASTIGOPHORA
Subphylum	MASTIGOPHORA
Class	PHYTOMASTIGOPHOREA
Order	EUGLENIDA
Suborder	EUGLENINA

Family	ASTASIIDAE	
Genus	***Copromonas*** Dobell	
1. *C. ruminantum* Woodcock	*Sus scrofa*	Sundarban
Order	CHRYSOMONADIDA	
Family	CROMULINIDAE	
Genus	***Oikomonas*** Kent	
2. *O. communis* Liebetanz	*Capra hircus*	Tangra, Calcutta
Class	ZOOMASTIGOPHOREA	
Order	KINETOPLASTIDA	
Suborder	BODONINA	
Family	BODONIDAE	
Genus	***Bodomonas*** Davis	
3. *B. rebae* Tripathi	*Catla catla*	West Bengal
	Cirrhina mrigala	West Bengal
	Cirrhina reba	West Bengal
	Labeo rohita	West Bengal
Family	CRYPTOBIDAE	
Genus	***Trypanoplasma*** Laveran and Mesnil	
4. *T indica* (Mandal)	*Mystus vittatus*	Champahati, South 24- Parganas
Suborder	TRYPANOSOMATINA	
Family	TRYPANOSOMATIDAE	
Genus	***Leishmania*** Ross	
5. *L. donovani* Laveran & Mesnil	*Phlobotomus papatasi*	Barddhaman, Murshidabad, North and South 24-Parganas
Genus	***Trypanosoma*** Gruby	
A. ***Trypanosoma*** of fishes		
6. *T anabasi* Mandal	*Anabas testudineus*	Canning, Berhampore
7. *T armeti* Mandal	*Mastacembelus armatus*	Champahati
8. *T batrachi* Qadri	*Clarias batrachus*	Calcutta, Dinhata, Koch Bihar, South 24-Parganas
9. *T bengalensis* Mandal	*Mystus bleekeri*	Canning and Champahati
10. *T cancili* Mandal	*Xenentodon cancila*	Raidighi

11. *T. choudhuryi* Mandal	*Hemiclepsis m. marginata* *Sarotherodon* (= *Tilapia*) *mossambica*	Balitha, Bankura Bagmari, North 24-Parganas
12. *T danilewskyi saccobranchi* Qadri	*Heteropneustes fossilis*	Berhampore, Calcutta market
13. *T. elongatus* Ray Chaudhuri and Misra	*Channa punctatus*	Calcutta
14. *T gachuii* Misra, Chandra and Choudhury	*Hemiclepsis marginata*	Calcutta
	Channa gachua	Calcutta
15. *T. gobida* Mandal	*Glossogobius giuris*	Canning
16. *T granulosum* Laveran and Mesnil	*Amphipnous* sp.	North 24-Parganas
	Anguilla anguilla	Calcutta
17. *T. maguri* Tandon and Joshi	*Clarias batrachus*	Calcutta market
18. *T mukundi* Ray Chaudhuri and Misra	*Heteropneustes fossilis*	Calcutta market
19. *T. nandi* Mukherjee and Haldar	*Nandus nandus*	Kalyani
20. *T. pancali* Mandal	*Mastacembelus pancalus*	Champahati, Calcutta, Malda
21. *T. punctati* Hasan and Qasim	*Ophicephalus punctatus*	Raigunj
22. *T seenghali* Joshi	*Mystus seenghala*	Calcutta market
23. *T. striati* Qadri	*Channa striatus*	Sonarpur, Canning Raiganj, Calcutta
24. *T. tandoni* Mandal	*Wallago attu*	Champahati
25. *T. vittati* Tandon and Joshi	*Mystus vittatus*	Dinhata, Koch Bihar, Taldi, North 24-Parganas
26. *T. xenentodoni* Das, Sarkar and Bandyopadhyay	*Xenentodon cancila*	Malda
27. *T.* sp.	*Aorichthys aor*	Calcutta market
28. *T.* sp.	*Nandus nandus*	Maldah
B. ***Trypanosoma* of amphibians**		
29. *T chattoni* Mathis and Leger	*Rana limnocharis*	Jalpaiguri
30. *T. inopinatum* Sergent & Sergent	*Rana hexadactyla*	Bankura
	Rana tigrina	Bankura
31. *T karyozeukton* Dutton and Todd	*Rana hexadactyla*	Salikona, Hugli
	Rana tigrina	Barddhaman and Darjiling

32. *T loricatum* (Mayer)	*Rana tigrina*	Bankura
	Rana limnocharis	Balitha, Bankura
33. *T mega* Dutton and Todd	*Rana tigrina*	Barddhaman and Darjiling
34. *T ranarum* (Lankester)	*Rana tigrina*	Bankura
	Rana sp.	Bankura
35. *T rotatorium* (Mayer)	*Bufo melanostictus*	Berhampore
	Bufo stomaticus	Calcutta
	Helobdella nociva (Expt.)	West Bengal
	Rana cyanophlyctis	Gorumara, Maldah
	Rana limnocharis	Rangpao, Koch Bihar
	Rana tigrina	Hugli, Gorumara and Bankura
	Rhacophorus maculatus	Bankura
36. *T systoma* Ray and Chodhury	*Uperodon systoma*	Medinipur
37. *T taprobanica* Ray and Choudhury	*Rana tigrina*	Barddhaman, Medinipur, Darjiling, Puruliya
C. *Trypanosoma* of reptiles		
38. *T balithaensis* Ray	*Helobdella nociva*	Balitha, Bankura
	Lissemys punctata punctata	Balitha, Bankura
39. *T enhydris* Sinha and Mandal	*Enhydris enhydris*	Chakdah, Darjiling, Koch Bihar
40. *T gangetica* Sinha	*Trionyx gangeticus*	Bangaon market
D. *Trypanosoma* of birds		
41. *T avium Danilewsky*	*Acrocephalus dumetorum*	Calcutta
(=T. knowlesi)	*Dicrurus adsimilis*	North & South 24-Parganas, Nadia
	Lonchura malabarica	Calcutta
41a. *T avium bakeri* Chatterjee and Ray	*Columba livia*	Calcutta (Expt.)
(= *T brimonti bakeri*)	*Dendrocitta vagabunda*	Nadia
	Pycnonotus jocosus	Calcutta
42. *T hannae* Pittaluga	*Columba livia domestica*	Calcutta, South 24-Pgs.
43. *T lanii* Choudhury and Misra	*Lanius schach tricolor*	Calcutta
44. *T* sp.	*Lonchura p. punctulata*	Calcutta

E. Trypanosoma of mammals

45. *T evansi* (Steel)	*Panthera pardus*	Darjiling zoo
	Panthera tigris	Aliproe zoo
	Panthera tigris altaica	Darjiling Zoo
	Panthera unca	Calcutta
46. *T (Herpetosoma) lewisi* (Kent)	*Bandicota bengalensis*	Calcutta
	Mus musculus	Sibpore, Haora
	Rattus decumenus (= *R. norvegicus*)	Calcutta
	Rattus rattus	Singur, Hugli
	Rattus rattus arboreus	Haora
47. *T indicum* Luhe	*Petaurista magnificus*	Darjiling
	Petaurista n. nobilis	Darjiling
48. *T rhinolophonis* Pal and Dasgupta	*Rhinolophus rouxi rouxi*	Singhmari, Darjiling
49. *T* sp.	*Pataurista nobilis nobilis*	Darjiling
Order	RETORTOMONADIDA	
Family	TETRAMITIDAE	
Genus	***Costia*** Leclerque	
50. *C. necatrix* (Henneguy)	*Channa punctatus*	Budge Budge Belgharia
	Channa striatus	Budge Budge Belgharia
	Indian carps	West Bengal
Genus	***Enteromonas*** da Fonseca	
51. *E. hominis* da Fonseca	*Homo sapiens*	Calcutta
Family	CHILOMASTIGIDAE	
Genus	***Chilomastix*** Alexeieff	
52. *C. caprae* Fonseca	*Capra hircus*	Tangra, Calcutta
53. *C. mesnili* Wenyon	*Homo sapiens*	Calcutta
Family	CALLIMASTIGIDA	
Genus	***Callimastix*** Weissenberg	
54. *C. frontalis* Braune	*Capra hircus*	Tangra, Calcutta

Genus	***Selenomonas*** Von Prowazek	
55. *S. ruminantium* var. *caprae*	*Capra hircus*	Tangra, Calcutta
Order	DIPLOMONADIDA	
Suborder	DIPLOMONADINA	
Family	HEXAMITIDAE	
Genus	***Giardia*** Kuntsler	
56. *G. intestinalis* (Lambl)	*Homo sapiens*	Cosmopolitan
Order	TRICHOMONADIDA	
Family	MONOCERCOMONADIDAE	
Genus	***Monocercomonas*** Grassi	
57. *M. caprae* Das Gupta	*Capra hircus*	Tangra, Calcutta
58. *M. ruminantum* (Braune)	*Axis axis*	Sundarbans
Family	TRICHOMONADIDAE	
Genus	***Trichomonas*** Donne	
59. *T gallinae* (Rivolta)	*Milvus migrans*	Calcutta
60. *T ruminatium* Braune	*Capra hircus*	Tangra, Calcutta
61. *T thukuni* Ray and Singh	*Cavia cutleri*	Calcutta
62. *T vaginalis* Donne	*Homo sapiens*	Cosmopolitan
Genus	***Tetratrichomonas*** Hibler, Hammond, Caskey, Johnson & Fitzgerald	
63. *T butteryi* (Hibler *et al*)	*Sus scrofa*	Sundarban
Genus	***Pentatrichomonas*** Bishop	
64. *P. hominis* (Davaine)	*Canis aureus*	Calcutta
Order	HYPERMASTIGIDA	
Suborder	LOPHOMONADINA	
Family	LOPHOMONADIDAE	
Genus	***Lophomonas*** Stein	
65. *L. striata* Bütschli	*Periplaneta americana*	Calcutta
Subphylum	OPALINATA	
Class	OPALINATEA	
Order	OPALINIDA	
Family	OPALINIDAE	
Genus	***Hegneriella*** Earl	
66. *H. mukundai* Chandra and Choudhury	*Kaloula pulchra taprobanica*	Medinipur

Genus	***Opalina*** Purkinje and Valentin	
67. *O. plicata* Ghosh	*Bufo melanostictus*	Calcutta
68. *O. scalpriformis* Ghosh	*Bufo melanostictus*	Calcutta, Maldah Murshidabad
	Bufo himalayana	Darjiling
69. *O. triangularis* Ghosh	*Bufo melanostictus*	Birbhum, Calcutta and Koch Bihar
Genus	***Cepedea*** Metcalf	
70. *C. longa* (Bezzenberger)	*Bufo melanostictus*	Calcutta
	Rhacophorus maculatus	Falta, South 24-Parganas
71. *C. srivastavai* Mukherjee and Chakraborty	*Rhacophorus maculatus*	Calcutta
Subphylum	SARCODINA	
Class	LOBOSEA	
Subclass	GYMNAMOEBA	
Order	AMOEBIDA	
Family	ENDAMOEBIDAE	
Genus	***Entamoeba*** Casagrandi and Barbagallo	
72. *E. cervis* Mandal and Choudhury	*Axis axis*	Sundarban Calcutta Zoo
73. *E. chattoni* Swellengrebel	*Macaca mulatta*	Sundarban
74. *E. chiropteris* Mandal and Choudhury	*Scotophilus kuhli kuhli*	Sundarban Tiger Reserve
75. *E. coli* (Grassi)	*Homo sapiens*	Calcutta
	Macaca mulatta	Sundarban
76. *E. histolytica* Schaudinn	*Homo sapiens*	Cosmopolitan
	Macaca mulatta	Sundarban
77. *E. muris* (Grassi)	*Rattus rattus arboreus*	Sundarban Tiger Reserve
78. *E. ovis* Swellengrebel	*Capra hircus*	Tangra, Calcutta
79. *E. suis* Hartmann	*Sus scrofa scrofa*	Sundarban Tiger Reserve
Genus	***Dientamoeba*** Jepps and Dobell	
80. *D. fragilis* Jepps and Dobell	*Macaca irus*	Calcutta
	Macaca mulatta	Sundarban

	Genus	***Iodamoeba*** Debell	
81.	*I. butschlii* (Prowazek)	*Macaca mulatta*	Sundarban forest
		Sus scrofa scrofa	Sundarban forest
	Phylum	APICOMPLEXA	
	Class	SPOROZOEA	
	Subclass	GREGARINA	
	Order	EUGREGARINIDA	
	Suborder	ASEPTATINA	
	Family	MONOCYSTIDAE	
	Genus	***Monocystis*** Stein	
82.	*M. beddardi* Ghosh	*Eutyphoeus nicholsoni*	Calcutta
83.	*M. bengalensis* Ghosh	*Pheretima posthuma*	Calcutta
84.	*M. illoidi* Ghosh	*Pheretima posthuma*	Calcutta
85.	*M. senchalensis* Pradhan and Das Gupta	*Apporectodea trapezoides*	Senchal, Darjiling
	Genus	***Nematocystis*** Hesse	
86.	*N. bengalensis* Roy Chowdhury and Haldar	*Eutyphoeus incommodus*	Ashokenagar, North 24-Parganas
87.	*N. levinei* Pradhan and Dasgupta	*Eutyphoeus gammiei*	Mangpoo, Darjiling
88.	*N. mangpooensis* Pradhan and Dasgupta	*Eutyphoeus gammiei*	Mangpoo, Darjiling
89.	*N. mauritii* Roy Chowdhury and Haldar	*Lampito mauriti*	Ashokenagar, North 24-Parganas
90.	*N. quadrikaryosomata* Pradhan and Dasgupta	*Pheretima differingens*	Goomti, Darjiling
91.	*N. senchalensis* Pradhan and Dasgupta	*Apporectodea trapezoides*	Senchal, Darjiling
92.	*N. theodoridis* Pradhan and Dasgupta	*Pheretima differingens*	Goomti, Darjiling
	Genus	***Apolocystis*** Cognelti	
93.	*A. akaryosomiferus* Pradhan and Dasgupta	*Pheretima robusta*	North Point, Darjiling
94.	*A. goomtiensis* Pradhan and Dasgupta	*Pheretima differingens*	Goomti, Darjiling
95.	*A. monokaryosomiferus* Pradhan and Dasgupta	*Pheretima robusta*	North Point, Darjiling

96.	*A. vacuolatus* Pradhan and Dasgupta	*Pheretima alexandri*	Kalimpong, Darjiling
	Genus	***Informis*** Pradhan and Dasgupta	
97.	*Informis informis* Pradhan and Dasgupta	*Apporectodea trapezoides*	Senchal, Darjiling
98.	*I. pseudotentaculatus* Pradhan and Dasgupta	*Apporectodea trapazoides*	Senchal, Darjiling
	Genus	***Bisurculus*** Pradhan and Dasgupta	
99.	*B. variegatus* Pradhan and Dasgupta	*Amynthas hawayanus*	Goomti, Darjiling
	Family	STOMATOPHORIDAE	
	Genus	***Stomatophora*** Drazeweeki	
100.	*S. bahli* Pradhan and Dasgupta	*Pheretima differingenus*	Darjiling
101.	*S. diadema* Hesse	*Pheretima posthuma*	Calcutta
102.	*S. globa* Pradhan and Dasgupta	*Pheretima alexandri*	Jorpokhali,Darjiling
103.	*S. pedongensis* Pradhan and Dasgupta	*Pheretima differingens*	Pedong, Darjiling
104.	*S. pradhanis* Roy Chowdhury and Haldar	*Metaphire (=Pheretima) posthuma*	Ashokenagar, North 24-Parganas
	Genus	***Chakravartiella***	
105.	*C. sugereiformes* Misra and Raychaudhury	*Trigoniulus goesii*	Naihati, North 24-Parganas
	Family	ZYGOCYSTIDAE	
	Genus	***Zygocystis*** Stein	
106.	*Z. indicus* Pradhan and Das Gupta	*Pheretima (=Metaphire) californica*	Kalimpong, Darjiling
	Family	ENTEROCYSTIDAE	
	Genus	***Enterocystis*** Zwetkow	
107.	*E. bengalensis* Sarkar	*Psocatropos* sp.	Naihati, North 24-Parganas
	Family	DIPLOCYSTIDAE	
	Genus	***Lankesteria*** Mingazzini	
108.	*L. culicis* (Ross)	*Aedes (Stegomyia) aegypti*	Calcutta
		Aedes (Stegomyia) albopictus	Calcutta

109.	*L. mackiei* (Shortt and Swaminath)	*Phlebotomus argentipes*	Calcutta
		Phlebotomus papatasi	Calcutta
	Suborder	SEPTATINA	
	Family	GREGARINIDAE	
	Genus	***Gregarina***	
110.	*G. alcidessi* Haldar and Chakravarty	*Alcedes* sp. nr. *leopardus*	Kalyani
111.	*G. basiconstrictonesa* Ghosh, Sengupta and Haldar	*Tribolium casteneum*	Chinsurah
112.	*G. biolobosa* Kundu and Haldar	*Longitarsus* sp.	Kalyani
113.	*G. chaetocnemae* Sarkar	*Chaetocnnema concinuipenis*	Murshidabad
114.	*G. crescentica* Haldar and Chakraborty	*Amblyrrhinus* sp.	Kalyani
115.	*G. cylindrosa* Haldar and Kundu	*Supella supellectilium*	Kalyani
116.	*G. dasguptai* Mandal et. al.	*Coccinella septempunctata*	Darjiling
117.	*G. discocephala* Kundu and Haldar	Nymph of Blattodea	Ranaghat
118.	*G. gryllodis* Haldar and Sarkar emend. Levine	*Gryllodes* sp.	Chinsurah
119.	*G. guttiventra* Haldar and Sarkar	*Plebeogryllus guttiventra*	Naihati
120.	*G. ischnopterae* Datta and Haldar	*Ischnoptera* sp.	Kalyani
121.	*G. levinei* Haldar and Sarkar emend. Levine	*Pteronemobius fascipense*	Chinsurah
122.	*G. lygeusi* Haldar, Ray and Gupta	*Lygeus hospes*	Kalyani
123.	*G. mukundai* Haldar and Kundu	Nymph of Dictyoptera	Ranaghat
124.	*G. nalae* Datta and Haldar	*Nala lividipes*	Kalyani
125.	*G. spraguei* Haldar and Chakraborty	Unnamed curculionid beetle	Kalyani
	Genus	***Anisolobus*** Vincent	
126.	*A. indicus* Haldar, Ray and Bose	*Coccinella septempunctata*	Kalyani
127.	*A. royii* com. nov.	*Oryzaephilus mercator*	Calcutta

	Family	Didymophidae	
	Genus	***Didymophyes*** Stein	
128.	*D. indiae* Kundu, Datta and Haldar	*Euparatettix histricus*	Ranaghat
129.	*D. lipai* Ghose, Gupta and Haldar	*Oryzaephilus mercator*	Calcutta
130.	*D. oryzaephilae* Ghose, Gupta and Haldar	*Oryzaephilus mercator*	Chinsurah
131.	*D. rigidus* Ghose, Gupta and Haldar	*Oryzaephilus mercator*	Kanchrapara
132.	*D. tridactylae* Ghose, Gupta and Haldar	*Tridactylus* sp.	Kalyani
	Genus	***Laterospora*** Haldar, Ray and Bose	
133.	*L. phenacocca* Haldar, Ray and Bose	*Phenacoccus hirsutus*	Medinipur, Nadia
	Genus	***Liposcelisus*** Sarkar and Haldar	
134.	*L. coronatus* Sarkar and Haldar	*Liposcelis* sp.	Naihati
	Genus	***Quadruhyalodiscus*** Kundu and Haldar	
135.	*Q. gallerucidae* Kundu and Haldar	*Gallerucida bicolor*	Fulia, Nadia
	Family	HIRMOCYSTIDAE	
	Genus	***Hirmocystis*** Labbe	
136.	*H. bengalensis* Haldar and Chakraborty	*Myllocerus* sp.1	Kalyani
137.	*H. hoplasomae* Kundu and Haldar	*Hoplasoma unicolor*	Ranaghat
138.	*H. lepropi* Haldar and Chakraborty	*Lepropus* sp.	Kalyani
139.	*H. lophocateri* Ghose and Haldar	*Lophocateres pusillus*	Kalyani
140.	*H. minuta* (Ishii)	*Oryzaephilus mercator*	Calcutta
141.	*H. oxeata* Ghose, Sengupta and Haldar	*Tribolium castaneum*	Chinsurah
142.	*H. pitcharis Haldar* and Chakraborty	*Zanthoprochilus* sp.	Kalyani
143.	*H. pseudoductis* Haldar and Chakraborty	*Myllocerus* sp.2	Kalyani

144.	*H. theodoridesi* Kundu and Haldar	*Gryllotalpa africana*	Ranaghat
145.	*H. triboli* Ghose and Haldar	*Tribolium castaneum*	Kalyani
	Genus	***Retractocephalus*** Haldar and Chakraborty	
146.	*R. aulacophorae* Haldar, Chakraborty & Kundu	*Aulacophora intermedia*	Kalyani
147.	*R. halticus* Haldar, Chakraborty & Kundu	*Haltica* sp.	Kalyani
148.	*R. raphidopalpae* Haldar and Chakraborty	*Raphidopalpa (=Aulacophora) foveicollis*	Kalyani
149.	*R. spatulatus* Haldar, Chakraborty & Kundu	*Lema* sp.	Kalyani
150.	*R. spinosus* Haldar, Chakraborty & Kundu	*Monolepta signata*	Kalyani
	Family	NEOHIRMOCYSTIDAE	
	Genus	***Neohirmocystis*** Ghose, Ray and Haldar	
151.	*N. dercetini* Ghose, Ray and Haldar	*Dercetina* sp.	Kalyani
152.	*N. grassei* Ghose, Ray and Haldar	*Tribolium castaneu*	Chinsurah
	Family	STENOPHORIDAE	
	Genus	***Hyalosporina*** Chakraborty	
153.	*H. cambolopsisae* Chakraborty	*Cambolopsis* sp.	Calcutta
154.	*H. rayi* Chakraborty and Mitra	*Polydesmus* sp.	Calcutta
		Strongylosoma contortipes	Calcutta
	Genus	***Stenophora*** Labbe	
155.	*S. ellipsoidi* Chakraborty	*Diplopoda* sp.	Calcutta
156.	*S. khagendrae* Ray	*Zikadesmus* sp.	Calcutta
157.	*S. shyamaprasadi* Chakravarty	*Cormocephalus dentipes*	Calcutta
	Family	LEIDYANIDAE	
	Genus	***Leidyana*** Watson	
158.	*L. guttiventra* Sarkar	*Plebeiogryllus guttiventra*	*Chinsurah*
159.	*L. linguata* Haldar and Sarkar	*Pteronemobius conclor*	Kalyani

160.	*L. oryzaephili* Ray	*Oryzaephilus mercator*	Calcutta
	Genus	***Amphiplatyspora*** Kundu and Haldar	
161.	*A. striata* Kundu and Haldar	*Pteronemobius concolor*	Ranaghat
	Family	MONODUCTIDAE	
	Genus	***Monoductus*** Ray and Chakravarty	
162.	*M. lunatus* Ray and Chakravarty	*Strongylosoma contortipes*	Calcutta
	Genus	***Phleobum*** Haldar and Chakraborty	
163.	*P. collarum* Kundu and Haldar	*Phleoba infumata*	Kalyani
164.	*P. gigantinum* Haldar	*Phleoba antennata*	Kalyani
	Family	DACTYLOPHORIDAE	
	Genus	***Grebneckiella*** Bhatia	
165.	*G. navillae* (Mitra and Chakravarty)	*Scolopendra* sp.	Calcutta
	Family	STYLOCEPHALIDAE	
	Genus	***Stylocephalus*** Ellis	
166.	*S. apapillatus* Haldar and Chakraborty	*Gonocephalum* sp.	Kalyani, Nadia
	Genus	***Lepismatophila*** Adams and Travis	
167.	*L. cruszi* Kundu and Haldar	*Acrotelsa collaris*	Ranaghat
168.	*L. rhombocephala* Haldar and Chakraborty	*Ctenolepisma nigra*	Kalyani, Nadia
	Family	ACTINOCEPHALIDAE	
	Genus	***Actinocephalus*** Stein	
169.	*A. ceriagrionae* Sarkar and Chakravarty	*Ceriagrion coromandelianum*	Calcutta
170.	*A. ellipsoidus* Sarkar and Haldar	*Ischnura delicata*	Kalyani
	Genus	***Caulocephalus*** Bhatia and Setna	
171.	*C. crenata* Bhatia and Setna	*Aulcophora foveicollis*	Calcutta
	Genus	***Pyxinia*** Hammerschmidt	
172.	*P. reneae* Sarkar	*Evorinea iota*	Murshidabad

	Genus	***Steinina*** Leger and Duboscq	
173.	*S. alphitobii* Sarkar and Chakravarty emend. Levine	*Alphitobius piceus*	Calcutta
174.	*S. microgoni* Sarkar and Chakravarty emend. Levine	*Anoplogenius microgonus*	Calcutta
175.	*S. palorusi* Gupta and Haldar	*Palorus* sp.	Kalyani
176.	*S. singhi* Ghose and Haldar	*Palorus ratzebergii*	Chinsurah, Hugli
	Genus	***Stylocystis*** Leger	
177.	*S. chowdhurya* Sarkar	*Cryptophagus*. sp.	West Bengal (exact locality not mentioned)
	Genus	***Chilogregarina*** Levine	
178.	*C. bhatiae* Sarkar	*Geophilus* sp.	Chinsurah
	Genus	***Crucocephalus*** Sarkar	
179.	*C. dufouri* Sarkar	*Dermestes* sp	Naihati
	Genus	***Harendraia*** Sarkar	
180.	*H. intricata* Sarkar	*Ptinus* sp.	Naihati
	Genus	***Acanthospora*** Leger	
181.	*A. bengalensis* Sarkar and Haldar	*Ceriagrion cerinorubellum*	Chinsurah
	Genus	***Ancyrophora*** Leger	
182.	*A. ischnurae* Sarkar and Haldar	*Ischnura senegalensis*	Chinsurrah
183.	*A. ovoides* Sarkar and Haldar	*Ischnura delicata*	Naihati
	Genus	***Ramicephalus*** Obata	
184.	*R. olivacus* Sarkar and Haldar	*Ceriagrion olivacum*	Hugli
	Genus	***Quadruspinospora*** Sarkar and Chakravarty	
185.	*Q. acridae* Haldar and Chakravarty emend. Levine	*Acrida exaltata*	Kalyani
186.	*Q. ailopii* Sarkar and Chakravarty emend. Levine	*Ailopus* sp.	Haora
187.	*Q. attractomorphae* Haldar and Chakravarty emend. Levine	*Attractomorpha crenulata*	Kalyani

188.	*Q. chakravartyi* Chakraborty and Haldar emend. Levine	*Aiolopus tamulus*	Kalyani
		Spathosternum sp.	Kalyani
189.	*Q. dichotoma* Kundu and Haldar	*Spathosternum p. prasiniferum*	Kalyani
190.	*Q. indoaiolopi* Haldar and Chakraborty emend. Levine	*Aiolopus* sp.	Kalyani
191.	*Q. megaspinosa* Haldar and Chakraborty	*Trilophidia annulata*	Kalyani
	Genus	***Tertractinospora*** Sarkar and Haldar	
192.	*T victoris* Sarkar and Haldar	*Ceriagrion coromandelianum*	Kalyani
	Genus	***Mukundella*** Sarkar	
193.	*M. undulatus* Sarkar	*Enallagma sp.*	Chinsurah, Naihati
	Genus	***Menospora*** Leger	
194.	*M. coenagrii* Sarkar and Haldar	*Coenagrion dyeri*	Hugli
195.	*M. enallagmae* Sarkar and Haldar	*Enallagma parvum*	Chinsurah
	Genus	***Hoplorhynchus*** Carus	
196.	*H. carusi* Sarkar and Mazumder	*Pseudagrion decorum*	Mahanda Reserve Forest
197.	*H. ramidigitus* Sarkar and Haldar	*Agriocnemis pygmaea*	Chinsurah
	Genus	***Odonaticola*** Sarkar and Haldar	
198.	*O. brachydiplaxi* Sarkar and Mazumder	*Brachidiplax farinosa*	Mahanada Reserve Forest
199.	*O. elliptica* Sakar	*Crocothemis s. servilia*	West Bengal (exact locality not mentioned)
200.	*O. hexacantha* Sakar and Haldar	*Brachythemis conteaminat*	Chinsurah
201.	*O. longicollara* Sarkar and Haldar	*Diplocodes trivialis*	Chinsurah
202.	*O. nonacantha* Devdhar and Deshpande	*Urothemis s. signata*	Hugli
203.	*O. orthetri* Sarkar and Haldar	*Orthetrum sabina*	Chinsurah

204.	*O. rodgii* Sarkar and Haldar	*Neurothemis t. tullia*	Kalyani
	Family	CEPHALOIDOPHORIDAE	
	Genus	***Cephaloidophora*** Mavrodiadi	
205.	*C. metaplaxi* (= *Steinina metaplexi*)	*Metaplax dentipes*	Port Canning
	Family	BRUSTIOSPORIDAE	
	Genus	***Brustiospora*** Kundu and Haldar	
206.	*B. indicola* Kundu and Haldar	*Stethorus* sp.	Kalyani
	Subclass	COCCIDIA	
	Order	EUCOCCIDA	
	Suborder	ADELEINA	
	Family	ADELEIDAE	
	Genus	***Adelina*** Hesse	
207.	*A. schellaki* Ray and Dasgupta	*Cormocephalus dentipes*	Calcutta
	Family	HAEMOGREGARINIDAE	
	Genus	***Haemogregarina*** Danilewsky	
	A. ***Haemogregarina*** **of fishes**		
208.	*H. colisa* Madal, Ray, Sarkar and Kahali	*Colisa fasciata*	Canning
	B. ***Haemogragarina*** **of Amphibians**		
209.	*H. berestneffi* Castellani and Willey	*Rana cyanophlyctis*	Balitha, Bankura; Berhampore; Reang, Darjiling.
		Rana limnocharis	Bankura, Darjiling
		Rana tigrina	Berhampore, Bankura
210.	*H. kaloulae* Ray and Choudhury	*Koloula pulchra taprobanica*	Berhampore, Bankura
211.	*H. maculatus* Ray and Choudhury	*Rhacophorus maculatus*	Balitha, Bankura
212.	*H. magna* (Grassi & Feletti)	*Rana limnocharis*	Bishnupur, Bankura
		Rana tigrina	Garumara
213.	*H. nucleobisecans* Shortt	*Bufo andersoni*	Bankura, Puruliya
		Bufo melanostictus	Malda, Bankura, Puruliya, South 24-Parganas

214. *H. pattoni* Ray and Choudhury	*Rana hexadactyla*	Medinipur
215. *H. perinucleophilum* Ray and Choudhury	*Rana tigrina*	Balitha, Bankura
216. *H. pulchra* Ray and Choudhury	*Kaloula pulchra*	Santaldi, Puruliya
217. *H. systoma* Ray and Choudhury	*Uperodon systoma*	Puruliya
218. *H.* sp.	*Bufo himalayanus*	Darjiling

C. ***Haemogregarina*** **of Reptiles**

219. *H. choudhury* Ray and Bhattacharjee	*Lissemys p. punctata*	Balitha, Bankura
	Helobdella nociva	Balitha, Bankura
220. *H. gangetica* Misra (= *H. simondi*)	*Trionyx gangeticus*	Calcutta
221. *H. mirabilis* Castallani and Willey	*Natrix piscator*	Koch Bihar
222. *H. xaveri* de Mello	*Lissemys punctata*	South 24-pgs.
223. *H.* sp.	*Enhydris enhydris*	Chakdah, Nadia
224. *H.* sp.	*Mabuya carinata*	Raiganj
225. *H.* sp.	*Hemidactylus flaviviridis*	Gorumara
226. *H.* sp.	*Natrix stolata*	Koch Bihar
227. *H.* sp.	*Calotes versicolor*	Reang, Darjiling

Genus ***Hepatozoon*** Miller

228. *H. mucosus* Sinha	*Ptyas mucosus*	North 24-Pgs.
229. *H.* sp.	*Petaurista magnificus*	Darjiling

Suborder EIMERIINA

Family EIMERIIDAE

Genus ***Tyzzeria*** Allen

230. *T. alleni* Chakravarty	*Nettapus coromandelianus*	Bidyadhari Spill area; Mahisbathan, Basirhat
231. *T. chenicusae* Ray and Sarkar	*Nettapus coromandelianus*	Basirhat

Genus ***Eimeria*** Schneider

A. ***Eimeria*** **of Fishes**

232. *E. glossogobii* Mukherjee and Haldar	*Glossogobius giuris*	Kalyani

233. *E. harpodoni* Setna and Bana	*Harpodon nehereus*	Port Canning
234. *E. notopteri* Chakravarty and Kar	*Notopterus notopterus*	Calcutta market
	N. chitala	Calcutta market
235. *E. southwelli* Halawani	*Scoliodon sorrakowah*	Sundarban
236. *E. zygaenac* Mandal	*Zygaena blochii*	Digha shore, Medinipur; Sundarban, South 24-Parganas
B. *Eimeria* of Amphibians		
237. *E. cyanophlyctis* Chakravarty and Kar	*Rana cyanophlyctis*	Calcutta
238. *E. laminata* Ray	*Bufo melanostictus*	Calcutta
C. *Eimeria* of Reptiles		
239. *E. bongaonensis* Sinha and Sinha	*Gekko gecko* (Linn.)	Bangaon
240. *E. fibrilosa* Mandal	*Enhydris enhydris*	Chakdah
241. *E. falviviridis* Setna and Bana	*Hemidactylus flaviviridis*	Barasat, North 24-Parganas; Calcutta
242. *E. gupti* Bhatia	*Natrix piscator*	Calcutta
243. *E. hemidactyli* Knowles and Dasgupta	*Hemidactylus falviviridis*	Calcutta
244. *E. irregularis Kar*	*Lissemys punctata*	Calcutta
245. *E. innominata* Kar	*Lissemys punctata*	Calcutta
246 *E. koormae* Dasgupta	Lissemys *punctata*	Basirhat, North 24-Parganas; Calcutta
247. *E. knowlesi* Bhatia	*Hemidactylus flaviviridis*	Calcutta
248. *E. najae* Ray and Dasgupta	*Naja naja*	Sundarban
249. *E. piscatori* Ray and Dasgupta	*Natrix piscator*	Calcutta
250. *E. stolatae* Ray And Dasgupta	*Natrix stolata*	Calcutta
251. *E. trionyxae* Chakravarty and Kar	*Trinyx gangeticus*	Calcutta
252. *E. triangularis* Chakravarty	*Trionyx gangeticus*	Calcutta
D. *Eimeria* of Birds		
253. *E. alectorae* Ray and Hiregaudar	*Alectoris graeca*	Zoological garden, Calcutta
254. *E. anili* Haldar, Ray and Mandal	*Sturnas contra contra*	Kalyani

255. *E. barbeta* Kar	*Cyanops asiatica asiatica*	Calcutta
256. *E. bengalensis* Paul, Ghosh and Haldar	*Gallus domesticus*	Kalna, Barddhaman
257. *E. bhutanensis* Ray and Hiregaudar	*Plyplectron bicoloratum*	Zoological garden, Calcutta
258. *E. charadrii* Mandal	*Charadrius asiaticus*	Narayantala, South 24 Parganas
259. *E. columbae* Mitra and Dasgupta	*Columba intermedia*	Calcutta
260. *E. coturnicis* Chakravarty and Kar	*Coturnix c. coturnix*	Calcutta
261. *E. dauki* Bhatia and Pande	*Amaurornis phoenicurus*	Barasat
262. *E. gallinagoi* Mandal	*Gallinago gallinago*	Basanti, South 24-Pargans
263. *E. gallusae* Paul, Ghosh and Haldar	*Gallus domesticus*	Bagata, North 24-Parganas
264. *E. gennaeuscus* Ray and Hiregaudar	*Gennaeus horsfieldi*	Zoological Garden, Calcutta
265. *E. kapotei* Chatterjee and Ray	*Columba livia intermedia*	Calcutta
266. *E. labbeana* (Labbe)	*Columba livia intermedia*	Calcutta
267. *E. malacce* Chakravarty and Kar	*Lonchura m. malacca*	Calcutta
268. *E. mandali* Banik and Ray	*Pavo cristatus*	Zoological Garden, Calcutta
269. *E. numeni* Mandal	*Numenius arquata*	Namkhana, South 24-Parganas
270. *E. pavonina* Banik and Ray	*Pavo cristatus*	Zoological Garden, Calcutta
271. *E. roscoviensis pluvialina* Mandal	*Pluvialis appricaria*	Namkhana, South 24-Parrganas
272. *E. tenella* (Raillet and Rucet)	*Gallus domesticus*	Calcutta
273. *E. tropicalis* Malhotra and Ray	*Columba livia intermedia*	Calcutta
274. *E. vanelli* Mandal	*Vanellus malabaricus*	Basanti, South 24-Parganas
E. *Eimeria* of Mammals		
275. *E. ahsata* Honess	*Ovis* sp.	Calcutta
	Capra hircus Calcutta,	North & South 24-Parganas

276.	*E. antilocervi* Ray and Mandal	*Antelope cervicapra*	*Zoological Garden, Calcutta.*
277.	*E. arloingi* (Marotel)	*Capra hircus*	Calcutta, North & South 24-Parganas
278.	*E. bandicota* Bandyopadhyay	*Bandicota bengalensis*	Darjiling
279.	*E. bandipurensis* Ray, Banik and Mukerjee	*Funumbulus palmarum*	Bandipur, Hugli
280.	*E. biswapatii* Bandyopadhyay	*Bandicota indica*	Haora
281.	*E. cervis* Mandal and Choudhury	*Axis axis*	Sunderban
282.	*E. christenseni* Levine, Ivens and Fritz	*Capra hircus*	Calcutta
283.	*E. clupearum* (Thelohan)	*Homo sapiens*	Calcutta
284.	*E. comminispora* Bandyopadhyay and Dasgupta	*Peturista magnificus*	Darjiling
285.	*E. crandallis* Honess	*Capra hircus*	Calcutta
286.	*E. darjeelingensis* Sinha and Sinha	*Suncus murinus soccatus*	Darjiling
287.	*E. faurei* (Moussu and Marotel)	*Capra hircus*	Calcutta
288.	*E. garumarana* Bandopadhyay	*Rattus rattus brunneusculus*	Garumara, Jalpaiguri
289.	*E. granulosa* Christensen	*Capra hircus*	Calcutta
290.	*E. intricata* Spiegel	*Capra hircus*	Calcutta
291.	*E. jalpaiguriensis*	*Herpestes edwardsi*	Calcutta
292.	*E. micropylifera* Bandyopadhyay and Dasgupta	*Petaurista magnificus*	Darjiling
293.	*E. murinus* Bandopadhyay and Dasgupta	*Suncus murinus*	Haora
294.	*E. nasuta* Bandyopadhyay and Dasgupta	*Petaurista magnificus*	Darjiling
295.	*E. neodeblicki* Vetterling	*Sus scrofa*	Calcutta, Sunderbans,
296.	*E. ninakholyakimovi* Yakimoff and Rostegaieff	*Capra hircus*	Calcutta
297.	*E. oryctolagi* Ray and Banik	*Oryctolagus cuniculus*	Calcutta
298.	*E. ovoidalis* Ray and Mandal	*Bubalus bubalis*	Calcutta
299.	*E. parva* Kotlan, Mocsy and Vajda	*Capra hircus*	Calcutta
300.	*E. sibporensis* Bandopadhyay and Dasgupta	*Rattus rattus arboreus*	Sibpore, Haora

301.	*E. spinosa* Henry	*Sus scrofa*	Calcutta
302.	*E. suncus* Ahuwalia, Singh, Arora, Mandal and Sarkar	*Suncus murinus soccatus*	Darjiling Calcutta

Genus *Caryospora* Leger

303.	*C. bengalensis* Mandal	*Enhydris enhydris*	Chakdah, Nadia
304.	*C. cobrae* Nandi	*Naja naja*	Barddhaman
305.	*C. gekkonis* Chakravarty and Kar	*Gekko gecko*	Calcutta

Genus *Isospora* Scheneider

A. *Isospora* of Amphibians

306.	*I. stomaticas* Chakravarty	*Bufo stomaticus*	Calcutta
307.	*I. wenyoni* Ray and Dasgupta	*Rana limnocharis*	Calcutta
		Bufo melanostictus	Calcutta
		Rana tigrina	Calcutta

B. *Isospora* of Reptiles

308.	*I. calotesi* Bhatia	*Calotes versicolor*	Calcutta
309.	*I. knowlesi* Ray and Dasgupta	*Hemidactylus flaviviridis*	Calcutta
310.	*I. minuta* Mitra and Dasgupta	*Naja naja*	Calcutta

C. *Isospora* of Birds

311.	*I. bellericae* Banik and Ray	*Bellerica pavonina regulorum*	Calcutta zoo
312.	*I. bengalensis* Mandal and Chakravarty	*Corvus splendens*	Calcutta
313.	*I. capistrata* Sinha and Sinha	*Heterophasia* (= *Leioptila*) *capistrata*	Darjiling
314.	*I. ceylonensis* Sinha, Sinha Chattoraj, Bandopadhyay and Ghosh	*Culicicapa cylonensis calochrysea*	Darjiling
315.	*I. concinnus* Sinha and Sinha	*Aegithalos concinnus rubricapillus*	Darrjiling
316.	*I. copsychi* Paul, Ghosh and Haldar (Linn)	*Copsychus saularis*	Barddhaman
317.	*I. emberizae* Mandal and Chakravarty	*Emberiza brruniceps*	Sunderban
318.	*I. estrildi* Paul, Ghosh and Haldar	*Estrilda amandava*	Calcutta
319.	*I. ginginiana* Chakravarty and Kar	*Acridotheres ginginianus*	Calcutta

319a.	*I. ginginiana tristis* Chakravarty and Kar	*Acridotheres tristis tristis*	Calcutta
320.	*I. gypsi* Patnaik and Mohanty	*Gyps bengalensis*	Calcutta
321.	*I. lacazei* (Labbe)	*Acridotheres* ginginianus	Calcutta
		Acridotheres t. tristis	Calcutta
		Copsychus saularis	Calcutta
		Passer domesticus	Calcutta
		Ploceus philippinus	Calcutta
		Pycnonotus cafer	Calcutta
		Sturnus contra	Calcutta
322.	*I. lonchurae* Mandal and Chakravarty	*Lonchura punctulata*	Calcutta
		Sturnnus contra	Calcutta
323.	*I. mandali* Paul, Ghsoh and Haldar	*Lonchura striata*	Calcutta
324.	*I. mayuri* Patnaik	*Pavo cristatus*	Calcutta market
325.	*I. megalaimae* Mandal and Chakravarty	*Megalaima haemocephala*	Subarb of Calcutta
326.	*I. muniae* Chakravarty and Kar	*Lonchura malacca malacca*	Subarb of Calcutta
327.	*I. psittaculae* Chakravarty and Kar	*Psittacula eupatria nipalensis*	Calcutta
		Pycnontus jocosus emeria	Calcutta
328.	*I. pycnonotae* Mandal and Chakravarty	*Pycnonotus jocosus*	Calcutta
		Turdoides striatus	Calcutta
329.	*I. temenuchii* Chakravarty and Kar	*Sturnus pagodarum*	Calcutta
330.	*I. zosteropis* Chakravarty and Kar	*Zosterops palpebrosa palpebrosa*	Calcutta
		Megalaima (= *Thereiceryx*) *zeylanica canniceps*	Calcutta
	D. ***Isospora* of Mammals**		
331.	*I. belli* Wenyon	*Homo sapiens*	Calcutta
332.	*I. canis* Nemeseri	*Canis familiaris*	Calcutta
333.	*I. felis* (Wasielewsky)	*Felis domestica*	Calcutta
334.	*I. hominis* (Railliet and Lucet)	*Homo sapiens*	Calcutta

335.	*I. leonina* Mandal and Ray	*Panthera leo*	Zological garden Calcutta
336.	*I. rovolta* (Grassi)	*Canis dingo*	Calcutta
		Felis chaus	Calcutta
		Felis domestica	Calcutta
		Herpestes auropunctata	Calcutta
337.	*I. sibporensis* Bandyopadhyay Nandi and Das	*Rattus rattus arboreus*	Sibpore, Haora
338.	*I. sundarbanensis* Ray and Sarkar	*Sus scrofa*	Sundarban
339.	*I. tropicalis* Mukherjee and Krassner	*Canis aureus*	Bandipore, Hugli

Genus *Dorisa* Levine

A. *Dorisa* of Birds

340.	*D. aethiopsaris* (Chakravarty and Kar)	*Acridotheres fuscus fuscus*	Calcutta
341.	*D. chakravartyi* (Ray and Sarkar)	*Lonchurra malabarica*	Calcutta
		Lonchura punctulata	Calcutta
342.	*D. graculae* Mandal, Nandi, Chakraborty, Bhowmik, Sarkar and Roy	*Gracula religiosa*	Darjiling
343.	*D. hareni* (Chakravarty and Kar)	*Amandava amandava*	Calcutta
		Lonchura malabarica	Calcutta
		Lonchura m. malacca	Calcutta
		Lonchura malacca rubroniger	Calcutta
		Lonchura punctulata	Calcutta
344.	*D. mandali* (Ray and Sarkar)	*Zosterops palpebrosa*	Calcutta
345.	*D. passeris* (Ray and Sarkarr)	*Passer domesticus*	Calcutta
346.	*D. vagabundae* (Mandal and Chakravarty)	*Dendrocitta vagabunda*	Calcutta

B. *Dorisa* of Mammals

347.	*D. bengalensis* Bandyopadhyay and Ray	*Funambulus pennanti*	Haora
348.	*D. harpia* (Sinha and Dasgupta)	*Harpiocephalus harpia lasyarus*	Darjiling
349.	*D. indica* Bandyopadhyay, Ray and Bhattacharjee	*Rattus rattus arboreus*	Haora

Genus ***Wenyonella*** Hoare

A. *Wenyonella* of Birds

350.	*W. columbae* Haldar and Ray Chaudhury	*Columba livia intermedia*	Calcutta, Nadia (Kalyani)
351.	*W. gagari* Sarkar and Ray	*Anas boschus*	Basirhat

B. *Wenyonella* of mammals

352.	*W. hoarei* Ray and Das Gupta	*Sciurus* sp.	Shibpur Botanical garden, Haora
353.	*W. levinei* Bandyopadhyay, Ray and Das Gupta	*Rattus rattus arboreus*	Haora

Genus ***Octosporella*** Ray and Raghavachari

354.	*O. mabuiae* Ray	*Mabuya* sp.	Calcutta

Genus ***Sivatoshella*** Ray and Sarkar

355.	*S. lonchurae* Ray and Sarkar	*Lonchura malabarica*	Calcutta
		Lonchura punctulata	Calcutta

Genus ***Pythonella*** Ray and Dasgupta

356.	*P. bengalensis* Ray and Dasgupta	*Python* sp.	Calcutta

Family LANKESTERELLIDAE

Genus ***Lankesterella*** Labbe

357.	*L. bufonis* Mansour and Mohammad	*Bufo melanostictus*	Balitha & Kotalpur, Bankura
358.	*L. minina* (Chaussat)	*Rana limnocharis*	Jalpaiguri
		Rana tigrina	Berhampore, Bankura South 24-Parganas
359.	*L.* sp.	*Bufo himalayanus*	Darjiling
360.	*L.* sp.	*Ploceus philippinus*	Chakdah, Nadia
361.	*L.* sp.	*Passer domesticus*	Chakdah, Nadia
362.	*L.* sp.	*Sturnus malabaricus*	Chakdah, Nadia

Family SARCOCYSTIDAE

Genus ***Sarcocystis***

363.	*S. blanchardi* Doflein	*Bos indicus*	Calcutta
		Bubalus bubalis	Calcutta

Family TOXOPLASMATIDAE

Genus ***Toxoplasma*** Nicolli and Manceaux

364.	*T gondii* (Nicolli and Manceaux)	*Rattus rattus*	Calcutta
		Lepus sp.	Calcutta, Haora

Suborder HAEMOSPORINA

Family PLASMODIIDAE

Genus ***Plasmodium*** Marchiafava and Celli

A. *Plasmodium* of Birds

365.	*P. circumflexum* Kikuth (Syn. *P. heroni*)	*Ardeola grayi*	Calcutta
		Dendrocitta vaqabunda	Chakdah, Nadia
366.	*P. coturnixae* Sarkar and Ray	*Coturnix coromandelica*	Calcutta
367.	*P. nucleophilum* Manwell	*Sturnus malabaricus*	Chakdah, Nadia
368.	*P. relictum* Grassi and Feletti (Syn. *P. ploceii, P. pericrocoti and P. praecox var. muniae*)	*Aedes* spp.	West Bengal
		Anopheles subpictus	West Bengal
		Columba livia intermedia	Calcutta
		Corvus splendens	Calcutta
		Culex spp.	West Bengal
		Ithaginis cruentus	Darjiling
		Lanius schach tricolor	Calcutta market
		Lonchura malacca atricapilla (Syn. *Munia* a. *atricapilla*)	Calcutta, South 24-Parganas
		Pericrocotus cinamomeus peregrinus	Calcutta
		Ploceus philippinus	Chakdah, Nadia; Calcutta
		Tragopan satyra	Darjiling
369.	*P.* sp.	*Dendrocitta vagabunda*	Chakdah, Nadia
370.	*P.* sp.	*Megalaima haemacephala*	Chakdah, Nadia; Calcutta
371.	*P.* sp.	*Otus scops*	Chakdah, Nadia
372.	*P.* sp.	*Heterophasia capistrata*	Darjiling
373.	*P.* sp.	*Ploceus philippinus*	Chakdah, Nadia
374.	*P.* sp.	*Muscicapa sundra*	Darjiling
375.	*P.* sp.	*Sturnus contra*	Chakdah, Nadia; Gangetic W.B.
376.	*P.* sp.	*Accipiter virgatus affinis*	Darjiling
377.	*P.* sp.	*Centropus sinensis*	North 24-Parganas
378.	*P.* sp.	*Sturnus malabaricus*	Gangetic West Bengal

	B. ***Plasmodium* of Mammals**		
379.	*P. falciparum* (Welch)	*Anopheles* spp.	West Bengal
		Homo sapiens	Cosmopolitan
380.	*P. malariae* Laveran	*Anopheles* spp.	West Bengal
		Homo sapiens	Cosmopolitan
381.	*P. vivax* (Grassi and Feletti)	*Anopheles* spp.	West Bengal
		Homo sapiens	Cosmopolitan
	Genus ***Mesnilium*** Misra, Haldar and Chakravarty		
382.	*M. malariae* Misra, Haldar and Chakravarty	*Channa punctatus*	Calcutta and its suburbs
	Family HAEMOPROTEIDAE		
	Genus ***Haemoproteus*** Kruse		
	A. ***Haemoproteus* of Fishes**		
383.	*H. rupicola* Mandal *et al.*	*Noemacheilus rupicola*	Darjiling
	B. ***Haemoproteus* of Amphibians**		
384.	*H. ovalis* Ray and Choudhury	*Rana limnocharis*	Balitha, Bankura
	C. ***Haemoproteus* of Reptiles**		
385.	*H. trionyxi* Misrra and Choudhury	*Trionyx gangeticus*	Calcutta
	D. ***Haemoproteus* of Birds**		
386.	*H. bennetti* Greiner, Mandal and Nandi	*Picus flavinucha*	Darjiling
387.	*H. columbae* Kruse	*Columba livia*	Calcutta, Nadia, South 24-Pgs.
		Columba livia domestica	Cosmopolitan
		Columba livia intermedia	Cosmopolitan
		Pseudolynchia canarenis	Calcutta and South 24-Pgs.
388.	*H. cornuata* Bennett and Nandi	*Megalaima haemacephala*	Chakdah, Nadia
389.	*H. danilewskyi* Kruse	*Corvus splendens*	Calcutta
		Dendrocitta vasabunda	Nadia
390.	*H. dicruri* de Mello	*Dicrurus adsimilis*	Nadia
391.	*H. fringillae* Labbe	*Copsychus saularis*	Calcutta, Nadia
392.	*H. handai* Maqsood	*Psittacula krameri manillensis*	Calcutta
393.	*H. himalayanus* Paul and Das Gupta	*Heterophasia capistrata*	Darjiling

394. *H. oryzivorae*	*Copsychus saularis*	Calcutta, Nadia
	Lonchura malabarica	Calcutta, Nadia
	Lonchura malacca ruboniger	Gangetic West Bengal
	Lonchura punctulata	Calcutta
	Ploceus philippinus	Nadia
	Trudoides striatus	Sagar island, South 24-Pgs.
395. *H. pasteris* de Mello	*Sturnus contra*	Nadia, South 24-Parganas
	Sturnus malabaricus	Nadia, South 24-Parganas
396. *H. sangunis* Chakravarty and Kar	*Pycnonotus jocosus emeria*	Calcutta
397. *H. syrnii* Mayer	*Otus scops*	Chakdah, Nadia
398. *H. thereicerycis* de Mello	*Megalaima a. asiatica*	Darjiling
	Magalaima haemacephala	Chakdah, Nadia
399. *H. zosteropis* Chakravarty	*Zosterops p. palpebrosa*	Calcutta
400. *H.* sp.	*Acrocephalus arundinaceus*	West Bengal
401. *H.* sp.	*Acrocephalus stentoreus*	West Bengal
402. *H.* sp.	*Acrocephalus dumetorum*	Calcutta, Sagar Island
403. *H.* sp.	*Copsychus malabaricus*	West Bengal
404. *H.* sp.	*Dicrurus adsimilis*	West Bengal
405. *H.* sp.	*Muscicapa parva*	Calcutta
406. *H.* sp.	*Ploceus manyar*	West Bengal
407. *H.* sp.	*Ithopygia saturata*	Darjiling
408. *H.* sp.	*Estrilda amandava*	Gangetic West Bengal
409. *H.* sp.	*Lanius schach tricolor*	Calcutta
410. *H.* sp.	*Lonchura malabarica*	West Bengal
411. *H.* sp.	*Lonchura malacca*	Gangetic West Bengal
412. *H.* sp.	*Sturnus contra*	Gangetic West Bengal
Genus	***Polychromophilus*** Dionisi	
413. *P. murinus*	*Hipposideros lankadiva*	Jalpaiguri
414. *P.* sp.	*Rhinolophus rouxi rouxi*	Darjiling

	Genus	***Hepatocystis*** Levaditi and Schoen	
415.	*H. rayi wui* Das Gupta, Chatterjee and Ray	*Petaurista magnificus*	Darjiling
416.	*H.* sp.	*Petaurista eleganas caniceps*	Darjiling
	Genus	***Rayella*** Das Gupta	
417.	*R. gigantica* Pal and Das Gupta	*Petaurista elegans caniceps*	Darjiling
418.	*R. hylopetei* Das Gupta, Pal, Chatterjee & Chakravarty	*Hylopetes alboniger*	Darjiling
419.	*R. rayi* Das Gupta	*Petaurista magnificus*	Darjiling
	Family	LEUCOCYTOZOIDAE	
	Genus	***Leucocytozoon*** Sambon	
420.	*L. sabrazesi* Mathis and Leger	*Gallus* sp.	Darjiling
		Gallus gallus murghi	Darjiling
	Subclass	PIROPLASMIA	
	Order	PIROPLASMIDA	
	Family	BABESIIDAE	
	Genus	***Babesia*** Starcovici	
421.	*B. bengalensis* Bandyopadhyay and Ray	*Herpestes edwardsi*	Barasat, North 24-Parganas
422.	*B. bigemina* (Smith and Kilborne)	*Bos indicus*	Calcutta
423.	*B. gibsoni* (Patton)	*Canis familiaris*	Calcutta
424.	*B. motasi* Wenyon	*Ovis* sp.	Calcutta
425.	*B. muris* (Fantham)	*Rattus rattus arboreus*	Sundarban
426.	*B. vesperuginis* (Dionisi)	*Scotophilus k. kuhli*	Sundarban
	Family	THEILERIIDAE	
	Genus	***Theileria*** Bettencourt, Franca and Borges	
427.	*T mutans* (Theiler)	*Bos indicus*	Calcutta
428.	*T parva* (Theiler)	*Bos indicus*	Calcutta
	Family	HAEMOHORMIDIIDAE	
	Genus	***Haemohormidium*** Henry (= *Babesiosoma*)	
429.	*H. batrachi* (Ray Chaudhuri and Choudhury)	*Clarias batrachus*	Naihati

430. *H. hareni* (Haldar, Misra and Chakravarty)	*Channa punctatus*	Calcutta and Subarbs
431. *H. ophicephali* (Misra, Haldar and Chakravarty)	*Channa punctatuts*	Subarbs of Calcutta
432. H. sp.	*Muraenesox* sp.	Canning market 24-Parganas
Family	DACTYLOSOMATIDAE	
Genus	***Dactylosoma*** Labbe	
433. *D. notopteri* Kundu and Haldar	*Notopterus notopterus*	Ranaghat and Krishnagar
434. *D. striata* Sarkar and Haldar	*Ophicephalus striatus*	Chinsurah
435. *D.* sp.	*Mystus vittatus*	Taldi, South 24-Parganas
Family	ANAPLASMIDAE	
Genus	***Anaplasma*** Theiler	
436. *A. centrale* Theiler	*Hylopetes alboniger*	Darjiling
437. *A. marginale* Theiler	*Hylopetes alboniger*	Darjiling
438. *A.* sp.	Indian bats	Calcutta
Phylum	MICROSPORA	
Class	MICROSPOREA	
Order	MICROSPORIDA	
Suborder	PANSPOROBLASTINA	
Family	?	
Genus	***Thelohania*** Henneguy	
439. *T anomola* Sen	*Anopheles ramsayi*	Calcutta
440. *T indica* Kudo	*Anopheles hyrcanus*	West Bengal
	Anopheles ramsayi	Calcutta
441. *T legeri* Hesse	*Anopheles annularies*	West Bengal
	Anopheles barbirostris	West Bengal
	Anopheles hyrcanus	West Bengal
	Anopheles ramsayi	West Bengal
	Anopheles subpictus	West Bengal
	Anopheles vagus	West Bengal
	Anopheles varuna	West Bengal
442. *T obscura* Kudo	*Anopheles varuna*	West Bengal

	Suborder	APANSPOROBLASTINA	
	Family	NOSEMATIDAE	
	Genus	***Nosema*** Nageli	
443.	*N. bombycis* Nageli	*Bombyx morii* (eggs. larvae, pupae imagos)	Maldah, Murshidabad
	Phylum	MYXOZOA	
	Class	MYXOSPOREA	
	Order	BIVALVULIDA	
	Suborder	BIPOLARINA	
	Family	MYXIDIIDAE	
	Genus	***Myxidium*** Biitschli	
	A. ***Myxidium*** **fishes**		
444.	*M. appocryptae* Bajpai and Haldar	*Apocryptes bato*	Kalyani
445.	*M. boddaerti* Choudhury and Nandi	*Boleophthalmus boddaerti*	Port Canning
446.	*M calcariferi* Chakravarty	*Lates calcarifer*	West Bengal
447.	*M fasciatum* Sarkar	*Colisa fasciata*	Barrackpore
448.	*M. glossogobi* Chakravarty	*Glossogobius giuris*	Calcutta
449.	*M. heteropneustesi* Chakravary	*Heteropneustes fossilis*	Calcutta
450.	*M. islampurium* Sarkar Mazumdar and Pramanik	*Channa marulius*	Islampur, Murshidabad
451.	*M. leiberkuhni* Butschli	*Anabas testudineus*	Calcutta
		Boleophthalmus boddaerti	Port Canning
452.	*M. mystusium* Sarkar and Ray Chaudhuri	*Mystus vittatus*	Chinsurah
453.	*M. sciaenae* Sarkar	*Sciaena bleekari*	Digha coast
454.	*M. striatusi* Sarkar	*Ophicephalus striatus*	Chinsurah
455.	*M.* sp.	*Ophicephalus punctatus*	Calcutta
456.	*M.* sp.	*Clarias batrachus*	Calcutta
457.	*M.* sp.	*Heteropneustes fossilis*	Calcutta
458.	*M.* sp.	*Ophicephalus punctatus*	Nadia
	B. ***Myxidium*** **of Amphibians**		
459.	*M. haldari* Sarkar	*Hyla arborea*	Chakdah, Nadia
	Genus	***Sphaeromyxa*** Thelohan	
460.	*S. dighae* Sarkar and Mazumdar	*Hilsa ilisha*	Digha

461. *S. hareni* Sarkar	*Tachysurus platystomus*	Digha coast
462. *S. pultai* Tripathi	*Odontamblyopus rubicundus*	Barrackpore
463. *S. theraponi* Tripathi	*Therapon jarbua*	Port Canning
Geuns	***Zschokkella*** Auerbach	
A. ***Zschokkella*** **of fishes**		
464. *Z. fossilae* Chakravarty	*Heteropneustes fossilis*	Calcutta
465. *Z. illishae* Chakravarty	*Hilsa ilisha*	Calcutta market
466. *Z. platystomuse* Sarkar	*Tachysurus platystomus*	Digha coast
B. ***Zschokkella*** **of Amphibians**		
467. *Z. auerbachi* (Weill)	*Bufo melanostictus*	Calcutta
	Rana limnocharis	Calcutta
	Rana tigrina	Calcutta
C. ***Zschokkella*** **of Reptiles**		
469. *Z. lissemysi* Chakravarty	*Lissemys punctata*	Calcutta
Suborder	EURYSPORINA	
Family	CERATOMYXIDAE	
Genus	***Ceratomyxa*** Thelohan	
469. *C. gobioidesi* Chakravarty	*Odontamblyopus rubicundus*	Calcutta
470. *C. hilsae* Chakravarty	*Hilsha ilisha*	Calcutta market
471. *C. sagarica* Choudhury and Nandi	*Boleophthalmus boddaerti*	Port Canning
472. *C. scatophagi* Chakravarty	*Scatophagus argus*	West Bengal
473. *C. tartoori* Sarkar	*Opisthopterus tartoor*	Digha coast
474. *C.* sp.	*Gobioides rubicundus*	Calcutta
475. *C.* sp.	*Trichogaster fasciatus*	Calcutta
476. *C.* sp.	*Macrones gulio*	Calcutta
Genus	***Leptotheca*** Thelohan	
477. *L. latesi* Chakravarty	*Lates calcarifer*	West Bengal
478. *L. macronesi* Chakravarty	*Macrones gulio*	West Bengal
Genus	***Chloromyxum***	
479. *C. amphipnoui* Ray	*Amblypharygodon mola*	Calcutta and Agarpara, North 24-Parganas
	Amphipnous cuchia	Calcutta
	Heteropneustes fossilis	Calcutta
480. *C. meglistchi* Sarkar	*Ophicephalus punctatus*	North 24-Parganas

481. *C. mrigalae* Tripathi	*Cirrhinus mrigala*	Barrackpore
	Cirrhinus reba	Barrackpore
482. *C.* sp.	*Xenentodon cancila*	Belgharia
Suborder	PLATYSPORINA	
Family	MYXOBOLIDAE	
Genus	***Myxobolus*** Butschili	
483. *M. aligarhensis* Bhatt and Siddiqui	*Ophicephalus punctatus*	Calcutta, North 24-Parganas and Nadia
484. *M. anili* Sarkar	*Rhinomugil corsula*	Coast of Bay of Bengal
485. *M. barbi* Tripathi	*Puntius ticto*	Belgharia
486. *M. bengalensis* Chakravarty and Basu	*Catla catla*	Bidyadhari, Agarpara
487. *M. branchialis* Tripathi	*Barbus sarana*	Barrackpore
488. *M. calbasui* Chakravarty	*Cirrhinus mrigala*	Calcutta
	Labeo calbasu	Calcutta
	Labeo rohita	Calcutta
489. *M. catlae* Chakravarty	*Catia catla*	Calcutta
	Cirrhinus mrigala	Calcutta
	Labeo rohita	Calcutta
490. *M. chakravartyi* Haldar, Das, and Sharma	*Catla catla*	Krishnagar
491. *M. clarii* Chakravarty	*Clarius batrachus*	Calcutta
492. *M. eeli* Mandal and Nair	*Mastacembelus armatus*	Champahati, South 24-Parganas
493. *M. indicum* Tripathi	*Cirrhinus mrigala*	Barrackpore
494. *M. mahendrae* Sarkar	*Catla Catla*	Chinsurah
495. *M. mrigalae* Chakravarty	*Cirrhinus mrigala*	Calcutta
496. *M. mustusius* Sarkar	*Mystus vittatus*	Chinsurah
497. *M. rohitae* Haldar, Das and Sharma	*Labeo rohita*	Krishnagar
498. *M. sphericum* Tripathi	*Cirrhinus mrigala*	Barrackpore
Genus	***Myxosoma*** Thelohan	
499. *M. cylindrica* Sarkar, Mazumdar and Pramanik	*Channa gachua*	Islampur, Murshidabad
500. *M. dermitis* Haldar, Mukherjee and Kundu	*Labeo rohita*	Ranaghat

501.	*M. filamentosa* Haldar, Mukherjee and Kundu	*Puntius filamentosus*	Kalyani
502.	*M. indirae* Kundu	*Cirrhinus mrigala*	Ranaghat
503.	*M. magaudi* Bajpai and Halder	*Colisa fasciatus*	Ranaghat
504.	*M. maruliensis* Sarkar Mazumdar and Pramanik	*Channa maruliensis*	Islampur, Murshidabad
505.	*M. noblei* Sarkar	*Ophicephalus striatus*	Chinsurah, Hugli
506.	*M. trichogasteri* Sarkar	*Colisa fasciatus*	Barrackpore
	Genus ***Thelohanellus*** Kudo		
507.	*T auerbachi* Sarkar	*Tachysurus platystomus*	Digha coast
508.	*T bengalensis* Sarkar and Raychaudhury	*Catla catla*	Chinsurah, Hugli
509.	*T calbasui* Tripathi	*Labeo calbasu*	Sheoraphulli Market, Hugli
510.	*T. catlae* Chakravarty and Basu	*Catla catla*	Bidyadhari, Agarpara, North 24-Parganas
511.	*T coeli* Sarkar and Mazumdar	*Tachysurus tenuispinis*	West Bengal Coast
512.	*T gangeticus* Tripathi	*Chela bacaila*	Nimtita, North 24-Parganas
513.	*T jiroveci* Kundu and Haldar	*Labeo bata*	Ranaghat
514.	*T mrigalae* Tripathi	*Cirrhinus mrigala*	West Bengal
515.	*T opthalmicus* Haldar, Das and Sharma	*Catla catla*	Krishnagar
516.	*T rodgii* Kundu and Haldar	*Labeo calbasu*	West Bengal
517.	*T rohitae* (Southwell and Prasad)	*Labeo rohita*	Bidyadhari, Agarpara, North 24-Parganas
		Labeo bata	"
518.	*T sanjibi* Sarkar and Ghosh	*Mystus gulio*	Chinsurah
519.	*T. seni* (Southwell and Prasad)	*Catla catla*	Calcutta, Bidyadhari, Agarpara
520.	*T sudevi* Sarkar and Ghosh	*Amblyopharyngodon mola*	Chinsurah
	Genus ***Neothalohanellus*** Das and Haldar		
521.	*N. catlae* Das and Haldar	*Catla catla*	Krishnagar
522.	*N. krishnagarensis* Das and Haldar	*Labeo calbasu*	Krishnagar, Nadia
	Genus ***Henneguya*** Thelohan		
523.	*H. bengalensis* Ray and Chakravarty	*Ophicephalus punctatus*	Naihati

524. *H. bicornuata* Raychaudhury and Chakravarty	*Ophicephalus punctatus*	Calcutta
525. *H. bleekeri* Haldar and Mukherjee	*Mystus bleekeri*	Kalyani
526. *H. chaudhuryi* Bajpai and Haldar	*Ophicephalus punctatus*	Kalyani
527. *H. latesi* Tripathi	*Lates calcarifer*	Barrackpore
528. *H. mystusia* Sarkar	*Mystus* sp.	Chinsurah, Hugli
529. *H. namae* Haldar, Das and Sharma	*Chanda nama* (=*Ambasais nama*)	Krishnagar
530. *H. ophicephali* Chakravarty	*Ophicephalus gachua*	Barrackpore
	Ophicephalus punctatus	Calcutta
531. *H. renalis* Sarkar, Mazumdar and Pramanik	*Channa maruliensis*	Domkal
532. *H. ritae* Bajpai and Haldar	*Rita rita*	Chandannagar, Hugli
533. *H. rubicundi* Haldar and Mukherjee	*Odontamblyopus rubicundus*	Kalyani
Genus	***Neohenneguya*** Tripathi	
534. *N. tetraradiata* Tripathi	*Odontamblyopus rubicundus*	Hugli river, West Bengal
Order	MULTIVAVULIDA	
Family	?	
Genus	***Kudoa*** Meglitsch	
535. *K. bengalensis* Sarkar and Mazumdar	*Tachysurus platystomus*	West Bengal coast
536. *K. tachysurae* Sarkar and Mazumdar	*Tachysurus tenuispinis*	West Bengal coast
Phylum	CILIOPHORA	
Class	KINETOFRAGMINOPHOREA	
Subclass	VESTIBULIFERIA	
Order	TRICHOSTOMATIDA	
Suborder	TRICHOSTOMATINA	
Family	BALANTIDIIDAE	
Genus	***Balantidium*** Claparede and Lachmann	
537. *B. blattarum* Ghosh	*Periplaneta americana*	Calcutta
538. *B. coli* (Malmsten)	*Sus scrofa*	Sundarban
	Homo sapiens	Calcutta

539. *B. depressum* (Ghosh)	*Pila globosa*	Calcutta, Haora; North & South 24-Parganas
540. *B. dogieli* Das and Mukherjee	*Lissemys punctata punctata*	Calcutta market
541. *B. helenae* Bezzenberger	*Rana cyanophlyctis*	Puruliya
	Rana limnocharis	Calcutta
	Rana hexadactyla	Calcutta
	Rana tigrina	Calcutta
542. *B. knowlesi* Ghosh	*Culicoides peregrinus*	Calcutta
543. *B. mrigalae* Mukherjee and Haldar	*Cirrhinus mrigala*	Nadia
544. *B. ovatum* Ghosh	*Periplaneta americana*	Calcutta
545. *B. pangasi* Mukherjee and Haldar	*Pangasius pangasius*	Nadia
546. *B. ranarum* Ghosh	*Rana tigrina*	Calcutta
547. *B. rayi* Pal and Das Gupta	*Tylototriton verrucossus*	Darjiling
548. *B. rhesum* Ghosh	*Macaca mulatta*	Calcutta
549. *B. rotundum* Bezzenberger	*Rana hexadactyla*	Puruliya and North 24-Parganas
	Rana tigrina	Puruliya and North 24-Parganas
550. *B. sushillae* Ray	*Rana tigrina*	Calcutta, Puruliya
551. *B. tylototritonis* Pal and Das Gupta	*Tylototriton vessucossus*	Darjiling
Subclass	HYPOSTOMATIA	
Order	RHYNCHODIDA	
Family	ANCISTROCOMIDAE	
Genus	***Ancistrocoma*** Chatton and Lwoff	
552. *A. dissimilis* Kozloff	*Mactra luzonica*	Digha
553. *A. pelseneeri* Chatton and Lwoff	*Mactra luzonica*	Digha
554. *A. thorsoni* Fenchel	*Mactra luzonica*	Digha
Genus	***Raabella*** Chatton and Lwoff	
555. *R. helensis* Chatton	*Modiolus striatulus*	Hugli river, Calcutta
Class	OLIGOHYMENOPHOREA	
Subclass	HYMENOSTOMATIA	
Order	HYMENOSTOMATIDA	
Suborder	OPHRYOGLENINA	

Family	ICHTHYOPHTHIRIIDAE	
Genus	***Ichthyophthirius*** Fouquet	
556. *I. multifilis* Fouquet	*Cirrhinus mrigala*	Experimental Hosts
	Labeo bata	"
	Xiphophorus hellerii	"
557. I. sp.	*Labeo rohita*	"
	Major carps	"
Order	SCUTICOCILIATIDA	
Suborder	PLEURONEMATINA	
Family	CYCLIDIIDAE	
	Incertae sedis	
Genus	***Cristigera*** Roux	
558. *C. susamai* Jamadar and Choudhury	*Crassostrea cucullata*	Sagar Island
Family	CONCHOPHTHIRIDAE	
Genus	***Conchopthirius*** Stein	
559. *C. curtus* Engleman	*Lamellidens marginallis*	Calcutta and its subarbs, Hugli, Medinipur, North and South 24-Parganas
560. *C. elongatus* Ghosh	*Lamellidens marginallis*	"
561. *C. lamellidens* Ghosh	*Lamellidens marginallis*	"
Suborder	THIGMOTRICHINA	
Family	ANCISTRIDAE	
Genus	***Ancistrumina*** Raabe	
562. *A. barbata* (Issel)	*Cerithidea obtusa*	Sagar Island
563. *A. obtusae* Jamadar and Choudhury	*Cerithidea obtusa*	Sagar Island
Genus	***Boveria*** Stevene	
564. *B. teredinidi* Nelson	*Mactra luzonica*	Digha
Genus	***Fenchelia*** Raabe	
565. *F. kapili* Jamadar and Choudhury	*Cerithidea obtusa*	Sagar Island
566. *F. sagarica* Jamadar and Choudhury	*Certhidea obtusa*	Sagar Island

	Genus	***Protophrya*** Kofoid	
567.	***P. indica*** Jamadar and Choudhury	*Littorina melanostoma*	Sagar Island
		Littorina scabra scabra	Digha
	Family	HYSTEROCINETIDAE	
	Genus	***Drilocineta*** Raabe	
568.	***D. perionyxi*** Nair and Chakrabarti	*Perionyx excavatus*	Barrackpore
	Order	ASTOMATIDA	
	Family	ANOPLOPHRYIDAE	
	Genus	***Anoplophrya*** de Putorac and Dragesco	
569.	*A. aelosomatis* Anderson	*Aelosoma chlorosticum*	Calcutta
		Metaphire posthuma	Calcutta
570.	*A. anili* Mukerjee and Chakrabarti	*Perionyx excavatus*	Barrackpore
571.	*A. chauhani* Mukherjee and Chakrabarti	*Perionyx excavatus*	Barrackpore
572.	*A. cylindrica* Ghosh	*Belamya bengalensis*	Calcutta
573.	*A. elongata* Ghosh	Small freshwater gastropod	Calcutta
574.	*A. lloydi* Ghosh	*Metaphire posthuma*	Calcutta
575.	*A. lumbrici* (Schrank)	*Pheretima peguyana*	Calcutta
576.	*A. pheritima* Raychudhuri, Haldar and Chakravarty	*Metaphire posthuma*	Calcutta
577.	*A. variabilis* Ghosh	Small gastropod	Calcutta
	Family	MAUPASELLIDAE	
	Genus	***Maupasella*** Capede	
578.	*M. nova* Capede	*Perionyx excavatus*	Barrackpore
	Subclass	PERITRICHA	
	Order	PERITRICHIDA	
	Suborder	SESSILINA	
	Family	SCYPHIDIIDAE	
	Genus	***Scyphidia*** Dujardin	
579.	*S. bengalensis* Jamadar and Choudhury	*Cerithidea cingulata*	Sagar Island
580.	*S. pyriformis* Tripathi	*Catla catla*	Serampore, Hugli
		Cirrhinus mrigala	"

	Cirrhinus reba	Serampore, Hugli
	Labeo rohita	"
581. *S. ubiquita* Hirshfield	*Littorina melanostoma*	Sagar Island
	Littorina scabra scabra	Sagar Island
Suborder	MOBILINA	
Family	TRICHODINIDAE	
Genus	***Trichodina*** Ehrenberg	
582. *T gangetica* Jamadar and Choudhury	*Modiolus striatulus*	Hugli river, Calcutta
583. *T indica* Tripathi	*Amblypharyngodon mola*	West Bengal (exact locality not mentioned)
	Catla catla	West Bengal (exact locality not mentioned)
	Chanda nama	"
	Chanda ranga	"
	Channa gachua	"
	Channa punctatus	"
	Cirrhinus mrigala	"
	Cirrhinus reba	"
	Labeo calbasu	"
	Labeo rohita	"
	Salmostoma bacaila	"
584. *T nigra* Lom	Major carps	Fulia, Nadia
	Nandus nandus	Kalyani
	Tilapia mossambica	Kalyani
585. *T pediculus* Ehrenberg	Tadpole	Calcutta
586. *T* sp.	*Ophicephalus punctatus*	Kalyani
587. *T* sp.	*Sphaeroides oblongus*	Digha
588. *T* sp.	*Tilapia mossambica*	Calcutta
Genus	***Tripartiella*** Sramenk-Husek	
589. *T bulbosa* (Davis)	*Catla catla*	Krishnagar
	Chanda nama	Kalyani
	Cirrhinus mrigala	Kalyani and Krishnagar
	Labeo rohita	Kalyani
	Mystus bleekeri	Kalyani
590. *T copiosa* Lom	*Cyprinus carpio*	Krishnagar
	Labeo rohita	Krishnagar

591.	*T. obtusa* Ergens and Lom	*Ctenopharyngodon idella*	Krishnagar
	Class	POLYHYMENOPHOREA	
	Subclass	SPIROTRICHA	
	Order	HETEROTRICHIDA	
	Suborder	CLEVELANDELLINA	
	Family	NYCTOTHERIDAE	
	Genus	***Nyctotherus*** Leidy	
592.	*N. chatterjeei* Chakravarty and Chatterjee	*Gryllotalpa vulgaris*	Calcutta, Hugli
593.	*N. kempi* Ghosh	*Pila globosa*	Calcutta, South 24-Parganas
594.	*N. ovalis* Leidy	*Periplaneta americana*	Calcutta, Maldah
	Genus	***Nyctotheroides*** Grasse	
595.	*N. cordiformis* (Ehrenberg)	*Bufo malanostictus*	Calcutta, Hugli, North and South 24-Parganas
		Rana tigrina	Calcutta
	Family	SICUOPHORIDAE	
	Genus	***Sicuophora*** de Puytorac and Grain	
596.	*S. macropharyngeus* (Bezzenberger)	*Rana tigrina*	Calcutta, North and South 24-Parganas
	HOST	**PARASITE LIST**	
	Phylum	ANNELIDA	
	Class	OLIGOCHAETA	
1.	*Aelosoma chlorosticum*	*Anoplophrya aelosomatis*	Calcutta
2.	*Amynthas diffringens*	*Apolocystis goomtiensis*	Goomti, Darjiling
	(= *Pheretima diffringens*)	*Nematocystis quadrikaryomata*	Goomti, Darjiling
		Nematocystis theodoridis	Goomti, Darjiling
		Stomatophora bahli	Darjiling
		Stomatophora pedongensis	Darjiling
3.	*Amynthas hawayanus*	*Bisurculus variegatus*	Goomti, Darjiling
4.	*Apporectodea trapozoides*	*Informis informis*	Senchal, Darjiling
		Informis pseudotentaculatus	Darjiling
		Monocystis senchalensis	" "
		Nematocystis senchalensis	" "
5.	*Eutyphoeus gammiei*	*Nematocystis levinei*	Mongpoo, Darjiling

	Nematocystis mangpooensis	Mongpoo, Darjiling
6. *Eutyphoeus incommodus*	*Nematocystis bengalensis*	Ashoknagar, North 24-Parganas
7. *Eutyphoeus nicholsoni*	*Monocystis beddardi*	Calcutta
8. *Lampito mauriti*	*Nematocystis mauritii*	Ashoknagar, North 24- Parganas
9. *Metaphir (Pheretima) posthuma*	*Anoplophrya aelosomatis*	Calcutta
	Anoplophrya lumbrici	Calcutta
	Ansplophrya lloydi	Calcutta
	Anoplophry pheretimi	Calcutta
	Monocystis bengalensis	Calcutta
	Monocystis uoide	Calcutta
	Stomatophora diadema	Calcutta
	Stomatophora pradhanis	Ashoknagar, North 24-Pargans
10. *Perionyx excavatus*	*Anoplophrya anili*	Barrackpore, North 24-Parganas
	Anoplophrya chauhani	"
	Drilocineta perionyxi	"
	Maupesella nova anili	"
11. *Pheretima alexandri*	*Apolocystis vacuolatus*	Kalimpong, Darjiling
	Stomatophora globa	Darjiling
12. *Pheretima californica*	*Zygocystis indicus*	Kalimpong, Darjiling
13. *Pheretima peguyana*	*Anoplophrya lumbrici*	Calcutta
14. *Pheretima robusta*	*Apolocystis akaryosomiferus*	North point, Darjiling
	Apolocystis monokaryosomiferus	"
Class	HIRUDINARIA	
15. *Helobdella nociva*	*Haemogregarina choudhuryi*	Balitha, Bankura
	Trypanosoma balithaensis	Balitha, Bankura
	Trypanosoma rotatorium	West Bengal (Experimental)
16. *Hemiclepsis marginata*	*Trypanosoma gachuii*	Calcutta
	Trypanosoma choudhuryi	Balitha, Bankura
Phylum	MOLLUSCA	
Class	GASTROPODA	
17. *Belamya bengalensis*	*Anoplophrya cylindrica*	Calcutta
18. *Cerithidea cingulata*	*Scyphidia bengalensis*	Sagar Island

19. *Cerithidea obtusa*	*Ancistrumina barbata*	Sagar Island
	Ancistrumina obtusae	Sagar Island
	Fenchelia kapili	Sagar Island
	Fenchelia sagarica	Sagar Island
20. *Littorina melanostoma*	*Protophrya indica*	Sagar Island
	Scyphidia ubiquita	Sagar Island
21. *Littorina scabra scabra*	*Protophrya indica*	Digha
	Scyphidia ubiquita	Sagar Island
22. *Pila globosa*	*Balantidium depressum*	Calcutta, Haora, North and South 24-Parganas
	Nyctotherus kempi	Calcutta, Falta, South 24-Parganas
23. Small gastropod- (unidentified, freshwater)	*Anoplophrya elongata*	Calcutta
	Anoplophrya variabilis	Calcutta
Class	BIVALVIA	
24. *Crassostrea cucullata*	*Cristigera susamai*	Sagar Island
25. *Lamellidens marginallis*	*Conchopthirius curtus*	Calcutta, Hugli, Medinipur, North and South 24-Parganas
	Conchopthirius elongatus	"
	Conchopthirius lamellidens	"
26. *Mactra luzonica*	*Ancistrocoma dissimilis*	Digha
	Ancistrocoma pelseneeri	Digha
	Ancistrocoma thorsoni	Digha
	Boveria teredinidi	Digha
27. *Modiolus striatulus*	*Raabella helenis*	Hugli river, Calcutta
	Trichodina gangetica	"
Phylum	ARTHROPODA	
Class	CRUSTACEA	
28. *Metaplax dentipes*	*Cephaloidophora* (=*Steinina*) *metaplaxi*	Port Canning, South 24-Parganas
Class	INSECTA	
Order	THYSANURA	
29. *Acrotelsa collaris*	*Lepismatophila cruszi*	Ranaghat
30. *Ctenolepisma nigra*	*Lepismatophila rhombocephala*	Kalyani

	Order	ODONATA	
31.	*Agriocnemis pygmaea*	*Hoplorhynchus ramidigitus*	Chinsurah
32.	*Brachydiplax farinosa*	*Odonaticola brachydiplaxi*	Mahananda Reserve Forest, Darjiling
33.	*Brachythemis contaminate*	*Odonaticola hexacantha*	Chinsurah
34.	*Ceriagrion cerinorubellum*	*Acanthospora bengalensis*	Chinsurah
35.	*Ceriagrion coromandalianum*	*Actinocephalus ceriagrionae*	Calcutta
		Tetractinospora victoris	Kalyani
36.	*Ceriagrion olivacum*	*Ramicephalus olivacus*	Hugli
37.	*Coenagrion dyari*	*Menospora coenagrii*	Hugli
38.	*Crocothemis s. servilia*	*Odonaticola elliptica*	West Bengal
39.	*Diplocodes trivialis*	*Odonaticola longicollara*	Chinsurah
40.	*Enallagma parvum*	*Menospora enallagmae*	Chinsurah
41.	*Enallagma sp.*	*Mukundaella undulatus*	Chinsurah and Naihati
42.	*Ischnura delicata*	*Ancyrophora ovoides*	Naihati
		Actinocephalus ellipsoidus	Kalyani
43.	*Ischnura senegalensis*	*Ancyrophora ischnurae*	Chinsurah
44.	*Neurothemis t. tulbia*	*Odonaticola rodgii*	Kalyani
45.	*Orthetrum sabina*	*Odonaticola orthetri*	Chinsurah
46.	*Pseudagrion decorum*	*Hoplorhynchus carusi*	Mahananda Reserve Forest, Darjiling
47.	*Urothemis s. signata*	*Odonaticola nonacontha*	Hugli
	Order	LEPIDOPTERA	
48.	*Bombyx morii*	*Nosema bombycis*	Maldah and Murshidabad
	Order	ORTHOPTERA	
49.	*Acrida exaltata*	*Quadruspinospora acridae*	Kalyani
50.	*Aiolopus tamulus*	*Quadruspinospora chakravartyi*	Kalyani
51.	*Aiolopus* sp.	*Quadruspinospra aiolopii*	Haora
52.	*Aiolopus* sp.	*Quadruspinospora indoaiolopi*	Kalyani
53.	*Attractomorpha crenulata*	*Quadruspinospora attractomorphae*	Kalyani
54.	*Euparatettix histricus*	*Didymophyes indiae*	Ranaghat
55.	*Gryllodes* sp.	*Gregarina gryllodis*	Chinsurah
56.	*Gryllotalpa africana*	*Hirmocystis theodoridesi*	Ranaghat
57.	*Gryllotalpa vulgaris*	*Nyctotherus chatterjeei*	Calcutta, Hugli

58. *Grylotalpa* sp.	*Nyctotherus chatterjeei*	Calcutta, Falta, 24-Parganas
59. *Phleoba antennata*	*Phleobum gigantinum*	Kalyani
60. *Phleoba infumata*	*Phleobum collarum*	Kalyani
61. *Plebeogryllus guttiventra*	*Gregarina guttiventra*	Naihati
	Leidyana guttiventra	Chinsurah
62. *Pteronemobius conclor*	*Amphiplatyspora striata*	Ranaghat, Kalyani
	Leidyana linguata	Kalyani
63. *Pteronemobius fascipense*	*Gregarina levinei*	Chinsurah
64. *Spathosternum p. prasiniferum*	*Qudruspinospora dichotoma*	Kalyani
65. *Spathosternum* sp.	*Qudruspinospora chakravartyi*	Kalyani
66. *Trilophidia annulata*	*Qudruspinospora meganspinosa*	Kalyani
67. *Tridactylus* sp.	*Didymophyes tridactylae*	Kalyani
Order	DICTYOPTERA	
68. *Ischnoptera* sp.	*Gregarina ischnopterae*	Kalyani
69. *Periplaneta americana*	*Balantidium blattarum*	Calcutta
	Balantidium ovatum	Calcutta
	Lophomonas striata	Calcutta
	Nyctotherus ovalis	Calcutta, Maldah
70. *Supella supellectilium*	*Gregarina cylindrosa*	Kalyani
71. Nymphal stage of an unnamed Blatellidae	*Gregarina mukundai*	Ranaghat
72. Nymphal stage of an unidentified Blattellidae	*Gregarina discocephala*	Ranaghat
Order	DEMAPTERA	
73. *Nala lividipes*	*Gregarina nalae*	Kalyani
Order	PSOCOPTERA	
74. *Liposcelis* sp.	*Liposcelisus coronatus*	Naihati
75. *Psocatropos* sp.	*Enterocystis bengalensis*	Naihati
Order	HEMIPTERA	
76. *Lygeus hospes*	*Gregarina lygeusi*	Kalyani
77. *Phenacoccus hirsutus*	*Laterospora phenacocca*	Medinipur, Nadia

Order COLEOPTERA

78.	*Alcides* sp. nr. *leopardus*	*Gregarina alcidessi*	Kalyani
79.	*Alphitobius piceus*	*Steinina alphitobii*	Calcutta
80.	*Amblyrrhinus* sp.	*Gregarina crescentica*	Kalyani
81.	*Anoplogenius microgonus*	*Steinina microgoni*	Calcutta
82.	*Aulacophora foveicollis*	*Caulocephalus crenata*	Calcutta
83.	*Aulacophora intermedia*	*Retractocephalus aulacophorae*	Kalyani
84.	*Chaetocnema concinnipenis*	*Gregarina chaetocnemae*	Murshidabad
85.	*Coccinella septempunctata*	*Anisolobus indicus*	Kalyani
		Gregarina dasguptai	Darjiling
86.	*Cryptophagus* sp.	*Stylocystis chowdhurya*	West Bengal
87.	*Dercetina* sp.	*Neohirmocystis dercetini*	Kalyani
88.	*Dermestes* sp.	*Crucocephalus dufouri*	Naihati
89.	*Evorinea iota*	*Pyxinia reneae*	Murshidabad
90.	*Gallerucida bicolor*	*Quadruhyalodiscus gallerucidae*	Fulia, Nadia
91.	*Gonocephalum* sp.	*Stylocyphalus apapillatus*	Kalyani
92.	*Haltica* sp.	*Retractocephalus halticus*	Kalyani
93.	*Hoplasoma unicolor*	*Hirmocystis hoplasomae*	Ranaghat
94.	*Lema* sp. 1	*Retractocephalus spatulatus*	Kalyani
95.	*Lepropus* sp.	*Hirmocystis lepropi*	Kalyani
96.	*Lophocateres pusillus*	*Hirmocystis lophocateri*	Kalyani
97.	*Longitarsus* sp.	*Gregarina bilobosa*	Kalyani
98.	*Monolepta signata*	*Retractocephalus spinousus*	Kalyani
99.	*Myllocerus* sp. 1	*Hirmocystis bengalensis*	Kalyani
100.	*Myllocerus* sp. 2	*Hirmocystis pseudoductis*	Kalyani
101.	*Oryzaephilus mercator*	*Anisolobus royii*	Calcutta
		Didymophyes lipai	Calcutta
		Didymophyes oryzaephilae	Chinsurah
		Didymophyes rigidus	Kanchrapara, Nadia
		Leidyana oryzaephili	Calcutta
		Hirmocystis minuta	Calcutta
102.	*Palorus ratzebergii*	*Steinina singhi*	Chinsurah
103.	*Palorus* sp.	*Steinina palorusi*	Kalyani
104.	*Ptinus* sp.	*Harendraia intricata*	Naihati

105.	*Raphidopalpa* (=*Aulacophora*) *foveicollis*	*Retractocephalus raphidopalpae*	Kalyani
106.	*Sitophilus oryzae*	*Microsporidium sitophili*	Chinsurah
107.	*Stethorus* sp.	*Brustispora indicola*	Kalyani
108.	*Xanthoprochilus* sp.	*Hirmocytis pticharis*	Kalyani
109.	*Triblium castaneum*	*Gregarina basiconstrictonea*	Chinsurah
		Neohirmocystis grassei	Chinsurah
		Hirmocystus oxeata	Chinsurah
		Hirmocystus triboli	Kalyani
110.	Unidentified beetle of Curculiondae	*Gregarina spraquei*	Kalyani
	Order DIPTERA		
111.	*Aedes* (*Steogmyia*) *aeqypti*	*Plasmodium galliaceum*	Calcutta
		Lankesteria culicis	Calcutta
112.	*Aedes* (*Stegomyia*) *albopictus*	*Lankesteria culicis*	Calcutta
113.	*Anopheles annularis*	*Plasmodium cynomolgi*	Calcutta
		Plasmodium malariae	West Bengal
		Thelohania legeri	West Bengal
114.	*Anopheles barbirostris*	*Thelohania legeri*	West Bengal
115.	*Anopheles culicifacies*	*Plasmodium cynomolgi*	Calcutta
		Plasmodium malariae	West Bengal
		Plasmodium vivax	Calcutta
116.	*Anopheles hyrcanus*	*Thelohania indica*	West Bengal
		Thelohania legeri	West Bengal
117.	*Anopheles maculatus*	*Plasmodium cynomolgi*	Calcutta
		Plasmodium malariae	West Bengal
		Plasmodium vivax	West Bengal
118.	*Anopheles ramsayi*	*Thelohania anomola*	Calcutta
		Thelohania indica	Calcutta
		Thelohania legeri	West Bengal
119.	*Anopheles subpicuts*	*Plasmodium relictum* (=*Proteosoma praecox*)	West Bengal
		Thelohania legeri	West Bengal
120.	*Anopheles vagus*	*Thelohania legeri*	West Bengal
121.	*Anopheles varuna*	*Thelohania legeri*	West Bengal
		Thelohania obscura	West Bengal
		Plasmodium vivax	West Bengal

122.	*Culicoides peregrinus*	*Balantidium knowlesi*	Calcutta
123.	*Phlebotomus argentipes*	*Lankestria mackiei*	Calcutta
124.	*Phlebotomus papatasi*	*Lankesteria mackiei*	Calcutta
		Leishmania donovani	Barddhaman, Murshidabad, North & South 24-Parganas
125.	*Pseudolynohia canariensis*	*Haemaproteus columbae*	Garia, South 24-Parganas
		Trypanosoma hannae	"
	Class	MYRIAPODA	
	Order	CHILOPODA	
126.	*Cormocephalus dentipes*	*Adelina schellacki*	Calcutta
		Stenophora shayamaprasadi	Calcutta
127.	*Geophilus* sp.	*Chilogregarina bhatiae*	Chinsurah
128.	*Scolopendra* sp.	*Grebneckiella navillae*	Calcutta
	Order	DIPLOPODA	
129.	*Combolopsis* sp.	*Hyalosporina combolopsisae*	Calcutta
130.	*Diplopoda* sp.	*Stomatophora ellipsoidi*	Calcutta
131.	*Polydesmus* sp.	*Hyalosporina rayi*	Calcutta
132.	*Strongylosoma contortipes*	*Hyalosporina rayi*	Calcutta
		Monoductus lunatus	Calcutta
133.	*Trigoniulus goesii*	*Chakravartiella sugereiformes*	Naihati, North 24-Parganas
134.	*Zikadesmus* sp.	*Stenophora khagendrae*	Calcutta
	Class	CHONDRICHTHYES	
	Subclass	ELASMOBRANCHI	
	Order	LAMNIFORMES	
135.	*Scoliodon sorrakowah*	*Eimeria southwelli*	Sundarban
136.	*Sphyrna blochii* (*Zygaena blochii*)	*Eimeria zygaenae*	Medinipur, South 24-Parganas
	Class	OSTEICHTHYES	
	Subclass	ACTINOPTERYGII	
	Order	CLUPEIFORMES	
137.	*Hilsa ilisha*	*Ceratomyxa hilsae*	Calcutta
		Sphaeromyxa dighae	Digha
		Zschokkella ilishae	Calcutta market
138.	*Notopterus chitala*	*Eimeria notopteri*	Calcutta market

139. *Notopterus notopterus*	*Dactylosoma notopteri*	Ranaghat and Krishnagar
	Eimeria notopteri	Calcutta market
140. *Opisthopterus tartoor*	*Ceratomyxa tartoori*	Digha coast
Order	ANGUILLIFORMES	
141. *Anguilla anguilla*	*Trypanosoma granulosum*	Calcutta market
Order	MYCTOPHIFORMES/SCOPELIFORMES	
142. *Harpodon nehereus*	*Eimeria harpodoni*	Port Canning, South 24-Parganas
Order	CYPRINIFORMES	
143. *Amblypharyngodon mola*	*Chloromyxum amphinoui*	Calcutta, North 24-Parganas
	Thelohanellus sudevi	Chinsurah
	Trichodina indica	West Bengal
144. *Catla catla*	*Bodomonas rebae*	West Bengal
	Myxobolus bengalensis	North 24-Parganas
	Myxobolus catlae	Calcutta
	Myxobolus chakravartyi	Krishnagar
	Myxobolus mahendrae	Chinsurah
	Neothelohanellus catlae	Krishnagar, Nadia
	Scyphidia pyriformes	Serampur, Hugli
	Thelohanellus bengalensis	Chinsurah
	Thelohanellus catlae	North 24-Parganas
	Thelohanellus opthalmicus	Krishnagar
	Thelohanellus seni	Calcutta, North 24-Parganas
	Trichodina indica	West Bengal
	Tripartiella bulbosa	Krishnagar
145. *Cirrhinus mrigala*	*Balantidium mrigalae*	Nadia
	Bodomonas rebae	West Bengal
	Chloromyxum mrigalae	Barrackpore
	Ichthyophthirius multifilis	Experimental
	Myxobolus calbasui	Calcutta market
	Myxobolus catlae	Calcutta
	Myxobolus indicum	Barrackpore
	Myxobolus mrigalae	Calcutta

	Myxobolus sphericum	Barrackpore
	Myxosoma Indirae	Ranaghat
	Scyphidia pyriformis	Serampur, Hugli
	Thelohanellus mrigalae	West Bengal
	Trichodina indica	West Bengal
	Tripartiella bulbosa	Kalyani and Krishnagar
146. *Cirhinus reba*	*Bodomonas rebae*	West Bengal
	Chloromyxum mrigalae	Barrackpore
	Scyphidia pyriformis	Serampore
	Trichodina indica	West Bengal
147. *Ctenopharyngodon idella*	*Tripartiella obtusa*	Krishnagar, Nadia
148. *Cyprinus carpio*	*Tripartiella copiosa*	Krishnagar, Nadia
149. *Labeo bata*	*Ichthyophthirius multifilis*	Experimental
	Thelohanellus jiroveci	Ranaghat
	Thelohanellus rohitae	North 24-Parganas
150. *Labeo calbasu*	*Myxobolus calbasui*	Calcutta
	Neothelohanellus krishnagarensis	Krishnagar, Nadia
	Thelohanellus calbasui	Hugli
	Thelohanellus rodgii	West Bengal
	Trichodina indica	West Bengal
151. *Labeo rohita*	*Bodomonas rebae*	West Bengal
	Ichthyophthirius sp.	Experimental
	Myxobolus calbasui	Calcutta
	Myxobolus catlae	Calcutta
	Myxobolus rohitae	Krishnagar
	Myxosoma dermitis	Ranaghat
	Scyphidia pyriformis	Serampur, Hugli
	Thelohanellus rohitae	North 24-Parganas
	Trichodina indica	West Bengal
	Tripartiella bulbosa	Kalyani
	Tripartiella copiosa	Krishnagar, Nadia
152. *Puntius filamentosus*	*Myxosoma filamentosa*	Kalyani
153. *Puntius sarana* (=*Burbus sarana*)	*Myxobolus branchialis*	Barrackpore

154. *Puntius ticto* (=*Burbus ticto*)	*Myxobolus barbi*	Belghoria
155. *Salmostoma bacaila*	*Thelonhanellus gangeticus*	North 24- Parganas
	Trichodina indica	West Bengal
156. Major carps	*Costia necatrix*	West Bengal
(Indian carps)	*Ichthyophthirius* sp.	experimental
	Trichodona nigra	Fulia, Nadia
Order	SILURIFORMES	
157. *Aorichthys aor*	*Trypanosoma* sp.	Calcutta market
158. *Clarias batrachus*	*Haemohormidium* (=*Babesiosoma*) *batrachi*	Naihati
	Myxidium sp.	Calcutta
	Myxobolus clarii	Calcutta market
	Trypanosoma batrachi	Dinhatah, Coch Bihar, Kalikapur, South 24-Parganas, Calcutta
	Trypanosoma maguri	Calcutta market
159. *Heteropneustes fossilis* (=*Saccobranchus fossilis*)	*Trypanosoma mukundi*	Calcutta market
	Chloromyxum amphipnoui	Calcutta
	Myxidium heteropneustesi	Calcutta
	Myxidium sp.	Calcutta
	Trypanosoma danileuskyi	Berhampore,
	saccobranchi	Calcutta
	Zschokkella fossilae	Calcutta
160. *Mystus bleekeri*	*Trypanosoma bengalensis*	Canning and Champahati, South 24-Parganas
	Henneguya bleekeri	Kalyani
	Tripartiella bulbosa	Kalyani
161. *Mystus gulio*	*Leptotheca macronesi*	West Bengal
	Thelohanellus sanjibi	Chinsurah
162. *Mystus seenghala*	*Trypanosoma seenghali*	Calcutta market
163. *Mystus vittatus*	*Dactylosoma* sp.	Taldi, South 24-Parganas
	Myxidium mystusium	Chinsurah
	Trypanoplasma indica	Champahati

	Trypanosoma vittati	Taldi, South 24-Parganas, Dinhata, Koch Bihar
164. *Mystus* sp.	*Henneguya mystusia*	Chinsurah
165. *Pangasius pangasius*	*Balantidium pangasi*	Kalyani
166. *Wallago attu*	*Trypanosoma tandoni*	Champahati
Order	ATHERINIFORMES	
167. *Xenentodon cancila*	*Chlromyxum* sp.	Belghoria
	Trypanosoma cancili	Raidighi, South 24-Parganas
	Trypanosoma xenontodoni	Maldah
Order	CHANNIFORMES	
168. *Channa gachua* (=*Ophicephalus gachua*)	*Henneguya* (=*Unicauda*) *ophicephali*	Barrackpore
	Myxosoma cylindrica	Islampur, Murshidabad
	Trichodina indica	West Bengal
	Trypanosoma gachuii	Calcutta
169. *Channa marulius*	*Myxidium islampurium*	Islampur, Murshidabad
	Myxosoma maruliensis	"
	Henneguya renalis	Domkal, Murshidabad
170. *Channa punctatus*	*Chloromyxum meglistchi*	North 24-Parganas
(= *Ophicephalus punctatus*)	*Costia necatrix*	North and South 24-Parganas
	Haemohormidium (= *Babesiosoma*) *harenii*	Calcutta and Subarbs
	Haemohormidium (=*Babesiosoma*) *ophicephali*	Subarbs of Calcutta
	Henneguya (=*Unicauda*) *bengalensis*	Naihati
	Henneguya (=*Unicauda*) *bicornuata*	Naihati, Calcutta
	Henneguya (=*Unicauda*) *choudhuryi*	Kalyani
	Henneguya (=*Unicauda*) *ophicephali*	Calcutta
	Mesnilium malariae	Calcutta and its subarbs
	Myxidium sp.	Calcutta

	Myxidium sp.	Nadia
	Myxobolus aligarhensis	Naihati, Calcutta
	Trichodina indica	West Bengal
	Trichodina sp.	Kalyani
	Trypanosoma elongatus	Calcutta
	Trypanosoma punctata	Raiganj
171. *Channa striatus striatus*	*Costia necatrix*	North and South 24-Parganas
	Dactylosoma striata	Sonarpur, South 24-Parganas
	Myxidium striatusi	Chinsurah
	Myxosoma noblei	Chinsurah
	Trypanosoma striati	Calcutta, Raiganj, West Dinajpur
Order	SYMBRANCHIFORMES	
172. *Amphipnous cuchia* (=*Amphipnous kuchia*)	*Chloromyxum amphipnoui*	Calcutta
173. *Amphiopnous* sp.	*Trypanosoma granulosum*	Habra, North 24-Parganas
Order	PERCIFORMES	
174. *Anabus testudineus*	*Myxidium lieberkuhni*	Calcutta
	Trypanosoma anabari	Canning, South 24-Parganas, Berhampore
175. *Boleophthalmus boddaerti*	*Ceratomyxa sagarica*	Canning
	Myxidium boddaerti	Canning, South 24-Parganas
	Myxidium lieberkuhni	"
176. *Chanda nama* (=*Ambassis nama*)	*Henneguya namae*	Krishnanagar
	Trichodina indica	West Bengal
	Tripartiella bulbosa	Kalyani
177. *Chanda ranga* (=*Ambasis ranga*)	*Trichodina indica*	West Bengal
177a. *Nandus nandus*	*Trichodina nigra*	Kalyani
	Trypanosoma sp.	Maldah
	Trypanosoma nandi	Kalyani
178. *Colisa fasciata* (=*Trichogaster fasciatus*)	*Ceratomyxa* sp.	Calcutta

	Haemogregarina colisa	Canning, South 24-Parganas
	Myxidium fasciatum	Barrackpore
	Myxosoma magauddi	Ranaghat
	Myxosoma trichogasteri	Barrackpore
179. *Glossogobius giuris* (=*Gobius giuris*)	*Eimeria glossogobi*	Kalyani
	Myxidium glossogobi	Calcutta
	Trypanosoma gobida	Canning, South 24-Parganas
180. *Lates calcarifer*	*Henneguya latesi*	North 24-Parganas
	Leptotheca latesi	West Bengal
	Myxidium calcariferi	West Bengal
181. *Odontamblyopus rubicundus* (=*Gobioides rubicundus*)	*Certomyxa gobioidesi*	Calcutta
	Ceratomya sp.	Calcutta
182. *Scatophagus argus*	*Ceratomyxa scatophagi*	West Bengal
183. *Therapon jarbua*	*Sphaeromyxa theraponi*	Canning, South 24-Parganas
184. *Tilapia mossambica*	*Trypanosoma choudhuryi*	Bagmari, North 24-Prganas
	Trichodina nigra	Kalyani
	Trichodina sp.	Calcutta
Order MASTACEMBELIFORMES		
185. *Mastacembelus armatus*	*Trypanosoma armeti*	Champahati, South 24 Pgs.
	Myxobolus eeli	Champahati, South 24-Parganas
186. *Mastacembelus pancatus*	*Trypanosoma pancali*	Champahati, South 24-Parganas, Maldah, Tiljala, Calcutta
Order TETRADONTIFORMES		
187. *Sphaeroides oblongus*	*Trichodina* sp.	Digha
Aquarium Fish		
188. *Xiphophorus hellerii*	*Ichthyophthirius multifilis*	Experimental
Miscellaneous		
189. *Apocrytes bato*	*Myxidium apocryptae*	Kalyani

190. *Chirocentrus dorab*	*Unicapsula chirocentrusi*	Indian Southern Coast
191. *Macrones gulio*	*Ceratomyxa* sp.	Calcutta
	Leptotheca macronesi	West Bengal
192. *Muraenesox* sp.	*Haemohormidium* (=*Babesiosoma*) sp.	Canning
193. *Noemacheilus* r. *rupicola*	*Haemoproteus rupicola*	Darjiling
194. *Rhinomugil corsula*	*Myxobolus anili*	Coast of Bay of Bengal
195. *Rita rita*	*Henneguya* (=*Unicauda*) *ritae*	Chandannagar
196. *Sciaena bleekeri*	*Myxidium sciaenae*	Digha coast
197. *Tachysurus platystomus*	*Kudoa bengalensis*	West Bengal coast
	Sphaeromyxa hareni	Digha
	Thelohanellus auerbachi	Digha coast
	Zschokkella platystomusi	Digha coast
198. *Tachysurus tenuispinis*	*Kudoa tachysurae*	West Bengal coast
	Thelohanellus coeli	West Bengal coast
Class AMPHIBIA		
Order CAUDATA		
199. *Tylototriton verrucossus*	*Balantidium rayi*	Jorpukuri, Darjiling
	Balantidium tylototritonis	"
Order ANURA		
200. *Bufo andersoni*	*Haemogregarina nucleobisecans*	Bankura, Puruliya
201. *Bufo himalayana*	*Haemogregarina* sp.	Darjiling
	Lankesterella sp.	Darjiling
	Opalina scalpriformes	Ghoom, Darjiling
202. *Bufo melanostictus*	*Cepedea longa*	Calcutta (DumDum)
	Eimeria laminata	Calcutta
	Haemogregarina nucleobisecans	Maldah, Bankura, Puruliya, South 24-Parganas
	Isospora wenyoni	Calcutta
	Lankesterella bufonis	Balitha, Kotalpur, Bankura
	Nyctotheroides cordiformis	Calcutta, Hugli North & South 24-Parganas

	Opalina plicata	Calcutta
	Opalina scalpriformes	Calcutta, Maldah, Murshidabad
	Opalina triangularis	Birbhum, Calcutta, Koch Bihar
	Trypanosoma rotatorium	Berhampore
	Zschokkella auerbachi	Calcutta
203. *Bufo stomaticus*	*Isospora stomaticae*	Calcutta
	Trypanosoma rotatorium	Calcutta
204. *Hyla arborea*	*Myxidium haldari*	Chakdah, Nadia
205. *Kaloula pulchra*	*Haemogregarina pulchra*	Santaldi, Puruliya
206. *Kaloula pulchra taprobanica*	*Hegneriella mukundai*	Medinipur
	Haemogregarina kaloulae	Bishnupur, Bankura; Murshidabad
	Sicuophora (=*Nyctotherus*) *macropharyngeus*	Puruliya
	Trypanosoma taprobanica	Barddhaman, Darjiling, Medinipur, Puruliya
207. *Rana cyanophlyctis*	*Balantidium helenae*	Puruliya
	Eimeria cyanophlyctis	Calcutta
	Haemogregarina berestneffi	Balitha, Bankura Berhampore, Murshidabad, Reang, Darjiling
	Sicuophora (=*Nyctotherus*) *macropharyngeus*	Puruliya
	Trypanosoma rotatorium	Garumara, Maldah
208. *Rana hexadactyla*	*Balantidium helenae*	Calcutta
	Balantidium rotundum	Puruliya
	Haemogregarina pattoni	Medinipur
	Trypanosoma inopinatum	Bankura
	Trypanosoma karyozeukton	Salikona, Hugli
209. *Rana limnocharis*	*Balantidium helenae*	Puruliya
	Haemogregarina berestneffi	Reang, Darjiling; Bankura
	Haemogregarina magna	Bishnupur
	Haemoproteus ovalis	Balitha, Bankura
	Isospora wenyoni	Calcutta
	Lankesterella minima	Jalpaiguri

	Trypanosoma chattoni	Jalpaiguri
	Trypanosoma loricatum	Balitha & Bishnupur, Bankura
	Trypanosoma rotatorium	Rangpoo, Darjiling and Koch Bihar
	Zschokkella auerbachi	Calcutta
210. *Rana tigrina*	*Balantidium helenae*	Calcutta
	Balantidium ranarum	Calcutta
	Balantidium rotundum	North 24-Parganas and Puruliya
	Balantidium sushilli	Calcutta, Puruliya
	Haemogregarina berestneffi	Berhampore, Bankura
	Haemogregarina magna	Garumara
	Haemogregarina perinucleophilum	Balitha, Bankura
	Isospora wenyoni	Calcutta
	Lankesteralla minima	Berhampore, Bankura, South 24-Parganas, Murshidabad.
	Nyctotheroides cordiformes	Calcutta
	Sicuophora macropharyngeus	Calcutta, North 24-Parganas
	Trypanosoma inopinatum	Bankura
	Trypanosoma karyozeukton	Barddhaman, Hugli and Darjiling
	Trypanosoma loricatum	Bankura
	Trypanosoma mega	Barddhaman, Darjiling
	Trypanosoma ranarum	Bankura
	Trypanosoma rotatorium	Garumara, Jalpaiguri, Bankura and Hugli
	Trypanosoma taprobanica	Barddhaman, Darjiling & Puruliya
	Zschokella auerbachi	Calcutta
211. *Rana* sp.	*Trypanosoma ranarum*	Bankura
212. *Rhacophorus maculatus*	*Cepedea longa*	South 24-Parganas
	Cepedea srivastavai	Calcutta
	Haemogregarina maculatus	Balitha, Bankura
	Trypanosoma rotatorium	Bankura
213. *Uperodon systoma*	*Haemogregarina systoma*	Puruliya
	Trypanosoma systoma	Medinipur

214. Tadpole	*Trichodina pediculus*	Calcutta
Class	REPTILIA	
Order	CHELONIA	
215. *Lissemys punctata*	*Eimeria irregularis*	Calcutta
	Eimeria koormae	Calcutta, Basirhat
	Eimeria innominata	Calcutta
	Haemogregarina xaveri	Falta, South 24-Parganas
	Zschokkella lissemysi	Calcutta
216. *Lissemys punctata punctata*	*Balantidium dogieli*	Calcutta market
	Haemogregarina choudhuryi	Balitha, Bankura
	Trypanosoma balithaensis	Balitha, Bankura
217. *Trionyx gangeticus*	*Eimeria triangularis*	Calcutta
	Eimeria trionyxae	Calcutta
	Haemogregarina gangetica	Calcutta market
	Haemoproteus trionyxi	Calcutta market
	Trypanosoma gangetica	Bongaon market
Order	SQUAMATA	
Suborder	LACERTILIA	
218. *Calotes versicolor*	*Isospora calotesi*	Calcutta
	Haemogregarina sp.	Reang, Darjiling
219. *Gecko gecko*	*Caryospora geckonis*	Calcutta
	Eimeria bongaonensis	Bongaon
220. *Hemidactylus flaviviridis*	*Eimeria flaviviridis*	Calcutta, Barasat
	Eimeria hemidactyli	Calcutta
	Eimeria knowlesi	Calcutta
	Haemogregarina sp.	Garumara
	Isospora knowlesi	Calcutta
221. *Mabuya carinata*	*Haemogregarina* sp.	Raiganj
222. *Mabuya* sp.	*Octosporella mabuiae*	Calcutta
Suborder	OPHIDIA	
223. *Enhydris enhydris*	*Caryospora bengalensis*	Chakdah, Nadia
	Eimeria fibrilosa	Chakdah, Nadia
	Haemogregarina sp.	Chakdah, Nadia
	Trypanosoma enhydris	Darjiling, Koch Bihar, Chakdah, Nadia

224. *Naja naja*	*Caryospora cobrae*	Barddhaman
	Eimeria najae	Sundarban
	Isospora minuta	Calcutta
225. *Natrix piscator*	*Eimeria gupti* (= *Eimeria cylindrica*)	Calcutta
	Eimeria piscatori	Calcutta
	Haemogregarina mirabilis	Koch Bihar
226. *Natrix stolata*	*Eimeria stolatae*	Calcutta
	Haemogregarina sp.	Koch Bihar
227. *Python* sp.	*Pythonella bengalensis*	Calcutta
228. *Ptyas mucosus*	*Hepatozoon mucosus*	North 24-Parganas
Class	AVES	
Order	CICONIFORMES	
229. *Ardeola grayi*	*Plasmodium circumflexum* (*Syn. Plasmodium heroni*)	Calcutta
Order	ANSERIFORMES	
230. *Anas bosohus*	*Wenyonella gagari*	Basirhat
231. *Nettapus coromandelianus*	*Tyzzeria alleni*	Bidyadhari spill area, Mahisbathan, North 24-Parganas
	Tyzzeria chenicusae	Basirhat, North 24-Parganas
Order	FALCONIFORMES	
232. *Accipiter virgatus affinis*	*Plasmodium* sp.	Darjiling
233. *Gyps bengalensis*	*Isospora gypsi*	Beliaghata, Calcutta
234. *Milvus migrans*	*Trichomonas gallinae*	Calcutta
Order	GALLIFORMES	
235. *Alectoris graeca*	*Eimeria alectorae*	Zoological Gardens, Calcutta
236. *Coturnix coromandelica*	*Plasmodium coturnixae*	Calcutta
	Plasmodium garnhami	Calcutta (Expt.)
237. *Coturnix c. coturnix*	*Eimeria coturnicis*	Calcutta market
238. *Gallus domesticus*	*Eimeria bengalensis*	Kalna, Barddhaman
	Eimeria gallusae	Bagata, North 24-Parganas (experimental)
	Eimeria tenella	Calcutta

		Trypanosoma evansi	Calcutta
239.	*Gallus gallus murghi*	*Leucocytozoon sabrazesi*	Darjiling
240.	*Gallus* sp.	*Leucocytozoon sabrazesi*	Darjiling
241.	*Gennaeus horsfieldi*	*Eimeria gennaeuscus*	Zoological Garden, Calcutta
242.	*Ithaginis cruentus*	*Plasmodium relictum*	Darjiling
243.	*Pavo cristatus*	*Eimeria mandali*	Zoological Garden, Calcutta
		Eimeria pavonina	"
		Isospora mayuri	Calcutta market
244.	*Polyplectron bicoloratum*	*Eimeria bhutanensis*	Zoological Garden, Calcutta
245.	*Tragopan satyra*	*Plasmodium relictum*	Darjiling
	Order GRUIFORMES		
246.	*Amaurornis phoenicurus*	*Eimeria dauki*	Barasat, North 24- Parganas
247.	*Bellerica pavonina regulorum*	*Isospora bellericae*	Zoological Garden, Calcutta
	Order CHARADRIIFORMES		
248.	*Charadrius asiaticus*	*Eimeria charadrii*	Narayantala, South 24-Parganas
249.	*Gallinago*	*Eimeria gallinagoi*	Basanti, South 24-Parganas
250.	*Numenius arquata*	*Eimeria numenii*	Namkhana, South 24-Parganas
251.	*Pluvialis appricaria*	*Eimeria roscoviensis pluvialina*	"
252.	*Vanellus malabaricus*	*Eimeria vanelli*	Basanti, South 24-Parganas
	Order COLUMBIFORMES		
253.	*Columba livia*	*Haemoproteus columbae*	Calcutta, South 24-Parganas
		Trypanosoma avium bakeri	Calcutta (experimental)
254.	*Columba livia domestica*	*Haemoproteus columbae*	All districts
		Trypanosoma hannae	Calcutta and South 24-Parganas
255.	*Columba livia intermedia*	*Eimeria columbae*	Calcutta
		Eimeria labbeana	Calcutta subarbs.
		Eimeria kapotei	Calcutta

		Eimeria tropicalis	Calcutta
		Haemoproteus columbae	All districts
		Plasmodium relictum	Calcutta
		Weneyonell columbae	Calcutta, Nadia
	Order PSITTACIFORMES		
256.	*Psittacula eupatria nipalensis*	*Isopora psittaculae*	Calcutta
257.	*Psittacula krameri manillensis*	*Haemoproteus handai*	Calcutta
	Order CUCULIFORMES		
258.	*Centropus sinensis*	*Plasmodium* sp.	North 24-Parganas
	Order STRIGIFORMES		
259.	*Otus scops*	*Haemoproteus syrnii*	Chakdah, Nadia
		Plasmodium sp.	Nadia
	Order PICIFORMES		
260.	*Megalaima a. asiatica* (= *Cyanops a. asiatica*)	*Eimeria barbeta*	Calcutta
261.	*Megalaima haemacephala*	*Haemoproteus cornuata*	Chakda, Nadia
		Haemoproteus thereicerycis	Nadia
		Plasmodium sp.	Nadia, Calcutta
		Isospora megalaimae	Subarb. of Calcutta
262.	*Megalaima zeylanicus caniceps*	*Isospora zosteropis*	Calcutta
263.	*Picus flavinucha*	*Haemoproteus bennetti*	Darjiling
	Order PASSERIFORMES		
264.	*Acridotheres fuscus fuscus*	*Dorisa aethiopsaris*	Calcutta
265.	*Acridotheres ginginianus*	*Isospora ginginiana*	Calcutta
		Isospora lacazei	Calcutta
266.	*Acridotheres tritis tristis*	*Isospora ginginiana tristis*	Calcutta
		Isospora lacazei	Calcutta
267.	*Acrocephalus arundianceus*	*Haemoproteus* sp.	West Bengal
268.	*Acrocephalus dumetorum*	*Haemoproteus fringittae*	Calcutta, Sagar Island
		Haemoprotus sp.	"
		Trypanosoma avium	Calcutta
269.	*Acrocephalus stentoreus*	*Haemoproteus* sp.	West Bengal
270.	*Aegithalos concinus rubricapillus*	*Isospora concinnus*	Darjiling
271.	*Amandava amandava*	*Dorisa hareni*	Calcutta
272.	*Copsychus malabaricus*	*Haemoprteus* sp.	West Bengal

273. *Copschus saularis*	*Haemoprteus fringillae*	Calcutta, Nadia
	Haemoproteus oryzivorae	Calcutta, Nadia
	Isospora copsychi	Barddhaman
	Isospora lacazei	Calcutta
274. *Corvus splendens*	*Haemoprteus danilewskyi*	Calcutta
	Isospora bengalensis	Calcutta
	Plasmodium relictum	Calcutta
275. *Culiciapa ceylonensis calochysea*	*Isospora ceylonensis*	Darjiling
276. *Denrocitta vagabunda*	*Dorisa vagabundae*	Calcutta
	Haemoproteus danilewskyi	Nadia
	Plasmodium circumflexum	Nadia
	Plasmodium sp.	Nadia
	Trypanosoma avium bakeri	Nadia
277. *Dicrurus adsimilis*	*Haemoproteus dicruri*	Nadia
	Haemoproteus sp.	
	Trypanosoma avium	Nadia, North and South 24- Parganas
278. *Emberiza bruniceps*	*Isospora emberizae*	Sundarban
279. *Estrida amandava*	*Haemoproteus* sp.	Gangetic West Bengal
	Isospora estrildi	Calcutta
280. *Gracula religiosa*	*Dorisa graculae*	Darjiling
281. *Heterophasia capistrata* (= *Leioptilos capistrata*)	*Haemoproteus himalayanus*	Darjiling
	Isospora capistrata	Darjiling
	Plasmodium sp.	Darjiling
282. *Ithopyga saturata*	*Haemoproteus* sp.	Darjiling
283. *Lanius schach tricolor*	*Haemoproteus* sp.	Calcutta market
	Plasmodium relictum	"
	Trypanosoma lanii	"
284. *Lonchura malabarica*	*Dorisa chakravartyi*	Calcutta
	Dorisa hareni	Calcutta
	Haemoproteus oryzivorae (= *Haemoproteus garnhami*)	Calcutta, Nadia
	Haemoproteus sp.	West Bengal
	Sivatoshella lonchurae	Calcutta
	Trypanosoma avium (= *Trypanosoma knowlesi*)	Calcutta
285. *Lonchura malacca*	*Haemoproteus* sp.	Gangetic West Bengal

286. *Lonchura malacca atricapilla*	*Plasmodium relictum* (= *P. praecax* var. *muniae*)	Calcutta, South 24-Parganas
287. *Lonchura malacca malacca*	*Dorisa hareni*	Calcutta
	Eimeria malaccae	"
	Isospora muniae	"
288. *Lonchura malacca rubrongier*	*Dorisa hareni*	Calcutta
	Haemoproteus oryzivorae (=*Haemoproteus lonchuri*)	Gangetic West Bengal
289. *Lonchura punctulata*	*Dorisa chakravartyi*	Calcutta
	Dorisa hareni	Calcutta
	Haemoproteus oryzivorae (= *Haemoproteus garnhami*)	Calcutta
	Isospora lonchurae	Calcutta
	Sivatoshella lonchurae	Calcutta
290. *Lonchura p. punctulata*	*Trypanosoma* sp.	Calcutta
291. *Lonchura striata*	*Isospora mandali*	Calcutta
292. *Muscicapa parva*	*Haemoproteus* sp.	Calcutta
293. *Muscicapa sundra*	*Plasmodium* sp.	Darjiling
294. *Passer domesticus*	*Dorisa passeris*	Calcutta
	Isospora lacazei	Calcutta and Subarb.
	Lankesterilla sp.	Chakda, Nadia
295. *Pericrocotus cinnamomaeus peregrinus*	*Plasmodium relictum* (= *P. pericrocoti*)	Calcutta
296. *Ploceus manyar*	*Haemoproteus* sp.	West Bengal
297. *Ploceus philippinus*	*Haemoproteus oryzivorae*	Nadia
	Isospora lacazei	Calcutta
	Lankesterella sp.	Nadia
	Plasmodium relictum (= *P. ploceii*)	Nadia, Calcutta
	Plasmodium sp.	Nadia
298. *Pycnonotus cafer*	*Isospora lacazei*	Calcutta
299. *Pycnonotus jocosus*	*Isospora pycnonotae*	Calcutta
	Trypanosoma avium bakeri	Calcutta
300. *Pycnonotus jocosus emeria*	*Haemoproteus sanguinis*	Calcutta
	Isospora psittaculae	Calcutta
301. *Sturnus contra*	*Haemoproteus pastoris*	Nadia, South 24-Parganas

	Haemoproteus sp.	Gangetic West Bengal
	Isospora lacazei	Calcutta
	Isospora lonchurae	Calcutta
	Plasmodium sp.	Nadia, Gangetic West Bengal
302. *Sturnus contra contra*	*Eimeria anili*	Kalyani
303. *Sturnus malabaricus*	*Haemoproteus pastoris*	Nadia, Sagar Island
	Lankesterella sp.	Chakdah, Nadia
	Plasmodium nucleophilum	Nadia
	Plasmodium sp.	Gangetic West Bengal
304. *Sturnus pagodarum*	*Isospora temenuchii*	Calcutta
305. *Turdoides striatus*	*Haemoproteus oryzivorae*	Sagar Island
	Isospora pycnonoti	Calcutta
306. *Zosterops palpebrosa*	*Dorisa mandali*	Calcutta
307. *Zosterops p. palpebrosa*	*Dorisa mandali*	Calcutta
	Haemoproteus zosteropis	Calcutta
	Isospora zosteropis	Calcutta
Class	MAMMALIA	
Order	INSECTIVORA	
308. *Suncus murinus*	*Eimeria murinus*	Haora
309. *Suncus murinus soccatus*	*Eimeria darjeelingensis*	Darjiling and Calcutta
	Elimeria suncus	Darjiling and Calcutta
Order	CHIROPTERA	
310. *Harpiocephalus harpia lasyurus*	*Dorisa harpia*	Darjiling
311. *Hipposideros lankadiva*	*Polychromophilus murinus*	Jalpaiguri
312. *Rhinolophus rouxi rouxi*	*Polychromophilus*	Darjiling
	Trypanosoma rhinolophonis	Singhmari, Darjiling
313. *Scotophilus k. kuhli*	*Babesia vesperuginis*	Sundarban
	Entamoeba chiropteris	Sundarban
314. Indian bat	*Anaplasma* sp.	Calcutta
Order	RODENTIA	
315. *Bandicota bengalensis*	*Eimeria bandicota*	Darjiling
	Trypanosoma (Herpetosoma) lewisi	Calcutta
316. *Bandicota indica*	*Eimeria biswapati*	Haora

317. *Cavia cutleri*	*Trichomonas thukuni*	Calcutta
318. *Funumbulus palmarum*	*Eimeria bandipurensis*	Bandipur, Hugli
319. *Funambulus pennanti*	*Dorisa bengalensis*	Haora
320. *Hylopetes alboniger*	*Anaplasma centrale*	Darjiling
	Rayella hylopatei	Darjiling
	Anaplasma marginale	Darjiling
321. *Lepus* sp.	*Toxoplasma gondi*	Calcutta, Sibpore
	(=*Toxoplasma cuniculi*)	Haora
322. *Mus musculus*	*Trypanosoma lewisi*	Sibpore, Haora
323. *Oryctolagus cuniculis* (*Oryctolagus* sp.)	*Eimeria oryctolagi*	Calcutta
324. *Petaurista elegans caniceps*	*Rayella gigantica*	Darjiling
	Hepatocystis sp.	
325. *Petaurista magnificus*	*Eimeria comminispora*	Darjiling
	Eimeria micropylifera	Darjiling
	Eimeria nasuta	Darjiling
	Hepatocyptis rayi wui	Darjiling
	Hepatozoon sp.	Darjiling
	Rayella rayi	Darjiling
	Trypanosoma indicum	Darjiling
326. *Petaurista n. nobilis*	*Trypanosoma indicum*	Darjiling
	Trypanosoma sp.	Darjiling
327. *Rattus decumenus*	*Trypanosoma lewisi*	Calcutta
328. *Rattus rattus*	*Babesia muris*	Sunderban
	Toxoplasma gondi	Calcutta
	Trypanosoma lewisi	Hugli
329. *Rattus rattus brunneusculus*	*Eimeria garumarana*	Garumara, Jalpaiguri
330. *Rattus rattus arboreus*	*Babesia muris*	Sunderban
	Dorisa indica	Haora
	Eimeria sibporensis	Sibpore, Haora
	Entamoeba muris	Sunderban
	Isospora sibporensis	Sibpore, Haora
	Trypanosoma lewisi	Haora
	Wenyonella levinei	Haora
330a. *Sciurus* sp.	*Wenyonella hoarei*	Botanical Garden, Haora

	Order CARNIVORA	
331. *Canis aureus*	*Pentatricomonas hominis* (=*P. canis auri*)	Calcutta
	Isospora tropicalis	Bandipore, Hugli
332. *Canis dingo*	*Isospora rivolta*	Calcutta
333. *Canis familiaris*	*Babesia gibsoni*	Calcutta
	Isospora canis	Calcutta
334. *Felis chaus*	*Isospora rivolta*	Calcutta
335. *Felis domestica* (=*Felis* sp., *F. catus*)	*Isospora felis*	Calcutta
	Isospora rivolta	Calcutta Zoo
336. *Herpestes auropunctatus*	*Isospora revolta*	Calcutta
337. *Herpestes edwardsi*	*Babesia bengalensis*	Barasat, North 24-Parganas
	Eimeria jalpaiguriensis	Jalpaiguri
338. *Panthera leo*	*Isospora leonina*	Calcutta Zoo
339. *Panthera purdus*	*Trypanosoma evansi*	Darjiling
340. *Panthera tigris*	*Trypanosoma evansi*	Alipore zoo, Calcutta
341. *Panthera tigris altaica*	*Trypanosoma evansi*	Darjiling zoo
342. *Panthera unca*	*Trypanosoma evansi*	Calcutta zoo
	Order ARTIODACTYLA	
343. *Antelope cervicaprae*	*Eimeria antelocervi*	Calcutta zoo
344. *Axis axis*	*Babesia bigemina*	Calcutta
	Entamaoeba cervis	Sundarban and Calcutta zoo
	Eimeria cervis	Sundarban
345. *Bubalus bubalis*	*Eimeria ovoidalis*	Calcutta
	Sarcocystis blanchardi	Calcutta
346. *Bos indicus*	*Sarcocystis blanchardi*	Calcutta
	Theileria mutans	Calcutta
	Theileria parva	Calcutta
347. *Capra hircus* (*Capra* sp.)	*Chilomastix caprae*	Calcutta
	Eimeria arloingi	Calcutta, North & South 24-Parganas
	Eimeria ahsata	Calcutta, North & South 24-Parganas
	Eimeria christensani	Calcutta

	Eimeria crandalis	Calcutta
	Eimeria faurei	*Calcutta*
	Eimeria granulosa	Calcutta
	Eimeria intricata	Calcutta
	Eimeria ninakholyakimovi	Calcutta
	Eimeria parva	Calcutta, North & South 24-Parganas
	Entamoeba ovis var. *caprae*	Calcutta
	Monocercomonas caprae	Calcutta
	Oikomonas communis	Calcutta
	Selenomonas ruminantium var. *caprae*	Calcutta
	Trichonomas ruminatium	Calcutta
348. *Ovis* sp.	*Babesia motasi*	Calcutta
	Eimeria ahsata	Calcutta
349. *Sus scrofa*	*Balantidium coli*	Sundarban
	Copromonas ruminantum	Sundarban
	Eimeria neodeblicki	Sajnekhali, Sundarban, Calcutta
	Eimeria spinosa	Calcutta
	Entamoeba suis	Sundarban
	Iodamoeba butschilii	Sundarban
	Isospora sundarbanensis	Sajnekhali, Sundarban
	Tetratrichomonas buttreyi	Sundarban
Order	PRIMATE	
350. *Homo sapiens*	*Balantidium coli*	Calcutta
	Chilomastix mesnili	Calcutta
	Eimeria clupearum	Calcutta
	Entameoba coli	Calcutta
	Entamoeba histolytica	Almost all parts of West Bengal
	Enteromonas hominis	Calcutta
	Giardia intestinalis	Almost all parts of West Bengal
	Isospora belli	Calcutta
	Isospora hominis	Calcutta
	Plasmodium falciparum	Almost all parts of West Bengal

	Plasmodium malariae	"
	Plasmodium vivax	"
	Trichomonas vaginalis	Almost all parts of West Bengal
351. *Macaca irus*	*Dientamoeba fragilis*	Calcutta
352. *Macaca mulatta*	*Balatidium rhesum*	Calcutta
	Dientamoeba fragilis	Sundarban
	Entameoba coli	Sundarban
	Entamoeba histolytica	Sundarban
	Entamoeba chattoni	Sundarban
	Iodamoeba butschlii	Sundarban

SYSTEMATIC ACCOUNT

Subkingdom PROTOZOA
Phylum SARCOMASTIGOPHORA
Subphylum MASTIGOPHORA
Class PHYTOMASTGOPHOREA
Order EUGLENIDA
Family ASTASIIDAE

Diagnosis : Body highly plastic, usually elongate spindle during locomotion; single flagellum arising from a blepharoplast located at anterior end; without any chromatophores.

Genus ***Copromonas*** Dobell

Diagnosis : Body elongate-ovoid; a small cytostome present at anterior end.

1. ***Copromonas ruminantum*** Woodcock

1985. *Copromonas ruminantum* Woodcock : Mandal and Choudhury, *Geobis new Reports*, 4. p. 14.

Diagnosis : Body oval or elongate, dimensions 4.41-11.27 (9.72) μm x 2.40 - 5.74 (4.59) μm; flagellum single longer than the body length and originating from the blepharoplast located at the base of the cytopharynx; nucleus oval or spherical, vescicular with a large endosome.

Host : Wild Boar, *Sus scrofa*; from faecal sample collected from Sundarban Tiger Reserve and Bhagabatpur Crocodile Project area, South 24-Parganas.

Distribution : India : West Bengal (South 24-Parganas district).

Remarks : This species has been reported by Mandal and Choudhury (1985) from West Bengal.

Order CHRYSOMONADIDA
Family CROMULINIDAE

Diagnosis : Forms minute, naked or sculptured shell; with a single flagellum.

Genus ***Oikomonas*** Kent

Diagnosis : Oval or spherical, round in cross section, without any chromatophore, nucleus single.

2. ***Oikomonas communis*** Liebetanz

1935. *Oikomonas communis* Liebetanz : Das Gupta, M., *Arch. Protistenk.*, **85**, p. 155.

Diagnosis : Body small, spherical or ovoidal with a long flagellum at one end; cytoplasm filled with minute granules stained green with Giemsa.

Host : *Capra hircus*; site of infection : stomach.

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) reported this species from the stomach contents of *Capra hircus* procured from a slaughter house at Tangra, Calcutta.

Class ZOOMASTIGOPHOREA

Order KINETOPLASTIDA

Key to the families

1(4) Typically two heterodynamic flagella, adbasal kinetoplast arranged in several discrete bodies or dispersed throughout mitochondrion.....

2(3) With two flagella, one free and the other marking outer margin of undulating membrane, body leaf-like.....CRYPTOBIIDAE

3(2) With two flagella, one directed anteriorly and the other posteriorly and trailing, body ovoid or elongate.....BODONIDAE

4(1) Single flagellum attached to the body by undulating membrane, kinetoplast relatively small and compact, body characteristically leaf-like.....TRYPANOSOMATIDAE

Family BODONIDAE

Genus ***Bodomonas*** Davis

Diagnosis : Body elongate, with a small depression at anterior end; two flagella, anterior one small and posterior one long and trailing.

3. ***Bodomonas rebae*** Tripathi

1954. *Bodomonas rebae* Tripathi, *Rec. Indian Mus.*, **52**, p. 221.

Diagnosis : Body elongate, with broad and flattened anterior end and tapering posterior end; cytoplasm granular, contractile vacuole round; cytopharynx small depression at the anterior end; nucleus spherical; flagella two in number, anterior one small and posterior one extending beyond the body.

Host : *Cirrhinus reba*, *C. mrigala*, *Catla catla* and *Labeo rohita*; site of infection : skin

Distribution : India : West Bengal (locality not mentioned).

Family CRYPTOBIDAE

Genus ***Trypanoplasma*** Laveran and Mesnil

Diagnosis : Body leaf-like, blepharoplast elongated rod- like, parasitic in the blood of fishes.

4. ***Trypanoplasma indica*** (Mandal)

1979. *Cryptobia indica* Mandal, *Bull. zool. Surv. India*, **2**, p. 20.

Material examined : Sev. exs., Champahati, South 24-Parganas, 18. viii. 1977, A.K.Mandal.

Diagnosis : Monomorphic, broad and sickle-shaped, dimensions 25-30 (28.5) µm × 6-10 (8.5) µm; cytoplasm having fine granules distributed all over the body; nucleus reniform or ovoidal situated anteriorly; anterior flagellum long, posterior flagellum trailing along the margin of the body forming an undulating membrane and extending as free portion.

Host : *Mystus vittatus*; site of infection : blood.

Distribution : India : West Bengal (South 24-Parganas district).

Family TRYPANOSOMATIDAE

Key to the genera

1(2) Body highly flattened leaf-like, pointed at flagellar end and bluntly rounded or pointed at the other, parasitic in the circulatory system of vertebrates .....Genus ***Trypanosoma***

2(1) Body ovoid or round in leishmanial stage and spindle-shaped in leptomonad stage, intracellular parasite in the cells of reticulo-endothelial system.....Genus ***Leishmania***

Genus ***Leishmania*** Ross

5. ***Leishmania donovani*** (Laveran and Mesnil)

1903. *Piroplasma donovani* Laveran and Mesnil, *C.R. Acad. Sci.*, 137, p. **137**, p. 957.

1926. *Leishmania donovani* : Wenyon, *Protozoology* vol. I, Bailliere, Tindal and Cox, London, p. 397.

Diagnosis : Ovoid or round, dimensions 2.5-5.0 µm × 1.5-2.0 µm; nulceus and kinetoplast visible in stained preparations; an internal fibrial representing the flagellum sometimes be traced; leishmanial stage occurring in man and others in mammals primarily rodents; heteroxenous parasite transmitted by sandflies belonging to the genus *Phlebotomus* in which spindle shaped leptomonad stage measuring about 14 to 20 µm long and 1.5 to 3.5 µm wide be found.

Host : Man, Dog, other mammals primarily rodents; site of infection : reticulo-endothelial system.

Distribution : India : West Bengal (Barddhaman, Murshidabad, North and South 24-Parganas districts), Assam and Bihar.

Remarks : It causes a disease known as kala-azar, dum-dum fever or visceral leishmaniasis.

Genus *Trypanosoma* Grudy

In all, 44 species of *Trypanosoma* have so far been reported from West Bengal out of which 23 are recovered from fishes, 9 from amphibians, 3 from reptiles, 4 from birds and 5 from mammals. Since these species are host specific at least in their hosts class level, such host-wise key is given below for the convenience of identification of these species.

A. Key to the species of Trypanosoma of fishes

1(24) Trypomastigote form monomorphic.....

2(3) Granules form conspicuous striations.....*T. xenentodoni*

3(2) Such striations lacking.....

4(7) Cytoplasm uniformly granular, vacuoles scattered throughout the cytoplasm.....

5(6) Body 'C' to 'S' shaped, length of cell body 26.5-38.5 µm, vacuoles concentrated more towards posterior part of the body.....*T anabasi*

6(5) Body elongated, slender, gradually attenuated, length of cell body 18.5-20.5 µm, vaculoles uniformly scattered.....*T cancili*

7(4) Cytoplasm not uniformly granular, localisation of vacuoles diverse.....

8(17) Granules concentrated more towards the side opposite to undulating membrane.....

9(10) Nucleus elongated, compact and located at the posterior half of the body .....*T danilewskyi*

10(9) Nucleus sausage or bean-shaped.....

11(14) Two large vacuoles found at both extremities of the nucleus.....

12(13) Nucleus bean-shaped, length of the cell body 14.0 - 17.5 µm .....*T bengalensis*

13(12) Nucleus sausage-shaped, length of the cell body 16.5 - 25.32 µm.....*T. choudhuryi*

14(11) Small vacuoles present.....

15(16) Length of cell body 35 -40 µm, small vacuoles distributed throughout the body.....*T. pancali*

16(15) Length of cell body 20.5-27.5 µm, few small vacuoles (2-5 in number) found anterior to the nucleus.....*T.tandoni*

17 (8) Concentration of granules in a different fashion.....

18(21) Nucleus bean-shaped.....

19(20) Nucleus located towards anterior end, chromatin granules concentrated at the centre, length of cell body 55-85 µm .....*T granulosum*

20(19) Nucleus located at the middle of the body, with compact chromatin material, length of cell body 20.0-35.5 µm.....*T. vittati*

21(18) Nucleus oval or oblong.....

22(23) Nucleus oval, located towards posterior third of the body, nuclear membrane not distinct, length of cell body 43.0- 44.5 µm.....*T. elongatus*

23(22) Nucleus large, oblong with distinct nuclear membrane and located at the anterior half of the body, length of cell body 30.9 - 36.2 µm.....*T. punctati*

24 (1) Trypomastigote form not monomorphic.....

25(38) Trpomastigote form dimorphic.....

26(33) Nucleus located almost at the middle of the body.....

27(30) Scattered volutin granules present throughout the body.....

28(29) Length of the cell body 46.5-51.5 µm in large form, small vacuoles distributed throughtout the body.....*T. gobida*

29(28) Length of the cell body 28.8-42.7 µm in large forms, vacuoles not present.....*T. nandi*

30(27) Volutin granules lacking.....

31(32) Small vacuoles present throughout the cytoplasm, length of the cell body in large forms 38-40 µm.....*T. armeti*

32(31) Few small vacuoles present in the posterior half of the body, length of the cell body in large form 24-28.5 µm.....*T. mukundi*

33(26) Nucleus located at anterior or posterior part of the body.....

34(35) Volutin granules present sometimes in the form of compact mass, length of the cell body in large forms 22-29 µm ..... *T batrachi*

35(34) Volutin granules lacking .....

36(37) Posterior part of the body devoid of any vacuole, length of the cell body in large forms 17.8-28 µm .....*T. seenghali*

37(36) Posterior part of the body vacuolated, length of cell body in large forms 23.3 - 26.4 µm .....*T gachui*

38(25) Trypomastigote form pleomorphic .....

39(40) Nucleus spherical, oval or pear-shaped and located at the anterior half of the body, length of the cell body in large form 54.75 µm .....*T. striati*

40(39) Nucleus oval or reniform and located in the middle to posterior part of the body, length of the cell body in large form 18.00 – 35.5 (25.5) µm.....*T. maguri*

B. Key to the species of Trypanosoma of amphibians

1(16) Body leaf-like.....

2(7) Trypomastigote form monomorphic.....

3(4) Body small, 'C' or 'S' - shaped in configuration, length of the cell body 15-18.5 (16.64) µm ..... *T taprobanica*

4(3) Body slender elongate.....

5(6) Nucleus elliptical and lcoated near the centre of the body, length of the cell body 30.34 µm.....*T. inopinatum*

6(5) Nucleus oval or kidney-shapped located at posterior-third of the body, length of the cell body 27.42 µm.....*T. systoma*

7(2) Trypomastigote form bi or pleomorphic.....

8(9) Trypomastigote form dimorphic, nucleus rounded to oval located at the posterior part of the body, length of the cell body 16.25-20.76 µm.....*T loricatum*

9(8) Trypomastigote form pleomorphic.....

10(11) Nucleus located at the anterior-third to middle-third of the body, length of the cell body 74.1 µm.....*T ranarum*

11(10) Nucleus located at middle to posterior-third of the body.....

12(13) Cytoplasm more densely granular in the posterior two-third of the body with 2-3 striated myonemes along longitudinal axis.....*T rotatorium*

13(12) Cytoplasm densely and coarsely granular in prenuclear region with dark striations.....

14(15) Nucleus round on oval and located near the junction of middle and posterior thirds of the body, lying parallel to the body axis, nuclear index 0.40..... *T. karyozeukton*

15(14) Nucleus oval or elliptical and situated middle third of the body, lying transverse to the long body axis, nuclear index 0.63.....*T. mega*

16 (1) Body spherical, length of the cell body 19.74-26.15 µm..... *T chattoni*

C. Key to the species of Trypanosoma of reptiles

1(4) Trypomastigote form monomorphic.....

2(3) Cytoplasm non-vacuolated, nucleus located at posterior half of the body, kinetoplast not surrounded by a halo, length of the cell body 30-35 (32.5) µm.....
.....*T. balithaensis*

3(2) Cytoplasm with 7-10 vacuoles, nucleus located at the middle of the body, kinetoplast always surrounded by a halo, length of the cell body 32.7-36.7 (34.7) µm .....
.....*T gangetica*

4(1) Trypomastigote form pleomorphic (with small, intermediate and large forms, nucleus round or oval situated almost at the middle, length of the cell body in large form 106 µm) ..... *T. enhydris*

D. Key to the species of Trypanosoma of birds

1(2) Pleomorphic, in large form posterior end with a prominent caudal prolongation, mostly occur in bone marrows of shrike ..... *T. lanii*

2(1) Pleomorphic, large form wihtout such prominent caudal prolongation, usually occur in peripheral blood .....

3(4) Occurring in a wide range of hosts ..... *T. avium*

4(3) Occurring in columbiform hosts ..... *T. hannae*

E. Key to the species of Trypanosoma of mammals

1(2) Trypomastigote form with an enormous size of vacuole adjacent to nucleus; length of the cell body 26-30 µm ..... *T. rihnolophonis*

2(1) Trypomastigote form without such vacuole .....

3(6) Kinetoplast large, posterior end of the body pointed .....

4(5) Occurring in rats, length of the cell body 27-36 µm ..... *T. lewisi*

3(4) Occurring in squirrels, length of the cell body 20-25 µm ..... *T indicum*

6(3) Kinetoplast small, posterior end of the body usually blunt, occurring in bovines, equines, camels, dogs etc., length of the cell body 15-34 µm ..... *T. evansi*

A. *Tryponosoma* of fishes

6. *Trypanosoma anabasi* Mandal

1978. *Trypanosoma anabasi* Mandal, *Angew Parasit.*, **19**, p. 159.

Material examined : Sev. exs., Canning, South 24 -Parganas, 4.iii.1974, A.K. Mandal.

Diagnosis : Trypomastigote form monomorphic, body 'C' to 'S' - shaped, length of cell body 26.5 - 38.5 µm, cytoplasm uniformly graanular, vacuoles scattered throughout but concentrated more towards posterior part of the body; nucleus almost oval and located near the middle of the body, undulating memberane conspicuous and having 6-8 large folds.

Host : *Anabas testudineus* ; site of infection : blood.

Distribution : India : West Bengal (Murshidabad and South 24-Parganas district).

7. *Trypanosoma armeti* Mandal

1975. *Trypanosoma armeti* Mandal, *Augew Parasit.*, **16**, p. 90.

Material examined : Sev. exs., Champahati, South 24-Parganas, 28.ii.1972, A.K. Mandal.

Diagnosis : Trypomastigote form dimorphic, slender form 42 (43.5) μm in length and stumpy form 38-40 (39.5) μm in length excluding free flagellum; cytoplasm granular with stray vacuoles throughout; nucleus ovoidal or bean-shaped in stumpy forms and elongated in slender forms and located almost at the middle of the body; undulating membrane conspicuous but narrow having 8-10 folds.

Host : *Mastacembelus armatus*, site of infection : blood.

Distribution : India : West Bengal (South 24-Parganas district).

8. *Trypanosoma batrachi* Qadri

1962. *Trypanosoma batrachi* Qadri, *Parasitolgy* **52**, p. 225.

1984. *Trypanosoma batrachi* : Mandal, *Tech. Monograph* No. 9, *zool. Surv. India*, p. 7.

Material examined : Six., Kalikapur, South 24-Parganas, 21.ii.1972, A.K. Mandal; Dinhata, Koch Bihar, 19.ii.1974 R. Ray.

Diagnosis : Trypomastigote form dimorphic, cytoplasm granular, volutin granules present sometimes as compact mass, nucleus situated towards posterior end and always encircled with a clear halo, cell body in large form measuring 22-29 μm, with long flagellum 9-14 μm in length.

Host : *Clarias batrachus;* site of infection : blood

Distribution : India : West Bengal (Calcutta, Koch Bihar and South 24-Parganas districts).

Remarks : Qadri (1962) descrbed this species as dimorphic but Mandal (1984) did not come across any stumpy form.

9. *Trypanosoma bengalensis* Mandal

1979. *Trypanosoma bengalensis* Mandal, *Bull. zool. Surv. India*, **2**, p. 18.

Material examined : Sev. exs., Canning, South 24-parganas, 29.viii. 1977, A.K. Mandal.

Diagnosis : Trypomastigote form monomorphic cytoplasm granular, arranged along the border opposite to undulating membrane, nucleus bean-shaped and centrally placed, length of cell body 14.0- 17.5 μm, undulating membrane having 3-7 folds.

Host : *Mystus bleekeri;* site of infection : blood.

Distribution : India : West Bengal (South 24-Parganas district).

10. *Trypanosoma cancili* Mandal

1978. *Trypanosoma cancili* Mandal, *Angew Parasit.*, **19**, p. 161.

Material examined : Sev. exs, Raidighi, South 24-Parganas, 3. vi. 1974, A.K. Mandal.

Diagnosis : Trypomastigote form monomorphic, body elongated gradually attenuated at both ends, cytoplasm coarsely granular with large number of small vacuoles scattered throughout, length of the cell body 18.5 - 20.5 μm, nucleus ovoidal situated almost at the middle, undulating membrane having 5-7 folds.

Host : *Xenentodon cancila*; site of infection : blood.

Distribution : India : West Bengal (South 24-Parganas district).

11. *Trypanosoma choudhuryi* Mandal

1977. *Trypanosoma choudhuryi* Mandal, *Acta Protozool.*, **16**, p, 2

Material examined : Sev. exs., Bagmari, North 24-Parganas, 19.xii.1975, A.K. Mandal.

Diagnosis : Trypomastigote form monomorphic, attenuated at both ends, cytoplasm possessing numerous granules mainly on the border opposite to undulating membrane, nucleus sausage-shaped, situated at the middle, length of the cell body 16.5 - 25.32 μm, length of free flagellum 6.5 - 12.5 μm.

Host : *Tilapia mossambica*; site of infection : blood.

Intermediate host : *Hemiclepsis marginata marginata.*

Distribution : India : West Bengal (North 24-Parganas and Bankura districts).

12. *Trypanosoma danilewskyi saccobranchi* Qadri

1962. *Trypanosoma danilewskyi saccobranchi* Qadri, *Parasitology*, **52**, p. 226.

1989. *Trypanosoma danilewskyi saccobranchi* : Mandal, *Tech. Monograph* No. 9, *zool. Surv. India*, p. 8.

Material examined : Sev. exs., Calcutta market, 17. iv. 1975. A.K. Mandal, Berhampur, Murshidabad, 3. vi. 1978, R. Ray.

Diagnosis : Trypomastigote form monomorphic, cytoplasm granular with large vacuoles at the anterior end, nucleus elongated, compact situated at posterior half; flagellum very thick and prominent, undulating membrane having 6-9 folds.

Host : *Heteropneustes fossills;* site of infection : blood.

Distribution : India : West Bengal (Calcutta and Murshidabad districts).

13. *Trypanosoma elongatus* Raychaudhuri and Misra

1979. *Trypanosoma elongatus* Raychaudhuri and Misra, *Arch. Protistenk.*, **115**, p. 13.

1948. *Trypanosoma elongatus* : Mandal, *Tech. Monograph* No. 9, *zool. Surv. India*, p. 15.

Material examined : Sev. exs., Calcutta market, 25.vi.1975, A.K. Mandal.

Diagnosis : Trypomastigote form monomorphic, slender and fusiform in shape; cytoplasm granular towards the posterior end, nucleus oval located at the posterior third of the body, cell body measuring 43.0 - 44.5 μm.

Host : *Ophicephalus punctatus;* site of infection : blood.

Distribution : India : West Bengal (Calcutta district).

14. *Trypanosoma gachuii* Misra, Chandra and Choudhury

1973. *Trypanosoma gachuii* Misra, Chandra and Choudhury, *Arch. Protistenk.*, **115**, p. 18.

Diagnosis : Trypomastigote form dimorphic, short slender and long slender forms; the former having pointed posterior end and the latter with blunt posterior end; nucleus situated more towards posterior end, cell body length (long form) 38.4-44.4 µm and (short slender form) 23.3 - 26.4 µm.

Host : *Channa gachua* ; site of infection : blood.

Intermediate host : *Hemiclepsis marginata.*

Distribution : India : West Bengal (Calcutta district).

15. *Trypanosoma gobida* Mandal

1990. *Trypanosoma gobida* Mandal, *Rec. zool Surv. India*, **86** (3&4) : 427-432.

Material examined : Sev. exs., Canning, South 24-Parganas, 22. iv.1981, A.K. Mandal.

Diagnosis : Typomastigote form dimorphic, stumpy and slender; stumpy form : broad having numerous small vacuoles in the cytoplasm, nucleus round situated almost at the middle; slender form; length of the cell body 46.5-51.5 µm, small vacuoles distributed throughout the body, nucleus situated at the middle of the body.

Host : *Glossogobius giuris*; site of infection : blood.

Distribution : India : West Bengal (South 24-Parganas district).

16. *Trypanosoma granulosum* Lavern and Mesnil

1902. *Trypanosoma granulosum* Lavern and Mesnil, *Arch. Protistenk*, **1**, p. 475.

1984. *Trypanosoma granulosum* : Mandal, *Tech. Monograph* No. 9, *zool Surv. India*, p. 23.

Material examined : Sev. exs., Habra, North 24-Parganas, 15.x.1978, A.K. Mandal.

Diagnosis : Trypomastigote form monomorphic, attenuated at both ends, cytoplasm highly granular towards anterior half, nucleus bean shaped, situated anteriorly having central concentration of chromatin granules, length of the cell body 20.0 - 35.5 µm, undulating membrane distinct.

Host : *Anguilla anguilla* and *Amphipnous* sp.; site of infection : blood.

Distribution : India : West Bengal (Calcutta and North 24-Parganas distrcits).

17. *Trypanosoma maguri* Tandon and Joshi

1978. *Trypanosoma maguri* Tandon and Joshi, *Z. wiss. Zool.*, **185**, p. 209.

1984. *Trypanosoma maguri* : Mandal, *Tech. Monograph* No. 9, *zool. Surv. India*, p. 28.

Material examined : Sev. exs., Calcutta market, 12.x.1976, A.K. Mandal.

Diagnosis : Pleomorphic, attenuated at both ends, cytoplasm granular, arranged throughout, nucleus oval or reniform located in the middle to posterior part of the body, length of the cell body (Large form) 18.00-35.5 µm.

Host : *Clarias batrachus;* site of infection : blood.

Distribution : India : West Bengal (Calcutta district). Uttar Pradesh (Lucknow).

18. ***Trypanosoma mukundi*** Raychoudhury and Misra

1973. *Trypanosoma mukundi* Raychoudhury and Misra, *Arch. Protistenk.,* **115,** p. 11.

1984. *Trypanosoma mukundi* : Mandal, *Tech. Monogrraph* No. 9, *zool. Surv. India,* p. 42.

Diagnosis : Dimorphic, slender and stumpy; slender form having long flagellum, cytoplasm possessing small vacuoles at the posterior half, length of the cell body 24.0 - 28.5 μm, stumpy form having small free flagellum with narrowly pointed posterior end.

Host : India : West Bengal (Calcutta district).

19. ***Trypanosoma nandi,*** Mukherjee and Halder

1982. *Trypanosoma nandi* Mukherjee and Halder, *Angew Parasit.,* **23,** p. 69.

Diagnosis : Dimorphic, Large form with short flagellum and smaller forms with long flagellum; cytoplasm devoid of any vacuole, nucleus ovoidal, length of cell body in large form 28.8 - 42.7 μm and in short form 18.7 -28.7 μm, length of free flagellum 2.3 - 3.3 μm and 6.6-8.6 μm, respectively.

Host : *Nandus nandus* ; site of infection : blood.

Distribution : India : West Bengal (Nadia district).

20. ***Trypasoma pancali*** Mandal

1975. *Trypanosoma pancali* Mandal, *Angew Parasit,* **16,** p. 92.

Material examined : Sev. exs. Champahati, South 24-Parganas, 7.iii.1972, A.K. Mandal.

Diagnosis : Monomorphic, attenuated at both ends, cytoplasm possessing small vacuoles throughout, volution granules present and arranged in a linear fashion opposite to undulating membrane-nucleus sausage-shaped, kinetoplast conical encircled with a clear halo, length of the cell body 35.6 - 40.0 μm.

Host : *Mastacembelus pancalus* ; site of infection : blood.

Distribution : India : West Bengal (South 24-Parganas district).

21. ***Trypanosoma punctati*** Hassan and Qasim

1962. *Trypanosoma punctati* Hassan and Qasim, *Z.f. Parasit.,* **22,** p. 119.

Material examined : Sev. exs., Raigunj, West Dinajpur, 12.vii.1976., R. Ray.

Diagnosis : Trypomastigote form monomorphic, spindle shaped, cytoplasm granular possessing a number of vacuoles, nucleus oblong located at anterior half of the body, length of the cell body 30.6-36.2 μm, flagellum very long, undulating membrane narrow with 5-6 folds.

Host : *Ophicephalus* (=*Channa*) *punctatus* ; site of infection : blood.

Distribution : India : West Bengal (West Dinajpur), Uttar Pradesh (Aligarh).

22. *Trypanosoma seenghali* Joshi

1976. *Trypanosoma seenghali* Joshi, *Indian J. Zootm.*, **7**, p. 7.

1984. *Trypanosoma seenghali* : Mandal, *Tech. Monograph* No. 9, *zool. Surv. India.* p. 52.

Material examined : Sev. exs., Calcutta market, 7. iii. 1975, A. K. Mandal.

Diagnosis : Trypomastigote dimorphic, tapering at both ends, cytoplasm finely granular, nucleus oval or round situtated at the anterior half, posterior part devoid of any vacuole, flagellum short or long with variable free flagellar length, cell body in large form measuring 19.8 - 28.0 μm.

Host : *Mystus seenghala* (Sykes); site of infection : blood.

Distribution : India : West Bengal (Calcutta district), Uttar Pradesh (Lucknow).

23. *Trypanosoma striati* Qadri

1955. *Trypanosoma striati* Qadri, *Parasitology*, **45**, p. 60.

1984. *Trypanosoma striati* : Mandal, *Tech. Monograph.* No. 9, *zool. Surv. India,* p. 62.

Material exained : Sev. exs., Sonarpur and Canning, South 24-Parganas, 19.iii.1972 and 15.iv.1975, A.K.Mandal.

Diagnosis : Trypomastigote pleomorphic with small, intermediate and large forms; cytoplasm granular with very few vacuoles in small form, less granular with many vacuoles in large form and intermediate type in intermediate form, nucleus spherical or oval or pear-shaped, located at the anterior half of the body, length of the cell body in large form 54.75μm; free flagellum large in small and intermediate forms and short in stumpy forms.

Host : *Ophicephalus striatus* (=*Channa striatus*); site of infection : blood.

Distribution : India : West Bengal (Calcutta, South 24- Parganas and West Dinajpur districts), Andhra Pradesh (Hyderabad).

24. *Trypanosoma tandoni* Mandal

1980. *Trypanosoma tandoni* Mandal, *Bull. zool. Surv. India,* **2**, p. 183.

Material examined : Sev. exs., Champhati, South 24- Parganas, 10.vii.1977, A.K. Mandal.

Diagnosis : Trypomastigote monomorphic, cytoplasm granular with a few vacuoles situated anterior to nucleus, nucleus sausage-shaped placed at the middle, length of the cell body 20.5 - 27.5 μm, undulating membrane with 5-9 folds.

Host : *Wallago attu*; site of infection : blood.

Distribution : India : West Bengal (South 24-Parganas district).

25. *Trypanosoma vittati* Tandon and Joshi

1973. *Trypanosoma vittati* Tandon and Joshi, *Z. wiss. Zool.*, **185**, p. 212.

1984. *Trypanosoma vittati* : Mandal, *Tech. Monograph* No. 9, *zool. Surv. India,* p. 58.

Material examined : Sev. exs., Taldi, South 24-Parganas, 30.iv.1975, A.K. Mandal.

Diagnosis Trypomastigote monomorphic, cytoplasm uniformly granular with a few small vacuoles, nucleus bean-shaped situated at the middle with compact chromatin material, length of cell body 20.0-35.5 μm.

Host : *Mystus vittatus;* site of infection : blood.

Distribution : India : West Bengal (Koch Bihar and South 24-Parganas districts), Uttar Pradesh (Lucknow).

26. ***Trypanosoma xenentodoni*** Das, Sarkar and Bandyopadhyay

1986. *Trypanosoma xenentodoni* Das, Sarkar and Bandyopadhyay, *J. Bengal. nat. Hist. Soc.*, **5**, p. 133.

Material examined : Sev. exs., Maldah, 15.xi.1984, A.K. Das.

Diagnosis : Trypomastigote monomorphic, volutin granules present and forming striations on the cytoplasm, nucleus slightly anterior in position, undulating membrane with 5-7 folds, length of the cell body 45.5-55.6 μm.

Host : *Xenentodon cancila*; site of infection : blood.

Distribution : India : West bengal (Maldah district).

27. ***Trypanosoma*** sp.

Host : *Aorichthys aor*; site of infection : blood.

Distribution : India : West Bengal (Calcutta district).

Remarks : Mandal (1984) reported this species from the blood samples taken from the above cited host collected from Calcutta market. This species is monomorphic with configuration mostly seen as 'S', length of the cell body 30 - 38.5 (32.5) μm, cytoplasm granular; nucleus elongated and located at the middle of the body, undulating membrane with 4-5 folds.

28. ***Trypanosoma*** sp.

Host : *Nandus nandus*; site of infection : blood.

Distribution : India : West Bengal (Maldah district).

Remarks : Tiwari and Ray (1981) recorded this species from the blood of *Nandus nandus* collected from Maldah, They, however, did not give any description of this parasite.

B. ***Trypanosoma*** **of amphibians**

29. ***Trypanosoma chattoni*** Mathis and Leger

1911. *Trypanosoma chattoni* Mathis and Liger, *C.r. Seanc. Soc. Biol.*, **70**, p. 956.

1983. *Trypanosoma chattoni* : Ray and Choudhury, *Tech. Monograph* No. 8, *zool. Surv. India*, p. 1.

Material exained : Sev. exs., Lataguri, Jalpaiguri, 30.i.1982 and Garumara, Jalpaiguri, 29.xi.1982, R. Ray.

Diagnosis : Trypomastigote form spherical having smooth occasionally irregular wrinkled surface, nucleus centrally placed, flagellum very short, length of the cell body 19.74 - 26.15 μm.

Host : *Bufo melanostictus, Bufo stomaticus, Rana limoncharis, Rana tigrina, Rhacophorus maculatus, Rhacophorus malabaricus* and *Microhyla ornata*; site of infection : blood.

Distribution : India : West Bengal (Jalpaiguri district) and Goa.

30. *Trypanosoma inopinatum* Sergent and Sergent

1904. *Trypanosoma inopinatum* Sergent and Sergent, *C. r. Seanc. Soc. Biol.*, **56**, p. 128.

1983. *Trypanosoma inopinatum* : Ray and Choudhury, *Tech. Monograph* No. 8, *zool. Surv. India*, p. 3.

Material examined : Sev. exs. Balitha, Bankura, 13.vi.1976, R. Ray.

Diagnosis : Trypomastigote form elongated, tapering at both ends, cytoplasm granular and vacuolated at the anterior half of the body, nucleus elliptical situated near the centre of the body, length of the cell body 30-34 μm; flagellum, when present, very short.

Host : *Rana hexadactyla* and *Rana tigrina;* site of infection: blood.

Distribution : India : West Bengal (Bankura district).

Remarks : This species is known in cause 'Redleg' disease among the common European frog *Rana esculenta* but such disease is not so far been reported from Indian frog. In this connection mention may be made that this is the only anuran trypanosome which is known as pathogenic.

31. *Trypanosoma karyozeukton* Dutton and Todd

1903. *Trypanosoma karyozeukton* Dutton and Todd, *Mem. Zool. Sch. Trop. Med.*, **11**, p. 1.

1983. *Trypanosoma karyozeukton* : Ray and Choudhury, *Tech. monograph* no. 8, *zool. Surv. India*, p. 22.

Material examined : Sev. exs., Salikona, Hugli, 17.iii.1977, R. Ray.

Diagnosis : Vermiform, elongated and coiled body, cytoplasm granular, nucleus round or oval located near the junction of middle and posterior third of the body and lying parallel to the body axis; nuclear index 40, length of the cell body 43-47 μm.

Host : *Rana hexadactyla*; site of infection : blood.

Distribution : India : West Bengal (Barddhaman, Darjiling and Hugli districts).

32. *Trypanosoma loricatum* (Mayer)

1943. *Amoeba loricatum* Mayer, *Des haematozoaires*, Ph.D. Thesis.

1983. *Trypanosoma loricatum* : Ray and Choudhury, *Tech. Monograph* No. 8, *zool. Surv. India*, p. 16.

Material examined : Sev. exs., Balitha, Bankura, 16. v. 1978, R.Ray; Bishnupur, Bankura, 10.iii.1980, R. Ray.

Diagnosis : Trypomastigote dimorphic, slender and broad; in the former the cytoplasm homogeneous and devoid of any striation but latter with thick and densely granular cytoplasm

having striations on the subpellicular surface, nucleus round to oval, located at the posterior part of the body, length of the cell body 16.25-20.76 μm.

Host : *Rana tigrina, Rana limnocharis;* site of infection : blood.

Distribution : India : West Bengal (Bankura district).

33. ***Trypanosoma mega*** Dutton and Todd

1903. *Trypanosoma mega* Dutton and Todd, *Mem. Liverpool. Sch. Trop Med.,* **11,** p. 1.

1989. *Trypanosoma mega* : Ray, *J. Bengal nat. Hist. Soc.* (New Series), **8,** p. 5.

Material examined : Sev. exs., Barddhaman, 12. vii.1985. R. Ray; sev. exs. Darjiling 16.viii.1987, R. Ray.

Diagnosis : Trypomastigote form elongated, cytoplasm dark and granular with longitudinal striations in the prenuclear region, nucleus oval or elliptical and situated middle third of the body lying transverse to the long axis of the body, nuclear index 0.63, length of the cell body 31.5-37.0 μm.

Host : *Rana tigrina;* site of infection : blood.

Distribution : India : West bengal (Barddhaman and Darjiling districts).

34. ***Trypanosoma ranarum*** (Lankester)

1871. *Undulina ranarum* Lankester, *Q. Jl. mocrosc. sci.,* **11,** p. 387.

1983. *Trypanosoma ranarum* : Ray and Chodhury, *Tech. Monograph* No. *8, zool. Surv. India,* p. 29.

Material examined : Sev. exs., Balitha, Bankura, 12.x. 1981, R. Ray.

Diagnosis : Trypomastigote form pleomorphic designated as Type I and II; body surface of Type I smooth but in Type II costate and flattened; nucleus round or elliptical located at anterior third to middle third of the body, body length varying between 71.1μm and 74.1 μm.

Host : *Rana tigrina* and *Rana* sp.; site of infection : blood.

Distribution : India : West Bengal (Bankura district), Andhra Pradesh, (Warangal).

35. ***Trypanosoma rotatorium*** (Mayer)

1843. *Amoeba rotatorium* Mayer, *Des haematozoaires* Ph.D. Thesis.

1901. *Trypanosoma rotatorium* Laveran and Meshil *C.R. Soc. Biol.,* **53,** p. 678.

1983. *Trypanosoma rotatorium* : Ray and Choudhury, *Tech. Monograph* No. 8, *zool. Surv. India,* p. 5.

Material exained : Sev. exs., Balitha, Kotalpur, Bankura 10.iii.1978, R. Ray; Nakunda, Salikona, Hugli, 5. vi. 1981, R. Ray.

Diagnosis : Trypomastigote form pleomorphic viz. Type I, II, and III; cytoplasm densely granular in the posterior two thirds of the body, having 2-3 striated myonemes along longitudinal axis, length of the cell body 29-34 μm.

Host : *Rana tigrina, Rana limnocharis, Rana cyanophlyctis, Bufo melanostictus, Bufo stomaticus;* site of infection : blood.

Intermediate hosts : *Helobdella nociva* (Rhyncobdellid leech)

Distribution : India : West Bengal (Bankura, Hugli, Maldah, Koch Bihar, Jalpaiguri and Darjiling districts); Goa, Orissa, Tripura and Andaman Island.

36. ***Trypanosoma systoma*** Ray and Choudhury

1983. *Trypanosoma systoma* : Ray and Choudhury, *Tech. Monograph* No. 8, *zool. Surv. India,* p. 34.

Material examined : Sev. exs., Medinipur, 15. viii. 1973, R. Ray.

Diagnosis : Trypomastigote form monomorphic, cytoplasm granular and vacuolated, nucleus oval or kidney-shaped situated on the posterior third of the body, length of the cell body 27-42 μm, undulating membrane well marked.

Host : *Uperodon systoma;* site of infection : blood.

Distribution : India : West Bengal (Medinipur district).

37. ***Trypanosoma taprobanica*** Ray and Choudhury

1984. *Trypanosoma taprabanica* Ray and Choudhury, *Bull. zool. Surv. India,* **6,** p. 152.

Material examined : Sev. exs., Santaldi, Puruliya 20.ix.1977, R. Ray.

Diagnosis : Trypomastigote monomorphic, attenuated at both ends, cytoplasm finely granular, body shape varying between 'C' or 'S', nucleus round to oval, length of the cell body 15-18.5 μm.

Host : *Kaloula pulchra taprobanica;* site of infection : blood

Distribution : India : West Bengal (Puruliya)

C. ***Trypanosoma*** **of reptiles**

38. ***Trypanosoma balithaensis*** Ray

1987. *Trypanosoma balithaensis* Ray, *Acta Protozool.,* **26,** p. 63.

Material examined : Sev. exs., Balitha, Bankura, 10.iii.1984, R. Ray.

Diagnosis : Trypamastigote monomorphic, cell body measuring 30-35 μm in length and 1.5-2.5 μm in width; free flagellum measuring 17.5-20.0 μm, nucleus round situated close to kinetoplast, cytoplasm homogeneous, granular without any striation.

Host : *Lissemys p. punctata;* site of infection : blood.

Intermediate host : *Helobdella nociva.*

Distribution : India : West Bengal (Bankura district).

39. ***Trypanosoma enhydris*** Sinha and Mandal

1976. *Trypanosoma enhydris* Sinha and Mandal, *Acta Protozool.,* **15,** p. 393.

Material examined : Sev. exs., Chakdah, Nadia, 21.iv.1975, C.K.Sinha.

Diagnosis : Trypomastigote pleomorphic, small form with long free flagellum (12-14 μm), intermediate form also with long free flagellum (14.5-17.5 μm) and large form with short free flagellum (9-11.0 μm); cytoplasm granular, nucleus round or oval situated almost at the middle, length of the cell body 10.6 μm.

Host : *Enhydris enhydris;* site of infection : blood.

Distribution : India : West Bengal (Nadia, Darjiling and Koch Bihar districts).

40. *Trypanosoma gangetica* Sinha

1978. *Trypanosoma gangetica* Sinha, *Acta protozool.*, **17, p. 9.**

Diagnosis : Monomorphic, dimensions 55.7 μm x 2.45 μm, cytoplasm homogenous with 7-10 vacuoles and without any volutin granules; nucleus centrally located, undulating membrane with 7-8 folds, free flagellum long measuring 19.2 μm in length.

Host : *Trionyx gangeticus;* site of infection : blood.

Distribution : India : West Bengal (North 24-Parganas district).

D. *Trypanosoma* of birds

41. *Trypanosoma avium* Danilewsky

1885. *Trypanosoma avium* Danilewsky, *Biol. Zentrabl.*, **5**, p. 529.

Material examined : A few exs., Sagar Island, South 24- Parganas, 25.xii.1976, N.C. Nandi; a few exs., Kumra, Habra, North 24-Parganas, 20.xii.1975, N.C. Nandi

Diagnosis : Highly pleomorphic, sometimes attaining a great size of 26 to 60 μm or even longer; kinetoplast elliptical stained deep red, situated a long distance away from the posterior end, measuring 0.6-0.9 μm in diameter; nucleus oval located almost at the middle, free flagellum short.

Hosts : *Acrocephalus dumetorum, Dicrurus adsimilis* and *Lonchura malabarica;* site of infection : blood.

Distribution : India : West Bengal (Calcutta, Nadia, South and North 24-Parganas districts); Delhi, Jammu and Kashmir; a cosmopolitan species with worldwide distribution.

41a. *Trypanosoma avium bakeri* Chatterjee and Ray

1991. *Trypanosoma avium bakeri* Chatterjee and Ray, *Parasitology* **62**, p. 331.

Material examined : Sev. exs., Balia, Nadia, 12.vi.1975, N.C. Nandi.

Diagnosis : Pleomorphic varying widely in length, width and shape and longitudinally striated measuring 50-60 μm; cytoplasm coarse, kinetoplast round or oval, nucleus small, round, granulated and sometimes lodged in a vacuole.

Hosts : *Pycnonotus jocosus, Dendrocitta vagabunda* and *Columba livia;* site of infection : blood and bone marrow.

Distribution : India : West Bengal (Calcutta and Nadia districts).

42. *Trypanosoma hannae* Pittaluga

1905. *Trypanosoma hannae* Pittaluga, *Rev. R. Acad. Cienc. Exactas Fis. Nat. Madr.*, **2**, p. 331.

Host : *Columba livia domestica;* site of infection : blood.

Distribution : India : West Bengal (Calcutta and South 24-Parganas districts).

Intermediate host : *Pseudolynchia canarensis.*

Remarks : Diagnostic features of this species can not be given due to nonavailability of concerned literature.

43. *Trypanosoma lanii* Choudhury and Misra

1976. *Trypanosoma lanii* Choudhury and Misra, *Proc. zool. Soc. Calcutta,* **29**, p. 29.

Diagnosis : Trimorphic - large thick, short thin and intermediate forms; cytoplasm granular in large form, having no granules in short and intermediate forms; in large form nucleus situated at one third portion in the cell body but in other two forms nucleus situated at the middle.

Host : *Lanius schach tricolor*; site of infection : blood and bone marrow.

Distribution : India : West Bengal (Calcutta district).

44. *Trypanosoma* sp.

Host : *Lonchura p. punctulata*; site of infection : blood.

Distribution : India : West Bengal (Calcutta district).

Remarks : Choudhury, Sarkar and Roy (1969) reported this parasite from the blood of the aforesaid host without assigning any specific status.

E. *Trypanosoma* of mammals

45. *Trypanosoma evansi* (Steel)

1885. *Spirochaele evansi,* Steel Investigations into an obscure and fatal disease among transport mules in British Burma.

1888. *Trypanosoma evansi* : Balbiani, *J. Micrograph,* **12**, p. 394.

Diagnosis : Pleomorphic with slender, intermediate, and stumpy forms; slender form with long flagellum and cell body measuring 15-34 μm; intermediate form with short free flagellum and cell body measuring 19.5-20.7 μm; stumpy form with short free flagellum and the cell body measuring 16.8-19.6 μm; kinetoplast small, posterior end of body usually blunt.

Host : *Panthera tigris, Panthera pardus, Panthere unca* .(Alipore and Darjiling Zoo) and cattle (sporadic); site of infection : blood.

Distribution : India : West Bengal (Calcutta and Darjiling districts).

46. *Trypanosoma lewisi* (Kent)

1880. *Herpetomonas lewisi* Kent, *A manual of Infusoria*

1901. *Trypanosoma lewisi* Laveran and Mesnil, *Ann. Inst. Pasteur,* **15,** p. 673.

Material exained : Sev. exs., Singur, Hugli, 6.xii.1975, A.K.Mandal; Sibpur, Haora, 5.iii.1981, S. Bandyopadhyay.

Diagnosis : Trypomastigote form monomorphic, cell body measuring 21-36.5 µm, nucleus oval situated at the anterior half of the body, free flagellum measuring 7.2-7.8 µm.

Host : *Bandicota bengalensis, Rattus rattus arboreus, R. norvegicus, Mus musculus;* site of infection : blood.

Distribution : India : West Bengal (Calcutta, Hugli and Haora districts) and spordically reported in other states.

47. *Trypansoma indicum* Luhe

1906. *Trypanosoma indicum* Luhe, *Menses Hondb. Tropenkarakh.,* **3,** p. 68.

1985. *Trypanosoma indicum* : Sinha and Dasgupta, *Indian J. Parasit.,* **9,** p. 239.

Diagnosis : Trypomastigote form monomorphic, cytoplasm having 3-5 vacuoles, nucleus subspherical to oval length of the cell body 20-25 µm.

Host : *Petaurista magnificus* and *Petaurista n. nobilis;* site of infection : blood.

Distribution : India : West Bengal (Darjiling district)

48. *Trypanosoma rhinolophonis* Pal and Dasgupta

1982. *Trypanosoma rhinolophonis* Pal and Dasgupta, *J. Bengal nat. Hist. Soc.* (New Series), **1,** p. 101.

Diagnosis : Trypomastigote form monomorphic; nucleus small, posteriorly placed, enormous size of the vacuole with juxtanuclear position, length of the cell body 26-30 µm.

Host : *Rhinolophus rouxi rouxi;* site of infection : blood.

Distribution : India : West Bengal (Darjiling district).

49. *Trypanosoma* sp.

Host : *Petaurista nobilis nobilis;* site of infection : blood.

Distribution : India : West Bengal (Darjiling district).

Remarks : Sinha and Dasgupta (1978) reported this parasite from the above mentioned host without assigning any specific status.

Order RETORTAMONADIIDA

Key to the families

1 (2) Flagella one or more in number, occuring in stomach of ruminants or in caecum and

colon of horse.....CALLIMASTIGIDAE

2 (1) Flagella 4 in number, one turn posteriorly, both freeliving and parasitic.....

3 (4) Among 4 flagella, one undulates in the cytostome .....CHILOMASTIGIDAE

4 (3) Among 4 flagella, one trails.....TETRAMITIDAE

Family TETRAMITIDAE

Key to the genera

1(2) Body ovoid or pyriform, a shallow cytostome present towards right side, two long and two short flagella extending from cytostome.....***Costia***

2(1) Body spherical or pyriform, cytostome lacking, three anterior flagella present, the fourth flagellum running along the flattened body surface and extending little freely at the posterior tip of the body.....***Enteromonas***

Genus ***Costia*** Leclerque

50. ***Costia necatrix*** (Henneguy)

1883. *Bodo necator* Henneguy, *C.R. Acad. Sci.*, **96**, p. 658.

1890. *Costia necatrix* Leclerque, *Bull. Soc. Belge micr.*, **16**, p. 70.

Material examined : Many exs., Budge Budge, South 24- Parganas, 12.ii.1990, A.K. Mandal & N.C. Nandi; many exs., Belgharia, North 24-Parganas, 21.iii.1990, A.K. Mandal & N.C. Nandi.

Diagnosis : Body pear-shaped, a funnel-like depression at pointed anterior end, flagella 4 in number, two long and two short, dimensions 10-20 µm x 5-10 µm; nucleus spherical.

Host : *Channa punctatus, C. striatus* and Indian carps; site of infection : epidermal layer of skin.

Distribution : India : West Bengal (North and South 24-Parganas districts).

Remarks : This parasite produces '*costiasis*' in both wild and reared fishes. The infection may at times cause considerable mortality of fishes. Recently Mandal *et al.*, (1990) observed this parasite in large numbers in association with epizootic ulcerative syndrome in *C. punctatus* and *C. striatus* from freshwater ponds of West Bengal.

51. ***Enteromonas hominis*** da Fonseca

1915. *Enteromonas hominis* da Fonseca, *Brazil Medico.*, **29**, p. 281.

Diagnosis : Trophozoite oval, dimensions 4-10 µm x 3-6 µm, nucleus circular or pyriform with a large endosome located near anterior end, cytoplasm vacuolated or reticulated containing bacteria.

Host : Man, macaques and golden hamster; site of infection : caecum.

Distribution : India : West Bengal (Calcutta district).

Remarks : Chatterjee (1919) described *Enteromonas bengalensis* from human intestinal contents. This species has been synonymised under *E. hominis* (see Levine, 1961).

Family CHILOMASTIGIDAE

Genus ***Chilomastix*** Alexeieff

Diagnosis : Body pyriform with a large cytostomal cleft at anterior end, 3 longer flagella anteriorly directed, fourth flagellum short and undulates within the cleft.

Key to the species

1 (2) Pear-shaped body with a large cytostomal cleft, parastic in ruminants .....*C. caprae*

2 (1) Body oval or pyriform with a large cytostomal cleft at anterior end, parastic in primates.....*C. mesnili*

52. *Chilomastix caprae* Fonseca

1915. *Chilomastix caprae* Fonseca, *Mem. Inst, Oswald. Cruz.*, **8**, p. 5.

Diagnosis : Pear-shaped body with 3 anteriorly directed flagella, fourth flagellum within a large cytostomal cleft, dimensions 8-10 μm × 4-6 μm.

Host : *Capra hircus;* site of infection : rumen.

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) reported this species from the rumen contents of goat procured from a public slaughter house at Tangra, Calcutta.

53. *Chilomastix mesnili* (Wenyon)

1926. *Chilomastix mesnili* : Wenyon, *Protozoology,* vol. I, p. 621.

Diagnosos : Trophozoite oval or pyriform, dimensions 5-36 μm x 2-6 μm, flagellar arrangements as in *C. caprae.*

Host : Man, Orang-utan, Chimpanzee and monkeys; site of infection : caecum and colon.

Distribution : India : West Bengal (Calcutta district); cosmopolitan.

Remarks : Chatterjee (1923) reported this species from the stools of patients (man) suffering from chronic intestinal complaints. In one occassion he (*op.cit.*) found this parasite in large numbers in association with innumerable *Entamaeba coli.*

Mention may be made here that Chatterjee (*op. cit.*) reported this parasite as a new species *Tetrachilomastix bengalensis* but according to Wenyon (1926) who happened to examine Chatterjee's material, this species is quite similar with *C. mesnili.* Chatterjee (1917a) also described another species *Trichomastix hominis* which appears to be a synonym *C. mesnili* (*see* Wenyon, 1926).

Family CALLIMASTIGIDAE

Key to the genera

1 (2) Body kidney to crescent-shaped, one or two flagella attached to the middle of the concave side.....***Selenomonas***

2 (1) Body oviod, 12-15 long flagella near anterior end.....***Callimastix***

54. *Callimastix frontalis* Braune

1966. *Callimastix frontalis* Brune : Kudo, *Protozoology*, p. 444.

Diagnosis : Body spherical or oviod with about 12 μm in diameter, flagella 12 in number and about 30 μm long, arising from a row of basal granules on the anterior margin of the body.

Host : Cattle, sheep and goats; site of infection : rumen.

Distribution : India : West Bengal (Calcutta district); cosmopolitan.

Remarks : Das Gupta (1935) reported this species from the rumen contents of goat procured from Tangra, Calcutta.

Genus *Selenomonas* Von Prowazek

55. *Selenomonas ruminantium* var. *caprae* Das Gupta

1889. *Ancyromonas ruminantium* Certês, *Bull. Soc. zool.*, Paris, **14**, p. 70.

1935 *Selenomonas ruminantium* var. *caprae* Das Gupta, *Arch. Protistenk.*, **85**, p. 156.

Diagnosis : Body crescent-shaped, dimensions 6.15-8.20 μm x 1.50-2.05 μm, 3-4 flagella arising from the centre of the concave side, nucleus located at the centre of the crescent.

Host : *Capra hircus;* site of infection : rumen.

Distribution : India : West Bengal (Calcutta district).

Remarks : Several authors placed *Selenomonas* in the Spirillaceae among bacteria but Jeynes (1955, 1956; cited from Levine, 1967) showed that it is actually a protozoon. Das Gupta (1935) described this variety from the rumen contents of goat procured from a slaughter house at Tangra, Calcutta.

Order DIPLOMONADIDA

Family HEXAMITIDAE

Diagnosis : Two karyomastigonts, body with two-fold rotational symmetry or bilateral symmetry, each mastigont with 4 flagella, one of them recurrent.

Genus *Giardia* Kuntsler

Diagnosis : Body pyriform to ellipsoid with anterior end broadly round and posterior end drawn out, bilaterally symmetrical, ventral side with a sucking disc in anterior half, 2 anterior nuclei, 2 slender axostyles and 8 flagella in 4 pairs present.

56. *Giardia intestinalis* (Lambl)

1859. *Cercomonas intestinalis* Lambl, *Viert. Prakt Heilk.*, **61**, p. 1.

1966. *Giardia intestinalis* Lambl : Kudo, *Protozoology*, p. 452.

Diagnosis : Trophozoite broadly pyriform, dimensions 9-20 µm × 5-10 µm, axostyles needle-like, nuclei vescicular and located near anterior margin.

Host : Man, monkeys and pig; site of infection : duodenum, jejunum and upper small intestine.

Distribution : India : West Bengal (in all districts); cosmopolitan.

Remarks : This species is common in man and known to cause giardiosis.

Order TRICHOMONADIDA

Key to families

1 (2) Anterior flagella variable in number, undulating membrane bordered by a flagella, a filamentous costa arising from the blepharoplast.....TRICHOMONADIDAE

2 (1) Two or three anterior flagella and a trailing flagellum which is either free or adherent, undulating membrane and costa lacking.....MONOCERCOMONADIDAE

Family MONOCERCOMONADIDAE

Genus *Monocercomonas* Grassi

Diagnosis : Body pyriform with a rounded anterior end; cytostome and nucleus anterior, axostyle projecting beyond posterior end of the body.

Key to the species

1 (2) Body oval with 2 anteior flagella, dimensions 6-12 µm x 4- 8 µm.....*M. caprae*

2 (1) Body ellipsoidal or oval with 3 anterior flagella, dimensions 5.6-11.3 µm × 3.2-8 µm .....*M. ruminantum*

57. *Monocercomonas caprae* Das Gupta

1935. *Monocercomonas caprae* Das Gupta, *Arch. Protistenk.*, **85**, p. 157

Diagnosis : Body oval with four free flagella arising in groups of two from two anterior blepharoplasts, dimensions 6-12 µm × 4- 8 µm, two blepharoplasts joined by a chromatic line.

Host : *Capra hircus*; site of infection : rumen.

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) described this species from the rumen contents of goats procured from slaughter house at Tangra, Calcutta.

58. *Monocercomonas ruminantum* (Braune)

1967. *Monocercomonas ruminatum* Braune : Levine, *Protozoan parasites of domestic animals and of man,* p. 168.

Diagnosis : Body ellipsoidal or oval, dimensions 5.6-11.3 μm × 3.2-8 μm, 3 long anterior flagella and 1 longer trailing flagellum.

Host : Cattle and deer; site of infection; rumen.

Distribution : India : West Bengal (South 24 Parganas district); common in cattle.

Remarks : Mandal and Choudhury (1984) reported this species from the faecal pellets of Spotted Deer, *Axis axis* from Sunderban, West Bengal. Mention may be made here that Levine (1967) has placed it under *Monocercomonoides caprae.*

Family TRICHOMONADIDAE

Key to the genera

1 (4) Anterior flagella 4 in number.....

2 (3) A knob-like or spatulate structure present at terminal ende of flagella..... .....***Tetratrichomonas***

3 (2) Such knob-like or spatulate structure lacking .....***Trichomonas***

4 (1) Anterior flagella 5 in number.....***Pentatrichomonas***

Genus *Trichomonas* Donne

Key to the species*

1 (2) Parabasal body sausage-shaped, dimensions 6-19 μm x 2-9 μm, parasitic in digestive tract of various birds.....*T gallinae*

2 (1) Parabasal body not sausage-shaped, parasitic in mammals.....

3 (4) Parastic in vagina, prostrate gland and urethra of man, dimensions 7-23 μm × 5-12 μm .....*T vaginalis*

4 (3) Parasitic in the rumen of goat, dimensions 8-17 μm x 5- 15 μm.....*T. ruminatium*

* *T. thukuni* is excluded from the key due to lack of its descriptive information.

59. *Trichomonas gallinae* (Rivolta)

1878. *Cercomonas gallinae* Rivolta, *Giorth. Anat Fisiol. Pat Anim.* Pissa, **10**, p. 220.

1966. *Trichomonas gallinae* : Kudo, *Protozoology*, p. 469.

Material examined : 1 ex., 6.viii.1959, Calcutta, K.N.Nair.

Diagnosis : Body roughly pyriform, dimensions 6-19 μm x 2-9 μm, parabasal body sausage-

shaped 4 μm long; nucleus oviod located at anterior part, axostyle protrudes a little out of the body.

Host : Pigeon, turkey, chicken, doves, hawks and kites; site of infection : digestive tract.

Distribution : India : West Bengal (Calcutta district), Orissa; cosmopolitan.

Remarks : This species is fairly common in domestic pigeons in which it often causes serious losses. However, this parasite has been recovered from the digestive tract of *Milvas migrans* from Calcutta.

60. *Trichomonas ruminatium* Braune

1935. *Trichomonas ruminatium* Braune : Das Gupta, *Arch Protistenk.*, **85**, p. 157.

Diagnosis : General morphology as far *T. gallinae*, dimensions 8- 17 μm × 5-15 μm, axostyle rigid.

Host : *Capra hircus;* site of infection : rumen.

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) observed this species in small numbers in rumen contents of goats collected from a slaughter house at Tangra, Calcutta.

61. *Trichomonas thukuni* Ray and Singh

1949. *Trichomonas thukuni* Ray and Singh *Proc-Indian Sci. Congr.*, p. 56.

Host : *Cavia cutleri;* site of infection : Caecum

Distribution : India : West Bengal (Calcutta district).

Remarks : Ray and Singh (1949) reported this species from the caecum of a guineapig, *Cavia cutleri* but, this description is not available.

62. *Trichomonas vaginalis* Donne

1836. *Trichomonas vaginalis* Donne, *C.R. Acad. Sci.*, **3**, p. 385.

1966. *Trichomonas vaginalis* : Kudo, *Protozoology*, p. 468.

Diagnosis : Body broadly pyriform, dimensions 7-23 μm × 5-12 μm, costa very narrow, parabasal body long and cylindrical with a parabasal filament, paracostal and extra axostylar granules numerous, undulating memberane with 3-4 waves extending a little more than half the body length.

Host : Man; site of infection : vagina, prostrate gland and urethra.

Distribution : India : West Bengal (in all districts); cosmopolitan.

Remarks : This parasite causes 'Trichomonad vaginitis' It has world-wide distribution.

Genus *Tetratrichomonas* Parlsi

63. *Tetratrichomonas buttreyi* (Hibler, Hammond, Caskey, Johnson & Fitzerald)

1960. *Trichomonas buttreyi* Hibler *et al.*, J. *Protozool.*, **7**. p. 159.

1963. *Tetratrichomonas buttreyi* : Honigberg, *J. Protozool.* **10**, p. 20.

Diagnosis : Body ovoid or ellipsoidal, dimensions 3.2-8.0 μm × 2.4-6.4 μm, knob-like or spatulate structure present at the terminal ends of flagella, undulating numbrane with 2-5 undulations extending to the posterior end fo the body, axostyle relatively narrow protruding beyond the body.

Host : *Sus scrofa*; site of infection : caecum, colon and rarely small intestine.

Distribution : India : West Bengal (South 24 Parganas district).

Remarks : Mandal and Choudhury (1984) collected this species in the faecal sample of wild boar in Sundarban, West Bengal.

Genus ***Pentatrichomonas*** Bishop

64. ***Pentatrichomonas hominis*** (Davaine)

1967. *Pentatrichomonas hominis* (Davaine) : Levine, *Protozoan parasites of domestic animals and of man*, p. 103.

Diagnosis : Body pyriform, dimensions 8-20 μm × 3-14 μm; anterior flagella usually five, rarely four, very rarely three, four of anterior flagella grouped together and fifth one separate and directed posteriorly; sixth flagellum running along undulating membrane and extending beyond it as free trailing flagellum, pelta crescent-shaped prolonged dorsally as a filament.

Host : Man, Gibbon, Chimpanzee, Orang-utan, various monkeys, baboon, dog, cat, rodents, golden hamster (*see* Levine, 1967); site of infection : caecum and colon,

Distribution : India : West Bengal (Calcutta district).

Remarks : Chatterjee, Ray and Mitra (1927) reproted this species under the name *Pentatrichomonas canis auri* (*see* Levine, 1967) from the caecal contents of an Indian jackal, *Canis aureus*.

Order HYPERMASTIGIDA

Family LOPHOMONADIDAE

Diagnosis : Mastigont system with numerous flagella, extranuclear organellae arranged in one system, anterior flagellar tuft single.

Genus ***Lophomonas*** Stein

Diagnosis : Ovoid or elongate, small nucleus single and vescicular located at anterior end, axostyle composed of many filaments.

65. ***Lophomonas striata*** Biitschli

1966. *Lophomonas striata* Biitschli : Kudo, *Protozoology*, p. 485.

Material examined : Sev. exx., Calcutta, 20.iv.1959, K.N. Nair; Sev. exs., Calcutta, 21,viii.1966, A.K. Das.

Diagnosis : Body elongate, spindle-shaped with obliquely arranged needle-like structures, bundle of axial filament short and never protruding.

Host : Cockroach, *Periplaneta americana*; site of infection : colon.

Distribution : India : West Bengal (Calcutta district); cosmopolitan.

Subphylum OPALINATA
Class OPALINATEA
Order OPALINIDA
Family OPALINIDAE

Diagnosis : Numerous cilia in oblique longitudinal rows over entire body surface, cytostome absent, nucleus of one kind ranging from one to many.

Key to the genera

1 (2) One large nucleus present.....***Hegneriella***

2 (1) Nuclei more than one.....

3 (4) Body cylindrical or pyriform, multinucleate.....***Cepedea***

4 (3) Body highly falttened, multinucleate.....***Opalina***

Genus ***Hegneriella*** Earl

66. ***Hegneriella mukundai*** Chandra and Choudhury

1980. *Hegneriella mukundai* Chandra and Choudhury, *Acta. Protozool.*, **19**, p. 51.

Diagnosis : Body oval, posterior end broader than the anterior, dimensions 81.7-107.5 µm × 47.3-73.1 µm, nucleus single, large and ovoid, and centrally located, nucleoplasm containing 8-10 scattered nucleoli

Host : *Kaloula pulchra taprobanica*; site of infection : rectum.

Distribution : India : West Bengal (Medinipur district).

Remarks : This is the only species of *Hegneriella* reported so far from India.

Genus ***Opalina*** Purkinje and Valentin

Key to the species

1 (2) Anterior end of the body distinctly narrower than the posterior end, width always greater than half the length.....*O. plicata*

2 (1) Anterior end only slighly narrower than the posterior end, width less than half the length upto two-third.....

3 (4) Body about twice as long as broad.....*O. triangularis*

4 (3) Body about three to five times as long as broad.....*O. scalpriformes*

67. *Opalina plicata* Ghosh

1919. *Oplina plicata* Ghosh, *Proc. Indian Assoc. Cult. Sci.*, **4**, p. 102.

Diagnosis : Body broadly or elongately ovate, tapering and rounded anteriorly, wide and rounded posteriorly, dorsal surface with 2 or 4 ridges, nuclei numerous.

Host : *Bufo melanostictus*; site of infection: intestine and rectum.

Distribution : India : West Bengal (Calcutta district).

68. *Opalina scalpriformes* Ghosh

1919. *Opalina scalpriformes* Ghosh, *Proc. Indian Assoc. Cult. Sci.*, **4**, p. 103.

Material examined : Sev. exs., Maldah town, 15.iii.1984, A.K. Das; sev. exs., Jiagunje, Murshidabad, 29.iii.1984, A.K. Das.

Diagnosis : Body elongated cylindrical, anteriorly rounded and posteriorly narrower; anterior part of the body thrown into several longitudinal folds or ridges, dimensions 175-200 µm × 60-78 µm, nuclei numerous.

Host : *Bufo melanostictus, B. himalayana;* site of infection: intestine and rectum.

Distribution : India : West Bengal (Calcutta, Darjiling, Maldah, Murshidabad districts), Goa and Uttar Pradesh.

69. *Opalina triangularis* Ghosh

1919. *Opalina triangularis* Ghosh, *Proc. Indian Assoc. Cult. Sci.*, **4**, p. 104.

Material examined : Sev. exs., Sainthia, Birbhum, 3.iv.1984, A.K. Das; sev. exs., Haldibari, Koch Bihar, 28.iii.1984, A.K. Das.

Diagnosis : Body lanceolate, more or less rounded and widest anteriorly and tapering posteriorly; one side nearly straight or concave and other side strongly convex, dimensions 85-250 µm × 40-135 µm, nuclei numerous.

Host : *Bufo melanostictus;* site of infection : intestine and rectum.

Distribution : India : West Bengal (Birbhum, Calcutta and Koch Bihar districts), Goa,

Genus *Cepedea* Metcalf

Key to the species

1 (2) Body very much elongated, anterior end rounded and posterior end tapering to point, length 200-600 µm..... *C. longa*

2 (1) Body not much elongated, both anterior and posterior ends rounded, 150-180 µm in length.....*C. srivastavai*

70. *Cepedea longa* (Bezzenberger)

1904. *Opalina longa* Bezzenberger, *Arch. Protistin.k*, **3**, p. 138.

1923. *Cepedea longa* : Metcalf, *Bull. U.S. Mus.*, **120**, p. 168.

Material examined : 4 exs., Maldah town, 15.iii.1984, A.K. Das; sev. exs., Falta, South 24-Parganas, 14,vii.1986, A.K. Das.

Diagnosis : Body greatly elongated, rounded in front, tapering posteriorly to a point, endoplasm with thick central zone of compact alveoli and loose paripheral zone, nuclei ellipsoidal or spherical, 200-600 µm in length.

Host : *Bufo melanostictus, Rhacophorus maculatus;* site of infection : rectum.

Distribution : India : West Bengal (Calcutta and South 24- Parganas districts).

71. ***Cepedea srivastavai*** Mukherjee and Chakraborti

1989. *Cepedea srivastavai* Mukherjee and Chakraborti, *J. zool. Soc. India,* **40**, p. 117.

Diagnosis : Body elongated, slender, anterior end broadly rounded, posterior end narrower and rounded, 150-180 µm in length, cytoplasm alveolar.

Host : *Rhacophorus maculatus;* site of infection : rectum

Distribution : India : West Bengal (Calcutta district).

Subphylum	SARCODINA
Class	LOBOSEA
Subclass	GYMNAMOEBIA
Order	AMOEBIDA
Family	ENDAMOEBIDAE

Key to the genera

1 (4) Trophozoite with single nucleus.....

2 (3) Nucleus vesicular, with a comparatively small endosome located at or near its centre, with varying number of peripheral granules.....***Entamoeba***

3 (2) Nucleus vesicular with a large endosome, some achromatic stands between endosome and nuclear membrance.....***Iodomoeba***

4 (1) Trophozoite usually with two nuclei, vesicular nucleus with a delicate membrane and an endosome connected the membrane by delicate strands.....***Dientamoeba***

Genus ***Entamoeba*** Casagrandi and Barbagallo

Key to the species

1(8) Mature cysts uniculeate.....

2(5) Mature cysts with numerous chromatoid bodies.....

3(4) Usually parasitic in macaques and other monkeys, trophozoites 9-20 μm long and cysts 6-18 μm in diameter..... *E. chattoni*

4(3) Usually parasitic in antelopes and goats, trophozoites 11-12 μm long and cysts 4-13 μm in diameter.....*E. ovis*

5(2) Mature cysts without chromatoid bodies.....

6(7) Parasitic in swine, trophozoites 5-25 μm long and cysts 4-17 μm in diamete.....*E. suis*

7(6) Parasitic in deer, trophozoites 6.31-10.40 m long and cysts 4.2-8.4 μm in diameter..... .....*E. cervis*

8(1) Mature cysts with 4-8 nuclei.....

9(10) Mature cysts tetranucleate, nucleus with small central endosome, trophozoites often ingest erythrocytes, and measuring 20-30 μm in length and cysts 1-20 μm in diameter .....*E. hiistolytica*

10(9) Mature cysts octonucleate.....

11(12) Eight nuclei of mature cysts generally occupy central area arranged in a cluster..... .....*E. chiropteris*

12(11) Such nuclear arrangement in cysts lacking.....

13(14) Both trophozoites and cysts comparatively larger havng 15- 20 μm and 10-30 μm length respectively, usually parasitic in man.....*E. coli*

14(13) Both trophozoites and cysts comparatively smaller, having 6.31-13.94 μm and 6.44-11.27 μm length respectively, parasitic in rat.....*E. muris*

72. ***Entamoeba cervis*** Mandal and Choudhury

1981. *Entamoeba cervis* Mandal and Choudhury, *Verr. ber. Erkrg. Zootiere,* **23,** p. 179.

Diagnosis : Trophozoites oval, 6.31-10.40 μm in length cytoplasm differentiated into ectoplasm and granular endoplasm, cyst always uninucleated with 4.2 - 8.4 μm in diameter, no glycogen granule found in cytoplasm.

Host : Spotted Deer, *Axis axis;* site of infection : unknown.

Distribution : India : West Bengal (Calcutta and South 24 Parganas districts).

Remarks : Mandal and Choudhury (1981) collected this species from the faecal samples of Spotted Deer from Sundarban Tiger Researve and Calcutta Zoo.

73. ***Entamoeba chattoni*** Swallengrebel

1914. *Entamocba chattoni* Swallengrebel, *Geneesk Tijdschr. Ned India* **54,** p. 420.

Diagnosis : Trophozoites 9-25 μm long, nucleus with a large or small, central or eccentric endorsome, cysts always uninuclcate 6-18 μm in diameter chromatoid bodies usually irregular and small.

Host : Macaques and other monkeys; site of infection : large intestine.

Distribution : India : West Bengal (South 24-Parganas district).

Remarks : Mandal and Choudhury (1988) reported this species from the faecal samples of *Macaca mulatta* from Sundarban forests, West Bengal.

74. ***Entamoeba chiropteris*** Mandal and Choudhury

1980. *Entamoeba chiropteris* Mandal and Choudhury, *Riv. Parasit.*, **47**, p. 59.

Diagnosis : Trophozoite 8.41-22.61 μm × 5.78-22.61μm; ectoplasm finely granular, endoplasm with vacuoles containing bacteria, chromatoid bars not found, nucleus with a large, compact endosome with several granular structures, matured cysts octonucleated, nuclei generally occupy a central area arranged in a cluster.

Host : Bat, *Scotophilus kuhli kuhli;* site of infection : intestine

Distribution : India : West Bengal (South 24-Parganas).

Remarks : Mandal and Choudhury (1986a) described this species from gut contents of bat collected from Sajnakhali, Sundarban Tiger Reserve, West Bengal.

75. ***Entamoeba coli*** (Grassi)

1879. *Amoeba coli* Grassi, *Gaz. Med. Ital. Lombard.*, **39**, p. 445.

1966. *Entamoeba coli* : Kudo, *Protozoology*, p. 540.

Diagnosis : Trophozoites 15-50 μm in diameter, cytoplasm filled with bacteria and debris, ectoplasm thin, nucleus with a large ecentric endosome, mature cysts 10-30 μm in diameter with 8 nuclei, cysts contianing splinter-like chromatoid bodies with sharp, fracture or square ends.

Hosts : Usually man, also other primates; site of infection : caecum and colon.

Distribution : India : West Bengal (Calcutta, South 24-Pargans districts); cosmopolitan.

Remarks : This parasite is common in man. However, Mandal and Choudhury (1988) reported this species from *Macaca mulatta* from Sundarban forests.

76. ***Entamoeba histolytica*** Schaudinn

1903. *Entamoeba histolytica* Schaudinn, *Arb. K. Gasundheistsamte*, **19**, p. 547.

1966. *Entamocba histolytica* : Kudo, *Protozoology*, p. 531.

Diagnosis : Trophozoites of pathogenic race large, 22-30 μm in diameter and those of small race 12-15 μm in diameter, clear layer of ectoplasm and granular endoplasm present, nucleus with small central endosome, a ring of small peripheral granules and a few scattered chromatin granules in between. Mature cysts of both races 10-20 μm in diameter and with 4 nuclei, trophozoites often ingest erythrocytes.

Hosts : Man and many other primates, dog, cat, pig, rat, possibly cattle; site of infection; large intestine, sometimes liver, occasionally lungs, and rarely brain, spleen etc.

Distribution : India : West Bengal (in all districts), cosmopolitan.

Remarks : *E. histolytica* is pathogenic to man, causing amoebic dysentry. Mandal and Choudhury (1986) reported this species from *Macaca mulalta* in Sundarban forests.

77. *Entamoeba muris* (Grassi)

1879. *Amoeba muris* Grassi, *Gaz. med. Ital. Lombard.*, **39**, p. 445.

1967. *Entamoeba muris* : Levine, *Protozoan parasites fo domestic animals and of man*, p. 141.

Diagnosis : Trophozoites 6.31-13.94 μm × 4.73-9.84 μm, morphologically similar to *E. coli* but smaller in dimensions, matured cysts octanucleated, 4.64-11.27 μm in diameter.

Hosts : Rats, mice, and golden hamster; site of infection : caecum and colon.

Distribution : India : West Bengal (South 24-Parganas district).

Remarks : Mandal and Choudhury (1986a) reproted this parasite from the faecal sample of *Rattus rattus arboreus* from Sundarban Tiger Reserve, West Bengal.

78. *Entamoeba ovis* Swallengrebel

1914. *Entamoeba ovis* Swallengrebel, *Geneesk, Tijdschr. Ned.- India*, **54**, p. 420.

Diagnosis : Trophozoites 5-8 μm in diameter, nucleus typically contains a large pale endosomes generally composed of several granules, a ring of peripheral chromatin and many small granules present between endosome and nuclear membrane, cysts uninucleated, 4 μm in diameter, containing numerous chromatoid bodies of varying size and a glycogen vacuole.

Host : *Capra hircus;* site of infection : rumen.

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) reproted this species from rumen of goat procured from a tannery at Tangra, Calcutta.

79. *Entamoeba suis* Hartmann

1931. *Entamoeba suis* Hartmann, *Morphologie and Systematic der Amoeben. Handbk. path. Microorg.*, 2nd Ed., **7**, p. 607.

Diagnosis : Trophozoites usually oval, dimensions 7.89-16.30 μm × 4.73-12.62 μm, endosome central and usually quite large, almost filling the nucleus, cysts spherical, uninuclcated measuring 7.24- 11-27 μm and without chromotoid bodies or glycogen vacuoles.

Host : Swine; site of infection : caecum and colon.

Distribution : India ; West Bengal (South 24-Parganas district).

Remarks : Mandal and Choudhury (1986) recorded this species from the faeces of wild pig, *Sus scrofa scrofa* from Sundarban forests, West Bengal.

Genus ***Dientamoeba*** Jepps and Dobell

80. ***Dientamoeba fragilis*** Jepps and Dobell

1918. *Dientamoeba fragilis* Jepps and Dobell, *J. r. Army med. Corps.*, **10**, p. 352.

Diagnosis : Trophozoites 3-22 μm, usually 6-12 μm in diameter, ectoplasm and endoplasm well differentiated, endoplasm with food vacuoles containing bacteria, yeast, starch granules and parts of cell, usually binucleate but sometimes uninucleate, each nucleus vesicular with an endosome composed 4-8 chromatin granules, granules connected with the membrane by delicate strands.

Hosts : Man and also some monkeys; site of infection : colon.

Distributin : India : West Bengal (Calcutta district).

Remarks : Knowles and Das Gupta (1936, *Indian J. Med. Res.*, **24** : 547- 556) found this species in the faecal contents of *Macaca irus* in Calcutta, Mention is to be made here that only trophozoites of this species are known till date.

Genus ***Iodamoeba*** Dobell

81. ***Iodamoeba butschlii*** (Prowazek)

1912. *Iodamoeba butschlli* von Prowazek, *Arch. Protistenk.*, **25**, p. 273.

Diagnosis : Trophozoites 4.73-9.60 μm × 3.15-4.83 μm, nucleus with large endsome surrounded by small spherules, most of trophozoites containing one large iodinophilic vacuole, periendosomal space filled up by some loosely arranged fibrillar structure radiating from endosomal area to nuclear membrane, cysts of somewhat irregular in shape with 3.22-6.44 μm in diameter.

Host : Man and other mammals; site of infection : intestine.

Distribution : India : West Bengal (South 24-Parganas district), cosmopolitan,

Remarks : Mandal and Choudhury (1986) reproted this species from the faecal samples of *Macaca mulatta* and *Sus scrofa scrofa* from Sundarban forests.

Phylum APICOMPLEXA
Class SPOROZOEA
Order EUGREGARINIDA
Suborder ASEPTATINA

Key to the families

1(4) Adult trophozoites always associated in pairs.....

2(3) Oocyst navicular or biconical.....ZYGOCYSTIDAE

3(2) Oocyst ellipsoidal.....ENTEROCYSTIDAE

4(1) Adult trophozoites solitary.....

5(8) Trophozoites with a differentiation at the anterior end.....

6(7) Anterior end of trophozoites sucker-like, sporocysts biconical, with similar, non-appendiculate poles, octozoic.....STOMATOPHORIDAE

7(6) Anterior end of trophozoites with or without an epimerite, sporocysts oval or spherical, octozoic.....DIPLOCYSTIDAE

8(5) Trophozoites without any differentiation at the anterior end, except in one genus, sporocysts biconical, octozoic.....MONOCYSTIDAE

Family MONOSYSTIDAE

Key to the genera

1(8) Trophozoites monomorphic.....

2(5) Trophozoites elongated, cylindrical.....

3(4) Resembling a nomatode worm and having a constant shape.....***Nematocystis***

4(3) Elongated in appearance but changing shape constantly.....***Informis***

5(2) Trophozoites ovoid or spherical.....

6(4) Trophozoites ovoid.....***Monocystis***

7(6) Trophozoites spherical.....***Apolocystis***

8(1) Trophozoites occurring in two forms, a larger form and a smaller form .....
.....***Bisurculus***

Genus ***Monocystis*** Stein

Key to the species

1(4) Trophozoites elongated and more or less fusiform.....

2(3) Often with a clear cylindrical process at one end, nucleus spherical with a large central karyosome..... *M. beddardi*

3(2) Without any cylindrical process, nucleus with a small eccentric karyosome.....
.....*M. lloidi*

4(1) Trophozoites elongated and cylindrical or club-shaped.....

5(6) Trophozoites elongated, cylindrical, blunt at both ends, nucleus spherical to ovoid with indistinguishable karyosome.....*M. senchalensis*

6(5) Trophozoites elongated and club-shaped, nucleus rounded with a large irregular karyosome.....*M. bengalensis*

82. *Monocystis beddardi* Ghosh

1923. *Monocystis beddardi* Ghosh, *J.R. microsco Soc.*, p. 425, figs, 9-13.

Diagnosis : Trophozoite elongated dimensions 100-150 µm × 30-40 µm fusiform or variable in shape including appearance and disappearance of bulbous swelling; often with a clear cylindrical process at one end; ectoplasm very thin and endoplasm highly granular; nucleus spherical with a large central karyosome; gametocyst spherical measuring 80-100 µm in diameter gametocytes hemispherical or irrgularily oval.

Host : Eutyphoeus nicholsoni (Beddard) [Annelida : Oligochaeta]; site of infection : seminal vesicles.

Distribution : India : West Bengal (Calcutta district), Uttar Pradesh (Lucknow).

83. *Monocystis bengalensis* Ghosh

1923. *Monocystis bengalensis* Ghosh, *J.R. microsc. Soc.*, p. 423.

Diagnosis : Trophozoite elongated and club-shaped, dimesions 40-80 µm × 12-30 µm; ectoplasm very thin and endoplasm highly granular, myonemes indistinct; nucleus rounded with a large irregular karyosome; gemetocysts irregularly hemi-spherical 70-80 µm in diameter; gemetocytes rounded or oval.

Host : *Pheretima posthuma* (L. Vaill) [Annelida : Oligachaeta]; site of infection : seminal vesicles.

Distribution : India : West Bengal (Calcutta district).

84. *Monocystis lloidi* Ghosh

1923. *Monocystis lloidi* Ghosh, *J.R. microsc. Soc.*, p. 425.

Diagnosis : Mature trophozoites somewhat fusiform in shape without any cylindrical process at the ends, measuring 100 µm in length; ectoplasm comparatively thick, endoplasm finely granular, paramylum grains indistinct; nucleus with a small eccentric karyosome; gametocysts spherical or oval 84 µm in diameter.

Host : *Pheretima posthuma* (L. Vaill); site of infection : seminal vesicles.

Distribution : India : West Bengal (Calcutta district).

85. *Monocystis senchalensis* Pradhan and Das Gupta

1982. *Monocystis senchalensis* Pradhan and Das Gupta, *J. Bengal nat. Hist. Soc.*, **1(2)**, p. 6.

Diagnosis : Trophozoites elongated, more or less cylindrical, blunt at both ends, measuring 43.02 - 185.4 µm × 10.8 - 48.6 µm, widest at the middle; cytoplasm alveolated; nucleus spherical to ovoid; endosome indistinguishable; spore biconical with ends drawn out.

Host : *Apporectodea trapezoides* Duges [Annelida : Oligochaeta]; site of infection : seminal vesicles.

Distribution : India : West Bengal (Darjiling district).

Genus *Nematocystis* Hesse

Key to the species

1(2) Trophozoites very large, about 2.5 mm in length, nucleus without any karyosome..... .....*N. levinei*

2(1) Trophozoites less than 2 mm in length, nucleus with or without any karyosome.....

3(6) Nucleus without any karyosome.....

4(5) Trophozoites 91.2 - 286.9 µm long, vermiform with one end narrow and other end rounded, nucleus slightly ellipsoidal..... *N. senchalensis*

5(4) Trophozoite 212.7 - 444.6 µm long, vermiform and ribbon- shaped, one pole with distinct funnel-like structure followed by a neck, other end blunt, nucleus spindle-shaped .....*N. theodoridis*

6(3) Nucleus with distinct karyosome.....

7(10) Karyosome single.....

8(9) Nucleus spherical, generally located at anterior part of the body, with a centrally located condensed karyosome.....*N. bengalensis*

9(8) Nucleus long spindle-shaped with a karyosome surrounded a faintly stained area, location of nucleus variable.....*N. mangpooensis*

10(7) Karyosome more than one in number.....

11(12) Nucleus elongated, generally located at the middle with double karyosome of which one spherical and other rod-like.....*N. mauritii*

12(11) Nucleuss elongated located towards the posterior end, with four karyosomes..... .....*N. quadrikaryosomata*

86. *Nematocystis bengalensis* Roy Chowdhury and Haldar

1984. *Nematocystis bengalensis* Roy Chowdhury and Haldar, *J. Bengal nat. Hist. Soc.*, **3(2)**, p. 20, pl. II, figs. 1-5.

Diagnosis : Trophozoites elongated, dumbel-shaped, rounded or nematode-like, dimensions 191.3 - 578.0 (334.0) µm x 37.0 - 50.0 (44.0) µm; anterior end swollen, terminating in a conical projection, posterior end abruptly tapering; pellicle smooth; nucleus spherical to ovoidal, usually located at the anterior broader portion, measuring 8.3 - 12.5 (12.2) µm × 4.1 - 8.3 (8.0) µm, endosome centrally located; gametocyst and spore unknown.

Host : *Eutyphoeus incommodus* (Beddard); site of infection : seminal vesicles.

Distribution : India : West Bengal (North 24-Parganas district).

87. *Nematocystis levinei* Pradhan and Das Gupta

1980. *Nematocystis levinei* Pradhan and Das Gupta, *North Bengal Univ. Rev.* (*Sci. & Tech.*), **1(2)**; p. 136, pl. 3, fig. 1.

Diagnosis: Trophozoites very large and elongated, measuring up to 2523.04 µm × 107.3 µm; blunt at both ends, in most cases one end usually broader than the other; epicyte clear; fine longitudinal striations along the length of the body converging at both ends; endoplasm with unevenly distributed elongated to ellipsoidal paraglycogen granules. Nucleus elongated, eccentric, measuring 36.3 - 98.8 µm × 13.2 - 28.2 µm; karyosome not visible.

Host : *Eutyphoeus gammiei* Beddard; site of infection : seminal vesicles.

Distribution : India : West Bengal (Darjiling district).

88. *Nematocystis mangpooensis* Pradhan and Dasgupta

1980. *Nematocystis mangpooensis* Pradhan and Dasgupta, *North Bengal Univ. Rev.* (*Sci. & Tech.*), **1(2)**, p. 137, pl. 4, fig. 1.

Diagnosis : Trophozoites elongated, vermiform, measuring 760 - 1339 µm × 77.52 - 150.48 µm; ends usually dissimilar, one end sometimes club-shaped and the other slender or tail-like; epicyte clear and thin; endoplasm with large paraglycogen granules; longitudinal striations converging at both ends; nucleus long, spindle-shaped, measuring 64.6 µm × 19 - 26.9 µm; karyosome 13.5 µm in diameter.

Host : *Eutyphoeus gammei* Beddard; site of infection : seminal vesicles.

Distribution : India : West Bengal (Darjiling District).

89. *Nematocystis mauritii* Roy Chowdhury and Haldar

1984. *Nematocystis mauritii* Roy Chowdhury and Haldar, *J. Bengal nat. Hist. Soc.*, **3(2)**, p. 18, pl. 1, figs. 1-6.

Diagnosis : Trophozeites vermiform, elongated or cylindrical, extremities convex and V-shaped, measuring 87.4 - 408.0 (366.0) µm × 29.1 - 62.4 (40.2) µm; pellicle thin; ectosarc clear, endosarc granulated; nucleus elongated with two endosomes, one spherical and the other rod-like; usually located at the middle and measuring 8.3 - 25.0 (14.0) µm × 8.3 - 17.0 (13.1) µm;. gametocyst and spore unknown.

Host : *Lampito mauritii* Kingberg; site of infection : seminal vesicles.

Distribution : India : West Bengal (North 24-Parganas district)

90. *Nematocystis quadrikaryosomata* Pradhan and Dasgupta

1980. *Nematocystis quadrikaryosomata* Pradhan and Dasgupta, *North Bengal Univ.Rev.* (*Sci.& Tech.*), **1(2)**, p. 136, pl. 2.

Diagnosis : Trophozoites vermiculer, cylindrical but of unequal breadth, measuring 273.22 µm long and 30.78 µm in its widest part; narrower end terminates in a bulbous area followed by a constricted 'neck', broader end with a flattened rim. Nucleus elongated, located towards the narrow end, measuring 25.8 µm × 11.4 µm; with four karyosomes of 7.2 µm in diameter.

Host : *Pheretima diffringens* Baird; site of infection : coelomic fluid.

Distribution : India : West Bengal (Darjiling district).

91. *Nematocystis senchalansis* Pradhan and Dasgupta

1980. *Nematocystis senchalansis* Prdhan and Dasgupta, *North Bengal Univ. Rev.* (*Sci. & Tech.*), 1(2), p. 135, pl. 1, figs. 1-4.

Diagnosis : Trophozoites vermiform, with one narrow end and the other end rounded; measuring 91.2-289.9 µm × 15.2-45.22 µm and with faint diagonal striations throughout the body length; nucleus large, slightly ellipsoidal, measuring 16.72-32.3 µm × 11.78-22 µm, usually lacking a karyosome; gametocyst and spore unknown.

Host : *Apporectodea trapezoides* Duges; site of infection : coelomic fluid.

Distribution : India : West Bengal (Darjiling district).

92. *Nematocystis theodoridis* Pradhan and Dasgupta

1980. *Nematocystis theodoridis* Pradhan and Dasgupta, *North Bengal Univ. Rev.* (*Sci. & Tech.*), 1(2), p. 136, pl. 3, figs. 2-3.

Diagnosis : Trophozoites long, ribbon-shaped and vermiform measuring 212.7 - 444.6 µm × 14.76 - 55.10 µm; one end funnel-like followed by a constricted 'neck', other end blunt; endoplasm loosely packed with paraglycogen granules; nucleus spindle-shaped, 14.76 - 30.04 µm × 6.84 - 13.30 µm; karyosome not visible.

Host : *Pheretima diffringens* Baird; site of infection : coelomic fluid.

Distribution : India : West Bengal (Darjiling district).

Genus *Apolocystis* Cognetti de Martiis

Key to the species

1(2) In trophozoites outer pellicle with a ectoplasmic process.....*A. goomtiensis*

2(1) In trophozoites outer pellicle without any ectoplasmic process.....

3(4) Nucleus vacuolated with a deeply stained round karyosome.....*A. vacuolatus*

4(3) Nucleus not vacuolated and with or without any karyosome.....

5(6) Nucleus round and large without any karyosome.....*A. akaryosomiferus*

6(5) Nucleus spherical and large with a very distinct karyosome having a halo around it..... .....*A. monokaryosomiferus*

93. *Apolocystis akaryosomiferus* Pradhan and Dasgupta

1982. *Apolocystis akaryosomiferus* Pradhan and Dasgupta, *J. Bengal nat. Hist. Soc.*, 2(1), p. 5, fig. 3.

Diagnosis : Trophozoites spherical, solitary, 54 - 100 µm in diameter; outer pellicle thin and complete, devoid of any ectoplasmic processes. Nucleus large and round, measuring 11.8 - 18 µm

in diameter. Spores biconical with slightly wing out trancated ends; fine granulations on the surface of spore.

Host : *Pheretima robusta* Perrier [Annelida : Oligochaeta]; site of infection : blood vessel.

Distribution : India : West Bengal (Darjiling district).

94. *Apolocystis goomtiensis* Pradhan and Dasgupta

1982. *Apolocystis goomtiensis* Pradhan and Dasgupta, *J. Bengal nat. Hist. Soc.*, **2(1)**, p. 9, fig. 7.

Diagnosis : Trophozoites spherical, 57.6-154.8 μm in diameter; pallicle fine; endoplasm granulated; nucleus round to ellipsoidal, 10.2-28.8 μm × 14.4-25.2 μm in measurements, located at various positions; karyosome not visible. Spores unknown.

Host : *Pheretima diffringens* Baird; site of infection : coelomic fluid.

Distribution : India : West Bengal (Darjiling district).

95. *Apolocystis monokaryosomiferus* Pradhan and Dasgupta

1982. *Applocystis monokaryosomiferus* Pradhan and Dasgupta, *J. Bengal nat. Hist. Soc.*, **2(1)**, p. 7, fig. 4.

Diagnosis : Trophozoite spherical, solitary, 61.2 - 115.2 μm in diameter; pellicle thin and devoid of any ectoplasmic processes; nucleus spherical and eccentric, 14.4 - 29.16 m in diameter, nuclear membrane unstained, karyosome single deeply stained, 4.32 - 9 μm in diameter. Spore boconical with slightly flattened ends.

Host : *Pheretima robusta* Perrier [Annelida : Oligochaeta]; site of infection : blood vessel.

Distribution : India : West Bengal (Darjiling district).

96. *Apolocystis vacuolatus* Pradhan and Dasgupta

1982. *Apolocystis vacuolatus* Pradhan and Dasgupta, *J. Bengal nat. Hist. Soc.*, **2(1)**; pp. 8-9, figs. 5 and 6.

Diagnosis : Trophozoites spherical, 228-235.5 μm in diameter; pellicle fine and devoid of any ectoplasmic processes; cytoplasm granulated; nucleus spherical, eccentric, 39.52 -45.06 μm in deameter; nuclear membrane well-defind; karyosome round, eccentric, 14.4 μm in diameter, with 2-8 vacuoles of varying shapes and sizes. Spores unknown.

Host : *Pheretima alexandri* Beddard; site of infection : intestine.

Distribution : India : West Bengal (Darjiling district).

Genus *Informis* Pradhan and Dasgupta

Key to the species

1 (2) Trophozoite possessing one or two elongated extensions of the body formed of pellicle alone, nucleus ellipsoidal with a spherical and deeply stained karyosome..... .....*I. pseudotentaculatus*

2 3(1) Trophozoite without any pellicular extension, nucleus ellipsoidal with karyosome of variable shape and size, having darkly stained and lightly stained areas..... .....*I. informis*

97. ***Informis informis*** Pradhan and Dasgupta

1982. *Informis informis* Pradhan and Dasgupta, *J. Bengal nat. Hist. Soc. (N.S.)*, **1(2)**, p. 4-6, figs. 1-5, 14a.

Diagnosis : Trophozoites elongated, 254.2-448.4 μm × 34.2-83.52 μm in dimension, constantly changing its shape, one end blunt and rounded and the other end tapering to a point; pellicle thin; cytoplasm filled with paraglycogen granules. Nucleus ellipsoidal, 19-38 μm × 17.1-25.2 μm, nuclear membrane not uniformly thick; karyosome variable in shape, thin connection from nuclear membrane keeping it suspended within the nucleus; empty areas between connections appearing vacuolated; spores large, biconical, measuring 29.5 μm × 10.8 μm

Host : *Approectodea trapezoides* Duges; site of infection : coelomic fluid.

Distribution : India : West Bengal (Darjiling district).

98. ***Informis pseudotentaculatus*** Pradhan and Dasgupta

1982. *Informis pseudotentaculatus* Pradhan and Dasgupta, *J. Bengal nat. Hist. Soc.* (N.S.), **1(2)**, p. 6, figs. 6-9, 14b.

Diagnosis : Trophozoites 63-323 μm × 14.04 - 98.08 μm, capable of changing shape actively, with one or two elongated processes of the pellicle at the terminal ends of the body; endoplasm packed with large and elongated paraglycogen granules with spherical, deeply stained bodies scattered in between; nucleus ellipsoidal, 9-28.5 μm × 9-20.9 μm; karyosome spherical 6.48-11.04 μm in diameter, eccentric in position. Spores 25.2 μm × 10 μm.

Host : *Apporectodea trapozoides* Duges; site of infection : coelomic fluid.

Distribution : India : West Bengal (Darjiling district).

Genus ***Bisurculus*** Pradhan and Dasgupta

99. ***Bisureulus variegatus*** Pradhan and Dasgupta

1982. *Bisureulus variegatus* Pradhan and Dasgupta, *J. Bengal nat. Hist. Soc. (N.S.)*, **1(2)**, p. 809, figs. 11-13, 14c.

Diagnosis : Trophozoites occuring in two forms, a larger variety of shapes, measuring 140-306 μm × 57.96 - 147 μm; smaller form 54.8 - 172.44 μm × 14.1-53 μm, sausage-shaped, occasionally bent in the middle; epimerite at both ends having 4-7 short, thin contractile processes; nucleus eccentric, 34.16 μm × 17.66 μm in larger forms and 14.76 - 29.52 μm × 17.6 μm; spores biconical in shape measuring 11.42 μm × 5.44 μm.

Host : *Amynthas hawayanus* Rosa [Annelida : Oligochaeta]; site of infection : coelomic fluid.

Distribution : India : West Bengal (Darjiling district).

Family STOMATOPHORIDAE

Key to the genera

1 (2) Trophozoites oviod or spherical, anterior end provided with a sucker-like epimerite, exclusively occuring in seminal vescicle of oligochaetes.....***Stomatophora***

2 (1) Trophozoites elongated and cylindrical, anterior end provided with a sucker-like organellae with a neck behind, occuring in the gut of millipedes.....***Chakravartiella***

Genus *Stomatophora* Drzewecki

Key to the species

1(2) Trophozoites spherical, sucker without mucron.....*S. globa*

2(1) Trophozoites resembling a sphere or flattened disc, sucker with mucron.....

3(4) Mucron wide measuring 10.8-28.8 µm and filled with small vacuole-like areas..... .....*S. pedongensis*

4(3) Mucron not such wide as above and without any vacuolated areas.....

5(8) Trophozoites plate or disc-like, marked by furrows and divided into a number of irregular lobes.....

6(7) Trophozoites 105 µm long and gametocysts 125-170 µm in diameter.....*S. diadema*

7(6) Trophozoites 33.2-50 µm long and gametocysts 83.2-91.5 × 71- 83.2 µm in dimension .....*S.pradhanis*

8(5) Trophozoites resembling a flattened disc and not divisible into any lobe .....*S.bahli*

100. *Stomatophora bahli* Pradhan and Dasgupta

1980. *Stomatophora bahli* Pradhan and Dasgupta, *North Bengal Univ. Rev. (Sci. & Tech.),* **1(2),** p. 141, pl. 1, figs. 1-3.

Diagnosis : Trophozoites solitary, disc-like, flattened, measuring 43.2-82.8 µm in diameter; and outline wavy, petaloid in appearance; pellicle thin; sucker 9-36 µm in diameter located centrally, petalloid in outline, mucron clear and ring-like, centrally located in the sucker, measuring 4.32-10.8 µm in diameter; epicytal striations extending from the mucron towards the periphery; nucleus eccentric, round to slightly ellipsoidal, measuring 10.8-25.2 µm in diameter; karyosome not visible.

Host : *Pheretima diffringens* Baird; site of infection : seminal vesicles.

Distribution : India : West Bengal (Darjiling district).

101. *Stomatophora diadema* Hesse

1909. *Stomatophora diadema* Hesse, *Arch. zool. exp. jen.,* **3(5);** p. 87.

Diagnosis : Trophozoite spherical, compressed, disc-like, 105 µm in diameter, marked by

furrows and irregular lobes; sucker shallow cup-like depression in the centre of the body with a central conical projection; nucleus rounded or oval, eccentric, with a large karyosome; gametocysts spherical, 125-170 μm in diameter; sporocysts navicular with truncated ends.

Host : *Pheretima posthuma;* site of infection : seminal vesicles

Distribution : India : West Bengal (Calcutta district).

102. *Stomatophora globa* Pradhan and Dasgupta

1980. *Stomatophora globa* Pradhan and Dasgupta, *North Bengal Univ. Rev. (Sci. & Tech.),* **1**(2), p. 142, pl. II, figs. 1-2.

Diagnosis : Trophozoites spherical, measuring 30.6-97.2 μm in diameter; cytoplasm alveolated; sucker 12.6-39.6 μm in diameter, surrounded by a clear halo, with variable number of long prolongations radiating outwards; mucron not visible; nucleus round 10.8-25.2 μm in diameter, located towards the periphery; karyosome not visible.

Host : *Pheretima alexandri* Beddard; site of infection : seminal vesicles.

Distribution : India : West Bengal (Darjiling district).

103. *Stomatophora pedongensis* Pradhan and Dasgupta

1980. *Stomatophora pedongensis* Pradhan and Dasgupta, *North Bengal Univ. Rev. (Sci. & Tech.),* **1**(2), p. 141, pl. II, fig. 3.

Diagnosis : Trophozoites solitary, flattened disc-like and measuring 50.4-93.6 μm in diameter; outline wavy and petaloid in appearance; sucker petaloid central, measuring 21.6 - 39.6 μm in diameter, mucron wide filled with small vacuole-like areas, measuring 10.8 - 28.8 μm in diameter; nucleus round to ellipsoidal, 10.8-18.0 μm in diameter; karyosome not visible; gametocysts spherical, 90-118.8 μm in diameter; spores navicular, 7.10 μm × 3.55 - 4.4 μm.

Host : *Pheretima diffringens* Baird; site of infection : seminal vesicles.

Distribution : India : West Bengal (Darjiling district).

104. *Stomatophora pradhanis* Ray Chowdhury and Haldar

1984. *Stomatophora pradhanis* Ray Chowdhury and Haldar, *J. Bengal nat. Hist. Soc. (N.S.),* **3**(2), p. 21, pl. III, figs. 1-7.

Diagnosis : Trophozoites 33.2 - 50.0 μm in diameter, flattened disc-like with epicyteal striations; pellicle well developed; sucker cup-like, almost centrally located, measuring 12.5 × 17.5 μm; nucleus round, eccentric, measuring 4.1-8.3 μm in diameter with an endosome inside. Gametocyst ovoidal, 89.0 × 75.0 μm; spore biconvex with sharply pointed ends, 83 × 3.3 μm in dimension.

Host : *Metaphire (=Pheretima) posthuma* (Vaillant); site of infection : seminal vesicles.

Distribution : India : West Bengal (North 24-Parganas district).

Remarks : As per International Code of Zoological Nomenclture this species is to be named as *S. pradhanii* since it is named by authors (Ray Chowdhury and Haldar, 1984) after Dr. (Ms.) Debika Pradhan.

Genus ***Chakravartiella*** Misra and Ray Chaudhruy

105. ***Chakravartiella sugereiformes*** Misra and Ray Chaudhury.

1973. *Chakravartiella sugereiformes* Misra and Ray Chaudhury, *Arch. Protistenk*, **115**, p. 364, pls. 29-32.

Diagnosis : Trophozoites solitary, elongated cylindrical, measuring 315.4-365.2 (346.6) μm × 90.5 - 125 (101.9) μm; anterior end flat bearing a sucker with tooth-like structures, posterior end blunt; ectoplasm thin and transparent, endoplasm dense and granulated; nucleus single, large, oval to oviod in shape, usually at the anterior end of the body, measuring 26.5 - 33.0 μm × 13.2-22.6 μm, with a large nucleolus at one side.

Host : *Trigoniulius goesii* Pocock [Arthropoda : Diplopoda]; site of infection : gut lumen.

Distribution : India : West Bengal (North 24-Parganas district).

Family ZYGOCYSTIDAE

Genus ***Zygocystis*** Stein

Diagnosis : Sporadins pyriform, two to three in syzygy; spores biconical with peculiar thickening at extremities, octozoic.

106. ***Zygocystis indicus*** Pradhan and Dasgupta

1983. *Zygocystis indicus* Pradhan and Dasgupta, *J. Bengal nat. Hist. Soc. (N.S.)*, **2**(2), p. 17, figs. 1-6 & 1 9.

Diagnosis : Trophozoites ovate, usually occurring in pairs, lying closely apposed to each other along their breadth, the cup-shaped concavity of one filling into the cone-shaped projection of the other; measuring 43.2 - 86 μm × 23.4 - 58.6 μm in dimension; pellicle thick; cytoplasm packed with paraglycogen granules. Nucleus round or ellipsoidal, 5.4-10.8 μm in diameter; gametocysts slightly ellipsoidal measuring 75.6 - 144 μm × 86.4 - 133 μm; spore biconical, barrel-like with distinct plugs at both ends.

Type host : (*Metaphire*) *Pheretima californica* Kinberg; site of infection : seminal vesicles.

Distribution : India : West Bengal (Darjiling district)

Family ENTEROCYSTIDAE

Genus ***Enterocystis*** Zwetkow

Diagnosis : Early stages of trophozoite in syzygy; sporadins in association ensiform, cysts spherical without duct, spores elongate ovoid, octozoic.

107. ***Enterocystis bengalensis*** Sarkar

1983. *Enterocystis bengalensis* Sarkar, *Curr. Sci.*, **52**(8), p. 372.

Diagnosis : Immature form small, spherical, aseptate and attached to midgut epithelium; mature gamonts elongated, 49-140 (90) μm × 14-42 (24.6) μm in dimensions, aseptate with spherical nucleus; syzygy occasional, caudo-frontal; gametocysts spherical, thin walled; oocysts ellipsoidal with truncated and thickened ends liberated by simple rupture; sporozoites filiform.

Host : *Psocatropos* sp. [Insecta : Psocoptera]; site of infection : midgut and hindgut.

Distribution : India : West Bengal (North 24 Parganas district).

Family DIPLOCYSTIDAE

Genus ***Lankesteria*** Mingazzini

Diagnosis : trophozoites more or less spatulate or leaf-shaped, epimerite small, gametocysts spherical produced by association of two individuals after contraction, sporocysts oval and octozoic.

Key to the species

1(2) Trophozoite elongate 50-200 μm long, gametocysts spherical.....*L. culicis*

2(1) Trophozoite egg-shaped or pear-shaped, dimensions 101.4 μm × 78 μm, gametocysts spherical or broadly oval.....*L. mackiei*

108. ***Lankesteria culicis*** (Ross)

1895. *Lankestria culicis* Ross, *Proc. S. Indian Branch Brit. Med. Assoc.*, p. 346.

Diagnosis : Trophozoite elongated, 50-200 μm in length, cytoplasm granular; a large central nucleus with a large karyosome; development intracellular; usually attached to the epithelial cell; gametocysts spherical.

Host : *Aedes* (*Stegomyia*) *aegypti* (Linn.) [Insecta : Diptera]; Indian hosts : *Aedes (Stegomyia) albopictus* Skuse; site of infection : stomach and malpighian tubules of pupa and adult mosquito.

Distribution : India : West Bengal (Calcutta district).

109. ***Lankesteria mackiei*** (Short and Swaminath)

1927. *Monocystics mackiei,* Short and Swaminath, *Indian J. med. Res.*, **15**, p. 539.

1938. *Lankesteria mackiei* : Bhatia, *Fauna of British India,* Protozoa : Sporozoa, p. 79.

Diagnosis : Trophozoites egg-shaped or pear shaped, dimensions 101.4 μm × 78 μm, epicyte wall marked with striations; nucleus large, spherical or subspherical, 30 μm in diameter, eccentrically placed; gametocyst spherical or broadly oval; 66.3 - 105.1 μm in length; sporocyst broadly spindle-shaped with a knob-like projections at each end, 9.6 μm × 5.8 μm, octozoic.

Host : *Phlebotomus argentipes* and *P. papatasi* [Insecta : Diptera]; site of infection : alimentary canal and body cavity.

Distribution : India : West Bengal (Calcutta district), Assam.

Suorder SEPTATINA

Key to the families

1(2) Parasitic in the gut of crustacea and relatively primitive arthropods, (epimerite present, oocysts ovoid or spherical, with protruding equatorial ridge).....
.....CEPHALOIDOPHORIDAE

2(1) Parasitic in the gut of insects.....

3(10) Sporonts in association or solitary.....

4(7) Sporonts in association only.....

5(6) Sporonts in association of 2 or 3, epimerite a small simple papilla, oocysts ellipsoidal .....DIDYMOPHIDAE

6(5) Sporonts in association upto 12, epimerite resembling a simple papilla or simple knob, oocysts of diverse shape..... HIRMOCYSTIDAE

7(4) Sporonts solitary as well as in association.....

8(9) Sporonts solitary as biassociative, epimerite lacking.....NEOHIRMOCYSTIDAE

9(8) Sporonts solitary or in association up to 12, epimerite simple and symmetrical..... .....GREGARINIDAE

10(3) Sporonts solitary only.....

11(14) Epimerite absent, rudimentary or simple.....

12(13) Epimerite absent or rudimentary, gametocyst without sporoduct, oocyst oviod or ellipsoid.....STENOPHORIDAE

13(19) Epimerite simple knob-like, gametocysts with several sporoduct, oocysts doliform.....LEIDYNIDAE

14(11) Epimerite more or less complex.....

15(18) Epimerite with a distinct neck.....

16(17) Epimerite digited with a long neck, gametocyst generally with a single residuum, oocysts cylindrical with rounded ends.....DACTYLOPHORIDAE

17(16) Epimerite short with fine bristles, gametocyst without any residuum, oocysts spherical set with brush border and chained with fine filamentous process.....BRUSTIOSPORIDAE

18(15) Epimerite without any neck.....

19(22) Epimerite with or without appendages, oocysts without any epispore.....

20(21) Gametocysts residuum present, oocysts purse or hat- shapped, emitted in chains.....STYLOCEPHALIDAE

21(20) Gametocysts residuum lacking, oocysts biconical, cylindro-biconical or irregular, gametocyst generally dehiscing by simply rupture.....ACTINOCEPHALIDAE

22(19) Epimerite with prongs, oocysts ellipsoidal or ovoid with hyaline epispore..... .....MONODUCTIDAE

Family GREGARINIDAE

Key to the genera

1 (2) Epimerite small, globular or cylindrical, protomerite of primite not forming any sucker like organellae.....*Gregarina*

2 (1) Epimerite lacking, protomerite of the primite expanded to form sucker-like organellae .....*Anisolobus.*

Genus *Gregarina* Dufour

Key to the species

1(16) Gametocysts with ectocyst.....

2(7) Gametocyst cylindrical or barrel shaped.....

3(6) Epimerite hemispherical.....

4(5) Gametocyst cylindrical, protomerite rectangular, deutomerite elongated cylindrical..... .....*G. cylindrosa*

5(4) Gametocyst barrel-shaped, protomerite conical deutomerite short and semicircular..... .....*G. mukundai*

6(3) Epimerite disc-like; (protomerite pitcher-like, deutomerite elongated cylindrical, gametocyst cylindrical).....*G. discocephala*

7(2) Gametocyst spherical or oval.....

8(13) Gametocyst spherical.....

9(10) Epimerite spherical, hyaline.....*G. guttiventra*

10(9) Epimerite not hyaline.....

11(12) Protomerite conical to subspherical, deutomerite obese.....*G. ischnopterae*

12(11) Protomerite hemispherical, deutomerite conical.....*G. nalae*

13 (8) Gametocyst oval.....

14(15) Epimerite knob-like, protomerite hemispherical, deutomerite ovoid .....*G. alcidessi*

15(14) Epidermite globuler, protomerite conical deutomerite elongated .....*G.levinei*

16 (1) Gametocyst without ectocyst.....

17(18) Epidermite hyaline knob-like, gametocyst oval with unequal gametocysts ....*G. spraguei*

18(17) Epidermite not hyaline, gametocyst spherical or oval with equal or unequal gametocysts

19(26) Epidermite globuler or knob-like.....

20(21) Gametocyst with unequal gametocytes (epidermite knob-like, protomerite subspherical, deutomerite elongate .....*G. crescentica*

21(20) Gametocyst with equal gametocytes.....

22(23) Gametocyst globular (protomerite cylindrical, deutomerite elongated , gametocysts spherical, rarely oval .....*G. dasguptai*

23(22) Gametocyst ovoidal or elliptical.....

24(25) Protomerite round or oval, deutomerite cylindro- conical.....*G. chaetocnemae*

25(24) Protomerite conical, deutomerite cylindrical.....*G. lygeusi*

26(19) Epimerite not knob-like.....

27(28) Epimerite bilobose (protomerite hemispherical deutomerite obese) .....*G. bilobosa*

28(27) Epimerite papilla-like or conical.....

29(30) Gametocysts with 4 sporoducts, each of which characteristically constricted at its base .....*G. basiconstrictonia*

30(29) Gametocysts with 7-10 sporoducts without any constriction .....*G. gryllodes*

110. *Gregarina alcidessi* Haldar and Chakraborty

1978. *Gregarina alcidessi* Haldar and Chakraborty, *Acta protozool.*, **17**(2); p. 237 figs. 8-15, pl. I, figs. 4-6.

Diagnosis : Trophozoites 52.5 - 350.0 (212.6) µm with a small, transparent, knob-like epimerite , hemispherical protomerite and ovoidal deutomerite, sporadins solitary or biassociative, primite smaller than satellite, with epicyteal striations; gametocyst ovoidal, 220 µm × 150 µm × - 320 µm × 170 µm excluding ectocyst, gelatinous ectocyst of 40-150 µm thickness, gametocytes of unequal size; three sporoducts, 30 µm long, broad at the base, tapering towards the tip; spores oval 6 µm × 5 µm, two knobs at each pole, released in chain; development intracellular.

Host : *Alcides* sp. nr. *leopardus* [Insecta : Coleoptera]; site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

111. *Gregarina basiconstrictonea* Ghose, Sengupta and Haldar

1986. *Gregarina basiconstrictonea* Ghose, Sengupta and Haldar, *Acta Protozool.*, **25**(1) : 94-98.

Diagnosis : Trophozoite elongated 45.9-48.6 (47.7) µm in length; epimerite small, papilla-like and occasionally expanding greatly in the form of a bulb; protomerite tongue-shaped; deutomerite large, cylindrical to obose in shape with a rounded posterior end; sporadin oval and solitary at the early stage, mature sporading cylindrical in shape with dome-shaped protomerite, cylindrical deutomerite; syzygy between two sporadins always caudo-frontal in nature; primite fan-like and

satellite somewhat barrel-shaped; gametocyst rounded with two equal gametocytes inside and four sporoducts on the cyst surface, each sporoduct characteristically constricted at its base; spore double-walled, barrel-shaped with two knob-like structures at each pole; sporozites rounded, 8 in each spore, arranged in two oblique rows.

Host : *Tribolium casteneum* (Herbst), [Insecta : Coleoptera] from ground nuts; site of infection: midgut.

Distribution : India : West Bengal (Hugli district).

112. ***Gregarina bilobosa*** Kundu and Haldar.

1981. *Gregarina bilobosa* Kundu and Haldar, *Z. Parasitenkd.*, **64** p. 234, figs. 1-12; 22-30.

Diagnosis : Trophozoites solitary, elongated, 34.0 - 246.0 (124.7) µm; epimerite bilobose, protomerite hemispherical, deutomerite obese, nucleus round, 10.9 µm in diameter with a large endosome; sporadin solitary or biassociative, association caudo-frontal, primite and satellite differed markedly in structure, syzygy showed epicyteal striations only in the primite; gametocysts oval enclosing two equal sized gametocytes; 3 small discs on the cyst surface and 3 sporoducts with broad basal and narrow distal portion, dehiscing spores through these ducts in short chains; spores barrel-shaped, double-walled, 6 µm × 3 µm; development intracellular.

Host : *Longitarsus* sp. (Insecta : Coleoptera); site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

113. ***Gregarina chaetocnemae*** Sarkar

1984. *Gregarina chaetocnemae* Sarkar, *Acta Protozool.*, **23**(4), p. 263.

Diagnosis : Trophozoite 39.8 - 77.0 (50.2) µm × 21.0 - 28.0 (24.5) µm with very small, spherula-like sessile epimerite, round to oval protomerite and oval to cylindro-conical deutomerite, sporadin 32.7-144.8 (87.0) µm × 18.7 - 79.4 (65.5) µm, solitary and also in caudo-frontal association; gamatocyst small ellipsoidal with two pairs of sporoducts, symmetrically arranged; sporocyst cylindrical with truncate ends released in long chain.

Host : *Chaetocnema concinnipenis;* site of infection : gut.

Distribution : India : West Bengal (Murshidabad district).

114. ***Gregarina crescentica*** Haldar and Chakraborty

1978. *Gregarina crescentica* Haldar and Chakraborty *Acta protozool.*, **17**(2), p. 234, fig. 1, 1-7, pl. 1, 1-3.

Diagnosis : Trophozoites 70-380 (154.2) µm, obese to elongated cylindrical; epimerite knob-like, protomerite subspherical, broader than long; deutomerite elongated, broadest behind septum, with rounded posterior extremity; nucleus spherical 14.3 µm in diameter with a centrally located endosome; sporadins solitary or caudofrontally biassociative, primite always smaller than satellite; Gametocyst oval, 340 µm × 210 µm, with 6 sporoducts, spores dolioform, 7 µm × 6 µm, with 4 minute knobs, 2 at each poles attached to the outer wall, dehisce in chains. Development intracellular.

Host : *Amblyrrhinus* sp. (Insecta : Colcoptera); site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

115. ***Gregarina cylindrosa*** Haldar and Kundu

1977. *Gregarina cylindrosa* Haldar and Kundu, *Vest. Cesk. Spol. Zool.*, **41**(4) : p. 249, figs. 1-11.

Diagnosis : Trophozoite elongated, 90.0 - 390.0 (203.3) μm; epimerite hemispherical, protomerite rectangular, broader than long, deutomerite elongated and cylindrical with a constriction at the septum; nucleus spherical or elliptical, 17.5 μm in diameter; sporadins solitary or biassociative, syzygy caudo-frontal, primite always larger that satellite; gametocyst cylindrical, 600 μm × 150 μm, with a gelatinous ectocyst. widest at poles, reaching a thickness of upto 105.0 μm; with six sporoducts slightly dialated at their bases, spores liberated singly; spores cylindrical, 10 μm × 5 μm in dimension development intraceleular.

Host : *Supella supellectilium* (Serv.) [Insecta : Blattodea]; site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

116. ***Gregarina dasguptai*** Mandal, Rai, Pradhan, Gurung, Sharma, Rai and Mandal

1986. *Gregarina dasguptai* Mandal *et al., Arch. Protistenk.*, **131**, p. 300, figs. 1-12.

Diagnosis : Trophozoite 66.69 - 280.80 μm × 17.50-140.40 μm; epimerite small, globular, 3.51 - 21.06 μm × 5.26 - 28.08 μm; protomerite cylindrical 14.04 - 63.18 μm × 14.0-62.92 μm; deutomerite elognated 45.63 - 214.11 μm × 17.55 - 140.40 μm. Sporadin solitary, syzygy caudofrontal; gametocyst spherical, rarely oval, 90.90 - 177.27 μm in diameter; spore barrel-shaped released in chains through sporoduct.

Host : *Coccinella septempunctata* L. [Insecta : Coleoptera]; site of infection : midgut.

Distribution : India : West Bengal (Darjiling district).

117. ***Gregarina discocephala*** Kundu and Haldar

1981. *Gregarina discocephala* Kundu and Haldar, *Z. Parasitenk.*, **64**, p. 237, figs. 13-21, 31-41.

Diagnosis : Trophozoites solitary, elongated, 42.5 - 415.0 (166.0) μm, with a circular disc-like epimerite, pitcher-like protomerite and elongated and cylincdrical deutomerite; nucleus spherical 20.8 μm in diameter with a large endosome; sporadins solitary or biassociative, association caudofrontal type; primite always smaller than satellite, epicyteal striations distinct in the uniting individuals; gametocysts with two cylindrical, equal-sized gametocytes; a transparent, gelatinous ectocyst and four sporoducts, two at each poles, 80 μm × 10 μm, with a broad basal and narrow distal portion connected by a screw headed structure; spores cylindrical, released in short chains, spore-wall with four rounded disc-like processes, two at each pole; development intracellular.

Host : Nymphal stage of Blattellidae; site of infection : midgut and caeca.

Distribution : India : West Bengal (Nadia district).

118. ***Gregarina gryllodesii*** Haldar and Sarkar

1980. *Gregarina gryllodesii* Haldar and Sarkar, *Arch. Protistenk.*, **123** : 62-63.

Diagnosis : Trophozoite 84.0 - 400.0 (307.0) μm with conical epimerite, braod hemispherical protomerite and sub-cylindrical deutomerite; sporadin 225.0 - 400.0 μm biassociative caudofrontally; gametocyst spherical with 7 to 10 sporoducts; spore barrel-shaped extruded in chains.

Host : *Gryllodes* sp. [Insecta : Orthoptera]; site of infection : intestinal caeca and midgut.

Distribution : India : West Bengal (Hugli district).

119. *Gregarina guttiventra* Haldar and Sarkar

1980. *Gregarina guttiventra* Haldar and Sarkar, *Arch. Protistenk.*, **123** : p. 63-67.

Diagnosis : Trophozite 24.0-40.0 μm, with epimerite hyaline, spherical; protomerite obese and deutomerite subspherical; sporadian 31.0 - 400.0 μm, elongated, cylindrical, biassociative caudofrontally; gametocyst small, spherical with a gelatinous ectocyst and a long sporoduct; spore small, doliform, extruded singly.

Host : *Plebegryllus guttiventra* Walker; site of infection : intestinal caeca and anterior midgut.

Distribution : India : West Bengal (North 24-Parganas district).

120. *Gregarina ischnopterae* Datta and Haldar

1984. *Gregarina ischnopterae* Datta and Haldar, *Arch. Protistenk.*, **128**; p. 90.

Diagnosis : Trophozoite elongated 83.3 - 166.6 (116.6) μm; epimerite knob-like, protomerite conical to subspherical; deutomerite obese in shape; sporadin 83.3 - 358.2 (174.7) μm, either solitary or in caudo-frontal association; gametocyst more or less spherical; gametocytes of equal size; ectocyst thick; sporduct gradually tapering; spores barrel-shaped, released in long chains. Development possibly extracellular.

Host : *Ischnoptera* sp. [Insacta : Dictyoptera], site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

121. *Gregarina levinei* Haldar and Sarkar *emend* Levine

1980. *Gregarina levinii* Haldar and Sarkar, *Arch. Protistenk.*, **123**, p. 67.

1985. *Gregarina levinei* Levine, In : *An illustrated Guide to the Protozoa,* eds : Lee *et al,* p. 322

Diagnosis : Trophozoite 107.8 - 127.0 μm in length, elongated with globular epimerite, conical protomerite and an elongated deutomerite; sporadin 246.2 μm × 46.2, μm solitary or biassociative caudo-frontally; gametocyst oval with a thick gelatinous ectocyst, three small processes and a short sporeduct; spore doliform with truncated ends, extruded in short chains.

Host : *Pteronemobius fascipense* Walker [Insecta : Orthoptera] ; site of infection : midgut.

Distribution : India : West Bengal (Hugli district).

122. *Gregarina lygeusi* Haldar, Ray and Gupta

1982. *Gregarina lygeusi* Haldar, Ray and Gupta. *J. Bengal nat. Hist. Soc.,* **1**(2), p. 18, figs. 1-7.

Diagnosis : Trophozoite elongated, 116.5 - 230.9 μm; epimerite simple globular, protomerite conical, deutomerite cylindrical; constriction between epimerite and protomerite very deep, septum between protomerite and deutomerite very distinct; sporadins solitary or biassociative, protomerite occasionally drawn into a long neck, syzygy always caudo-frontal; gametocysts ovoidal, 232.4 μm × 199.2 μm to 298.8 μm × 232.4 μm, with 4 sporoducts, slightly broader at their bases

and gradually tapering towards the free end; spores dolioform, double walled, 7.5 µm × 3.3 µm, with 4 disc-like processes, two at each pole.

Host : *Lygeus hospes* Fabricius [Insecta : Hemiptera]; site of infection : midgut contents.

Distribution : India : West Bengal (Nadia district).

123. *Gregarina mukundai* Haldar and Kundu

1980. *Gregarina mukundai* Haldar and Kundu, *Arch. Protistenk.*, **123**, p. 344, figs. 1-16.

Diagnosis : Trophozoites conical, 52.5 - 510.0 (295.8) µm; epimerite subspherical, protomerite somewhat conical, broader than long; deutomerite short, semilunar with a slight constrictin at the septum; sporadins solitary or biassociative, syzygy caudofrontal; primite larger than satellite; gametocysts 840 µm × 210 µm, barrel-shaped, enclsoing two equal sized gametocytes; ectocyst widestat poles, measuring 1170 µm × 240 µm at the middle and 1,170 µm × 300 µm at the ends; spsoroducts always remained within the cyst wall liberation of spores through the elevated regions in short chains; spores barrel-shaped, 10 µm × 5 µm in size with four knob-like processes, two at each poles.

Host : Nymphal stage of an undertermined insect species belonging to the family Blattellidae; site of infection : midgut content.

Distribution : India : West Bengal (Nadia district).

124. *Gregarina nalae* Datta and Haldar

1984. *Gregarina nalae* Datta and Haldar, *Arch. Protistenk.*, **128**, p. 92.

Diagnosis : Trophozoite 42.5 µm in length with knob-like epimerite; hemispherical protomerite and conical deutomerite; sporadin 85.0 - 366.5 (219.9) µm, solitary or in caudo-frontal association; gametocyst spherical, with ectocyst and six short sporoducts; spores barrel-shaped; liberation in long chains through sporoduct.

Host : *Nala lividipes* (Dufour) [Insecta : Dermoptera]; site of infection : midgut.

Distribution : India : West Bengal (Naida district).

125. *Gregarina spraguei* Haldar and Chakraborty

1978. *Gregarina spraguei* Haldar and Chakraborty, *Acta Protozool.*, **17**(2), p. 240, figs. 16-20, pl. I, figs. 7-9.

Diagnosis : Trophozoites elongated, 112.5 - 280.0 µm; epimerite hyaline knob-like, protomerite hemispherical, slightly broader than long; deutomerite broadest slightly below the septum, sporadin solitary or biassociative caudofrontaly, primite smaller than satellite; gametocyst oval, 270 µm × 200 µm - 310 µm × 200 µm, enclosing two gametocytes of unequal size; with four sporodoucts, broad at the base and gradually tapering at the tip, releasing spares in chains; spores ovoidal 8 µm × 6 µm, with 4 knobs attached on the outer wall development intracellular.

Host : An unidentified beetle of subfamily Branchyderinae, family Curculionidae (Coleoptera); site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

Genus ***Anisolobus*** Vincent

Key to the species

1 (2) Protomerite elongated and cylindrical, deutomerite cylindrical, gametocysts more or less spherical with two sporoducts.....*A indicus*

2 (1) Protomerite flattened, sucker-like, deutomerite almost oval, gametocyst oval with 6-8 sporoducts.....*A. royii comb.nov.*

126. ***Anisolobus indicus*** Haldar, Ray and Bose

1988. *Anisolobus indicus* Haldar, Ray and Bose, *Acta Protozool.*, 27(2), p. 166, fings. 1-9.

Diagnosis : Body divisible into elongated and cylindrical protomerite and cylindrical deutomerite; true epimerite absent, a sucker-like structure attached to the anterior end of protomerite; measuring 117.5 μm in length; sporadins biassociative, primite retains its sucker-like structure, satellite possessing a cup-shaped concavity in the same place to accomodate the deutomerite of primite; gametocyst isogamous, more or less spherical, 132.8 - 149.4 μm × 99.6 - 116.2 μm in dimension, ectocyst absent but with two sporoducts 58.1 μm × 16.6 μm; spores barrel-shaped, released in long chains, measuring 5.8 μm × 3.3 μm.

Type host : *Coccinella septempunctata* L. [Insecta : Coleoptera] from cabbage, *Brassica camprestris;* site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

127. ***Anisolobus royii*** comb. nov.

1989. *Anisolobus indicus* Roy, *J. Protozool.*, 36(1), p. 20, figs. 8-13.

Diagnosis : Trophozoite with no true epimerite, protomerite flattened, sucker-like measuring 26 (21-30) μm × 51 (38-64) μm, deutomerite almost oval 51 (47-103) μm × 38.5 (17-51) μm; sporadin 102 - 324 μm in length, biassociative, association caudofrontal; gametocyst oval, 60-107 μm × 43-73 μm, cyst with a thick envelope measuring 64-115 μm × 47-81 μm, dehisces through 6-8 sporoducts; spore barrel-shaped (6 μm × 4 μm) released in long chains.

Host : *Oryzaephilus mercator* F. (Insecta : Coleoptera); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Remarks : Since the specific name *Anisolobus indicus* is preoccupied (*see* Halder, Ray and Bose, 1988), *Anisolobus royii* comb. nov. is proposed for the present species as per Internatinal code of Zoological Nomenclature.

Family DIDYMOPHIDAE

Key to the genera

1(4) Epimerite spherical with a corona.....

2(3) Corona consisting of 14-16 ridges and not provided with any stalk.....***Liposcelisus***

3 (2) Corona comprising of 4 sucker-like hyaline discs provided with a very short stalk..... ***Quadruhyalodiscus***

4 (1) Epimerite cylindro-conical or inverted cap-like without any corona.....

5 (6) Epimerite cylindro-conical with a small pointed papilla.....***Didymophyes***

6 (5) Epimerite inverted cap-like on the top of a stalk..... ***Laterospora***

Genus ***Didymophyes*** Stein

Key to the species

1 (2) Gametocyst with ectocyst.....*D. tridactylae*

2 (1) Gametocyst without any ectocyst.....

3 (6) Trophozoite vase-like.....

4 (5) Epimerite with prominent ridges radiating from central area..... *D. rigidus*

5 (4) Epimerite without any ridge.....*D. oryzaephilae*

6 (3) Trophozoite ovoidal.....

7 (8) Protomerite hemispherical, deutomerite obese or flat, spore spherical..... *D. lipai*

8 (7) Protomerite rectangular, always broader than long, deutomerite ovoidal or cylindrical, spores ovoidal.....*D. indiae*

128. ***Didymophyes indiae*** Kundu, Datta and Haldar

1987. *Didymophyes indiae* Kundu, Datta and Haldar, *Arch, Protistenk.*, **134**, p. 417, Figs. 1-7.

Diagnosis : Trophozoites ovoidal or elongated, 55.0 - 125.0 (80.5) µm × 27.5-75.0 (47.5) µm; epimerite subconical, papilla-like; protomerite rectangular, always broader than long; deutomerite ovoidal or cylindrical; nucleus spherical variously located; sporadins solitary or biassociative, 35.0 - 205.0 (133.0) µm × 25. - 125.0 (85.0) µm, association caudo-frontal; gametocyst spherical, 161.0 µm in diameter; spores smooth ovoidal with remarkably thick spore wall.

Host : *Euparatetix histricus* (Stal) (Insecta : Orthoptera); site of infection : midgut and hepatic cacea.

Distribution : India : West Bengal (Nadia district).

129. ***Didymophyes lipai*** Ghose, Gupta and Haldar

1987. *Didymophyes lipai* Ghose, Gupta and Haldar, *Acta Protozool.*, **26**(3), p. 250, fig. 2, 1-8.

Diagnosis : Trophozoites ovoidal 22.95-35.1 µm × 8.64 - 26.65 µm; epimerite egg-shaped or conical with pointed anterior end; protomerite hemispherical, ovoidal or hat-shaped; deutomerite cashew nut-like, obese or flat; sporadins solitary or biassociative, primite larger than satellite, association caudo frontal; gametocysts rounded, 67.2 µm in dimension, burst by simple rupture,

liberating spore in chains; spores spherical, double walled, 8.25 μm × 6.6 μm; development intracellular.

Host : *Oryzaephilus mercator* (F), larvae and adult, from *Anacardium occidentalis* L. (Casheaw nuts); site of infection : midgut.

Distribution : India : West Bengal (Calcutta district).

Remarks : Roy (1989) opines that this species belongs to the genus *Hirmocystis* and is a synonym of *H. minuta.*

130. ***Didymophyes oryzaephilae*** Ghose, Gupta and Haldar

1987. *Didymophyes oryzaephilae* Ghose, Gupta and Haldar, *Acta Protozool.*, **26**(3), p. 246, fig. 1, 1-9.

Diagnosis : Trophozoites small, vase-like, measuring 24.3 - 32.4 μm × 11.0 - 16.2 μm; epimerite small, cashew nut-like, protomerite rectangular, deutomerite vese-like; nucleus spherical, centrally located; sporadins solitary or biassociative, association caudo frontal; gametocysts spherical, dehiscing by simple rupture, 47.2 μm × 42.6 μm in dimension; spores double walled, smooth, ellipsoidal; early development intracellular.

Type host': *Oryzaephilus mercator* (F.) [Insecta : Coleoptera] from *Juglans regia* L. (Ground nuts); site of infection : midgut.

Distribution : India : West Bengal (Hugli district).

Remarks : Roy (1989) opines that this species belongs to the genus *Hirmocystis* and is a synonym of *H. minuta.*

131. ***Didymophyes rigidus*** Ghose, Gupta and Haldar

1987. *Didymophyes rigidus* Ghose, Gupta and Haldar, *Acta Protozool.*, **26**(3), p. 252, fig. 3, 1-13.

Diagnosis : Trophozoite vase-like, measuring 23.8 μm × 10.8 μm; epimerite papilla-like, with prominent ridges radiating from central area while viewing from the top; protomerite rectangular or hemispherical, broader than long; deutomerite rectangular or cylindrical; sporadins solitary or biassociative, ovoidal to cylindrical; gametocysts spherical, dehiscing by simple rupture; spores smooth, ellipsoidal, 3.0 μm × 2.2 μm; early development intracellular.

Host : *Oryzaephilus mercator* (F) [Insecta : Coleoptera]; site of infection : midgut.

Distribution : India : West Bengal (North 24-Pargans district).

Remarks : Roy (1989) opines that this species also belongs to the genus *Hirmocystis* and is a synonym of *H. minuta.*

132. ***Didymophyes tridactylae*** Kundu, Datta and Haldar

1987. *Didymophyes tridactylae* Kundu, Datta and Haldar, *Arch. Protistenk.*, **134**, p. 419-422, figs. 8-12.

Diagnosis : Trophozoite vase-shaped, 42.5 - 46.8 μm × 19.1 - 29.8 μm; epimerite hyaline papilla-like; protomerite rectangular, broader than long; deutomerite more or less spherical in shape; nucleus spherical or ovoidal, having a big endosome; sporadins cylindro-conical, biassociative caudo-frontally, measuring 34.0 - 157.0 (81.7) μm × 17.0 - 114.8 (50.1) μm; gametocyst

ovoidal with ectocyst, 116.6 - 233.2 μm × 133.3 - 183.2 μm, simple rupture releasing sproes in mass; spores ovoidal, covered with a rectangular hyaline coat.

Host : *Tridactylus* sp. [Insecta : Orthoptera]; site of infection : midgut and hepatic caeca.

Distribution : India : West Bengla (Nadia district).

Genus ***Laterospora*** Haldar, Ray and Bose

133. ***Laterospora phenacocca*** Haldar, Ray and Bose

1988. *Laterospora phenacocca* Haldar, Ray and Bose, *J. Bengal nat. Hist. Soc. (N.S),* 7(1), p. 42, figs. 1-9.

Diagnosis : Trophozoites elongated, 212.3 μm × 89.5 μm in average dimensions; epimerite inverted cap-like on the top of a short stalk, protomerite dome-shaped, deutomerite elongated and cylindrical; nucleus spherical, 24.0 μm × 26.7 μm; cytoplasm almost uniformly granulated; sporadin solitary or biassociative; association caudofrontal; gametocysts spherical, 211.1 μm in average diameter, dehiscing by simple rupture, releasing spores in long chains; spores dolioform, arranged in sidewise manner; two knob-like projections located at each pole; development intracellular.

Type host : *Phenacoccus hirsutus* Cr., a hemipteran jute pest (Insecta); site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

Genus ***Liposcelisus*** Sarkar and Haldar

134. ***Liposcelisus coronatus*** Sarkar and Haldar

1980. *Liposcelisus coronatus* Sarkar and Haldar, *Riv. Parasitol.,* 41(2) : p. 22.

Diagnosis : Trophozoite 34.5 - 69.0 (51.6) μm in length, obese in shape; epimerite spherical, sucker-like and beset with a corona; protomerite sub-conical; deutomerite hemispherical in shape; sporodin solitary or in loose caudo-frontal association; gametocyst spherical with thick cyst wall; spore smooth, spindle- shaped with sharply pointed ends.

Host : *Liposcelis* sp. (Insecta : Pscoptera); site of infection : midgut.

Distribution : India : West Bengal (North 24-Parganas district).

Genus ***Quadruhyalodiscus*** Kundu and Haldar

135. ***Quadruhyalodiscus gallerucidae*** Kundu and Haldar

1984. *Quadruhyalodiscus gallerucidae* Kundu and Haldar, *Arch. Protistenk.,* **128** : p. 328.

Diagnosis : Trophozoite cylindrical 59.5 - 172.1 (126.8) μm in length; epimerite sucker-like, beset with a corona consisting of four hyaline discs; protomerite conical to obese; deutomerite cylindrical. Sporadin 97.7 - 267.7 (200.9) μm in length; solitary or in loose caudo-frontal association; gametocyst spherical or slightly oval; spore smooth, spindle shaped with polar thickenings, liberated in a mass by simple rupture.

Host : *Gallerucida bicolor* (Jope) [Insecta : Coleoptera]; site of infection : midgut.

Distribution : India : west Bengal (Nadia district).

Family HIRMOCYSTIDAE

Key to the genera

1 (2) Epimerite very labile resembling a conical button, oocysts ovoid, ellipsoidal or cylidrical ..... ***Hirmocystis***

2 (1) Epimerite globular, retractile into protomerite; oocysts barrel-shaped, extruded in chains ..... ***Retractocephalus***

Genus *Hirmocystis* Labbe

Key to the species

1(2) Epimerite hyaline with a characteristic oxeate in shape..... *H. oxeata*

2(1) Epimerite not oxeate in shape.....

3(8) Epimerite knob-like.....

4(5) Protomerite hemispherical, deutomerite obese or pitcher-shaped..... *H. theodoridesi*

5(4) Protomerite and deutomerite of different shape.....

6(7) Protomerite spherical or dome-shaped, deutomerite cylindrical..... *H. minuta*

7(6) Protomerite cylindroconical, deutomerite elongated gradually tapering posteriorly..... ..... *H. haplosomae*

8(3) Epimerite not knob-like.....

9(10) Epimerite dome-shaped, protomerite short pea-shaped..... *H. lophocateri*

10(9) Epimerite papilla-like and protomerite of different shapes.....

11(12) Protomerite pitcher-like..... *H. pitcheris*

12(11) Protomerite not pitcher-like.....

13(16) Protomerite hemispherical or dome-shaped.....

14(15) Deutomerite obese, elongated and cylindrical..... *H. bengalensis*

15(14) Deutomerite somewhat globular..... *H. triboli*

16(13) Protomerite ovoidal.....

17(18) Deutomerite conical widest behind the septum..... *H. lepropi*

18(17) Deutomerite obese sharply constricted at the septum..... *H. pseudoductis*

136. ***Hirmocystis bengalensis*** Haldar and Chakraborty

1979. *Hirmocystis bengalensis* Haldar and Chakraborty, *Z. parasitenkd.*, **59**, p. 122, figs. 1-7 and 20-21.

Diagnosis : Trophozoites, solitary, elongated, measuring 35.0 - 222.5 µm × 15.0 - 62.5 µm; epimerite hyaline papilla-like with a rounded end; protomerite hemispherical, broadest at the middle; deutomerite obese, elongated and cylindrical; nucleus spherical with distinct nuclear membrane, 7.5 - 20.0 µm in diameter; sporadins solitary, bi or tri associative in an anteroposterior axis; gametocysts white, egg-shaped, 240 -300 µm × 170 - 190 µm, burst by simple rupture, liberating spores in chain; spores ovoidal, double-walled, 7.5 µm × 5.0 µm, with two knob-like projections at each poles; development intracellular.

Host : *Myllocerus* sp. 1 (Insecta : Coleoptera); site of infection : gut epithelium.

Distribution : India : West Bengal (Nadia district).

137. ***Hirmocystis hoplasomae*** Kundu and Haldar

1981. *Hirmocystis hoplamsomae* Kundu and Haldar, *Acta Protozool.*, **20**(3); p. 330.

Diagnosis : Trophozoites 93.5 - 293.2 (170.4) µm, cylindrical; epimerite knob-like; protomerite cylindro-conical; deutomerite elongated, gradually tapering posteriorly; sporadin solitary or bias-sociative; gamtocysts spherical to ovoidal; gametocytes equal-sized; spores barrel-shaped; initial development intracellular.

Host : *Hoplasoma unicolor* Illiger (Coleoptera : Insecta); site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

138. ***Hirmocystis lepropi*** Haldar and Chakraborty

1981. *Hirmocystis lepropi* Haldar and Chakraborty, *Proc. Indian Acad. Sci. (Anim. Sci.)*, **90**(3); p. 316, figs. 1-7.

Diagnosis : Trophozoites cylindrical, 77.5 - 580 µm; epimerite subspherical papilla-like, 5 - 10 µm in length; protomerite ovoidal; deutomerite conical, widest behind the septum, nucleus spherical, 12.5 µm in diameter with a large, slightly eccentric end some; sprodins biassociative caudo-frontally; gametocysts oval, 250 µm x 50 µm - 360 µm × 200 µm; simple rupture releasing spores in chains; spores ovoidal, double walled, 6 µm × 4 µm, with four knobs, two at each pole; development intracellular.

Type host : *Lepropus* sp. (Insecta : Coleoptera); site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

139. ***Hirmocystis lophocateri*** Ghose and Haldar

1989. *Hirmocystis lophocateri* Ghose and Haldar, *Acta Protzool.*, **28**(1), p. 55, figs. 3, 3-9.

Diagnosis : Trophozoites solitary, elongated, measuring 30.45 - 56.7 µm × 6.07 - 22.1 µm; epimerite dome-shaped; protomerite short, pea-shaped; deutomerite elongated and cylindrical; nucleus rounded with a clear endosome; sporadin solitary or biassociative, ovoidal to elongated, association caudo-frontal; gametocyst ovoidal 96.6 µm x 38.4 µm, dehiscing by simple rupture liberating spores in chains; spores 5.7 µm x 3.3 µm, ovoidal, double-walled; development intracellular.

Host : *Lophocateres pusillus* (K.) [Insecta : Coleoptera]; site of infection : gut.

Distribution : India : West Bengal (Nadia district).

140. ***Hirmocystis minuta*** (Ishii, 1914) emend Roy, 1989

1989. *Hirmocystis minuta* (Ishii, 1914) emend Roy, 1989, *J. Protozool.*, **36**(1), p. 20, figs. 1-7.

Diagnosis : Trophozoite with small, spherical or dome-shaped protomerite (4-12 μm × 4-16 μm) and elongated, cylindrical deutomerite (24-80 μm × 16.24 μm); sporadin bi or rarely triassociative, with caudofrontal association. Gametocyst spherical (60 μm) with equatorial constriction, devoid of sporoducts; spores 6 μm × 4 μm, extruded in long chains after simple dehiscence of cyst.

Host : *Tribolium ferrugineum* F (Tenebrionid beelte).

Indian host : *Oryzaephilus mercator* F. [Insecta : Coleoptera]; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Remarks : This species was originally described as *Gregarina minuta* by Ishii (1914). Roy (1989) reviewed, redescribed and emended it as *Hirmocystis minuta.*

141. ***Hirmocystis oxeata*** Ghose, Sengupta and Haldar

1986. *Hirmocystis oxeata* Ghose, Sengupta and Haldar, *Acta Protzool.*, **25**(1) : p. 98.

Diagnosis : Trophozoite (40.5 μm) elongated, solitary; epimerite characteriscally oxeate-shaped; protomerite elongated, broadest at the middle; deutomerite large with rounded posterior end; sporadins (27.0 - 121.5 μm) in caudo-frontal association; gametocysts spherical; spore double walled and barrel-shaped; early development intracellular.

Host : *Tribolium castaneum* (Herbst) [Insecta : Coleoptera], from walnuts; site of infection: midgut.

Distribution : India : West Bengal (Hugli district).

142. ***Hirmocystis pitcharis*** Haldar and Chakraborty

1979. *Hirmocystis pitcharis* Haldar and Chakraborty, *Z. parasitenkd.*, **59**, p. 124, figs. 8-13 and 22-25.

Diagnosis : Trophozoites 62.5 - 480.0 μm x 17.5 - 180.0 μm in dimension; epimerite broadly papillated with a pointed extremity; protomerite pitcher-like, deutomerite widest behind the septum, narrow posteriorly ending in a blunt proximity; cytoplasm finely granulated; nucleus spherical and located at the middle; sporadin biassociative sometimes solitary; protomerite hemispherical, deutomerite with a rounded end; nucleus anteriorly situated; gametocyst 320.0 μm × 190.0 μm; thin-walled, egg-shaped enclosing two unequal gametocytes; spores 6.0 μm × 4.0 μm, oval, liberated in chains; development intracellular.

Host : *Xanthoprochilus* sp. [Insecta : Coleoptera]; site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

143. ***Hirmocystis pseudoductis*** Haldar and Chakraborty,

1979. *Hirmocystis pseudoductis* Haldar and Chakraborty, *Z. parasitenkd.*, **59**, p. 126, figs. 14-19 and 26-28.

Diagnosis : Trophozoites 65.0-460.0 μm x 50-170 μm, oval in outline and circular in cross-section; epimerite subconical and papilla-like, protomerite ovoidal, deutomerite obese, sharply constricted at the septum; nucleus spherical, 10-40 μm in diameter with a central rounded endosome; sporadin with globular protomerite and an elongated deutomerite, biassociative, primite always smaller than the satellite; gametocyst opaque, egg-shaped, 400 μm × 250 μm, enclosing two unequal gametocytes; spore ovoidal with two knobs at each pole, 7 μm × 6 μm liberating in chains; development intracellular.

Host : *Myllocerus* sp. 2 (Insecta : Coleoptera); site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

144. ***Hirmocystis theodoridesi*** Kundu and Haldar

1981. *Hirmocystis theodoridesi* Kundu and Haldar, *Acta Protozool.*, **20**(3); p. 324.

Diagnosis : Trophozoites obese in shape at the early stage, later on becoming elongated and cylindrical, 19.3-105.0 (54.0) μm; epimerite knob-like; protomerite hemispherical; deutomerite obese or pitcher-shaped; sporadin solitary or in linear associations of twos and fours. Gametocyst almost spherical; gametocytes of equal size; ectocyst present; spores dolioform or barrel-shaped; development extracellular.

Host : *Gryllotalpa africana* [Orthoptera : Insecta]; site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

145. ***Hirmocystis triboli*** Ghose and Haldar.

1989. *Hirmocystis triboli* Ghose and Haldar, *Acta Protozool.*, **28**(1), p. 57, figs. 4, 10-17.

Diagnosis : Trophozoites 41.55 ± 18.85 μm × 27.44 ± 16.36 μm, vase- like with tongue or papilla-like epimerite, dome or hat-shaped protomerite and somewhat globular deutomerite; sporadin solitary or biassociative, cylindrical in shape with hat or dome-shaped protomerite, association caudo-fronta; gametocyst 119.7 μm × 76.6 μm, spherical, whitish, double-walled with an ectocyst; burst by simple rupture releasing the spores in masses.

Host : *Tribolium casteneum* (Harbst) [Insecta : Coleoptera]; site of infection : gut.

Distribution : India : West Bengal (Nadia district).

Genus ***Retractocephalus*** Haldar and Chakraborty

Key to the species

1 (6) Epimerite simple, globular.....

2 (5) Deutomerite obese with distinct epicyteal striations.....

3 (4) Protomerite somewhat conical and pointed towards the apex, epimerite retractile into

protomerite.....*R. aulacophorae*

4 (3) Protomerite greatly elongated and somewhat narrower anteriorly, epimerite not retractile into protomerite.....*R. spatulatus*

5 (2) Deutomerite cylindrical with distinct epicyteal striations.....*R. raphidopalpae*

6 (1) Epimerite simple knob-like or ovoidal.....

7 (8) Protomerite broader than long having a depression at anterior margin and two pointed projections on two sides of the septum.....*R halticus*

8 (7) Protomerite hemispherical with pointed apex.....*R. spinosus*

146. ***Retractocephalus aulacophorae*** Haldar, Chakraborty and Kundu

1982. *Retractocephalus aulacophorae* Haldar, Chakraborty and Kundu, *Arch. Protistenk.*, **125**, p. 48.

Diagnosis : Trophozoite elongated 40.0 - 410.0 (155.1) µm; epimerite globular and retractile; protomerite somewhat conical; deutomerite obese in shape with distinct epicyteal striations; sporadin solitary and biassociative; gametocyst nearly spherical; spore barrel-shaped, liberated in chains; trophozoite and sporadin similar in size.

Host : *Aulacophora intermedia* Jacoby [Insecta : Coleoptera]; site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

147. ***Retractocephalus halticus*** Haldar, Chakraborty and Kundu

1982. *Retractocephalus halticus* Haldar, Chakraborty and Kundu, *Arch. Protistenk.*, **125** : p. 57.

Diagnosis : Trophozoite elongated 210.0 - 440.0 (324.3) µm; epimerite retractile, somewhat ovoidal; protomerite broader than long; deutomerite somewhat cylindroconical; sporadin solitary, rarely bioassociative; gametocyst spherical; spore barrel-shaped and extruded in chains; development intracellular; trophozoite and sporadin similar in size.

Host : *Haltica* sp. [Insecta : Coleoptera]; site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

148. ***Retractocephalus raphidopalpae*** Haldar and Chakraborty

1976. *Retractocephalus raphidopalpae* Haldar and Chakraborty, *Curr. Sci.*, **45** : p. 668.

Diagnosis : Trophozoite elongated, 57.5 - 135.0 (116.5) µm; epimerite simple, retractile, globular and hyaline; protomerite and deutomerite elongated cylindrical in outline with distinct epicyteal striations; sporadin 87.5 - 360.0 (183.6) µm, solitary and biassociative caudo-frontally; gametocyst oval; spore barrel-shaped, liberating in chains.

Host : *Raphidopalpa* (= *Aulacophora*) *feveicollis* Lucas [Insecta : Coleoptera]; site of infection: midgut.

Distribution : India : West Bengal (Nadia District).

149. ***Retractocephalus spatulatus*** Haldar, Chakraborty and Kundu

1982. *Retractocephalus spatulatus* Haldar, Chakraborty and Kundu, *Arch. Protistenk.*, **125** : p. 51.

Diagnosis : Trophozoite 120.0-220.0 (155.4) µm, elongated; epimerite globular and retractile; protomerite hemispherical. deutomerite elongated, somewhat obese with epicyteal striations; sporadin solitary or biassociative caudofrontally, primite large than the satellite; gametocyst oval; spore barrel-shaped, liberated in chains; development intracellular.

Host : *Lema* sp. [Insecta : Coleoptera]; site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

Remarks : The epimerite of the young trophozoite assumes a characteristic spatulated shape from which the specific name is derived.

150. ***Retractocephalus spinosus*** Haldar, Chakraborty and Kundu

1982. *Retractocephalus spinosus* Haldar, Chakraboty and Kundu, Arch. *Protistenk.*, **125** : p. 54.

Diagnosis : Trophozoite 100-300 (196.4) µm, elongated; epimerite knob-like and retractile; protomerite somewhat hemispherical; deutomerite elongated cylindrical with indistinct epicyteal striation; sporadia solitary or biassociative; gametocyst spherical or slightly oval; spore barrel-shaped, liberated in chain, development intracellular.

Host : *Monolepta signata* Oliv. (Insecta : Coleoptera); site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

Remarks : The epimerite of the young trophozoite is provided with a characteristic blunt spine from which the species named is derived.

Family NEOHIRMOCYSTIDAE

Genus ***Neohirmocystis*** Ghosh, Ray and Haldar

Diagnosis : Epimerite lacking, ssporadins solitary, biassociative, satellite with septum during association, spores spherical.

Key to the species

1 (2) Mature sporadins with hat-like, tongue-like or globular protomerite, gametocyst blackish-white and round.....*N. grassei*

2 (1) Mature sporadins with conical protomerite, gametocyst white and spherical.....*N. dercetini*

151. ***Neohirmocystis dercetini*** Ghose, Roy and Haldar

1986. *Neohirmocystis dercetine* Ghose, Roy and Haldar, *Acta Protozool.* **25**(4) : p. 457, figs. 10-16.

Diagnosis : Sporadins solitary or biassociative, 44.8 - 106.4 (66.0) µm in length; obese-shaped, with conical protomerite and elongated, sometimes ovoidal to elliptical deutomerite; nucleus spherical with an endosome inside; association caudo-frontal; gametocyst almost spherical 79.0 µm × 77.0 µm in average dimensions, simple rupture; spores spherical, double-walled, 4.1 µm in diameter; development extracellular.

Host : *Derectine* sp. [Insecta : Coleoptera] from the potato plants, *Solanum tuberosum*; site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

152. *Neohirmocystis grassei* Ghose, Ray and Haldar

1986. *Neohirmocystis grassei* Ghose, Ray and Haldar, *Acta Protozool.*, **25**(4) : p. 456, figs. 1-9.

Diagnosis : Sporadins 25.35-199.8 (74.1) µm, solitary or biossociative with hat-like, tongue like or blobular protomerite, syzygy caudo-frontal, primite with fan-shaped protomerite, but protomerite dome-shaped in satellite; gametocyst round with prominent ectocyst; spore spherical, double-walled; development intracellular.

Type host : *Tribolium castaneum* (Herbst) from the fruits of *Trachyspermum amor*; site of infection : midgut.

Distribution : India : West Bengal (Hugli district).

Family STENOPHORIDAE

Key to the genera

1(2) Epimerite small, tongue-shaped, bordered by a collar at its base, sporocysts covering with a surrounding hyaline membrane.....***Hyalosporina***

2 (1) Epimerite lacking or rudimentary, sporocysts ovoidal with equitorial line.....***Stenophora***

Genus *Hyalosporina* Chakraborty

Key to the species

1 (2) Gametocysts oval, 292-390 µm × 263-375 µm in dimensions .....*H. cambolopsisae*

2 (1) Gametocysts spherical, 96-120 µm in diameter.....*H. rayii*

153. *Hyalosporina cambolopsisae* Chakravarty

1935. *Hyalosporina cambolopsisae* Chakravarty, *Arch. Protistenk.*, **84**; p. 211, pl. vii, figs. 1-19.

Diagnosis : Trophozoite elongated, dimension 43-150 µm × 14.30 µm, attached to the epithelial cells; epimerite simple consisting of a collar or ring and a tongue-like process; protomerite small and conical; deutomerite elongated, cylindrical with longitudinal epicyteal striations; sporonts 800-111 µm × 80-111 µm in dimensions; gametocysts and sporocysts oval.

Host : *Cambolopsis* sp. [Arthropoda : Myriapoda]; site of infection : alimentary canal.

Distribution : India : West Bengal (Calcutta district).

154. *Hyalosporina rayi* Chakravarty and Mitra

1936. *Hyalosporina rayi* Chakravarty and Mitra, *Proc. Indian Sci. Congr.*, p. 346. Chakravarty, 1936. *Arch. Protistenk.*, **88** : 116-120, figs. 1-5.

Diagnosis : Trophozoite elongated, 130-173 μm × 37-70 μm; epimerite rounded; protomerite small, triangular in shape; deutomerite broader anteriorly, gradually tapering posteriorly, nucleus spherical, tethered to the pellicle by myonemas; gametocysts spherical, 77-116.5 μm in diameter; sporocysts elongate-oval.

Host : *Polydesmus* sp., *Strongylosoma contortipes* Alms (Arthropoda : Myriapoda); site of infection : alimentary canal.

Distribution : India : West Bengal (Calcutta district).

Genus ***Stenophora*** Labbe

Key to the species

1 (2) Epimerite hyaline and oval, protomerite rectangular or barrel-shaped and broader..... .....*S. shyamaprashadi*

2 (1) Epimerite not hyaline and protomerite of different shape.....

3 (4) Epimerite round, protomerite bottle-shaped with a process at its posterior end..... .....*S. ellipsoidi*

4 (3) Epimerite conical or rounded, protomerite rounded anteriorly and flattened at the septum.....*S. khagendrae*

155. *Stenophora ellipsoidi* Chakravarty

1983. *Stenophora ellipsoidi* Chakravarty, *Arch. Protistenk.*, **82** : p. 164, figs. 1-6.

Diagnosis : Young trophozoite with a round epimertie and a bottle-shaped protomerite; sporonts 250-372 μm × 50-95 μm, ellipsoidal with protomerite posteriorly drawn out into a small blunt process; gametocysts spherical; sporocyst spindle; shaped, octozoic; development intracellular.

Host : *Diplopoda* sp. (Arthropoda : Myriapoda); site of infection : midgut.

Distribution : India : West Bengal (Calcutta district).

156. *Stenophora khagendrae* Ray

1933. *Stenophora khagendrae* Ray, *Arch. Protistenk.*, **81** : p. 343, figs. 1-9.

Diagnosis : Young trophozoite intracullalar, with a conical or rounded epimerite; sporont solitary, 225 μm × 56 μm, parrot-shaped with a deutomerite up to eight times as long as protomerite; gametocyst spherical, 100-123 μm in diameter; sporocysts spindle- shaped.

Host : Unnamed millipede close to *Zikadesmus;* site of infection ; intestine.

Distribution : India : West Bengal (Calcutta district).

157. *Stenophora shyamaprashadi* Chakravarty

1939. *Stenophora shyamaprashadi* Chakravarty, *Arch. Protistenk.*, **91**(1) : p. 8.

Diagnosis : Sporonts solitary, elongated, 82-174 μm × 18-42.5 μm, epimerite hyaline, oval;

protomerite rectangular or barrel- shaped, granular and broader than long; deutomerite granular, broadest at little distance behind the septum, tapering with a rounded posterior end, nucleus spherical; gametocyst spherical, thick-walled, 253.5 μm in diameter; dehiscing by simple rupture, liberating oval spore, 8.24 μm × 4.12 μm in dimension.

Host : *Cormocephalus dentipes* Poc. (Arthropoda : Chilopoda); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Family LEIDYANIDAE

Genus ***Leidyana*** Watson

Diagnosis : Epimerite simple, globular, knob-like; oocysts emerging through sporoduct in long chains.

Key to the species

1 (2) Gametocysts with ectocysts, protomerite dome-shaped.....*L. linguata*

2 (1) Gametocysts without ectocysts, protomerite of different shape.....

3 (4) Protomerite rectangular, deutomerite elongated.....*L. guttiventrisa*

4 (3) Protomerite hemispherical with irregular anterior margin, deutomerite triangular..... .....*L. oryzaephili*

158. ***Leidyana guttiventrisa*** Sarkar

1988. *Leidyana guttiventrisa* Sarkar, *Acta. Protozool.*, **27**(1) . 68-69.

Diagnosis : Trophozoite 42 μm × 11 μm, with a conical to lance-shaped epimerite, a rectangular protomerite and an elongated deutomerite; sporadin 206.5 μm × 73.5 μm, two segmented, cylindrical and solitary; gametocyst oval to egg-shaped without ectocyst; sporocyst barrel-shaped released singly or in chain through sporoduct.

Host : *Plebeiogryllus guttiventris* (Walker) [Insecta : Orthoptera], site of infection : midgut.

Distribution : India : West Bengal (Hugli district).

159. ***Leidyana linguata*** Haldar and Sarkar

1979. *Leidyana linguta* Haldar and Sarkar, *Acta Protozool.*, **18**(3), p. 436.

Diagnosis : Trophozoite 53.4 μm × 17.3 μm in dimension; with large, tongue-like epimerite, dome-shaped protomerite and subspherical deutomerite; sporodin elongated, 31.4-415.8 (143.8) μm × 12.5 - 71.8 (27.5) μm in dimension, two segmented and solitary; gametocyst small, spherical with ectocyst; spore cylindrical, extruded through short bent sporoduct in short chains.

Host : *Pteronemobius conclor* Walker (Insecta : Orthoptera); site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

160. ***Leidyana oryzaephili*** Roy

1989. *Leidyana oryzaephili* Roy, *J. Protozool.*, **36**(1), p. 20, figs. 14-20.

Diagnosis : Trophozoite 44-70 µm × 35-57 µm, epimerite agranular, 4-13 µm X 22-26 µm, protomerite hemispherical with irregular anterior margin, deutomerite triangular; sporadin solitary, 56-116 µm; gametocyst small, spherical, 55-75 µm in diameter, dehiscing through five sporoducts; spores barrel-shaped, 6 µm × 4 µm, extruded in long chains.

Host : *Oryzaephilus mercator* F. [Insecta : Coleoptera]; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Family AMPHIPLATYSPORIDAE

Genus ***Amphiplatyspora*** Kundu and Haldar

Diagnosis : Trophozoite without epimerite, sporadins solitary, gametocysts ovoidal with a prominent ectocysts, spores cylindrical extruded in chains.

161. ***Amphiplatyspora striatea*** Kundu and Haldar

1984. *Amphiplatyspora striata* Kundu and Haldar, *Riv. Parasitol.*, **1**(45), p. 480.

Diagnosis : Trophozoite without an epimerite; sporadins 115.0- 415.0 (277.5) µm, solitary with protomerite and deutomerite characterised by epicyteal striations, both longitudinal and cross striations; gametocysts ovoidal with a prominent gelatinous ectocyst; spores cylindrical with polar thickenings, extruded in chains by simple rupture of the cyst.

Host : *Pteronemobius concolor* (Wlk.), [Insecta : Orthoptera], site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

Family MONODUCTIDAE

Key to the genera

1 (2) Epimerite lacking or a hyaline body, sporadins biassociative, gametocysts with ectocysts.....***Phleobum***

2 (1) Epimerite a small elevations with prons attached to its base sporonts solitary or in association, gametocysts without ectocysts .....***Monoductus***

Genus ***Monoductus*** Ray and Chakravarty

162. ***Monoductus lunatus*** Ray and Chakravarty

1933. *Monoductus lunatus* Ray and Chakravarty, *Arch. Protistenk.*, **81**, p. 352, pl. ii, text figs. 1-5.

Diagnosis : Trophozoite elongated, 225-445 µm × 33-49 µm; epimerite knob-like with 12-16 stiff radiating processes at its neck; protomerite small, more or less conical; deutomerite elongated cylindrical; sporonts solitary or associative; gametocysts spherical, 225-230 µm in diameter; sporocysts compressed, truncated at one pole; a single spore-duct releasing sporocysts in a long chain.

Host : *Stronglysoma contortipes* Attems [Arthopoda : Diplopoda]; site of infection : alimentary canal.

Distribution : India : West Bengal (Calcutta district).

Genus ***Phleobum*** Haldar and Chakravarty

Ket to species

1 (2) Epimerite absent, deutomerite cylindrical with epicyteal striations..... *P. gigantinum*

2 (1) Epimerite spherical and hyaline, deutomerite elongated, ovoidal to cylindrical, without any epicyteal striations.....*P. collarum*

163. *Phleobum collarum* Kundu and Haldar

1986. *Phleobum collarum* Kundu and Haldar, *Arch. Protistenkd.*, **132.** p. 120, figs. 1-11.

Diagnosis : Trophozoites 147.5-474.8 μm × 50.0 - 133.2 μm in dimensions; epimerite spherical, hyaline and knob-like; protomerite collar-like, subspherical to rectangular; deutomerite elongated; nucleus spherical to elliptical; sporadins cylindrical, associating caudofrontally in pairs; satellite smaller or larger than primite; gametocysthi descing through a pore at one corner of the cyst wall liberating outside encased within a transparent mucoid covering; spores ovoidal, 7.7 μm × 4.4 μm.

Host : *Phleoba infumata* Brunner (Insecta : Orthroptera); site of infection; midgut and hepatic caeca.

Distribution : India : West Bengal (Nadia district).

164. *Phleobum gigantinum* Haldar and Chakravarty

1974. *Phleobum gigantinum* Haldar and Chakravarty, *Proc. 3rd. Int. Congr. parasitol.*, **1.** p. 8.

Diagnosis : Trophozoites 230.0 - 620.0 μm in length; epimerite absent, deutomerite cylindrical, pallicle well developed with epicyteal striations; nucleus spherical, 50.0 μm in diameter, with several karyospme. Sporadin biassociative, satellite always larger than primite. Gamctocyst spherical, 520-600 μm in diameter, dehiscing through a single enormous-sized sporoduct of 2.7 μm long; spores ovoidal 6 μm × 4 μm.

Host : *Phleoba anttenatta* Bruner. (Insecta : Orthoptera); site of infection : midgut.

Distribution : India : West Bengal (Nadia District).

Family DACTYLOPHORIDAE

Genus ***Grebneckiella*** Bhatia

Diagnosis : Protomerite spread out transversely with numerous delicate rhizoids, made up of two long narrow horizontal lobes, fused and turned up spirally at one end, peripheral portion with several teeth form long filaments projecting out.

165. *Grebneckiella navilllae* (Mitra and Chakravarty)

1937. *Nina navillae* Mitra and Chakravarty, *Proc. Indian Sci. congr.* p. 291.

1938. *Grebneckiella navillae* : Bhatia, *Fauna of British India* : *Protozoa : Sporozoa*, p. 108.

Diagnosis : Sporonts solitary, 819-975 µm × 97-190 µm; gametocyst oval 125-175 µm × 95-125 µm in dimension; sporocysts spherical to oval, with two envelopes; liberated in chains (detail description lacking).

Host ; *Scolopendra* S. [Arthropoda : Chilopoda]; site of infection : Intestine.

Distribution : India : West Bengal (Calcutta District).

Remarks : The speies was originally described as *Nina navillae* by Mitra and Chakravarty (1937). The genus *Nina* Grebnecki, 1873 is preoicupied for a molluscan genus Nina G.E. gray, 1850. Hence Bhatiia (1938) erected the genus *Grebnekiella* and renamed it as *G. navillae*. The species needs redescription.

Family STYLOCEPHALIDAE

Key to genara

1(2) Epimerite elongated into a neck, swollen posteriorly at its free end, oocysts purse-like... ..... ***Stylocephalus***

2(1) Epimerite elongated into a neck but then turning into a simple knob, oocysts void or ellipsoidal..... ***Lepismatophila***

Genus ***Stylocephalus*** Ellis

166. ***Stylocephalus apapillatus*** Haldar and Chakravarty

1979. *Stylocephalus apapillatus* Haldar and Chakravarty, *Arch. Protistenk.*, 122, p. 155.

Dignosis : Trophozoites 60.0 -200.0 µm, elongated; epimerite tube- like; protomerite subconical to quardrangular; deutomerite, elongated, circular in cross section and with epicyteal striations; sporadins 95-201 µm, solitary, associated by their anterior ends. Gametocyst round or oval; spores hat-shaped, liberation in chain; sporozoite boat shaped, early development intracellular.

Host : *Gonocephalum* sp. [Insecta : Coleopetra]; site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

Genus ***Lepismatophila*** Adams and Travis

Key to the species

1 (2) Epimerite sub-globular, protomerite elliptical or conical, deutomerite elongated..... .....*L. cruszi*

2 (1) Epimerite rhomboidal, protomerite hemisherical or subconical, broadest at the base, deutomerite cone-shaped.....*L. rhombocephala*

167. *Lepismatophila cruszi* Kundu and Haldar

1984. *Lepismatophila cruszi* Kundu and Haldar, *Acta Protozool.*, **23** (4) p. 257.

Diagnosis : Trophozoite 36.1 - 150.0 (84.8) μm, with subglobular epimerite, elliptical or concial protomerite and an elongated deutomerite; sporadin 95.0 - 290.0 (185.6) μm, solitary, assoicating side-wise; gametocyst bean-shaped; spore boat-shaped.

Host : *Acrotelsa collaris* (Fabricius) [Insecta : Thysanura]; site of infection ; midgut and venticular caeca.

Distribution : India : West Bengal (Nadia district).

168. *Lepismatophila rhombocephala* Haldar and Chakravarty

1977. *Lepismatophila rhombocephala* Haldar and Chakravarty, *Arch. Protistenk.*, **119**, p. 362, figs. 1-6. pl. i. figs. 1-4.

Diagnosis : Trophozoites 77.5 - 155.0 μm (125.8) μm × 57.5 -117.5 (85.5) μm) in dimensions; epimerites rhomboidal, apical sides slightly elevated and a notch in the middle; protomerite hemispherical or subconical, broadest at the base; deutomerite cone-shaped, ending in a rounded extremity; nucleus 20-25 μm in diameter, located centrally. sporadins solitary; gametocysts egg. shaped, 160 × 110 μm; delicate cyst wall enclosing two unequal gametocytes; simples rupture liberating spores in spiral chains; spores ellipsoidal, 14 μm × 5 μm.

Host : *Ctenolepisma nigra* (Qudamans), [Insecta : Thysanura]; site of infection : ventricular caeca and midgut.

Distribution : India : West Bengal (Nadia District).

Family ACTINOCEPHALIDAE

Key to the genara

1(13) Oocyst with spines or thickening at their poles.....

2(5) Oocyst with 2 spines at each poles.....

3(4) Oocysts ovoid with 2 very long spines at each pole..... ***Quadruspinospora***

4(3) Oocyst biconical, bent in the middle, with 2 sharp, stout spines at each end..... .....***Tetractinospora***

5(2) Oocyst with more than 4 spines of various arrangements.....

6(9) Oocysts with 6 equatorial bristles.....

7(8) Epimerite composed of a head furnished with flexible and rigid appendages forming hooks, oocyst biconical with polar tuft and 6 equatorial bristles.....***Ancyrophora***

8(7) Epimerite disc-like, with many upward projecting process at its periphery, oocysts biconical, with one row of polar spines and a row of 6 equatorial spines .....***Remicephalus***

9(6) Oocysts without 6 equatorial bristles.....

10(11) Oocysts diamond-shaped with polar and meridional spines.....***Mukundaella***

12(11) Oocyst biconical or ellipsoidal, with equatorial spines and terminal tufts ..... ***Echanthospora***

13(1) Oocysts without any spine or thickening at their pole.....

14(20) Epimerite a large cup bordered with hooks.....

16(17) Epimerite hat-shaped, with petaloid spines on the margin ..... ***Odonaticola***

17(16) Epimerite of different shape and without petaloid spines.....

18(19) Epimerite terminating by a couple bordered by hooks, oocysts bent banana-shaped ..... ***Menspora***

19(18) Epimerite terminating in a flattened bulb bordered by digitations anteriorly ....***Hoplorhynchus***

20(14) Epimerite of different shape.....

21(22) Epimerite a sharply pointed process, ordinarily recurved in a long, hyaline point very sharp at its end .....***Stylocystis***

22(21) Epimerite not pointed or recurved as above.....

23(24) Epimerite not pointed dialated into a cauliflower at the top and narrow at the base .. ..***Caulocephalus***

24(23) Epimerite not resembling cauliflower.....

25(30) Epimerite with simple or digitiform process.....

26(27) Digitiform epimerite later changing into a flattened structure ..... ***Steinina***

27(26) Epimerite not changing into such flattened structures.....

28(29) Epimerite simple or with non-persistent digitiform process, parasitic in Chilopoda .....***Chiloregarina***

29(28) Epimerite with 8-16 or more digitiform processes at its apex, but such processes subsequently disappear, parasitic in insects.....***Actinocephalus***

30(25) Epimerite globuler, bowl-shaped or a crenulute crateriform disc.....

31(32) Epimerite highly complex, bowl-like with a bulb-like round base..... ***Harendraia***

32(31) Epimerite not bowl-like.....

33(34) Epimerite a crenulate crateriform disc with or without hooks at its periphery, with a style in the centre..... ***Pyxinia***

34(33) Epimerite globular having 6-8 broad vertical ridges set upon a short, thick-walled neck, with a dilated base ..... ***Crucocephalus***

Genus *Actinocephalus* Stein

Key to the species

1 (2) Epimerite with 9 slightly backwardly directed pointed process, protomerite concial, deutomerite elongated tapering posteriorly ..... *A. ellipsoidis*

2 (1) Epimerite with 16 or more laterally directed digitiform processes, protomerite subspherical, broader than long, deutomerite circular in cross-section .... *A. ceriagrionae*

169. *Actinocephalus ceriagrionae* Sarkar and Chakravarty

1969. *Actinocephalus cariagrionae* Sarkar and Chakravarty, *Proc. zool. Soc.*, Calcutta, **22**, p. 18, text-fig. 1 (A-D), Pl. 2, figs. 1-2.

Diagnosis : Trophozoites solitary, elongated, 117-258 μm × 35-100 μm in dimension; epimerite short and stout, with a proximal stout, cylindrical, retractile neck and a distal large, simple, spherical knob possessing 16 or more, laterally directed digitiform processes; protomerite subspherical, broader than long, deutomerite circular in cross-section, broadest at the anterior one-third of the body; sporadins large, elongated, measuring about 1 μm in length; gametocysts, almost spherical, 2.84 μm × 4.28 μm, a button-like hyaline tip at each pole of the longitudinally striated sporocyts.

Host : *Ceriagrion coromandelianum* (Fabr.), *Ceriagrion cerinorubellum* (Bauer) [Insecta : Coleoptera]; site of infection : midgut contents.

Distribution : India : West Bengal (Calcutta district).

170. *Actinocephalus ellipsoides* Sarkar and Haldar

1981. *Actinocephalus ellipsoides* Sarkar and Haldar, *Acta Protozool.*, **20**(1); p. 21.

Diagnosis : Trophozoites elongated, 67.8-458.3 (307) μm × 33.3- 50.0 (40.0) μm in dimension; epimerite disc-like with nine slightly backwardly directed pointed processes, neck short, protomerite conical, deutomerite elongated, tapering posteriorly; sporadin solitary, elongated; gametocyst ellipsoidal, covered by thin ectocyst; spore biconical bent in the middle, with 8 filliform sporzoites dehiscing by simple rupture; development extracellular.

Host : *Ischnura delicata* Hagen (Insecta : Odonata); site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

Genus *Caulocephalus* Batia and setna

171. *Caulocephalus crenata* Bhatia and Setna

1924. *Caulocephalus crenata* Bhatia and Setna, *Parasitology*, **16**, p. 284, figs. 12-23.

Diagnosis : Trophozoites elongated, cylindrical; epimerite dilated anteriorly, caulifolower-like with crenate surface; protomerite elongated, conical with its anterior end characteristically specialised; deutomerite cylindrical, sporonts 40-142 μm, elongated and associative; gametocysts spherical, 90 μm in diameter; sporocysts ovoid or nearly spherical.

Host : *Aulacophora foveicollis* Kust. [Insecta : Coleoptera]; site of infection : alimentary canal.

Distribution : India : West Bengal (Calcutta district), Punjab.

Genus ***Pyxinia*** Hammerschmidt

172. ***Pyxinia reneae*** Sarkar

1984. *Pyxinia reneae* Sarkar, Acta Protozool., **23**(4), p. 264.

Diagnosis : Trophozoites almost fusiform, 49.9-133.6 (96.7) µm × 10.8 -29.7 (22.5) µm; epimerite complex, differentiable into a proximal small, smooth hemisphere and a distal long ribbon on the summit; protomerite conical; deutomerite cylindro-conical. sporadins 40.5 -194.4 (138.7) µm × 10.8 -37.8 (30.7) µm, solitary; gametocysts small, round to ovoid; sporocyst smooth, ellipsoidal released singly and in cluster by simple rupture of the gametocyst's wall.

Host : *Evorinea iota* (Arrow) [Insecta : Coleoptera] from Jackfruit trees; site of infection : midgut.

Distribution : India : West Bengal (Murshidabad district).

Genus ***Steirina*** Leger and Duboscq

Key to the species

1 (4) Epimerite superimposed upon protomerite.....

2 (3) Epimerite ending in a circular disc which is provided with some conscentric ring-like striations..... *S. alphitobiusae*

3 (2) Epimerite possessing a characteristic style..... *S. palorusi*

4 (1) Epimerite not superimposed upon protomerite.....

5 (6) Epimerite saucer-shaped with concave surface lying on protomerite ..... *S. microgoni*

6 (5) Epitermite somewhat conical with a short or long projection ..... *S. singhi*

173. ***Steinina alphitobii*** Sarkar and Chakravarty emend. Levine

1969. *Steinina alphitobiusae* Sarkar and Chakravarty, *Proc. Zool.* Soc., Calcutta, **22**, p. 20, Text figs. a-c, pl. 2, figs. 3-4.

Diagnosis : Trophozoite biconical, broadest near the septum, 26- 39 µm × 14-24 µm; epimerite broad at the base, a circular disc at the apex with concentric ring-like striations and thread-like processes at the edge, protomerite diutomerite septum thin with slight constriction in this region. sporont onese to pyriform; without any epimerite. Gametocysts 190-210 µm in diameter; spores spherical, 12-14 µm in diameter; sporocysts with two button-like hyaline, subconical knobs, one at each pole.

Host : *Alphitobius piceus* 01. (Insecta : Coleoptera); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

174. *Steinina microgoni* Sarkar and Chakravarty *emend.* Levine

1969. *Steinina microgonasae* Sarkar and Chakravarty, *Proc. zool. Soc.*, Calcutta, **22**, p. 22, text-fig. 3, pl. 2, figs. 6-8.

Diagnosis : Trophozoites 90-140 μm, broader at the anterior end and narrower posteriorly; epimerite saucer-shaped, furnished with fine thread-like processes at the rim; protomerite dome-shaped; a thick septum and a distinct constriction separating protomerite and deutomerite; deutomerite broader near the septum and tapers posteriorly; nucleus spherical, 22 μm in diameter, located anteriorly in the deutomerite; cysts and spores unknown.

Host : *Anoplogenius microgonus* Bates [Insecta : Coleoptera]; site of infection : midgut.

Distribution : India : West Bengal (Calcutta district).

175. *Steinina palorusi* Gupta and Haldar

1987. *Steinina palorusi* Gupta and Haldar, *Arch. Protistenk.*, **133**, p. 136, figs. 1-9, pl. I, figs. 16-20.

Diagnosis : Trophozoites solitary, obese, 68.8-106.6 μm in length; epimerite superimposed upon the protomerite and covering more than half of the protomerite's tip and characterised with a style; protomerite hemispherical or dome-shaped; deutomerite broadest near the septum, septum thin; nucleus ovoidal with a single endosome, located anteriorly. Sporadins solitary, 18.5-99.9 μm in length; gametocysts oval, 91.5 μm × 66.5 μm in dimension; spores, biconical and pot bellied, 12.5 μm × 9.0 μm in dimensions, button-like, hyaline, subconical knobs, one at each pole.

Host : *Palorus* sp. larva from wheat, [Insecta : Coleoptera]; site of infection : midgut of the host larvae.

Distribution : India : West Bengal (Nadia district).

176. *Steinina singhi* Ghose and Haldar

1987. *Steinina singhi* Ghose and Haldar, *Indian J. Parasitol.*, **11**(2), p. 239, figs. 1-7.

Diagnosis : Trophozoites conical; epimerite somewhat conical with a short or long projection, the style, 8.1-29.7 μm x 10.8-7.3 μm in diamension; protomerite flattened or himispherical, 13.5-29.7 μm in length and 29.7-45.9 μm in width, septum thin, deutomerite conical or oval with rounded or pointed ends, 32.4-97.2 μm × 36.5 -56.7 μm; sporadins solitary; gametocyst double walled, ellipsoidal, 39. μm × 24.9 μm in dimension; simple rupture liberating spores in chains; spores double-walled, smooth, biconical, broadest at the middle, 15.7 μm × 9.7 μm; early development intracellular.

Host : *Palrous ratzebergii* (Wissmann) infecting *Coriandrum sativum* L. [nsecta : Coleoptera]; site of infection : midgut.

Distribution : India : West Bengal (Hugli district).

Genus ***Stylocystis*** Leger

177. ***Stylocystis chowdhurya*** Sarkar and Mazumder.

1983. *Stylocystis chowdhurya* Sarkar and Mazumder, *Arch. Protistenk.*, **127**, p. 189.

Diagnosis : Trophozoites fusiform to elongate, 70.2-203.4 (104).6 µm × 13.5 - 43.2 (20.1) µm, epimerite long, filamentous, sharply pointed anterior end and a small conical or bulb-like swelling at the base; protomerite dome-shaped; deutomerite elongated and narrowed posteriorly; sporadin solitary, 196.0 - 252.2 (231.0) µm × 32.7 - 63.0 (54.6) µm; gametocyst ovoidal; spore smooth, diamond-shaped with truncated ends, liberated by simple rupture.

Host : *Crytophagus* sp. [Insecta : Coleoptera] from Jajube trees (*Ziziphus jajuba*); site of infection : midget and hindgut.

Distribution : India : West Bengal (Exact locality not mentioned).

Genus ***Chilogregarina*** Levine

178. ***Chilogregarina bhatiae*** Sarkar

1987. *Chilogregarina bhatiae* Sarkar, *Acta Protozool.*, **26**(1), p. 70.

Diagnosis : Trophozoites flat, leaf-like and elongated, dimension 226 µm × 28 µm; epimerite nonpersistent, discoid with 8 digitiform processes; neck of moderate-size; protomerite ellipsoidal; deutomerite elongated, gradually tapered posteriorly to bluntly pointed end; sporadin 198 µm × 25 µm, solitary, leafy and elongated with inverted cup-like protomerite, highly serrated posteriorly.

Host : *Geophius* sp. (Arthropoda : Chilopoda); site of infection : midgut.

Distribution : India : West Bengal (Hugli District).

Genus ***Crucocephalus*** Sarkar

179. ***Crucocephalus dufouri*** Sarkar

1984. *Crucocephalus dufouri* Sarkar, *Arch. Protistenk.*, **128**, p. 275.

Diagnosis : Trophozoites cylindrical, 36.7-88.8 µm × 17.2-31.7 µm in dimension; epimerite globular with 6-8 broad vertical ridges; neck short, thick walled with dialated base; protomerite dome- shaped; deutomerite oblong; sporadin solitary, fusiform to cylindro-conical, 18.7-262.8 µm × 5.6-62.4 µm in dimension; gametocytes spherical, dehiscing by simple rupture; sporocytes biconical with sharply pointed ends.

Host : Larvae of *Dermestes* sp. [Insecta : Coleoptera]; site of infection : midgut (anterior portion).

Distribution : India : West Bengal (North 24-Parganas district).

Genus ***Harendraia*** Sarkar

180. ***Harendraia intricata*** Sarkar

1984. *Harendraia intricata* Sarkar, *Arch. Protistenk.*, **128**, p. 277.

Diagnosis : Trophozoites ovoid or almost fusiform, 87.3-246.3 µm × 20.0-83.5 µm, epimerite

long bowl-like round base, elongated neck and truncated apex beset with 4 short, slender, symetrically arranged filamentsor spines; neck between epimerite and protomerite short and broad; protomerite dome-shaped; deutomerite ovoid or cylindirical. sporadins solitary and cylindrical, 31.2-334.0 μm × 12.5-104.4 μm; gametocysts spherical dehiscing by simple rupture; sporocysts ellipsoidal released in lateral chains.

Host : *Ptinus* sp. [Insecta : Coleoptera]; site of infection : midgut.

Distribution : India : West Bengal (North 24-Parganas district).

Genus ***Acanthospora*** Leger

181. ***Acanthospora bengalensis*** Sarkar and Haldar

1981. *Acanthospora bengalensis* Sarkar and Haldar, *Arch. Protistenk.*, **124** p. 379.

Diagnosis : Trophozoites elongated, 176.4-758.5 (410) μm, epimerite bulb-like; protomerite conical; deutomerite long, cylindrical, sporadin large, solitary, 291.4 -913.7 (546.2) μm; gametocyst spherical; gametocytes equal in size; spore spindle-shaped, hexagonal with polar and meridional spines; development intracellular.

Host : *Ceriagrion cerinorubellum* (Braner) [Insecta : Odonata]; site of infection : midgut.

Distribution : India : West Bengal (Hugli District).

Genus ***Ancyrophora*** Leger

Key to the species

1 (2) Epidermite globular with 12 short digitiform processes, spore with polar and equatorial spines ..... *A. ischnurae*

2 (1) Epidermite disc-like with 10-11 radiating digitiform processes, spore with polar and meridional spines ..... *A. ovoides*

182. ***Ancyrophora ischnurae*** Sarkar and Haldar

1981. *Ancyrophora ischnurae* Sarkar and Haldar, *Z.Parasitenkd.*, **65**, p. 218

Diagnosis : Trophozoite elongated, 63.0 - 218.4 (124.8) μm; epimerite globular with 12 short digitiform processes; protomerite dome-shaped with a long neck; deutomerite cylindro- conical; sporadin solitary, 175.3 - 784.9 (449.5) μm; gametocyst spherical, occasionally with hyaline ectocyst; spore spindle - shaped, hexagonal with polar and equatorial spines.

Host : *Ischnura senegalensis* (Rambur) [Insecta : Odonata]; site of infection : midgut.

Distribution : India : West Bengal (Hugli district).

183. ***Ancyrophora ovoides*** Sarkar and Haldar

1981. *Ancyrophora ovoides* Sarkar and Haldar, *Z. Parasitenkd.*, **65**, p. 220-222.

Diagnosis : Trophozoites 183.3-542.7 (309.8) μm, elongated epimerite disc-like with 10

to 11 radiating digitiform processes; protomerite small, conical or tomb-like; deutomerite elongated, cylindro-conical; sporadin 84.8-916.8 (415.3) μm, solitary with a large, almost rectangular protomerite; gametocyst ovoidal; spore small, spindle shaped with polar and meridional spines.

Host : *Ischnura delicata* Hagen (Insecta : Odonata); site of infection : midgut.

Distribution : India : West Bengal (North 24-Paragans district).

Genus ***Ramicephalus*** Obata

184. ***Ramicephalus olivacus*** Sarkar and Haldar

1981. *Ramicephalus olivacus* Sarkar and Haldar, *Acta Protozool.*, **20**(2) : 186.189.

Diagnosis : Trophozoites 58.8 - 411.6 (212.9) μm, elongated epimerite cylindroglobular, differentiated into an upper hyaline, elevated, circular disc with 15 to 20 peripherially arranged sharply pointed spines and a lower cylindrical longitudinally straited part; protomerite hemispherical; deutomerite cylindrical; sporadin 112.0 μm, solitary; gametocyst spherical with two layers of ectocysts; spore spindle shaped with shorter polar and longer equatorial spines.

Host : *Ceriagrion olivacum* Laidlow [Insecta : Odonata]; site of infection : midgut.

Distribution : India : West Bengal (Hugli district).

Genus ***Quadruspinospora*** Sarkar and Chakravarty

Key to species

1(2) Gametocyst with a distinct ectocyst, epimerite with 25-30 dichotomously branched digitiform processes, spores barrel-shaped ..... *Q. dichotoma*

2(1) Gametocyst without ecotocyst, epimierite with less than 25 digitiform processes, spores oval.....

3(6) Protomerite rhomboidal.....

4(5) Epimerite with 10-23 digitiform processes, trophozoite 140- 600 μm in length..... .....*Q. indoaiolopii*

5(4) Epimerite with 12-14 digitiform processes, trophozoite 92-290 μm in length..... .....*Q. attractomorphi*

6(3) Protomerite hemispherical or dome-shaped.....

7(8) Epimerite with 20-24 digitiform processes .....*Q. chakravartyi*

8(7) Epimerite with less than 20 digitiform prcesses.....

9(10) Deutomerite broadest behind septum with epicyteal longitudinal striations.....*Q. aelopii.*

10(9) Deutomerite of differnet shape and without any epicyteal striations.....

11(12) Deutomerite with broad posterior end, epimerite with 13-16 digitform processes..... .....*Q. megaspinosa*

12(11) Deutomerite not with broad posterior end, epimerite with 10-13 digitiform processes, deutomerite elongated gradually narrowed to a rounded end .....*Q. acridae*

185. ***Quadruspinospora acridae*** Haldar and Chakravarty

1976. *Quadrupspinospora acridiae* Haldar and Chakravarty, *Proc. zool. Soc.*, Calcutta, **29**, p. 76.

Diagnosis : Trophozoites 70-720 (326.1) µm, elongate, epimerite subspherical knob-like with 10-13 digitiform processes; protomerite hemispherical; deutomerite elongated gradually narrowed to a rounded end; sporadin solitary, larger than the trophozoites; gametocyst spherical to slightly oval; spore oval with four elongated spines.

Host : *Acrida exalta* Walker [Insecta : Orthoptera]; site of infection : hapatic caeca and midgut.

Distribution : India : West Bengal (Nadia district).

186. ***Quadruspiospora aelopii*** Sarkar and Chakravarty

1969. *Quadruspinospora aelopii* Sarkar and Chakravarty, *Proc. zool. coc.*, Calcutta, **22**, p. 17.

Diagnosis : Trophozoites elongated, 92.5-290 µm in length; epimerite knob-like, 15-20 µm, with 8-12 digitiform processes; protomerite hemispherical, 15-65 µm in length, broader than long; septum thick forming a distinct constriction; deutomerite 62.5-205 µm in length, broadest behind the septum with epicyteal longitudinal striations; sporont similar to trophozoites, associate sidewise; gametocyst subspherical or spherical, 530-590 µm in diameter; simple rupture; spores oval, 8 µm × 4 µm, with two long polar spines at each pole.

Host : *Aelopus* sp. [Insecta : Orthoptera]; site of infection : midgut and caeca.

Distribution : India : West Bengal (Haora district).

187. ***Quadruspinospora attractomorphae*** Haldar and Chakravarty emend. Levine

1978. *Quadruspinospora attractomorpii* Haldar and Chakravarty, *Indian J. Zool.*, 6(1), p. 43.

Diagnosis : Trophozoites 92.5-290.0 µm, elongated; epimerite subspherical knob-like with 12-18 digitiform processes; protomerite rhamboidal; deutomerite elongated cylindrical; sporadin solitary; gametocyst spherical; spore oval with four long spines.

Host : *Attractomorpha crenulata* (Fabr.) [Insecta : Orthoptera]; site of infection : hepatic caeca and midgut.

Distribution : India : West Bengal (Nadia district).

188. ***Quadruspinospora chakravartyei*** Chakraborty and Haldar emend. Levine

1974. *Quadruspinospora chakravartyei* Chakraborty and Haldar, *Proc. Indian Sci. cong.*, pt. III; p. 51; 1975 Haldar and Chakraborty Geiobios, **2** p. 104.

Diagnosis : Trophozoites 52.5-457.5 µm, elongated, solitary; epimerite subspherical, knob-like, provided with 20-24 pointed digitiform processes; neck very short; protomerite more or less dome-shaped; deutomerite elongated, bluntly conical towards posterior end; sporadin solitary,

smaller in size than the trophozoite; gametocyst spherical; spore oval with two long spines at each oles.

Host : *Spathostarnum* sp. [Insecta : Orthoptera]; site of infection : midgut and hepatic-caeca.

Distribution : India :West Bengal (Nadia district).

189. ***Quadruspinospora dichotoma*** Kundu and Haldar

1983. *Quadruspinospora dichotoma* Kundu and Haldar, *Arch. Protistenk.*, **127**, p 99.

Diagnosis : Trophozoites 89.2-250.0 (224.9) µm, elongated; epimerite subspherical, knob-like with 25 to 30 dichotomously branched digitiform processes arranged in a circular fashion; protomerite almost rectangular; deutomerite cylindro-conical in outline; sporadin 85.0-749.7 (394.5) µm, solitary or laterally associated in pairs. gametocyst almost spherical with a distinct ectocyst; spores barrel-shaped with four long spines; development intracellular.

Host : *Spathosternum prasiniferum prasiniferum* (Walker), [Insecta : Orthoptera]; site of infection : midgut and hepatic caeca.

Distribution : India : West Bengal (Nadia district).

190. ***Quadruspinospora indoaiolopii*** Haldar and Chakraborty emend. Levine

1976. *Quadruspinospora indoaiolopii* Haldar and Chakraborty, *Proc. zool. Soc.*, Calcutta, **29**, p. 24.

Diagnosis : Trophozoites 140-600 (350) µm, elongated, solitary epimerite sub-spherical knoblike with 10-23 short digitiform processes, protomerite somewhat rhomboidal; deutomerite elongated, circular in cross-section; sporadin solitary; gametocyst spherical; spore oval with two spines attached to each pole.

Host : *Aiolopus* sp. (Insecta : Orthoptera); site of infection : midgut and hepatic caeca.

Distribution : West Bengal (Nadia district).

191. ***Quadruspinospora megaspinosa*** Haldar and Chakraborty

1976. *Quadruspinospora megaspinosa* Haldar and Chakraborty, *Proc. zool. Soc.*, Calcutta, **29** p. 79.

Diagnosis : Trophozoites 95-630 (314.2) µm, elongated, cylindrical; epimerite spherical knob-like with 13-16 digitiform processes; neck short; protmerite hemispherical; deutomerite cylindricol with somewhat broad posterior end; sporadin solitary, larger in size; gametocyst spherical to subspherical; spore oval with 4 long spines.

Host : Trilophidia annualata Thunberg [Insecta : Orthoptera]; site of infection : hepatic caeca and midgut.

Distribution : India : West Bengal (Nadia district).

Genus ***Tetractinospora*** Sarkar and Haldar

192. ***Tetractinospora victoris*** Sarkar and Haldar

1981. *Tetractinospora victoris* Sarkar and Haldar, *Acta Protozool.*, **20**(2), p. 194.

Diagnosis : Trophozoites 932-312.5(250.3) μm; elongated; epimerite globular with short neck; protomerite rectangular, deutomerite elongated, conical; sporadin 226.7-466.7 (349.5) μm, solitary; gametocyst spherical with ectocyst; spores biconical bent at the middle, with a pair of short stout spines at each pole.

Host : *Ceriagrion coromandelianum* (Fabricius), [Insecta : Odonata]; site of infection : midgut.

Genus ***Mukundaella*** Sarkar

193. ***Mukundaella undulatus*** Sarkar

1981. *Mukundaella undulatus* Sarkar, *Proc. Indian Acad. Sci.* (anim. Sci.), **90**(6), p. 650.

Diagnosis : Trophozoites 348.6 μm × 50.5 μm, elongated, fusiform or cylindrical; epimerite a broad wide cup with numerous closely- set vertical undulations on its wall; neck short; protomerite conical or rectangular; deutomerite fusiform or cylindroconical sporadin large, cylindroconical, solitary; gametocysts spherical, sporulation by simple rupture; spore diamond-shaped, hexagonal in polar view, with two polar and six meridional spines.

Host : *Enallagma* sp. [Insecta : Odonata]; site of infection : midgut.

Distribution : India : West Bengal (Hugli and North 24-Parganas districts).

Genus ***Mensopora*** Leger

Key to the species

1 (2) Epimerite bell-shaped, protomerite inverted flask-like, deutomerite elongated cylindrical ..... *M. coenagrii*

2 (1) Epimerite cup-like, protomerite conical, deutomerite elongated fusiform..... ..... *M. enallagmae*

194. ***Menospra coenagrii*** Sarkar and Haldar

1980. *Menospora coenagrii* sarkar and Haldar, *Proc. zool. Soc.,* Calcutta, **33**, P. 21.

Diagnosis : Trophozoites 194.8 μm × 31.6 μm, elongated; epimerite bell-shaped with many short backwardly directed digitiform processes; neck long; protomerite inverted flask-like, deutomerite elongated cylindrical; sporodin 262.1 μm × 55.2 μm, solitary with dome-shaped protomerite and sharply pointed deutomerite; gametocyst spherical; spore cylindro-biaconical.

Host : *Coenagrion dyeri* Fraser [Insecta : Odonata]; site of infection : midgut.

Distribution : India : West Bengal (Hugli district).

195. ***Menospora enallagmae*** Sarkar and Haldar

1980. *Mensopra enallagmae* Sarkar and haldar, *Proc. zool. Soc.,* Calcutta, **33**, p. 180.

Diagnosis : Trophozoite 338.9 × 63.7 μm, somewhat fusiform; epimerite cup-like beset with 32 backwardly directed digitiform processes; protomerite conical; deutomerite elongated fusiform, sporadin 321.7 μm × 68.8 μm, large, solitary; gametocysts spherical with gelatinous ectocyst; gametocyte with a triangular transparent region; spore cylindro-biconical.

Host : *Enallagma pravum* Salys [Insecta : Odonata]; site of infection : midgut.

Distribution : India : West Bengal (Hugli district).

Genus ***Hoplorhynchus*** Carus

Key to the species

1 (2) Epimerite discoid with 10 radially arranged digitiform process; protomerite tomb-shaped, deutomerite cylindro- conical.....*H. carusi*

2 (1) Epimerite disc-like with 11-14 digitiform processes arranged peripherally, protomerite conical, deutomerite cylindrical.....*H. ramidigitus*

196. ***Hoplorhynchus carusi*** Sarkar and Mazumder

1983. *Hoplorhynchus carusi* Sarkar and Mazumder, *Odontologica,* **12**(2), p. 174.

Diagnosis : Trophozoite elongated; epimerite discoid with 10 radially arranged digitiform processes; neck long and narrow; protomerite tomb-shaped; deutomerite very long and cylindroconical; sporadin very elongated.

Host : *Pseudagrion decorum* (Rambur) [Insecta : Odonata]; site of infection : midgut.

Distribution : India : West Bengal (Darjiling district, Mahananda Reserve Forest).

197. ***Hoplorhynchus ramidigitus*** Sarkar and Haldar

1980. *Hoplorhynchus ramidigitus* Sarkar and Halkar, *Acta Protozool.,* **19**(4), p. 346.

Diagnosis : Trophozoite 75.0-175.0 (131.7) µm; elongated; epimerite disc-like with 11 to 14 short, stumpy, bifid or trifid, digitiform processes arranged peripherally; protomerite conical, connected with epimerite by a neck; deutomerite cylindrical sporadin 87.5-700.1 (302.0) µm, solitary; gametocyst small, spherical; spore crescentic.

Host : *Agriocnemis pygmaea* (Rambur) [Insecta : Odonata]; site of infection : midgut.

Distribution : India : West Bengal (Hugli district).

Genus ***Odonaticola*** Sarkar and Haldar

Key to the species

1(2) Epimerite conical with 9 petaloid spanes.....*O. nomacantta*

2(1) Epimerite hat or umbrella-shaped.....

3(8) Epimerite with many marginal petaloid spines.....

4(7) Protomerite ovoid.....

5(6) Deutomerite fusiform, trophozoite in an average 910.7 µm in length.....*O. elliptica*

6(5) Deutomerite oblong, trophozoite in an average 289.3 µm in length.....*O. orthetri*

7(4) Protomerite conical, (deutomerite cylindroconical, trophozoite in an average 376.0 μm in length).....*O. brachydiplexi*

8(3) Epimerite with 6-8 petaloid spines.....

9(10) Trophozoite considerably long, 604.6-838.1 (743.6) μm; epimertie with 7 pelatoid marginal spines.....*O. longicollara*

10(9) Trophozoite not so long, epimerite with 6 or 8 petaloid marginal spines.....

11(12) Epimerite with 6 petaloid spines, protomerite cylindrical, trophozoite 31.5-273.1 (88.5) μm in length .....*O. hexacantha*

12(11) Epimerite with 8 petaloid spines, protomerite conical, trophozoite 268.8 μm in length.....*O.rodgii*

198. ***Odonaticola brachydiplaxi*** Sarkar and Mazumder

1983. *Odonaticola brachydiplaxi* Sarkar and Mazumder, *Odonatologica,* **12**(2), p. 175.

Diagnosis : Trophozoite 376..0 μm × 45.0 μm, elongated; epimerite umbrella-shaped with many marginal petaloid spines; neck long and narrow; protomerite almost conical; deutomerite cylindroconical; sporadin 237.5 μm × 60.0 μm, small, solitary.

Host : *Brachydiplax farinosa* Kruger [Insecta : Odonata]; site of infection : midgut.

Distribution : India : West Bengal [Darjiling district], Mahananda Reserve Forest).

199. ***Odonaticola elliptica*** Sarkar

1981. *Odonaticola elliptica* Sarkar, *Proc. Indian Acad. Sci., (Anim. sci.),* **90**(6), p. 652.

Diagnosis : Trophozoite with a small, conical umbrella-like epimerite having many small, curved spines along its margin; an ovoid protomerite and a fusiform deutomerite; neck between epimerite and protomerite broad; sporadin large, solitary; gametocyst spherical, spores boat-shaped, liberated by simple rupture of the cyst wall; trophozoite and sporadins 233.5-1700.3 (910.7) μm × 50.0-383.4 (178.5) μm in dimension.

Host : *Crocothemis s. servilia* (Drury) [Insecta : Odonata]; site of infection : midgut.

Distribution : India : West Bengal (Exact locality not mentioned).

200. ***Odonaticola hexacantha*** Sarkar and Haldar

1981. *Odonaticola hexacantha* Sarkar and Haldar, *Arch. Protistenk.,* **124** : 289-292.

Diagnosis : Trophozoite 31.5-273.1 (88.5) μm, elongated with a very long, slender neck; epimerite hat-shaped with six distinct spines; protomerite cylindrical; deutomerite elongated; sporadin 54.2-758.5 (319.8) μm, solitary gametocyst spherical with a gelatinous ectocyst; spore boat-shaped with two short projections.

Host : *Brachythemis contaminate* (Fabricius) [Insecta : Odonata]; site of infection : midgut.

Distribution : India : West Bengal (Hugli district).

201. ***Odonaticola lingicollara*** Sarkar and Haldar

1981. *Odonaticola longicollara* Sarkar and Haldar, *Arch. Protistenk.*, **124**, p. 292.

Diagnosis : Trophozoite exceedingly long, 604.6-838.1 (743.6) μm; epimerite hat-shaped with seven petaloid marginal spines; long neck; protomerite conical; deutomerite elongated; sporadin 146.0-1467.8 (741.8) μm, solitary; gametocyst spherical with thin cyst wall; spore boat-shaped.

Host : *Diplacodes trivialis* (Rambur) [Insecta : Odonata]; site of infection : midgut.

Distribution : India : West Bengal (Hugli district).

202. ***Odonaticola nonacantha*** (Devdhar and Deshpande)

1971. *Menospora nonacantha* Devdhar and Despande, *Indian Zool.*, **2.** p. 41.

Diagnosis : Trophozoite elongated; epimerite conical with nine petaloid spined along its margin and a long neck; protomerite dome-shaped and deutomerite cylindroconical; sporadin solitary; gametocyst spherical with ectocyst; spore boat-shaped released mostly in clusters and a few singly by simple rupture.

Host : *Agriocnemis* sp.; (Insecta : Odonata); site of infection : midgut.

Distribution : India : West Bengal (Hugli district); Karnataka.

203. ***Odonaticola orthetri*** Sarkar and Haldar

1981. *Odonaticola orthetri* Sarkar and Haldar. *Arch. Protistenk.*, **124;** p. 295.

Diagnosis : Trophozoite 241.6-337.0 (289.3)μm, elongated; epimerite hat-shaped having umbrella like peripheral margin with several sharp spines; long neck; protomerite ovoidal and deutomerite oblong; sporadin 75.0-950.2 (564.9) μm, solitary; gametocyst large, spherical with gelatinous hyaline ectocyst; spore boat-shaped; development extracellular.

Host : *Orthetrium sabina* (Drury) [Insecta : Odonata]; site of infection : midgut.

Distribution : India : West Bengal (Hugli district).

204. ***Odonaticola rodgii*** Sarkar and Haldar

1981. *Odonaticola rodgii* Sarkar and Haldar, *Arch. Protistenk.*, **124,** p. 299.

Diagnosis : Trophozoite 268.8 μm, elongated, fusiform; epimerite hat-shaped with eight petaloid spines; neck long; protomerite conical; deutomerite cylindroconical with pointed posterior end; sporadin 239.9-1624.5 (693.5) μm, solitary, gametocysts spherical with thick hyaline gelatinous ectocyst; spore boat-shaped; development extracellular.

Host : *Neurothemis t. tullia* (Drury) (Insecta : Odonata); site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

Family CEPHALOIDOPHORIDAE

Genus ***Cephaloidophora*** Mavrodiadi

Diagnosis : Epimerite small, lenticular, oocysts ellipsoidal or spherical, with an inconspicuous equatorial ring.

205. ***Cephaloidophora metaplaxi*** (Pearse)

1933. *Steinina metaplaxi* Pearse, *Rec. Indian Mus.*, **34** : 293, fig. 3.

1988. *Cephaloidophora metaplaxi* Levine, *The Protozoan phylum Apicomplexa,* vol. I, p. 45.

Diagnosis : Trophozoite somewhat flattened; epimerite nearly spherical; protomerite wider than long; deutomerite almost rectangular, with rounded angles; nucleus ellipsoidal; Sporonts 40-60 μm × 18-20 μm in dimension.

Host : *Metaplax dentipes* Heller [Crustacea : Brachyura]; site of infection : intestine.

Distribution : India : West Bengal (South 24-Parganas district).

Family BRUSTIOSPORIDAE

Genus ***Brustiospora*** Kundu and Haldar

Diagnosis : As for the family (*see* Key to the family).

206. ***Brustiospora indicola*** Kundu and Haldar

1981. *Brustiospora indicola* Kundu and Haldar, *Arch, Protistenk.*, **124**, p. 473, figs. 1-18.

Diagnosis : Trophozoites cylindrical, 69.2-131.7 μm × 11.7-17.0 μm; epimerite a broom-stick or spatulated or bilobed elevation provided with bristles; a short or moderately long neck; protomerite cylindrical, conical or hemispherical; deutomerite cylindrical, broadest just behind the septum; sporadins solitary; gametocysts elliptical or egg-shaped, 106.2 μm × 63.7 μm to 131.7 μm × 76.5 μm; single rupture releasing spores in chains; spores spherical, 3.8 μm in diameter, beset with brushy border.

Host : *Stathorus* sp. [Insecta : Coleoptera]; site of infection : midgut.

Distribution : India : West Bengal (Nadia district).

Subclass COCCIDIA

Order EUCOCCIDA

Key to the families

1(2) Heteroxenous producing oocysts following syngamy (oocysts with two sporocysts, each with four sporozoites).....SARCOCYSTIDAE

2(1) Homoxenous or heteroxenous, development without syngamy.....

3(6) Macrogamete and microgamont usually associated in syzygy during development, microgamont producing 1-4 microgametes.....

4(5) Zygote inactive, life cycle involving one host, chiefly in invertebrates .....ADELEIDAE

5(4) Zygote active (ookinete), life cycle involving two hosts, one vertebrate and other in invertebrate (leech).....HAEMOGREGARINIDAE

6(3) Macrogamete and microgamont develop independently, syzygy absent, microgamont

typically producing many microgametes.....

7(10) Sporozoite typically enclosed in sporocyst within oocyst, zygote non-motile.....

8(9) Homoxenous, merogony and gamogony within hosts, sporogony typically outside, sporozoites never in blood cells.....EIMERIIDAE

9(8) Heteroxenous or homoxenous with merogony, gomogony and sporogony in same vertebrate host, sporozoites in blood cells.....LANKESTERELLIDAE

10(7) Sporozoite naked with three-mambrane wall, zygote motile (ookinete).....

11(12) Parasite having a sexual phase in the mosquito and asexual cycle in tissue and blood cells of the vertebrate hosts, distinguished by erythrocytic schizogony.....
.....PLASMODIIDAE

12(11) Parasite having a sexual phase in insects other than mosquitoes and asexual cycle in tissue cells of vertebrate host, erythrocytic schizogony lacking.....

13(14) Pigmented gametocytes in erythrocytes of vertebrate hosts.....HAEMOPROTEIDAE

14(13) Gametocytes in erythrocytes/leucocytes of vertebrate host, usually non-pigmented and occasionally pseudo- pigmented.....LEUCOCYTOZOIDAE

Family ADELEIDAE

Genus ***Adelina*** Hesse

Diagnosis : Oocysts spherical or subspherical with thick wall, with 3-20 spherical or ellipsoidal sporocysts, each with two sporozoites.

207. ***Adelina schellacki*** Ray and Das Gupta

1937. *Adelina schellacki* Ray and Das Gupta, *Proc. Indian Sci. Congr.*, p. 291.

Diagnosis : Oocysts oval, octosporoblastic, without residue; sporoblasts spherical with two sporozoites.

Host : *Cormocephalus dentipes Poc.* [Arthropoda : Chilopoda]; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Family HAEMOGREGARINIDAE

Key to the genera

1(2) Oocysts with 8 or more naked sporozoites, infection of vertebrate host by bite of invertebrate, schizogony occurring in erythocytes of vertebrates.....***Haemogregarina***

2(1) Oocysts enormous with n sporocysts, each with 4 to 16 or more sporozoites, infection of vertebrate host by ingestion of invertebrate host, schizogony occurring in the cells of liver, spleen and other organs of vertebrate.....***Hepatozoon***

Genus *Haemogregarina* Danilewsky

In all 20 species including 6 undertermined ones of the genus *Haemogregarina* have been reported so far from West Bengal. Out of these one species is found from fish host, 10 including one unidentified speicies from amphibian hosts and 9 including 5 undetermined species from reptilian hosts. Host-wise key to the species of *Haemogregarina* is given below for the convenience of identification.

A. Key to the species of *Haemogregarina* of fishes

The key is not given since a single species is known from this state and dealt with under its systematic account.

B. Key to the species of *haemogregarina* from amphibians

1(12) Both capsule and polar cap or either of these two present .....

2(7) Both capsule and polar cap present.....

3(4) Mature macrogametocyte sausage-shaped; (measuring 14.4 μm × 2.95 μm with an average area of 28.95 μm^2, occupying about 25.97% of the total host cell-parasite complex .....*H. nucleobiscecans*

4(3) Mature macrogametocyte elongated with both ends, rounded or sometimes posterior end attenuated to form hook-like structure.....

5(6) Macrogametocyte measuring 16.02 μm × 3.65 μm with an area of 43.22 μm^2, occupying about 38.2% of the total host cell-parasite complex.....*H. kaloulae*

6(5) Macrogametocyte measuring 15.3 μm × 3.9 μm with an average area of 50.7 μm^2, occupying 44.2% of the total host cell-parasite complex.....*H. systoma*

7(2) Either capsule or polar cap present.....

8(9) Polar cap present but capsule absent (mature macrogametocyte measuring 16.5 μm X 3.3 μm with an area of 40.5 μm^2 occupying about 38.4% of the total host cell-parasite complex).....*H. maculatus*

9(8) Capsule present but polar cap absent.....

10(11) Mature macrogametocyte measuring 16.5 μm X 2.57 μm with an average area of 29.56 μm^2, occupying about 29% of host cell-parasite complex, cytoplasm homogeneous, scantly granular at anterior end.....*H. berestneffi*

11(10) Mature macrogametocyte measuring 16.0 μm × 3.8 μm with an area of 29.0 μm^2, occupying about 28.7% of total host cell-parasite complex; cytoplasm densely granular in the middle near nucleus and lighter towards the poles.....*H. pattoni*

12(1) Both capsule and polar cap absent.....

13(14) Mature macrogametocyte always encircling the host cell-nucleus by it twisted body or sometime super imposed with host cell nucleus.....*H. perinucleophilum*

14(13) Mature macrogametocyte not encircling the host cell nucleus as above.....

15(16) Macrogametocyte measuring 12.4 μm × 4.06 μm with an average area of 44.5 μm^2, occupying about 42.7% of the total host cell-parasite complex..... .....*H. magna*

16(15) Macrogametocyte measuring 15.41 μm × 3.0 μm with an average area of 32.53 μm^2, occupying 33.4% of the total host cell-parasite complex.....*H. pulchra*

C. Key to the species of ***Haemogregarina*** from reptiles

1 (2) Parasitic in snakes (macrogametocyte elongated slightly curved, 12 μm in length, nucleus located near anterior pole).....*H. mirabilis*

2 (1) Parasitic in turtles.....

3 (6) Macrogametocyte elongated or broadly-elongated.....

4 (5) Macrogametocyte elongated, slightly curved with both ends equally blunt, measuring 8.5 μm × 3.5 μm, nucleus oval or rounded and centrally located.....*H. choudhuryi*

5 (4) Macrogametocyte broad-elongated with two ends equally blunt measuring 9.6 μm × 4.8 μm, nucleus ribbon-like, located cantrally.....*H. gangetica*

6 (3) Macrogametocyte broadly oval or sometimes reniform, measuring 7.5-13.5 μm X 2.5-6.5 μm.....*H. xaveri*

A. ***Haemogregarina*** **of fishes**

208. ***Haemogregarina colisa*** Mandal, Ray, Sarkar and Kahali

1984. *Haemogregarina colisa* Mandal, Ray, Sarkar and Kahali, *Bull. zool. Soc. India*, **5**, p. 139.

Material examined : Sev. exs., Canning, South 24-Parganas 22. iv. 1980, A.K. Mandal.

Diagnosis : Mature forms broad, bean-shaped with both ends rounded, measuring 8.53 μm × 2.36 μm; nucleus rounded or bean-shaped and located at the middle.

Host : *Colisa fasciatus*, site of infection : blood

Distribution : India : West Bengal (South 24-Parganas district).

B. ***Haemogregarina*** **of amphibians**

209. ***Haemogregarina berestneffi*** Castellani and Willey

1903. *Haemogregarina encapsulae* Berestneffi, *Arch. Protistenk.*, **2**, p. 343.
1905. *Haemogregarina berestneffi* Castellani and Willey, *Q.J. Microsc. Sci.*, **49**, p. 383.

Material examined : Sev. exs., Bishnupur, Bankura, 20. vii. 1976, R. Ray.

Diagnosis : Gametocyte typically elongate and straight, anterior end more or less rounded and narrower and posterior end pointed, measuring 16.5 μm × 2.57 μm with an average 29.56 μm^2; cytoplasm homogeneous, scanty granular at the anterior end; nucleus rounded, oval or irregular shaped measuring 2.85 μm × 2.19 μm with an average area about 5.13 μm^2, situated centrally or a little below towards the posterior end.

Host : *Rana cyanophlyctis* Schneider, *R. limnocharis* Wiegmann and *R. tignina* Daudin; site of infection : blood.

Distribution : India : West Bengal (Bankura, Darjiling and Murshidabad district); Maharashtra, Tamil Nadu.

210. *Haemogregarina kaloulae* Ray and Choudhury

1984. *Haemogregarina kaloutae* Ray and Choudhruy, *Tech. Monogr.* No. 8. *Zool. Surv. India,* p. 32.

Material examined : Sev. exs., Bishnupur, Bankura, 7.vii,1977, R. Ray.

Diagnosis : Gametocyte elongated with both ends rounded, measuring 16.02 μm × 3.65 μm with an area of 43.22 μm^2; cytoplasm granular, more dense towards the poles, giving rise to cap-like structure measuring 3.75 μm × 2.87 μm and area of 8.75 μm^2; nucleus rounded to oval, triangular or band-shaped, measuring 3.9 μm × 2.06 μm with a mean area of 6.12 μm^2, usually situated at the anterior end.

Host : *Kaloula pulchra taprobanica* Parker; site of infection : blood.

Distribution : India : West Bengal (Bankura and Murshidabad districts).

211. *Haemogregarina maculatus* Ray and Choudhruy

1984. *Haemogregarina maculatus* Ray and Choudhruy, *Tech. Monogr.* No. 8. *Zool. Surv. India,* p. 24.

Material examined : Sev. exs., Balitha, Bankura, 25.vi.1977, R. Ray.

Diagnosis : Gametocyte elongated to club-shaped having broader anterior end with a neck-like constriction and the attenuated end possessing a plug like structure, measuring 16.5 μm × 3.3 μm with an area of 40.5 μm^2; cytoplasm granular; nucleus rhomboidal or rounded, situated on the broader anterior half, measuring 2.4 μm × 2.1 μm with an average area of 4.4 μm^2 and containing chromatin granules.

Host : *Rhacophorus maculatus* (Gray); site of infection : blood.

Distribution : India : West Bengal (Bankura district).

212. *Haemogregarina magna* (Grassi & Feletti)

1891. *Drepanidium magnum* Grassi and Feletti, *Cent. f. Bakl. U. Parasit.* **10**; p. 449.

1984. *Haemogregarina magra* (Grassi and Feletti) : Ray, *Tech. Monogr. No. 8, Zool. Surv. India,* p.11.

Material examined : Sev. exs., Santaldih, Puruliya, 17.v.1977, R. Ray; Sev. exs., Ranibandh, Bankura, 25.v.1977, R. Ray.

Diagnosis : Gametocyte elongated having broadly rounded anterior end and narrower posteriorly, measuring 12.4 μm × 4.06 μm with an average area 44.5 μm^2; cytoplasm homogeneous, hyaline, a little granular; broad to oval nucleus sometimes rounded or band-shaped, situated centrally or towards the broader end, measuring 4.4 μm × 3.3 μm with an area about 12.1 μm^2

Host : *Rana limnocharis* and *R. tigrina;* site of infection : blood.

Distribution : India : West Bengal (Bankura and Jalpaiguri districts).

213. ***Haemogregarina nucleobisecans*** Shortt

1917. *Haemogregarina mucleobisecans* Shortt. *Indian J. med. Res.*, **4**, p. 402.

Material examined : Sev. exs., Kotalpur, Bankura, 25.i.1977, R. Ray; Sev. exs., Sajnakhali, Sundarban, South 24-Parganas, 8.viii.1977, N.C. Nandi.

Diagnosis : Gametocyte sausage-shaped, slightly curved with anterior end regular, rounded and broad, posterior end slightly bent or hook-like or attenuated, measuring 14.4 μm × 2.95 μm with an average area 28.95 μm^2; nucleus rounded, oval, band-shaped or triangular or irregular in outline, measuring 3.25 μm × 1.95 μm with a mean area of 5.18 μm^2, situated centrally containing a close network of granules and with no karyosome; parasite enveloped in a pink coloured, thick capsule measuring 15.17 μm × 3.7 μm with an area of 31.84 μm^2

Host : *Bufo melanostictus* and *B. andersoni;* site of infection : blood.

Distribution : India : West Bengal (Bankura, Maldah, Puruliya and South 24-Parganas districts); Delhi, Punjab.

214. ***Haemogregarina pattoni*** Ray and Choudhury

1984. *Haemogregarina pattoni* Ray and Choudhury, *Tech. Monogr. No. 8. Zool. Surv. India,* p. 27.

Material examined : Sev. exs., Medinipur, 17.vii.1977, R. Ray.

Diagnosis : Gametocyte elongated with broader, rounded anterior end and attenuated posterior end; measuring 16 μm × 3.8 μm with an ara of 29.0 μm^2; cytoplasm densely granular in the middle; nucleus oval to round situated almost in the middle, measuring 3.5 μm × 2.5 μm with an area of 7.0 μm^2, containing compactly arranged chromatin granules; capped form elongated measuring 9.7 μm × 4.93 μm with an area of 33.05 μm^2; capsule in different developmental phases measuring 6.0 μm × 1.25 μm with an area of 5.15 μm^2

Host : *Rana hexadactyla;* site of infection : blood.

Distribution : India : West Bengal (Medinipur district).

215. ***Haemogregarina perinucleophilum*** Ray

1983. *Haemogregarina perinucleophilum* Ray, *Rec. zool. Sruv. India,* **81**, p. 53.

Material examined : Sev. exs., Balitha, Bankura, 16.viii.1976 and 1.vii.1977, R. Ray.

Diagnosis : Gametocyte elongated, gregarine form having a broader head, attenuated thin body and hook-like pointed tail; measuring 11.1 μm × 3.1 μm with an average area of 25.7 μm^2, the larger one measuring 18.5 μm × 4.0 μm with an area of 37.5 μm^2; cytoplasm densely granular. Nucleus oval, kidney-shaped, sometimes tubular, situated on the anterior half of the body, measuring 3.4 μm × 2.2 μm with an area of 6.0 μm^2, containing less compact chromatin granules.

Host : *Rana tigrina* : site of infection : blood.

Distribution : India : West Bengal (Bankura district).

216. ***Haemogregarina pulchara*** Ray and Choudhury

1984. *Haemogregarina pulchara* Ray and Choudhury, *Tech. Monogr.* No. 8. *Zool, Surv. India* p. 39.

Material examined : Sev. exs., Santaldih, Puruliya, 16.viii.1973, R. Ray.

Diagnosis : Gametocyte elongated, measuring 15.41 μm × 3.0 μm with an area of 32.53 μm^2, anterior end broad and rounded, posterior end attenuated; cytoplasm hyaline, homogeneous, more granulated towards the broader anterior end; nucleus rounded or oval, sometimes elongated measuring 2.3 μm × 1.75 μm with an area of 1.55 μm^2, situated centrally or subcentrally, chromatin granules compactly arranged; borad form measuring 15.5 μm × 4.0 μm with an area of 44.0 μm^2

Host : *Kaloula pulchara* Gray; site of infection : blood.

Distribution : India : West Bengal (Puruliya district).

217. ***Haemogregarina systoma*** Ray and Choudhury

1984. *Haemogregarina systoma* Ray and Choudhury, *Tech. Monogr. No. 8. Zool. Surv. India* p. 41.

Material examined : Sev. exs., Puruliya, 15.viii.1973, R. Ray.

Diagnosis : Gametocyte elongated with both the ends rounded, measuring 15.3 μm × 3.9 μm with an average area of 50.7 μm^2; cytoplasm homogeneous and coarsely granular, polar caps visible; nuclesu rounded, oval on triangular, measuring 6.2 μm^2 in area, situated at the centre and containing a large number of chromatin granules.

Host : *Uperodon systoma* Schneider; site of infection : blood.

Distribution : India : West Bengal (Puruliya district).

218. ***Haemogregarina*** sp.

Host : *Bufo himalayanus* Gunther.

Distribution : India : West Bengal (Darjiling district).

Remarks : Sinha (1979) reported the occurrence of this unnamed species from the blood smear of aforesaid host.

C. ***Haemogregarina*** **of reptiles**

219. ***Haemogragerina choudhuryi*** Ray and Bhattacharjee

1989. *Haemogregarina choudhuryi* Ray and Bhattacharjee, *Acta Protozool.*, 23(1), p. 67.

Material examined : Sev. exs., Balitha, Bankura, 16.iii. 1982, R. Ray.

Diagnosis : Mature gamont bean-shaped, 8.0 μm × 2.5 μm with an average area of 18.7 μm^2; microgamonts Kidney or bean-shaped with a few metachromatic granules, measuring 8.5 μm × 2.0 μm with an average area of 15.5 μm^2; macrogamont elongated with both ends equally blunt, measuring 8.5 μm × 3.5 μm with an average area of 20.6 μm^2; binucleated, tetranucleated and hexanucleated schizonts in R.B.C. ultimately forming six merozoites; mature schizonts measuring 10.9 μm × 5.5 μm with an area of 38.5 μm^2; merozoite elongated, measuring 5.7 μm × 1.0 μm; mature schizonts in the endothelial cells of lung capillaries measuring 16.5 μm × 10.0 μm and containing 20-35 developing merozoites; each merozoite measuring 4.0 μm × 1.2 μm.

Host : *Lissemys punctata punctata* ; site of infection : blood.

Intermediate host : *Helobdella nociva* Harding.

Distribution : India : West Bengal (Bankura district).

220. ***Haemogregarina gangetica*** Misra

1974. *Haemogregarina simondi* Misra, Nandi, Raut and Choudhury, *Acta Protozool.*, **12**, p. 345.

1976. *Haemogregarina gangetica* Misra, *Acta Protozool.*, **16**, p. 21.

Diagnosis : Both macro and microgametocyte in R.B.C.; fully developed microgametocyte having nucleus with two band-shaped structures measuring 9.16 μm × 3.2 μm; macrogemetocyte broad, elongated with both ends equally blunt, measuring 9.6 μm x 4.8 μm; nulcleus ribbon-like, either compact or granular in nature; schozogony in the lung.

Host : *Trionyx gangeticus;* site of infection : blood.

Distribution : India : West Bengal (Calcutta district).

221. ***Haemogragarina mirabilis*** Castellani and Willey

1904. *Haemogregarina mirabilis* Castellani and Willey, *Spolia Zeylanica,* **2**, p. 86.

Diagnosis : Macrogametocyte 12 μm in length, elongated thick gregarine-like and bent, cytoplasm staining uniformly blue; nucleus reddish blue in Romanowsky's stain.

Host : *Natrix piscator*; site of infection : blood.

Distribution : India : West Bengal (Koch Bihar district).

222. ***Haemogregarina xaveri*** de Mello

1932. *Haegregarina xaveri* de Mello, *Arch. Esc., Med.-Cirrug, Nova Goa, Ser.* A., **8**, p. 1411.

Diagonis : Marcogameticyte broadly oval or sometimes reniform measuring 7.5-13.5 μm in length and 2.5 - 6.2 μm in width; microgametocyte elongate or vermicular measuring 9-10 μm in length and 4 μm in width; schizogony in the lungs, spleen, liver etc.; cyst sometimes having 2 or 3 schizonts and sometimes 6 or 7 schizonts in organ imprints.

Host : *Lissemys punctata;* site of infection : blood.

Distribution : India : West Bengal (South 24-Parganas) and Goa.

223. ***Haemogregarina*** sp.

Host : *Enhydris enhydris;* site of infection : blood.

Distribution : India : West Bengal (Nadia district).

Remarks : Sinha and Das Gupta (1977 : *Proc. 1st Nat. Congr.* Parasitol., p. 14) reported this unnamed species from the aforesaid host.

224. ***Haemogregarina*** sp.

Host : *Mabuya carinata;* site of infection : blood

Distribution : India : West Bengal (West Dinajpur district).

Remarks : Tiwari and Ray (1981) reported the occurrence of this unnamed species from the blood smear of the aforesaid host.

225. ***Haemogregarina*** sp.

Host : *Hemidactylus flaviviridis;* site of infection : blood

Distribution : India : West Bengal (Jalpaiguri district).

Remarks : As for Sl. No. 224.

226. ***Haemogregarina*** sp.

Host : *Natrix stolata;* site of infection : blood

Distribution : India, West Bengal (Koch Bihar district).

Remarks : As for Sl. No. 224.

227. ***Haemogregarina*** sp.

Host : *Calotes versicolor*; site of infection : blood.

Distribution : India : West Bengal (Darjiling district).

Remarks : As for Sl. No. 224.

Genus ***Hapatozoon*** Miller

228. ***Hepatozoon mucosus*** Sinha

1986. *Hepatozoon mucosus* Sinha, *Acta Protozool.*, **25**, p. 471.

Diagnosis : Gametocytes exhibiting two morphological types : broad or oval forms measuring 5.5 - 11 μm × 1.6 - 3.8 μm and thin or narrow forms with a broad and tapering ends, 9.7 16 μm × 1.4 - 2.5 μm; trophozoites in liver and lungs, 6.4 - 7.7 μm × 4.8 - 6.5 μm; macroschizonts 10 - 13 μm × 8 - 11 μm with mature macromi-rozoites of 3.5 - 12 μm × 1.6 - 4 μm; microshizonts 7.7 - 11 μm × 6.5 - 8.8 μm.

Host : *Ptymas mucosus*; site of infection : blood.

Distribution : India : West Bengal (North 24-Parganas district).

229. ***Hepatzoon*** sp.

Host : *Petanrista magnificus;* site of infection : blood.

Distribution : India : West Bengal (Darjiling district).

Remarks : Das Gupta (1965 : *Trans. R. Soc. trop. Med & Hyg.*, 659, pp. 716-717) reported the occurrence of this unnamed species from the blood smears of the aforesaid host.

Family EIMERIIDAE

Key to the genera

1(2) Oocysts without sporocyst.....***Tyzzeria***

2(1) Oocyst with sporocysts.....

3(4) Oocysts with one sporocyst; (sporocyst with 8 sporozoites).....***Caryospora***

4(3) Oocyst with more than one sporocyst.....

5(10) Oocyst with two sporocysts.....

6(7) Each sporocyst with four sporozoites.....***Isospora***

7(6) Each sporocyst with 8 or 16 sporozoites.....

8(9) Each sporocyst with 8 sporozoites, species occurring in vertebrate hosts.....***Dorisa***

9(8) Each sporocyst with 16 sporozoites.....***Sivatoshella***

10(5) Oocyst with 4, 8 or 16 sporocysts.....

11(14) Oocyst with 4 sporocysts.....

12(13) Each sporocysts with 2 sporozoites.....***Eimeria***

13(12) Each sporocysts with 4 sporozoites.....***Wenyonella***

14(11) Oocyst with 8 or 16 sporocysts.....

15(16) Oocyst with 8 sporocysts and each sporocyst with 2 sporozoites.....***Octosporella***

16(15) Oocyst with 16 sporocysts and each sporocyst with 4 sporozoites.....***Pythonella***

Genus *Tyzzeria* Allen

Key to the species

1 (2) Oocyst oval, 14.48 - 17.3 µm × 9.63 - 11.5 µm in dimension.....*T. alleni*

2 (1) Oocyst broadly cylindrical, 20.4 - 27.6 µm × 14.0 - 20.0 µm in dimensions.....
.....*T chenicusae*

230. ***Tyzzeria alleni*** Chakravarty and Basu

1947. *Tyzzeria alleni* Chakravarty and Basu, *Sci & Cult.*, Calcutta, **12**, p. 106.

Diagnosis : Oocysts oval with micropyle and oocystic residium, measuring 14.4 - 17.3 (16.5) µm x 9.6 - 11.5 (10.5) µm; shape index 1.56, residual mass 6.4 µm in diameter, sporozoites elongated having rounded posterior and pointed anterior ends, measuring 5.5 - 6.8 µm in length with centrally placed spherical nucleus, 2.4 µm in diameter.

Host : Cotton Teal, *Nettapus coromandelianus* Gmelin; site of infection : intestine.

Distribution : India : West Bengal (North 24-Parganas district).

231. ***Tyzzeria chenicusae*** Ray and Sarkar

1967. *Tyzzeria chenicusae* Ray and Sarkar, *J. Protozool.*, **14**, p. 27.

Diagnosis : Oocyst broadly cylindrical, measuring 20.4 - 27.6 µm (24.48) µm × 14.0 20.4 (16.8) µm; shape index 1.5; microply absent; sporozoites club-shaped, 13.2 µm × 4.2 µm, usually arranged in a circular fashion around a granular mass of residual body, placed at the broader pole of the sporozoites.

Host : Cotton teal, *Nettapus* (= *Chenicus*) *coromadelianus* Gmelin; site of infection :intestine.

Distribution : India : West Bengal (North 24 Parganas district).

Genus ***Eimeria*** Schneider

So far, 71 species of *Eimeria* has been reported from this state out·of which 5 are recovered from fishes, 2 from amphibians, 14 from reptiles, 22 from birds and 28 from mammals. A host wise key to the species of *Eimeria* is given below for the convenience of identification.

A. Key to the species of ***Eimeria*** of fishes

1 (6) Oocyst spherical or round.....

2 (3) Sporocyst elliptical with long protuberance at one end.....*E. harpodoni*

3 (2) Sporocyst pyriform without any protruberance.....

4 (5) Wall of sporocyst provided with warts.....*E. zygaene*

5 (4) Wall of the sporocyst not provided with warts.....*E. glossogobii*

6 (1) Oocyst not spherical.....

7 (8) Sporocyst oval with sausage-shaped sporozoites, 10.1 µm in length.....*E. southwelli*

8 (7) Sporocyst oval with elongated sporozoites, 5.5 µm in length.....*E. notopteri*

B. Key to the species of ***Eimeris*** of amphibians

1 (2) Oocyst spherical, measuring 8.5 - 11.0 µm in diameter.....*E. laminata*

2 (1) Oocyst oval or spherical, 15.5 - 20.2 µm x 15.5 - 18.3 µm in dimension.....

.....*E. cyanophlyctis*

C. Key to the species of ***Eimeria*** of reptiles

1 (8) Oocyst spherical.....

2 (3) Sporocyst oval or ellipsoidal, oocyst measuring 13-15 µm.....*E. bongaonensis*

3 (2) Sporocyst pyriform or spindle shaped.....

4 (5) Oocyst without residuum.....*E. koormae*

5 (4) Oocyst with residuum.....

6 (7) Oocyst measuring 20 µm or more.....*E. stolatae*

7 (6) Oocyst below 20 µm in size.....*E. trionyxae*

8 (1) Oocyst not spherical.....

9 (1) Oocyst irregular.....*E. irregularis*

10 (9) Oocyst with regular shape.....

11(16) Oocyst oval, cylindrical, sub-spherical or almond-shaped.....

12(13) Oocyst with residuum.....

12 a. Oocyst 36 µm x 18 µm in dimension.....*E. guptae*

12 b. Oocyst 29-31 µm x 22.5 - 24.5 µm in dimension.....*E. piscatori*

12 c. Oocyst 23-27 µm x 17-18 µm in dimension.....*E. najae*

13(12) Oocyst without residuum.....

14(15) Sporocyst ovoid.....*E. knowlesi*

15(14) Sporocyst pyriform.....*E. innominata*

16(11) Oocyst of different shape.....

17(20) Oocyst elliptical-ellipsoidal.....

18(19) Sporocyst ovoid.....*E. flaviviridis*

19(18) Sporocyst naviculoid.....*E. fibrilosa*

20(17) Oocyst triangular or lemon-shaped.....

21(22) Oocyst triangular, measuring 9.5 - 14.5 µm in length.....*E. triangularis*

21(22) Oocyst lemon-shaped, measuring 16.5-21.5 µm in length.....*E. hemidactyli*

D. Key to the species of ***Eimeria*** of birds

1(2) Oocyst pyriform, (19.8 - 20.9 µm in length).....*E. gallinagoi*

2(1) Oocyst not pyriform.....

3(26) Oocyst spherical or sub-spherical.....

4(11) Oocystic residuum present.....

5(6) Sporocyst ellipsoidal.....*E. tropicalis*

6(5) Sporocyst pyriform or bean-shaped.....

7(10) Size of oocyst below 20 µm.....

8(9) Sporocyst pyriform, residual mass present at the centre.....*E. mandali*

9(8) Sporocyst bean-shaped, scantly residual mass at one end.....*E. bhutanensis*

10(7) Size of oocyst above 20 µm.....*E. numeni*

11(4) Oocystic residuum absent.....

12(17) Sporocyst oval, ovoidal or elliptical.....

13(16) Sporocyst 10-13 µm in length.....

14(15) Oocyst 26.5-30.5 µm in length.....*E. malaccae*

15(14) Oocyst 12-2-19.5 µm in length.....*E. labbeana*

16(13) Sporocyst 22.2 - 34.2 µm in length.....*E. barbeta*

17(12) Sporocyst pyriform .....

18(19) Oocyst large, 26.5 - 38.5 in length.....*E. coturnicis*

19(18) Oocyst comparatively small, 13-22 µm in length.....

20(21) Wall of oocyst provided with warts.....*E. vanelli*

21(20) Wall of oocyst smooth.....

22(23) Oocyst with knob at micropylar end.....*E. dauki*

23(22) Oocyst without any micropylar knob.....

24(25) Oocyst subspherical, 21.2 µm x 18.3 µm in dimensions.....*E. gennaeuscus*

25(24) Oocyst spherical to sub-spherical, 15.44 µm x 13.59 µm in dimensions.....*E. gallusae*

26 (3) Oocyst elliptical or ovoidal.....

27(40) Oocyst oval or ovoidal.....

28(37) Sporocyst pyriform.....

29(34) Oocystic residuum present, sporocyst pyriform.....

30(33) Sporocyst above 10 µm in length.....

31(32) Micropyle present.....*E. tennella*

32(31) Micropyle absent.....*E. roscoviensis*

33(30) Sporcyst below 10 µm in length (7.8 - 9.8 µm).....*E. charadrii*

34(29) Oocystic residuum lacking.....

35(36) Sporocyst boat-shaped.....*E. anili*

36(35) Sporocyst pyriform.....*E. bengalensis*

37(26) Sporocyst ovoid or ellipsoidal.....

38(39) Oocyst large, 24-30 µm in length.....*E. kapotei*

39(38) Oocyst comparatively small, 14.5 - 17.5 µm in length.....*E. columbae*

40(27) Oocyst elliptical or ellipsoidal.....

41(42) Sporocyst pear-shaped, sporozoite banana-shaped.....*E. alectorae*

42(41) Sporocyst boat-shaped, sporozoite elongated.....*E. pavonina*

E. Key to the species of ***Eimeria*** of mammals

1(12) Oocyst spherical or subspherical.....

2(3) Sporocyst spherical (10 µm in diameter).....*E. cluperum*

3(2) Sporocyst not spherical.....

4(11) Sporocyst ovoid/ovoidal.....

5(8) Micropyle absent.....

6(7) Oocyst measuring 15-18.7 µm x 13.2 - 17.4 µm in dimension, sporocyst 7.1-8.9 µm x 5.5 - 7.0 µm in dimension.....*E. darjeelingensis*

7(6) Oocyst measuring 15-21 µm x 14-16.5 µm in dimension and sporocyst 8.5 - 13.5 µm x 6.5 - 8 µm in dimension.....*E. murinus*

8(5) Micropyle present.....

9(10) Oocyst measuring 24-28 µm x 21.5-23 µm in dimension.....*E. bandicota*

10(9) Oocyst measuring 17.25 - 20.25 µm x 16.5 - 19.25 µm in dimension.....*E. gorumarana*

11(4) Sporocyst not ovoid/ovoidal.....

11a Sporocyst pear-shaped.....*E. bandiurensis*

11b	Sporocyst lemon-shaped.....*E suncus*
11c	Sporocyst cylindrical.....*E. cervis*
12(1)	Oocyst not spherical or subspherical.....
13(28)	Oocyst ellipsoidal or ovoidal or vice versa.....
14(27)	Oocyst ellipsoidal.....
15(16)	Oocystic residuum present.....*E. oryctolagi*
16(15)	Oocystic residuum absent.....
17(26)	Sporocyst oval or ellipsoidal.....
18(21)	Sporocyst ellipsoidal.....
19(20)	Stieda body present, sporocyst 9.1-11.7 µm x 5.2 - 6.5 µm in dimension..... .....*E. spinosa*
20(19)	Stieda body absent, sporocyst measuring 11-14.3 µm x 8-9.5 µm in dimension..... .....*E. comminispora*
21(18)	Sporocyst oval.....
22(23)	Stieda body absent or vestigial.....*E. arloingi*
23(22)	Stieda body present.....
24(25)	Sporocyst 17-20.5 µm x 10.2 - 11.9 µm in dimension.....*E. intricata*
25(24)	Sporocyst 9-14 µm x 4-10 µm in dimension.....*E. ninakholyakimovi*
26(17)	Sporocyst spindle-shaped.....*E. crandalis*
27(14)	Oocyst ellipsoidal-ovoidal.....
27a	Sporocyst ovoid, 8.25 10.5 µm in length.....*E. biswapatii*
27b	Sporocyst spindle-shaped, 14-15 µm in length.....*E. nasuta*
27c	Sporocyst naviculoid, 17-18 µm in length.....*E. micropylifera*
27d	Sporcyst ellongate-ovoid, 16-21 µm in length.....*E. ahsata*
27e	Sporocyst oval, 14-16 µm x 8-9 µm in dimension.....*E. ovoidalis*
27f	Sporocyst broad-ovoid, 9-13 µm x 6-8 µm in dimension.....*E. neodebliecki*
28(13)	Oocyst not ellipsoidal or ellipsoidal-ovoidal.....
28a	Oocyst cylindrical, 28-34 µm x 12-16 µm in dimension.....*E. antilocervi*
28b	Oocyst pyriform, 22-35 µm x 17-25 µm in dimension.....*E. granulosa*
28c	Oocyst egg-shaped, 23.8-38.34 µm x 18.8-23.8 µm in dimension.....*E. faurei*

28d Oocyst subspherical to spherical, 22-43 µm x 24-30 µm in dimension..... ..... *E. christenseni*

28e Oocyst ellipsoid or subspherical, 13.6-18.7 µm x 11.9-15.3 µm in dimension..... ..... *E. parva*

28f Oocyst subspherical to ellipsoidal, 14-15 µm x 10.5-13.5 µm in dimension..... ..... *E. sibporensis*

28g Oocyst subspherical to ovoid, 21-22.5 µm x 18-21 µm in dimension..... ..... *E. jalpaiguriensis*

A. *Eimeria* of fishes

232. *Eimeria glossogobii* Mukherjee and Haldar

1980. *Eimeria glossogobii* Mukherjee and Haldar, *Acta Protozool.*, **30**, p. 181.

Diagnosis : Oocyst spherical, with delicate and smooth wall having faintly yellowish tinge, measuring 7.1-12.2 µm x 7.1-11.0 µm in dimension; pyriform to oval, measuring 3.0-9.1 µm x 2.0-5.1 µm; stieda body present as a small knob at the pointed end of each sporocyst, oocystic and sporocystic residuum absent; sporozoites sickle-shaped.

Host : Bar eyed Goby, *Glossogobius giuris* (Hamilton); site of infection : small intestine.

Distribution : India : West Bengal (Nadia district).

Remarks : The specific name should be *E. glossogobia* instead of *E. glossogobii* as per International Code of Zoological Nomenclature (Mandal, 1989).

233. *Eimeria harpodoni* Setna and Bana

1935. *Eimeria harpodoni* Setna and Bana, *J. R. microsc. Soc.*, **55**, p. 165.

Diagnosis : Oocyst spherical with two transparent membrane, the outer one is thinner than the inner one; 12.3-17.5 µm in diameter; cytoplasm granular with centrally placed nucleus; four rounded sporoblasts, each 3.5-4.4 µm in diameter, without any micropyle; thin granular oocystic residuum; sporocyst elliptical with a long protuberance at one end; a broad inverted V-shaped appendage present at the edge of this protuberance or neck; sporocyst measuring 8.5-10.8 (9.7) µm x 3.6-5.7 (4.8) µm, sporocystic residual compact mass present at one end of the sporcyst; elongated sporozoite 7.3 µm in length, slightly curved at middle region with one pointed end.

Host : Bombay duck, *Harpodon nehereus* (Ham.); site of infection : intestine.

Distribution : India : West Bengal (South 24-Parganas district) and Bombay.

234. *Eimeria notopteri* Chakravarty and Kar

1944. *Eimeria notopteri* Chakravarty and Kar, *Curr. Sci.*, **13**, p. 51.

Diagnosis : Oocyst irregular in shape, measuring 23.5-25.2 (24.3) µm x 21.4-22.5 (22.2) µm; oocystic wall double layered of equal thickness, micropyle and oocystic residuum absent; sporocyst oval with both ends bluntly pointed, measuring 10.5-11.5 (11.0) µm, x 5.5-7.3 (6.8) µm; shape

index 1.5; sporocystic residuum absent, sporozoite elongated, 5.5 μm in length, with one pointed and the other rounded ends.

Host : Feather back, *Notopterus notopterus* (Pallas), and Chital, *Notopterus chitala* (Gunthar); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district) and Meghalaya.

235. *Eimeria southwelli* Halawani

1930. *Eimeria southwelli* Halawani, *Ann. trop. Med. Parasit.*, **24**, p. 1; *Trans. R. Soc. trop. Med. Hyg.*, **23**, p. 326.

Diagnosis : Mature oocyst cylindrical or sausage-shaped provided with a single outer transparent wall, measuring 1-3 μm in thickness; oocyst 30.5-53.5 (39.5) μm x 10.5-15.4 (13.1) μm, shape index 3.02, sporocyst oval, measuring 10 μm-12 μm in length and 6.5 μm in width, sporocystic residuum absent, sporozoite sausage shaped 10.1 μm in length and arranged irregularly.

Host : Eagle Ray (Devil fish), *Aetobatis narinari* [=*Aetobatus flagellum* (Schn.)] and Light Tip Shark, *Scoliodon sorrakowah* (Cuvier); site of infection : alimentary canal.

Distribution : India : West Bengal (South 24-Parganas district) and Maharashtra.

Remarks : *E. southwelli* interestingly occurs in the embryo of Eagle Ray as noted by Halwani (1930).

236. *Eimeria zygaenae* Mandal and Chakravarty

1965. *Eimeria zygaenae* Mandal and Chakravarty, *Sci. Cult.*, **31**, p. 381.

Diagnosis : Oocyst round, 12.1-14.3 (31.2) μm in diameter, having two transparent oocystic envelop, outer is thinner than the inner one; oocystic residuum absent and micropyle seen after complete development of the oocyst; sporocyst pyriform, anterior end bluntly pointed and the posterior end rounded, wall of the sporocyst warty and yellowish in colour, sporocyst measuring 7.7- 8.9 (8.8) μm x 4.5 - 6.6 (5.5) μm, shape index is 1.6, sporocytic residuum present as globular mass; sporozoite elongated, 6.6 μm in length.

Host : Hammer headed shark Sphyrna (=*Zygena*) *blochii* Cuvier; site of infection : intestine.

Distribution : India : West Bengal (Medinipur and South 24- Parganas districts).

B. *Eimeria* of amphibians

237. *Eimeria cyanophlyctis* Chakravarty and Kar

1944. *Eimeria cyanophlyctis* Chakravarty and Kar, *Proc. Indian Sci. Congr.*, p. 104.

Diagnosis : Mature oocyst oval or sub-spherical transparent, single walled, 15.5-20.2 (17.9) μm x 15.5-18.3 (16.7) μm in dimension; shape index 1.07; oocystic residuum in the form of and irregular mass; micropyle absent; sporocyst spindle-shaped, single layered, measuring 10.5-12.5 (11.5) μm x 4.5-6.5 (5.5) μm, shape index 2.09, sporocystic residuum scattered. Sporozoite elongated with pointed anterior end.

Host : Skipping Frog, *Rana cyanophlyctis* Schneider; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

238. *Eimeria laminata* Ray

1935. *Eimeria laminata* Ray, *Parasitology*, **27**, p. 369.

Diagnosis : Oocyst spherical, measuring 8.5-11.0 (9.8) µm in diameter, oocystic wall double layered, outer one thicker than the inner one, with oocystic residuum; sporocyst spindle-shaped pointed at both ends and without any knob, 5.2-6.5 µm x 3.0 µm in dimensions, shape index 1.96, sporocystic residuum present; sporozoite elongated bodies pointed at one end.

Host : Indian common Toad, *Bufo melanostictus* Schneider; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

C. *Eimeria* of reptiles

239. *Eimeria bongaonensis* Sinha and Sinha

1978. *Eimeria bongaonensis* Sinha and Sinha, *Indian J. Zootmy.*, **19**, p. 61.

Diagnosis : Oocyst circular, 13-15 (13.8) µm in diameter, oocystic wall greenish, smooth and bilayered; micropyle, oocystic residuum and polar granule absent; sporocysts ellipsoidal, 8.4- 9.3 (8.8) µm x 5.1-5.7 (5.2) µm, without stieda body and containing scattered residue; 3.9-4.3 µm x 1.4-1.9 µm in dimensions.

Host : Takkhak or Indian Gekko, *Gekko gecko* (Linn.); site of infection : intestine.

Distribution : India : West Bengal (North 24 Parganas district).

240. *Eimeria fibrilosa* Mandal

1976. *Eimeria fibrilosa* Mandal, *Acta Protozool.*, **15**, p. 405.

Diagnosis : Oocyst ellipsoidal, 25-27 (25.5) µm × 13.5-22.5 (18.0) µm, shape index 1.36, with double-layered wall, outer thinner than the inner one, micropyle absent; oocystic residuum refractile and globular, sporocyst 10-15 (12.5) µm × 5-6 (5.5) µm, shape index 2.09; sporozoite bean-shaped, 10.5-14.4 (12.2) µm × 7.5-8.5 (8) µm, shape index 1.56, sporocystic residum as beaded mass.

Host : Common water snake, *Enhydris enhydris*, (Schneider); site of infection : intestine.

Distribution : India : West Bengal (Nadia district).

241. *Eimeria flaviviridis* Setna and Bana

1935. *Eimeria flaviviridis* Setna and Bana, *J. R. microsc. Soc.*, **55**, p. 256.

Diagnosis : Oocyst elliptical, colourless, measuring 18.5-35.4 (25.5) µm × 10.5-15.5 (12.5) µm, shape index 2; micropyle and oocystic residuum absent; sporocyst ovoid, 6.5-6.4 (8.3) µm × 5.3-8.3 (6.9) µm, shape index 1.2, sporocystic residuum present; sporozoite 9.5 µm × 1 µm in dimension. Schizonts round 12 µm in diameter or sometimes irregular, containing 16 to 140 elongated merozoites, each measuring 8-10 µm × 1.3-1.5 µm, microgametocytes ovoid measuring 17 µm × 16 µm in dimension.

Host : House Lizard, *Hemidactylus flaviviridis* (Ruppell); site of infection : intestine.

Distribution : India : West Bengal (Calcutta and North 24- Parganas districts) and Maharashtra.

242. *Eimeria gupti* Bhatia

1936. *Eimeria cylindrica* Ray and Das gupta, *Proc. Indian Sci. Congr.*, p. 345.

1938. *Eimeria gupti* Bhatia, *The fauna of British India including Ceylon and Burma, Protozoa : Sporozoa*, p. 386.

Diagnosis : Oocyst cylindrical, measuring 36 µm x 18 µm oocystic residuum present.

Host : Checkered Keelback (Water snake), *Natrix piscator* (Schneider); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Remarks : The species is incompletely described and requires redescription.

243. *Eimeria hemidactyli* Knowles and Das Gupta

1935. *Eimeria hemidactyli* Knowles and Das Gupta, *Indian J. med. Res.*, **22**, p. 701.

Diagnosis : Oocyst lemon-shaped with two layers of equal thickness; measuring 16.5-21.5 (18.5) µm × 12.5-16.2 (14.4) µm, shape index 1.3; oocystic residuum and micropyle absent; ovoid sporocyst 9.5-11.3 (10.4) µm × 7.5-8.5 (8.0) µm, shape index 1.3, sporocystic residuum scattered inside the sporocyst; sporozoite elongated, pointed at one end, 6.5 µm in length.

Host : House Lizard, *Hemidactylus flaviviridis* (Ruppell); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

244. *Eimeria irregularis* Kar

1944. *Eimeria irregularis* Kar, *Indian vet. J.*, **29**, p. 231.

Diagnosis : The oocyst irregular, 14.5-16.5 (15.5) µm in diameter, without micropyle or oocystic residuum; sporocyst elongately oval, 11.5-13.5 912.5) µm × 6.5-7.5 (6.9) µm, with rounded posterior end and somewhat pointed anterior end characterised in having a little knob, sporocystic residual mass present; sporozoite sausage-shaped, 8.5 µm × 2.5 µm, with both the ends rounded.

Host : Pond Turtle, *Lissemys punctata* (Bonnaterre); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

245. *Eimeria innominata* Kar

1944. *Eimeria innomeria* Kar, *Indian vet.*, 29, p. 231.

Diagnosis : Oocyst subspherical, double walled, outer one thinner than the inner, measuring 16.5-18.8 (17.7) µm x 11.5-14.3 (13.5) µm, shape index 1.3, micropyle and oocystic residuum absent; sporocyst pyriform with an irregular shaped knob at the pointed end, 10.5-12.3 (11.3) µm x 5.5-7.5 (6.5) µm, shape index 1.7, sporocystic residual mass present; sporozoites elongated 6.5-7.5 µm x 4.1-4.6 µm, with one sharply pointed end.

Host : Pond turtle, *Lissemys punctata* (Bonnarterre); site of infection : liver and bile.

Distribution : India : West Bengal (Calcutta district).

246. *Eimeria koormae* Das Gupta

1938. *Eimeria koormae* Das Gupta, *Proc. Indian Sci. Congr.*, p. 155; 1938. *Arch. Prostistenk.*, **90**, p. 410.

Diagnosis : Oocyst spherical with two layers, the inner layer thicker than the outer, 13.5-15.8 (14.6) µm in diameter, micropyle present, oocystic residuum absent; sporocyst spindle-shaped, tapering at both ends, 9.3-11.3 (10.3) µm × 3.5 5.6 (4.6) µm, shape index 2.24; sporocystic residual mass granular and situated between the two sporozoites; sporozoite elongated, one end rounded and stouter than the other; mature schizont 12 µm in diameter with 8 merozoites; macrogamete spherical, 12.36 µm in diameter.

Host : Pond turtle. *Lissemys punctata* (Bonnaterre); site of infection : small intestine.

Distribution : India : West Bengal (Calcutta and North 24- Parganas districts) and Bangladesh.

247. *Eimeria knowlesi* Bhatia

1936. *Eimeria knowlesi* Bhatia, *Curr. Sci.*, **5**, p. 177.

Diagnosis : Oocyst spherical or oval, double-layered, without any micropyle and residuum, 16.5-20.5 (18.5) µm × 14.5-18.5 (16.5) µm; sporocysts ovoid, 9.00-11.00 (10.0) µm × 7.5-8.5 (7.9) µm; sporocystic residual mass in between the sporozoites; sporozoite elongated, 7.2 µm in length.

Host : House Lizard. *Hemidactylus flaviviridis* (Ruppelll); site of infection : intestine

Distribution : India : West Bengal (Calcutta district).

248. *Eimeria najae* Ray and Das Gupta

1937. *Eimeria najae* Ray and Das Gupta, *Arch. Protistenk.*, **88**, p. 275.

Diagnosis : Oocyst ovoidal, double walled, outer wall thinner, 23.5-27.5 (25.5) µm × 15.5-18.5(16.9) µm, shape index 1.5, micropyle visible in immeture oocysts, oocystic residual mass compact; sporocyst spindle-shaped, 11.5-13.5 (12.5) µm × 5.9-7.8 (6.9) µm, shape index 1.8 sporozoite elongated, tapering at both ends, 10.5-11.5 µm in length; schizont with 8 merozoites, each of 7 µm × 2 µm; microgametocyte 20-24 µm in diameter.

Host : Cobra, *Naja naja* Linn; site of infection : intestine.

Distribution : India : West Bengal (South 24-parganas district).

249. *Eimeria piscatori* Ray and Das Gupta

1936. *Eimeria piscatori* Ray and Das Gupta, *Proc. Indian Sci. Congr.*, p. 345.

Diagnosis : Oocyst oval, 29-31µm × 22.5-24.5 µm, with oocystic residuum; sporocyst spindle shaped, 14 µm × 4.5 µm in dimension.

Host : Checkered Keelback (Water snake) *Natrix piscator;* site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Remarks : This species is incompletely described.

250. ***Eimeria stolatae*** Ray and Das Gupta

1938. *Eimeria stolatae* Ray and Das Gupta, *Arch. Protistenk,* **90,** p. 361.

Diagnosis : Oocyst spherical, double walled, the outer thinner than the inner, 19.5 21.5 (20.5) µm in diameter; micropyle and oocystic residuum absent; sporocyst spindle-shaped with both ends tapering, 11.5 - 13.4 (12.5) µm × 5.5 - 7.5 (6.5) µm, shape index 2.0 sporocystic residuum present; sporozoite 8.5 × 2.3 µm in dimension; schizont 8.2 µm × 4.1 µm, with 8 merozoites; macrogamete round 18-20 µm in diameter.

Host : Striped Keelback (Grass snake), *Natrix stolata* (Linnaeus), site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

251. ***Eimeria trionyxae*** Chakravarty and Kar

1943. *Eimeria trionyxae* Chakravarty and Kar, *J. Asiat. Soc. Bengal.,* p. 49

Diagnosis : Oocyst spherical, double layered, outer thinner, 14.45 19.5 (16.5) µm in diameter, micropyle absent, oocystic residuum present; sporocyst pyriform, 11.5 - 13.40 (12.5) µm × 5.7 - 7.9 (6.3) µm, shape index 2.00, sporocystic residuum present; sporozoites elongated, 9.5 - 10.5 µm in length; schizont round, 8- 14 µm in diameter.

Host : Tortoise, *Trionyx gangeticus* Cuv.; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

252. ***Eimeria triangularis*** Chakravarty and Kar

1943. *Eimeria triangularis* Chakravarty and kar, *J. Asiat. Soc. Beng.,* **9,** p. 49.

Diagnosis : Oocyst triangular, 9.5 - 14.5 (12.5) µm in length, oocystic residuum and micropyle absent; sporocyst oval or spindle-shaped with both the ends bluntly rounded, 9.5 - 11.5 (10.5) µm X 3.4 - 5.4 (4.14) µm, shape index 3.02; sporozoites elongated, 9.5 µm in length, with tapering ends.

Host : Tortoise, *Trionyx gangeticus* Cuv.; site of infection : intestine.

Districation : India : West Bengal (Calcutta district).

D. ***Eimeria* of birds**

253. ***Eimeria alectorae*** Ray and Hiregaudar

1959. *Eimeria alectorae* Ray and Hiregaudar, *Bull. Calcutta. Sch. trop. Med. Hyg.,* **7,** p. 111.

Diagnosis : Oocyst ellipsoidal with a few ovoidal and very few spherical forms; oocystic wall pale yellowish-brown with a micropyle; oocyst measuring 23.6-26.4 µm × 15.6 -19.5 µm, shape index 1.43; sporocyst pear-shaped, 8 - 9.5 µm × 5-5.6 µm, with sporocystic residuum and stieda body at the pointed end; sporozoites banana- shaped.

Host : Chukar Partidge. *Alectoris graeca* (Meisner); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

254. ***Eimeria anili*** Haldar, Ray and Mandal

1982. *Eimeria anili* Haldar, Ray and Mandal, *Arch. Protistenk.*, **126**, p. 217.

Diagnosis : Oocyst ovoidal, measuring 14.1 - 17.4 μm × 12.3 - 13.3 μm; distinct micropyle present, oocystic residuum absent; sporocyst boat shaped, bilayered, measuring 7.3 - 9.2 μm × 5.8 - 5.5 μm, stieda body and sporocystic residdum present; elongated sporozoites measuring 7.0 μm × 1.7 μm.

Host : *Sturnus contra contra* Linnaeus; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

255. ***Eimeria barbeta*** kar

1944. *Eimeria barbeta* Kar, *Proc. Indian Sci. Congr.*, p. 104.

Diagnosis : Oocystic oval, double walled, the outer thinner, 22.2 - 34.2 (32.2) μm × 17.5 - 19.5 (18.5) μm, shape index 1.2; micropyle present and oocystic residuum absent, sporocyst oval, anterior portion narrower and provided with an ill developed knob, 14.5 - 16.5 (15.5) μm × 7.5 - 9.5 (8.5) μm, shape index 1.8, sporocystic residuum present as compact mass; Sporozoites sickle shaped, 10.5 - 12.5 μm × 2.2 μm, shape index 5.2.

Host : Blue-throated Barbet, *Megalaima Cyanops asiatica asiatica* (Lath.); site of infection: intestine.

Distribution : India : West Bengal (Calcutta district).

256. ***Eimeria bengalensis*** Paul, Ghosh and Haldar

1991. *Eimeria bengalensis* Paul, Ghosh and Haldar, *Environ. & Ecol.*, **9** (1), p. 148.

Diagnosis : Oocyst ovoid, 27.39 - 31.54 (28.1) μm × 19.09-22.41 (21.60) μm, double layerd, space between two layers ornamented with striations, oocystic residuum and micropyle absent, polar granules present; sporocyst pyriform, 16.60 - 18.26 (17.15) μm × 7.47 - 9.13 (8.58) μm, stieda and sub stieda body present, sporocystic residuum present; sporozoite elongated; 11.62 - 12.45 (12.220 μm × 3.65 - 4.15 (4.07) μm.

Host : Common Domestic Fowl, *Gallus domesticus* ; site of infection : intestine.

Distribution : India : West Bengal (Barddhaman district).

257. ***Eimeria bhutanensis*** Ray and Hiregaudar

1959. *Eimeria bhutanensis* Ray and Hiregaudar, *Bull. Calcutta Sch. trop. Med. Hyg.*, **87**, p. 111.

Diagnosis : Oocysts spherical to subspherical in shape, endocytic wall thicker and slightly yellowish in colour, 15.5 - 16.8 μm × 14.6 - 16.6 μm; sporocyst bean-shaped, 6.7 μm × 3.4 μm, with a stieda body at one end and having scanty residual matter; sporozoites sickle-shaped.

Host : Bhutan Peacock pheasant, *Polyplectron bicoloratum* (= *Polyplectron bicoloratum bakeri* (Linn.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

258. ***Eimeria charadrii*** Mandal

1965. *Eimeria charadrii* Mandal, *Proc. zool. Soc. Calcutta,* **18,** p. 47.

Material examined : Sev. exs., Narayantala, South 24-Parganas, 7. vii. 1972, A.K. Mandal.

Diagnosis : Oocyst oval with double wall, outer wall thinner, anterior end drawn out as a small neck, 14.3 - 17.6 (15.8) µm × 11.0 - 12.0 (11.5) µm, shape index 1.3, micropyle present; oocystic residuum absent; sporocyst pyriform, 7.8 - 9.8 (8.8) µm × 5.5 - 7.6 (6.6) µm, shape index 1.3, anterior end narrow, posterior end round, sporocystic residuum present as scattered mass; sporozoites elongated with both ends bluntly pointed, 4.4 µm × 2.2 µm; schizont spherical, 8.8m in diameter; microgametocyte oval, 7.7 µm × 5.5 µm; macrogamete 6.6 µm in diameter.

Host : Sand Plover, *Charadrius asiaticus* Pallas; site of infection : intestine.

Distribution : India : West Bengal (South 24-Parganas district).

259. ***Eimeria columbae*** Mitra and Das Gupta

1937. *Eimeria columbae* Mitra and Das Gupta, *Proc. Indian Sci. Congr.,* p. 291.

Materiai examined : Sev. exs., Calcutta 21.vi.1974, A.K. Mandal.

Diagnosis : Oocyst subspherical, double walled, outer thinner and membranous, 14.5 17.5 (16.5) µm × 13.5 - 15.5 (14.5) µm, shape index 1.14; mocropyle absent, oocystic residuum present; sporocyst ellipsoidal without any knob, 6.5 - 8.5 (7.3) µm × 3.5 5.8 (4.6) µm, shape index 1.6 sporocystic residuum present as scattered mass; sporozoites curved with one end pointed and the other end rounded; schizont 4.1 µm in diameter; macrogamete 6.1 µm in diameter.

Host : Domestic Pigeon, *Columba intermedia* (= *Columba livia intermedia* Strickland) *Columba* sp.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district) and Orissa.

260. ***Eimeria coturnicis*** Chakravarty and Kar

1947. *Eimeria coturnicis* Chakravarty and Kar, *Proc. R. Soc. Edinb.,* **62** (B), p. 225.

Diagnosis : Oocyst oval, with double envelops, 26.5 - 38.5 (31.5) µm × 19.4 26.4 (22.8) µm, shape index 1.3, micropyle end and oocystic residuum absent; sporocyst pyriform, anterior end pointed and provided with a knob, 13.4 - 17.4 (15.4) µm × 8.5 - 11.5 (9.5) µm, shape index 1.6, sporocystic residuum present as a compact mass; sporozoites spherical or slightly oval in shape.

Host : Common Quail, *Coturnix c. coturnix* (Linn.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

261. ***Eimeria dauki*** Bhatia and Pande

1965. *Eimeria dauki* Bhatia and pande, *Indian J. Microbiol.*, **5**, p. 65.

Material examined : Sev. exs., Barasat, North 24-Parganas 12.viii. 1976, A.K. Mandal.

Diagnosis : Oocyst ovoidal, with a knob at narrow micropylar end and double walled, 14-20 (17.8) µm × 11-13.5 (12.5) µm, shape index 1.4, oocystic residuum absent; sporocyst elongated with narrow anterior end, 10.5 - 12.5 (10.5) µm × 5.5 - 7.8 (5.8) µm, stieda body prominent plug-like, sporocystic residuum present as dark granules; sporozoites elongated, 8.5 µm × 2.5 µm.

Host : White-breasted Waterhen, *Amaurornis phoenicurus* (Pennant); site of infection : intestine.

Distribution : India : West Bengal (North 24-parganas district) and Uttar Pradesh.

262. ***Eimeria gallinagoi*** Mandal

1965. *Eimeria gallinagoi* Mandal, *Proc. zool. Soc. Calcutta,* **18**, p. 47.

Material examined : Sev. exs., Basanti, South 24-parganas, 17.vii.1970, A.K. Mandal.

Diagnosis : Oocyst pyriform, double walled with uniform thickness and yellowish in colour, 19.8 - 20.9(20.2) µm × 13.2 - 14.3 (13.8) µm, shape index 1.4; micropyle present but oocystic residuum absent; sporocyst pyriform, anterior narrower end with a small knob, 6.7 - 8.7 (7.7) µm × 4.5 - 6.5 (5.5) µm, shape index 1.4, sporocystic residuum present as concentrated mass; sporozoite 5.5 µm × 2.5 µm.

Host : Fantail snipe, *Gallinago gallinago* (Linnaeus); site of infection : intestine.

Distribution : India : West Bengal (South 24-Parganas district).

263. ***Eimeria gallusae*** Paul, Ghosh and Haldar

1991. *Eimeria gallusae* Paul *et al., Environ. & Ecol.*, **9**(1), p. 148.

Diagnosis : Oocyst spherical to subspherical, 13.28 - 17.49 (15.44) µm × 11.42 - 14.94 (13.59) µm, double layered, oocystic residuum, micropyle and polar granules absent; sporocyst pyriform, 6.64 - 9.13 (7.87) µm × 4.98 - 6.94 (5.81) µm, stieda body and sporocystic residuum present; sporozoite elongated, 4.15 - 6.30 (5.62) µm × 1.66 - 2.98 (2.26) µm.

Host : Common Domestic Fowl, *Gallus domesticus;* site of infection : intestine.

Distribution : India : West Bengal (North 24-Parganas).

264. ***Eimeria gennaeuscus*** Ray and Hiregaudar

1959. *Eimeria gennaeuscus* Ray and Hiregaudar, *Bull. Calcutta Sch. trop. Med. Hyg.*, **7**, p. 111.

Diagnosis : Oocyst subspherical, with thin wall, pale yellowish brown in colour, endocystic wall thicker than the outer wall, 21.2 - 1.5 µm × 18.3 - 2.0 µm, shape index 1.16; sporocyst pear- shaped with a small stieda body and residuum, 7.8 µm × 4.5 µm; sporozoite sickle shaped.

Host : Kalij Pheasant, *Gennaeus horsfieldi* G.R. Gray (=*Lophura leucomelana* (Latham)); site of infection : intestine

Distribution : India : West Bengal (Calcutta district).

265. ***Eimeria kapotei*** Chatterjee and Ray

1969. *Eimeria kapotei* Chatterjee and Ray, *Proc. Indian Sci. Congr.*, p. 512.

Diagnosis : Oocyst oval, 24-30 (26.1) μm × 22-26 (23.5) μm, double walled inner one being thicker, micropyle present; sporocyst ovoid, 8.5 - 9.5 μm in length, sporocystic residuum and steida body present; sporozoite bean-shaped, 5.6 μm in length.

Host : Domestic Pigeon, *Columba livia intermedia* Strickl. (=*Columba* sp.); site of infection: small intestine

Distribution : India : West Bengal (Calcutta district).

266. ***Eimeria labbeana*** (Labbe)

1896. *Coccidium pfeifferi* Labbe, *Archs. Zool. exp. gen.*, **4.** p. 517.

1928. *Eimeria labbeana* Pinto, *C. r. Seanc. Soc. Biol.*, **98,** p. 1571.

Material examined : Sev. exs., Calcutta, 15.iii.1972, A.K. Mandal.

Diagnosis : Oocysts oval or spherical, oval form measuring 19.5 - 21.2 (20.1) μm × 16.5 - 17.5 (16.9) μm, shape index 1.1; spherical form measuring 17.5 - 18.5 (17.9) μm in diameter, double walled, outer one thinner; micropyle present, oocystic residuum absent; sporocyst oval 11.00-13.5 (12.4) μm × 5.5 - 6.8 (6.4) μm, shape index 1.4, sporocystic residuum compact; sporozoites elongated, 6.5 μm × 2.3 μm; schizonts of two types, small and large; macrogametocyte 3.4 - 15.8 μm × 2.3 - 12.2 μm.

Host : Domestic Pigeon, *Columba livia intermedia* Strickl. (=*Columba* sp.); Ring necked Dove, *Streptopelia orientalis;* site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

267. ***Eimeria malaccae*** Chakravarty and Kar

1944. *Eimeria malaccae* Chakravarty and Kar, *Proc. Indian Acad. Sci.*, **20** (B), p. 102.

Diagnosis : Oocyst broadly oval, 26.5 - 30.5 (28.5) μm × 16.5 - 18.5 (17.5) μm, shape index 1.6 double walled outer one thinner; micropyle present, oocystic residuum absent; sporocyst oval, anterior end pointed and with a small knob, 11.5 - 13.5 (12.5) μm × 9.5 - 11.5 (10.5) μm, shape index 1.1, sporocystic residuum coarsely granular, sporozoite 8.5 μm × 2.3 μm, with anterior end tapering.

Host : Black headed Munia, *Munia* (*Lonchura*) *malacca malacc*a Linn; site of infection : intestine

Distribution : India : West Bengal (Calcutta district).

268. ***Eimeria mandali*** Banik and Ray

1964. *Eimeria mandali* Banik and Ray, *Bull. Calcutta Sch. trop. Med. Hyg.*, **12,** p. 27.

Diagnosis : Oocyst round, double layered, measuring 14.5 - 20.6 (17.6) μm × 14.2 - 18.8

(16.5) µm, shape index 1 : 1, micropyle and oocystic residuum present; sporocyst pyriform, 6.5 - 12.0 µm × 4.5 - 8.5 µm, sporocystic residual mass present at the centre; sporozoite banana-shaped, measuring 6.5 µm in length.

Host : Common Pea Fowl, *Pavo cristatus* Linnaeus; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district), and Uttar Pradesh.

269. ***Eimeria numeni*** Mandal

1965. *Eimeria numeni* Mandal, *Proc. zool. Soc.*, Calcutta, **18**, p. 47.

Material examined : Sev. exs., Basanti, South 24-parganas, 3.vii.1976, A.K. Mandal.

Diagnosis : Oocyst spherical, double layered, 20.9 - 23.1 µm in diameter, micropyle and oocystic residuum absent; sporocyst pyriform, 5.6 - 7.6 (6.6) µm × 4.5 - 6.5 (5.5) µm, shape index 1.2, sporocystic residuum present as scattered mass; sporozoite elongated, 5.9 µm × 2.5 µm; Schizont spherical, 5.5 µm in diameter, microgametocyte 7.7 µm × 4.4 µm; macrogametes oval, 6.6 µm × 4.4 µm.

Host : Curlew, *Numenius arquata (Linnaeus);* site of infection : intestine.

Distribution : India : West Bengal (South 24-Parganas district).

270. ***Eimeria pavonina*** Banik and Ray

1961. *Eimeria pavonina* Banik and Ray, *Bull. Calcutta Sch. trop. Med. Hyg.*, **9**, p. 61.

Diagnosis : Oocyst egg-shaped, double layered, 20 - 28 (26.5)µm × 16 - 20 (18.5)µm, micropyle and oocystic residuum present; sporocyst boat-shaped, 6 - 16 µm × 4 - 8 µm, stieda body present at the pointed end, sporocystic residuum present as a scattered granules, sporozoites elongated, 10 - 12 µm in length.

Host : Common Pea Fowl, *Pavo cristatus* Linnaeus; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

271. ***Eimeria roscoviensis pluvialina*** Mandal

1965. *Eimeria roscoviensis pluvialina* Mandal, *Proc. zool. Soc. Calcutta,* **18**, p. 47.

1974. *Eimeria pluvialina* Mandal, Nomen novum, Pellerdy, *Coccidia and Coccidiosis,* Verlag Paul Parey Berlin and Hamburg, p. 334.

Material examined : Sev. exs., Narayantala, South 24-Parganas, 12.v.1974, A.K. Mandal.

Diagnosis : Oocyst pyriform or ovoidal, double layered, 17.7 - 19.7 µm × 13.3-15.3 µm, shape index 1.3, micropyle absent, oocystic residuum present; sporocysts pyriform, 11.1 - 13.1 µm × 5.6 - 7.6 µm, shape index 1.7, sporocystic residuum present as scattered mass; sporozoites elongated, 8.8m × 2.5 µm; schizonts 6.6 µm in diameter; merozoites sphindle-shaped, 7.7 -8 µm in length; macrogametocyte 9.9 µm × 7.7 µm; macrogamete measuring 8.8 µm × 5.5 µm.

Host : Golden Plover, *Pluvialis appricaria* (Linnaeus); site of infection : intestine.

Distribution : India : West Bengal (South 24-Parganas district).

Remarks : Pellerdy (1974) treated this subspecies as a distinct species but herein its subspecies status is retained.

272. ***Eimeria tenella*** (Railliet and Lucet)

1891. *Eimeria avium* acut., *Coccidium tenellum* Raillict and Lucet, *Bull. Soc. zool. Fr.*, **16**, p. 246.

1909. *Eimeria tenella* : Fantham, *Proc. zool. Soc. London,* **14**, p. 43.

Material examined : Sev. exs., Calcutta, 10.ix. 1972, A.K. Mandal.

Diagnosis : Oocyst broad-oviod, 19.2 - 26 μm × 16-22 μm, oocystic wall striated, micropyle present; sporocyst measuring 11 μm × 7 μm, stieda body present; sporozoites elongated banana-shaped, 5 - 8 μm in length; mature schizont 42.5 μm × 37.5 μm, merozoite 6.5 μm in length.

Host : Domestic Fowl, *Gallus domesticus* (= *Gallus* sp.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district), Madhya Pradesh, Uttar Pradesh, Orissa; Tamil Nadu. Elsewhere : Bangladesh; consmopolitan.

273. ***Eimeria tropicalis*** Malhotra and Ray

1961. *Eimeria tropicalis* malhotra and Ray, *Proc. Indian Sci. Congr.* p. 412.

Diagnosis : Oocyst spherical or sub-spherical, 19 - 24 μm × 18 - 23 μm, oocystic residuum present; sporocyst ellipsoidal, 10 μm × 6 μm, stieda body and sporocystic residuum present; sporozoites globular in shape.

Host : Blue rock Pigeon, *Columba livia intermedia* (Strickland); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district), Uttar Pradesh.

274. ***Eimeria vanelli*** Mandal

1965. *Eimeria vanelli* Mandal, *Proc. zool. soc. Calcutta,* **18**, p. 47.

Material examined : Sev. exs., Basanti, South 24-Parganas, 10.Viii. 1973, A.K. Mandal.

Diagnosis : Oocyst oval or pyriform, double layered, provided with warts, 19.19 - 21.9 μm × 13.3 - 15.3 μm, shape index 1.4, micropyle present, oocystic residuum absent; sporocyst Pyriform, 11.1 - 13 μm × 5.6 - 7.6 μm; index 1.8, sporocystic residuum present as scattered mass; sporozoites elongated tapering at both ends, 8.7 μm in length; young schizont 5.5 μm in diameter afterwards become elongated producing 6 - 10 merozoites, each measuring 9.9 μm in length and arranged symmetrically; microgametocytes oval, 11 μm × 7.7 μm; macrogametocytes oval, 12.1 μm × 9.9 μm.

Host : Yellow-wattled Lapwing, *Vanellus malabaricus* (Boddaert); site of infection : intestine.

Distribution : India : West Bengal, (South 24-Parganas district).

E. *Eimeria* of mammals

275. ***Eimeria ahsata*** Honess

1942. *Eimeria ahsata* Honess, *Univ. Wyo. Agric. Exp. Sta.,* **249**, p. 3.

Material examined : Sev. exs., Calcutta, 12.x.1976, A.K. Mandal; Barasat, North 24-Parganas, 9.ix.1973, A.K. Mandal; Basanti, South 24-Parganas, 17.vii.1977, A.K. Mandal.

Diagnosis : Oocyst ellipsoidal to ovoid, 37 - 45 µm × 22 - 29 µm, oocystic residuum absent, micropylar cap present; sporocyst elongate ovoid, 16 - 21 µm × 7 - 10 µm, stieda body absent, sporocystic residuum present as scattered granules; sporozoite banana-shaped; microgametocyte 36.5 µm × 23 µm; macrogametocyte 35-45 µm in diameter.

Host : Rocky mountain bighorn sheep, *Ovis canadensis*; Domestic sheep, *Ovis* sp., and domestic goat, *Capra hircus* (= *Capra* sp.); site of infection : small intestine.

Distribution : India : West Bengal (Calcutta, North and South 24-Parganas districts), Orissa, Uttar Pradesh. Elsewhere : Sri Lanka.

276. *Eimeria antilocervi* Ray and Mandal

1960. *Eimeria antelocervi* Ray and Mandal, *Bull. Calcutta Sch. trop. med. Hyg.*, **8**, p. 57.

Diagnosis : Oocyst cylindrical, 28 - 34 µm × 12 - 16 µm, with a distinct micropyle, oocystic wall single layered, oocyst residuum absent; sporocyst pyriform, 11 µm × 7 µm, sporocystic residuum present.

Host : Balck buck, *Antelope cervicaprae* [= *Antilope cervicapra* (Linn.)]; site of infection : intestine

Distribution : India : West Bengal (Calcutta district).

277. *Eimeria arloingi* (Marotel)

1905. *Coccidium arloingi* Marotel, *Recl. Med. vet.*, **33**, p. 243.

Material examined : Sev. exs., Calcutta, 12.ix.1973, A.K. Mandal; Sev. exs., 8.ix.1974, Basanti, South 24-Parganas, A.K. Mandal; Sev. exs., 16.iii.1977. Basirhat, North 24-Parganas, A.K. Mandal.

Diagnosis : Oocyst ellipsoidal, 24.65 - 37.4 (30.3) µm in length, with crescent-shaped polar cap lying above the micropyle, shape index 0.16 - 0.62, oocystic residuum absent; sporocyst elongate ovoid, 11 - 17 µm × 6 -10 µm, stieda body absent or vestigial, sporocystic residuum present; sporozoite elongated; schizont 146 µm × 122 µm, merozoite 9 µm × 2 µm microgametocyte 11 - 26 µm × 8 - 16 µm.

Host : Domestic goat, *Capra hircus* (= *Capra* sp.) Domestic sheep, *Ovis* sp.; Ladakh goat, *Capra ibex* Linn.; Rocky mountain bighorn sheep, *Ovis canadensis* Shaw; Mouflon, *Ovis musimon* Linn., *Ovis ammon* Linn.; site of infection : small intestine.

Distribution : India : West Bengal (Calcutta, North & South 24- Parganas district), Orissa, Andhra Pradesh, Bihar, Madhya Pradesh, Punjab, Maharashtra and Uttar Pradesh.

278. *Eimeria bandicota* Bandyopadhyay and Das Gupta

1982. *Eimeria bandicota* Bandyapadhyay and Das Gupta, *J. Bengal nat. Hist. Soc. (N.S.)*, 1(3), p. 28.

Diagnosis : Oocysts supspherical measuring 24 - 28.5 µm × 21.5 - 23 µm (mean 26 µm × 22.5 µm), micropyle present but polar granule and oocystic residuum absent; sporocyst ovoid

10.5 - 13.5 μm × 6 - 9 μm (mean 11.7 μm × 7.6 μm), stieda body small,o sporocystic residuum present; sporozoites measuring 9 - 12 μm × 3.5 - 4.5 μm (mean 10.1 μm × 4 μm).

Host : *Bandicota bengalensis* (Gray); site of infection : intestine.

Distribution : India : West Bengal (Darjiling district).

279. ***Eimeria bandipurensis*** Ray, Banik and Mukherjee

1965. *Eimeria bandipurensis* Ray, Banik and Mukherjee, *J. Protozool.*, **12**, p. 478.

Diagnosis : Oocyst spherical or egg-shaped, measuring 16 - 18 μm in diameter or 16 - 20 μm × 14 - 18 μm, double laryered, micropyle and oocystic residuum absent; sporocyst broadly pear-shaped with a stied body at the narrow end, 6 -10 (8) μm × 6 8 (6.5) μm, sporocystic residuum present; sporozoites banana-shaped.

Host : Indian Palm Squirrel, *Funambulus palmarum* (Linnaeus); site of infection : intestine.

Distribution : India : West Bengal (Hugli District) and Kerala.

280. ***Eimeria biswapatii*** Bandyapadhyay

1986. *Eimeria biswapatii* Bandyapadhyay *Acta. Protozool.*, **25** (1), p. 109.

Diagnosis : Oocyst ovoid, measruing 16.5 - 19.5 μm × 12-15 μm micropyle present, polar granules and oocystic residuum absent; sporocyst ovoid, devoid of stieda body, measuring 8.25 - 10.5 μm × 5.5 - 6.5 μm, sporocystic residuum present; sporozoites comma-shaped, 6-7.5 μm × 2.25 - 3 μm.

Host : *Bandicota indica* (Bechstein); site of infection : intestine.

Distribution : India : West Bengal (Haora district).

281. ***Eimeria cervis*** Mandal and Choudhury

1982. *Eimeria cervis* Mandal and Choudhury, *Sonderdruck aus Verhandun gebercht des* xxic. *Internationalen Symposiums uber die Erkrankungen der Zootiere*, p. 327.

Diagnosis : Oocyst subspherical, measuring 12.65 - 14.57 (13.62) μm × 9.90 - 11.50 (10.82)μm, mycropyle, oocystic residuum absent; sporocyst cylindrical, slightly curved with one end narrower than the other, 6.60 - 8.25 μm × 2.20 - 3.30 μm, sporocystic residuum absent; sporozoite club-shaped with a blunt posterior and a tapering anterior end, measuring 3.30 - 6.05 μm in length.

Host : Spotted deer, *Axis axis* Erxleben; site of infectin : intestine.

Distribution : India : West Bengal (South 24-Parganas district).

282. ***Eimeria chirstenseni*** Levine, Ivens and Fritz

1962. *Eimeria christenseni* Levine, Ivens and Fritz, *J. Parasit.*, **48**, p. 255.

Material examined ; Sev. exs., Calcutta, 17.vii.1978, A.K. Mandal.

Diagnosis : Oocyst ovoid, rarely ellipsoidal, and slightly flattened at the micropylar end, 32

- 43 µm × 24 - 30 µm with a mean of 39 µm × 26 µm, micropyle present, micropylar cap prominent, colourless round-shaped, oocystic residuum absent; sporocysts broadly ovooid, stieda body absent, 14 - 18 µm × 8 - 11 µm with a mean of 15 µm × 10 µm, sporocystic residuum present; sporozoites arranged head to tail order.

Host : Domestic goat, *Capra hircus* (= *Capra* sp.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district), Madhya Pradesh and Uttar Pradesh.

283. ***Eimiria clupearum*** (Thelohan)

1894. *Coccidium clupearum* Thelohan, *Archs. Zoo. exp. gen.*, **2**, p. 541.

1987. *Eimeria clupearum* (Thelohan) : Mandal, *Fauna of India, Protozoa, Sporozoa, Eimeriidae,* p. 256.

Diagnosis : Oocyst spherical, 18 - 21 (19.5) µm in diameter; sporocyst spherical 10 µm in diameter, sporocystic residuum present; sporozoite with rounded anterior end and pointed posterior end.

Host : Herring, *Alosa sardina; Clupea harengus,* Sardine, *Saradina* (= *Clupea*) *pilchardus*; Spart, *Sprattus* (=*Clupea*) *sprattus*; Ancovy, *Engraulis encrosicholus;* Round herring, *Etrumeus micropus;* Sardine, *Sardina melanostrictal;* Mackerel, *Scomber scomber* and also from Man; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Remarks : Knowles (1924) recorded this species from facal sample of man. However, the species was originally found in large numbers in the intestine of herrings, mackerel and sparts, consumption of which might be the possible reason that the oocysts were found in the faeces of man (Mandal, 1987).

284. ***Eimeria comminispora*** Bandyopadhyay and Das Gupta

1984. *Eimeria comminispora* Bandyopadhyay and Das Gupta, *J. Bengal nat. Hist. Soc.* (New Series), 3(1), p. 19.

Diagnosis : Oocysts ellipsoid, 32 - 38 µm × 25 - 27 µm (mean 34.5 µm × 26.75 µm), double walled, with no micropyle, polar granule and oocystic residuum; sporocyst ellipsoid, devoid of stieda body, 11 - 14.3 µm × 8.9.5 µm (mean 13.4 µm × 8.82 µm); sporozite 9.5 - 11.5 µm × 3.5 - 4.5 µm (mean 10.5 µm × 4.2 µm); sporocytic residuum globular.

Host : *Petaurista magnificus* (Helgson); site of infection : intestine.

Distribution : India : West Bengal (Darjiling district).

285. ***Eimeria crandallis*** Honess

1942. *Eimeria crandallis* Honess, *Univ. Wyo, Agric. Expt. Sta.,* **249**, p. 3.

Material examined : Sev. exs., Calcutta, 17. x.1973, A.K. Mandal.

Diagnosis : Oocyst more or less spherical to oval or ellipsoidal, measuring 17 - 23.8 µm × 17 - 22.1 µm (mean 20.4 µm × 18.4 µm), shapre index 0.74 - 0.93, micropyle with a very

small polar cap, oocystic residuum absent; sporocyst ovoid, 13.6 µm × 3.6 µm, with no stieda body, sporocystic residuum usually present; sporozoite with one or two clear globules.

Host : Rocky Mountain bighorn sheep, *Ovis c. canadensis* Shaw; Domestic goat, *Capra hircus* (= *Capra* sp.); Siberian wild goat, *Capra siberica* (Pallas), Domestic sheep, *Ovis aries* (= *Ovis* sp.); Agrali, *Ovis amon* (Linn.); Mouflon, *Ovis musimon*, Shew; Ladhak goat/Alpine Ibex, *Capra ibex* (Linn.); Wild goat, *Capra aegagreus* (Erxleben); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district), Bihar, Jammu and Kashmir, Madhya Pradesh, Maharashtra, Orissa and Tamil Nadu.

286. *Eimeria darjeelingensis* Sinha and Sinha

1980. *Eimeria darjeelingensis* Sinha and Sinha, *Acta Protozool.*, 19, p. 293.

Diagnosis : Oocyst subspherical, 15.0 - 18.7 µm × 13.2 - 17.4 (mean 16.7 µm × 14.9 µm), oocystic wall smooth, bilayered of uniform thickness, oocystic residuum, micropyle and polar granule absent; sporocyst ovoid, single layered, 7.1 - 8.9 µm × 5.5 - 7.0 µm (mean 8.0 µm × 5.6 µm), stieda body and sporocystic residuum present; sporozoites 4.0 5.5 µm × 1.4 - 1.8; trophozoite subspherical to ovoid 5.6 - 7.7 µm × 5.2 - 6.3 µm; multinucleated schizont with 12 nuclei, measuring 13.9 µm × 11.9 µm; macrogamete 14.8 µm × 11.0 µm; microgamete 5.6 - 11.0 µm × 5.6 - 9.0 µm.

Host : House-shrew, *Suncus murinus soccatus* (Hodgson), site of infection : small intestine.

Distribution : India : West Bengal (Darjiling district).

287. *Eimeria faurei* (Moussu and Marotel)

1902. *Coccidium faurei* Moussu and Marotel, *Archs. Parasit.*, **6**, p. 82.

1909. *Eimeria faurei* : Martin, *Rev. Vet.*, Toulouse, **34**, p. 201.

Material examined : Sev. exs., Calcutta, 17.vii.1975, A.K. Mandal.

Diagnosis : Oocyst egg-shaped, 23.8 38.34 (29.53) µm × 18.8 - 23.8 (22.36) µm, micropyle at the narrower and with no cap, oocystic residuum absent, polar granules present; sporocyst elipsoidal, 15 - 17 µm × 8 - 10 µm, sporocystic residuum scattered, stieda body absent; sporozoite elongated; schizont 100 µm in diameter.

Host : Domestic sheep, *Ovis aries* (= *Ovis* sp.); Domestic goat, *Capra hircus* (= *Capra* sp.); Rocky Mountain Bighorn sheep, *Ovis canadensis* Shaw; Argali, *Ovis amon* (Linnaeus);Oriental sheep, *Ovis orientalis* Gmelin; Barbary sheep, *Ammotragus lervia* [= *Ovis tragelapus* (Peller)]; Ibex, *Capra ibex* Linnaeus; Chamolis, *Rupicapra rupicapra;* Siberain Wild goat, *Capra siberica* (Pallas); site of infection : small intestine.

Distribution : India : West Bengal (Calcutta district), Madhya Pradesh, Maharshtra, Orissa, Punjab and Uttar Pradesh.

288. *Eimeria garumarana* Bandhyopadhyay and Das Gupta

1984. *Eimeria garumarana* Bandyopadhyay and Das Gupta, *J. Bengal nat. Hist. Soc.*, (New Series) 3(2), p. 28.

Diagnosis : Oocyst subspherical measuring 17.25 - 20.25 µm × 16.5 - 19.25 µm (mean 18.45 × 17.85 µm), prominent micropyle but with no polar granule or oocystic residuum; sporocyst ovoid 9-11.25 m X 6 - 8.25 µm with a mean 9.78 × 7.45 µm, stieda body present; sporozoites comma-shaped measuring 6 - 8.25 (7.12) µm × 2.25 - 3.75 (3) µm; sporocystic residuum in the form of globules.

Host : *Rattus rattus brunneusculus* (Hodgson); site of infection : intestine.

Distribution : India : West Bengal (Jalpaiguri district).

289. *Eimeria granulosa* Christensen

1938. *Eimeria granulosa* Christensen, *J. Parasit.*, **24**, p. 453.

Material examined : Sev. exs., Calcutta, 21.x.1975, A.K. Mandal.

Diagnosis : Oocyst pyriform, egg or urn-shaped, measuring 22 - 35 µm × 17 - 25 µm (mean 29.4 µm × 20.9 µm), micropyle 3-5 µm in diameter with a polar cap, oocystic residuum or polar granule absent; sporocyst ovoid or elongate ovoid, rounded at both ends 13 - 16 µm × 8 - 9 µm, stieda body faintly present; sporocystic residuum present; sporozoite elongated with one end narrower than the other.

Host : Domestic sheep, *Ovis aries* (= *Ovis* sp.); Rocky mountain bighorn sheep, *Ovis canadensis* Shaw; Domestic sheep, *Ovis* sp.; Domestic goat, *Capra hircus* (Linn.) (= *Capra* sp.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district), Haryana, Orissa, Madhya Pradesh and Uttar Pradesh.

290. *Eimeria intricata* Spiegel

1925. *Eimeria intricata* Spiegel, *Z. Infktkankh. u. Hygine der Hasstiers*, **28**, p. 42.

Material examined : Sev. exs., Calcutta, 12.xii.1973, A.K. Mandal.

Diagnosis : Oocyst 37.4 - 51.0 µm × 28.9 - 37.4 µm (mean 45.5 µm × 32.7 µm), ellipsoidal to ovoid, shape-index 0.65 - 0.83, exocystic wall of the oocyst very thick, large micropyle 3.4 - 8.5 µm in size having a cresent-shaped polar cap; sporocyst pyramidal, 17 - 20.4 µm X 10.2 - 11.9 µm, stieda body and sporocystic residuum present; sporozoite elongated; schizont 32 - 37 µm × 21 - 25 µm containing 25 - 40 merozoites; macrogamete 36 - 54 µm × 25 - 36 µm.

Host : Domestic sheep, *Ovis arises* (= *Ovis* sp.); Rocky mountian bighorn sheep, *Ovis ammon* (Linnaeus); Domestic goat, *Capra hircus* (= *Capra* sp.); Roe deer, *Capreolus capreolus* (Linn.); Fallow Deer, *Dama dama* (Linnaeus); site of infection : small intestine.

Distributin : India (Calcutta district), Bihar, Madhya Pradesh, Maharashtra, Orissa, Punjab and Uttar Pradesh.

291. *Eimeria jalpaiguriensis* Bandyopadhyay

1982. *Eimeria jalpaiguriensis* Bandyopadhyay, *J. Bengal nat. Hist. Soc.* (N.S.), **1**(2) p. 23.

Diagnosis : Oocyst subspherical to ovoid measuring 21 - 22.5 µm (mean 21.6 µm) × 18 - 21 µm (mean 19), micropyle, polar granule and oocystic residuum absent; sporocyst ovoid with

small stieda body, 9 - 11 μm × 6 - 7.5 μm; sporozoites broad and elongated, 6 - 9 μm × 2 - 3.5 μm; 8 - 10 globules in the sporocystic residual bodies.

Host : *Herpestes edwardsi* (Geoffroy); site of infection : Intestine.

Distribution : India : West Bengal (Jalpaiguri district).

292. ***Eimeria micropylifera*** Bandyopadhyay and Das Gupta

1984. *Eimeria micropylifera* Bandyopadhyay and Das Gupta, *J. Bengal. nat. Hist. Soc.* (N.S.), 3(1), p. 19.

Diagnosis : Oocyst ovoid tapering at the micropylar end assuming bottle-neck shape, 32 - 35 μm × 22.5 - 25 μm (mean 33.16 μm × 23.66 μm), double walled, micropyle somewhat sunken in the bottle-neck; sporocyst naviculoid, 17 - 18 μm × 7 - 8.5 μm (mean 17.75 μm × 7.75 m), stieda body present; sporozoites head to tail oreinted, 12 - 13 μm × 3 - 4 μm (mean 12.62 μm × 3.37 μm); 6 - 8 globules in sporozoitic residuum.

Host : *Petaurista magnificus* (Hodgson); site of infection : intestine.

Distribution : India : West Bengal (Darjiling district).

293. ***Eimeria murinus*** Bandyopadhyay and Das Gupta

1985. *Eimeria murinus* Bandyopaadhyay and Das Gupta, *Indian J. Parasit.*, 9(1), p. 101.

Diagnosis : Oocyst subspherical, 15 - 21 (18.8) μm × 14 - 16.5 (16.1) μm, micropyle, polar granule and oocyst residuum absent; sporocyst ovoid, 8.5 - 13.5 (12.6) μm × 6.5 8 (5.1) μm, stieda body small; sporozoites comma-shaped 4.5 - 7 (5.1) × 2 - 3.5 (3.2) μm; sporocystic residuum in the form of scattered globules.

Host : *Suncus murinus murinus* (Linnaeus); site of infection : intestine.

Distribution : India : West Bengal (exact locality not mentioned).

294. ***Eimeria nausta*** Bandyopadhyay and Dasgupta

1984. *Eimeria nasuta* Bandyopadhyay and Das Gupta, *J. Bengal nat. Hist. Soc.* (N.S.), 3(1), p. 19.

Diagnosis : Oocyst ovoid tapering at one end to a bottle-neck shape, 23 - 26 μm × 17 - 21 μm (mean 25.12 μm × 19.5 μm), micropyle, polar granule, oocystic residuum absent; sporocysts spindle-shaped without stieda body, 14 - 15 μm × 6 - 7 μm (mean 14.5 μm × 6.5 μm); sporozoites comma-shaped, head to tail oriented, measuring 11 - 12.5 μm × 3.5 - 4.5 μm (mean 1.2 μm × 4.1 μm); sporocystic residuum granular.

Host : *Petaurista magnificus* (Hodgson); site of infection : intestine.

Distributin : India : West Bengal (Darjiling district).

295. ***Eimeria neodebliecki*** Vetterling

1965. *Eimeria neodebliecki* Vetterling, *J. Parasit.*, 5, p. 897.

Material examined : Sev. exs., Calcutta, 7.vill.1975, A.K. Mandal.

Diagnosis : Oocyst ellipsoidal, occasionally ovoid in shape, 17 - 26 μm × 14 19 μm (mean

22.1 µm × 16 µm), length-width ratio 1.2 to 1.3 to 1.3 (1.25), oocystic wall double-layered, micropyle and oocystic residuum absent, one or two polar granules occasion. present: sporocyst broadly ovoid, 9 - 13 µm × 6 - 8 µm (mean of 10.4 µm × 6.6 µm), stie' ·ay ·orocystic residuum present; sporozoite banana-shaped, usually lying length wise head . position.

Host : Domestic pig. *Sus scrofa scrofa* (=*Sus scrofa* Linn.) and Wild boar, *Sus scrofa scrofa* (Lin..); site of infection : intestine.

Distribution : India : West Bengal (Calcutta and South 24- Parganas districts), Madhya Pradesh and Uttar Pradesh.

296. *Eimeria ninakholyakimovi* Yakimoff and Rastegaieff

1930. *Eimeria ninakholyakimovi* Yakimoff and Rastegaieff, *Arch. Protistenk.*, **70**, p. 185.

Material examined : Sev. exs., Calcutta, 17.v. 1975, A.K. Mandal.

Diagnosis : Oocyst ovoid to sub-spherical, 20.4-26.8 (22.2) µm x 17.0-20.4 (18.08) µm, shape index 0.83-0.91 (0.04), oocystic wall very thin, micropyle and oocystic residuum absent; sporocyst elongate ovoid, 9-14 µm x 4-10 µm, stieda body and sporocystic residuum present; sporozoite elongate, lying length wise and head to tail orientation; schizont 290 µm in diameter; macrogamete 9-18 µm x 7-13 µm.

Host : Domestic goat, *Capra hircus* (Linn.) (= *Capra* sp.); domestic sheep, *Ovis* sp.; Wild goat; *Capra aegagrus* (Erxleben); Siberian Wild goat, *C. Siberica* (Pallas); Alpine ibex, *C. ibex* Linn. and Rocky mountain bighorn sheep, *O. canadensis* Shaw; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district), Haryana, Madhya Pradesh, Maharashtra, Orissa, Punjab and Uttar Pradesh.

297. *Eimeria oryctolagi* Ray and Banik

965. *Eimeria oryctolagi* Ray and Banik, *Proc. Indian Sci. Congr.* p. 465.

Diagnosis : Oocyst ellipsoidal, 28.5-46.8 (38.7) µm x 12.5-28.5 (19.1) µm, shape index 1 : 2, double walled, micropyle and oocystic residuum present; sporocyst pyriform, 8.5-14.5 (10.0) µm x 4.5-8.5 (6.0) µm, stieda body and sporocystic residuum present; sporozoite elongated, tapering at one end, 10.5 µm in length.

Host : Domestic rabbit, *Oryctolagus cuniculis* Linn. (= *Oryctoalgus* sp.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

298. *Eimeria ovoidalis* Ray and Mandal

1961. *Eimeria ovoidalis* Ray and Mandal, *Proc. Indian Sci. Cong.*, p. 411.

Diagnosis : Oocyst ovoidal, 32.0-40.0 (35.5) µm x 20- 28 (23.8) µm, micropyle present, oocystic residuum absent; sporocyst oval, 14- 16 µm x 8-9 µm, sporocystic residual mass coursely granular, stieda body present; sporozoite ovoidal, 8-9 µm x 4-6 µm.

Host : Buffalo calf, *Bubalus bubalis* Linn.; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

299. ***Eimeria parva*** Kotlan, Mocsy and Vajda

1929. *Eimeria parva* Kotlan, Mocsy and Vajda, *Allstory Lapok.*, **52**, p. 304.

Material examined : Sev. exs., 24-Parganas (North & South), 17. vii. 1977, A.K. Mandal.

Diagnosis : Oocyst 13.6-18.7 µm x 11.9-15.3 µm (mean 16.2 µm x 13.4 µm), shape index 0.72-0.95 (0.81), oocyst ovoidal or subspherical in shape, double layered with no micropyle and polar cap; sporocyst ellipsoidal, stieda body and sporocystic residuum present; schizont 185-258 µm x 128-179 µm; macrogametocyte 15-19 µm in diameter.

Host : Domestic sheep, *Ovis aries* (= *Ovis* sp.); Domestic goat, *Capra hircus* (= *Capra* sp.); Asiatic Mouflon, *Ovis orientalis* Gmelin; Muflon, *O. musimon* Linnaeus; Argali, *O. ammon* (Linnaeus); Rocky mountain bighorn sheep, *O. canadensis* Shaw; Siberian wild goat, *Capra siberica* (= *Capra ibex siberica* (Pallas) and Alpine ibex, *C. ibex* Linnaeus; site of infection : intestine.

Distribution : India : West Bengal (Calcutta, North and South 24- Parganas districts), Bihar, Haryana, Madhya Pradesh, Punjab, Maharashtra, Orissa, and Uttar Pradesh.

300. ***Eimeria sibporensis*** Bandyopadhyay and Das Gupta

1986. *Eimeria sibporensis* Bandyopadhyay and Das Gupta, *Geobios new Reports*, **5**, p. 74.

Diagnosis : Oocyst subspherical to ellipsoid, 14-15 µm x 10.5-13.5 µm (mean 14.7 µm x 11.7 µm), micropyle present but no polar granule or oocystic residuum; sporocyst ovoid with no steida body, 7.5-9 µm x 6 µm, (mean 8 µm x 5 µm); sporozoite comma-shaped 6-7.5 µm x 2-3 µm (mean 6.3 µm x 2.6 µm); sporocytic residuum present.

Host : *Rattus rattus arboreus* (Horsfield); site of infection : intestine.

Distribution : India : West Bengal (Haora district).

301. ***Eimeria spinosa*** Henry

1931. *Eimeria spinosa* Henry, *Univ. Calif. Publ. Zool.*, **36**, p. 115.

Material examined : Sev. exs., Calcutta, 7. vii. 1977, A.K. Mandal.

Diagnosis : Oocysts ellipsoidal measuring 16-22.4 µm x 12.8-16 µm, entire surface with 1 µm high spines; sporocyst 9.1-11.7 µm x 5.2- 6.5 µm, stieda body and sporocystic residuum present; schizont 8- 10 µm with about 20 merozoites; macrogametocystes 7-9 µm in diameter.

Host : Domestic pig, *Sus scrofa* (Linn.); site of infection : small intestine.

Distribution : India : West Bengal (Calcutta district), Haryana, Madhya Pradesh and Orissa.

302. ***Eimeria suncus*** Ahluwalia, Singh, Arora, Mandal and Sarkar.

1979. *Eimeria suncus* Ahluwalia, *et. al., Acta Protozool.*, **18**, p. 451.

Material examined : Sev. exs., Calcutta, 15.v.1975, A.K. Mandal.

Diagnosis : Oocyst almost subspherical, 18.2-21.8 (19.50) µm x 15.5-16.8 (15.2) µm, bilayered wall with a micropyle cap, oocystic residuum and polar granules absent; sporocyst lemon-shaped, 9.5- 11.2 (10.5) µm x 6.5-8.8 (7.8) µm, with a nipple like protuberance at one end, sporocystic residuum beaded globular mass scattered within the sporocyst; sporozoites comma-shaped, 4.0-5.5 (4.5) µm x 3.2-3.8 (3.5); µm macrogametocyte 14 µm x 12.56 µm.

Host : House-shrew, *Suncus murinus murinus* Linn. and *S. murinus soccatus* Hodgson; site of infection : small intestine.

Distribution : India : West Bengal (Calcutta and Darjiling districts).

Genus ***Caryospora*** Leger

Key to the species

1 (2) Oocyst spherical, sporocyst spherical.....*C. gekkonis*

2 (1) Oocyst spherical to subspherical, sporocyst pear-shaped.....

3 (4) Sporocyst measuring 18-20 µm x 12-14 µm.....*C. bengalensis*

4 (3) Sporocyst measuring 12-16.5 µm x 9-12.8 µm.....*C. cobrae*

303. ***Caryospora bengalensis*** Mandal

1976. *Caryospora bengalensis* Mandal, *Acta Protozool.*, **15**, p. 405.

Material examined : Sev. exs., Chakdah, Nadia, 18. vii. 1975, R. Nandi.

Diagnosis : Oocysts spherical, 20-22.5 (21.5) µm in diameter, shape index 1.07, double layered, micropyle present, oocystic residuum absent; sporocyst double-layered, pear-shaped, 18-20 (19) µm x 12-14 913.5) µm, shape index 1.4, stieda body with a shiny plug at the pointed end, sporocystic residuum present; sporozoites bean-shaped 10-12 (11.0) µm in length and 2.5µm at its broadest width.

Host : Common water snake, *Enhydris enhydris* (Schneider); site of infection : intestine.

Distribution : India : West Bengal (Nadia district).

304. ***Caryspora cobrae*** Nandi

1985. *Caryospora cobrae* Nandi, *J. Protzool.*, **32**(1), p. 204.

Material examined : Sev. exs., Barddhaman, 17. vi. 1978, R. Nandi.

Diagnosis : Oocyst subspherical to spherical, 16.5-19.5 (18.5) µm x 16.5-18.5 (17.2) µm, L/W ratio 1.02-1.10; 2-layered, micropyle with a micropylar cap, polar granule and residuum absent; sporocyst pyriform, 12.0-16.5 (14.2) µm x 9.0-12.8 (11.8) µm, stieda body distinct, substieda body present, residuum present; sporozoite sausage-shaped to narrowly ovoid, 4.6-6.5 (5.4) µm x 1.2-3.0 (2.0) µm.

Host : *Naja naja* Linnaeus; site of infection : intestine.

Distribution : India : West Bengal (Barddhaman district).

305. ***Caryospora gekkonis*** Charkravarty and Kar

1947. *Caryospora gekkonis* Chakravarty and Kar, *J.R. Asiat. Soc. Bengal,* **12,** p. 3.

Diagnosis : Oocyst spherical, 18.5-20.5 (19.7) µm, double walled, no oocystic residuum, micropyle present; sporocyst almost spherical, thin-walled, 10.5-12.5 (11.5) µm in diameter, one end knob-like, sporocystic residuum present; sporozoites almost spherical, 2.5 µm in diameter.

Host : Takkhak or Indian Gekko, *Gekko gecko* (Linn.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Genus ***Isospora*** Scheneider

In all 34 species of Isospora have been reported so far from West Bengal out of which 2 are recovered from amphibian host, 3 from reptilian hosts, 20 from avian hosts and 9 from mamallian hosts. Host-wise key of this genus is as follows :

A. Key to the species of ***Isospora*** of amphibians

1 (2) Oocyst subcylindrical, 15.3-20.5 µm x 13.5-15.5 µm in dimensions.....*I. wenyoni*

2 (1) Oocyst broadly oval, 24.5-26.5 µm x 15.5-19.5 µm in dimensions.....*I. stomaticae*

B. Key to the species of ***Isospora*** of reptiles

1 (4) Oocyst spherical or subspherical, sporocyst elliptical.....

2 (3) Oocyst 17.5-23.14 µm in diameter.....*I. knowlesi*

3 (2) Oocyst 25-37 µm in diameter.....*I. calotesi*

4 (1) Oocyst cylindrical, sporocyst spherical.....*I. minuta*

C. Key to the species of ***Isospora*** of birds

1(12) Oocyst oval.....

2(7) Oocyst with residuum.....

3(6) Sporocyst pyriform or spindle-shaped.....

4(5) Sporozoite elongated with tapering anterior end, 13.5-15.5 µm in length.....
.....*I. emberizae*

5(4) Sporozoite elongated-bluntly pointed at both ends, 9.2-10.4 µm in length.....
.....*I. lonchurae*

6(3) Sporocyst somewhat oval with narrow anterior end.....
.....*I. psittaculae*

7(2) Oocyst without residuum.....

8(11) Sporocyst pyriform.....

9(10) Sporozoite elongated, 11.1-13.1 µm in length.....*I. pycnonotae*

10(9) Sporozoite sickle-shaped, 6.5 µm in length.....*I. muniae*

11(8) Sporocyst oval.....*I. zosteropis*

12(1) Oocyst spherical or subspherical.....

13(16) Oocyst with micropyle.....

14(15) Oocyst spherical, 18.7-23.3 µm in diameter, sporocysts pyriform.....*I. bengalensis*

15(14) Oocyst subspherical, 22.5-24.5 µm x 19.5-21.5 µm in dimensions, sporocysts elongately oval.....*I. temenuchi*

16(13) Oocyst without micropyle.....

17(26) Sporocyst pyriform.....

18(25) Sporozoite elongated.....

19(20) Oocystic wall with bulbous thickening at broader pole.....*I. bellaricae*

20(19) Oocystic wall without any bulbous thickening.....

21(22) Sporozoite more than 10 µm in length, oocyst spherical, 20.3-24.5 µm in diameter.....*I. ginginiana*

22(21) Sporozoite less than 10 µm in length.....

23(24) Oocyst spherical, (23.2-25.4 µm in diameter).....*I. megalaimae*

24(23) Oocyst subspherical.....

24a Oocyst, 19.09-24.94 µm x 16.60-23.22 µm, sporocyst 11.62-19.92 µm x 8.32-12.45 µm.....*I. estrildi*

24b Oocyst 16.65-23.31 µm x 15.54-21,09 µm, sporocyst 10.54-14.95 µm x 7.75-1054 µm.....*I. copsychi*

24c Oocyst, 20.75-24.09 µm x 19.92-22.49 µm, sporocyst, 13.28-16.60 µm x 9.32-11.62 µm.....*I. mandali*

25(18) Sporozoite not elongated.....

25a Sporozoite banana-shaped, 6-7 µm x 1.5-2.0 µm.....*I. mayuri*

25b Sporozoite bean-shaped, 8.5 µm x 2.3 µm.....*I. lacazei*

25c Sporozoite sausage-shaped with pointed anterior end, 6 µm x 1.6 µm.....*I. gypsi*

25d Sporozoite club-shaped, 7.5-10.2 µm x 10.8-2.5 µm.....*I. capistrata*

26(17) Sporocyst not pyriform.....

27(28) Sporocyst conical, (16-18 µm x 11-12.5 µm).....*I. concinus*

28(27) Sporocyst oval, (17.5 μm x 18.5 μm).....*I. ceylonensis*

D. Key to the species of ***Isospora*** of mammals

1(6) Oocyst with micropyle.....

2(3) Oocyst elongated, egg-shaped with one end more constricted that other forming neck .....*I. belli*

3(2) Oocyst ovoidal or spherical to subspherical without any constriction as above.....

4(5) Oocyst ovoidal, 19.5 μm x 12 μm, sporocyst 7.5 μm x 6 μm.....*I. sundarbanensis*

5(4) Oocyst spherical to subspherical, 21-24.7 μm x 19.5-22.5 μm, sporocyst ovoid, 12-15.75 μm x 9-11.25 μm.....*I. sibporensis*

6(1) Oocyst without any micropyle.....

7(8) Oocyst not elongated, not parasitic in man.....*I. hominis*

8(7) Oocyst not elongated, not parasitic in man.....

9(10) Oocyst spherical, ovoid or egg-shaped.....

9a Oocyst subspherical, 36-40 μm x 32 μm; sporozoite bean-shaped.....*I. canis*

9b Oocyst spherical, 16 μm in diameter; sporozoite banana-shaped.....*I. tropicalis*

9c Oocyst ovoid or egg-shaped, 39-48 μm x 26-37 μm; sporozoite comma-shaped..... .....*I. felis*

9d Oocyst ovoid, 27-30 μm x 20-25 μm; sporozoite elongated with one end pointed..... .....*I. rivolta*

10(9) Oocyst rhomboidal, (30-32 μm x 28-31 μm).....*I. leonina*

A. *Isospora* of amphibians

306. *Isospora stomaticae* Chakravarty and Kar

1944. *Isospora stomaticae* Chakravarty and Kar, *Proc. Indian Sci. Congr.*, p. 104; 1952, *Proc. zool. Soc. Calcutta.* **5**, p. 11.

Diagnosis : Oocyst oval or spherical, double layered, both the walls thin, without any residuum and micropyle, 24.5-26.5 (25.5) μm x 15.5-19.5 (17.5) μm, shape index 1.5; sporocyst egg-shaped, with a stieda body, at the anterior end, 15.5-17.5 (16.5) μm x 10.5-11.5 (10.9) μm, shape index 1.5, sporocystic residuum present; sporozoite elongated, 12.5-14.5 μm x 2.5-4.5 μm; schizonts with 8.12 elongated merozoites, 6.6 μm x 3.2 μm; macrogametocyte round or oval, 15 μm in diameter.

Host : Marbled Toad, *Bufo stomaticus* Lutken; site of infection : small intestine.

Distribution : India : West Bengal (Calcutta district).

307. ***Isospora wenyoni*** Ray and Das Gupta

1935. *Isospora wenyoni* Ray and Das Gupta, *Arch. Protistenk.*, **86**, p. 219.

Diagnosis : Oocyst subcylindrical, double layered, 15.3-20.5 (17.5) µm x 15.5 (14.5) µm, shape index 1.2, oocystic residuum present, micropyle absent; sporocyst naviculoid, 10.0-13.3 (11.8) µm x 7.5-9.5 (8.5) µm, shape index 1.3, sporocystic residuum present; sporozoite elongated tapering at one end, mature schizont 15 µm in diameter; macrogametocyte 16-20 µm x 11-14 µm.

Host : Indian common Toad, *Bufo melanostictus* Schneider, Indian Bull frog, *Rana tigrina* Daudin, and Paddy field frog, *Rana limnocharis* Wiegmann; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

B. ***Isospora* of reptiles**

308. ***Isospora calotesi*** Bhatia

1938. *Isospora calotesi* Bhatia, *The Fauna of British India, including Ceylon and Burma,* Protozoa : Sporozoa, Taylor and Francis, London, p. 167.

Diagnosis : Oocyst spherical or subspherical, double-layered, with a micropyle but without any oocystic residuum, 25.0-3.70 (32.5) µm in diameter; sporocyst elliptical, 12.5-17.5 (14.5) µm x 9.5-10.5 (9.8) µm, shape index 1.5, with a stieda body at the anterior end, sporocystic residuum present; sporozoites elongated 12.0 µm x 2.5 µm; schizont 22 µm x 17 µm, producing small vermiform merozoites about 100 in number.

Host : Garden lizard, *Calotes versicolor* (Daudin); site of infection : intestine.

Distrribution : India : West Bengal (Calcutta distrrict) and Maharashtrra.

309. ***Isopora knowlesi*** Ray and Das Gupta

1937. *Isospora knowlesi* Ray and Das Gupta, *Arch. Protistenk.*, **88**, p. 269.

Diagnosis Oocyst spherical, double layered, 17.5-23.14 (21.7) µm in diameter, residuum and micropyle absent; sporocyst ellipsoidal, 12.0-15.5 (14.3) µm x 7.3-10.5 (8.5) µm, shape index 1.7; sporozoite elongated tapering at one end, 10.5 µm-12.5 µm in length.

Host : House lizard, *Hemidactylus flaviviridis* (Ruppell); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

310. ***Isopora minuta*** Mitra and Das Gupta

1937. *Isopara minuta* Mitra and Das Gupta, *Proc. Indian Sci. Congr.*, p. 291.

Diagnosis : Oocyst cylindrical, 14.5-16.5 (15.5) µm × 6.8-8.5 (7.7) µm, shape index 2.01, oocyst residium and micropyle absent; sporocyst spherical, 6.5-9.9 (7.7) µm in diameter, residium present as compact mass; sporozoites elongated tapering at one end, 3.5 - 4.6 µm in length.

Host : Cobra, *Naja naja* Linn.; King cobra, *Naja hannah* (Linn.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta distrrict) and Meghalaya.

C. *Isopora* of birds

311. *Isopora bellericae* Banik and Ray

1962. *Isopora bellericae* Banik and Ray, *Bull. Calcutta Sch. trop. Hyg.*, **10**, p. 16.

Diagnosis : Oocyst round or slightly oval, 18.7-24.5 (22.5) µm × 18.5 -22.5 (21.5) µm, double walled, with a bulbous thickening at one of the broader poles, residuum and micropyle absent; sporocyst pear-shaped with a prominent stieda body, 9.5 -15.00 µm × 7.5 - 9.5 µm, sporocystic residium present; sporozoites elongated.

Host : Crowned Crane, *Bellerica* (=*Bellearica*) *pavonina regulorum;* site of infection : Intestine.

Distribution : India : West Bengal (Calcutta district).

312. *Isopara bengalensis* Mandal and Chakravarty

1964. *Isopora aengalensis* Mandal and Chakravarty, *Proc. zool. Soc. Calcutta,* **17**, p. 35.

Material examined : Sev. exs., Calcutta, 27. iii. 1963, A.K. Mandal.

Diagnosis : Oocyst spherical, double walled, 18.7-23.3 (20.5) µm in diameter, micropyle present, oocystic residium absent; sporocyst pyriform 14.4-16.4 (15.4) µm × 6.7 - 8.7 (7.7) µm, shape index 2.0 with a knob at the pointed anterior end, sporocystic residium present; sporozoite elongated, 8.8 µm × 3.8 µm with shape index 2.6.

Host : House crow, *Corvus splendens* Viellot; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

313. *Isopora capistrata* Sinha and Sinha

1981. *Isopora capistrata* Sinha and Sinha, *Acta. Protozool.*, **20**, p. 129.

Diagnosis : Oocyst spherical 18.2 -24.6 (21.6) µm in diameter, double layered, oocystic residuum, micropyle, micropylar cap and polar body absent; sporocyst pyriform with a knob at the anterior end, 11.00-16.9 (14.6) µm × 8.8 -10.4 (9.6) µm, sporocystic residuum present; sporozoite club-shaped, 7.5-10.2 (9.0) µm × 1.8 - 2.5 (2.2) µm; schizont 7.9 µm × 7.6 µm; macrogamete 12 µm × 10 µm.

Host : Black-headed sibia, *Leioptila capistrata* Vigrous = *Hetrophasia capistrrata* (Vigrous); site of infection : intestine.

Distribution : India : West Bengal (Darjiling distrrict).

314. *Isopora ceylonensis* Sinha, Sinha, Chattoraj, Bandyopadhyay and Ghosh

1978. *Isopora ceylonensis* Sinha, Chattoraj, Bandyopadhyay and Ghosh, *Acta Protozool.*, **17**, p. 503.

Diagbosis : Oocyst oval or roudish, 20.5 -26.5 (24.8) µm × 18 - 23 (21.5), double layered, micropyle and oocystic residiuum absent; sporocyst 17.5 µm × 18.5 µm, residuum present as clusterous mass; sporozoite elongated, 10 µm × 3 µm; trrophozoite 5.7 µm × 3.0 µm; schizont 9.6 × 4.6 µm; macrogametocyte 12 µm × 9.8 µm.

Host : Common Himalayan grey-headed flycatcher, *Culiciapa ceylonensis calochrysea* Oberholser; site of infection : intestine.

Distribution : India : West Bengal (Darjiling district).

315. ***Isopora concinnus*** Sinha and Sinha

1979. *Isopora concinous* Sinha and Sinha, *Acta Protozool.*, **18**, p. 455.

Diagnosis : Oocyst spherical, 23.5 - 29.0 (27.0) µm × 21 -25 (23) µm, double layered, micropyle and oocystic residuum absent; sporocyst conical, 16.0 -18-0 (17.8) µm × 11.0- 12.5 (12.0) µm; sporozoite elongated, 11.8 µm × µm; trophozoite oval, 7.0 µm × 4.2 µm; schizont round or oval, 13.8 µm in diameter; macrogametocyte 16.3 µm × 15.4 µm.

Host : Sikkim Red-headed Tit. *Aegithalos concinnus rubricapillus* (Tricehurrst); site of infection: small intestine.

Distrribution : India : West Bengal (Darjiling district).

316. ***Isopora copsychi*** Paul, Ghosh and Haldar

1991. *Isopora copsychi* Paul, Ghosh and Haldar, *Environ. & Ecol.*, **9**(1), p. 128.

Diagnosis : Oocyst subspherical, 16.65 -23.31 (22.41) µm × 15.54 - 21.09 (21.13) µm, double layered, residuum, micropyle and polar granule absent; sporocyst pyriform, 10.54 -14.98 (14.77) µm × 7.7 - 10.54 (10.12) µm, stieda body and residuum present; sporozoite elongated, 2.22 - 5.55 µm × 1.66 - 2.77 µm.

Host : *Copsychus saularis* (Linn.); site of infection : intestine.

Distribution : India : West Bengal.

317. ***Isospora emberizae*** Mandal and Chakravarty

1964. *Isospora emberizae* Mandal and Chakravarty, *Proc. zool. soc. Calcutta*, **17**, p. 35.

Material examined : Sev. exs., Sundarban, 27.iii.1961, A.K. Mandal.

Diagnosis : Oocyst oval with three layers, middle one thicker than the other two layers, 22.2 -24.2 (23.2) µm × 18.8 - 20.8 (19.8) µm, shape index 1.1, micropyle and residuum present, sporocyst pyriform with a small knob at the anterior end, 18.8 - 20.8 (19.8) µm × 14.4 - 16.4 (15.4) µm, shape index 1.2, sporocystic residuum present; sporozoite elongated, 13.5 - 15.5 (14.5) µm × 2.5 - 3.5 (3.0) µm.

Host : Red headed bunting, *Emberiza bruniceps* Brandt; site of infection : intestine.

Distribution : India : West Bengal (South 24 Parganas district).

318. ***Isospara estrildi*** Paul, Ghosh and Haldar

1991. *Isospora estrildi* Paul, Ghosh and Haldar, *Environ. & Ecol.*, **9**(1), p 128.

Diagnosis : Oocyst subspherical, 19.9-24.94 (22.13) µm × 16.60 - 23.24 (20.80) µm, double layered, residuum and micropyle absent, polar granules present; residuum and micropyle absent, polar granule present; sporocyst pyriform, 11.62 - 19.92 (14.50) µm × 8.3 - 12.45 (9.40) µm, stieda body and residuum present; sporozoite elongated, irregularly arranged, 4.15 - 8.3 µm × 2.49 - 4.15 µm.

Host : *Estrilda amandava* (L.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

319. ***Isospora ginginiana*** Chakravarty and Kar

1944. *Isospora ginginiana* Chakravarty and Kar, *Proc. Indian Acad. Sci.*, **20** (B), p. 102.

Diagnosis : Oocyst round, double layered, 22.3 - 24.5 (23.4) µm, in diameter, micropyle and residuum absent; sporocyst pyriform with a refractile knob at anterior pointed end, 15.5 - 17.5 (16.5) µm × 10.5-11.5 (11) µm, shape index 1.5, residuum present; sporozoite elongated, 10.5 µm × 4.2 µm; schizont 8.8 µm in diameter; macrogametocyte 11 µm in diameter.

Host : Bank Myna, *Acridotheres ginginianus* (Lath.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

319a. ***Isospora ginginiana tristis*** Chakrvarty and Kar

1947. *Isospora ginginiana tristis* Chakravarty and Kar, *Proc. R. Soc.* Edinb. **62**, p. 225.

Diagnosis : Oocyst subspherrical or slightly oval, 24.0-30.0 (26.0) µm × 19.5 - 24.5 (21.9) µm, shape index 1.18; sporocyst pyriform, 15.5 - 17.5 (16.5) µm × 8.5 - 11.5 (10.5) µm, shape index 1.5; sporozoite elongated, 15.4 µm × 2.2 µm; other characters as for *I. ginginiana*.

Host : Common Mayna, *Acridotheres tristis tristis* (Linn.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Remarks : Pellerdy (1974) treated this subspecies as separate species *I. tristis*.

320. ***Isospora gypsi*** Patnaik and Mohanty

1969. *Isospora gypsi* Patnaik and Mohanty, *Curr. Sci.*, **38**, p. 316.

Material examined : Sev. exs., Calcutta, 12.iii.1972, A.K. Mandal.

Diagnosis : Oocyst spherical to sub-spherical, double layered, 17.0 - 23.5 (20.4) µm, × 14.5 - 19.5 (17.5) µm, shape index 1.5, residuum and micropyle absent, one or more polar granules present; sporocysts pyriform or ellipsoidal, 11.5 - 16.5 (13.2) µm × 8.2 - 8.5 (8.5) µm with a refractile plug like stieda body at the narrow anterior end, residuum present; sporozoite sausage-shaped, 6.0 µm × 1.6 µm, with pointed anterior end.

Host : Indian White-backed Vulture, *Gyps bengalensis* (Gmelin); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district), Orissa and Uttar Pradesh.

321. ***Isospora lacazei*** (Labbe).

1893. *Diplospora lacazei* Labbe, *C.r. hebl. Seanc Acad. Sci., Paris,* **117**, p. 407.

1893. *Isospora lacazei* Labbe, *C.r. helb. Seanc Acad. Sci, Paris,* **117** : 407.

Material examined : Sev. exs., Calcutta, 12.xii.1964, A.K. Mandal.

Diagnosis : Oocyst spherical or sub-spherical, double walled, 24.0 - 32.0 (26.8) µm × 20.0 - 30.0 (27.4) µm, shape index is 1.09, macropyle and oocystic residuum absent; sporocyst ovoid to pyriform with a button-shaped plug at the narrow anterior end, 14 - 22 (17.2) µm, × 10.0 -11.0 (10.3) µm, shape index 1.56, sporocystic residuum present; sporozoite bean-shaped, 8.5 µm 2.3 µm; schizont 14 µm × 10 µm, with 12-15 sickle-shaped merozoites; macrogamete 11-16 µm, in diameter.

Host : House Sparrow, *Passer domesticus* (Linn.); Baya, *Ploceus philippinus* (Linn.) Magpie Robin, *Copsychus saularis* (Linn.); Red-vented Bulbul, *Pycnonotus cafer* (Linn.) Pied Mayna, *Sturnia* (= *Sturnus*) *contra* (Linn.); common Mayna, *Acridotheres tristis tristis* (Linn.) and Bank Mayna, *Acridotheres ginginianus* (Latham); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Remarks : Pellerdy (1974) gave a detail account of this common and cosmopolitan parasite having world wide distribution.

322. ***Isospora lonchurae*** Mandal and Chakravarty

1964. *Isospora lonchurae* Mandal and Chakravarty, *Proc. zool. soc.* Calcutta, **17**, p. 35.

Material examined : Sev. exs., Calcutta, 12.3. 1963, A.K. Mandal.

Diagnosis : Oocyst oval, double layered, 24.3 - 26.4 (25.4) µm × 20.9 - 23.1 (21.8) µm, shape index 1.1, micropyle absent and oocystic residuum present; sporocyst pyriform with a small knob at the anterior end, 18.7 - 20.9 (19.5) µm, × 11.13.2 (12.1) µm, shape index 1.6 sporocystic residium present; sporozoite elongated bluntly pointed at both ends, 9.2 - 1.4 (9.6) µm, × 2.5-3.5 (2.8) µm; macrogemetocyte 8.8 - 11.0 µm in diameter.

Host : Spotted munia, *Lonchura punctulata* (Linn.); Pied Mayna, *Sturnus contra* Linn.; site of infection : intestine.

Distribution : India West Bengal (Calcutta district).

323. ***Isospora mandali*** Paul, Ghosh and Haldar

1991. *Isospora mandali* Paul, Ghosh and Haldar, *Environ & Ecol.*, **9**(1), p. 131.

Diagnosis : Oocyst spherical or subspherical, 20.75 - 24.09 (22.41) µm × 19.92 - 22.41 (21.13) µm, double layered, micropyle absent, polar granules present; sporocyst pyriform, 13.28 - 16.66 (14.77) µm × 9.13 - 11.62 (10.12) µm, stieda body and sporocystic residuum present; sporozoite elongated, 4.89 - 6.64 µm × 1.66 - 2.66 µm.

Host : *Lonchura striata* (L.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

324. ***Isospora mayuri*** Patnaik,

1966. *Isospora mayuri* Patnaik, *Indian J. Microbiol.*, **6**, p. 53.

Material examined : Sev. exs. Calcutta, 10.iii.1971, A.K. Mandal.

Diagnosis : Oocyst sub-spherical, double walled, 20 -27.4 (23.3) µm, × 18-24.1 (21.36) µm,

shape index 1.0-1.21 (1.09), oocystic residuum and micropyle absent; sporocyst pyriform, 14.5 - 16.1 (15.9) µm × 9.6 - 11.23 (10.17) µm, stieda body at the pointed end; sporozoites banana-shaped, 6-7 µm × 1.5 - 2 µm.

Host : Indian Pea fowl, *Pavo cristatus* Linn.; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district), Delhi, Orissa and Uttar Pradesh.

325. ***Isospora megalaimae*** Mandal and Chakravarty

1964. *Isospora megalaimae* Mandal and Chakravarty, *Proc. zool. soc. Calcutta,* **17**, p. 35.

Material examined : Sev. exs., Calcutta, 10.iii.1962, A.K. Mandal.

Diagnosis : Oocysts round, 23.2 - 25.4 µm in diameter, double layered, micopyle and oocystic residiuum absent; sporocyst pyriform, 17.6 µm × 9.9 µm, sporocystic residuum present; sporozoite elongated, 7.7 µm in length and arranged irregularly ; schizont round, 6.6 µm in diameter; macrogametocyte round , 15.5 µm in diameter;

Host : Crimson-breasted Barbet, *Magalaima haemocephala* (P.L.S. Muller); site of infection: intestine.

Distribution : India : West Bengal (Calcutta district).

326. ***Isospora muniae*** Chakravarty and Kar

1944. *Isospora muniae* Chakravarty and Kar, *Proc. Indian Acad. Sci.,* **20** (B) , p. 102.

Diagnosis : Oocyst broadly or elongately oval, 24.5 31.5 (28.3) µm × 15.5 - 19.5 (17.5) µm, shape index 1.6, double layered, micropyle present, oocystic residiuum absent; sporocyst pyriform, 14.5 - 16.5 (15.5) µm × 10.2 - 11.2 (10.7) µm, shape index 1.4, double layered with a refractile knob at the pointed anterior end, sporocystic residiuum present; sporozoites sickle-shaped, 6.5 µm, × 2.00 µm; elongately oval, schizont, 10-13.2 µm × 6.6-8.8 µm, producing 16 sickle-shaped merozoites; macrogamete oval, 18.8 µm × 13.2 µm.

Host : Black-headed Munia (=*Lonchura*) *malacca malacca* Linn.; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

327. ***Isospora psittaculae*** Chakravarty and Kar

1947. *Isospora psittaculae* Chakravarty and Kar, *Proc. R. Soc. Edinb.,* **62** (B), p. 225.

Diagnosis : Oocyst broadly oval, double layered, 28.5 - 32.6 (30.5) µm × 24.4 - 28.4 (25.4) µm , shape index 1.16, oocystic residuum present, micropyle absent; sporocyst somewhat oval with narrow anterior end and with a well developed knob of 2.2 µm in length, sporocyst 22.0 - 26.4 (24.5) µm × 12.5 - 14.5 (13.50) µm, shape index 1.8, sporocystic residuum present ; sporozoite elongated 11.5 -15.5 (13.5) µm × 4.4 -6.4 (5.4) µm.

Host : Large Indian Parakeet, *Psittacula eupatria, nipalensis* (Hodgson), and Red whiskered Bulbul, *Pycnonotus* (=*Elathea*) *jocosus emeria* (Linn.) ; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

328. ***Isospora pycnonotae*** Mandal and Chakravarty.

1964. *Isospora pycnonotae* Mandal and Chakravarty, *Proc. zool. Soc. Calcutta,* **17**, p. 35.

Material examined : Sev. exs., Calcutta , 10. iv. 1963, A.K. Mandal.

Diagnosis : Oocyst oval, double walled, 23.2 - 24.5 (24.2) µm × 18.8 - 20.8 (19.8) µm , shape index 1.2, micropyle present, oocystic residuum absent; sporocyst pyriform, provided with a small knob at the pointed end , 18.8 -20.8 (19.8) µm × 7.8 -9.8 (8.8) µm, shape index 2.1, sporocystic residuum present ; sporozoite elongated , 11.1 - 13.1 (12.1) µm × 2.1 - 3.4 (2.8) µm ; schizont 4.4 µm in diameter with 8-12 merozoites; macrogamete 22 µm × 15.4 µm.

Host : Red Whiskered Bulbul, *Pycnonotus jocosus* (Linnaeus) and Jungle Babbler, *Turdoides straitus* (Dumont.) ; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district) and Uttar Pradesh.

329. ***Isospora temenuchii*** Chakravarty and Kar

1944. *Isospora temenuchii* Chakravarty and Kar, *Proc. Indian Acad. Sci.,* **20** (B), p. 102.

Diagnosis : Oocyst subspherical or slightly ovoid, 22.5 - 24.5 (23.5) µm × 19.5 - 21.5 (20.5) µm, shape index 1.14, double layered, micropyle present, oocystic residuum absent; sporocyst elongately oval with a well developed knob at the anterior end , 15.5 - 17 (16.5) µm × 10.2 - 11.5 (10.6) µm, sporocystic residuum present; sporozoite elongated, 8.5 µm × 3.3 µm.

Host : Black headed or Brahminy Mayna, *Temenuchus* (= *Sturnus*) *pagodarum* (Gmelin); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

330. ***Isospora zosteropis*** Chakravarty and Kar

1947. *Isospora zosteropis* Chakravarty and Kar, *Proc. R. Soc.,* Edinb., **62** (B), p. 225.

Diagnosis : Oocyst oval, double layered, 17.5 - 22.5 (19.8) µm × 13.5 - 19.5 (16.5) µm , shape index 1.2, micropyle and oocystic residuum absent ; sporocyst oval with a knob at the anterior end , 15.3 - 17.5 (16.5) µm × 10.5 - 11.5 (11.1) µm, shape index 1.4, sporocystic residuum present ; sporozoites club-shaped , 14.5 - 16.5 (15.5) µm × 2.1 - 3.5 (2.5) µm.

Host : White eye, *Zosterops palpebrosa palpebrosa* (Temm, & Schiegal); *Megalaima* (= *Thereiceryx*) *zeylanica*; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Isospora of Mammals

331. ***Isospora belli*** Wenyon

1923. *Isospora belli* Wenyon, *Ann. trop. Med. Parasit.,* **17**, p. 231.

Diagnosis : Oocyst elongated, egg-shaped, with one end more constricted than the other, forming neck, 25-23 (29) µm × 12.5 - 16 (14.25) µm , double layered , micropyle present; sporocyst 12- 14 µm × 7-9 µm, sporocystic residuum present; sporozoites elongated with rounded anterior end and tapering at the posterior

Host : Man, *Homo sapiens* Linnaeus.

Distribution : India : West Bengal (Calcutta district) and Maharashtra.

Remarks : Das Gupta (1934), Mukherjee and Ray (1965) and Ray, Mukherjea and Chakrabarty (1959) reported this species from man while working at the School of Tropical Medicine, Calcutta.

332. *Isospora canis* Nemeseri

1959. *Isospora canis* Nemeseri, *Allatori. Lapok .*, **14**, p. 91.

Material examined : Sev. exs., Calcutta, 10.x. 1979, A.K. Mandal.

Diagnosis : Oocyst subspherical, 38 µm × 32 µm, micropyle and oocystic residuum absent, sporocyst spherical 20 µm × 16 µm, stieda body absent , sporocystic residuum present; sporozoites bean-shaped, 11.5 µm in length.

Host : Domestic dog, *Canis familiaris* Linn. (= *Canis* sp.).

Distribution : India : West Bengal (Calcutta district).

Remarks : Mandal (1976) has synonymised *Isospora canis* a homonym, described by Ray and Banik with *T. canis* Nemeseri.

333. *Isospora felis* (Wasielewsky)

1904. *Diplospora bigemina* Wasielewsky (partim), *Studien und Mikrophotogramme zur Kenntnis der Pathogenen Protozoen,* Leipzig, p.

1923. *Isospora felis* Wenyon, *Ann. trop. Med. Parasit.,* **17**, p. 231.

Diagnosis : Oocysts ovoid to egg-shaped, tapering at one end, ovoid form 39-48 µm × 26-37 µm (mean 43.5 µm × 31.5 µm) and the egg-shaped one measuring 35-45 µm × 23-35 µm (mean 40 µm × 29 µm), oocystic wall smooth and pinkish in colour, micropyle absent; sporocyst elongated, 20-24 µm × 18-21 µm (mean 22 µm × 19.5 µm), sporocystic residuum present; sporozoites comma-shaped, schizont 4-6.2 µm producing 8-16 merozoites; macrogametocyte 16-12 µm × 8-12 µm.

Host : Domestic cat, *Felis catus* [= *F. domestica* Linn. (= Felis sp.)]; White Tiger, *Panthera* sp., Alsatian pup., *Canis* sp.; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district), Tamil Nadu and Uttar Pradesh.

334. *Isospora hominis* (Railliet and Lucet)

1891. *Coccidium bigeminus* var. *hominis* Railliet and Lucet. *Bull. Soc. Zool.* Frence, **16**, p. 246.

1923. *Isospora hominis* (Ralliet and Lucet) : Wenyon, *Ann. trop. Med. Perasit.,* **17**, p. 231.

Diagnosis : Oocysts elongated, 22-32 µm × 10-15 µm, transparent, colourless, with a thin outer and a thick inner membrane, micropyle and oocystic residuum absent; sporocyst oval, 9-16 µm × 7-11 µm, sporocystic residuum present; sporozoite elongated with one end rounded and the other pointed.

Host : Man, *Homo sapiens* Linn.

Distribution : India : West Bengal (Calcutta district).

Remarks : Ray, Mukherjee and Chakrabarty (1959) and Haldar and Chakravarty (1969) reported this species from India. The present knowledge on coccidia and subsequent description of certain genera like *Sarcocystis, Besnoitia, Frenkelia* etc., indicates that this human coccidium, *Isospora hominis* may be treated as *Sarcocystis hominis* and *S. suihominis*. The authors like Zaman (1963), Tardos and Laarman (1976), Dubey (1976) and Long (1982) have contributed much on the subject (*see* Mandal, 1988).

335. ***Isospora leonina*** Mandal and Ray

1960. *Isospora leonina* Mandal and Ray, *Bull. Calcutta Sch. Trop. Med. Hyg.*, **8**, p. 107.

Diagnosis : Oocyst rhomboidal, 30-32 (31.8) µm × 28.00-31 (28.2) µm, micropyle and oocystic residuum absent; sporocyst subspherical, 16-20 µm × 13.5 - 15 µm, sporocystic residuum present; sporozoite sausage shaped, 9.5 µm in length.

Host : Lion, *Panthera leo* (Linn.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district) and Nandankanan Biological Park, Barang, Orissa (Patnaik and Acharjya, 1970).

336. ***Isospora rivolta*** (Grassi)

1879. *Coccidium rivolta* Grassi (partim), *Gaz. Med. Ital.*, **39** : 445.

1923. *Isospora rivolta* : Wenyon, *Ann. trop. Med. Parasit.*, **17**, p. 231.

Diagnosis : Oocyst ovoid, 27-30 µm × 20-25 µm (mean 28 µm × 23 µm), shape index 1.17-1.22, double layered, micropyle, polar cap, polar granules and oocystic residuum absent; sporocyst ellipsoidal, 17-19 µm × 12-14 µm (mean 18 µm × 12 µm), steida body absent, sporocystic residuum present; sporozoite elongated, 13-15 µm × 2-3 µm; schizont, 17-24 µm × 12-15 µm, 4-20 merozoites.

Host : Domestic dog, *Canis familiaris* Linn. (= *Canis* sp.); Dingo, *Canis dingo* Linn.; Domestic cat, *Felis catus* (= *Felis domestica* Linn.) (= *Felis* sp.), Jungle cat, *Felis chaus* Guldensteadt, *Herpestes auropunctata;* site of infection : intestine.

Distribution : India : West Bengal (Calcutta district), Tamil Nadu and Uttar Pradesh.

337. ***Isospora sibporensis*** Bandyopadhyay, Nandi and Das

1987. *Isospora sibporensis* Bandyopadhyay, Nandi and Das, *Acta Protozool.*, **26**(3); p. 259.

Material examined : Sev. exs., Sibpore, Haora, 8. iii. 1986, A.K. Das.

Diagnosis : Oocyst subspherical to spherical, 21-24.75 µm × 19.5-22.5 µm (mean 22.05 µm × 20.75 µm), yellowish, bilayered, micropyle with micropylar cap and polar body, oocystic residuum absent; sporocyst ovoid, 12-15.75 (14.1) µm × 9-11.25 (10.5) µm, steida body and residuum present; sporozoite elongated, 4.5-6 (5.4) µm × 2.45-3 (2.85) µm.

Host : *Rattus rattus arboreus* (Horsefield); site of infection : intestine.

Distribution : India : West Bengal (Haora district).

338. ***Isospora sundarbanensis*** Ray and Sarkar

1985. *Isospora sundarbanensis* Ray and Sarkar, *J. Bengal nat. Hist. Soc.* (N.S.), 4(1), p. 15.

Material examined : Sev. exs., Sundarban, South 24-Parganas, 12. ii. 1982, N.C. Sarkar.

Diagnosis : Oocyst ovoidal, 18.5-20.0 (19.5) µm × 10.5-13.5 (12.0) µm, bilayered, yellowish brown, micropyle present, residuum and polar granule absent; sporocyst ovoidal with cap-like steida body, 7-8 (7.5) µm × 5.5-6.5 (6.0) µm, residuum present; sporozoite round, 3.5-4.0 µm in diameter.

Host : *Sus scrofa* (Linn.); site of infection : intestine.

Distribution : India : West Bengal (South 24-Parganas district).

339. ***Isospora tropicalis*** Mukherjee and Krassner

1965. *Isospora tropicalis* Mukherjee and Krassner, *Proc. zool. Soc. Calcutta,* **18**, p. 35.

Diagnosis : Oocyst spherical, 16 µm in diameter, micropyle and oocystic residuum absent; sporocyst oval, 15.5-16 µm × 10.0-10.5 µm, sporocystic residuum present; sporozoites banana-shaped, 8-10 µm × 3.2-4 µm.

Host : Asiatic Jackal, *Canis aureus* Linn.; site of infection : intestine.

Distribution : India : West Bengal (Hugli district).

Genus ***Dorisa*** Levine

In all 10 species of *Dorisa* have been reported so far from the state. Out of these 7 species are known from birds and 3 from mammals.

A. Key to the species of ***Dorisa*** of birds

1(8) Oocyst spherical.....

2(3) Oocystic residuum present.....*D. passeris*

3(2) Oocystic residuum absent.....

4(7) Sporocyst ellipsoidal.....

5(6) Stieda body present, oocyst 27.5-30.0 µm. .....*D. chakravartyi*

6(5) Stieda body absent, oocyst 16.80-20.16 µm. .....*D. graculae*

7(4) Sporocyst pyriform.....*D. hareni*

8(1) Oocyst oval.....

9(12) Oocystic residuum present.....

10(11) Sporocyst oval.....*D. vagabundae*

11(10) Sporocyst vial-shaped.....*D. mandali*

12(9) Oocystic residuum absent.....*D. aethiopsaris*

B. Key to the species of ***Dorisa*** of mammals

1 (2) Oocyst with micropyle.....*D. indica*

2 (1) Oocyst without any micropyle.....

3 (4) Sporozoites rounded.....*D. bengalensis*

4 (3) Sporozoites elongated.....*D. harpia*

A. ***Dorisa*** **of birds**

340. ***Dorisa aethiopsaris*** (Chakravarty and Kar)

1947. *Dorisiella aethiopsaris* Chakravarty and Kar, *Proc. R. Soc., Edinb., 62 (B)*, p. 225.

Material examined : Sev. exs., Calcutta, 12. vi. 1968, A.K. Mandal.

Diagnosis : Oocyst subspherical or oval, double walled, subspherical form 28.5-30.5 (29.5) µm × 24.4-25.4 (25.4) µm, shape index 1.16, oval form 33.5-38.5 (35.8) µm × 24.-26.4 (25.4) µm, shape index 1.4, micropyle and oocystic residuum absent; sporocyst oval, with a well developed knob at the pointed anterior end, 19.5-22.5 (20.9) µm × 11.2-13.2 (12.2) µm, shape index 1.5, sporocystic residuum present; sporozoite elongated, 12.2-14.2 (13.2) µm × 1.5-2.5 (2.1) µm; schizont spherical 8.8 µm in diameter, macrogamets 11 µm in diameter.

Host : Jungle Myna, (= *Acridotheres Aethiopsar*) *fuscus fuscus* (Wagler); site of infection: intestine.

Distribution : India : West Bengal (Calcutta district).

341. ***Dorisa chakravartyi*** (Ray and Sarkar)

1967. *Dorisiella chakravartyi* Ray and Sarkar, *Proc. Indian Sci. Congr.*, p. 488.

Material examined : Sev. exs., Calcutta, 19.v.1965, A.K. Mandal.

Diagnosis : Oocyst spherical, 27.5-30.00 (28.45) µm, double layered, oocystic residuum and micropyle absent; sporocyst ellipsoidal, 22.5 µm × 15.0-17.5 µm, with stieda and substiedal body, sporocystic residuum present; sporozoite elongated, club- shaped, 13.2 µm × 3.6 µm.

Host : White-throated Munia, *Lonchura malabarica* (Linn.) and Spotted Munia, *L. punctulata* (Linn.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

342. ***Dorisa graculae*** (Mandal, Mandal, Chakraborty, Bhowmik, Sarkar and Ray)

1984. *Dorisiella graculae* Mandal *et al., Acta Protozool.*, **23**, p. 179.

Diagnosis : Oocyst spherical, double walled, 16.80-20.16 μm in diameter, micropyle, refractile granule, oocystic residuum absent; sporocyst ellipsoidal, bilayered, without stieda body, 10.08-13.44 (11.17) μm × 5.04-6.72 (6.52) μm, sporocystic residuum present; sporozoite elongated, 6.72-10.08 (8.56) μm × 3.36-5.04 (4.87) μm.

Host : *Gracula religiosa* Linn.; site of infection : intestine.

Distribution : India : West Bengal (Darjiling district).

343. ***Dorisa hareni*** (Chakravarty and Kar)

1944. *Dorisiella hareni* Chakravarty and Kar, *Proc. Indian Acad. Sci.*, **20** (B), p. 102.

Diagnosis : Oocyst spherical, 18.5-22.5 (20.5) μm in diameter, double walled; micropyle and oocystic residuum absent; sporocyst single layered, pyriform, 14.5-18.5 (16.5) μm × 9.5-10.5 (9.9) μm, shape index 1.5, residuum present; sporozoite club-shaped with bluntly pointed anterior end, 8.2 μm × 2.5 μm; trophozite spherical, 5.6 μm in diameter, schizonts 19.5 × 16.36 μm; macrogametocyte 16.6 μm × 12.8 μm.

Host : Black-headed Munia, *Munia* (= *Lonchura*) *malacca malacca* Linn.; Chestnet-bellied Munia (= Nepal Black headed Munia), *Munia atricapilla* (= *Lonchura malacca*) *rubroniger* (Hodgson); Red Munia, *Amandava amandava* (= *Estrilda amandava* (Linn.); Whitethroated Munia, *Uroloncha* (= *Lonchura*) *malabarica* (Linn.) and Spotted Munia, *Uroloncha* (= *Lonchura*) *punctulata* (Linn.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

344. ***Dorisa mandali*** (Ray and Sarkar)

1967. *Dorisiella mandali* Ray and Sarkar, *Proc. Indian Sci. Congr.*, p. 448.

Material examined : Sev. exs., Calcutta, 17. iii. 1965, A.K. Mandal.

Diagnosis : Oocyst oval, 27.5-33.7 μm × 25.0-30.0 μm (average 30.73 μm × 26.7 μm), wall transparent greenish yellow in colour, oocystic residuum present, micropyle absent; sporocyst vial-shaped with prominent plug-like "stieda body" at the pointed anterior end, sporocystic residuum present; sporozoite 12.2 μm × 4.5 μm.

Host : Indian white eye, *Zosterops palpebrosa* (Temm.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

345. ***Dorisa passeris*** (Ray and Sarkar)

1967. *Dorisiella passeris* Ray and Sarkar, *Proc. Indian Sci. Congr.*, p. 448.

Diagnosis : Oocyst spherical, 30-32.5 (31.17) μm in diameter, outer wall pale yellowish green, oocystic residuum present, micropyle absent; sporocyst vial-shaped 22.5 μm × 15.2 μm, sporocystic residuum present; sporozoite curved, sausage-like, 9.7 μm × 3.0 μm, blunt at both ends.

Host : House Sparrow, *Passer domesticus* (Linn.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

346. ***Dorisa vagabundae*** (Mandal and Chakravarty)

1963. *Dorisiella vagabundae* Mandal and Chakravarty, *Proc. zool. Soc., Calcutta,* **16**, p. 147.

Material examined : Sev. exs., Calcutta, 12.v.1961, A.K. Mandal.

Diagnosis : Oocyst oval, double walled, outer thinner, micropyle and oocystic residuum present, 24.0-26.4 μm × 22.0 μm; sporocyst with a less prominent stieda body, 17.6-19.8 μm × 12.1 μm; sporozoite club-shaped, pointed at one end.

Host : *Dendrocitta vagabunda* (Latham); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

B. ***Dorisa* of mammals**

347. ***Dorisa bengalensis*** Bandyopadhyay and Ray

1982. *Dorisa bengalensis* Bandyopadhyaya and Ray, *Indian J. Parasitol.*, **6**(2), p. 265.

Diagnosis : Oocyst subspherical to ovoid, bilayered, 18-19.5 μm x 16.5-18 μm, micropyle absent; sporocyst ellipsoid with a prominent steida body, 13.5-14 μm x 9-10 μm, sporocystic residuum present; sporozoite rounded, 3 μm in diameter.

Host : Indian Palm Squirrel, *Funambulus pennanti* Wroughton; site of infection : intestine.

Distribution : India : West Bengal (Haora district).

348. ***Dorisa harpia*** (Sinha and Das Gupta)

1978. *Dorisiella harpia* Sinha and Das Gupta, *Proc. Asian Cong. Parasit.*, p. 188.

Diagnosis : Oocysts subspherical to ellipsoidal 21.5-24.2 (22.6) μm × 17-19 (17.8) μm, double layered, oocystic residuum absent, micropyle present; sporocyst 16.8 μm × 10.8 μm with compact sporocystic residuum; sporozoite elongated, 8.4 μm x 3.2 μm; trophozoite oval, 6.6 μm × 5.5 μm; schizont spherical, 5.5 μm in diameter, macrogamete 15.5 μm × 14.0 μm.

Host : Hairywinged Bat, *Harpiocephalus harpia lasyurus* (Hodgeson); site of infection : intestine.

Distribution : India : West Bengal (Darjiling district).

349. ***Dorisa indica*** Bandyopadhyay, Ray and Bhattacharjee

1986. *Dorisa indica* Bandyopadhyay, Ray and Bhattacharjee, *Acta Protozool.*, **25**(1), p. 115.

Diagnosis : Oocyst subspherical, 19.5-22.5 (20.8) μm × 18-19.5 (18.6) μm, smooth, colourless and bilayered wall, micropyle and polar body present, residuum absent; sporocyst ovoid, bimembraneous, with a knob-like stieda body, residuum abundant, 14.25-16.5 (15.4) μm × 8.25-9.3 (8.5) μm; sporozoite ellipsoid, 4.2.-4.5 (4.4) μm × 2.7-3.0 (2.9) μm.

Host : *Rattus rattus arboreus* (Horsefield); site of infection : Intestine.

Distribution : India : West Bengal (Haora district).

Genus *Wenyonella* Hoare

Four species of this genus, 2 from birds and 2 from mammals, are reported so far from this state.

A. Key to the species of *Wenyonella* of birds

1 (2) Oocyst bilayered, spherical or slightly oval, measuring 21.3-26.5 µm x 20.6-25.8 µm ..... *W. columbae*

2 (1) Oocyst trilayered, pitcher-shaped, measuring 22.8-26.4 µm x 16.8-19.2 µm ..... *W. gagari*

B. Key to the species of *Wenyonella* of mammals

1 (2) Oocyst spherical, measuring 14.5-18.5 µm in diameter, micropyle present..... *W. hoarei*

2 (1) Oocyst ellipsoid to slightly ovoid, measuring 16.5-21.75 µm x 13.5-15.0 µm, micropyle absent..... *W. levinei*

A. *Wenyonella* of birds

350. *Wenyonella columbae* Haldar and Ray Chaudhury

1974. *Wenyonella columbae,* Haldar and Ray Chaudhury, *Arch. Protistenk.,* **116,** p. 251.

Diagnosis : Oocyst spherical or slightly oval, 21.3-26.5 (23.8) µm × 20.6-25.8 (23.0) µm, bilayered, micropyle and oocystic residuum absent; sporocyst 10.5-12.8 (11.6) µm × 6.4-8.6 (7.5) µm, sporocystic residuum and steida body absent; sporozoite elongated, 4.5 µm in length.

Host : Domestic pigeon, *Columba livia intermedia* Strickland

Distribution : India : West Bengal (Calcutta and Nadia districts).

351. *Wenyonella gagari* Sarkar and Ray

1968. *Wenyonella gagari* Sarkar and Ray, *Proc. Indian Sci. Congr.,* p. 499.

Diagnosis : Oocyst pitcher-shaped having three layers of 1.8 µm in thickness, outer layer yellow, middle greenish and the inner yellowish pink, a prominent micropyle of 4.8 µm in diameter at narrrow pole with flunted 4-6 ridges at its outer boarder, 22.8- 26.4 (24.0) µm × 16.8-19.2 (18.5) µm, oocystic residuum absent; sporocyst vial-shaped, 13.2 (13.8) µm × 7.2-9.6 (8.4) µm, sporocystic residuum and stieda body present; sporozoite club- shaped 9.6 µm × 3.6 µm.

Host : Domestic duck, *Anas boschus* Linnaeus [= *Anas p. platyrhyncha* (Linn.)] (= *Anas* sp.); site of infection : intestine.

Distribution : India : West Bengal (North 24-Parganas district).

B. *Wenyonella* of mammals

352. *Wenyonella hoarei* Ray and Das Gupta

1935. *Wenyonella hoarei* Ray and Das Gupta, *Sci. & Cult.,* **1,** p. 112.

Diagnosis : Oocyst spherical, double layered, 14.5-18.5 (16.8) µm in diameter, oocystic residuum absent, micropyle present; sporocyst ovoid, with a lens-shaped knob at the pointed anterior end, 9.5-11.5 (10.5) µm × 7.5-9.3 (8.4) µm, shape index 1.2, sporocystic residuum present; sporozoite elongated, 7.4 µm × 1.5 µm; schizonts with two types of merozoites measuring 6 µm × 2 µm and 8 µm × 2 µm.

Host : Indian squirrel, *Sciurus* sp.; site of infection : intestine.

Distribution : India : West Bengal (Haora district).

353. ***Wenyonella levinei*** Bandyopadhyay, Ray and Das Gupta

1986. *Wenyonella levinei* Bandyopadhyay, Ray and Das Gupta, *Arch. Protistenk.*, **131**, p. 303.

Diagnosis : Oocyst ellipsoid to ovoid, 16.5-21.75 (19.95) µm × 13.5-15 (14.25) µm, double layered, micropyle, polar granule and oocystic residuum absent; sporocyst ovoid, 7.5-9.75 (8.55) µm × 5.22-6.0 (5.4) µm, sporocystic residuum present, stieda body absent; sporozoite ellipsoid, 4.5-5.25 (4.95) µm × 3.0-4.5 (3.3) µm.

Host : *Rattus rattus arboreus* (Horsfield); site of infection : intestine.

Distribution : India : West Bengal (Haora district).

Genus ***Octosporella*** Ray and Raghavachari

354. ***Octosporella mabuiae*** Ray and Raghavachari

1942. *Octosporella mabuiae* Ray and Raghavachari, *Proc. Indian Sci. Congr.*, p. 170.

Diagnosis : Oocyst octosporocystid, sporocyst dizoic; spherical oocyst 14-16 µm in diameter with no oocystic residuum; sporocyst spindle-shaped, 8.4 µm × 4.2 µm, sporocystic residuum present; sporozoite sickle-shaped.

Host : *Mabuya* sp.; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Genus ***Sivatoshella*** Ray and Sarkar

355. ***Sivatoshella lonchurae*** Ray and Sarkar

1967. *Sivatoshella lonchurae* Ray and Sarkar, *Proc. Indian Sci. Congr.*, p. 448.

Diagnosis : Oocyst spherical, 36.0-38.0 (37.62) µm in diameter, oocystic wall 4 layered of 3.6 µm in thickness, oocystic residuum and micropyle absent; sporocyst pear-shaped, 28.00-29.00 µm × 18.0 µm, stieda body and substiedal body present at the narrow pole, sporocystic residuum present; sporozoite broad, comma-shaped, peripherally arranged; schizont 24-26 µm in diameter containing nearly 100 merozoites; macrogametocyte 30-35 µm in diameter.

Host : Spotted Munia, *Lonchura punctulata* (Linn.); Whitethroated Munia, *L. malabarica* (Linn.); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Genus ***Pythonella*** Ray and Das Gupta

356. ***Pythonella bengalensis*** Ray and Das Gupta

1937. *Pythonella bengalensis* Ray and Das Gupta, *Proc. Indian Sci. Congr.*, p. 292.

Diagnosis : Oocyst with sixteen sporocysts (heccaidecasporocystid), each containing four sporozoites (tetrazoic sporocyst); oocyst spherical, 25-30 μm in diameter; sporocyst 8-10 μm × 6.7 μm, with a central residuum.

Host : Indian Python, *Python* sp., site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Family LANKESTERELLIDAE

Genus ***Lakesterella*** Labbe

Diagnosis : Heteroxenous, oocyst producing 32 or more sporozoites, sporozoites occurring in vertebrate erythrocytes, with about 30 subpellicular microtubules.

So far 3 species of *Lankesterella* including one undetermined species have been recovered from amphibians and 3 undetermined species from avian hosts. In this connection mention is to be made here that Levine (1988) listed two species of *Lankesterella* viz., *L. ranae* and *L. rhacophorae* both dealt with by R. Ray (1979) in his unpublished Ph.D. Thesis. Since these 2 species are not published tile to date these are to be treated as '*nomen nudum*' and, therefore, excluded from the present systematic account.

A. Key to the species of ***Lankesterella*** of amphibians

1 (2) Sporozoite vermiform with anterior extremity tapering, 10-15 μm in length.....*L. minima*

2 (1) Sporozoite slender, crescent-shaped, measuring 9.0-11.5 μm in length.....*L. bufonis*

A. ***Lankesterella*** **of amphibians**

357. ***Lankesterella bufonis*** Mansour and Mohammed

1962. *Lankesterella bufonis* Mansour and Mohammed, *J. Protozool.*, 9(2), p. 243.

Diagnosis : Sporozoite very small, slender, crescent-shaped, 9-11.5 (10.6) μm × 1.0-2.5 (1.45) μm; nucleus terminal or subterminal with few chromatin granules; vacuole single and centrally located.

Host : *Bufo melanostictus* Schneinder; site of infection : blood.

Distribution : India : West Bengal (Bankura district).

358. ***Lankesterella minima*** (Chaussat)

1938. *Lankesterella minima* (Chaussat) : Bhatia, *Fauna of British India : Protozoa : Sporozoa,* Taylor and Fracis Ltd., London, p. 159.

Material examined : Sev. exs. Calcutta, 17.iii. 1968, A.K. Mandal.

Diagnosis : Sporozoite vermicular with anterior extremity tapering, 10-15 μm in length, schizont 7.5-8.5 μm in diameter producing 16-25 merozoites; merozoites 6.0 μm × 1.5 μm in dimensions, finally invade endothelial cells of blood vessels and develop into micro and macrogametocytes; microgamete and macrogamete (7-9 μm in diameter) fertilizing to form zygote which develops into an oocyst containing 10-20 sporozoites but no sporocyst; leech acting as mechanical transmitter.

Host : *Rana tigrina* Daudin, *Rana limnocharis*; site of infection : blood.

Distribution : India : West Bengal (Bankura, Jalpaiguri, Murshidabad and South 24-Parganas districts).

359. ***Lankesterella*** sp.

Host : *Bufo himalayanus* Boulenger; site of infection : blood.

Distribution : India : West Bengal (Darjiling district).

Remarks : Sinha (1979) recorded this unnamed species from the above mentioned host.

360. ***Lankesterella*** sp.

Host : *Ploceus philippinus* (Linnaeus) : blood

Distribution : India : West Bengal (Nadia district).

Remarks : Nandi *et al. (1984) reported this unnamed species from the above mentioned host.*

361. ***Lakesterella*** sp.

Host : *Passer domesticus* (Linnaeus); site of infection : blood.

Distribution : India : West Bengal (Nadia district).

Remarks : Nandi *et al.* (1984) reported this unnamed species from the above mentioned host.

362. ***Lankesterella*** sp.

Host : *Sturnus malabaricus* (Gmelin); site of infection : blood.

Distribution : India : West Bengal (Nadia district).

Remarks : Nandi *et al.* (1984) reported this unnamed species from the above mentioned host.

Family SARCOCYSTIDAE

Genus ***Sarcocystis*** Lankester

Diagnosis : Last generation meronts typically in striated muscles; merozoites elongate.

363. ***Sarcocystis blanchardi*** Doflein

1901. *Sarcocystis blanchardi* Doflein, *Die Protozoen als Parasiten und Krankheitserreger,* Jena, p. 221, figs. 197, 198.

1938. *Sarcocystis blanchardi* Doflein : Bhatia; *Fauna of British India,* Protozoa : Sporozoa, Taylor and Francis Ltd, London, p. 363.

Material examined : Sev. exs., Calcutta, 17.v.1971, A.K. Mandal.

Diagnosis : Cysts measuring upto 30 mm × 5 mm × 3 mm, usually 1 cm long, compartmented when mature, cyst wall smooth, peripheral polyhedral chambers filled with fine granulations, central chambers empty or containing spores (cytophaneres); trophozoites about 10 μm long.

Host : *Bubalus bubalis* and *Bos indicus* Linnaeus; site of infection : striated and heart muscle.

Distribution : India : West Bengal (Calcutta district).

Remarks : Chatterjee (1907) found the cysts and spores of *Sarcocystis* sp. in the heart-muscle of a cow which was letter referred to by Bhatia (1938) as *S. blanchardi.* This species is extremely common throughout the world and in very heavy infections there may be lameness, weakness, emaciation, paralysis and even death (Levine, 1967).

Family TOXOPLASMATIDAE

Genus ***Toxoplasma*** Nicolle and Manceaux

Diagnosis : Meronts in many types of cell; host cell nucleus outside meront wall; euryxenous, producing pseudocyst and reproducing by endodyogeny.

364. ***Toxoplasma gondii*** (Nicolle and Manceaux)

1908. *Leishmania gondii* Nicolle and Manceaux, *C.R. Acad. Sci.,* **147,** p. 763.

1926. *Toxoplasma gondii* : Wenyon : *Protozoology,* Balliere, Tindall and Cox, London, p. 1043.

1967. *Toxoplasma gondii* : Levine : *Protzoan Parasites of Domesticated Animals and of Man,* Burgess Publishing Company, Minnesota; p. 325.

Material examined : Sev. exs., Calcutta 15.v.1971, A.K. Mandal.

Diagnosis : Trophozoite crescentic or banana-shaped, with one end pointed and the other 2bd rounded, 4-8 μm × 2-4 μm, with more or less central and vesicular nucleus; occurring in host cells either singly or in groups; schizont growing upto 20 μm in diameter, producing 20-30 nuclei by a process of internal budding known as endodyogeny, in this process 2 daughter cells produced, growing until they destroy the parent cell and become released from the host cell.

Host : Mammals and brids, common in rodents; *Rattus rattus; Lepus* sp.; site of infection : blood and in many types of cells, epithelial, endotehlial, skaletal, neurons, microglia etc.

Distribution : India : West Bengal (Calcutta and Haora districts). Worldwide.

Remarks : Toxoplasmosis is apparently extremely common in man and also in many domestic animals and has many different manifestations (Livine, 1967). Krishnan and Lal (1933) reported *Toxoplasma cuniculi* Splendore infection in smear preparation from liver, spleen, bone-marrow and heart blood of rabbits, *Lepus* sp. from Calcutta. This species *T. cuniculi* is considered as a synonym of *T. gondii* (*see* Levine, 1967).

Family PLASMODIIDAE

Key to the genera

1 (2) Parasitic in mammals, birds and reptiles, pigment granules present in gametocytes and schizonts.....***Plasmodium***

2 (1) Parasitic in fishes, pigment granules present in gametocytes only.....***Mesnilium***

Genus *Plasmodium* Marchiafava and Celli

Seven species of *Plasmodium*, 4 from birds and 3 from man have been reported from this state. In addition 10 unidentified species of *Plasmodium* are also known from birds. In this connection, mention is to be made that 2 species of *Plasmodium* viz., *P. cynomolgi* and *P. knowlesi* are not dealt with here since the place of origin of infection of these species is doubtful. (*see* Napier and Campbell, 1932, Sinton and Mulligan, 1932, Knowles and Das Gupta, 1932).

A. Key to the species of *Plasmodium* of birds

1 (6) Elongate gametocyte.....

2 (3) Erythrocytic schizonts with plentiful cytoplasm, (mature gametocytes and a sexual forms tending to encircle the host cell- nucleus without displacing it, mature segmenters with 13-30 merozoites).....*P. circumflexum*

3 (2) Erythrocytic schizonts with scanty cytoplasm.....

4 (5) Erythrocytic schizonts small with 4-9 merozoites.....*P. nucleophilum*

5 (4) Erythrocytic schizonts large with 10-14 merozoites.....*P. coturnixae*

6 (1) Round gametocytes, (mature segmenters with 8-32 merozoites).....*P. relictum*

B. Key to the species of *Plasmodium* of Mammals

1 (2) Full grown schizonts rounded, nearly filing erythrocytes, 6- 12 merozoites, typically arranged in circle, schizogony in 72 hours.....*P. malariae*

2 (1) Full grown schizonts irregular in form, filling half to two- third the erythrocyte and irregularly arranged, schizogomy in about 48 hours.....

3 (4) Gemetocytes crescent-shaped, infected erythrocytes normal or atrophied.....*P. falciparum*

4 (3) Gametocytes rounded or oval, infected erythrocytes hypertrophied.....*P. vivax*

A. *Plasmodium* of birds

365. *Plasmodium circumflexum* Kikuth

1931. *Plasmodium circumflexum* Kikuth, *Centralb. f. Bakt.*, **121**, p. 401.

Material examined : Sev. exs., Chakdah, Nadia, 14.v.1975, N.C. Nandi.

Diagnosis : Mature gametocytes and asexual forms tending to encircle the host-cell nucleus without displacing it; mature segementers with 13-30 merozoites; pigment localized at the extremity in asexual forms; 48 hour periodicity; elongated gametocytes; sporogony in *Theobaldia* mosquitoes; usually occurring in passerine birds, also found in grouse and eider duck.

Host : *Dendrocitta vagabunda, Ardeola grayi* and in a number of sparrows, thrushes and other passeriform species (Garnham, 1966); site of infection : blood, lungs, liver, spleen, bone-marrow, heart, capillary endothelium of brain etc. of vertebrate hosts (birds).

Distribution : India : West Bengal (Calcutta and Nadia districts), widely distributed being a cosmopolitan species.

Remarks : Basu (1938) reported a malarial parasite *viz. Plasmodium heroni* in pond heron, *Ardeola grayi* with elongated schizonts and gametocytes. According to Garnham (1966) *P. heroni* should be regarded as a synonym of *P. circumflexum* or of *P. fallax*. *P. heroni* is considered herein as a possible synonym of *P. circumflexum*.

366. ***Plasmodium coturnixae*** Sarkar and Ray

1972. *Plasmodium coturnixae* Sarkar and Ray, *Cey. J. med. Sci.*, **21**(2), p. 85.

Diagnosis : Elongated gametocytes with one pole narrower than the other, margins irreguler or slightly crenated, 15 - 20 small black pigment granules usually aggregated at either pole of the female gametocyte ; erythrocytic schizonts with 10 -14 merozoites, round, 7.6 µm in diameter with pigments in the centre or perpherally located ; exoerythrocytic schizont in macrophage cells of bone marrow, liver, spleen, kidney and in lungs; experimental vector *Aedes aegypti* and *Culex f. fatigans*; ookinete sausage-shaped, 13 -17 µm × 3 -4 µm in dimension; oocysts 36 µm in diameter

Host : Grey Quail, *Coturnix coromandelica* (Gmelin); site of infection : blood.

Distribution : India : West Bengal (Calcutta district).

Remarks : Bennett *et al.* (1982) consider this species as *incertaecsedis*.

367. ***Plusmodium nucleophylum*** Manwell

1935. *Plasmodium nucleophylum* Manwell, *Am. J. trop. Med.*, **15**, p. 365.

Diagnosis : Gametocyte elongate often closely applied to hostcell nucleus ; mature segmenters rarely seen in peripheral blood with 4-9 merozoites; non - pathogenic to canaries , 24 hour periodicity.

Host : *Sturnus malabarica* from West Bengal (Nandi *et al.*, 1984) and in a variety of passeriform species (*vide* Graham, 1966; Bennett *et al.*, 1982).

Distribution : India : West Bengal (Nadia district), Andhra Pradesh, a cosmopolitan species.

368. ***Plasmodium relictum*** (Grassi and Feletti)

1891. *Haemamoeba relicta* Grassi and Feletti, *Bull. mens. Acad. gioania Sci. nat. Catania*, **16**, p. 16.

1966. *Plasmodium relictum* (Grassi and Faletti) : Graham : *Malaria parasites and other Haemosporidia*, Blackwall Scientific Publications , Oxford, p. 522.

Material examined : Sev. exs., Chakdah, Nadia, 3.xi.1975,N.C. Nandi; sev. exs., Calcutta, 30. vii. 1975 and 4. viii. 1975, N.C. Nandi.

Diagnosis : Gametocytes round or oval, erythrocytic stages in the peripheral blood, pigment of mature gametocytes relatively fine and dot-like, host-cell nucleus markedly displaced or expelled by mature forms; ring - stages common in immature red cells; mature segments with 8-32 merozoites; periodicity variable, usually 24-36 hours; usually with high parasitemia and relatively high mortality.

Host : From West Bengal as for systematic list (please vide supra) - a very common bird malarial parasite occurring in a wide range of hosts (*vide* Garnham, 1966; Bennett *et al.*, 1982).

Intermediate host : *Anopheles subpictus.*

Distribution : India : West Bengal (Calcutta, Darjiling, Nadia, South 24- Parganas districts) - a cosmopolitan species occurring throughout.

Remarks : Both the species of *Plasmodium* viz., *P. ploceii* and *P pericrocoti* reported by Chakravarty and Kar (1945a, b) and *P. praecox* var. *muniae* reported by Das Gupta and Siddons (1941) are considered as synonyms of *P. relictum.*

369. ***Plasmodium*** sp.

Material examined : Sev. exs., Chakdah, Nadia, 19 v. 1975, N.C. Nandi.

Host : *Dendrocitta vagabunda* (Latham); site of infection : blood.

Distribution : India : West Bengal (Nadia district).

Remarks : Nandi *et al.* (1984) reported this unnamed species from the aforesaid host.

370. ***Plasmodium*** sp.

Material examined : Sev. exs., Chakdah, Nadia, 6.v.1975, N.C.Nandi; sev. exs., Calcutta, 24. vi. 1975, N.C.Nandi.

Host : *Magalaima haemacephala* (Muller) ; site of infection : blood.

Distribution : India : West Bengal (Calcutta and Nadia districts).

Remarks : As for 51. No. 369.

371. ***Plasmodium*** sp.

Material examined : Sev. exs., Balia, Nadia, 26. iv. 1975, N.C.Nandi.

Host : *Otus scops* (Linnaeus); site of infection : blood.

Distribution : India : West Bengal (Nadia district).

Remarks : As for Sl. No. 369.

372. ***Plasmodium*** sp.

Host : *Heterophasia capistrata* (Vigors) ; site of infection : blood.

Distribution : India : West Bengal (Darjiling district).

Remarks : Pal and Dasgupta (1980) reported this unnamed species from the aforesaid host.

373. ***Plasmodium*** sp.

Host : *Ploceus philippinus* (Linnaeus); site of infection : blood.

Distribution : India : West Bengal (Nadia district)

Remarks : As for Sl. No. 369.

374. ***Plasmodium*** sp.

Host : *Muscicapa sundra* (Hodgson) ; site of infection : blood.

Distribution : India : West Bengal (Darjiling district).

Remarks : As for Sl. No. 372.

375. ***Plasmodium*** sp.

Host : *Sturnus contra* Linnaeus; site of infection : blood.

Distribution : India : West Bengal (Nadia district and Gangetic West Bengal).

Remarks : As for Sl. No. 369.

376. ***Plasmodium*** sp.

Host : *Accipiter virgatus affinis* (Hodgson) ; site of infection : blood.

Distribution : India : west Bengal (Darjiling district).

Remarks : Sinha and Sinha (1980) recorded this unnamed species from the aforesaid host.

377. ***Plasmodium*** sp.

Host : *Centropus sinensis* (Stephens); site of infection : blood.

Distribution : India : West Bengal (North 24-Parganas district).

Remarks : Ghosh and Das Gupta (1980) recorded this unnamed species from the aforesaid host.

378. ***Plasmodium*** sp.

Host : *Sturnus malabaricus* (Gmelin); site of infection : blood.

Distribution : India : West Bengal (exact locality not mentioned).

Remarks : Bandyopadhyay and Haldar (1987) recorded this unnamed species of the aforesaid host.

379. ***Plasmodium falciparum*** (Welch)

1897. *Haenatozoon falciparum* Welch, *Syst. Pract. Med.*, **1**, p. 17.

1966. *Plasmodium falciparum* (Welch) : Garnham : *Malaria Parasites and other Haemosporidia,* Blackwell Scientific Publications, Oxford, p. 357.

Diagnosis : Relatively small ring forms with double dots of chromatin, some apparently on edge (accole forms); usually with crescentic gametocytes, macrogametocyte 12-14 µm long; trophozoite compact, rarely seen in peripheral blood; schizont irregular in form, 5 µm in diameter, 8-32 merozoites, irregularly arranged filling half to two-third the erythrocyte, with early clumping of coarse dark pigments, rarely occur in peripheral circulation; host erythrocyte not hypertrophied, but accompanied by reddish clefts known as Maurer's clefts; erythrocytic schizogony at 48 hours interval; paroxysms of chills and fever occur every other day; [for exoerythrocytic schizogony and sporogony, Garaham (1966) may be consulted].

Host : Man, *Homo sapiens* Linn. ; site of infection : blood, liver, kidney, spleen, bone-marrow, brain etc.

Distribution : India : West Bengal (All districts) and in almost all parts of India (Knowles, Senior White and Das Gupta, 1930; Bhatia, 1938). This species is worldwide in distribution but scattered mainly in tropics and subtropics.

Remarks : This is a common species of *Plasmodium* known to infect man. It causes malignant tertian malaria and is the greatest killer of the human race over most parts of Africa and elsewhere in the tropics (Garnham, 1966).

380. ***Plasmodiium malariae*** (Grassi and Feletti)

1892. *Haemamoeba malariae* Grassi and Feletti, *Atti Accad. Zioenia Sci. nat. Catania,* Memoir, **5**, pp. 1-80.

1966. *Plasmodium malariae* (Grassi & Feletti) : Garnham; *Malaria parasites and other Hoemosporidia,* Blackwell Scientific Publications, Oxford, p. 257.

Diagnosis : 'Ring' form about one-third diameter of erythrocyte, one in each red cells; trophozoite compact, often band-like, schizont rounded, 7 µm in diameter, nearly filling the erythrocyte, 6-12 merozoites, typically arranged in circle; schizogony in 72 hours; gametocyte round or ovoid, 9 µm in diameter, with brown-black pigments; host erythrocyte not enlarged, very faint stippling (Ziemann's) after prolonged staining only paroxysms occurring every 3 days; for other stages *see* Garnham, 1966.

Host : Man, *Homo sapiens* Linn., and Chimpanzees in West Africa (Garnham, 1966); site of infection : blood, liver.

Intermediate host : *Anopheles annularis, A. culicifacies* and *A. maculatus.*

Distribution : India : West Bengal (almost all districts) and apparently all over India (*vide* Knowles, Senior White and Das Gupta, 1930); worldwide occurring tropical, subtropical and warmer temperate regions.

Remarks : This species is known to cause quartan malaria in man and is less common in occurrence than *P. vivax*. However, like *P. vivax* it is not a very pathogenic organism, although chronic infection may lead to a lethal kidney condition.

381. *Plasmodium vivax* (Grassi and Feletti)

1890. *Haemoeba vivax* Grassi and Feletti, *Archo. ital. Biol.*, **13**, p. 297.

1966. *Plasmodidum vivax* (Grassi and Feletti) : Garnham : *Malaria parasites and other Haemosporidia*, Blackwell Scientific publications, Oxford, p. 116.

Material examined : Sev. exs., Calcutta, 30. vii.1975, N.C. Nandi.

Diagnosis : Relatively large ring forms about one-third diameter of erythrocyte, round or oval, usually one in each red cells, a round chromatin dot in thin part of ring; trophozoite amoeboid; schizont irregular, filling half to two-third the erythrocyte; schizogony usually at interval of 48 hours, 12-24 merozoites in irregular grape-like cluster, with small brown pigment granules usually collected in a single mass; gametocyte large, round or ovoid, 10 μm in diameter; host erythrocyte enlarged, stippled with red dots known as Schüffner's dots; all erythrocytic stages occurring in peripheral blood, multiple infection in R.B.C. not uncommon; paroxysms at every other day as in *falciparum* malaria; also *see* Garnham (1966) for other life-cycle stages.

Host : Man, *Homo sapiens* Linn.; site of infection : blood, liver.

Intermediate host : *Anophales culicifacies, A. maculatus* and *A. varuna.*

Distribution : India : West Bengal (all districts); all over India; worldwide, in tropics, subtropics and warmer temperate regions (Knowles *et al.*, 1930; Garnham, 1966).

Remarks : This species is the most widespread of the human malaria parasites and is known to cause benign tertian malaria in man.

Genus *Mesnilium* Misra, Haldar and Chakravarty

382. *Mesnilium malariae* Misra, Haldar and Chakravarty

1972. *Mesnilium malariae* Misra *et al.*, *Arch., Protistnek.*, **114**, p. 444.

Diagnosis : Ring form small, with pin-head like chromatin mass and a narrow ring enclosing a vacuole; schizont about half the host erythrocyte in size, polar, lateral or tangentially located. 6-8 merozoites, unpigmented; gametocyte in peripheral blood, filling three-fourth the erythrocyte, with coarse pigment granules, host cell nucleus unaltered, exoerythrocytic cycle in R.E. cells of liver, spleen or kidney.

Host : *Channa punctatus* (Bloch) [= *Ophicephalus punctatus*]; site of infection : blood, liver, spleen & kidney.

Distribution : India : West Bengal (Calcutta district).

Remarks : It is a pathogenic species which causes the host fish succumbed to infection after 72 hours (Misra *et al.*, 1972).

Family HAEMOPROTEIDAE

Key to the genera

1 (2) Merogony in endothelial cells of blood vessels especially the lungs, parasitic in vertebrates other than mammals.....***Haemoproteus***

2 (1) Merogony in mesodermal cells of various organs especially liver, parasitic in mammals

3 (6) Merogony in liver parenchyma with the formation of giant macroscopic meronts (merocysts).....

4 (5) Merocyst in cluster in liver.....***Rayella***

5 (4) Merocyst not in cluster in liver.....***Hepatocystis***

6 (3) Merogony finally occurring in Kupffer cells of liver (macromeronts in liver and lungs, micromeronts in reticulo-endothelial cells), meronts tiny.....***Polychromophilus***

Genus *Haemoprotens* Kruse

In all 17 named and 13 unnamed species of *Haemoproteus* have been recorded from this state. Out of these, 14 species are recovered from birds and one each from fish, amphibia and reptile respectively. All the 13 unnamed species are reported from birds only. Key to the species of this genus from birds is presented since single species of *Haemoproteus* from other host groups is reported.

Key to the species of *Haemoproteus* of birds

1(20) Macrogametocyte halteridial in shape.....

2(3) Inner lateral margins of macrogametocytes forming a pair of horns (parasitic in capitonidae).....*H.cornuata*

3(2) Such "horns" not present.....

4(5) Cytoplasm with volutin granules at poles, (parasitic in Strigidae).....*H. syrnii*

5(4) Cytoplasm without any volutin granules.....

6(11) Parasite causing marked displacement of host cell nucleus.....

7(8) Mean number of pigment granules more than thirty (parasitic in Capitionidae)..... .....*H. thereicerycis*

8(7) Mean number of pigment granules less than twenty.....

9(10) Mean number of pigment granules 17, macrogametocytes 14.4 μm × 3.6 μm and 53.5 μm^2 in area.....*H. oryzivorae*

10(9) Mean number of pigment granules 11.1, macrogametocyte 13.5 μm × 2.8 μm and 41.32 μm^2 in area.....*H. pastoris*

11(6) Parasite not causing marked displacement of host cell nucleus.....

12(15) Mean number of pigment granules more than twenty.....

13(14) Mean number of pigment granules 33, parasitic in Columbidae.....*H. columbae*

14(13) Mean number of pigment granules 23, parasitic in Corvidae.....*H. danilewskyi*

15(12) Mean number of pigment granules 15 or less.....

16(17) Pigment granules less than 10, parasitic in Muscicapidae.....*H. himalayanus*

17(16) Pigment granules 15 (average).....

18(19) Parasitic in Dicruridae, macrogametocyte 12.6 μm × 2.5 μm and 36.0 μm^2 in area..... .....*H. dicruri*

19(18) Parasitic in Zosteropidae, macrogametocyte 15.8 μm × 3.0 μm and 50.5 μm^2 in area... .....*H. zosteropis*

20(1) Macrogametocyte not halteridial in shape.....

21(24) Shape of macrogametocyte microhalteridial.....

22(23) Macrogametocyte bilobed, mean number of pigment granules 12, parasitic in Fringillidae and other small passerine birds (Muscicapidae).....*H. fringillae*

23(22) Macrogametocyte not bilobed, mean number of pigment granules 15, parasitic in Pycnonotidae.....*H. sanguinis*

24(21) Shape of macrogametocyte not microhalteridial.....

25(26) Macrogametocyte rhabdosomal, causing marked displacement of host cell, nucleus, parasitic in Picidae.....*H. bennetti*

26(26) Macrogametocyte circumnuclear not causing any marked displacement of host cell nucleus, parasitic in Psittacidae.....*H. handai*

Genus *Haemoproteus* Kruse

A. *Haemoproteus* of fish

383. ***Haemoproteus rupicola*** Mandal, Bhattacharya, Saha, Biswas, Chakraborty and Mandal

1985. *Haemoproteus rupicola* Mandal *et. al.*, *Acta Protozool.*, **24**(1) p. 41.

Diagnosis : Gametocytes mostly in red cells and rarely in leucocytes; macrogametocyte, slightly curved and elongate, 3-4.5 (3.9) μm × 1.5 × 2.5 (1.95) μm, and 6-12.25 (8.47)μm^2 in area; microgametocyte oval, 3.5-6 (4.3) μm × 2-3.5 (2.4) μm, and 3.5-10.5 (6.68) μm^2 in area; pigment, black, finely granular and peripherally located.

Host : *Noemacheilus rupicola rupicola* (McClelland); site of infection : blood.

Distribution : India : West Bengal (Darjiling district).

B. *Haemoproteus* of amphibia

384. *Haemoproteus ovalis* Ray and Choudhury

1981. *Haemoproteus ovalis* Ray and Choudhury, *Bull. zool. Surv. India*, 4(2), p. 217.

Material examined : Sev exs., Balitha, Bankura, 1.vii.1977, R. Ray.

Diagnosis : Microgametocyte elongated pyriform, 8 μm × 4 μm and 22.0 μm^2 in area, occupying 16.76% of the total host cell parasite complex; macrogametocyte bean or kidney shaped, 9 μm × 4 μm and 23.5 μm^2 in area, occupying 20.83% of the host cell-parasite complex; pigment yellowish black granules, 7-10 in number; infected erythrocyte slightly hypertrophied, host cell nucleus distorted or displaced at one pole.

Host : *Rana limnocharis* Wiegmann; site of infection : blood.

Distribution : India : West Bengal (Bankura district).

C. *Haemoproteus* of reptile

385. *Haemoproteus trionyxii* Misra and Choudhury

1977. *Haemoproteus trionyxii* Misra and Choudhury, *Arch. Protistenk.*, **119**, p. 395.

Diagnosis : Microgametocyte typically round, cytoplasm negative to stain excepting the peripheral part, 6.4-9.6 (8.2) μm × 6.4-8.0 (7.8) μm, polar in location, without any displacement of host cell nucleus, pigment rod-shaped, 6-8 in number, either separate or clumped together into a large round mass at the periphery; macrogametocyte round, oval or elongate, polar or tangatial but never lateral in location, 7.2-12.8 (10.2) μm × 5.6-8.8 (7.5) μm, pigment rod-shaped, many and scattered, host cell nucleus not displaced.

Host : *Trionyx gangeticus* Cuvier; site of infection : blood.

Distribution : India : West Bengal (Calcutta district).

D. *Haemoproteus* of birds

386. *Haemoproteus bennetti* Greiner, Mandal and Nandi

1977. *Haemoproteus bennetti* Greiner, Mandal and Nandi, *J. Parasitol.*, **63**(4), p. 651.

Material examined : Sev exs., Darjiling, 13.vii. 1977, N.C. Nandi.

Diagnosis : Macrogametocyte rhabdosomal, margin entire, 12.7 (1.1) μm × 4.4 (0.4) μm and 45.8 (6.6) μm^2 in area, occupying about 50% of the host cell-parasite complex; pigment granules discrete, yellow-brown, scattered and averaging 20 (2.5) granules; volutin granules absent; nucleus median, round to oval, 3.3 (0.4) μm × 2.7 (0.4) μm and 6.9 (1.4) μm^2 in area; erythrocyte nucleus displaced laterally or to one pole, and occasionally enuncleated; host cell hypertrophied in length (9.5%), in width (5.3%) and in area (15.1%); and host cell nucleus atrophied (15.5%) in area.

Host : *Picus flavinucha* Gould; site of infection : blood

Distribution : India : West Bengal (Darjiling district).

387. *Haemoproteus columbae* Kruse

1890. *Haemoproteus Columbae* Kruse, *Arch. Pathol. Anat.*, **120**, p. 359.

Material examined : Sev exs., Calcutta, 22.v. 1976, N.C. Nandi; sev. exs., Balia, Nadia, 10.x.1975, N.C. Nandi; sev exs., Garia, South 24-Parganas, 12.viii. 1989, A.K. Mandal.

Diagnosis : Macrogametocyte halteridial, inner and polar margin amoeboid, outer margin entire, 12.6 (0.4) µm × 3.4 (0.4) µm and 34.3 (3.9) µm^2 in area, occupying about 60% of the host cell- parasite complex; pigment yellowish-black, discrete, round, scattered, 30 (4.2) granules per parasite, nucleus round-oval, median to submedian, 2.5 (0.2) µm × 1.8 (0.2) µm and 3.2 (0.7) µm^2 in area, host cell relatively unchanged, host cell nucleus atrophied 25.8% in area.

Host : *Columba livia, Columba livia domestica, Columba livia intermedia* Strickland and *Streptopalia chinensis* (Scopoli); site of infection : blood.

Intermediate host : *Pseudolynchia canariensis.*

Distribution : India : West Bengal (Calcutta, Nadia and South 24- Parganas districts), Delhi, Maharashtra - a cosmopolitan species with worldwide distribution.

388. *Haemoproteus cornuata* Bennett and Nandi

1981. *Haemoproteus cornuata* Bennett and Nandi, *Can. J. Zool.*, **59**(1), p. 2064.

Material examined : Sev exs., Chakdah, Nadia, 16.vi.1975, N.C. Nandi.

Diagnosis : Macrogametocyte broadly sausage-shaped and halteridial, margins entire, inner lateral margins with a deep invagination forming a pair of 'cornua' of 'horns', 21.9 (2.3) µm × 4.3 (0.6) µm and 73.1 (9.1) µm^2 in area, occupying 67% of the host cell-parasite complex; nucleus median or submedian, 3.5 (0.8) µm × 2.3 (0.4) µm and 6.6 (2.1)µm^2 in area; pigment granules small, scattered, 28.2 (6.4) in number; host cell hypertrophied (19.7) in area, host cell nucleus atrophied (11.5%) in area.

Host : *Megalaima haemocephala* (Muller) and other species of the genus *Megalaima* (*see* Bennett and Nandi, 1981); site of infection : blood.

Distribution : India : West Bengal (Nadia district) and Maharashtra. Elsewhere : Bhutan and Thailand.

389. *Haemoproteus danilewskyi* Kruse

1890. *Haemoproteus danilewskyi* Kruse, *Arch. Pathol. Anat.*, **120**, p. 359.

Material examined : Sev. exs., Calcutta, 3.iv.1976, N.C. Nandi; sev. exs., Balia, Nadia 12.v.1975, N.C.Nandi.

Diagnosis : Macrogametocyte slender, halteridial, margin entire, 11.9 (1.1) µm × 2.6 (0.4) µm and 32.0 (4.6) µm^2 in area, occupying about 58.4% of the host cell-parasite complex; nucleus round- oval, submedian to terminal, 2.1 µm^2 in area; pigment granules yellowish-black, 9-23 scattered granules; host cell hypertrophied (28.8%) in area.

Host : *Corvus splendens* Vieillot, *Dendrocitta vagabunda* (Latham) and other corvid species (*see* Bennett *et al.*, 1982); site of infection : blood.

Distribution : India : West Bengal (Calcutta and Nadia districts). Worldwide.

390. *Haemoproteus dicruri* de Mello

1935. *Haemoproteus dicruri* de Mello, *Proc. Indian Acad. Sci.*, **2** B, p. 469.

Material examined : Sev. exs., Balia, Nadia, 12.v.1975, N.C. Nandi.

Diagnosis : Macrogametocyte hateridial, margins entire, 12.6 (0.3) µm × 2.5 (0.2) µm and 36.0 μm^2 in area, occupying about 60% of the host cell-parasite complex, nucleus submedian, round-oval, 3.7 (0.8) μm^2 in area, pigments yellowish-brown, averaging 15 granules; host cell hypertrophied (19.2%) in area and host cell nucleus atrophied (3.4%) in area.

Host : *Dicrunus adsimilis* (Bechstein), *D. macrocercus* Vieillot; site of infection : blood.

Distribution : India : West Bengal (Nadia district), Goa, Kashmir, Orissa. Elsewhere : Zambia.

391. *Haemoproteus fringillae* Labbe

1894. *Haemoproteus fringillae* Labbe, *Arch. Zool. Exp. Gen.*, **2**, p. 55.

Material examined : Sev exs., Calcutta, 22.v.1976, N.C. Nandi; sev. exs., Balia, Nadia, 19.ix. 1975, N.C. Nandi.

Diagnosis : Macrogametocyte microhalteridial in shape, bilobed, margins entire, with a marked constriction at the middle of the convex margin, 14.0 (0.8) µm x 2.5 (0.3) µm and 42.4 (3.6) μm^2 in area; nucleus round or semi-round, central or sub-central, occasionally terminal but usually peripheral, 2.17 µm in diameter, pigments dark-yellow, elongated, boat-shaped or round, 13.8 (3.0) granules, randomly scattered; host cell nucleus rarely displaced to periphery; no multiple invasion of erythrocyte.

Host : *Copsychus saularis* (Linnaeus); site of infection : blood.

Distribution : India : West Bengal (Calcutta and Nadia districts), Andhra Pradesh, Goa, Orissa. Worldwide.

392. *Haemoproteus handai* Maqsood

1943. *Haemoproteus handai* Maqsood, *Indian Vet. J.*, **20**, p. 109.

Diagnosis : Macrogametocyte large, circumnuclear, margins amoeboid in immature forms, entire in mature forms, 25.3 (1.8) µm × 3.1 (0.6) µm and 78.0 (11.7)μm^2 in area, occupying 88% of the erythrocyte-parasite complex; nucleus small, compact, ovoid to rectangular, central, 6.1 (1.5) μm^2 in area; pigment randomly scattered, 20.8 (1.8) granules; host cell nucleus central, slightly displaced laterally and atrophied (15.9%) in area; host cell hypertrophied (5.4%) in area. Voluntin granules small, deep violet, 6 (3.2) granules per parasite.

Host : *Psittacula krameri manillensis* (Bechstein) and other psittaciform birds; site of infection: blood.

Distribution : India : West Bengal (Calcutta district); South- east Asia and Australia.

393. *Haemoproteus himalayanus* Pal and Das Gupta

1980. *Haemoproteus himalayanus* Pal and Das Gupta, *Proc. zool. Soc.*, Calcutta, **33** (1-2), p. 87.

Diagnosis : Gametocyte halteridial, scanty pigment grains, tissue schizonts occuring in lung, schizont measuring 35 µm in average.

Host : *Heterophasia capistrata* (Vigors); site of infection : blood.

Distribution : India : West Bengal (Darjiling district).

Remarks : Bennett *et al.* (1991) declared *H. himalayanus* a species *incertae sedis* : since, as they (*op. cit.*) opined, the description of this species "is based on mixed infection of *Plasmodium* and *Haemoproteus*) in post-mortem material for which no quantitative values are presented for any morphological characters and makes this "species" an organism of uncertain taxonomic status."

394. *Haemoproteus oryzivorae* Anschütz

1909. *Haemoproteus oryzivorae* Anschütz, *Zentrlbl. Baketeriol. Parasitenkd. Infektionskr. Hyg. Abt. 1. Orig.*, **51** p. 654.

Material examined : Sev exs., Calcutta, 22.v.1976, N.C. Nandi; sev exs., Balia, Nadia, 10.vii. 1975, 23.vii. 1975, 19.ix. 1975; sev exs., Sagar Island, South 24-Parganas, 24.xii. 1976, N.C. Nandi.

Diagnosis : Macrogametocyte hateridial, rarely broadly sausage- shaped, margins entire, 13.3 (0.8) µm × 3.8 (0.3) µm and 48.1 (2.2) μm^2 in area, occupying about 70% of the host cell-parasite complex; nucleus round, ovoid or broadly triangular, median to subterminal, usually located on the outer margin of the parasite, occupying about 9% of the area of the macrogametocyte; pigment granules small, ovoid, yellow to dark-yellow brown, scattered, averaging 12 (2) granules; host cell hypertrophied in area (34.6%), host cell nucleus atrophied (10.4%) in area and markedly displaced to periphery.

Host : *Copsychus saularis* (Linnaeus), *Ploceus philippinus* (Linnaeus), *Turdoides striatius (Dumont), Lonchura malabarica, Lonchura malacca, Lonchura punctulata* and other smaller passeriform birds; site of infection : blood.

Distribution : India : West Bengal (Calcutta, Nadia and South 24- Parganas districts), Andhra Pradesh, Goa, Orissa. Elsewhere : South-eastern Asia to Philippine islands.

Remarks : *Haemoproteus garnhami* described by Grewal (1964) from *Lonchura malabarica* and *Haemoproteus lonchuri* described by Bandyopadhyay and Haldar (1988) from *Lonchura malacca* are considered as synonyms of *H. oryziovrae* Anschütz (*see* also Bennett and Peirce, 1991). The records of *H. garnhami* from munias (*Lonchura spp.*) by Nandi *et al.* (1984) and Nandi (1984) may also be considered to belong to this species.

395. *Haemoproteus pastoris* de Mello

1935. *Haemoproteus pastrois* de Mello, *Proc. Indian Acad. Sci.*, **2** B, p. 469.

Material examined : Sev exs., Balia, Nadia 6.v.1975 & 26.ix.1975, N.C. Nandi; sev. exs., Sagar Island, South 24-Parganas, 25.xii.1976, N.C. Nandi.

Diagnosis : Macrogametocyte halteridial, margins usually entire, sometimes end margins amoeboid, medium sized, 11.6 (0.6) μm × 2.6 (0.2) μm and 31.5 (3.4) μm^2 in area, occupying about 50% of the host cell-parasite complex; nucleus round to ovoid, submedian, 1.9 (0.2) μm^2 in area; pigment yellowish-brown, scattered, averaging 8 (0.7) granules; host cell hypertrophied (13.1%) and host cell nucleus atrophied (4.5%) in area.

Host : *Sturnus contra* Linnaeus, *Sturnus malabaricus* (Gmelin) and other mynas and starlings (Family Sturnidae); site of infection : blood.

Distribution : India : West Bengal (Nadia and South 24-Parganas district), Andhra Pradesh, Goa, Jammu and Kashmir, Maharashtra. Elsewhere : Africa, Asia east to Philippine Islands.

396. ***Haemoproteus sanguinis*** Chakravarty and Kar

1945. *Haemoproteus sanguinis* Chakravarty and Kar, *J.R. Asiat. Soc. Bengal,* **11,** p. 36.

Diagnosis : Macrogametocyte microhalteridial, margins entire, not bilobed, 13.8 91.3) μm × 2.4 (0.3) μm and 35.5 (5.2) μm^2, occupying 53.7% of the erythrocyte-parasite complex; nucleus roughly ovoid, median to subterminal, 3.5 (1.3) μm^2 in area; pigment yellow-brown, discrete, scattered 15.4 (5.4) granules; host cell hypertrophied (11.3%) and host cell nucleus atrophied (13.9%) in area.

Host : *Pycnonotus jocosus emeria* (Linnaeus) and other pycnonotid birds (*see* Bennett *et al.*, 1982); site of infection : blood.

Distribution : India : West Bengal (Calcutta district). Elsewhere : Africa and Asia.

397. ***Haemoproteus syrnii*** (Mayer)

1910. *Halterdium syrnii* Mayer, *Arch. Schiffs Trop. Hyg.,* **14** : p. 197.

Material examined : Sev exs., Chakdah, Nadia, 26.iv.1975, N.C. Nandi.

Diagnosis : Macrogametocyte halteridial, margins entire with volutin granules at poles, inner margin usually not touching the host cell nucleus, 15.6 (0.7) μm × 2.3 (0.3) μm and 39.8 (4.0) μm^2 in area; nucleus round-oval, median to submedian 3.6 (0.9) μm^2 in area, pigment yellow-brown, 13 (2.3) scattered granules; volutin averaging 14 (4.2) granules; host cell hypertrophied (8%) and host cell nucleus sometimes slightly hypertrophied in area, macrogametocyte occupying 53.1% of the erythrocyte-parasite complex.

Host : *Otus scops* (Linnaeus) and other strigid birds (*see* Bennett *et al.*, 1982); site of infection : blood.

Distribution : India : West Bengal (Nadia district). Worldwide.

398. ***Haemoproteus thereicerycis*** de Mello

1935. *Haemoproteus thereicerycis* de Mello, *Proc. Indian Acad. Sci.,* **2** B, p. 269.

Material examined : Sev exs., Darjiling, 11.iii.1975, N.C. Nandi; sev. exs., Chakdah, Nadia, 16.vi.1975, N.C. Nandi.

Diagnosis : Macrogametocyte halteridial, sometimes broadly sausage-shaped, margins entire,

16.3 (1.8) μm × 4.9 (0.9) μm and 80.2 (9.4) μm^2 in area, occupying 75% of the erythorcyte-parasite complex; nucleus ovoid, usually median, 8.5 (1.9) μm^2 in area; pigment yellow-brown or black, averaging 31.3 (2.9) granules, randomly scattered; host cell hypertrophied (20%) in area; host cell nucleus atrophied (4%) in area and markedly displaced laterally.

Host : *Megalaima asiatica asiatica* (Latham), *Megalaima heamacephala* (Muller) and other capitonid species (see Bennett and Nandi, 1981).

Distribution : India : West Bengal (Darjiling and Nadia districts), Andhra Pradesh, Arunachal Pradesh, Goa, Maharashtra, Orissa. Elsewhere : Neotropical, Ethiopian and oriental life zones (Bennett and Nandi, 1981).

399. ***Haemoproteus zosteropis*** Chakravarty and Kar

1945. *Haemoproteus zosteropis* Chakravarty and Kar, *Proc. Indian Acad. Sci.*, 22 B, p. 63.

Diagnosis : Macrogametocyte halteridial, margins entire, 15.8 (1.8) μm × 3.0 (0.6) μm and 50.5 (7.9) μm^2 in area, occupying 66% of the erythrocyte-parasite complex; nucleus ovoid, median to submedian, 2.7 (0.1) μm^2 in area; pigment 15 (2.0) granules, usually scattered, occasionally clumping in various parts of the cytoplasm; host cell hypertrophied (12%) and host cell nucleus slightly atrophied (2%) in area.

Host : *Zosterops palpebrosa palpebrosa* (Temminck) and other zosteropid birds (*see* Bennett *et al.*, 1982).

Distribution : India : West Bengal (Calcutta district). Elsewhere : Asia and Africa.

400. ***Haemoproteus*** sp.

Host : *Acrocephalus arundinaceus* Linnaeus; site of infection : blood.

Distribution : India : West Bengal (exact locality not mentioned).

Remarks : McClure *et al.* (1978) reported this unnamed species from the aforesaid host.

401. ***Haemoproteus*** sp.

Host : *Acrocephalus stentioreus* (Hemprich and Ehrenber); site of infection : blood.

Distribution and Remarks : As for Sl. No. 400.

402. ***Haemoproteus*** sp.

Host : *Acrocephalus dumetorum* Blyth; site of infection : blood.

Distribution : India : West Bengal (Calcutta and South 24- Parganas district).

Remarks : Nandi *et al.* (1984) recorded this unnamed species from the aforesaid host.

403. ***Haemoproteus*** sp.

Host : *Copsychus malabaricus* (Scopoli); site of infection : blood.

Distribution and Remarks : As for Sl. No. 400.

404. ***Haemoproteus*** sp.

Host : *Dicrurus adsimilis* (Bechstein); site of infection : blood.

Distribution and Remarks : As for Sl. No. 400.

405. ***Haemoproteus*** sp.

Host : *Muscicapa parva* Bechstein; site of infection : blood.

Distribution : India : West Bengal (Calcutta district).

Remarks : As for Sl. No. 402.

406. ***Haemoproteus*** sp.

Host : *Ploceus manyar* (Horsfield); site of infection : blood.

Distribution and Remarks : As for Sl. No. 400.

407. ***Haemoproteus*** sp.

Host : *Ithopygia saturata*; site of infection : blood.

Distribution : India : West Bengal (Darjiling district)

Remarks : Pal and Das Gupta (1980) recorded this unnamed species from the aforesaid host.

408. ***Haemoproteus*** sp.

Host : *Estrilda amandava* (L.); site of infection : blood.

Distribution : India : West Bengal (exact locality not mentioned).

Remarks : Bandyopadhyay and Haldar (1987) reported this unnamed species from the aforesaid host from Gangetic West Bengal.

409. ***Haemoproteus*** sp.

Host : *Lanius schach tricolor* (Hodgson); site of infection : blood.

Distribution : India : West Bengal (Purchased from local dealer in Calcutta).

Remarks : Choudhury and Misra (1976) recorded this unnamed species from the aforesaid host.

410. ***Haemoproteus*** sp.

Host : *Lonchura malabarica* (L.); site of infection : blood.

Distribution and Remarks : As for Sl. No. 400.

411. ***Haemoproteus*** sp.

Host : Lonchura malacca (L.); site of infection : blood.

Distribution and Remarks : As for Sl. No. 408.

412. ***Haemoproteus*** sp.

Host : *Sturnus contra* (L.); site of infection : blood.

Distribution and Remarks : As for Sl. No. 408.

Genus *Polychromophilus* Dionisi

413. ***Polychromophilus murinus*** Dionisi

1899. *Polychromophiluos murinus* Dionisi, *Atti Socm. Studi. Malar.*, **1**, p. 133.

1966. *Polychromophilus murinus* : Garnham : *Malaria parasites and other Haemosporidia,* Blackwell Scientitic Pub., London, p. 920.

Material examined : Sev. exs., Khutimari, Jalpaiguri, 19,vii.1975, N.C. Nandi.

Diagnosis : Gametocytes round-oval, 6-8 μm in diameter, cytoplasm finely granular, usually a little denser towards the periphery, nucleus of macrogametocyte compact, round, central or subcentral, 1-1.5 μm in diameter, numerous dark-brown pigment granules scattered throughout the cytoplasm, in smaller grains, host cell hypertrophied.

Host : *Hipposideros lankadiva* Kelart, vespertilionid bats (see Garnham, 1986); site of infection : blood.

Distribution : India : West Bengal (Jalpaiguri district).

Remarks : Nandi and Mandal (1976) recorded this species from the aforesaid host with some differences in gametocyte morphology suggesting of its being a local strain.

414. ***Polychromophilus*** sp.

Host : *Rhinolophus rouxi rouxi* (Temminck); site of infection : blood.

Distribution : India : West Bengal (Darjiling district).

Remarks : Palo and Das Gupta (1982) reported this unnamed species from the aforesaid host.

Genus *Hepatocystis* Levaditi and Sechoen

415. ***Hepatocystis ravi wui*** Dasgupta, Chatterjee and Ray

1970. *Hepatocystis ravi wui* Dasgupta, Chatterjee and Ray, *Parasitology,* **61**, p. 411.

Diagnosis : Pigmented haemoproteid parasite with gametocytes occurring in red blood cells; tissue stages occur in clusters of cystic bodies, associated with finer blood vessels of liver forming characterstic foci of infection; mature merocyst about 1.5 µm in diameter.

Host : *Petaurista magnificus* Hodgson; site of infection : blood, lung and spleen.

Distribution : India : West Bengal (Darjiling district).

416. ***Hepatocystis*** sp.

Host : *Petaurista elegans caniceps* Gray; site of infection : blood, lung and spleen.

Distribution : India : West Bengal (Darjiling district).

Remarks : Pal and Dasgupta (1984) reported this unnamed species from the aforesaid host.

Genus ***Rayella*** Das Gupta

Key to the species

1 (2) Gametocytes having haemozon pigments as black granules, (parasitic in *Hylopetes alboniger*).....***R. hylopetei***

2 (1) Gametocytes without such black pigments.....

3 (4) Schizont of large size, measuring up to 225 µm, in diameter, parasitic in *Petaursta elegans caniceps*.....***R. gigantica***

4 (3) Schizont not so large, growing up to 150 µm in diameter, parasitic in *Petaurista magnificus*.....***R. rayi***

417. ***Rayella gigantica*** Pal and Das Gupta

1984. *Rayella gigantica* Pal and Das Gupta, *J. Bengal nat. Hist. Soc.* (N.S.), 3(1), p. 3.

Diagnosis : Only gametocytes occurring in the red blood cells without any haemozoin pigments; exoerythrocytic stages found both in liver and lungs; cystic schizonts occurring in large clusters in the liver, few in number in the lung; mature schizonts, large measuring 100 - 225 µm in diameter.

Host : *Petaurista elegans caniceps* Gray; site of infection : R.B.C., liver and lungs.

Distribution : India : West Bengal (Darjiling district).

418. ***Rayella hylopetei*** Das Gupta, Pal, Chatterjee & Chatterjee

1971. *Rayellal hylopetei* Das Gupta, Pal, Chatterjee and Chatterjee, *Parasitology*, **62**, p. 195.

Diagnosis : Gametocytes occurring in red blood cells having haemozoin pigments in black granules, male gametocytes with pale cytoplasm and diffuse chromatin, infected red blood cells hypertrophied and showed no stippling; tissue stages in the form of cystic bodies in characteristic foci of infection occurring in association with blood vessels of the liver.

Host : *Hylopetes alboniger* Hodgson; site of infectin : R.B.C. and liver.

Distribution : India : West Bengal (Darjiling district).

419. *Rayella rayi* Das Gupta

1967. *Rayella rayi* Das Gupta, *Parasitology*, **57**, p. 733.

Diagnosis : Gametocytes without any black pigments occurring in the red blood cells; absence of erythrocytic schizogony; exoerythrocytic schizogony occurring in liver; schizonts measuring 150 μm in diameter representing small cystic bodies; occurring in clusters in close association with blood vessels of the liver and often forming definite foci of infection.

Host : *Petaurista magnificus* Hodgson; site of infection : R.B.C., liver.

Distribution : India : West Bengal (Darjiling district).

Family LEUCOCYTOZOIDAE

Genus *Leucocytozoon* Sambon

Diagnosis : Unpigmented gametocytes occurring in R.B.C. and rarely in W.B.C. of birds; host cell grossly hypertrophied, host cell nucleus distorted and displaced perihperally; schizogony in liver and other tissues, schizonts with cytomeres; sporogony in Simuliidae and Ceratopogonidae; oocysts small, unpigmented with fewer than 100 sporozoites.

420. *Leucocytozoon sabrazesi* Mathis and Leger

1909. *Leuococytozoon sabrazessi* Mathis and Leger, *C.R. Soc. Biol.* Paris, **67**, p. 98.

Diagnosis : Immature gametocyte ring-like, 2-3 μm in diameter. mature macrogametocyte round ovoid and elongate, occurring in fusiform host-cell, nucleus round-oval centrally or eccentrally placed; oval ones 15.6 μm × 11.6 μm and elangatged ones measuring 21.0 μm × 8.5 μm, occupying 122.6 μm^2 and 123.1 μm^2 in area respectively; microgametocyte slightly smaller than macrogametocyte with defused nucleus; host cell and host cell nucleus highly hypertrophied.

Host : *Gallus* sp. and *G. gallus murghi* Robinson and Kloss site of infectin : blood.

Distribution : India : West Bengal (Darjiling district), Madhya Pradesh, Orissa. Elsewhere : Indochina, Malaya, Java and Sumatra.

Subclass PIROPLASMIA

Order PIROPLASMIDA

Key to the families

1 (2) Schizogony in the endothelial cells of the blood vessels of vertebrate (finally parasites invading the erythrocytes in which occurring round, ovoid, irregular or bacilliform forms).....THEILERIIDAE

2 (1) Schizogony in the erythrocytes of vertebrates.....

3 (4) Pear-shaped arranged in pairs, ticks acting as vectors.....BABESIIDAE

4 (3) Parasites of different shapes and showing no tendency towards paired arrangements, vectors unknown.....

5 (6) Nucleus with endosome, 4-16 merozoites formed.....DACTYLOSOMATIDAE

6 (5) Nucleus without endosome or nucleolus, 4 merozoite formed.....HAEMOHORMIDIIDAE

Family BABESIIDAE

Genus ***Babesia*** Starcovici

Diagnosis : Apical complex reduced to a polar ring, rhoptries and subpellicular microtubules, filaments not present on parasitized erythrocytes.

Key to the species

1 (4) Trophozoites rounded and appearing as small ring-like forms somewhat resembling the ring form of malarial parasite.....

2 (3) Ring form generally having two compact chromatins - one larger and other smaller, parasitic in jackal and dog.....*B. gibsoni*

3 (2) Ring form with a single chromatin, parasitic in bat, *Scotophilus kuhli khuli*..... ..... *B. vespuruginis*

4 (1) Trophozoites without having any ring form.....

5 (6) Parasite multiplying by a characteristic budding process, buds remaining attached by their pointed ends, parasitic in *Bos indicus*.....*B. bigemina*

6 (5) Such characteristic budding lacking in parasite.....

6a Frequently pear-shaped, occassionally ovoid, round or irregular, dimensiion 2.5 - 4.0 μm × 1.2 - 3.0 μm, parasitic in sheep, *Ovis* sp.....*B. motasi*

6b Round oval or amoeboid, dimension 1.33 - 3.69 μm × 1.23 - 2.49 μm, parsitic in rat, *Rattus rattus*.....*B. muris*

6c Pyriform, dimension 3.5 μm × 1.8 μm, parasitic in mongoose, *Herpestes edwardsi*..... .....*B. bengalensis*

421. ***Babesia bengalensis*** Bandyopadhyay and Ray

1985. *Babesia bengalensis* Bandyopadhyay and Ray, *Acta Protozool.*, **24**(2), p. 147.

Diagnoosis : Trophozoite intraerythrocytic, immature forms pyriform or oval, 2 μm × 1.5 μm and 2 μm^2 in area; mature forms forms pyriform 3.5 μm × 1.8 μm and 4.5 μm^2 in area; multiplication by binary fission and schizogony; product of schizogony occurring in tetrad, arranged cross-wise or in the form of a fan.

Host : Common Indian Mangoose, *Herpestes edwardsi* (Geoffroy); site of infection : blood.

Distribution : India : West Bengal (North 24-Parganas district).

422. ***Babesia bigemina*** (Smith and Kilborne)

1893. *Pyrosoma bigeminum* Smith and Kilborne, *U.S. Dept. Agric. Bur. Anim. Inudst.*, Bull. **1**, p. 177.

1926. *Babesia bigemina* (Smith and Kilborne) : Wenyon : *Protozoology,* Vol.II, Bailliere, Tindall and Cox, London, p. 993.

Material examined : Sev. exs., Calcutta, 17.vi.1975. A.K. Mandal.

Diagnosis : Parasite large intraerythrocytic, round, oval, irregular, or pyriform, occurring in pairs, individuals of each pair lying closely together; round forms 2-3 μm in diameter, pear-shaped forms 2-4 μm × 1.5 - 2 μm, occassionally 5-6 μm in length, extending across the R.B.C.; multiplication by charactristic budding process, buds remaining attached by their pointed ends.

Host : *Bos indicus* Linnaeus, occurring in cattle and deer; site of infection : blood.

Distribution : India : West Bengal (Calcutta district), Tamil Nadu, Uttar Pradesh. Elsewhere : Central and South America, Europe, Africa and Australia.

Remarks : This species is highly pathogenic for adult animals and causing a disease commonly known as 'Red-water fever.'

423. ***Babesia gibsoni*** (Patton)

1910. *Piroplasma gibsoni* Patton, *Bull. Soc. Path. Exot.*, **3**, p. 274.

1926. *Babesia gibsoni* (Patton) : Wenyon : *Protozoology,* Vol. II. Bailliere, Tindall and Cox, London, p. 1020.

Material examined : Sev. exs., Calcutta, 12,iii.1976, A.K. Mandal.

Diagnosis : Trophozoites small, rounded, not having characteristic paired, formation pear shaped forms, appearing as small ring-like forms, occupying about one-eighth of the infected corpuscle, generally with two compact chromatins, one larger and other smaller; sometimes larger ovoid or elongate forms present; host cell usually unaltered, parasite often excentrically located in the corpuscle, usually one, occasionally as many as 5 parasites occurring in a single host cell; schizogony in spleen.

Host : Dog, *Canis familiaris* Linnaeus, Jackal, *Canis aureus* Linn.; occurring in dogs and wild canids; site of infection : blood.

Distribution : India : West Bengal (Calcutta district), Tamil Nadu, Sri Lanka and China.

Remarks : This species is highly pathogenic in domestic dogs (Levine, 1967). The disease is usually referred to as 'Tick fever.'

424. ***Babesia motasi*** Wenyon

1926. *Babesia motasi* Wenyon, *Protozoology,* Bailliere, Tindall and Cox, London, p. 1006.

Material examined : Sev. exs., Calcutta, 10.v.1978. A.K. Mandal.

Diagnosis : Parasites large, mostly pear-shaped, occasionally round or irregular, occurring singly or in pairs and the pairs always lying at an acute angle at their narrower ends, 2.5 - 4 μm × 1.2 - 3 μm; chromatin often appeared as double; host cell hypertrophied.

Host : Sheep, *Ovis* sp. and goats; site of infection : blood.

Distribution : India : West Bengal (Calcutta district), Karnataka. Elsewhere : Southern Europe, Russia, Africa, Far East and tropical Asia.

Remarks : This species iss not so pathogenic and may either cause an acute or chronic disease.

425. ***Babesia muria*** (Fantham)

1096. *Piroplasma muris* Fantham, *Quart. J. Microsc. Sci.*, **50**, p. 493.

1986. *Babesia muris* (Fantham) : Mandal and Choudhury, *Riv. Parasit.*, 47(2), p. 58.

Diagnosis : Trophozoite round, oval, amoeboid or pyriform, unpigmented, intracorpuscular, 1.23 - 3.69 μm × 1.23 - 2.49 μm and 4.7 μm^2 in area, occurring singly or in pairs, with a single chromatin at one side of the parasite; multiplication typically by binary fission, host cell unaltered.

Host : Rat, *Rattus rattus arboreus*; site of infection: blood.

Distribution : India : West Bengal (South 24-Parganas district).

426. ***Babesia vesperuginis*** (Dionisi)

1899. *Achromaticus vesperuginis* Dionisi, *Atti Soc. Studi Malaria,* Rome, **1**, p. 133.

1986. *Babesia vesperuginis* (Dionisi) : Maandal and Choudhury; *Riv. Parasit.*, 47(2), p. 58.

Diagnosis : Trophozoite intraerythrocytic, unpigmented, round or irregular amoeboid, 0.82 - 2.46 μm × 0.82 - 2.05 μm and 0.5 - 2.01 μm^2 in area; round-oval forms resembling a ring stage with single chromatin; amoeboid forms rarely with six chromatins as if branching out in various direction and connected with each other by thread-like structures; cross-appearance during division; no change in infected red cells.

Host : Bat, *Scotoophilus kuhli kuhli* ; site of infection : blood.

Distribution : India : West Bengal (South 24-Parganas district).

Family THEILERIIDAE

Genus ***Theileria*** Bettencocurt, Franca and Borgess

Diagnosis : Elements of apical complex much reduced, always including only rhoptries; polar ring or conoid lacking, usually without subpellicular microtubules, vectors ixodid ticks, parasitic in mammals.

Key to the species

1 (2) Transmissible by direct blood inocculation, non-pathogenic, persistance of parasites in blood for long periods.....*T. mutans*

2 (1) Not transmisssible by direct blood inocculation, highly pathogenic, no persistance of parasites after recovery.....*T. parva*

427. ***Theileria mutans*** (Theiler)

1906. *Piroplasma mutans* Theiler, *J. Comp. Path. & Therap.*, 19, p. 297.

1938. *Theileria mutans* (Theiler) : Bhatia : *Fauna of British India, Protozoa* : Sporozoa, Taylor and Francis Ltd., London, p. 298.

Material examined : Sev. exs., Calcutta, 12.x.1979, A.K. Mandal.

Diagnosis : Intraerythrocytic forms minute, comma-shaped bacilliform or coccal; sometimes dumbbell-shaped, ring or even cross-shaped forms; the largest one about 1 μm in diameter; schizonts larger than *T parva* with ovoid nuclei; non pathogenic; transmissible by direct blood inoculation; blood forms persisted for longer periods.

Host : Cattle, *Bos indicus* Linnaeus and buffalo; site of infection : blood.

Distribution : India : West Bengal (Calcutta district). Elsewhere : Asia, Africa, Soluthern Europe, England, USSR, Australia and North America.

Remarks : This species is known to cause benign bovine theileriosis with a mortality rate less than 1% in cattle. Levine (1967), however, referred this species as *Gonderia mutans* (Theiler).

428. ***Theileria parva*** (Theiler)

1904. *Piroplasma parvam* Theiler, *J.R. Army Med. Corps*, 3, p. 599.

1926. *Theileria parva* (Theiler) : Wenyon : *Protozoology, Bailliere Tindall and Cox*, London, p. 1029.

Material examined : Sev. exs., Calcutta, 10.x.1978, A.K. Mandal.

Diagnosis : Erythrocytic forms resembling small babesiids, occuring in ring-, comma-, pear- or rod-shaped forms; nucleus located at one end in rod-like forms; blood forms non-infective and with no multiplication, growing to form gametocytes; male gametocytes long, slender rod-like and the female ones rounded or pear-shaped; rod-like gametocytes 2.5 μm × 1.2 μm; schizonts large, multinucleate resembling Koch's "blue bodies" with a varying number of red chromatin dots; schizonts of two kinds, some with a smaller number of larger nuclei and others with a larger number of smaller nuclei, giving rise to merozoites capable of reproducing by schizogony.

Host : Cattle, *Bos indicus* Linneaus, and buffalo; site of infection : blood.

Distribution : India : West Bengal (Calcutta district). Elsewhere : East Africa.

Remarks : This species is most highly pathogenic (mortality rate up to 100%) in domestic cattle (Baker, 1969). It causes theileriosis commonly known as East Coast fever.

Family HAEMOHORMIDIIDAE
Genus ***Haemohormidium*** Henry

Diagnosis : As for the family.

Key to the species

1 (2) Full grown trophozoite and schizont measuring 2.5 μm and 3.5 μm in length respectively ..... *H. hareni*

2 (1) Full grown trophozoite and schizonts measuring 3.5-6.0 μm and 4 μm respectively.....

3 (4) Macrogametocyte oval, 3.5 μm × 2.5 μm, parasitic in *Ophicephalus punctatus*..... .....*H. ophicephali*

4 (3) Macrogametocyte round, 1.7 μm in diameter, parasitic in *Clarias batrachus*..... .....*H. batrachi*

429. *Haemohormidium batrachi* (Ray Chaudhuri and Choudhury)

1983. *Babesiosoma batrachi* Ray Chaudhuri and Choudhury, *Arch. Protistenk.*, **127**, p. 335.

1988. *Haemohormidium batrachi* (Ray Chaudhuri and Choudhury) : Levine : *The Protozoan Phylum Apicomplexa*, Vol. II, p. 44.

Diagnosis : Trophozoites usually elongated, sometimes ovoidal, vacuolated and non-pigmented, 5.0 μm × 3.0 μm, nucleus occupying the broader end of the parasite; schizont with 4 crescent-shaped nuclei arranged in the form of a rosette or cross, 5.0 μm × 4.5 μm; microgametocyte elongated or spindle shaped with two nuclei connected by a chromatic thread; macrogametocyte round or slightly oval 1.7 μm in diameter.

Host : *Clarias batrachus* (L.); site of infection : blood.

Distribution : India : West Bengal (North 24-Parganas district).

430. *Haemohormidium hareni* (Haldar, Misra and Chakraborty)

1971. *Babesiosoma hareni* Haldar, Misra and Chakravarty, *Arch. Protistenk.*, **113**, p. 1.

1988. *Haemohormidium hareni* (Haldar, Misra and Chakravarty), Levine : *The Protozoan Phylum Apicomplexa* vo. II. p. 44.

Diagnosis : Schizogony found in the erythrocyte, the youngest form measuring 2.0 μm × 1.5 μm; trophozoite measuring 2.5 μm × 1.5 μm; schizont 3.5 μm × 3.0 μm, having 4 merozoite; microgametocyte 5.0-6.5 μm × 1.5-2.5 μm and macrogametocyte round, 2.5 μm in diameter.

Host : *Channa punctatus* Block; site of infection : blood.

Distribution : India : West Bengal (Calcutta district).

431. *Haemohormidium ophicephali* Misra, Haldar and Chakravarty

1969. *Babesiosoma ophicephali* Misra, Haldar and Chakravarty, J. *Protozool.*, **16**(3), p. 446.

1988. *Haemohormidium ophicephali* (Misra, Haldar and Chakravarty) Levine, *The Protozoan Phylum Apicomplexa*, vol. II, p. 44.

Diagnosis : Schizogony occurring in erythrocyte with the formation of 4 merozoite, youngest form, slightly triangular measuring 3.0 μm × 2.0 μm; trophozoite ovoid, 3.5-6.0 μm × 2.0-2.5 μm; schizont elongated, 4.0 μm × 2.5 μm; microgametocytes slender, elongated, 5.0 μm × 1.5 μm; macrogametocyte oval, 3.5 μm x 2.5 μm.

Host : *Channa punctatus* Bloch; site of infection : blood.

Distribution : India : West Bengal (Calcutta district).

432. *Haemohormidium* sp.
(= Babesiosoma sp.)

Host : *Muraenesox* sp.; site of infection : blood.

Distribution : India : West Bengal (South 24-Parganas district).

Remarks : Mandal (1984) reported this unnamed species from the aforesaid host. The trophozoite of this parasite is ovoid, 2-2.5 μm × 1.5-2 μm, with vacuolated cytoplasm, and schizonts with 4 distinct nuclei arranged cross-wise inside the erythrocyte.

Family DACTYLOSOMATIDAE

Genus *Dactylosoma* Labbe

Diagnosis : Merogony present, more than 4 merozoites formed, parasitic in cold blooded vertebrates.

Key to the species

1 (2) Trophozoite oval to spherical, 3.1 μm × 2.26 μm; mature schizont elongated, triangular, elliptical or oval with nuclei arranged in 4 clusters of 2 each or vice versa..... .....*D. notopterae*

2 (1) Trophozoite stumpy, triangular with one end broad and other end tapering gradually, 2.3 μm × 1.4 μm; mature schizont ovoid to quadrilateral, nuclei arranged in 2 clusters of 4 each.....*D. striata*

433. *Dactylosoma notopterae* Kundu and Haldar

1984. *Dactylosoma notopterae* Kundu and Haldar *Riv. Parasit.*, **15**; p. 391.

Diagnosis : Youngest form ovoidal, nucleus triangular stained pinkish red; trophozoite oval to spherical measuring 3.1 μm × 2.6 μm; schozogony in R.B.C. forming 8 merozoites arranged in a fashion of four clusters; gametocyte of 2 types, microgamete cylindrical having two nuclei, measuring 7.1 μm × 3.0 μm and the macrogametocyte almost round, measuring 4.5 μm × 4.4 μm.

Host : *Notopterus notopterus* (Pallas); site of infection : blood.

Distribution : India : West Bengal (Nadia district).

434. *Dactylosoma striata* Sarkar and Haldar

1979. *Dactylosoma striata* Sarkar and Haldar, *Indian J. Parasit.*, **3**, p. 99.

Diagnosis : Youngest trophozoite stumpy and triangular, measuring 3.2 μm x 1.4 μm; scizogony completed with the formation of 8 merozoites; schizont ovoid with 8 merozoites arranged in two clusters of four; microgametocyte spindle-shaped, 4.6 μm x 1.0 μm and macrogametocyte 2.0 μm × 1.7 μm, almost round.

Host : *Ophicephalus striatus* Bloch; site of infection : blood.

Distribution : India : West Bengal (Hugli district).

435. ***Dactylosoma*** sp.

Host : *Mystus vittatus* (Bloch); site of infection : blood.

Distribution : India : West Bengal (South 24-Parganas district).

Remarks : Mandal (1979) reported this unnamed species from the aforesaid host. The parasite is intraerythrocytic and produces 5 merozoites arranged in the form of a fan.

Incertae Sedis to Order Piroplasmida

Genus ***Anaplasma*** Theiler

Diagnosis : Spherical body of chromatin, less than 0.5 μm in diameter, occuring in erythrocytes, tick acting as vectors, parasitic in mammals.

Remarks : Although Levine (1988) has not included this genus under piroplasms still this is included in the present communication as this parasite is reported several times from India even in recent times (see Bhatia, 1938; Sinha, 1985).

Key to the species

1(2) Appeared as spherical, chromatin granule, lying at the margin of host erythrocyte..... .....*A. marginale*

2(1) Morphologically similar to above, but lying in the central position in host erythrocyte .....*A. centrale*

436. ***Anaplasma centrale*** Theiler

1911. *Analplasma centrale* Theiler, *Zeitschr. Infektionskr. d.* Haust., **19**, p. 105.

1985. *Anaplasma centrale* : Sinha : Indian *J. Parasit.*, **9**, p. 283.

Diagnosis : Spherical chromatin granules with no cytoplasm, 0.2- 0.5 μm in diameter, located centrally inside the erythrocyte, a parasitophorous vacuole present.

Host : *Hylopetes alboniger* Hodgson; site of infection : blood.

Distribution : India : West Bengal (Darjiling district).

437. ***Anaplasma marginale*** Theiler

1910. *Anaplasma marginale* Theiler, *Bull. Soc. Path exot.*, **3**, p. 135

1985. *Anaplasma marginale* Sinha, *Indian J. Parasit.*, **9**, p. 283.

Diagnosis : Spherical chromatin granular, measuring 0.2-.40 μm in diameter; aparently with no cytoplasm, parasitophorous vacuole present, usually formed at the margin of the red cells.

Host : *Hylopetes alboniger* Hodgson; site of infection : blood.

Distribution : India : West Bengal (Darjiling district).

438. ***Anaplasma*** sp.

Host : Indian bats; site of infection : blood.

Distribution : India : West Bengal (Calcutta district).

Remarks : Knowles (1928), *see* Bhatia, 1938) reported this unnamed species from blood of Indian bats.

Phylum	MICROSPORA
Class	MICROSPOREA
Order	MICROSPORIDA
Family	?
Genus	***Thelohania*** Henneguy

Diagnosis : Each sporont developing into 8 (in one case upto 12) sporoblasts and ultimately into 8 (in one case upto 12) spores, sporont membrane may degenerate at different times during spore formation.

Key to the species

1 (4) Spores oval with equally rounded extremities.....

2 (3) Spore measuring 4.-5.2 μm × 2.4-2.8 μm.....*T. indica*

3 (2) Spore measuring 4.75-6.0 μm × 3-4 μm.....*T. legeri*

4 (1) Spores broadly oblong or pyriform with dissimilar extremities.....

5 (6) Spore pyriform, polar end tapered, 5.1-6.1 μm × 2-2.1 μm, sporont dividing to form 8-12 sporoblasts.....*T. anomola*

6 (5) Spore broadly oblong showing a small knob at one end and showing a clear oblong space at the other, 4.5-5.0 μm × 3-3.5 μm, sporont dividing to form 8 sporoblasts.... .....*T. obscura*

439. ***Thelohania anomala*** Sen

1941. *Thelohania anomala* Sen, *J. Malar. Inst. India,* 4(2), p. 258.

Diagnosis : Spore pyriform, 5.1-6.1 μm × 2.0-2.1 μm, polar end tapered; daughter schizont uninucleated; four nucleated schizont dividing into two binucleated parasites; nuclear fusion taken place to become sporont; sporont divide to form 8-12 sporoblasts; each sporoblast giving rise to mature spore.

Host : Larvae of *Anopheles ramsayi* Covell (Insecta : Diptera); site of infection : adipose tissue (Fat body) of the larvae.

Distribution : India : West Bengal (Calcutta district).

Remarks : This species differs from an allied species *Thelohania legari* by its narrower dimension of the spores and greater number of the sporoblasts.

440. *Thelohania indica* Kudo

1929. *Thelohania indica* Kudo, *Arch. Protistenk.*, **67**, p. 1.

Diagnosis : Spore ellipsoidal, 4-5.2 μm × 2.4-2.8 μm, with equally rounded extremities, thick spore membrane, a comparatively large nucleus at one end and a polar capsule at the other; schizonts elongated with 4-8 nuclei arranged in pairs; sporont octosporoblastic.

Host : Larvae of *Anopheles hyrcanus* (Giles); and *A. ramsayi* Covell; site of infection : adipose tissue.

Distribution : India : West Bengal (Calcutta district and also from other non-specific locality of the state).

441. *Thelohania legari* Hesse

1904. *Thelohania legeri* Hesse, *C.R. Soc. Biol.*, **57** : 570.

Diagnosis : Spore oval, 4.75-6.0 μm × 3.4 μm; daughter schizont uninucleated, large schizont with four nuclei giving rise to binucleated forms to become sporonts; sporonts, 9-10 μm × 4-6 μm, transforming into pansporoblast with eight spores.

Host : Larvae of *Anopheles maculipennis* Meig : *A. barbirostris* Van der Wulp, *A. varuna* Lyengar, *A. annularis* Van der Wulp, *A. varuna* Lyengar, *A. hyrcanus* (Giles), *A. ramsayi* Covell, *A. subpictus* Grassi and *A. vagus* Donitz (Iyengar, 1929; Kudo, 1929); site of infection : adipose tissue.

Distribution : India : West Bengal (Calcutta district).

Remarks : This is perhaps the commonest microsporidians occurring in anopheline larvae (*see* Sen, 1941).

442. *Thelohania obscura* Kudo.

1929. *Thelohani obscura* Kudo, *Arch. Protistenk.*, **67**, p. 1.

Diagnosis : Spore 4.5-5.0 μm × 3.0-3.5 μm, broadly oblong with thin membrane, a small knob-like mass at one end and a clear oblong space at the other; sporont octosporoblastic.

Host : Larva of *Anopheles varuna* Iyengar (Insecta : Diptera); site of infection : thorax and anterior abdominal segments of the larvae.

Distribution : India : West Bengal.

Remarks : This species was described by Kudo (1929) based on material sent by M.O.T. Iyengar from Bengal.

Family NOSEMATIDAE

Diagnosis : Pansporoblastic membrane usually absent, sporoblast mono or dinucleated.

Genus *Nosema* Nageli

Diagnosis : Each sporont becoming a single sporoblast forming a single spore.

443. *Nosema bombycis* Nageli

1938. *Nosema bombycis* : Bhatia, *Fauna of British India, Protozoa : Sporozoa,* Taylor and Francis. Ltd., p. 351.

Material examined : Sev. exs., Maldah, 10.xii. 1983, A.K. Mandal; sev exs., Murshidabad, 5.xi.1983, A.K. Mandal.

Diagnosis : Spore egg-shaped, anterior end somewhat narrower than the posterior end, 3-4 μm × 1-2 μm, with two vacuoles, one at each end; polar capsule single, located axially in spore, 1.5-2 μm × 0.8-1 μm; polar filament long, 57-72 μm, occasionally up to 98 μm; sporoplasm forming a cytoplasmic girdle round the polar capsule.

Host : *Bombyx morii* Fabricius; site of infection : all tissues of eggs, larvae, pupae and imago.

Distribution : India : West Bengal (Maldah and Murshidabad districts) - cosmopolitan occurring throughout the world.

Remarks : This species is pathogenic in silk-worm causing a disease known as pebrine disease. The disease often causes epidemic among larval silk-worms and spreads to the offspring through the ova. The outbreak usually entails huge economic loss to the silk industry.

Phylum MYSOZOA
Class MYXOSPOREA
Order BIVALVULIDA

Key to the families

1 (2) Spore with polar capsule at opposite ends of spore or with widely divergent polar capsule located in sutural plane or sutural zone.....MYXIDIIDAE

2 (1) Spore with polar capsule at one pole in sutural plane or in plane perpendicular to sutural plane.....

3 (4) Spore with 2-4 polar capsule at one pole located at perpendicular to sutural plane .....CERATOMYXIDAE

4 (3) Spore with 2-4 polar capsule at one located at sutural plane.....MYXOBOLLIDAE

Family MYXIDIIDAE

Key to the genera

1 (2) Polar filament short, ribbon-like, (trophozoite large and discoid, spore fusiform with truncated ends).....*Sphaeromyxa*

2 (1) Polar filament long and fine.....

3 (4) Spore fusiform with pointed or rounded ends, sutural line typically straight.....*Myxidium*

4 (3) Spore fusiform usually with truncated ends, sutural line obliquely directed, usually 'S' form.....*Zschokkela*

Genus *Myxidium* Butschli

Sixteen species of *Myxidium* have been known so far from this state. Out of these, 15 including 4 unidentified species are reported from fish and one species from Amphibia.

Key to the species of Myxidium of fishes

1(12) Shell valve non-striated.....

2 (3) Both extremities of spore drawn out into transparent needle-like structures..... .....*M. boddaerti*

3 (2) Spore not drawn out into needle-like structures as above.....

4 (5) Spores large, over 30 µm in length (30.7-38.7 µm).....*M. apocryptae*

5 (4) Spores small, less than 20 µm in length.....

6 (7) Sutural ridge of shell value 'S'- shaped.....*M. fasciatum*

7 (6) Sutural ridge of shell value not 'S'-shaped.....

8 (9) Spore elongate oval with both extremities rounded, shell slightly elevated in front of filament openings.....*M. glossogobi*

9 (8) Spore fusiform with pointed ends, shell not elevated in front of the filament openings.....

10(11) Polar capsule spherical to ovoidal, spore, spore 11 - 16.5 µm × 5 - 7.49 µm..... .....*M. mystusium*

12 (1) Shell valve striated.....

13(14) Spore of large dimensions, measuring 23 -27 µm in length.....*M. calcariferi*

14(13) Spore measuring upto 20 µm in length.....

15(16) Suture of shell valve finely curved and nearly S-shaped.....*M. sciaenae*

16(15) Suture of shell valve not as above.....

17(18) Spore cylindrobiconical in sutural view and bilobate in valvular view.....*M. striatusi*

18(17) Spore fusiform with both extremities pointed.....

19(20) Spores narrow three times as long as broad.....*M. lieberkunhni*

20(19) Spores broad about twice as long as broad.....*M. heteropneustsi*

A. *Myxidium* of fishes

444. *Myxidium apocryptae* Bajpai and Haldar

1982. *Myxidium apocryptae* Bajpai and Haldar, *Arch. Protistenk.*, **125**, p. 129.

Diagnosis : Mature spore more or less spindle-shaped with pointed extremities, 30.7 - 32.2 µm × 4.2 - 6.6 µm; shell valve thin without any striations; polar capsule elongated, pyriform, 9.1 - 12.5 µm × 2.5 -3.0 µm. Polar filament in some 9.1 - 15.8 µm long and in others 66.4 87.1 µm long; sporoplasm granular and located in between the two polar capsule, iodinophilous vacuole absent.

Host : *Apocryptes bato* Ham.; site of infection : gall bladder.

Distribution : India : West Bengal (Nadia district).

445. *Myxidium boddaerti* Choudhury and Nandi

1973. *Myxidium boddaerti* Choudhury and Nandi, *Proc. zool. Soc. Calcutta,* **26,** p. 45.

Material examined : Sev. exs., Port Canning, South 24-Parganas, 18.vii.1971, N.C. Nandi.

Diagnosis : Spore fusiform with both the extremities drawn out into transparent needle-like structures, 133.3 - 166.8 µm in length with extension and 6.4 - 8.3 µm in breadth; shell valve thick and smooth, sutural line indistinct; polar capsules equal in size, pyriform, 7.4 - 10.3 µm × 3.0 - 4.0 µm; sporoplasm granular and filling the extracapsular space.

Host : *Boleophthalmus boddaerti* Palbs; site of infection : gut.

Distribution : India : West Bengal (South 24 Parganas district).

446. *Myxidium calcariferi* Chakravarty

1943. *Myxidium procerum* var. *calcariferi* Chakaravarty, *Proc. Indian Acad, Sci,* **18**(2) B, p. 28.

Diagnosis : Spore elongated and fusiform with pointed terminal ends, 23-27 µm × 6.18 µm; shell valves equal and marked with striations, sutural line absent; polar capsules pyriform, equal in size 8.24 µm × 4.12 µm, polar filament 25-30 µm; sporoplasm occupying the entire space between the polar capsules.

Host : *Lates calcarifer* (Bloch); site of infection : gall bladder.

Distribution : India : West Bengal (exactly locality not mentioned).

447. *Myxidium fasciatum* Sarkar

1985. *Myxidium fasciatum* Sarkar, *Acta Protozool.,* **24,** 175.

Diagnosis : Vegetative form hyaline oval (17.6 µm × 12.8 µm - 22.5 µm × 19.0 µm) to spherical (19.0 - 21.0 µm in diameter), disporous; spore cylindrobiconical, 14.4 - 17.6 µm × 5.6 - 6.9 µm; polar capsule pear-shapped, 4.0 - 4.8 µm, polar filament having 2-3 coils, short and ribbon-like; iodonophilous vacuole absent.

Host : *Trichogaster fasciatus* Bl. & Schn.; site of infection : gall bladder.

Distribution : India : West bengal (North 24-Parganas district).

448. *Myxidium glossogobi* Chakravarty

1939. *Myxidium glossogobi* Chakravarty, *Arch. Protistenk.,* **92,** p. 172.

Diagnosis : Spore elongately oval with rounded extremities 12-15 μm × 8.5 - 10 μm ; shell valve nonstriated, sutural plane indistinct; polar capsules pyriform, one at each end of spore, 3.1 - 4.1 μm long, shell slightly elevated in front of filament openings, polar filament 40 -50 μm long; sporoplasm uniformly granular and located at the middle portion of the spore.

Host : *Glossobogobius giuris* (Ham); site of infection : gall bladder.

Distribution : India : West Bengal (Calcutta district).

449. ***Myxidium heteropneustesi*** Chakravarty

1943. *Myxidium heteropneustesi* Chakravarty, *Proc. Indian Acad. Sci.*, **18**(2)B, p. 28.

Diagnosis : Spores more or less spindle-shaped with bluntly pointed extremities, 14.42 μm × 6.18 μm, shell valve provided with striations, sutural line indistinguished among striations; polar capsule equal, slightly ovoidal with pointed anterior ends, 4.12 - 6.18 μm × 4.12 μm; sporoplasm granular, rectangular and located in the space between the polar capsules.

Host : *Heteropneustes fossilis* (Bloch); site of infection : gall bladder.

Distribution : India : West Bengal (Calcutta district).

450. ***Myxidium islampurium*** Sarkar, Mazumdar and Pramanik

1985. *Myxidium islampurium* Sarkar, Mazumdar and Pramanik, *Arch. Protistenk.*, **130**, p. 289.

Diagnosis : Spore almost fusiform in valvular view and more arched on the upper side, cylindribiconical in sutural view, suture thin and straight, shell valve thin and smooth; iodinophilous vacuole absent; spore measuring 8.5 - 12 μm × 3.0 - 6.0 μm; pola rcapsule conical having 3-4 coil, measuring 3.0 - 4.5 μm × 2.0 - 3.0 μm.

Host : *Channa marulius* Ham.; site of infection ; gall bladder.

Distribution : India : West Bengal (Murshidabad district).

451. ***Myxidium leiberkuhni*** Butschli

1881. *Myxidium leiberkuhni* Butschli, *Z. wiss. Zool.*, **35**, p. 629.

1943. *Myxidium leiberkuhni* : Chakravarty, *Proc. Indian Acad. Sci.*, **18**(2) B, P. 29.

Diagnosis : Spores fusiform with both extreimities pointed, 12.4 - 15 μm × 4.12 - 5 μm; shell valves thin, striated; sutural line very faint; polar capsule pyriform, equal in size, 4.12 μm × 2.06 μm, polar filament 15 μm in length.

Host : *Anabas testudineus* (Bloch), *Boleophthalamus boddaerti* Palbs from India and *Esox lucinus* Linn., *Lota lota* etc. from abroad.

Distribution : India ; West Bengal (Calcutta and South 24- Parganas districts).

Remarks : Butschli (1881) originally described this species from the urinary bladder of a freshwater fish *Esox lucinus*. But, Chakravarty (19430 recorded the same species from the gall bladder of an anabantid fish, *Anabas testudineus*. Subsequently Choudhury and Nandi (1973) reported this species from the gall bladder of a gobiid fish, *Bolephthalmus boddaerti*. It is worth mentioning here that Sarkar (1985) proposed Chakravarty's species as new to science and named

it *M. mukundae* in view of the fact that : (i) it is smaller in size (12.4 - 15 μm *vs.* 18-20 μm) and (ii) its site of infection is different (gall bladder *vs.* urinary bladder).

Howerver *M. leiberkuhni* is retained for Indian forms until further study after obtaining the material from the Indian hosts are made.

452. *Myxidium mystusium* Sarkar and Ray Choudhury

1986. *Myxidium mystisium* Sarkar and Ray Choudhury, *Acta Protozool.*, **25**, p. 359.

Diagnosis : Spore fusiform with pointed end, 11.0 - 16.65 μm × 5.0 - 7.49 μm, shell valve smooth, suture slightly curved, ridged and very distinct; polar capsule spherical to ovoidal, 3.33-7.49 μm in diameter; polar filament having 4-5 coils, extended one measuring 36.0 μm in length; extracapsular cavity filled with biconcave, granular mass of sporoplasm, iodinophilous vacuole absent.

Host : *Mystus vittatus* Day; site of infection : gall bladder.

Distribution : India : West Bengal (Hugli district).

453. *Myxidium sciaenae* Sarkar

1986. *Myxidium sciaenae* Sarkar, *Acta Protozool.*, **25**, p. 477.

Diagnosis : Spore fusiform in valvular view, more fusiform in sutural view, 19.36 (æ 0.47) μm × 5.32 (± 0.28) μm; shell valve two each having 5-6 longitudinal striations; suture distinct, finely pyriform having 6-7 coils of polar filament, 5.2 (± 0.13) μm × 2.50 (± 0.12) μm; sporoplasm filling the entire extracapsular biconcave cavity; iodinophilous vacuole absent.

Host : *Sciaena bleekeri* Day; site of infection : gall bladder.

Distribution : India : West Bengal (Medinipur district).

454. *Myxidium striatusi* Sarkar

1982. *Myxidium striatusi* Sarkar *Acta Protozool.*, **21**, p. 239.

Diagnosis : Spore, cyllindro-biconical in sutural view, bilobate in valvular view due to depression around the intercapsular region, 11.1 - 18.7 μm × 4.7 - 7.0 μm; shell valve with fine longitudinal striations, suture straight; polar capsule two, pyriform, open almost vertically to the sutural line, 3.7 - 5.6 μm × 2.8 - 3.7 μm; sporoplasm uninucleated, finely granulated, completely filling the extra-capsular cavity.

Host : *Ophicephalus striatus* Bloch; site of infection : gall bladder.

Distribution : India : West Bengal (Hugli district).

455. *Myxidium* sp.

Host : *Ophicephalus punctatus* Bloch; site of infection : gall bladder

Distribution : India : West Bengal (Calcutta district).

Remarks : Ray (1933) reported this unnamed species from the aforesaid host.

456. ***Myxidium*** sp.

Host : *Clarias batrachus* (Linnaeus); site of infection : gall bladder.

Distribution and Remarks : As for Sl. No. 455.

457. ***Myxidium*** sp.

Host : *Heteropneustes fossilis* (Bloch); site of infection : gall bladder.

Distribution and Remarks : As for Sl. No. 455.

458. ***Myxidium*** sp.

Host : *Ophicephalus punctatus* Bloch; site of infection : gall bladder.

Distribution : India : West Bengal (Nadia district).

Remarks : Haldar and Mukherjee (1978) reported this unnamed spcies from the aforesaid host.

B. ***Myxidium*** **of amphibians**

459. ***Myxidium haldari*** Sarkar

1982. *Myxidium haldari* Sarkar, *Acta Protozool.*, **2**, p. 197.

Diagnosis : Trophozoite large, oval to ellisoidal, disporoblastic, polysporous; spore fusiform or cylindrobiconical in sutural view, circular in polar view, slightly bent in the middle, 10-12 µm × 6.5-7.0 µm; shell with 8-10 longitudinal striations, suture almost straight; polar capsule two, round, one at each end, opening vertically to the sutural line, 3-4 µm in diameter, polar filament 38-65 µm in length.

Host : *Hyla arborea*; site of infection : gall bladder.

Distribution : India : West Bengal (Nadia district).

Genus ***Sphaeromyxa*** Thelohan

Key to the species

1 (4) Spore slightly arched in front and sutural view.....

2 (3) Sutural line more or less parallel to the long axis of the spore, polar capsule long, pyriform and with truncate ends.....***S. pultai***

3 (2) Sutural line curved and not parallel to the long axis of the spore, polar capsule ellipsoid .....***S. dighae***

4 (1) Spore more or less S-shaped in sutural view.....

5 (6) Polar capsule oval to ellipsoidal, spore measuring 27.55 µm × 7.80 µm.....***S. hareni***

6 (5) Polar capsule pyriform, spore measuring 19.8 µm × 5.4 µm.....***S. theraponi***

460. *Sphaeromyxa dighae* Sarkar and Mazumdar

1983. *Sphaeromyxa dighae* Sarkar and Mazumdar, *Acta Protozool.*, **22**, p. 257.

Diagnosis : Spore large, broad and bent in the middle forming an angle 140 degrees in valvular view, arched in sutural view, measuring 22.22 μm × 3.23 μm; shell valve smooth, elongated and curved, suture curved; polar capsule two, one on each end, subterminal and ellipsoidal, 2.43 μm × 2.32 μm; polar filament ribbon-like, 4-5 coils in each capsule.

Host : *Hilsa ilisha* (Ham.); site of infection : gall bladder.

Distribution : India : West Bengal (Medinipur district).

461. *Sphaeromyxa hareni* Sarkar

1984. *Sphaeromyxa hareni* Sarkar, *Acta Protozool.*, **23**(3), p. 183.

Diagnosis : Spore fusiform in valvular view, sometimes slightly curved with round ends and almost 'S'-shaped in sutural view, 23.35-28.95 μm × 5.6-8.87 μm; shell valve smooth, thin-walled with 'S'-shaped sutural line; polar capsule ovoid to ellipsoidal, 8.87- 10.27 μm x 3.0-5.1 μm, polar filament 34.5 μm in length; sporoplasm filling the extracapsular space.

Host : *Tachysurus platystomus* (Day); site of infection : gall bladder.

Distribution : India : West Bengal (Medinipur district).

462. *Sphaeromyxa pultai* Tripathi

1952. *Sphaeromyxa pultai* Tripathi, *Rec. Indian Mus.*, **50**, p. 63.

Diagnosis : Young trophozoite circular 4.5 μm in diameter, mature trophozoite mone or disporous, measuring 12.6-13.9 μm, and 19-27.3 μm respectively, spore long with truncated ends, two sides slightly curved in front and sutural view, 28.8-30.0 μm × 5-5.5 μm, shell thin and smooth; sutural line more or less parallel to the long axis of the spore, sutural ridge absent; polar capsule long, pyriform with truncated ends; sporoplasm granular, not filling the whole of the extra-capsular cavity.

Host : *Odontamblyopus rubicundus* (Ham.); site of infection : gall bladder.

Distribution : India : West Bengal (North 24-Parganas district).

463. *Sphaeromyxa theraponi* Tripathi

1952. *Sphaeromyxa theraponi* Tripathi, *Rec. Indian Mus.*, **50**, p. 63.

Diagnosis : Spore arched in front view measuring 19.8 μm × 5.9 μm, one side more arched than the other; sutural view appearing as 'S' shaped; sutural line also 'S' shaped, thin and distinct; sutural ridge absent, shell valve thin and smooth; polar capsule small, pyriform, 7.2 μm × 2.7 μm with truncated ends; sporoplasm filling most of the extracapsular cavity.

Host : *Therapon jarbua* (Forsk.) site of infection : gall bladder.

Distribution : India : West Bengal (South 24-Parganas district).

Genus *Zschokkella* Auerbach

Five species of this genus, 3 from fishes and one each from amphibians and reptiles have been known so far from this state.

Key to the species

A. *Zschokkella* of fishes

1 (4) Valve of the shell thin and not provided with any striation, suture thin and 'S' shaped

2 (3) Spore broader, 10.50-12.25 µm × 6.50-7.35 µm, parasitic in marine fish *Tachysurus platystomus*.....*Z. platystomusi*

3 (2) Spore narrower, 10.3 µm × 4.12-5.18 µm, parasitic in freshwater fish, *Heteropneustes fossils*.....*Z. fossillae*

4 (1) Valve of the shell thin and provided with longitudinal striation, suture not 'S' shaped, (Spore 12.36 µm × 6.18 µm).....*Z. ilishae*

A. *Zschokkella* of fishes

464. *Zschokkella fossilae* Chakravarty

1943. *Zschokkella fossilae* Chakravarty, *Proc. Indian Acad. Sci.,* **18**(2) B, p. 30.

Diagnosis : Trophozoite roughly circular, 12.36-16.48 µm in diameter, disporous; spore more or less semi-circular, 10.3 µm × 4.12-5.18 µm; shell valves thin, non-striated, sutural line 'S'-shaped; polar capsules spherical, equal in size, 3.1 µm in diameter, located at each end of the spore and having distinct coiled filaments.

Host : *Heteropneustes fossils* (Bloch); site of infection : gall bladder.

Distribution : India : West Bengal (Calcutta district).

465. *Zschokkella ilishae* Chakravarty

1943. *Zschokkella ilishae* Chakravarty, *Proc. Indian Acad. Sci.,* **18**(2) B, p. 30.

Diagnosis : Trophozoite disc-shaped, non-motile, 14.5-22.6 µm in longest diameter; spore more or less semi-circular, 12.36 µm × 6.18 µm; shell valve thin with longitudinal striations; polar capsules equal, spherical, 4.26 µm in diameter; sporoplasm located in between the polar capsules but dorsally extended over the capsules.

Host : *Hilsa ilisha* (Ham.); site of infection : gall bladder.

Distribution : India : West Bengal (exact locality not mentioned).

466. *Zschokkella platystomusi* Sarkar

1987. *Zschokkella platystomusi* Sarkar, *Arch. Protistenk.,* **133**, p. 151.

Diagnosis : Spores ellipsoidal in valvular view with one edge view highly convex and the other slightly concave, dumbbell to nearly fusiform in sutural view, 10.50-12.25 µm × 6.50-7.35 µm; shell valve thin walled, hyaline and smooth; suture thin, not ridged and S-shaped;

Polar capsule two, spherical to ovoidal, 2.80-3.50 μm in diameter; polar filament when extruded measuring 84.0 μm; sporoplasm granular and filling the extracapsular cavity.

Host : *Tachysaurus platystomus* (Day); site of infection : gall bladder.

Distribution : India : West Bengal (Medinipur district).

B. *Zschokkella* of amphibians

467. *Zschokkella auerbachi* (Weill)

1929. *Cystodiscus auerbachi* Weill, *Arch. Zool. exper. et. gen.*, 69 (notes et revue). (*see*, Chakravarty, 1940).

1933. *Zschokkella prashadi* Ray, *Proc. Indian Sci. Congr.*, p. 259.

1940. *Zschokkella auerbachi* : Chakravarty, *J.R. Asiat. Soc. Bengal*, **6**, p. 71.

Diagnosis : Mature trophozoite irregular oval, disc-shaped or elongated amoeboid in shape, diameter varying from 1.07-1.7 μm in oval or circular form and in elongated form 1.0-1.75 μm × 0.39-0.5 μm; spore semicircular and ovoidal in side view with angles rounded but one end slightly tapering, 10.3 μm × 6.18 μm and 12.36-14.44 μm × 6.78-8.24 μm; polar capsule spherical, 4.12 μm in diameter, polar filament 40-50 μm long.

Host : *Bufo melanostictus* Schneider, *Rana tigrina* Daudin, and *Rana limnocharis* Wiegman; site of infection : gall bladder.

Distribution : India : West Bengal (Calcutta district), Uttar Pradesh.

C. *Zschokkella* of reptile

468. *Zschokkella lissemysi* Chakravarty

1940. *Zschokkella lissemysi* Chakravarty, *J. Asiatic Soc. Bengal* **6**, p. 70.

Diagnosis : Young trophozoite measuring 12.36-14.42 μm × 8.24-9.33 μm; spore semicircular in front view with one end slightly tapering, and ovoidal in lateral view, 18.5-22.6 μm × 14.4-16.4 μm; shell valves thick and striated, sutural line and ridge absent; polar capsule spherical and equal, 7.2-9.2 μm in diameter, each capsule with a fine duct, opening exterior by the side of the lid; polar filament 100 μm in length. Sporoplasm occupying the entire extra-capsular cavity.

Host : *Lissemys punctata* (Bonnaterre); site of infection : gall bladder.

Distribution : India : West Bengal (Calcutta district).

Family CERATOMYXIDAE

Key to the genera

1 (4) Spore with two polar capsules.....

2 (3) Shell valve conical and hollow, breadth of spore more than twice the sutural diameter .....*Ceratomyxa*

3 (2) Shell valve hemispherical, breadth of spore less than twice the sutural diameter..... .....*Leptotheca*

4 (1) Spore with four polar capsules.....***Chloromyxum***

Genus ***Ceratomyxa*** Thelohan

1 (2) Shell valve with 2-5 hollow appendages, sutural diameter of spore 14-19 µm..... .....***C. tartoori***

2 (1) Shell valve without such appendages, sutural diameter 3.5-10 µm.....

3 (4) Breadth of the spore about 9 times the lenght of sutural diameter.....***C. sagarica***

4 (3) Breadth of the spore 3-4 times the length of sutural diameter.....

5 (6) Extra capsular cavity filled with finely granular sporoplasm (breadth of the spore 14-15 µm, sutural diameter 4.5 µm).....***C. gobiodesi***

6 (5) Sporoplasm not filling entirely extracapsular cavity.....

7 (8) Breadth of the spore 25-40 µm, sutural diameter 10 µm, parasitic in *Hilsa ilisha*..... .....***C. hilsae***

8 (7) Breadth of the spore 16-26 µm, sutural diameter 4.2-7.2 µm, parasitic in *Scatophagus argus*.....***C. scatohphagi***

469. ***Ceratomyxa gobioidesi*** Chakravarty

1939. *Ceratomyxa gobioidesi* Chakravarty, *Arch. Protistenk.*, **92**, p. 171.

Diagnosis : Trophozoite circular or disc-shaped, 55-650 µm in diameter, disporous; spore crescent shaped, 14-15 µm in width, shell valve symmetrical with terminal end blunt, sutural plane distinct, sutural diameter 4-5 µm; polar capsules spherical and equal, one on each side of the sutural plane, polar filament 15 µm long, extracapsular cavity filled with granular sporoplasm.

Host : *Odantoamblypus* (*Gobioides*) *rubicundus* (Ham.); site of infection : gall bladder.

Distribution : India : West Bengal (Calcutta district).

470. ***Ceratomyxa hilsae*** Chakravarty

1939. *Ceratomyxa hilsae* Chakravarty, *Arch. Protistnek.*, **92**, 0. 171.

Diagnosis : Trophozoite spherical and usually disporous; spore elliptical in front view, anteriorly arched in lateral view, posteriorly almost straight, 25-40 µm in width; shell valve tapering with rounded or blunt extremities, sutural plane prominent, sutural diameter 10 µm; polar capsules spherical, equal in size, 5 µm in diameter, polar filament 35-40 µm long; sporoplasm asymmetrically placed and not filling the entire extra-capsular cavity.

Host : *Hilsa ilisha* (Ham.); site of infection : gall bladder.

Distribution : India : West Bengal (Calcutta district).

471. ***Ceratomyxa sagarica*** Choudhury and Nandi

1973. *Ceratomyxa sagarica* Choudhury and Nandi, *Proc. zool. Soc. Calcutta*, **26**, p. 45.

Material examined : Sev. exs., Port Canning, South 24-Parganas, 10.i.1971.

Diagnosis : Spore crescentic to flat-base arched form with two lateral prolongations ending almost in needle point, breadth of spore (26.5-36.3) μm about nine times the length of sutural diameter (3.3-4.1) μm; shell valve thin and asymmetrical, sutural ridge vertically curved; polar capsule pyriform, one on each side of sutural plane, unequal in size, 2-3 μm × 1.6-2.5 μm, sporoplasm not filling the entire extracapsular cavity.

Host : *Boloephthalmus boddaerti* Palbs; site of infection : gall bladder.

Distribution : India : West Bengal (South 24-Parganas district).

472. *Ceratomyxa scatophagi* Chakravarty

1943. *Ceratomyxa scatophagi* Chakravarty, *Proc. Indian Acad. Sci.*, **18**(2) B, p. 24.

Diagnosis : Trophozoite irregular in shape measuring 50-120 μm × 40-85 μm; spore crescent shaped in lateral view, 16-26 μm in breadth; shell valves alike, cylindrical with terminal extremities rounded, sutural line indistinct, sutural diameter 4.2-7.2 μm; polar capsules equal, spherical, 2.5-3.1 μm in diameter, polar filament 30-50 μm in length.

Host : *Scatophagus argus* (Bloch); site of infection : gall bladder.

Distribution : India : West Bengal (exact locality not mentioned).

473. *Ceratomyxa tartoori* Sarkar

1986. *Ceratomyxa tartoori* Sarkar, *Acta Protozool.*, **25**(3), p. 351.

Diagnosis : Spore hemispherical in sutural view with highly convex, round anterior surface and almost flat posterior surface, 167-234 m in breadth, 14-19 μm in sutural diameter; shell valve two, thin and smooth, each valve with an appendage or prolongation forming about 45° angle with the sutural axis, sometimes spores with 3-5 hollow appendages; polar capsules two, occasionally 3-4, spherical or nearly ovoidal with a very short neck, 6-7 μm in diameter or 5-7 (6.29) μm × 5-7 (5.5) μm; polar filament 20-28 μm in length.

Host : *Opisthopterus tartoor* Day; site of infection : gall bladder.

Distribution : India : West Bengal (Medinipur district).

474. *Ceratomyxa* sp.

Host : *Gobioides rubicudus* Ham.; site of infection : liver, gall bladder, kidney, ovary etc.

Distribution : India : West Bengal (Calcutta district).

Remarks : Ray (1933a, b) reported this unnamed species from the aforesaid host.

475. *Ceratomyxa* sp.

Host : *Trichogaster fasciatus* Schneider; site of infection : gall bladder.

Distribution and Remarks : As for Sl. No. 474.

476. ***Ceratomyxa*** sp.

Host : *Macrones gulio* (Ham.); site of infection : gall bladder.

Distribution and Remarks : As for Sl. No. 474.

Genus ***Leptotheca*** Thelohan

1 (2) Spore bean-shaped with both extermities rounded, spore valve smooth and symmetrical, sporoplasm not occupying entire extracapsular cavity of the spore.....*L. latesi*

2 (1) Spore elliptical, spore valve smooth and unequal, sporoplasm occupying entire extracapsular cavity of the spore.....*L. macronesi*

477. ***Leptotheca latesi*** Chakravarty

1943. *Leptotheca latesi* Chakrvarty, *Proc. Indian Acad. Sci.*, **18**(2) B, p. 22.

Diagnosis : Trophozoites circular, 10-14 μm in diameter, disporous; spore bean-shaped in lateral view with both extremities rounded, 10.3012.4 μm in breadth; shell valves smooth and symmetrical, sutural line prominent, sutural diameter 6.2 μm, sutural ridge absent; polar capsule spherical, equal in size, one on each side of the sutural line, 3.1 μm in diameter, polar filament 50-80 μm in long; sporoplasm not filling the entire extracapsular cavity.

Host : *Lates calcarifer* (Bloch); site of infection : gall bladder.

Distribution : India : West Bengal (exact locality not mentioned).

478. ***Leptotheca macronesi*** Chakravarty

1943. *Leptotheca macronesi* Chakravarty, *Proc. Indian Acad. Sci.*, **18**(2) B, p. 23.

Diagnosis : Trophozoites circular, 10.3 μm in diameter, monosporous; spore elliptical with ventral side more or less flattened, extremities rounded, 10-14.4 μm in breadth; shell valves smooth, unequal and thin, sutural line distinct, sutural diameter 6.18-7.2 μm; polar capsules equal, spherical, one on each side of sutural line, 3.1 μm in diameter; sporoplasm filling the entire extracapsular cavity.

Host : *Macrones gulio* (Ham.); site of infection : gall bladder.

Distribution : India : West Bengal (exact locality not mentioned).

Genus ***Chloromyxum*** Mingazzini

Key to the species

1 (4) Spore spherical.....

2 (3) Spore 8.24-10.3 μm in diameter, shell valve striated, polar capsule oval, 4.1-5.2 μm × 3.1-4.0 μm.....*C. amphipnoui*

3 (2) Spore 9-10 μm in diameter, shell valve without any striations, polar capsule spherical,

2.7-3.6 μm in diameter.....*C. mrigalae*

4 (1) Spore ovoidal, (7-8.5 μm × 6-8 μm, shell valve without any striations, polar capsule ovoid to pyriform, 2-3.5 μm × 2-2.5 μm.....*C. meglitschi*

479. *Chloromyxum amphipnoui* Ray

1933. *Chloromyxum amphinoui* Ray, *Curr. Sci.*, **1**, p. 347.

1943. *Chloromyxum amphipnoui* : Chakravarty, *Proc. Indian Acad. Sci.*, **18**(2) B, p. 26.

Diagnosis : Trophozoites oval or spherical in outline, measuring 14.4 μm × 16.5 μm - 35 μm × 40 μm; spore almost spherical in front view, ovoidal in side view, 8.24-10.3 μm in breadth; shell valve alike and striated, with fine sutural line; polar capsules equal in size, oval with attenuated anterior end, 4.1-5.2 μm × 3.1-4.0 μm, polar filament 35-40 μm long; sporoplasm filling the entire extracapsular space.

Host : *Amphipnous cuchia* (Ham.), *Heteropneustes fossilis* (Bloch) and *Amblypharyngodon mola* (Ham.); site of infection : gall bladder.

Distribution : India : West Bengal (Calcutta and North 24- Parganas districts).

Remarks : Chakravarty and Basu (1948) reported this species from the gall bladder of *Amblypharyngodon mola.*

480. *Chloromyxum meglitschi* Sarkar

1982. *Chloromyxum meglitschi* Sarkar, *Acta Protozool.*, **21**, p. 239.

Diagnosis : Trophozoite coelozoic, ellipsoidal, disporous; spore small, ovoidal with truncated narrower end, 11-16.5 μm × 9-13 μm, shell valve smooth, suture slightly curved; polar capsule 4, ovoid to pyriform, 2-3.5 μm × 2-2.5 μm, located towards the broader end of the spore, opening through small duct.

Host : *Ophicephalus punctatus punctatus* Bloch; site of infection : gall bladder.

Distribution : India : West Bengal (North 24-Parganas district).

481. *Chloromyxum mrigalae* Tripathi

1952. *Chloromyxum mrigalae* Tripathi, *Rec. Indian Mus.*, **50**, p. 64.

Diagnosis : Trophozoite globular, 19.8-23 μm in diameter; spore spherical, 7-10 μm in diameter, with thin and smooth shell valves, sutural line distinct and slightly curved; polar capsules 4 in number, spherical and equal in size, 2.7-3.6 μm in diameter, sporoplasm filling half of the extracapsular cavity.

Host : *Cirrhinus reba* (Ham.) and *C. mrigala* (Ham.); site of infection : gall bladder.

Distribution : India : West Bengal (North 24-Parganas district).

482. *Chloromyxum* sp.

Host : *Xenentodon cancila* (Ham.); site of infection : gall bladder.

Distribution : India : West Bengal (North 24-Parganas district).

Remarks : Tripathi (1952) reported this unnamed species from the gall bladder of the aforesaid host from Belgharia fish farm. The spore is spherical, 7.2 µm in diameter, with smooth shell, slightly raised sutural line and spherical polar capsule of 2.7 µm in diameter.

Family MYXOBOLIDAE

Key to the genera

1(6) Shell-valve of spore prolonged into long processes.....

2(5) Shell-valve prolonged only posteriorly as caudal appendage.....

3(4) Caudal appendages being the extension of the shell-valve and composed of same material as the shell-valve.....***Henneguya***

4(3) Caudal appendage not an extension of the shell-valve and composed of materials different from those of shell-valve.....***Unicauda***

5(2) Shell valve with two equally long prolongations at both anterior and posterior ends .....***Neohenneguya***

6(1) Shell valve without any prolonged process.....

7(10) Spore with two polar capsules.....

8(9) Sporoplasm with a conspicuous iodinophile vacuole.....***Myxobolus***

9(8) Sporoplasm without iodinophile vacuole.....***Myxosoma***

10(7) Spore with one polar capsule.....

11(12) Spore flattened, pyriform, polar capsule present at anterior end parallel to the longitudinal axis of the spore.....***Thelohanellus***

12(11) Spore oval to ellipsoidal, polar capsule present at broad end, either perpendicular or at longitudinal axis of the spore.....***Neothelohanellus***

Genus ***Myxobolus*** Thelohan

Sixteen species of *Myxobolus* have so far been reported from this state.

Key to the species

1(16) Polar capsule equal sized.....

2(3) Spore elongately pyriform, shell of spore thin, (spore 14.5-16.5 µm × 6.18 µm, polar capsule elongated pyriform).....***M. catlae***

3(2) Spore oval, ellipsoidal, or subspherical, shell of spore thick or moderately thick.....

4(5) Anterior end of spore possessing a small knob.....***M. bengalensis***

5(4) Anterior end of spore without any distinct knob.....

6(9) A small intercapsular ridge present between opening of two capsules.....

7(8) Polar capsule spherical, 2.8-3.6 μm in diameter, sutural ridge distinct, having four thickennings along its posterior margin.....*M. sphericum*

8(7) Polar capsule pyriform, 3.6-4.5 μm × 2.7 μm, sutural ridge distinct but without having four thickennings as above.....*M. barbi*

9(6) Small intercapsular ridge between opening of two capsules lacking.....

10(13) Spore oval or ovoidal.....

11(12) Shell valve bearing a triangular notch-like depression at its anterior extremity, polar capsule pear-shaped, 6.6 μm × 3.3 μm.....*M. rohitae*

12(11) Shell valve without any triangular notch, polar capsule broadly pyriform, 4.74-5.05 μm × 2.48-3.18 μm.....*M. anili*

13(10) Spore subspherical.....

14(15) Polar capsule 6.18 μm × 3.09 μm, parasitic in *Clarias batrachus*.....*M. clarii*

15(14) Polar capsule 4.5-5.5 μm × 2.5-3.0 μm, parasitic in *Mastacembelus armatus*....*M eeli*

16(1) Polar capsule unequal.....

17(26) Both the polar capsule are of same shape.....

18(23) Spore more than 10 μm in length.....

19(22) Spore pyriform in shape.....

20(21) Spore broadly pyriform, 12.22-13.96 μm × 8.73-10.74 μm, shell valves thin-walled, polar filament of large polar capsule ribbon-like.....*M. mystusius*

21(20) Spore pyriform, narrower, 12-14 μm × 6-7.5 μm, shell valves quite thick, polar filament thread-like.....*M. aligarhensis*

22(19) Spore oval or ovoidal in shape.....

22a Spore 12.4-15.0 μm × 8.2-10.0 μm, larger polar capsule 6.18 μm × 4.12 μm and smaller one 4.12 μm × 3.09 μm.....*M. calbasui*

22b Spore 11.5-13.96 μm × 9.77-10.47 μm, larger polar capsule 6.28- 7.35 μm × 3.49-4.19 μm, small one 4.19-6.98 μm × 3.14-3.49 μm.....*M. mahendrae*

22c Spore 12.1-14.3 μm × 7.7-10.5 μm, large polar capsule 5.6 μm × 4.3 μm and smaller one 4.5 μm × 3.2 μm.....*M. chakravartyi*

23(18) Spore less than 10 μm in length.....

24(25) Shell valves exhibit several triangular markings, both polar capsule pyriform.....*M. mrigalae*

25(24) Shell valve lacking any triangular markings, both polar capsule oval.....*M. branchialis*

26(17) Larger polar capsule pyriform, smaller one more or less spherical.....*M. indicum*

483. *Myxobolus aligarhensis* Bhatt and Siddiqui

1964. *Myxobolus aligarhensis* Bhatt and Siddiqui, *J. Protozool.*, **11**, p. 314.

1970. *Myxobolus punctatus* Ray Chaudhuri and Chakravarty, *Acta Protozool.*, **8**, p. 160.

Diagnosis : Cyst rounded, milky-white, 0.190-0.628 µm × 0.192-0.531 µm; spore pyriform, gradually tapering, bluntly pointed anterior end and rounded posterior end, 12-14 µm × 6-7.5 µm; shell valves thick, symmetrical, sutural line and sutural ridge straight; polar capsules two, pyriform, equal (excepting those parasitic in heart muscle, Mukherjee and Haldar, 1981), 6.5-8 µm x 2-2.5 µm and 6-7 µm x 2-2.5 µm, polar filament thread-like, unequal, 38-45 µm and 32 µm in length; sporoplasm filling the extracapsular cavity, an iodinophilous vacuole present.

Host : *Ophicephalus* (= *Channa*) *punctatus* Bloch; site of infection : accessory respiratory membrane, pharyngeal epithelium and fins.

Distribution : India : West Bengal (Calcutta, Nadia and North 24- Parganas districts), Punjab and Uttar Pradesh.

Remarks : Mukherjee and Haldar (1981) described *M. punctatus* from different organs of fish, *Ophicephalus punctatus* collected from fish ponds around Kalyani University Campus, Nadia. Gupta and Khera (1988) treated this species as synonym of *M. aligarhensis* as both the species have been collected from the same fish host and size of spores and polar capsules in both is almost the same. The present authors agree with this proposition.

484. *Myxobolus anili* Sarkar

1989. *Myxobolus anili* Sarkar, *Proc. zool. Soc., Calcutta,* **42**, p. 71.

Diagnosis : Spore broadly ellipsoidal with slightly acuminate anterior end in valvular view and broadly lenticular in sutural view, 9.48-11.06 (10.74) µm × 7.92-9.84 (8.69) µm; shell valves thick-walled, smooth and symmetrical, suture straight, thick- walled and ridged; polar capsule two, equal, broadly pyriform with short neck converging anteriorly, 4.74-5.05 (4.82) µm × 2.48-3.16 (3.05) µm; polar filament thread-like, 20 µm in length; sporoplasm dikaryotic, iodinophilous vacuole and intercapsular ridge absent.

Host : *Rhinomugil corsula* Ham.; site of infection : mesentry.

Distribution : India : West Bengal (coast of Bay of Bengal).

485. *Myxobolus barbi* Tripathi

1952. *Myxobolus barbi* Tripathi, *Rec. Indian Mus.*, **50**, p. 63.

Diagnosis : Spore 12.6-13.5 µm × 9.0 µm, perfectly oval in front view, lenticular in side and anterior view; shell valves thick, sutural ridge prominent, sutural line indistinct; polar capsules pyriform, equal and convergent, 3.6-4.5 µm x 2.7 µm, small intracapsular ridge present, iodinophilous vaculobe round; capsulogenous nuclei small, located at the posterior end of the capsule; sporoplasm filling most of the extracapsular cavity.

Host : *Barbus ticto* (Ham.); site of infection : skin.

Distribution : India : West Bengal (North 24-Parganas district).

486. *Myxobolus bengalensis* Chakravarty and Basu

1948. *Myxobolus bengalensis* Chakravarty and Basu, *Proc. zool. Soc. Bengal*, **1**, p. 23.

Diagnosis : Cyst oval, 2-4.1 μm in diameter; spore more or less oval in front view with anterior end bluntly pointed and posterior end rounded, spindle-shaped in side view, 8.56-9.36 μm × 6.42-6.80 μm, anterior end with a small knob; shell valve smooth, sutural ridge prominent, sutural line indistinct; polar capsule oval, 4.28-5.40 μm × 2.5-3.2 μm, polar filament 50-125 μm long, a spherical iodinophilous vacuole present.

Host : *Catla catla* (Ham.); site of infection : gills.

Distribution : India : West Bengal (North 24-Parganas district).

487. *Myxobolus branchialis* Tripathi

1952. *Myxobolus branchialis* Tripathi, *Rec. Indian Mus.*, **50**, p. 63.

Diagnosis : Spore oval in front view fusiform in side view; 6.4-7 μm × 4.5-5 μm; shell valves smooth, symmetrical and moderately thick, sutural ridge prominent; polar capsule unequal, convergent, oval-shaped, 3.5 μm × 1.5 μm and 1.5 μm × 1.0 μm; polar filament unequal; iodinophilous vacuole oval, 1.7 μm × 2.3 μm; trophozoite 13.5 μm in diameter; cyst 0.27-0.45 μm.

Host : *Barbus sarana* (Ham.); site of infection : gills.

Distribution : India : West Bengal (North 24-Parganas district).

488. *Myxobolus calbasui* Chakravarty

1939. *Myxobolus calbasui* Chakravarty, *Arch. Protistenk.*, **50**, p. 172.

Diagnosis : Cyst almost spherical, 300-350 μm in diameter, young trophozoites spherical or slightly oval, 30 μm in diameter; spore roughly oval in front view with anterior extremity pointed and the posterior rounded and lenticular in lateral view, 12.4-15 μm × 8.2-10 μm; shell somewhat thick with symmetrical shell valves, sutural ridge distinct, sutural line indistinct; polar capsules pyriform, unequal, 6.18 μm × 4.12 μm and 4.12 μm × 3.09 μm; polar filament unequal in size, 125 μm and 60 μm; single spherical, 4.1 μm in diameter, iodinophilous vacuole present.

Host : *Labeo calbasu* (Ham.), *L rohita* (Ham.) and *Cirrhina mrigala* (Ham.); site of infection: gall bladder.

Distribution : India : West Bengal (Calcutta district).

489. *Myxobolus catlae* chakravarty

1943. *Myxobolus catlae* Chakravarty, *Proc. Indian Acad. Sci.*, **18**(2)B, p. 32.

Diagnosis : Cyst opaque white, spherical or oval, 45-150 μm in largest diameter; spore

elongately pyriform in front view with sharply pointed anterior and rounded posterior extremities, spindle-shaped in lateral view, 14.5-16.5 μm × 6.18 μm; shell thin, sutural ridge and line indistinct; polar capsule elongated pyriform, equal, 10.3-12.36 μm × 2.06-3.01 μm, polar filament 150 μm long.

Host : *Catla catla* (Ham.), *Labeo rohita* (Ham.) and *Cirrhinus mrigala* (Ham.); site of infection : gills.

Distribution : India : West Bengal (Calcutta district).

490. ***Myxobolus chakravartyi*** Haldar, Das and Sharma

1983. *Myxobolus chakravartyi* Haldar, Das and Sharma, *Arch. Protistenk.*, **127**, p. 283.

Diagnosis : Cyst creamy-white, oblongate to rounded, 390-440 μm × 220-280 μm; spore ovoidal, anterior end flat-like in between the two openings of the polar capsules, posterior end broadly rounded, 12.4-14.3 μm × 7.7-10.5 μm; shell valve symmetrical, sutural ridge prominent; polar capsule unequal, pyriform, 5.5-6.6 μm × 3.3-5 μm and 4.4-5.0 μm × 2.2-4.4 μm, polar filament 37.4-40.5 μm in length.

Host : *Catla catla* (Ham.); site of infection : internal eye musculature.

Distribution : India : West Bengal (Nadia district).

491. ***Myxobolus clarii*** Chakravarty

1943. *Myxobolus clarii* Chakravarty, *Proc. Indian Acad. Sci.*, **18**(2)B, p. 31.

Diagnosis : Cysts broadly oval, opaque white, measuring 780-775 μm × 604-877 μm; spore subspherical in front view, lenticular in lateral view, 11.3-12.4 μm × 10.3 μm; shell comparatively thick with equal valves, sutural ridge distinct; polar capsules pyriform with their ends drawn into a short narrow tube, 6.18 μm × 3.09 μm, polar filament 50 μm long; iodinophilous vacuole single, spherical, 3 μm in diameter.

Host : *Clarias batrachus* (Linn.); site of infection : gall bladder, liver, testes, ovary and fat bodies.

Distribution : India : West Bengal (Calcutta district).

492. ***Myxobolus eeli*** Mandal and Nair

1975. *Myxobolus eeli* Mandal and Nair, *Acta Protozool.*, **14**(2), p. 175.

Material examined : Sev. exs., Champahati, South 24-Parganas, 28.ii.1972, A.K. Mandal.

Diagnosis : Spore subspherical in front view, lenticular in lateral view, 10.5-14 μm × 8.2-11.5 μm, smooth-walled with 2-3 triangular folds; suture distinct and ridged; polar capsule two, equal, pyriform, convergent, 4.5-5.5 μm × 2.5-3.0 μm, polar filament with 6 coils, extruded one 28-32 μm in length; sporoplasm hemispherical 7 μm in diameter, and with a spherical iodinophilous vacuole.

Host : *Mastacembelus armatus* (Lacepede); site of infection : inner wall of intestine.

Distribution : India : West Bengal (South 24-Parganas district).

493. *Myxobolus indicum* Tripathi

1952. *Myxobolus indicum* Tripathi, *Rec. Indian Mus.*, **50**, p. 63.

Diagnosis : Spore oval in front view, lenticular in side view, 9.5-10.8 μm × 7.5-8.2 μm, shell valves moderately thick, smooth and symmetrical; polar capsules unequal and divergent, longer one pyriform, 2.7 μm - 3.6 μm × 1.8 μm, and the smaller one more or less spherical, 1.8 μm × 1.0 μm; iodinophilous vacuole round to oval, 2.5 μm in diameter.

Host : *Cirrhinus mrigala* (Ham.); site of infection : muscles, liver and intestinal wall.

Distribution : India : West Bengal (North 24-Parganas district).

494. *Myxobolus mahendrae* Sarkar

1986. *Myxobolus mahendrae* Sarkar, *Acta Protozool.*, **25**(2), p. 235.

Diagnosis : Spore histozoic, almost cylindrobiconical with thin, slightly curved suture in sutural view and ovoidal with truncate anterior end in valvular view, 11.52-13.96 (12.70) μm × 9.77-10.47 (10.37) μm; shell valve two, symmetrical, smooth and thick-walled with 5-6 triangular markings on the wall; polar capsule broadly pyriform, unequal, slightly convergent, open side by side, 6.28-7.33 μm × 3.49-4.19 μm and 4.19 - 6.98 μm × 3.14-3.49 μm; iodinophilous vacuole present.

Host : *Catla catla* (Ham.); site of infection : gill arch epithelium.

Distribution : India : West Bengal (Hugli district).

495. *Myxobolus mrigalae* Chakravarty

1939. *Myxobolus mrigalae* Chakravarty, *Arch. Protistenk.*, **92**, p. 173.

Diagnosis : Cysts oval, opaque white in colour, 0.75-1.5 μm × 0.75-1.0 μm, polysporous; spore spherical or slightly oval in front view, lenticular in lateral view, 7.21-8.24 μm in length; shell somewhat thick, valves symmetrical with several triangular markings; sutural ridge porminent, sutural line indistinct; polar capsules pyriform, unequal in size, 5.15 μm × 3.09 μm and 3.09 μm × 2.06 μm; sporoplasm located posteriorly, iodinophilous vacuole 3.1 μm in diameter, polar filament unequal.

Host : *Cirrhinus mrigala* (Ham.); site of infection : scales.

Distribution : India : West Bengal (Calcutta district).

496. *Myxobolus mustusius* Sarkar

1986. *Myxobolus mystusius* Sarkar, *Acta Protozool.*, **25**(2), p. 235.

Diagnosis : Spore histozoic, almost lenticular with straight thin suture in sutural view and broadly pyriform with rounded posterior and sharply-pointed anterior tip in valvular view, 12.22-13.96 μm × 8.73-10.47 μm; shell valves two, symmetrical and thin-walled; polar capsules two, convergent, unequal, pyriform, 6.28-7.68 μm × 2.79-4.19 μm and 3.49-4.19 μm × 1.40-1.75 μm; polar filament 16-20 μm in length in larger polar capsule; a small iodinophilons vacuole present.

Host : *Mystus vittatus* Day; site of infection : gill filaments.

Distribution : India : West Bengal (Hugli district).

497. ***Myxobolus rohitae*** Haldar, Das and Sharma

1983. *Myxobolus rohitae* Haldar, Das and Sharma, *Arch. Protistenk.*, **127**, p. 283.

Diagnosis : Cyst rounded, 220-300 µm in diameter; spore ovoidal to rounded, 9.9-12.1 µm × 8.8-9.9 µm; shell valves two, meeting along the straight longitudinal sutural line, a triangular notch-like depression at the anterior extremity; polar capsule pear-shaped, equal 6.6 µm × 3.3 µm, polar filament 33-45.1 µm in length; a small iodinophilous vacuole present.

Host : *Labeo rohita* (Ham.); site of infection : scale.

Distribution : India : West Bengal (Nadia district).

498. ***Myxobolus sphericum*** Tripathi

1952. *Myxobolus sphericum* Tripathi, *Rec. Indian Mus.*, **50**, p. 63.

Diagnosis : Spore oval in front view, lenticular in side view, anterior end wider than the posterior end, 9-9.5 µm × 7.2 µm; shell valves moderately thick, smooth and symmetrical, sutural ridge prominent and with four thickenings along its posterior margin, sutural line indistinct; polar capsules spherical, equal and convergent, 2.8-3.6 µm in diameter; iodinophilous vacuole oval, prominent, 2.0-2.7 µm in diameter.

Host : *Cirrhina mrigala* (Ham.); site of infection : inner side of the scales.

Distribution : India : West Bengal (North 24-Parganas district).

Genus *Myxosoma* Thelohan

Key to the species

1(2) Both polar capsules elongated and tubular (spore nearly pyriform, 12-17.5 µm × 2.5-5.0 µm).....*M. maruliensis*

2(1) Both polar capsule pyriform.....

3(4) Polar capsules unequal, a knob-like swelling present at the base of each polar filament .....*M. magauddi*

4(3) Polar capsules equal, polar filament without any knob-like swelling as above.....

5(6) Spore cylindroconical shell valve with 6-8 long striations.....*M. cylindrica*

6(5) Spore oval or elliptical, shell valve smooth and without any striation.....

7(8) Spore with short posterior extension of shell valve, suture thick, ridged and almost 'S' shaped,.....*M. noblei*

8(7) Spore without any posterior extension of shell valve, suture not S-shaped.....

9(10) Spore broadly pyriform, (polar capsules 9.00-10.47 μm × 3-3.84 μm, arranged parallel to each other).....*M. trichogasteri*

10(9) Spore oval.....

10a Spore broadly oval to spherical, 11-14 μm × 9-11 μm, polar capsule 4-6 μm × 2-2.5 μm.....*M. indirae*

10b Spore broadly oval, sometimes elongated, 9-11 μm × 8-10 μm, polar capsule 4-5 μm × 2-3 μm.....*M. dermitis*

10c Spore broadly oval or slightly elongated, 11.2-17.3 μm × 8.1- 12.2 μm, polar capsule 4-7.1 μm × 2-4 μm.....*M. filamentosa*

499. ***Myxosoma cylindrica*** Sarkar, Mazumdar and Pramanik

1985. *Myxosoma cylindrica* Sarkar et. al., *Arch. Protistenk.*, 130 : p. 289.

Diagnosis : Spore histozoic lenticular in sutural view with thick, almost straight suture, cylindroconical in valvular view with 6-8 longitudinal striations on each valve, 12.8-16.32 μm × 4.48-6.4 μm; polar capsules two pyriform, small and equal with very short neck at the conical end of the spore, opening side by side, 4.0-5.2 μm × 1.12-2.24 μm, extended polar filament 8.0-16.0 μm in length; iodinophilous vacuole absent.

Host : *Channa gachua* Bloch; site of infection : kidney.

Distribution : India : West Bengal (Murshidabad district).

500. ***Myxosoma dermitis*** Haldar, Mukherjee and Kundu

1981. *Myxosoma dermitis* Haldar, Mukherjee and Kundu, *Arch. Protistenk.*, **124**, p. 244.

Diagnosis : Cyst creamy-white, 0.5 to 1 mm in diameter; spore usually broadly oval, sometimes elongated and rarely circular in outline, shell valve relatively thick and smooth; 9-11 μm × 8-10 μm; polar capsule equal, pyriform with 6 coils, 4-5 μm × 2-3 μm, extruded polar filament 10-25 μm in length; iodinophilous vacuole absent.

Host : *Labeo rohita* Ham.; site of infection : scale

Distribution : India : West Bengal (Nadia district).

501. ***Myxosoma filamentosa*** Haldar, Mukherjee and Kundu

1981. *Myxosoma filamentosa* Haldar, Mukherjee and Kundu, *Arch. Protistenk.*, **124**, p. 244.

Diagnosis : Spore broadly oval, slightly elongated but never thick circular in outline in front view, lenticular in side view, 11.2-17.3 (13.7) μm × 8.1-12.2 (9.5) μm, shell valve considerably elevated with prominent sutural ridge; polar capsule pyriform, measuring 4-7.1 μm x 2.0-4.0μm, polar filament with 5 or 6 coils extruded one 23.4-34.6 μm long; polar capsule unequal in about 25% of the spore.

Host : *Puntius filamentosus* Cuvier; site of infection : brain meninges.

Distribution : India : West Bengal (Nadia district).

502. ***Myxosoma indirae*** Kundu

1985. *Myxosoma indirae* Kundu, *Acta Protozool.*, **24**, p. 235.

Diagnosis : Cyst egg-shaped to spherical (0.5 to 1.00 µm); spore broadly oval to spherical in front view, lenticular in side and posterior end view, 11-14 µm × 9-11 µm; shell valve thick and smooth, suture thick, ridged and slightly oblique; polar capsule pyriform and convergent having 8 to 10 coils of filament in each, 4-5 µm × 2-2.5 µm, polar filament 28-37 µm in length; iodinophilous vacuole absent.

Host : *Cirrhinus mrigala* (Ham.); site of infection : head cartilage, scaie and tail fin.

Distribution : India : West Bengal (Nadia district).

503. ***Myxosoma magauddi*** Bajpai, Kundu and Haldar

1981. *Myxosoma magauddi* Bajpai, Kundu and Haldar, *Riv. Parasit.*, **42**, p. 343.

Diagnosis : Cyst 1.0 mm in diameter; spore oval, measuring 10.8-11.7 µm × 8.3-10.0 µm; shell valve two, meeting along the longitudinal straight sutural line, inner wall of shell valve with a triangular projection at the anterior end; polar capsule pear-shaped, unequal (large) 3.3-5.0 µm × 2.5-3.3 µm, and (small) 2.5-3.3 µm × 1.7-2.5 µm; polar filament having six or several loose coils, length (longer) 18.2-42.5 µm and (smaller) 8.3-10.8 µm, with a knob-like swelling at the base of each filament.

Host : *Trichogaster fasciatus* Bloch; site of infection : branchial filament.

Distribution : India : West Bengal (Nadia district).

504. ***Myxosoma maruliensis*** Sarkar, Mazumdar and Pramanik

1985. *Myxosoma maruliensis Sarkar, Mazumdar and Pramanik, Arch. Protistenk.*, **130**, p. 289.

Diagnosis : Spore histozoic, hyaline and nearly pyriform and planoconvex, anterior end pointed, posterior end truncated or rarely rounded, 12.0-17.5 µm × 2.5-5.0 µm, shell valve thin walled and smooth, suture thin, slightly bent with anterior minute orifice; polar capsule elongated and tubular, with 9-11 coils, 7.5-13.0 µm × 1.0-2.0 µm; about 38.1% spores with unequal polar capsule, opening separately unlike the spores with equal polar capsule, measuring 8-13 µm × 1.2-1.8 µm and 8.13 µm × 1.0-1.8 µm with 7-9 coils of polar filament; iodinophilous vacuole absent.

Host : *Channa marulius* Ham.; site of infection : kidney.

Distribution : India : West Bengal (Murshidabad district).

505. ***Myxosoma noblei*** Sarkar

1982. *Myxosoma noblei* Sarkar, *Acta Protozool.*, **2**, p. 239.

Diagnosis : Cyst oval, 121 µm × 98 µm; spore nearly lenticular in sutural view, suture thick, ridged and almost S-shaped, broadly elliptical in valvular view with short blunt, round or slightly pointed posterior extension of the shell valve; spore thick-walled, shell valve horizontally striated; polar capsule 5.8-8.5 µm or 3.0-4.5 µm, pyriform, equal and convergent with 7-8 coils of polar filament in each, polar filament 76 µm in length; iodinophilous vacuole absent.

Host : *Ophicephalus striatus* Bloch; site of infection : gall bladder.

Distribution : India : West Bengal (Hugli district).

506. ***Myxosoma trichogasteri*** Sarkar

1985. *Myxosoma trichogasteri* Sarkar, *Acta Protozool.*, **24**, p. 175.

Diagnosis : Spore lenticular in sutural view and pyriform in valvular view with pointed anterior end and round posterior end, 14-17 μm × 8.70-9.85 μm; shell valve thin-walled, smooth and symmetrical, suture thick and slightly bent; polar capsule two, pyriform and equal having 5-6 coils; 9.00-10.47 μm × 3.0-3.84 μm; polar filament (extruded one) 55-60 μm in length; iodinophilous vacuole absent.

Host : *Trichogaster fasciatus* Bloch; site of infection : gall bladder.

Distribution : India : West Bengal (North 24-Parganas district).

Genus ***Thelohanellus*** Kudo

1(2) Two distinct types of spores present, microspores 15.5-17.1 μm × 6.1-8.3 μm and macrospores 31-36.1 μm × 11.1-13.8 μm.....*T. jiroveci*

2(1) One type of spores present.....

3(4) Spore large, more than 30 μm or more in length.....

3a Spore 30-33 μm × 10-13 μm, parasitic in *Labeo rohita*.....*T. rohitae*

3b Spore 31-41 μm × 10-15 μm, parasitic in *Labeo calbasu*.....*T. rodgii*

4(3) Spore comparatively small in dimensions, less than 20 μm in length.....

5(12) Spore more or less pyriform in shape.....

6(7) Spore with flat and ridged surface and bent neck.....*T. coeli*

7(6) Spore with different configuration.....

8(11) Suture with prominent sutural ridge.....

9(10) Suture S-shaped, spore 10-12 μm × 5.5-7.5 μm, polar capsule 3.75-7.0 μm × 3-4.5 μm.....*T. bengalensis*

10(9) Suture not S-shaped, spore 12.1-13.2 μm × 6.6-7.7 μm, polar capsule 5.5-6.6 μm × 2.8-3.3 μm.....*T opthalmicus*

11(8) Suture not distinct and not ridged, (spore 14-15.75 μm × 4.53-7.00 μm).....
.....*T. auerbachi*

13(14) Spore elongated thin, with two lateral lines almost straight.....*T. gangeticus*

14(13) Spore more or less oval or elongately ellipsoidal.....

15(16) Spore elongately ellipsoidal, slightly accuminate at anterior pole and round at posterior

pole (spore 13.0-15.0 μm × 5.0-6.5 μm).....*T. sudevi*

16(15) Spore oval.....

17(22) Spore small, less than 15 μm in length.....

18(19) Spore oval with lateral sides more or less parallel, and a slight knob-like projection at anterior end (spore 10.8-12 μm in length).....*T. mrigalae*

19(18) Spore oval, anterior end less broad than posterior end and without any knob like projection.....

20(21) Shell with distinct sutural ridge.....

20a Spore 12.48-14.94 μm in length, parasitic in cyprinid fish.....*T. seni*

20b Spore 12.0-13.0 μm in length, parasitic in silurid fish.....*T. sanjibi*

21(22) Shell without any sutural ridge, (Spore 9-10.8 μm in length).....*T. calbasui*

22(17) Spore large 19.26-21.4 μm × 10.7-12.48 μm in dimension.....*T. catli*

507. *Thelohanellus auerbachi* Sarkar

1987. *Thelohanellus auerbachi* Sarkar, *Arch. Protistenk.*, **133**, p. 151.

Diagnosis : Spore broadly pyriform to elongately pyriform with pointed anterior and rounded posterior ends, 14.00-15.75 μm × 4.53-7.00 μm; shell valve smooth, curved at the apical region, suture indistinct; polar capsule also broadly pyriform 7.00-8.75 μm × 2.80-4.20 μm, polar filament with 5-6 coils, extended one 51.00-85.00 μm in length.

Host : *Tachysurus platystomus* (Day); site of infection : gall bladder.

Distribution : India : West Bengal (Medinipur district).

508. *Thelohanellus bengalensis* Sarkar and Raychoudhury

1986. *Thelohanellus bengalensis* Sarkar and Raychoudhury, *Acta Protozool.*, **25**, p. 359.

Diagnosis : Spore coelzoic, broadly pyriform to cylindroconical in valvular and almost S-shaped in sutural view measuring 10.0- 12.0 μm × 5.5-7.5 μm; shell valve thick-walled, usually smooth having 3-4 longitudinal striations, suture S-shaped and ridged; polar capsule one, broadly pyriform measuring 3.75-7.0 μm × 3.0- 4.5 μm; polar filament having 3-4 coils, extruded filament 52.5 μm in length; extracapsular cavity filled with sickle-shaped mass of sporoplasm with two nuclei and an iodinophilous vacuole.

Host : *Catla catla* Ham.; site of inefection : gall bladder.

Distribution : India : West Bengal (Hugli district).

509. *Thelohanellus calbasui* Tripathi

1952. *Thelohanellus calbasui* Tripathi, *Res. Indian Mus.*, **50**, p. 76.

Diagnosis : Cysts 1.5-2.0 mm in diameter; spore more or less oval, pyriform in side view, 9-10.8 μm × 7.2 μm; shell thin and smooth, sutural valves equal, sutural line distinct, sutural

ridge absent; polar capsule oval with anterior end drawn into a small duct, 5.4 μm × 3.4 μm in dimension.

Host : *Labeo calbasu* (Ham.); site of infection : scale.

Distribution : India : West Bengal (Hugli district).

510. *Thelohanellus catlae* Chakravarty and Basu

1948. *Thelohanellus catlae* Chakravarty and Basu, *Proc. zool., Soc. Bengal,* **11**, p. 23.

Diagnosis : Cysts oval or circular in outline, 7.5 mm in diameter; spore more or less oval, 19.26-21.40 μm × 10.70-12.48 μm, with anterior end bluntly pointed and posterior end rounded, more or less spindle-shaped in lateral view; shell valve thick, sutural ridge and line prominent; polar capsule occupying two- third of the spore having 9-10 threads of polar filament, 10.71-13.90 μm × 9.63-11.77 μm; iodinophile vacuole present.

Host : *Catla catla* (Ham.); site of infection : branchiae.

Distribution : India : West Bengal (North 24-Parganas district).

511. *Thelohanellus coeli* Sarkar and Mazumder

1983. *Thelohanellus coeli* Sarkar and Mazumdar, *Arch. Protistenk.,* 127, p. 59.

Diagnosis : Spores pyriform, thick-walled, posterior end round and anterior end with a narrow slightly angled neck, 12.0-13.5 μm × 6-8 μm; upper surface with a median longitudinal ridge; polar capsule single, pyriform, 6-8 μm × 3-3.8 μm, situated at the centre and having 6-8 coils of polar filaments, maximum length 50.00 μm.

Host : *Tachysurus tenuispinis* (Day); site of infection : gall bladder.

Distribution : India : West Bengal (Bay of Bengal)

512. *Thelohanellus gangeticus* Tripathi

1952. *Thelohanellus gangeticus* Tripathi, *Rec. Indian Mus.,* **50**, p. 77.

Diagnosis : Spore elongated, thin anterior end truncated, posterior end slightly flattened with rounded ends, pyriform in side view, 16.2-17.5 μm × 5.4 μm; sutural ridge present, sutural line indistinct; polar capsule pyriform with thin neck, 7.2 μm × 2.5 μm; sporoplasm filling nearly half of the extra-capsular cavity, iodinophilous vacuole small.

Host : *Chela bacaila* (Ham.); site of infection : muscles.

Distribution : India : West Bengal (North 24-Parganas district).

513. *Thelohanellus jiroveci* Kundu and Haldar

1981. *Thelohanellus jiroveci* Kundu and Haldar, *Vest. Cs. Spolec, zool.,* **45**, p. 94.

Diagnosis : Cyst large, oval, creamy-white, 1.5-2.0 mm × 0.5 mm; spores two types, namely, macrospores and microspores occuring simultaneously within the single cyst; macrospores pyriform, with gradually pointed anterior and rounded posterior extremities, spindle shaped in lateral view, 31-36.1 (3.50) μm × 11.1-13.8 (13.0) μm; shell valve moderately thick, sutural line distinct;

polar capsule single, pyriform, 15.5-19.9 (18.4) μm × 5.5-7.7 (7.0) μm, 10-12 coils of polar filamentl extruded filament exceedingly long, 194.2-222.0 μm in length; sporoplasm crescentic, binucleate, and with a large, more or less round iodinophilous vacuole; microspores measuring 15.5-17.7 (16.3) μm × 6.1-8.3 (6.8) μm with a polar capsule of 7.2-7.7 μm × 3.8-4.4 μm dimensions and polar filament of 66.6-77.7 (74.1) μm in length.

Host : *Labeo bata* (Ham.); site of infection : branchiae.

Distribution : India : West Bengal (Nadia district).

514. ***Thelohanellus mrigalae*** Tripathi

1952. *Thelohanellus mrigalae* Tripathi, *Rec. Indian Mus.*, **50**, p. 76.

Diagnosis : Cyst 0.75 mm in diameter having mature spore; spore oval in front view, with lateral sides more or less parallel, and a slight knob-like projection at the anterior end, pyriform in sutural view, 10.8-12 μm × 6.3-7.2 μm; shell valve thick symmetrical and smooth, sutural line prominent; polar capsule oval, 5.4-7.2 μm × 3.6-5.0 μm, occupying nearly half of the spore cavity; sporoplasm filling nearly the whole of the extracapsular cavity, iodinophilous vacuole present.

Host : *Cirrhinus mrigala* (Ham.); site of infection : skin on the head.

Distribution : India : West Bengal (exact locality not mentioned).

515. ***Thelohanellus opthalmicus*** Haldar, Das and Sharma

1983. *Thelohanellus opthalmicus* Haldar, Das and Sharma, *Arch, Protistenk.* **127**, p. 283.

Diagnosis : Cyst rounded, white-coloured, 310-390 μm in diameter; spore pyriform with tapering anterior end and rounded posterior end, 12.1-13.2 μm × 6.6-7.7 μm; shell valve symmetrical, uniformly thick with prominent sutural ridge; polar capsule, single, pyriform with 6-7 coils of polar filament, 5.5-6.6 μm × 2.8-3.3 μm, extruded polar filament 27.5-50.6 μm in length; sporoplasm cup- shaped having a spherical iodinophilous vacuole.

Host : *Catla catla* (Ham.); site of infection : internal musculature and scerla of eye.

Distribution : India : West Bengal (Nadia district).

516. ***Thelohanellus rodgi*** Hagargi, Kundu and Haldar

1979. *Thelohanellus rodgi* Hagargi, Kundu and Haldar, *Proc. 2nd Nat, Congr. Parasitol.*, Varanasi, p. 56.

Diagnosis : Spore ranging from 31.0-41.0 μm × 10.0-15.0 μm, almost pyriform; polar capsule ranging from 15.0-20.0 μm × 7.0-8.0 μm having polar filament; sporoplasm binueleate and with iodinophilous vacuole of 4-5 μm in diameter.

Host : *Labeo calbasu* (Ham.); site of infection : gills.

Distribution : India : West Bengal (exact locality not known).

Remarks : Diagnosis of this species is based on comparative measurements of 14 species of *Thelohanellus* described from different Indian carps provided by Haldar, Das and Sharma (1983).

517. *Thelohanellus rohitae* (Southwell and Prasad)

1918. *Myxobolus rohitae* Southwell and Prasad, *Rec. Indian Mus.*, **15**, p. 344.

1943. *Thelohanellus rohitae* (Southwell and Prashad); Chakravarty, *Proc. Indian Acad Sci.*, **18**(2)B, p. 33.

Diagnosis : Cysts opaque white, spherical or oval, 45-150 μm in largest diameter; spore elongately pyriform in front view with acutely pointed anterior and rounded posterior extremities, 30-33 μm × 10-13 μm; shell valve thick, sutural ridge very prominent; polar capsule having the same form as the spore, 16-20 μm × 7.8-24 μm, provided with a highly coiled filament; a spherical iodinophilous vacuole present; polar filament 206 μm in length.

Host : *Labeo rohita,* (Ham.) *Labeo bata;* site of infection : gills.

Distribution : India : West Bengal (North 24-Parganas district) and Bangladesh.

518. *Thelohanellus sanjibi* Sarkar and Ghosh

1990. *Thelohanellus sanjibi* Sarkar and Ghosh, *New Agriculturist,* **1**(1), p. 35.

Diagnosis : Cyst small, oval to spherical, 100-200 μm in diameter; spore histozoic, egg-shaped to ovoidal in valvular view, lenticular in sutural view with anterior pole more pointed than the posterior pole, 12-13 μm × 8-8.5 μm; shell valve smooth, symmetrical and thick-walled, suture slightly curved and ridged; polar capsule single, broadly ovoidal to almost spherical, opening anteriorly through a very short neck, 4-5 μm × 3.5 μm, with 4-5 coils of polar filament; extracapsular cavity large filled with homogeneous mass of sporoplasm and a spherical iodinophilous vacuole.

Host : *Mystus guleo* (Ham.); site of infection : kidney.

Distribution : India : West Bengal (Hugli district).

519. *Thelohanellus seni* (Southwell and Prasad)

1918. *Myxobolus seni* Southwell and Prasad, *Rec. Indian Mus.*, **15**, p. 347.

1948. *Thelohanellus seni* : Chakravarty and Basu, *Proc. zool; Soc. Bengal,* **1**, p. 3.

Diagnosis : Cysts roughly oval or lenticular, upto 1.1 mm; spore 12.48-14.94 μm × 8.56 μm, with two polar capsules, 6.42 μm × 4.52 μm and a short tail-like process, iodinophilous vacuole present.

Host : *Catla catla* (Ham.); site of infection : branchiae.

Distribution : India : West Bengal (Calcutta and North 24-Parganas district).

520. *Thelohanellus sudevi* Sarkar and Ghosh

1990. *Thelohanellus sudevi* Sarkar and Ghosh, *New Agriculturist,* **1**(1), p. 35.

Diagnosis : Cyst small oval to spherical, 100-200 μm; spore histozoic, elongately ellipsoidal in valvular view and lenticular in sutural view, 13-15 μm × 5-6.5 μm, anterior pole slightly acuminate and posterior pole rounded; shell valves two, smooth, symmetrical and thick-walled, suture broad, thick and almost straight with no ridge; polar capsule single, pyriform, 4.75-6 μm

x 2-3 μm, with 4-5 coils of polar filament; extracapsular cavity large, filled with homogenous binucleate mass of sporoplasm and a small iodinophilous vacuole.

Host : *Amblypharyngodon mola* Ham.; site of infection : kidney.

Distribution : India : West Bengal (Hugli district).

Genus : ***Neothelohanellus*** Das and Haldar

Key to the species

1 (2) Spore rounded to ellipsoidal, 8.2-8.8 μm × 7.7 μm, polar capsule 4.4 μm × 3.3 μm, length of polar filament 77.0-90.2 μm.....*N. catlae*

2 (1) Spore oblongate to ellipsoidal, 11-12.1 μm × 7.1-8.2 μm, polar capsule 5.5 μm × 4.4 μm, length of polar filament 22.0-42.9 μm.....*N. krishnagarensis*

521. ***Neothelohanellus catlae*** Das and Haldar

1986. *Neothelohanellus catlae* Das and Haldar, *Arch. Protistenk.*, **132**, p. 125.

Diagnosis : Cyst small rounded, 100-160 μm in diameter; spore rounded to ellipsoidal, 8.2-8.8 μm × 7.7 μm; shell valves two, symmetrical, uniformly thick and meeting along the longitudinal sutural line; polar capsule single, pyriform, 4.4 μm × 3.3 μm, located angularly to the longitudinal axis and having 8-9 coils of polar filaments inside, extuded filament thread-like, 77-90.2 μm in length; sporoplasm crescentic, binucleate, and with a round iodinophilous vacuole.

Host : *Catla catla* (Ham.); site of infection : kidney.

Distribution : India : West Bengal (Nadia district).

522. ***Neothlohanellus krishnagarensis*** Das and Haldar

1986. *Neothehanellus krishnagarensis* Das and Haldar, *Arch. Protistenk.*, **132**, p. 125.

Diagnosis : Cyst oblongate, creamy-white, 300-380 μm × 240-280 μm; spore oblongate to ellipsoidal, 11.0-12.1 μm × 7.1-8.2 μm; shell valves symmetrical, uniformly thick and meeting along the longitudinal sutural line; polar capsule single, pyriform, located perpendicular to the longitudinal axis of the spore, 5.5 μm × 4.4 μm, with 5-6 coils of polar filaments, extruded polar filament 22-42.9 μm in length, sporoplasm hemispherical, binucleate, and with a small spherical iodinophilous vacuole.

Host : *Labeo calbasu* (Ham.); site of infection : fatty matrix of brain.

Distribution : India : West Bengal (Nadia district).

Genus ***Henneguya*** Thelohan

In all 11 species of *Henneguya* have been dealt with in the present paper. Out of these 4 species, namely, *H. bengalensis, H. bicornuta, H. chaudhuryi* and *H. ritae* have been described under the genus *Unicauda* Davis (1970), the former two by Raychaudhuri and Chakravarty (1970) and the latter two by Bajpai and Haldar (1982). But, spores of *Henneguya* and *Unicauda* resemble very closely excepting that caudal appendage of the latter is not an extension of the shell valve and composed of material different from those of shell valve (Kudo, 1966). From

the description of the aforesaid 4 species it is evident that the caudal prolongation of these species is the extension of the 'main spore body' Hence, these are placed under the genus ***Henneguya*** which is in conformity with the opinion of Gupta and Khera (1987).

In this connection mention is to be made here that Tripathi (1952) described *Unicauda ophicephali* which, in the present circumstances, becomes the synonym of *Henneguya ophicephali* described by Chakravarty (1939) (*see* Gupta and Khera, 1987).

1(16) Caudal prolongation bifurcated.....

2(5) Two polar capsules unequal in size.....

3(4) Spore ovoidal or oblongate, total length 41.5-52.5 μm; polar capsule pyriform, larger one 6.18-9.25 μm × 2.06-3.0 μm.....*H. ophicephali*

4(3) Spores oblongate, total length 35.2-38.0 μm; polar capsule elongated pyriform, larger one 5.5-6.0 μm × 1.1 μm.....*H. namae*

5(2) Two polar capsules equal in size.....

6(9) Spore oval in shape.....

7(8) Spore elongately oval, average total length 31.2 μm, polar capsule pyriform without any tubular neck, caudal prolongation long, 19.7 μm in average.....*H. rubicundi*

8(7) Spore broadly oval, average total length 16.83 μm; polar capsule subspherical to broadly pyriform with short narrow tubular neck; caudal prolongation short and slender, 7.9 μm in average.....*H. renalis*

9(6) Spore not oval in shape.....

10(13) Spore oblongate.....

11(12) Bifurcation of caudal process characteristically at their distal and in the form of two unequal arm of 'U'.....*H. bleekeri*

12(11) Caudal prolongations characteristically forked at distal end with two equal sized arms .....*H. bicornuata*

13(10) Spore pyriform or fusiform, caudal process of different configuration.....

14(15) Spore pyriform, polar capsule also pyriform 3.6 μm × 2 μm in dimension.....*H. latesi*

15(14) Spore fusiform, polar capsule tubular, 5-6 μm × 1-1.3 μm in dimension.....*H. mystusia*

16(1) Caudal prolongation undivided throughout the length.....

17(18) Spore small, 26.3-33.2 m in length, caudal prolongation 17.7 μm in average..... .....*U. chaudhuryi*

18(17) Spore comparatively large, more than 35 μm in length.....

18a Spore 35.73-45.73 μm in length, caudal prolongation 21.54 μm in average..... .....*U. bengalensis*

18b Spore 39.9-44.8 μm in length, caudal prolongation 29.4 μm in average.....*U. ritae*

523. ***Henneguya bengalensis*** (Chaudhury and Chakravarty)

1970. *Unicauda bengalensis* Chaudhury and Chakravarty, *Acta Protozool.*, **8**, p. 107.

Diagnosis : Cysts oval, whitish in colour, 1.0 to 1.25 mm in diameter; spore body oblongate, 26.4-29.15 μm × 2.75-3.89 μm, with gradually pointed anterior end and posteriorly continued into a long caudal prolongation; sporoplasm granular filling the extracapsular region having two sporoplasmic and a rounded iodinophilous vacuole; polar capsules, two, pyriform, equal and situated at the anterior end of the spore body with a distinct coiled polar filament in each capsule.

Host : *Ophicephalus punctatus* (Bloch.); site of infection : buccal cavity.

Distribution : India : West Bengal (North 24-Parganas district).

524. ***Henneguya bicornuata*** (Chaudhuri and Chakravarty)

1970. *Unicauda bicornuata* Chaudhuri and Chakravarty, *Acta Protozool.*, **8**, p. 147.

Diagnosis : Cyst oval milky white, 1.2 to 1.5 mm in diameter; spore body oblongate, anterior end extremely rounded, posterior portion gradually tapering and continued into a long caudal prolongation of 11.55-13.75 μm in length, undivided for a distance but forked at its extreme end, 26.4-29.15 μm × 2.75-3.85 μm; sporoplasm rounded and having a rounded iodinophilous vacuole; polar capsules two, equal, pyriform and situated at the anterior end, 3.3-3.56 μm × 1.1-1.38 μm, polar filament distinct in each capsule.

Host : *Ophicephalus punctatus* (Bloch.); site of infection : branchial epithelium

Distribution : India : West Bengal (Calcutta district).

525. ***Henneguya bleekeri*** Haldar and Mukherjee

1985. *Henneguya bleekeri* Haldar and Mukherjee, *Arch. Protistenk.*, **130**, p. 419.

Diagnosis : Cyst white, oval to rounded, 1.5 mm × 1.0 mm; spore elongated, main body of the spore oblongate with rounded anterior end, 20-25.5 μm in length with caudal prolongation and 3.3-5.0 μm in breadth; caudal prolongation bifurcated after some distance and curved characteristically at their distal end in the form of two unequal arms of the 'U', lenticular in side view, sutural line straight; polar capsules, two, equal, 3.6 μm × 1.7 μm, with 6- 8 coils of polar filament; sporoplasm fillng the entire extracapsular cavity, iodinophilous vacuole present.

Host : *Mystus bleekeri* (Day); site of infecfion : kidney.

Distribution : India : West Bengal (Nadia district).

526. ***Henneguya chaudhuryi*** (Bajpai and Haldar)

1982. *Unicauda chaudhuryi* Bajpai and Haldar, *Riv. Parasitol.*, **43**, p. 147.

Diagnosis : Spore oblongate, anterior extremity more or less rounded, posterior end extended as an undivided caudal appendage, 26.3-33.2 μm × 3.3-4.4 μm, caudal prolongation 14.5-20.0 μm in length; sporoplasm with a single iodinophilous vacuole; polar capsules two, pyriform, identical and convergent anteriorly, 5- 7.5 μm × 1.6 μm, with 6-7 coils of polar filament.

Host : *Ophicephalus punctatus* Bloch.; site of infection : gill filaments.

Distribution : India : West Bengal (Nadia district).

527. ***Henneguya latesi*** Tripathi

1952. *Henneguya latesi* Tripathi, *Rec. Indian Mus.*, 50, p. 72.

Diagnosis : Cyst small with mature spore; spore pyriform in front view, fusiform in sutural view, 9.0-10.8 μm × 6.3-8.2 μm; shell valve thin and symmetrical, with two very thin prolongations (17.2-25.4 μm) posteriorly; polar capsule pyriform 3.6 μm × 2 μm, slightly convergent; sporoplasm granular and filling most of the extracapsular cavity; iodinophilous vacuole present.

Host : *Lates calcarifer* (Bloch.); site of infection : gills.

Distribution : India : West Bengal (North 24-Parganas district).

528. ***Henneguya mystusia*** Sarkar

1985. *Henneguya mystusia* Sarkar, *Acta Protozool.*, 24, p. 55.

Diagnosis : Cyst ovoidal, opaque white, 0.2 mm × 0.1 mm, polysporous; spine fusiform in valvular view, widest just posterior to polar capsule and obovate in sutural view, anterior end very slightly curved and blunt, 12.0-15.0 μm × 3.0-4.0 μm, caudal prolongation 17.0-25.0 μm; shell valves two, thin, smooth, symmetrical, each tapering posteriorly into a very long and fine caudal prolongation, suture thin, straight to slightly curved; polar capsule tubular, almost equal, 5.0-6.0 μm × 1.0-1.3 μm, polar filament not distinct, iodinophilous vacuole present.

Host : *Mystus* sp.; site of infection : gill filament.

Distribution : India : West Bengal (Hugli district).

529. ***Henneguya namae*** Haldar, Das and Sharma

1983. *Henneguya namae* Haldar, Das and Sharma, *Arch. Protistenk.*, **127**, p. 288.

Diagnosis : Cyst small, creamy-white, oval, 180-220 μm × 150-190 μm, polysporous; spore oblongate, anterior end broader and rounded, posterior end tapering and prolonged as a tail, 17.6- 19.3 μm × 5.5-6.6 μm, excluding tail measuring 17.6-18.7 μm in length, tail bifurcated and divaricated; shell valve uniformly thick and symmetrical, sutural ridge prominent; polar capsule two, elongated, pyriform, unequal, measuring 5.5-6 μm × 1.1 μm and 4.4-5 m x 1.1 μm, with 9-10 coils and 8-9 coils of polar filament of 23.1-55(48.2) μm and 27.5-48.4(38.6) μm; sporoplasm oblong, occasionally extending into the caudal prolongation, binucleate and with a spherical iodinophilous vacuole.

Host : *Ambassis nama* (Ham.); site of infection : gill filaments.

Distribution : India : West Bengal (Nadia district).

530. ***Henneguya ophicephali*** Chakravarty

1939. *Henneguya ophicephali* Chakravarty, *Arch. Protistenk.*, **92**, p. 174.

1952. *Unicauda ophicephali* Tripathi, *Rec. Indian Mus.*, **50**, p. 73.

Diagnosis : Cysts spherical or oval, 2 mm in diameter, polysporous; spore more or less ovoidal or oblongate, anterior end broader and rounded, posterior end tapering and prolonged as the tail, measuring 41.5-52.5 µm in length including the tail, 6.18-7.21 µm in breadth, tail bifurcated and divaricated in spores from the gills and relatively approximated in those from the muscles; shell valve symmetrical, sutural ridge prominent; polar capsules pyriform, unequal, 6.18-9.27 µm × 2.06-3.0 µm and 5.15- 8.24 µm × 2.06-3.0 µm; polar filament 26-32 µm in length; iodinophilous vacuole 2.06 µm in diameter.

Host : *Ophicephalus punctatus* (Bloch) and *Ophicephalus gachua* (Ham); site of infection : gills and muscles.

Distribution : India : West Bengal (Calcutta and North 24- Parganas districts).

Remarks : *Unicauda ophicephali* described by Tripathi (1952) is considered to be a synonym of this species.

531. ***Henneguya renalis*** Sarkar, Mazumdar and Pramanik

1985. *Henneguya renalis* Sarkar *et. al. Arch. Protistenk.*, **130**, p. 294.

Diagnosis : Spore histozoic and hyaline, almost pyriform in sutural view, broadly oval in valvular view, 14.4-19.2 µm × 8.0-11.2 µm, caudal appendage short and fine, 4.8-12.8 µm in length; shell valve smooth and thin walled, suture slightly bent and thin; polar capsule two, equal, oval ot pyriform with short neck and with 3-4 coils of polar filament, 4.6-7.36 µm × 2.5-5.06 µm.

Host : *Channa marulius* Ham.; site of infection : kidney.

Distribution : India : West Bengal (Murshidabad district).

532. ***Henneguya ritae*** (Bajpai and Haldar)

1952. *Unicauda ritae* Bajpai and Haldar, *Arch. Protistenk.*, **125**, p. 79.

Diagnosis : Spore oblongate with pointed anterior end, posterior end prolonged undividedly, lenticular in front as well as side view, 39.9-44.8 µm × 5.0-5.8 µm, caudal prolongation 27.2-31.5 µm; sutural line distinct; polar capsule two, pyriform, 5.0-5.8 µm × 1.7-2.5 µm, polar filament having 6 to 7 coils, extruded filament 16.7-23.2 µm in length; sporoplasm lanceolate, almost filling the extracapsular space, and with an iodinophilous vacuole.

Host : *Rita rita* Ham.; site of infection : branchial filament.

Distribution : India : West Bengal (Hugli district).

533. ***Henneguya rubicundi*** Haldar and Mukherjee

1985. *Henneguya rubicundi* Haldar and Mukherjee, *Arch. Protistenk.*, **130**, p. 419.

Diagnosis : Cyst creamy-yellowish, oval, tumour-like, 2 mm × 1.5 mm; spore body elongate oval in front view, anterior extremity bluntly rounded, posterior extremity narrow and prolonged as the caudal appendage, 24.4-36.7 µm × 3.3-8.1 µm, caudal appendage 13.3- 24.5 µm in length; shell valve smooth and uniform, sutural ridge distinct and straight, sutural line indistinct; polar capsules, two, equal, pyriform, 3.3-5.1 µm × 2.2-3.0 µm with 6-8 coils of polar filament, sporoplasm almost filling the entire extracapsular space, binucleate and with a distinct iodinophilous vacuole.

Host : *Gobioides rubicundus* (Bloch); site of infection : dorsal and ventral fins.

Distribution : India : West Bengal (Nadia district).

Genus ***Neohenneguya*** Tripathi

534. ***Neohenneguya tetraradiata*** Tripathi

1952. *Neohenneguya tetraradiata* Tripathi, *Rec. Indian Mus.*, **50**, p. 63.

Diagnosis : Cyst 0.5 mm in diameter; trophozoite irregular in shape; spore fusiform with two long thin prolongations at either end, 16.2-21.6 μm × 5.4 μm; sutural line thin, sutural ridge not distinct, shell valve thin, smooth and slightly unequal in size, polar capsule spherical, 2-2.7 μm in diameter, polar filament long and thin; iodinophilous vacuole present.

Host : *Odontamblyopus rubicundus* (Ham.); site of infection : gills.

Distribution : India : West Bengal (Hugli river).

Order MULTIVALVULIDA

Family ?

Genus ***Kudoa*** Meglitsch

Diagnosis : Spore quadriate or stellte in anterior end view, shell delicate, sutural line usually indistinct, polar capsule 4 in number.

Key to the species

1 (2) Spore large, 7.87 μm × 8.44 μm in average with 4 lateral inflations from the capsular surface giving it a stellate shape, polar capsule tubular and convergent, infecting skeletal muscles near anal fin.....*K. bengalensis*

2 (1) Spore 'small', 4.87 μm × 7.75 μm in average, not forming any stellate shape, polar capsule pyriform and convergent, found in the bile of gall bladder.....*K. tachysurae*

535. ***Kudoa bengalensis*** Sarkar and Mazumder

1983. *Kudoa bengalensis* Sarkar and Mazumder, *Arch. Protistenk.*, **127**, p. 60.

Diagnosis : Spore ovoid, thin-walled and with four lateral inflations from the capsular surface giving it a stellate shape, 7-8.5 μm × 7.0-11.0 μm; sutural line two, indistinct, dividing the spore into four quadrants; each quadrant with a polar capsule and a lateral inflation extending as median, bluntly pointed edge, meeting with the other quadrant at the sutural lines through small notches; polar capsules four, almost tubular and convergent, axes coinciding with axes of the lateral inflations, 3.0-4.8 μm × 1.8-2.0 μm in dimensions.

Host : *Tachysurus platystomus* (Day); site of infection : skeletal muscle.

Distribution : India : West Bengal (Bay of Bengal)

536. ***Kudoa tachysurae*** Sarkar and Mazumdar

1983. *Kudoa tachysurae* Sarkar and Mazumdar, *Arch. Protistenk.*, **127**, p. 60.

Diagnosis : Spore coelozoic, small, thin-walled, tetracapsulated, comprising four indistinct quadrants, 4.5-6.0 μm × 7.0-9.0 μm; two quadrants longitudinally arranged having larger polar capsules than the other two horizontal ones, edges highly convex or almost round unlike flat and parallel edges of the horizontal quadrants forming four notches at their meeting points; polar capsule pyriform, 3-4 μm × 2-3 μm and 1-1.5 μm × 1-1.5 μm, with coils of polar filament inside.

Host : *Tachysurus tenuispinis* (Day); site of infection : gall bladder.

Distribution : India : West Bengal (Bay of Bengal).

Phylum CILIOPHORA
Class KINETOFRAGMINOPHOREA
Subclass VESTIBULIFERA
Order TRICHOSTOMATINA
Family BALANTIDIIDAE

Diagnosis : Vestibulum anteriorly located, cytostome located at the base of vestibulum, somatic ciliation uniform, parasitic in invertebrate and vertebrate hosts.

Genus ***Balantidium*** Claparede and Lachmann

Diagnosis : Body oval, ellipsoid to subcylindrical, unformly ciliated; peristome starting at or near anterior end, cytopharynx not well developed, contractile vacuole and cytopyge terminal; parasitic in the gut of both vertebrate and invertebrate.

In all 15 species of *Balantidium* have been reported from West Bengal. Out of these, 4 species are recovered from invertebrate hosts (3 from insects and 1 from freshwater snail) and 11 from vertebrate hosts belonging to fishes, amphibians, reptiles and mammals.

In this connection mention is to be made here that Ghosh (1921) described a new genus *Paraburs aria* to accommodate his species *P. pheretima* collected from earthworm, *Pheretima posthuma*. This genus is not sufficiently characterised. Therefore, Bhatia (1936) did not consider this genus as valid. However, Corliss (1979) synonymised it under *Balantidium*. Since the host *Pheretima posthuma* is well studied for their protozoan parasites by many workers in different parts of India for many years and none of them is able to observe *Paraburs aria* or *Balantidium* from this host, the species *P. pheretima* appears to be a doubtful record and, therefore, is not dealt with or listed in the present communication.

Key to the species of Balantidium

1(8) Commensal in the gut of invertebrates.....

2(3) Peristome large reaching the middle of the body or further, occupying the entire ventral surface.....*B. knowlesi*

3(2) Peristome not reaching the middle of the body.....

4(5) Body irregularly pyriform, peristome extending about one- third the length of the body .....*B. blattarum*

5(4) Body elongately oval, peristome extending about one-fifth the length of the body.....

6(7) Contractile vacuole large, posterior, with an anal canal opening in front of posterior end, parasitic in *Periplaneta americana*.....*B. ovatum*

7(6) Contractile vacuole medium sized, posterior and lateral, without any anal canal, parasitic in *Pila globosa*.....*B. depressium*

8(1) Commensal in the gut of vertebrates.....

9(12) Inhabiting the gut of mammals.....

10(11) Body egg-shaped, narrowed and tapering anteriorly and rounded posteriorly, macronucleus ribbon-like, folded at each end.....*B. rhesum*

11(10) Body ovate, anteriorly tapering and blunt, posteriorly broad and rounded, macronucleus round, disc-shaped.....*B. coli*

12 (9) Inhabiting the gut of cold blooded vertebrates.....

13(16) Commensal in the gut of freshwater fishes.....

14(15) Body ovate, 44.6-116.3 μm × 33.2-91.4 μm in dimensions, peristome short, obliquely placed.....*B. pangasi*

15(14) Body elongated, more or less rounded at both ends, 136- 233.3 μm × 55.6-89.3 μm, peristome not oblique, ending deep into cytostome.....*B. mrigali*

16(13) Commensal in the gut of amphibians and turtle.....

17(24) Peristome not reaching the middle of the body.....

18(19) Body torpedo-shaped, contractile vacuole three in number, macronucleus broadly oval .....*B. sushillae*

19(18) Body oval or elongated egg-shaped, contractile vacuole less than three, macronucleus elongated or kidney-shaped.....

20(23) Macroneucleus kidney-shaped.....

21(22) Body oval, macroneucleus with many vacuolated structure, contractile vacuole two..... .....*B. tylototritonis*

22(21) Body elongated egg-shaped, macronucleus without any vacuolated structure, contractile vacuole one or two.....*B. helenae*

23(20) Macronucleus elongated, body oval, peristome with slantingly directed cleft and having 'siderophile' lip possessing a strong affinity for basic stains.....*B. dogieli*

24(17) Peristome reaching below the middle of the body.....

25(26) Body roughly pyriform, commensal in the gut of salamandar.....*B. rayi*

26(25) Body round or broadly oval, commensal in the gut of anurans.....

27(28) Body flattend, peristome slit-like, contractile vacuole single.....*B. rotundum*

28(27) Body rounded in transverse section, peristome not slit-like, contractile vacuole two.... .....*B. ranarum*

537. ***Balantidium blattarum*** Ghosh

1922. *Balantidium blattarum* Ghosh, *Parasitology,* **14,** p. 15.

Diagnosis : Body irregularly pyriform, 90 µm in length, slightly less than twice as long as its greatest transverse diameter, circular in transverse section; anterior end tapering and rounded, posterior end obliquely truncate; peristome small extending about one-third the length of the body, with a large undulating membrane; contractile vacuole large, posteriorly located; macronucleus spherical, centrally located.

Host : *Periplaneta americana;* site of infection : intestine.

Distribution : India : West Bengal (Calcutta district) and Punjab.

538. ***Balantidium coli*** (Malmsten)

1857. *Paramaecium coli* Malmsten, *Virchows Arch. Berlin,* Bd., **12,** p. 302.

1928. *Balantidium coli* : Chatterjee, *Indian Med. Gaz.,* **63,** p. 79.

Diagnosis : Body egg-shaped, posterior end slightly broader, anterior end somewhat narrowed and pointed, 30-200 µm × 20-70 µm; body cilia arranged in longitudinal rows with a slightly spiral course; peristome ventral, at the anterior end, somewhat obliquely placed, with adoral zone of cilia passing through the cytostome into the short cytopharynx; contractile vacuole two, one at the posterior and the other near the middle of the body; macronucleus sausage or bean-shaped, lying transversely at the middle of the body, with a small micronucleus close to it; cyst 50-60 µm in length.

Host : *Homo sapiens, Sus scrofa,* Chimpanzee and other primates, rarely in dog and rat; site of infection : caecum and colon.

Distribution : India : West Bengal (Calcutta district) - a cosmopolitan species having worldwide distribution.

Remarks : *B. coil* extremely common in swine. It is pathogenic in man and other primates. It causes diarrahea or balantidial dysentry in man (Levine, 1967).

539. ***Balantidium depressum*** (Ghosh)

1921. *Balantidiopsis depressum* Ghosh, *Bull. Carmichael Med. Coll.,* **2,** p. 13.

1936. *Balantidium depressum* : Bhatia, *Fauna of British India, Protozoa: Ciliophora,* Taylor and Francis Ltd., London, p. 253.

Material examined : Sev. exs., Calcutta, 23.cii.1961, K.N. Nair; sev. exs., Shibpur, Haora, 27.viii.1970, A. Chakrabarti.

Diagnosis : Body elongately oval, slightly narrowed and rounded anteriorly, wide and tapering posteriorly, 57-63 µm × 37 µm; a deep concavity on ventral, posterior third part of the body; longitudinal ciliary striae distinct; peristome small fusiform, about one-fifth of the body length; macronucleus oval central, micronucleus spherical and placed at the side of macronucleus; contractile vacuole posterior and lateral.

Host : *Pila globosa* (Swainson); site of infection : rectum.

Distribution : India : West Bengal (Calcutta Haora and North and South 24-Parganas districts).

540. ***Balantidium dogieli*** Das and Mukherjee

1974. *Balantidium dogieli* Das and Mukherjee, *Curr. Sci.*, **43**(22), p. 730.

Meterial examined : 5 exs., Calcutta market, 16.vi.1965, R.N. Mukherjee.

Diagnosis : Body oval, 56.3-93.8 (79.4) μm × 45-67.5 (55.3) μm; cilia long and regularly arranged, peristomeal cilia longer and thickly grown; peristome anteriorly placed, slantingly directed, not reaching upto the anterior third of the body; conractile vacuole single, located below the middle region; macronulceus elngated, 22.5-37.5 μm × 5.6-7.5 μm, located near the middle region; micronucleus very small, placd adjacent to the macronuleus.

Host : *Lissemys punctata punctata* (Bonnaterre); site of infection : rectum.

Distribution : India : West Bengal (Calcutta district).

541. ***Balantidium helenae*** Bezzenberger

1904. *Balantidium helenae* Bezzenberger, *Arch. Protistenk.*, **3**, p. 151.

Material examined : 1 ex., Barabazar, Puruliya, 29.ix.1983, R. Ray.

Diagnosis : Body ovoid, anterior end narrower than the posterior, 45-175 μm × 30-62 μm; peristome not reaching upto the middle; contractile vacuole single or variable in number; macronucleus kidney-shaped, 31-37 μm × 10-18 μm; micronucleus rounded, 5 μm × 2.5 μm, lying at the notch of macronucleus.

Host : *Rana tigrina* Daudin, *R. cyanophlyctis* Schneider *Rama haxadactyla* and *R. limnocharis* Wiegm., site of infection : intestine and rectum.

Distribution : India : West Bengal (Puruliya district).

542. ***Balantidium knowlesii*** Ghosh

1925. *Balantidium knowlesii* Ghosh, *Parasitology*, **17**, p. 189.

Diagnosis : Body broadly ovate, posterior end wider than anterior, length slighly less than twice the width, 40 μm × 25 μm, dorsal surface convex, ventral surface flattened; peristome large, cup-like, ovate, occupying the ventral surface, adoral row of cilia not well developed, no distinct undulating membrane; ciliation throughout the body, anteriorly with long cilia; contractile vacuole single, posterior; macronucleus rounded or broadly oval, located centrally; micronucleus isngle, lodged in a depression of the macronucleus.

Host : *Culicoides peregrinus;* site of infectin : coelomic cavity.

Distribution : India : West Bengal (Calcutta district).

543. ***Balantidium mrigalae*** Mukherjee and Haldar

1986. *Balantidium mrigalae* Mukherjee and Haldar, *J. Bengal nat. Hist. Soc.* (*N.S.*), **5**(1), p. 10.

Diagnosis : Body elongated with a more or less rounded anterior and posterior extremities, 136-233.3 (180.9) µm × 55.6 - 89.3 (65.1) µm; peristome at the anterior end; body cilia short, closely set in parallel rows; cytoplasm divisible into a thin, hyaline ectoplasm and granular endoplasm; macronucleus more or less bean-shaped, 22.2 - 44.4 (33.2) µm × 11-17 (13.7) µm, situtated at the posterior end in most cases; micronucleus 4.2 µm in diameter, lying in the concavity of the macronucleus; contractile vacule obscured.

Host : *Cirrhina mrigala* (Hamilton); site of infection : intestine.

Distribution : India : West Bengal (Nadia district).

544. ***Balantidium ovatum*** Ghosh

1922. *Balantidium ovatum* Ghosh, *Parasitology*, 14, p. 371.

Diagnosis : Body elongately oval, wider posteriorly than anteriorly, slightly less than twice as long as its greatest diameter, 85 µm in length; anterior end rounded, posterior end abruptly tapering; cilia long, an anterior row of long cilia present; peristome small, tubuliform, with an undulating membrane having a row of stouter cilia; contractile vacuole large, posteriorly placed; macronucleus broadly oval, central.

Host : *Periplaneta americana*; site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

545. ***Balantidium pangasi*** Mukherjee and Haldar

1986. *Balantidium pangasi* Mukherjee and Haldar, *J. Bengal nat. Hist. Soc.* (*N.S.*), 5(1), p. 7.

Diagnosis : Body ovate, 44.6 - 116.3 (76.7) µm × 33.2 - 91.4 (50.3) µm, with thick pellicle and uniformly covered with short and closely set cilia arranged in rows, 27 rows of dorsal kineties present; peristome at the anterior end, very short and ending in pocket-like cytostome; cytoplasm with distinct ecto and endoplasm; macronucleus bean-shaped, situated in the posterior half of the body, 14.8 - 26.7 (17.9) µm × 6.6 - 12.8 (9.3) µm; micronucleus very small, round to oval, placed in the concavity of the macronuclens; contractile vacuole single.

Host : *Pangasius pangasius* (Hamilton); site of infection : intestine.

Distribution : India : West Bengal (Nadia district).

546. ***Balantidium ranarum*** Ghosh

1921. *Balantidium ranarum* Ghosh, *Bull. Carmichael Med. Coll.*, 2, p. 14.

Diagnosis : Body elongately to broadly oval, tapering anteriorly, truncate or rounded posteriorly, 65 µm × 40 µm; peristome extending beyond the middle of the body, porvided with a distinct adoral row of long and stout cilia; body cilia long and uniformly arranged in meridional rows; contractile vacuole two, postero- lateral, one on each side; macronucleus oval with micronucleus adjacent to it.

Host : *Rana tigrina* Daudin; site of infection : rectum.

Distribution : India : West Bengal (Calcutta district)

547. ***Balantidium rayi*** Pal and Das Gupta,

1978. *Balantidium rayi* Pal and Das Gupta, *Proc. zool. soc.*, Calcutta, **31**, p. 49.

Diagnosis : Body roughly pyriform, 59-69 μm × 45-55 μm, anterior end more pointed than the posterior end; peristome at the anterior end with specialised cilia, stouter, and longer than the others; cytostome leading into the tubular cytopharynx extending beyond the middle region; contractile vacuole single; macronucleus oval, 23 μm × 18 μm; micronucleus 2.5 μm in diameter, lying close to the macronucleus.

Host : *Tylototriton verrucossus* Anders; site of infection : rectum.

Distribution : India : West Bengal (Darjiling district).

548. ***Balantidium rhesum*** Ghosh

1927. *Balantidium rhesum* Ghosh, *J.R. Microsc. Soc.*, p. 14.

Diagnosis : Body ovate, nearly or less than twice as long as broad, anteriorly tapering and blunt, posteriorly broad and rounded, 10-11 μm × 5 μm; peristome triangular, extending one-fourth the length of body; contractile vacuole single, posteroterminal; macronucleus circular, disc-like, located about the middle.

Host : *Macaca mulatta* Zimmerman; site of infeciton : intestine.

Disstribution : India : West Bengal (Calcutta district).

549. ***Balantidiium rotundum*** Bezzenberger

1904. *Balantidium rotundum* Bezzenberger, *Arch. Protistenk.*, **3**, p. 153.

Material examined : Two exs., Naihati, North 24-Parganas, 25.viii.1965, R.N. Mukherjee; 30 exs., Raghunathpur, Puruliya, 3.x.1983, R. Ray.

Diagnosis : Body round or compactly egg-shaped, strongly compressed dorso-ventrally, with a marked bulging on the ventral surface, 56 μm × 44 μm; cilia very long and fine; peristome slit-like, anteriorly located, extending along the right margin, a little in front of the middle, with long and thick adoral cilia on the left; contractile vacuole single, lying at the lower right quadrant of the body; macronucleus oval or slightly kidney- shaped, lying in left lower quadrant of the body; micronucleus distinct and located at the notch, middle or near at one end of macronucleus.

Host : *Rana tigrina* Daudin *Rana hexadaclyla;* site of infection : small intestine.

Distribution : India : West Bengal (North 24-Parganas and Puruliya districts).

550. ***Balantidium sushilae*** Ray

1932. *Balantidium sushilii* Ray, *J.R. Microsc.* Soc., **52**, p. 374.

Material examined : 1 ex., Barabhem, Puruliya, 29.ix.1983, R. Ray.

Diagnosis : Body torpedo-shaped, 150-319.44 μm × 35.65 μm; peristome narrow groove-like, not reaching the middle of the body, with long cilia on the left and an undulating membrane; contractile vacuoles three, two lateral and one terminal; macronucleus broadly oval, variable in position; micronucleus lateral to macronucleus; a boring apparatus present.

Host : *Rana tigrina* Daudin; site of infection : intestine.

Distribution : India : West Bengal (Calcutta and Puruliya districts).

551. ***Balantidium tylototritonis*** Pal and Das Gupta

1978. *Balantidium tylototritonis* Pal and Daas Gupta, *Proc. zool. Soc.*, Calcutta, **31**, p. 47.

Diagnosis : Body oval, 90.5 - 109.5 μm × 60 - 79.5 μm, anterior end tapering; peristomeal depression at the anterior end, cytostome circular, cytopharynx short, not reaching middle region, peristomeal cilia stouter and longer than cytopharyngeal cilia; contractile vacuole two in number; macronucleus containing a number of vacuoles, micronucleus sheathed, closely adherent to the macronucleus.

Host : *Tylototriton verrucosus* Andes.; site of infection : rectum.

Distribution : India : West Bengal (Darjiling district).

Order RHYNCHODIDA

Family ANCISTROCOMIDAE

Diagnosis : Body pear or banana shaped, somatic ciliature confined to anterior half only, sucking tube sometimes clearly protruding from anterior end, parasitic in both freshwater and marine invertebrates.

Key to the genera

1 (2) Strongly elongated banana-shaped body, slightly depressed in thigmotactic area, kineties generally arranged in three complexes-middle and left and right lateral complexes, two lateral complexes making a parenthetical system.....***Ancistrocoma***

2 (1) Pear shaped, feebly elongated body with moderately flattened thigmotactic area, thigmotactic ciliature consisting of two complexes, on right side two arc-like bent present, not forming any parenthetcal system.....***Raabella***

Genus ***Ancistrocoma*** Chatton and Lwoff

Key to the species

1 (2) Central thigmotactic complex consisting of relatively short kineties reaching two-third of body length.....*A. **pelseneeri***

2 (1) Central thigmotactic complex consisting of relatively long kinetic reaching three-fifth of body length.....

3 (4) Thigmotactic complex consisting of eleven kineties, a complex of seven kineties lying on the left from it.....*A. **thorsoni***

4 (3) Central thigmotactic complex comprising five knieties, on the left usually three to four kineties present.....*A. **dissimilis***

552. ***Ancistrocoma dissimilis*** Kozloff

1946. *Ancistrocoma dissimilis* Kozloff, *Biol. Bull.*, **91**, p. 189.

1988. *Ancistrocoma dissimilis* : Jamadar and Choudhury, *Tech. Monogr.*, 12, p. 17.

Diagnosis : Body elongated; 27.2 - 44.2 μm × 8.5 - 11.9 μm; macronucleus more or less round, located above the posterior third of the body, 5.1 - 10.2 μm × 5.1 - 8.5 μm; micronucleus 1.7 μm in diameter, lying posterior to the macronucleus; kineties 12-14 in number, central thigmotactic complex with 5 kineties; contractile vacuole at the posterior third of the body.

Host : *Pholadidea penita* (Conrad), *Mactra luzonica* (Deshayes).; site of infection : gills and labial palps.

Distribution : India : West Bengal (Medinipur district). Elsewhere : U.S.A.

553. ***Ancistrocoma pelseneeri*** Chatton and Lwoff

1926. *Ancistrocoma pelseneeri* Chatton and Lwoff, *C.R. Acad. Sci.* Paris, p. 175.

1988. *Ancistrocoma pelseneeri* : Jamadar and Choudhury, *Tech. Monogr.*, **12**, p. 13.

Diagnosis : Body elongated, somewhat buckled, 27.2 - 42.5 μm × 8.5 - 13.6 μm; anterior terminal more or less attenuated banana- shaped with incurved ventral surface; macronucleus oblong, centrally located; micronucleus spherical, lying anterior to the macronucleus; kineties 14-16 in number; contractile vacuole in the middle.

Host : *Macoma balthica, Mactra luzonica* (Deshayes); site of infection : gills and palps.

Distribution : India : West Bengal (Medinipur district). Elsewhere : Baltic sea.

554. ***Ancistrocoma thorsoni*** Fenchel

1965. *Ancistrocoma thorsoni* Fenchel, *Ophelia*, **2**, p. 71.

1988. *Ancistrocoma thorsoni* : Jamadar and Choudhury, *Tech. Monogr.*, 12, p. 15.

Diagnosis : Body elongated, slightly buckled, 28.9 - 47.6 μm × 8.5 - 13.6 μm; macronucleus elongated, 15.3 - 27.2 μm in length, nearly half of the body length; micronucleus spindle-shaped or spherical; kineties 18-20 in number forming two systems, a left thigmotactic system of 11 kineties and a right system of 7-9 kineties; contractile vacuole located in the posterior half of the body.

Host : *Abra nitida* (Muller), *Mactra luzonica* (Deshayes; site of infection : gills and labial palbs.

Distribution : India : West Bengal (Medinipur district). Elsewhere : Scandinavian water.

Genus ***Raabella*** Chatton and Lwoff

555. ***Raabella helensis*** Chatton and Lwoff

1950. *Raabella helensis* Chatton and Lwoff, *Archs, zool. exp. gen.*, **86**, p. 393.

1988. *Raabella helensis* : Jamadar and Choudhury, *Tech. Monogr.*, **12**, p. 21.

Diagnosis : Body pyriform, 25.5 - 35.7 μm × 13.6 - 18.7 μm, pointed anteriorly and rounded

posteriorly; anterior end with suctorial tentacles; macronucleus ovoid or spherical, 6.8 - 11.05 µm × 5.1-7.65 µm, situated nearly at the centre; micronucleus spherical, 2.55 µm in diameter, anterior to macronucleus; contractile vacuole single, spherical, close to macronucleus; cilia restricted at the anterior half of the body; thigmotactic zone formed of 3 ciliary rows, central complex of 5 kineties, running meridionally, left complex of 5-6 kineties and right system with 2 long, archly buckled, parallelly running kineties.

Host : *Mytilus edulis, Modiolus* (*Modiolus*) *striatulus* (Hanley); site of infection ; gills.

Distribution : India : West Bengal (Calcutta district); Andhra Pradesh (Kaakinada Bay). Elsewhere : California, U.S.A.; Helsinger, Kristineberg and Asko; Baltic sea (*vide* Jamadar and Choudhury, 1988).

Class OLIGOHYMENOPHOREA
Subclass HYMENOSTOMATIA
Order HYMENOSTOMATIDA
Family ICHTHYOPHTHIRIIDAE

Diagnosis : Encysted tomont of large size, producing hundreds of tomites, trophonts invading epithelial tissues of marine and freshwater fishes, causing white spot disease.

Genus ***Ichthyophthirius*** Fouquet

Diagnosis : Body ovoid, with unifrom ciliation, vestibule inconspicuous, cytostome located at anterior end, macronucleus horse-shoe shaped, parasitic in the integument of freshwater fishes.

556. ***Ichthyophthirus multifilis*** Fouquet

1966. *Ichthyophthirus multifilis* Fouquest : Kudo, *Protozoology*, p. 894.

Diagnosis : Body ovoid, length greatly variable, 100-1000 µm; cytostostome large, macronucleus horse-shoe shaped, cytoplasm with various inclusions.

Host : *Labeo bata, Cirrhinus mrigala, Xiphophorus hellerii*, site of infection : skin

Distribution : India : West Bengal (Experimental).

Remaprks : It produces pustules in the epidermis and gills of fishes.

557. ***Ichthyophthirius*** sp.

Host : Indian Carps, site of infectin : skin.

Distribution : India, West Bengal (Experimental)

Remarks : Tripathi (1955) reported this unnamed species from Indian carps.

Order SCUTICOCILIATIDA

Key to the families

1 (4) Buccal ciliature mostly subequatorial in location, scutico- vestige (segment 'C' of

paroral membrane) usually indistinct, strongly developed thigmotactic ciliature and/ or distinct sucker or adhesive disc characteristically present at apical pole.....

2 (3) Body somewhat flattened laterally, prominent thigmotactic sucker, essentially at apical end of the body, buccal apparatus reduced or even rudimentary at antapical pole..... .....HYSTEROCINETIDAE

3 (2) Body occasionally elongate, not latterally flattened, anterior thigmotactic ciliature present but not any thigmotactic sucker, buccal ciliature conspicuours, winding in arc of 360° around antapical pole in some species.....ANCISTRIDAE

4 (1) Buccal ciliature equatorial or subequatorial, a permanent scutico-vestige present, thigmotactic ciliature, sucker or adhesive disc absent.....

5 (6) Body laterally compressed, elliposoidal to broadly reniform with dense and uniform ciliation.....CONCHOPHTHIRIDAE

Family CYCLIDIIDAE

Genus ***Cristigera*** Roux

Diagnosis : Body ovoid, much compressed with a post oral depression and with a long caudal cilium, peristome closer to midventral line. Corliss (1979) considers this genus as *incertae sedis* under the family Cyclidiidae.

558. ***Cristigera susamai*** Jamadar and Choudhury

1988. *Cristigera susamai* Jamadar and Choudhury, *Tech.Monogr.*, **12**, p. 9.

Diagnosis : Body ovoid, much compressed, 25.5 - 42.5 µm × 8.5 - 13.6 µm, anterior end pointed and posterior end slightly broad; dorsal surface convex and ventral surface somewhat flattened; macronucleus usually round, 5.1 - 10.2 µm × 3.4 - 8.5 µm; micronucleus 1.7 - 2.55 µm in diameter, lying in front of macronucleus; cytostome at anterior $^1/_3$ of the body, buccal cavity occupying a conspicuous position on the ventral surface just above the macronucleus; somatic cilia throughout, anterior ones longer than the posterior; kineties 8-12 in number; contractile vacuole, single, found, located at the posterior middle, caudal cilium long.

Host : *Crassostrea cucullata* (Born); site of infection : gills and labial palps.

Distribution : India : West Bengal (South 24-Parganas district).

Family CONCHOPHTHIRIDAE

Genus ***Conchopthirius*** Stein

Diagnosis : Body oval to ellipsoid, flattened; cytostome on right side, near middle in a depression with an undulating membrane,

Key to the species

1 (2) Form very broad, cytopharynx ciliated, very long, extending across almost close to the dorsal border, macronucleus oval, subcentral.....*C. curtus*

2 (1) Form ovate or elongate, cytopharynx lacking; macronucleus oval, posterior.....

3 (4) Body elongate, two and a hlaf times as long as broad; dorsal border nearly straight; ventral border not dentate and with a shallow notch just behind the anterior third of the body.....*C. elongatus*

4 (3) Body ovate, one and a half times as long broad; dorsal border convex and minutely dentate in anterior and slightly notched in posterior half.....*C. lamellidens*

559. *Conchopthirius curtus* Engleman

1862. *Conchopthirius curtus* Engleman, *Z. wiss. Zool.*, **11**, p. 379.

Diagnosis : Body oval with equally rounded ends; dorsally convex and ventrally flattened; 120 µm in length;; peristomeal depression in front of the middle; cytopharynx long, tubular and recurved; ciliary lines longitudinal, throughout; a tuft of strong cilia at the posterior end; contractile vacuole behind the middle surrounded by subsidiary vacuole; macronucleus oval, subcentral; micronucleus one or two in number.

Host : *Lamellidens marginallis;* site of infection : mantle chamber.

Distribution : India : West Bengal Calcutta Hugli, Medinipur, North and South 24-Parganas districts).

Remarks : Biswas and Mukherjee (1981) and Raut and, Nandi (1984) reported on this species from Calcutta and its adjoining districts.

560. *Conchopthirius elongatus* Ghosh

1918. *Conchopthirius elongatus* Ghosh, *Rec. Indian Mus.*, **15**, p. 132.

Material examined : Sev. exs., India, West Bengal, Calcutta, 17.v.1964, K.N. Nair.

Diaagnosis : Body elongated, nearly two and a half times as long as broad, 50 µm in length, anterior end broad and rounded, posterior end narrow and bluntly pointed; peristome small, conical, ventrally located just behind the anterior third length of the body; cytopharynx absent; ciliary lines anteriorly well marked; contractile vacuole single, behind the middle of the body macronucleus, oval, posteriorly placed.

Host : *Lamellidens marginallis*; site of infection : mantle chamber.

Distribution : India : West Bengal : (Calcutta, Hugli, Medinipur, North and South 24-Parganas districts).

Remarks : As for Sl. No. 559.

561. *Conchophthirius lamellidens* Ghosh

1918. *Conchopthirius lamellidens* Ghosh, *Rec. Indian Mus.*, **15**, 0. 132.

Material examined : Sev. exs., India, West Bengal, Calcutta, 12.x.1963, K.N. Nair.

Diagnosis : Body ovate, 90 µm in length, about 1/2 times as long as broad, bluntly pointed at both ends; dorso-ventrally convex, minutely dentate at the anterior ventral border; peristomeal

notch in the posterior half; longitudinal ciliary lines distinct; contractile vacuole single, subcentral. macronucleus oval or triangular, posterior and subterminal.

Host : *Lamellidens marginalis* (Lamarck); site of infection : mantle chamber.

Distribution : India : West Bengal (Calcutta, Hugli, Medinipur, North and South 24-Parganas districts).

Remarks : As for Sl. No. 559.

Family ANCISTRIDAE

Key to the genera

1 (2) Body oval, strongly flattened, ciliature dense, number of kineties of the range of 65 ..... ***Protophrya***

2 (1) Body of diverse shape, not strongly flattened number of kineties 12-30.....

3 (4) Two adoral kineties starting in the vicinity of the enlarged posterior pole and making around it a large involutive spiral..... ***Boveria***

4 (3) Two adoral kineties starting from anterior pole without forming any spiral as above.....

5 (6) Body elongated with a cone-shaped prolongation at posterior end, two adoral kineties starting about one-third the body length from anterior pole..... ***Fenchelia***

6 (5) Body ovoid, anterior end attenuated, posterior end without any cone, two adoral kineties beginning at a small distance of the apical suture..... ***Ancistrumina***

Genus ***Ancistrumina*** Raabe

Key to the species

1 (2) Body ovoid, margins convex, posterior end almost rounded, 35.08 µm × 27.88 µm in dimensions, macronucleus oval located in the anterior part of the body..... *A. obtusae*

2 (1) Body elongately oval with almost parallel margins, 34.61 µm × 19.92 µm in dimensions, macronucleus round, oval or elongated, location as above..... *A. barbata*

562. ***Ancistrumina barbata*** (Issel)

1903. *Ancistrumina barbata* (Issel), *Mitt. Zool. Stn. Neapel,* **16.**, p. 63.

1988. *Ancistrumina barbata* : Jamardan and Choudhury, *Tech. Monogr.,* **12**, p. 27.

Diagnosis : Body elongated, with almost parallel margins and truncated posterior end, 28.9 - 42.5 µm × 17.0 - 23.8 µm; kineties 20-24 in number; peristome 22.1 - 28.9 µm, extending four-fifth length of the body from the apical part; undulating membrane forms a big loop; macronucleus oval or elongated, 8.5 - 17.0 µm × 5.8 - 11.9, centrally placed, anteriorly indented to accommodate the spherical micronucleus; 1.2 - 3.4 µm in diameter contractile vacuole in the posterior part of the body; with three distinct ciliary regions consisting of thigmotactic, adoral and somatic ciliature.

Host : *Fusus syracusanus* Lamarck, *Certithidea obtusa* (Lamarck); site of infection : mantle cavity and buccal mass.

Distribution : India : West Bengal (South 24-Parganas district). Elsewhere : Neapolitanian Bay.

563. ***Ancistrumina obtusae*** Jamadar and Choudhury

1988. *Ancistrumina obtusae* Jamadar and Choudhury, *Tech. Monogr.*, **12**, p. 24

Diagnosis : Body ovoid, 30.2 - 40.8 µm × 20.4 - 34.0 µm almost rounded at its posterior part, somatic kineties more or less meridional, 19-22 in number; peristome elongated, extending from anterior one-third part to the posterior extremity; cytostome at the posterior end with two long lashing cilia; macronucleus elongated, or oval, 14.29 µm × 9.45 µm, situated in the anterior part of the body; micronucleus spherical, 1.7 - 3.4 µm in diameter, juxtaposed to the macronucleus; contractile vacuole posteriorly located; somatic cilia 4-5 µm long, adoral cilia 9-15 µm long and thigmotactic cilia 5-6 µm long.

Host : *Cerithidea obtusa* (Lamarck); site of infection : buccal cavity.

Distribution : India : West Bengal (South 24-Pargans district.)

Genus ***Boveria*** Stevens

564. ***Boveria teredinidi*** Nelson,

1923. *Boveria teredinidi* Nelson, *Anat. Rec.*, **26.** p. 356.

1988. *Boveria teredinidi* : Jamadar and Choudhury, *Tech. Mongr.*, **12**, p. 40.

Diagnosis : Body somewhat conical, 34.0 - 57.8 µm × 15.3 - 22.1 µm, anterior end slightly tapering; kineties 20-22 in number; oval apparatus broad disc-like; cytostome a temporary structure,o visible during active feeding; macronculeus large, oval centrally placed, 10.2 - 15.3 µm × 6.8 - 8.5 µm; micronucleus spherical, 2.5 - 3.4 µm in diameter, located at the anterior one-third part of the body; contractile vacuole single; at the anterior one-third part of the body; contractile vacuole single; food vacuole 7-12 in number.

Host : *Teredo navalis* L.; site of infectin : labial palps and gills.

Distribution : India : West Bengal (Medinipur district), Goa (Arabian sea). Elsewhere : North America (Atlantic coast).

Genus ***Fenchelia*** Raabe

Key to the species

1 (2) Body ovoid or pear-shaped with a short distinct prolongation on posterior body pole, 39.1 - 51.0 µm × 22.1 - 37.4 µm in diamensions.....*F. sagarica*

2 (1) Body ovoid with a conspicuous cone-shaped prolongation on posterior body pole, 25.5 - 40.8 µm × 13.6 - 30.6 µm in dimensions.....*F. kapili*

565. ***Fenchelia kapili*** Jamadar and Choudhury

1988. *Fenchelia kapili* Jamadar and Choudhury, *Tech. Monogr.*, **12**, p. 32.

Diagnosis : Body ovoid, 25.5 - 40.8 μm × 13.6 - 30.6 μm, dorso-ventrally flattened with a cone-shaped prolongation at the posterior end; kineties 21-25 in number, anterior thigmotactic cilia longer; peristome starts behind the anterior one-third of the body; undulating membrane forms a big loop posteriorly; cytostome situated posteriorly; macronucleus ovoid or oblong 8.5 - 15.3 μm × 5.1 - 10.2 μm; micronucleus spherical, 1.7 - 3.4 μm in diameter, single, anterior to the macronucleus; contractile vacuole large, located posteriorly near the cytostome.

Host : *Cerithidea obtusa* (Lamarck); site of infection : ctenidium and mantle cavity.

Distribution : India : West Bengal (South 24-Parganas district) and Andhra Pradesh (Kakinada Bay).

566. ***Fenchelia sagarica*** Jamadar and Choudhury

1988. *Fenchelia sagarica* Jamadar and Choudhury, *Tech. Monogr.*, **12**, p. 30.

Diagnosis : Body dorso-ventrally flattened, 39.1 - 51.0 μm × 22.1 - 37.4 μm, ovoid or pear-shaped with a small protrusion at the posterior end; kinetis 30-32 in number; peristome starts considerably posterirly from the anterior tip; cytostome situated posteriorly from the anterior tip; cytostome situated posteriorly in a depression; macronucleus variable in shape, 8.5 - 17.0 μm × 6.8 - 17.0 μm, located at the anterior half of the body, micronucleus spherical or oval, 3.4 - 5.1 μm in diameter, shadowed by the macronucleus and not readily visible; contractile vacuole single, large, located posteriorly, 25.5 - 42.5 μm in diameter.

Host : *Cerithidea obtusa* (Lamarck); site of infection : mantle cavity.

Distribution : India : West Bengal (South 24-Parganas district) and Andhra Pradesh (Kakinada Bay).

Genus ***Protophrya*** Kofoid

567. ***Protophrya indica*** Jamadar and Choudhury

1988. *Protophrya indica* Jamadar and Choudhury, *Tech. Monogr.*, **12**. p. 36.

Diagnosis : Body pyriform, laterally flattened, 59.5 - 89.9 μm × 35.7 59.5 μm; kineties 60-77 in number; peristome naked and narrow, starts from the mid region of the body; cytostome situated close to the posterior end; undulating membrane formed of adoral cilia and a long caudal cilium of 11.9 - 17.0 μm in length; macronucleus oval or round located at the anterior part; micronucleus spherical, lying above the macronucleus; contractile vacuole single, located adjacent to the cytostome.

Host : *Littorina melanostoma* Gray *Littorina scabra seabra* site of infection : mantle cavity and buccal mass.

Distribution : India : West Bengal (Medinipur and South 24- Parganas, districts); Andhra Pradesh (Waltair) and Goa (Dona Paula).

Family HYSTEROCINETIDAE

Genus ***Drilocineta*** Raabe

Diagnosis : Prominent thigmotactic sucker at apical end of the body, short ciliary rows

between the arms of the sucker, small congregation of food vacuoles in the posterior part of the body, macronucleus elongated.

568. ***Drilocineta perionyxi*** Nair and Chakrabarti

1975. *Drilocineta perionyxi* Nair and Chakrabarti, *Acta Protozool,* **14**, p. 171.

Meterial examined : 3 exs., Barrackpur, North 24-parganas, 31. vi. 1971, 30. iii. & 25. ix. 1973, Coll. K.N. Nair; 2 exs., Barrackpur, North 24-parganas, 4. vi. 1971 & 30. iii. 1973, Coll. A. Chakrabarti.

Diagnosis : Body elongated, anterior end bluntly pointed and slightly curved, and posterior end truncated, 85-195 µm × 43-85 µm in dimensions; an inverted 'U' shaped sucker of unequal arms at antero-ventral region, 5-6 ciliary rows in between arms of sucker; macronucleus elongated with rounded posterior and acuminated anterior ends; contractile vacuole single with 3-4 accessory vacuoles below macronucleus; food vacuoles congregated at posterior part of the body.

Host : *Perioryx excavatus;* location : intestine (posterior part).

Distribution : India : West Bengal (North 24-parganas district).

Order ASTOMATIDA

Key to the families

1 (2) Body ovoid to elongate ovoid, no endoskeleton, apical hooks or suckers ....ANOPLOPHRYIDAE

2 (1) Body cylindrical, rounded at both ends, skeletal fibres short, small anterior spines fixed or mobile.....MAUPASELLIDAE

Family ANOPLOPHRYIDAE

Genus ***Anoplophrya*** de Putorac and Dragesco

Diagnosis : Shape as for the family, macrounucleus ovoid to cylindrical, contractile vacuole one to several.

Key to the species

1(4) Contractile vacuole single.....

2(3) Body oval, twice as long as broad, posterior end considerably pointed, macronucleus band-shaped, straight or curved.....*A. aelosomatis*

3(2) Body band-like, about three to four times as long as broad, posterior end with a minute notch, macronucleus club-shaped with pointed anterior end.....*A. variabilis*

4(1) Contractile vacuole more than one.....

5(6) Contractile vacuoles numerous arranged in two longitudinal rows, mostly non-contractile, (body elongated, band-like, sometimes twisted in posterior region).....*A. elongata*

6(5) Contractile vacuoles few and scattered.....

7(11) Contractile vacuoles three in number.....

8(9) Body elongated, human foot-shaped, 100 µm × 60 µm, in dimensions, (macronucleus irregularly band-shaped exhibiting three-fourth length of body).....*A. chauhani*

9(8) Body oval or elongately oval.....

10(12) Body oval, subtruncate posteriorly.....*A. lloydi*

11(10) Body elongately oval with rounded ends.....

12(13) Comparatively large, 180-250 µm × 50-70 µm, macronucleus ribbon-shaped extending almost entire length of the body.....*A. lumbrici*

13(12) Smaller in size, 85 µm × 48 µm, macronucleus band-shaped, extending two-third the length of the body.....*A. anili*

14 (7) Contractile vacuoles four in number, (body elongated cylindrical about six times as long as broad).....*A. cylindrica*

569. ***Anoplophrya aelosomatis*** Anderson

1989. *Anoplophrya aelosomatis* Anderson, *J. Asiat. Soc. Bengal,* **58,** p. 381.

Diagnosis : Body oval, twice as long as broad, tapering at both ends, 62-63 µm in length; densely ciliated with fine longitudinal striations; macrounucleus axial, band-shaped and extending almost the whole length of the body; contractile vacuole single, close to the macronucleus.

Host : *Aelosoma chlorosticum* Wood-Mason *Metaphire; posthuma*; site of infection : alimentary canal.

Distribution : India : West Bengal (Calcutta district).

570. ***Anoplophrya anili*** Mukherjee and Chakrabarti

1975. *Anoplophrya anili* Mukherjee and Chakrabarti, *Curr. Sci.,* **40** (16), p. 590.

Diagnosis : Body 85 µm × 48 µm, elongately oval with rounded ends; anterior end broadly rounded, gradually narrower towards posterior end; ciliation thick and uniform; contractile vacuole three in living condition; macronucleus 58 µm in length, band- shaped, two-third the length of the body; micronucleus small, spherical; endoplansmic zonation distinct.

Host : *Perionyx excavatus* Perrier; site of infection : alimentary tract.

Distribution : India : West Bengal (North 24-parganas district).

571. ***Anoplophrya chaudhani*** Mukherjee and Chakraborty

1975. *Anoplophrya chauhani* Mukherjee and Chakrraborty, *Dr. B.S. Chauhan Comm. Vol.* pp. 305-306.

Diagnosis : Body elongated, human foot-shaped, 100 µm × 60 µm; anterior end broader; posterior end rounded; ciliation thick and uniform; macronucleus 74 µm in length, irregularly band-shaped with broader anterior anterior and gradually narrower posterior end, extending

three-fourth the length of the body; micronucleus small, spherical; three contractile vacuoles in living condition.

Host : *Perionyx excavatus* Perrier; site of infection : digestive tract.

Distribution : India : West Bengal (North 24-Parganas district).

572. *Anoplophrya cylindrica* Ghosh

1922. *Anoplophrya cylindrica* Ghosh, *Indian J. Med.*, **3**, p. 284.

Diagnosis : Body elongated and cylindrical, 230 μm in length, about six times as long as broad with rounded ends; ectoplasm thin and endoplasm finely granular; contractile vacuoles four and irregularly arranged; macronucleus elongated, extending almost the whole length of the body.

Host : *Belamya* (=*Vivipera*) *bengalensis;* site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

573. *Anoplophrya elongata* Ghosh

1921. *Anoplophrya elongata* Ghosh, *Bull. Carmichael Med. Coll.*, **2**, p. 6.

Diagnosis : Body elongated, band-like, 150 μm × 30 μm, occasionally twisted, with bluntly tapering ends; anterior end broader; numerous small vacuoles arranged in longitudinal rows; cilia small and uniform; macronucleus flattened and borad-like, extending almost the whole length of the body.

Host : Small freshwater gastropods (unnamed); site of infection : rectum.

Distribution : India : West Bengal (Calcutta district).

574. *Anoplophrya lloydi* Ghosh

1918. *Anoplophrya lloydi* Ghosh, *Rec. Indian Mus.*, 15, p. 129.

Diagnosis : Body elongately oval with subtruncate posterior end; macronucleus irregulary ribbon - shaped, extending nearly the whole length of the body; micronucleus small, spherical located close to macronucleus, contractile vacuoles three, on the right side.

Host : *Pheretima posthuma* (L. Vaill); site of infection : seminal vesicles.

Distribution : India : West Bengal (Calcutta district).

575. *Anoplophrya lumbrici* (Schrank)

1935. *Anoplophrya lumbrici* (Schrank); Heidenreich, *Arch. Protistenk*, 84, p. 315.

Diagnosis : Body elongate oval with posterior end subtruncate, 180-250 μm × 50-70 μm, dorsalside convex and ventral side concave; macronucleus more or less ribbon-shaped, 100-120 μm in length, extending almost entire length of body; micronucleus spherical.

Host : *Pheretima peguyana* (Rosa); site of infection : seminal vesicle.

Distribution : India : West Bengal (Calcutta district).

576. ***Anoplophrya pheretimii*** Raychaudhuri, Haldar and Chakravarty

1969. *Anoplophrya pheretimii* Raychauduri, Haldar and Chakravarty, Arch. Protistenk., **113**, p. 228.

Host : *Metaphire* : *(Pheretima) posthuma.*

Distribution : India : West Bengal (Calcutta district); site of infection: gut.

Remarks : Diagnostic characters and exact place of occurrence of this species could not be incorporated in the present work due to nonavailability of concerned literature. Ghosh, Haldar and Chakravarty (1970) however, studied some cytochemical localisation of this species wherein no diagnostic feature of this ciliate is available.

577. ***Anoplophrya variabilis*** Ghsoh

1921. *Anoplophrya variabilis* Ghosh, *Bull. Carmichal Med. Coll.*, **2**, p. 6.

Diagnosis : Body band-like, 84-174 m in length, 3 to 4 times as long as broad, with a minute notch at the posterior end, rounded anterior end and almost parallel sides; ciliation uniform in longitudinal rows; with two hook-like caudal cirri; contractile vacuole single, posterior; macronuclues club-shaped.

Host : Small freshwater gastropods (unnamed); site of infection : intestine.

Distribution : India : West Bengal (Calcutta district).

Family MAUPASELLIDAE

Genus ***Maupasella*** Cepede

Diagnosis : Ellipsoid body with a spinous attaching organellae at anterior end, macronucleus elongate and ribbon-shaped, contractile vacuoles irregularly disposed.

578. ***Manpasella nova*** Cepede

1910. *Manpasella nova* Cepede, *Zool. exp. gan.*, (5) ii, p. 408.

Diagnosis : Body ovoidal, 48-66 μm × 15-17 μm, dorsoventrally flattened with bluntly rounded anterior end and tapering posterior end; ciliary line longitudinal, cilia fine and densely arranged; maconucleus elongated, ribbon-shaped, granular, located at four-fifth of the body; micronucleus fusiform, almost centrally placed; contractile vacuoles 8-10 in numbers, arranged in two rows.

Host : *Perionyx excavatus;* site of infection : digestive tract.

Distribution : India : West Bengal (North 24-Parganas district, Barrackpore) cited from Mukherjee and Chakrabarti (1985); Paris, France; Lahore, Pakistan.

Remarks : Mukherjee and Chakrabarti (1987) described a subspecies *M. nova anili* frrom *Perionyx excavatus* from Barrackpur, North 24-Parganas district. This form is elliposoidal in shape and 55-58 μm × 15-17 μm in dimensions.

Order PERITRICHIDA

Key to the families

1 (2) Stalkless, yet sessile, attached to substrata by scopulary organellae forming flattened disc often prominently distinct from rest of the body.....SCYPHIDIDAE

2 (1) Mobile, body cylindrical, adoral spiral ranges from turn of 180° to 2-3 nearly full circles, always with wide radius.....TRICHODINIDAE

Family SCYPHIDIIDAE

Genus *Scyphidia* Dujardin

Diagnosis : Body cylindrical, posterior end attached to submerged objects or aquatic animals, body usually cross-striated.

Key to the species

1 (4) Body vase-shaped, cylindrical, distinctly sculptured by regular or transverse striations, macronuclues elongated or sausage-shaped.....

2 (3) Scopular disc small, peristomeal disc inconspicuous, macronucleus considerably large, sometimes its length surpassing total length of animal.....*S. bengalensis*

3 (2) Scopular disc comparative large, peristomeal disc conspicuous, expanded peristomeal disc resembling a pointed snout, macronucleus not very large.....*S. ubiquita*

4 (1) Body urn-shaped or conical, not sculptured by any striation, macronucleus pyriform pointed posteriorly.....*S. pyriformis*

579. *Scyphidia (Gerda) bengalensis* Jamadar and Choudhury

1988. *Scyphidia (Gerda) bengalensis* Jamadar and Choudhury, *Tech. Mongr.*, **12**, p. 48.

Diagnosis : Body cylindrical, contractile and vase-shaped with concentric pellicular ridges, 40.8 - 71.4 µm × 25.5 - 61.2 µm; scopular disc very small; pertistomeal disc conspicuous with the circlet of long cilia; macronucleus cylindrical, variable in shape and size, 28.9 - 81.9 µm × 5.1 - 8.5 µm; contractile vacuole prominent, located near the gullet.

Host : *Cerithidea cingulata* (Gmelin); site of infection : mantle cavity and buccal mass.

Distribution : India : West Bengal (Sagar Island, South 24-Parganas district).

580. *Scyphidia pyriformis* Tripathi

1954. *Scyphidia pyriformis* Tripathi, *Rec. Indian Mus.*, **52**, p. 227.

Diagnosis : Body urn-shaped or conical, anterior end round, posterior end elongated and truncate broad, frill-like scopula, 38.5 -46.9 µm × - 18.0 -20.36 µm in dimensions, peristome arched, with ciliated circular oral groov descending obliquely to form vestibule, macronucleus pyriform, pointing posteriorly, contractile vacuole single, located at the anterior part of the body and connected with vestibule by a small duct.

Host : *Labeo rohita, Catla catla, Cirrhinus mrigala. Cirrhinus reba;* location : skin, fins and gills.

Distribution : India , West Bengal (Hugli district).

Remarks : Fish fries infected with this parasite become weak and sluggish.

581. ***Scyphidia (Gerda) ubiquita*** Hirshfield,

1969. *Scyphidia (Gerda) ubiquita* Hirshfield, *J. Morphol.*, **85**, p. 1.

Diagnosis : Body cylindrical, vase-shaed 40.8 - 96.9 µm × 23.8 - 64.6 µm, with transverse striae; peristomial disc snout-like; gullet long with two rows of cilia; macronucleus elongated or sausage-shaped, centrally located; micronucleus small, spherical to oval, located at the anterior proximity of the macronucleus; contractile vacuole located near the peristomeal disc.

Host : *Littorina melanostoma* Gray and L. (*Littorinopsis*) *scabra scabra* (Linnaeus); site of infection : mantle cavity and buccal mass.

Distribution : India : West Bengal (South 24-Parganas district) and European coast.

Family TRICHODINIDAE

Key to the genera

1 (2) Adoral spiral making one to three.....***Trichodina***

2 (1) Adoral spiral making incomplete turn of 180° to 290°.....***Tripartiella***

Genus ***Trichodinaa*** Ehrenberg

Key to the species

1 (2) Body bell-shaped to hemispherical, parasitic in invertebrate host (estuarine bivalve) (diameter 40.8 - 52.7 µm, height 6.8 - 15,3 µm, number of denticles 21-24)..... .....*T gangetica*

2 (1) Body disc-shaped or ellipsoid, parasitic in vertebrate hosts.....

3 (4) Body ellipsoid, often with a median constriction, parasitic in tadpole, (diameter 35 -60 µm, height 25-55 µm, number of denticles 22-25).....*T pediclus*

4 (3) Body disc-shaped, parasitic in fish.....

5 (6) Total diameter 21.9 - 28.4 µm; diameter of denticulate ring 7.3 - 11.9 µm,..... ..... *T. indica*

6 (5) Total diameter 44.4 - 83.2 µm, diameter of denticulate ring 16.6 - 27.3 µm..... .....*T. nigra*

582. ***Trichodina gangetica*** Jamadar and Choudhury

1988. *Trichodina gangetica* Jamadar and Choudhury, *Tech. Monogr.*, 12, p. 51.

Diagnosis : Body bell-shaped to hemispherical, 40.8 - 52.7 µm in diameter; adhesive basal

disc concave, circular in outline, consisting of a striated membrane and denticulate ring containing 21 - 27 denticles; cytostome ventral, anterior to mid body level; adoral ciliary spiral of two parallel rows; macronucleus large, horse-shoe or arch-shaped; contractile vacuole located anterior to the left arm of the macronucleus.

Host : *Modiolus striatulus* (Hanley); site of infection : gills and labial palps.

Distribution : India : West Bengal (Calcutta district).

583. ***Trichodina indica*** Tripathi

1954. *Trichodina indica* Tripathi, *Rec. Indian Mus.*, **52**, p. 225.

Diagnosis : Body semicircular or sub-spherical in side view and circular in anterior view; total diameter 21.9 - 28.4 µm, height 18.25 - 20.07 µm; anterior end arched, surrounded by oval ciliary groove; aboral end with skeletal ring consisting of an outer striated ring and inner denticular ring, latter consisting of 20- 22 cone-shaped denticles, fitting into one another to form an interlocking ring; each denticle with 7-9 striae; macronucleus horse-shoe shaped, thicker at centre and slightly tapering at open ends; mirconucleus elliptical and outer to macronucleus.

Host : *Labeo rohita, Labeo calbasu, Cirrhinus mrigala, Cirrhinus reba, Catla catla, Amblypharyngodon mola, Chela bacaila Channa gachua, Channa punctatus, Ambassia, Ambassia ranga;* location : gills

Distribution : India : West Bengal (specific locality not mentioned).

Remarks : Tripathi (1954) recorded this species as the commonest ciliate parasite infecting the pond fishes and their fry and fingertings.

584. ***Trichodina nigra*** Lom

1960. *Trichodina nigra* Lom, *J. protozool.*, **7**, p. 23.

1982. *Trichodina nigra* : Mukherjee and Haldar, *Arch. Protistenk.*, **126**, p. 420.

Diagnosis : Body disc-shaped, 61-79 µm in diameter; adoral zoon forming a spiral of about 360°-380°; adhesive disc large with distinct border membrane; denticles 20-28 in number with large distinct blades and thorns, blade falcated blade falcated in shape without any rounded apex, thorns directed to the centre of the adhesive disc, and with 7-8 radial pins; macronucleus horse- shoe shaped micronucleus single.

Host : *Nandus nandus* (Ham.), *Tilapia mossambica* (Peters) and site of infection : body surface and gills.

Distribution : India : West Bengal (Nadia district).

585. ***Trichodina pediculus*** Ehrenberg

1830. *Trichodina pediculus* Ehrenberg, *Abhandl. d. Konigh. Akad. d. Wissensch. zu Berlin*, p. 1.

1966. *Trichodina pediculus* : Kudo, *Protozoology*, p. 1028.

Material examined : 4 exs., India, West Bengal, Calcutta, 11.v.1960, K.N. Nair.

Diagnosis : Body ellipsoid often with a median constriction, diameter 35-60 m, adoral spiral

complete, describing an arrc more than 360°; macronucleus sausage-shaped, adhesive disc with denticulate ring with 22-25 denticles having curved hooks and long rays extending to middle of the disc.

Host : Tadpole; location : gill.

Distribution : India : West Bengal (Calcutta district).

586. ***Trichodina*** sp.

Host : *Ophicephalus punctatus* (Bloch).

Distribution : India : West Bengal (Nadia district).

Remarks : Haldar and Mukherjee (1978) reported this unnamed species from the aforesaid host.

587. ***Trichodina*** sp.

Host : *Sphaeroides oblongus* (Bloch); site of infection : gills.

Distribution : India : West Bengal (Medinipur district).

Remarks : Choudhury and Nandi (1973) reported this unnamed species from the aforesaid species of puffer fish (Order Tetradontiformes).

588. ***Trichodina*** sp.

Host : *Tilapia mossambica* (Peters); site of infection : gills.

Distribution : India : West Bengal (Calcutta district).

Remarks : Choudhury and Chandra (1972) reported on this unnamed species from the aforesaid host.

Genus ***Tripartiella*** Sramenk-Husek

Key to the species

1 (2) Anterior projection of the blade forming a sharp spike.....*T. copiosa*

2 (1) Anterior projection of the blade not in the form of sharp spike.....

3 (4) Anterior projection of the blade resembling a rounded triangle forming a 'V' with the blade.....*T. obtusa*

4 (3) Anterior projection of the blade forming two distinct projections - one short and the other long with a notch.....*T. bulbosa*

589. ***Tripartiella bulbosa*** (Davis)

1987. *Tripartiella bulbosa* : Das and Haldar, *Arch. Protistenk.*, **134**, p. 170.

Diagnosis : Body disc-shaped, 17.6 - 28.6 μm, in diameter. adhesive disc 15.4 22.0 μm diameter; denticulate ring 7.7 - 14.3 μm in diameter with a delicate central part, and relatively

long blade joining the centre by a more or less pronouced knee-like bend; blades rounded or trancated at their peripheral ends, thorn short, straight and directed backwards, anterior projection of the blade forming two distinct projections, one short and the other long with a notch; adoral zone making a turn of 180-200°

Host : *Catla catla* (Ham) *Labea rohita* (Ham), *Mystus bleckeri;* Chanda nama and *Cirrhinaus mrigala* (Ham.); site of infection : gills.

Distribution : India : West Bengal (Nadia district).

590. ***Tripartiella copiosa*** Lom

1959. *Tripartiella copiosa Lom, Acta Parasitol.* 7, p. 573.

1987. *Tripartilla copiosa* : Das and Haldar, *Arch. Protistenk.,* **134,** p. 170.

Diagnosis : Body disc-shaped, 16.5 - 23.1 μm, in diameter, denticles characterized by a delicate central part with anterior projection of the blade in the form of a sharp sike; adoral zone making a turn ranging from 180-225°; adhesive disc 12.1 - 19.2 (17.0) μm in diameter; denticulate ring 6.6 - 11.0 μm in diameter with 18-25 (22) denticles, each having 5 radial pins.

Host : *Labeo rohita* (Himilton), *Cyprinus carpio* (Linn); site of infection : gills.

Distribution : India : West Bengal (Nadia district).

591. ***Tripartiella obtusa*** Ergens and Lom

1970. *Tripartiella obtusa* Ergens and Lom, *Puvodci parasitarnich nemoci ryb.,* Praha, 383 pp.

1987. *Tripartiella obtusa* : Das and Haldar, *Arch; Protistenk.,* **134,** p. 174.

Diagnosis : Body small, disc-shaped, 17.6 - 22.5 (19.8) μm in diameter; adhesive disc distinct, 14.8 - 19.5 (16.7) μm in diameter; denticulate ring 8-13.5 (9.4) m in diameter with 20-25 (22) denticles and 4 radial pins per denticle, blades rectangular in shape with anterior projection resembling a rounded triangle forming a 'V' together with the blade and pointed anticlockwise; adoral zone making a turn of 180-200°

Host : *Ctenopharyngodon idella* (Val.); site of infection : gills.

Distribution : India : West Bengal (Nadia district).

Class POLYHYMENOPHOREA

Order HETEROTRICHIDA

Key to the families

1 (2) Body plump-ovoid to ellipsoidal, occasionally tailed, sucker typically present on concave side of the body, uniquely reinforced with polysaccharide skeletal elements..... .....SICUOPHORIDAE

2 (1) Body ovoid to slightly reniform, plump, sucker on ventral side lacking..... .....NYCTOTHERIDAE

Family NYCTOTHERIDAE

Key to the genera

1 (2) Body ovoid, pyriform or reniform, left margin convex, right margin more or less flat, micronuclues always below macronucleus, commensal of anurans.....*Nyctotheroides*

2 (1) Body generally less flat, micronuclus most often located above macronucleus, commensal fo both invertebrate and vertebrate.....*Nyctotherus*

Genus *Nyctotherus* Leidy

1 (4) Cytopharynx reaching upto the middle of the body.....

2 (3) Body broadly egg-shaped, cytopharynx transversely directed, macronucleus egg-shaped .....*N. ovalis*

3 (2) Body pyriform, cytopharynx obliquely directed, macronucleus oval.....*N. chatterjee*

4 (1) Cytopharrynx reaching upto two-third the body length, (body reniform, cytopharynx slightly curved, macronucleus elongately oval).....*N. kempi*

592. ***Nyctotherus chatterjee*** (Chakravarty and Chattarjee)

1957. *Nyctotherus pyriformis* Chakravarty and Chatterjee, Proc. zool. Soc., Calcutta, 10, p. 68.

Diagnosis : Body pyriform, 92.4 - 105.0 μm × 48.4 - 66.0 μm; macronucleus band-shaped micronucleus attached to the broader end of macronucleus; peristomes initiates from the anterior end; cytopharynx ends beyond the posterior third of the body; cytopyge at the posterior rounded end; contractile vacuole single near the anal tube.

Host : *Gryllotalpa vulgaris;* site of infaunation : rectum.

Distribution : India : West Bengal (Calcutta and Hugli districts).

593. ***Nyctotherus kempi*** Ghosh

1921. *Nyctotherus kempi* Ghosh, *Bull. Carmichael Med. Coll.,* 2, p. 10.

Material examined : 4 exs., Falta, South 24-Parganas, 27. viii. 1965, A.K. Das.

Diagnosis : Body elongate, about thrice as long as broad, 170 μm × 84, μm much flattened dorso-ventrally, anterior half highly flexible; anterior end tapering to point, posterior end rounded, left side convex, right side more or less straight; peristome linear, along the right side and extending beyond the middle of the body; macronucleus elongately oval, lying in front of the middle, micronucleus adjacent; contractile vacuole single, small, at the posterior end of the body.

Host : *Pila globosa* (Swainson); site of infection : rectum.

Distribution : India : West Bengal (Calcutta and South 24- Parganas district).

594. ***Nyctotherus ovalis*** Leidy

1849. *Nctotherus ovalis* Leidy, *Proc. Acad. Nat. Sci. Philad.,* 4 : 233.

Material examined : Sev. exs., Calcutta, 14. ix. 1961, K.N. Nair; 3 exs., Tulshihata, Maldah, 19. iii. 1984, A.K. Das.

Diagnosis : Body broadly oval, 70-360 m in length, divisible into two parts by caryophore diaphragm, smaller anterior one transparent and finely alveolar and larger posterior infranuclear portion with large alveole and numerous riclusions; cytopharynx slightly bent and reaching up to the middle. Contractile vacuole single, subterminal; macronucleus egg-shaped, curved.

Host : *Periplaneta americana;* site of infection : midgut and hindgut.

Distribution : India : West Bengal (Calcutta and Maldah districts); Punjab, Goa.

Genus *Nyctotheroides* Grasse

595. ***Nyctotheroides* cordiformis** (Ehrenberg)

1838. *Bursaria cordiformis* Ehrenberg, *Infusions thierchen als Vollkommene Orgnismen*, Leipzig, p. 328.

1921. *Nyctotherus cordiformis,* Ghosh, *Bull. Carmichael Med. Coll.* 2, p. 10.

Material examined : 2 exs., Diamond Harbour, South 24-Parganas, 10, viii. 1964, K.N. Nair; 4 exs., Calcutta, 14. ix. 1964, K.N. Nair; 2 exs., Barasat North 24-Parganas, 6. iii. 1985, A.K. Das; 3 exs., Konnagar, Hugli, 3. x. 1967, A.K. Das.

Diagnosis : Body reniform, somewhat pointed anteriorly, 80-220 m in length; cytopharynx reaching beyond the middle of the body, broadly curved, contractile vacuole single, posteroterminal, with anal aperture close to it; macronucleus kidney-shaped, micronucleus located below macronucleus and centrally attached to it.

Host : *Bufo melanostictus, Rana tigrina;* location : intestine and cloaca.

Distribution : India : West Bengal (Calcutta, Hugli, North and South 24-Parganas districts). Goa, Karnataka, Rajasthan.

Family SICUOPHORIDAE

Genus ***Sicuophora de*** Puytorac & Grain

Diagnosis : Body ovoid, highly complex along inferior surface, provided with polysaccharide skeletal armature, commensal in anurans.

596. ***Sicuophora macropharyngeus*** (Bezzenberger)

1904. *Nyctopherus macropharyngeus* Bezzenberger, *Arch. Protistenk.,* 3, p. 138.

Material examined : 3 exs., Patipukur, Calcutta, 21. iv. 1964, K.N. Nair; 1 ex., Damond Harbour, South 24-Parganas, 10. viii. 1964, K.N. Nair; 4 exs., Barasat, North 24-Parganas, 6. iii. 1985, A.K. Das.

Diagnosis : Body oval,. posterior part of the body distinctly thicker than anterior part, 140-360 m in length; at anterior end a thinner portion appearing to project like a frill; cytopharynx large, funnel-shaped, posterior portion of it forming a coil in two and a half spiral turns; macronucleus of diverse shape (pentagonal, oval orr cone-shaped), micronucleus placed over macronucleus; contractile vacuoles two or three located near posterior end.

Host : *Rana tigrina,* location : cloaca

Distribution : India : West Bengal (Calcutta, North and South 24- Parganas districts), Maharastra, Karnataka, Rajasthan.

GENERAL REMARKS ON DISTRIBUTION

Distribution of parasites is usually tagged with the localities whereform their respective hosts are collected although there is a probability that parasites may enter their hosts either directly or through vector in places sometimes far away from the actual collection spot of the host. This probability is more for birds, mammals and riverine and maritime fishes as well as migratory animals, animals kept in zoo or purchased from market. Keeping this in mind source of collection of hosts, if examined in zoo or purchased in market, is clearly indicated in the host- parasite list in the present communication.

Species-wise distribution of protozoan parasites of West Bengal has already been dealt with under their respective systematic account. District-wise distribution (Map. 1-3) of these parasite are presented below mentioning only the serial number of the species as specified in the parasite-host list of this paper in order of avoid repetition of species names.

District-wise distribution

BANKURA : *Ma* (11, 30, 32, 34, 35, 38, 56, 62); *Sa* (76); *Ap* (209, 210, 211, 212, 213, 215, 219, 357, 358, 379, 380, 381, 384, 387) : *total* = 23

BARDDHAMAN : *Ma* (5, 31, 33, 37, 56, 62); *Sa* (76); *Ap* (256, 304, 316, 379, 380, 381, 387) : *total* = 14

BIRBHUM : *Ma* (56, 62); *Op* (69); *Sa* (76); *Ap* (379, 380, 381, 387) : *total* = 8

CALCUTTA : *Ma* (2, 8, 12, 13, 14, 16, 17, 18, 20, 22, 23, 27, 33, 41, 42, 43, 44, 45, 46, 51, 52, 53, 54, 55, 56, 57, 59, 60, 61, 62, 64, 65); *Op* (67, 68, 69 70, 71); *Sa* (72, 75, 76, 78, 80); *Ap* (82, 83, 84, 101, 108, 109, 127, 129, 140, 153, 154, 155, 156, 157, 160, 162, 165, 169, 171, 173, 174, 207, 220, 234, 237, 238, 241, 242, 243, 244, 245, 246, 247, 249, 250, 251, 252, 253, 255, 257, 259, 260, 264, 265, 266, 267, 268, 270, 272, 273, 275, 276, 277, 282, 283, 285, 287, 289, 290, 295, 296, 297, 298, 299, 302, 305, 307, 308, 309, 310, 311, 312, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 340, 341, 343, 344, 345, 346, 350, 354, 355, 356, 363, 364, 365, 366, 368, 370, 379, 380, 381, 382, 385, 387, 389, 391, 392, 394, 396, 399, 402, 405, 409, 422, 423, 424, 427, 428, 430, 438); *Mi* (439, 440); *My* (448, 449, 451, 455, 456, 457, 464, 467, 468, 469, 470, 474, 475, 476, 479, 483, 488, 489, 491, 495, 519, 524, 530); *Ci* (537, 538, 541, 542, 544, 546, 548, 550, 555, 559, 560, 561, 569, 572, 573, 574, 575, 576, 577, 582, 588, 592, 593, 594, 595, 596); *total* = 225

DARJILING : *Ma* (31, 35, 37, 39, 45, 47, 48, 49, 56, 62); *Op* (68); *Sa* (76); *Ap* (85, 87, 88, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 102, 103, 106, 116, 196, 198, 209, 218, 227, 229, 278, 284, 286, 292, 294, 302, 313, 314, 315, 342, 348, 359, 368, 372, 374, 376, 379, 380, 381, 383, 386, 387, 393, 398, 407, 414, 416, 417, 418, 419, 420, 436, 437; *Ci* (547, 551) : *total* = 72

HAORA : *Ma* (46, 56, 62); *Sa* (76); *Ap* (186, 280, 293, 300, 337, 347, 352, 353, 364, 379, 380, 381, 387); *Ci* (539) : *total* = 18

HUGLI : *Ma* (31, 35, 46, 56, 62); *Sa* (76); *Ap* (111, 118, 121, 130, 141, 152, 158, 176, 178, 181, 182, 186, 193, 194, 195, 197, 200, 201, 202, 203, 279, 339, 379, 380, 381, 387, 434); *My* (452, 454, 494, 496, 505, 508, 509, 518, 520, 528, 532); *Ci* (559, 560, 561, 580, 592, 595) : *total* = 50

JALPAIGURI : *Ma* (29, 35, 56, 62); *Sa* (76); *Ap* (212, 225, 288, 291, 358, 379, 380, 381, 387, 413) : *total* = 14

MALDAH : *Ma* (20, 26, 28, 35, 56, 62); *Op* (68), *Sa* (76); *Ap* (213, 379, 380, 381, 387); *Mi* (443); *Ci* (594) : *total* = 15

MEDINIPUR : *Ma* (36, 37, 52, 62); *Op* (66); *Sa* (76); *Ap* (214, 236, 379, 380, 381, 387); *My* (453, 460, 461, 466, 507); *Ci* (552, 553, 554, 559, 560, 561, 564, 567, 587) : *total* = 26

MURSHIDABAD : *Ma* (5, 6, 12, 56, 62); *Op* (68); *Sa* (76); *Ap* (113, 172, 209, 210, 358, 379, 380, 381, 387); *Mi* (443); *My* (455, 473, 499, 504, 531) : *total* = 22

NADIA : *Ma* (19, 39, 41, 56, 62); *Sa* (76); *Ap* (110, 112, 114, 115, 117, 120, 122, 123, 124, 125, 126, 128, 132, 133, 135, 136, 137, 138, 139, 142, 143, 144, 145, 146, 147, 148, 149, 150, 4151, 159, 161, 163, 164, 166, 167, 168, 170, 175, 185, 187, 188, 189, 190, 191, 192, 204, 206, 223, 232, 240, 254, 303, 350, 360, 361, 362, 365, 367, 368, 369, 370, 371, 373, 375, 379, 380, 381, 387, 388, 389. 391, 394, 395, 397, 398, 433); *My* (444, 458, 459, 483, 490, 497, 500, 501, 501, 502, 503, 513, 515, 521, 522, 525, 526, 529, 535); *Ci* (543, 545, 584, 586, 589, 590, 591) : *total* = 108

NORTH 24-PARGANAS : *Ma* (5, 16, 40, 41, 50, 56, 62); *Sa* (76); *Ap* (86, 89, 104, 105, 107, 119, 131, 134, 179, 180, 183, 193, 228, 230, 231, 239, 241, 246, 261, 263, 275, 299, 351, 377, 379, 380, 381, 387, 421, 429); *My* (447, 462, 479, 480, 481, 482, 483, 485, 486, 487, 493, 506, 510, 512, 517, 519, 523, 527, 530); *Ci* (539, 549, 559, 560, 561, 568, 570, 571, 578, 595, 596) : *total* = 69

PURULIYA : *Ma* (37, 56, 62); *Sa* (76); *Ap* (213, 216, 217, 379, 380, 381, 387); *Ci* (549) : *total* = 12

SOUTH 24-PARGANAS : *Ma* (1, 4, 5, 6, 7, 8, 9, 10, 15, 20, 23, 24, 25, 41, 42, 50, 56, 58, 62, 63); *Op* (70); Sa 972, 73, 74, 75, 76, 77, 79, 80, 81); *Ap* (205, 208, 213, 222, 233, 235, 236, 248, 258, 262, 269, 271, 274, 275, 281, 295, 299, 317, 338, 358, 368, 379, 380, 381, 387, 394, 402, 425, 426, 432, 435); *My* (445, 451, 463, 471, 492, 530); *Çi* (538, 539, 540, 558, 559, 560, 561, 562, 563, 565, 566, 567, 579, 581, 593, 595, 596) : *total* = 84

WEST DINAJPUR : *Ma* (21, 23, 56, 62); Sa (76); *Ap* (224, 379, 380, 381, 387) : *total* = 10

[Ma = Mastigophora; Sa = Sarcodina; Op = Opalinata; Ap = Apicomplexa; Mi = Microspora; My = Myxozoa; Ci = Ciliata]

Groupwise details of parasitic proozoa of this state along with their host-species are tabulated as follows :

Group		Number of			
		Family	Genera	Species	Host-species
Phylum	Sarcomastigophora				
Subphylum	Mastigophora	12	17	65	69
Subphylum	Sarcodina	1	3	10	8
Subphylum	Opalinata	1	3	6	4
Phylum	Apicomplexa	30	74	357	257
Phylum	Microspora	2	2	5	8
Phylum	Myxozoa	4	13	93	46
Phylum	Ciliophora	13	19	60	48
Total		63	131	596	351*

(* less than actual total since 140 hosts are reported with parasites of different groups)

From the above cited data it is quite evident that more than 200 species of protozoan parasites embracing 5 phyla are reported from Calcutta and little more than 100 species belonging to 4 phyla are known from Nadia districts. The districts from where 50 or more species are recorded include South 24-Parganas, Darjiling, North 24-Parganas and Hugli.

So far, 133 species of invertebrates and 218 species of vertebrates covering 5 phyla and 11 classes are found to harbour 596 species of protozoan parasites from this state. Out of these, 140 species are reported to be infested/infected with single and the rest with multiple number of parasitic protozoan species, maximum being 20 from the frog, *Rana tigrina*. The goat *Capra hircus* is also found to possess 16 protozoan parasites excluding 49 species of protozoan symbiotes which inhibit the rumen of the goat and will be dealt with in the third part of this treatise. In this connection it is worthmentioning that 9 host-species, all vertebrates and studied in West Bengal since 1870 by many Protozoologists of several Universities and institutes are reported with more than 10 species of parasites. Among these, 4 are fishes (*viz. Catla catla, Channa punctata, Cirrhina mrigala and Labeo rohita*), 3 are amphibians (*viz. Bufo melanostictus, Rana limnocharis and Rana tigrina*) and 2 are mammals (*viz., Capra hircus and Homo sapiens*). This data indicates that many more species of parasitic protozoa may be recovered from such host-species from which single species of Protozoa is reported so far, if different tissues and organs of these hosts are searched thoroughly. The number of parasitic protozoan species will further increase to a considerable extent in this state if new invertebrate and vertebrate hosts are examined for this purpose.

Plate – 1

Figs. 1-4. Showing general structures of parasitic flagellates belonging to the genera *Trypanosoma* (fig.1); *Giardia* (fig. 2A,B); *Monocercomonas* (fig. 3) and *Trichomonas* (fig. 4).

(Ax - Axostyle; Af - Anterior flagellum; Bl - Blepharoplast; C - Costa; CR - Chromatic ring; Cy - Cytostome; FF - Free flagellum; FL - Flagellum; KL - Kinetoplast; NU - Nucleus; PB - Parabasal body; PE - Pelta; PF - Parabasal filament; TF - Trailing flagellum; UM - Undulating membrane).

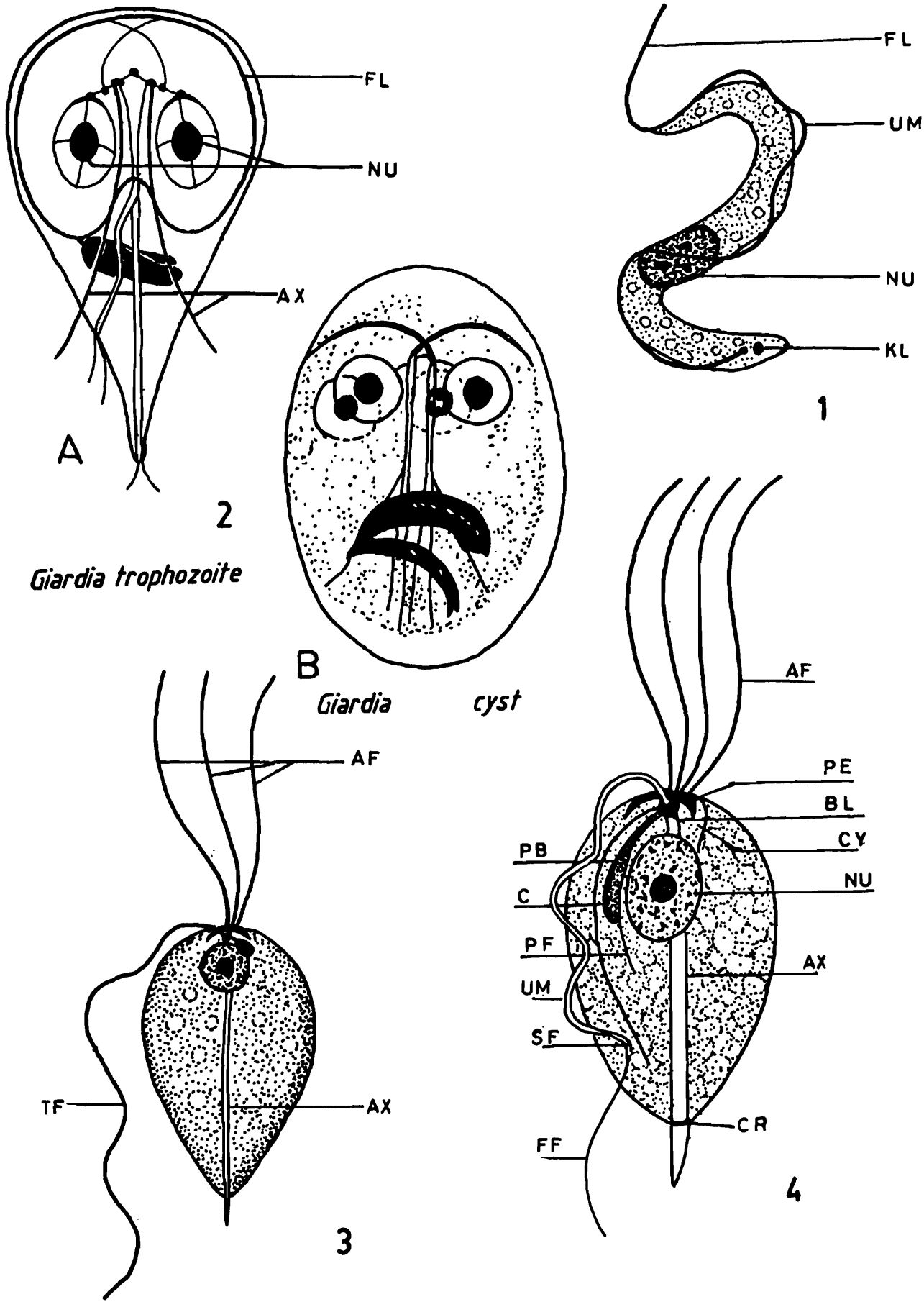

FL
NU
AX
A
2
Giardia trophozoite
B
Giardia cyst
FL
UM
NU
KL
1
AF
PE
BL
CY
PB
NU
C
PF
AX
UM
SF
CR
FF
4
AF
TF
AX
3

Plate – 2

Figs. 1-10 Showing general strructures and life cycle stages of some gregarines parasitizing invertebrate hosts of West Bengal. 1. An aseptate gregarine of earthworms; 2-3. Septate gregarines of coccinellid beetle (fig. 2) and psocopteran insect (fig. 3); 4-10. Life cycle stages of a cephaline gregarine, *Gregarina bilobosa* from Coleopteran insect Fig. 4. Young trophozoite attached to the host gut epithelium. Fig. 5 Fully grown trophozite, Fig. 6. Sporadin. Fig. 7. sporadins in syzygy. Fig. 8 A freshly formed gametocyst with two equal sized gametocystes. Fig. 9 A maturre gametocyst with three sporoducts. Fig. 10. A barrel-shaped spore showing linearly arranged sporozoites.

(EP - Epimerite; PR - Protomerite; DE - Deutomerite)

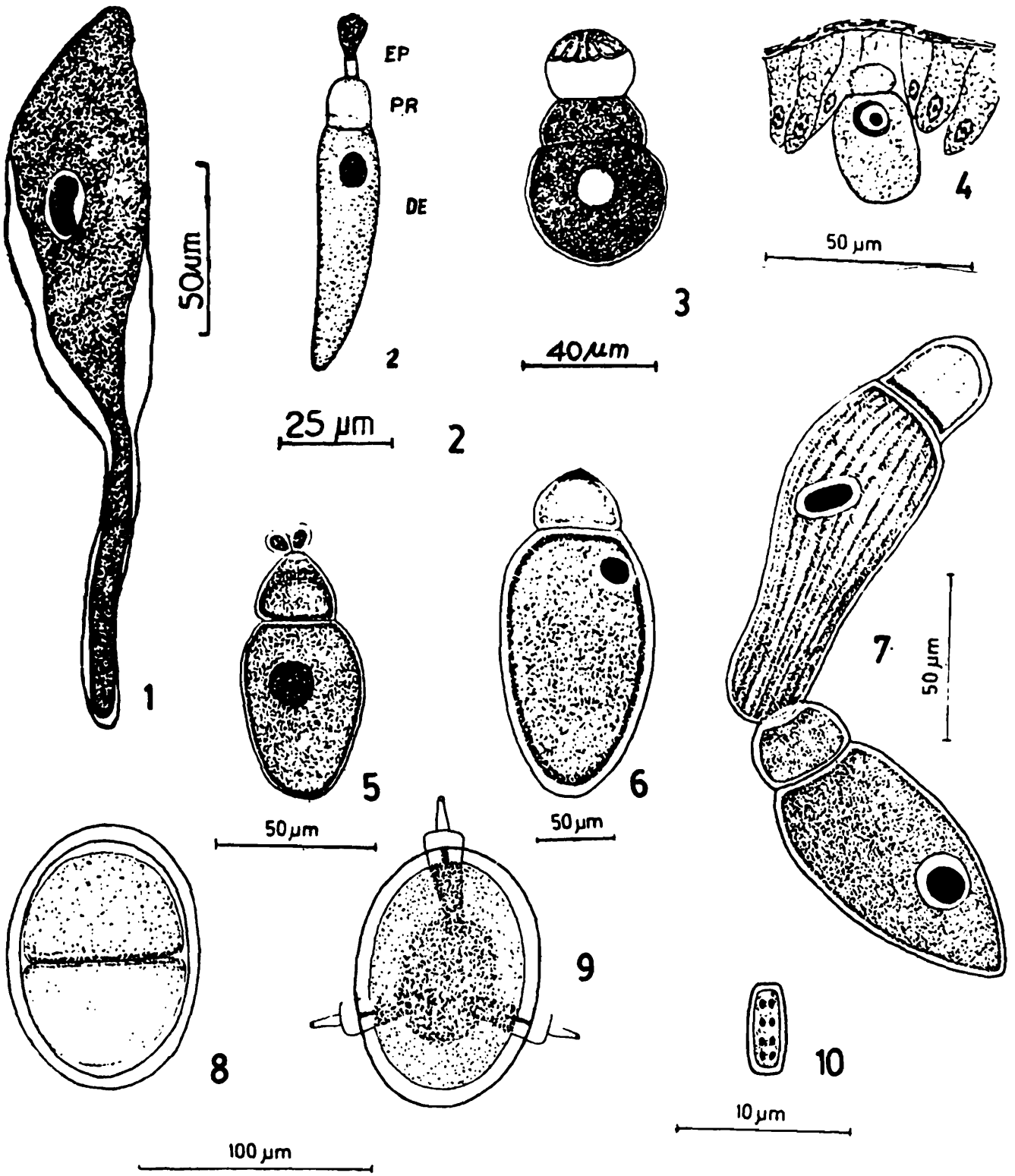
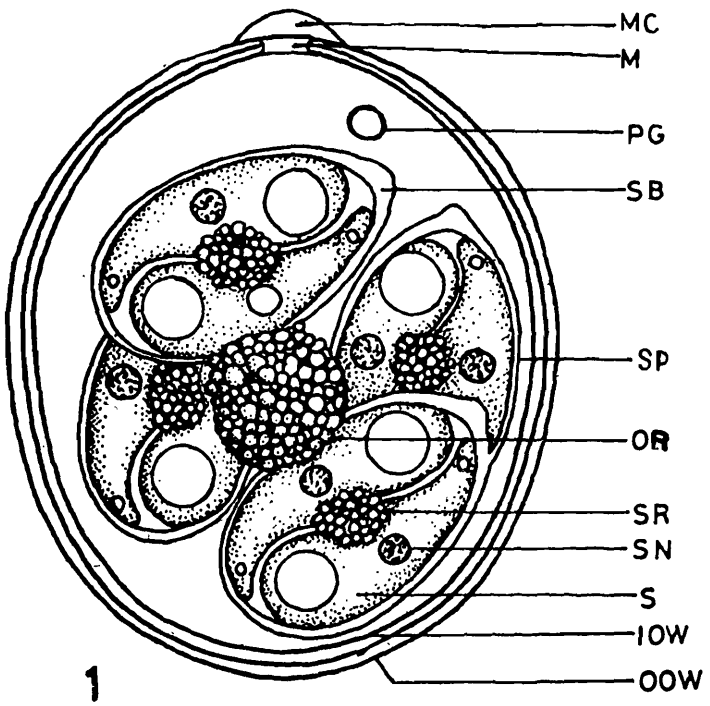

50um
1
EP
PR
DE
2
25 µm
2
40µm
3
4
50 µm
5
50µm
6
50µm
7
50 µm
8
100 µm
9
10
10 µm

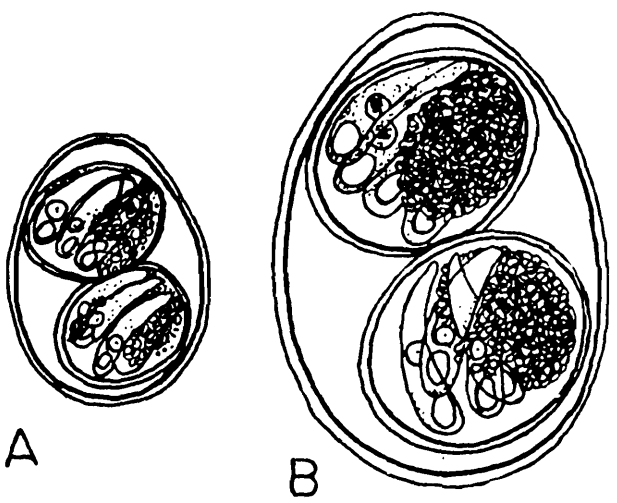
Plate – 3

Figs. 1 Showing general structures and some life cycle stages of some genera of Eimmerina and Haemosporina. 1. Showing general strructures of sporulated oocyst of *Eimeria*. 2. Sporulated oocysts of *Isopora*, A. *Isopora rivolta* and B. *Isopora felis*. 3. showing general morphological structure of a microgametocyte of *Leucocytozon*. 4A-D. Showing some life cycle stages in the blood belonging to the genus *Plasmodium*.. (A. Ring stage B. Growing schizont. C. Segmenter. D. Macrogametocyte.)

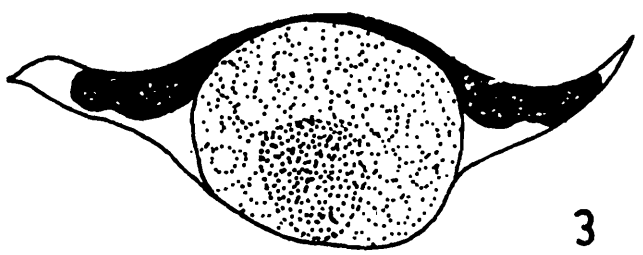
(IOW - Inner layer of oocyst wall, M - Micropyle, MC - Micropyler cap, OOw - Outer layer of oocyst wall, OR - Oocyst residuum, PG - Polar granule, S - Sporozoite, SB - Steida body, SN - Sporozoite nucleus, SP - Sporocyst, SR - Sporocyst residuum).



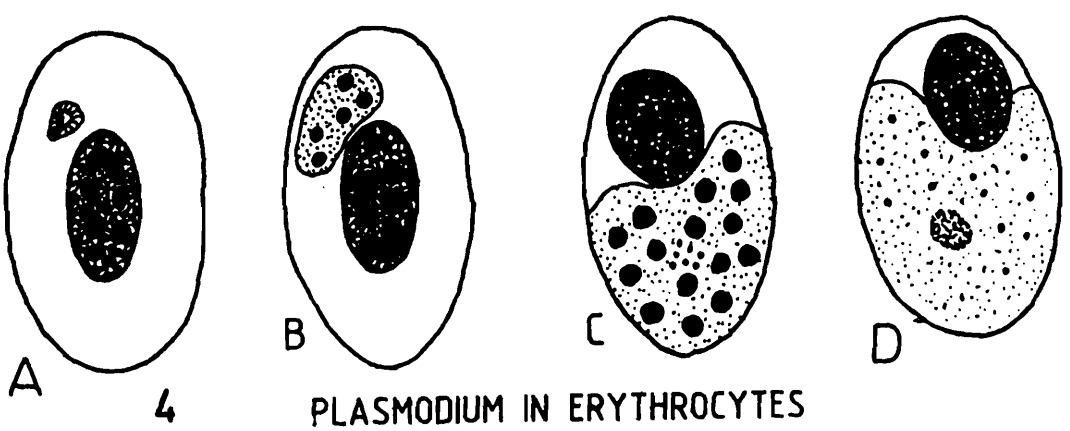
EIMERIA OOCYST



ISOSPORA OOCYST



Leucocytozoon sp

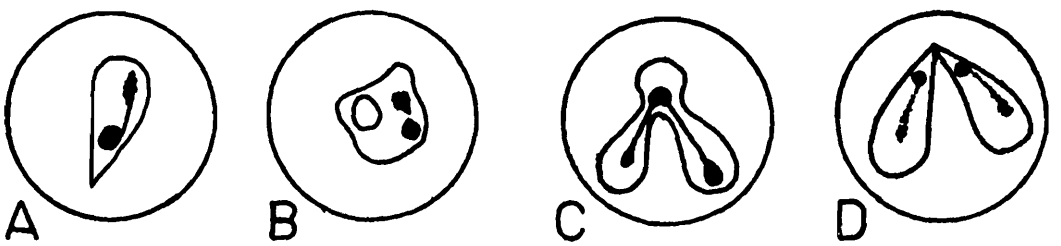


PLASMODIUM IN ERYTHROCYTES

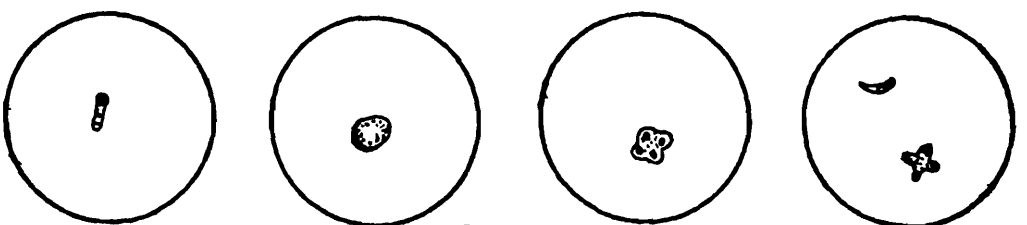
Plate – 4

Figs. 1-2. Showing general structures and some life cycle stages of Piroplasmida. 1A-D. different stages of *Babesia Bigemina* in erythrocytes of bovine host. 2A-D. Diferent stages of *Theileria parva* in erythrocytes of bovine host. 3. Showing general structures of *Balantidium coli.*

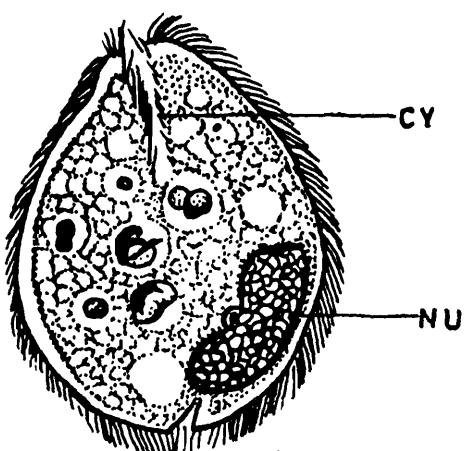
(CY- cytopharynx; NU - Nucleus)



1 *Babesia bigemina*



2 *Theileria parva*



3 *Balantidium coli*

Plate – 5

Figs. 1-6 Showing some haemoflagellates inhabiting fishes of West Bengal. 1A-B. *Trypanosoma anabasi* Mandal 2A-B. *Trypanosoma armeti* Mandal. 3. *Trypanosoma danilewskyi saccobranchi* Qadri. 4. *Trypanaosoma batrachi* Qadri. 5A-B. *Trypanosoma bengalensis* Mandal. 6A-B. *Trypanosoma choudhuryi* Mandal.

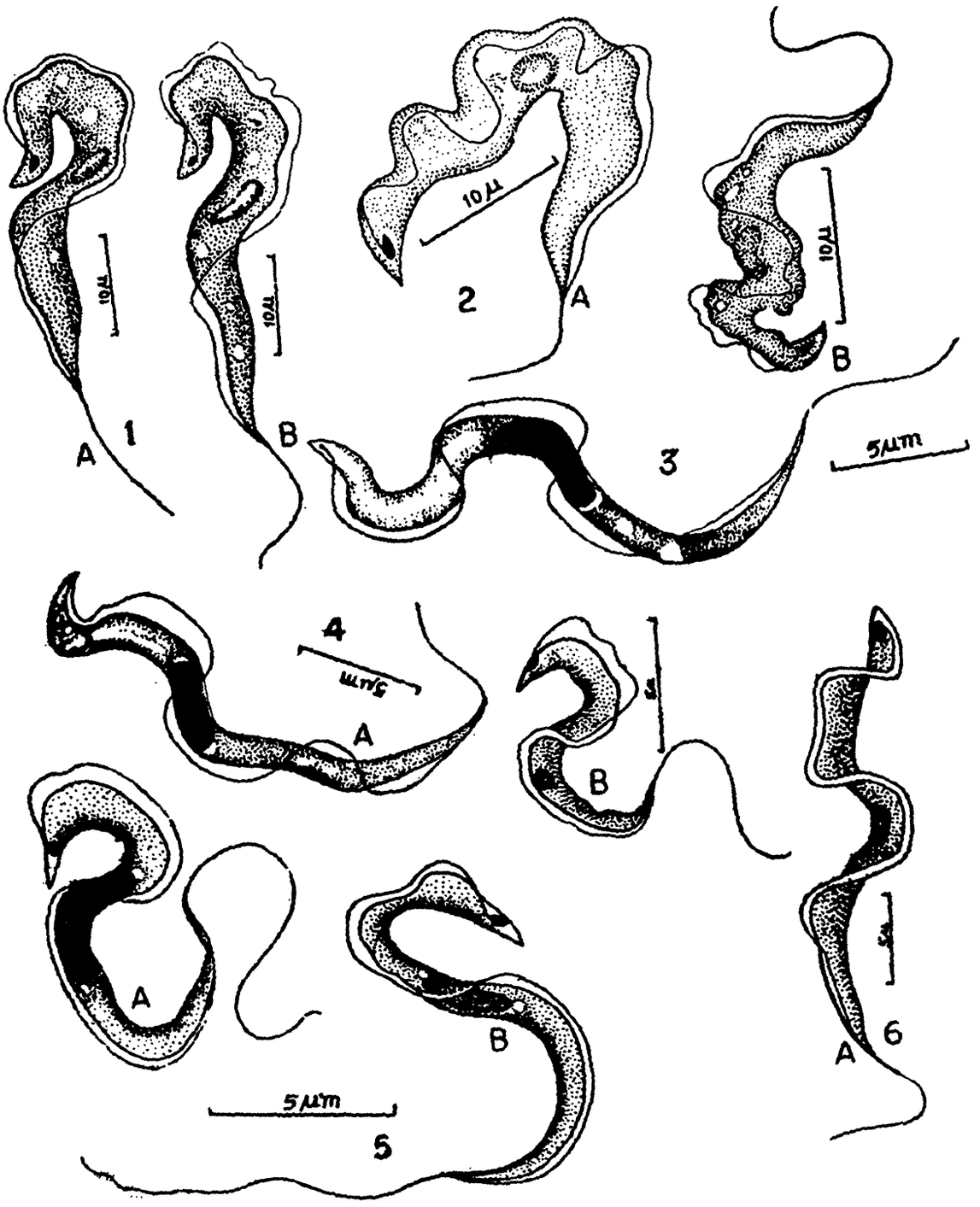

10μ
A
1
B
10μ
2
A
10μ
B
5μm
3
4
5μm
A
B
A
B
5μm
5
A
6

Plate – 6

Figs. 1-6. Showing six species of haemoflagellates belonging to the genera *Trypanosoma* and *Trypanoplasma* from fishes of West Bengal. 1A-B. *Trypanosoma vittati* Tandon and Joshi. 2A-B. *Trypanosoma indica* Mandal. 3A-B. *Trypanosoma tandoni* Mandal. 4A-B. *Trypanosoma pancali* Mandal. 5. *Trrypanosoma cancili* Mandal : 6A-B. *Trypanosoma gobida* Mandal, in press.

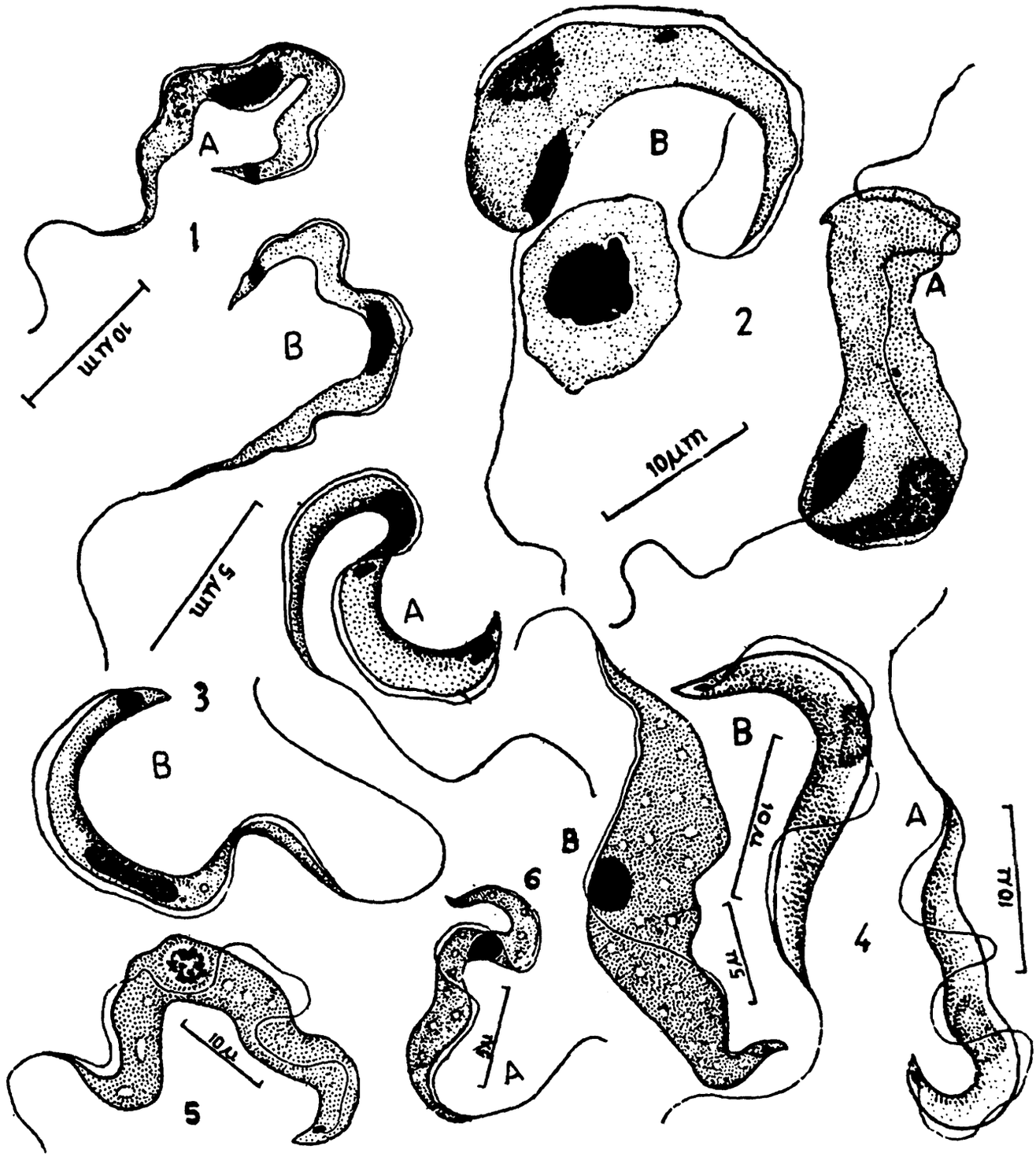

A
1
B
10μm
B
2
10μm
A
5μm
A
3
B
B
6
B
A
10μm
5μm
A
4
10μm
10μm
5

Plate – 7

Figs. 1-7 Showing trophozoites of seven species of aseptate gregarines from millipede (Fig. 3) and earthworms of West Bengal (Figs. 1, 2, 4-7). 1. *Nematocystis bengalensis* Ray Chowdhury and Haldar. 2. *Nemaotocystis mauritii* Ray Chowdhury and Haldar. 3. *Chakravartiella sugerieformes* Misra and Ray Choudhury. 4. *Stomatophora pradhanis* Pradhan and Dasgupta. 5. *Informis informis* Pradhan and Das Gupta. 6. *Informis pseudotentaculatus* Pradhan and Das Gupta. 7. *Bisurculus variegatus* Pradhan and Das Gupta.

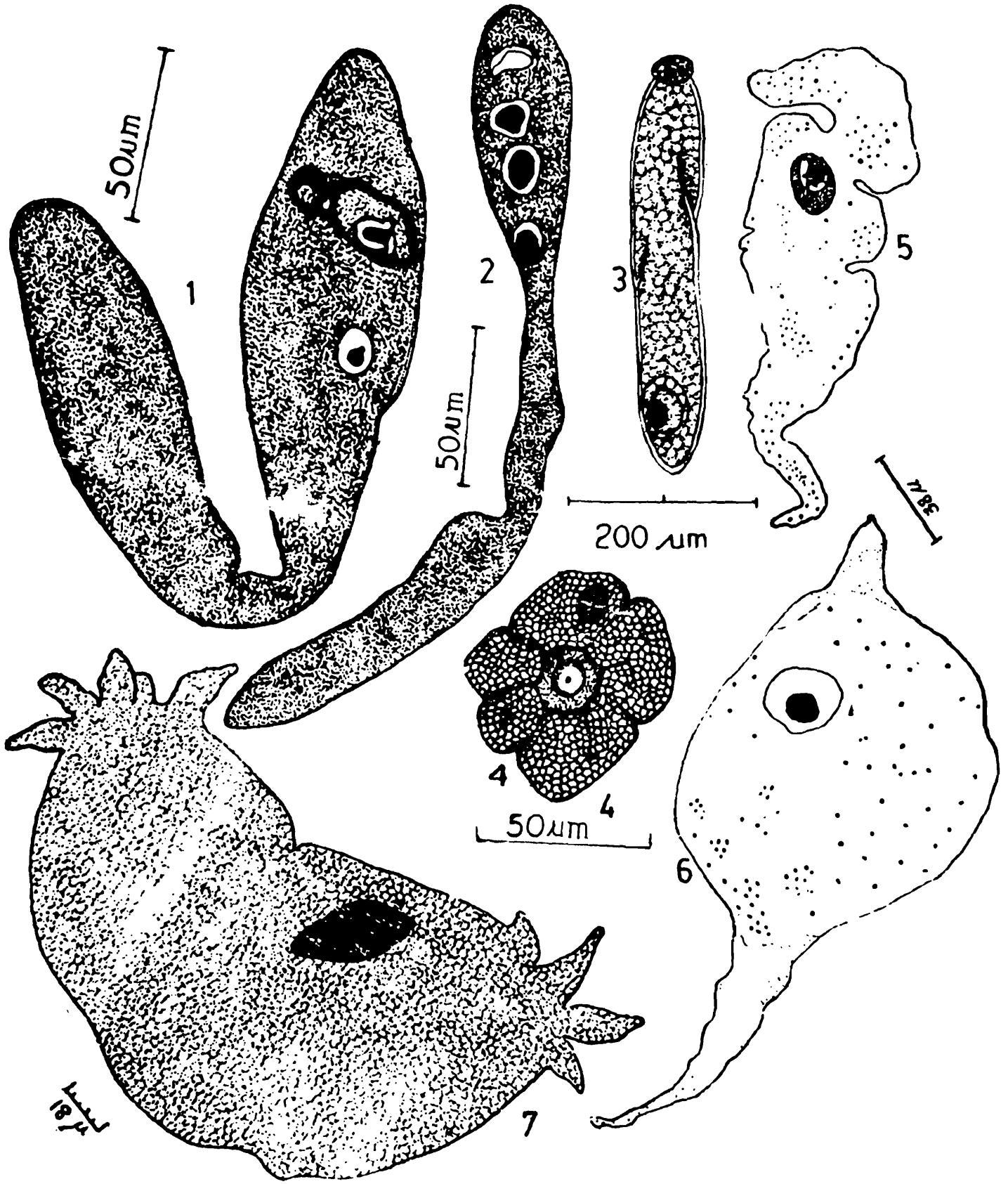

50um
1
2
50um
3
200 um
5
4
4
50um
6
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Plate – 8

Figs. 1-16. Showing trophozoites of sixteen species of septate gregarines from insects of West Bengal. 1. *Acanthosphora bengalensis* Sarkar and Haldar. 2. *Liposcelisus coronatus* Sarkar and Haldar. 3. *Odonaticola longicollara* Sarkar and Haldar. 4. *Odonaticola hexacantha* Sarkar and Haldar. 5. *Ancyrophora ovoides* Sarkar and Haldar. 6. *Ancyrophora ischnurae* Sarkar and Haldar. 7. *Retractocephalus spatulatus* Haldar, Chakraborty and Kundu. 8. *Retractocephalus spatulatus* Haldar, Chakraborty and Kundu 9. *Retractocephalus aulacophorae* Haldar, Chakraborty and Kundu. 10. *Didymophyes oryzaephilae* Ghosh, Gupta and Haldar.11. *Didymophyes lipai* Ghosh, Gupta and Haldar.12. *Qudruspinospora megaspinosa* Haldar and Chakraborty. 13. *Quaduspinospora acridae* Haldar and Chakraborty. 14. *Quadruspinospora indoaiolopii* Haldar and Chakraborty. 15. *Brustiospora indicola* Kundu and Haldar. 16. *Tetractinospora viectoris* Sarkar and Haldar.

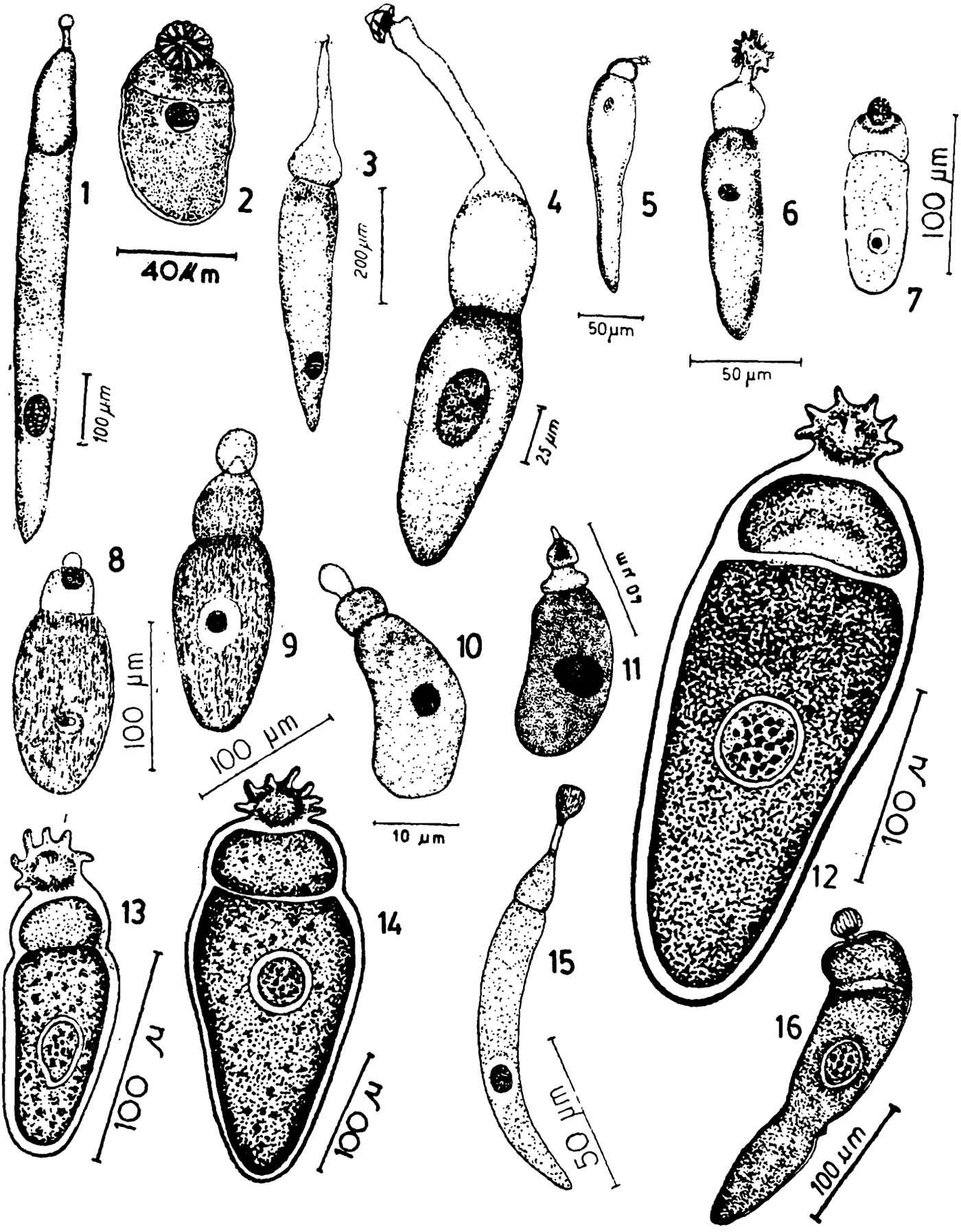

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Figs. 1-11 Showing sporulated oocysts of some coccidian parrasites of farm animals of West Bengal. 1. *Eimeria arloingi* (Marotel). 2. *Eimeria ahsata* Honess. 3. *Eimeria christenseni* Levine, Ivens and Fritz. 4. *Eimeria crandalis* Honess. 5. *Eimeria faurei* (Moussu and Marotel). 6. *Eimeria intricata* Spiegel. 7. *Eimeria granulosa* Christiansen. 8. *Eimeria spinosa* Henry. 9. *Eimeria ovoidalis* Ray and Mandal. 10. *Eimeria parva* Koltan, Moscy and Vajda. 11. *Eimerria ninakholyakimovi* Yakimov and Rostagaieff.

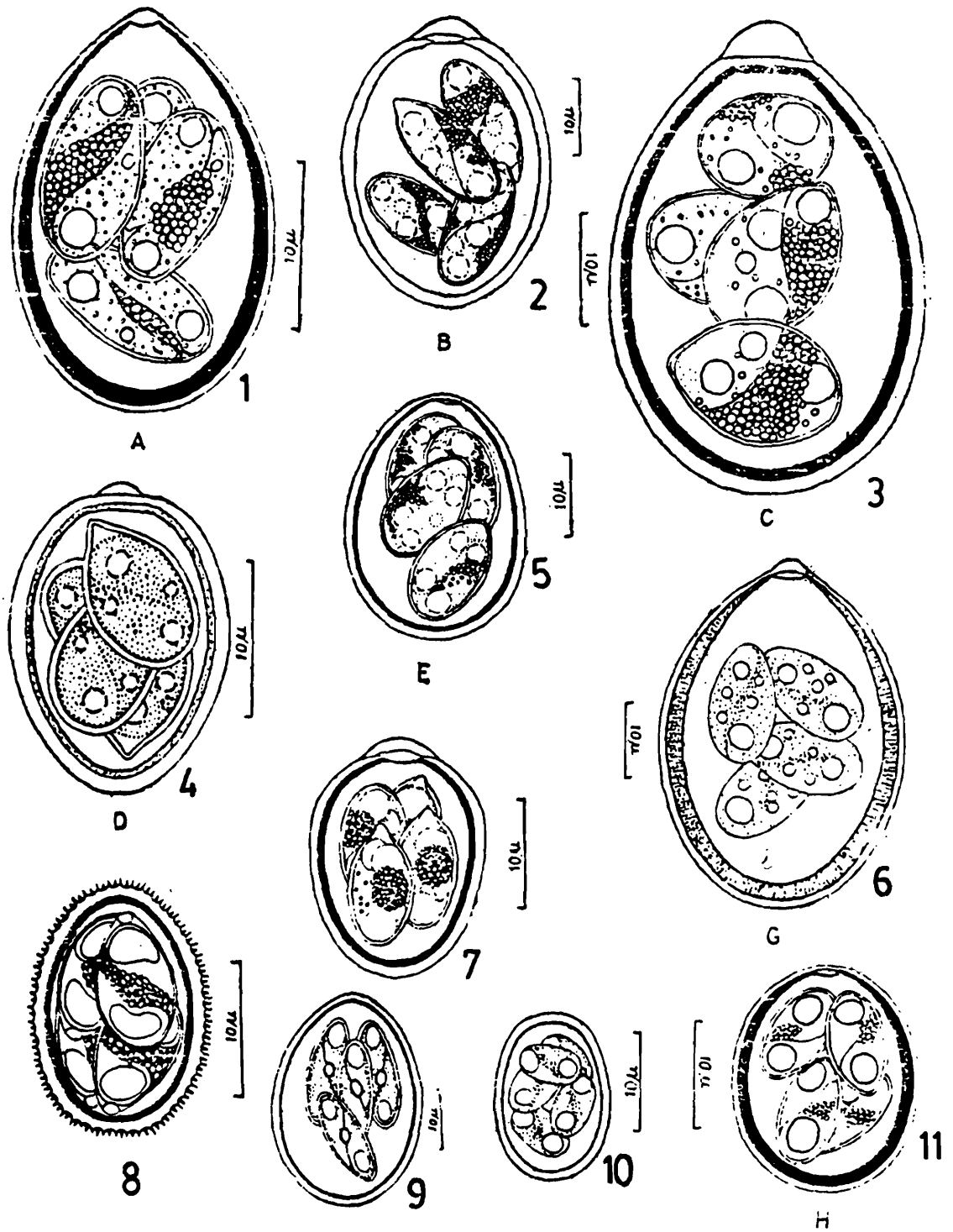

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Figs. 1-24. Showing some myxozoan parasites of fishes of West Bengal. 1. Lateral view of fresh spore of *Leptotheca latesi*. 2. Lateral view of fresh spore of *Leptotheca macronesi*. 3. and 4. Stained spores of *Myxidium calcariferi*. 5. Stained spore of *Myxidium lieberkuhri*. 6. Front view of fresh spore of *Myxidium heteropneusti*. 7 and 8. Stained spores of *Ceratomyxa scatophagi*. 9. Fresh spore of *Zschokkella fossilae*. 10. Fresh spore of *Zchokkeella illishae*. 11. Trophozoite of *Chloromyxum amphipnoui*. 12 and 13. Stained spores of *Chloromyxum amphipnoui*. 14-19. Different views of spores of *Myxobolus catlae* (Fig. 15. side view showing single polar capsule, Fig. 16. showing iodinophilous vacuole, Fig. 17. front view, Figs. 18 & 19. Stained spores). 20-23. Different views of fresh spores of *Myxobolus clarii* (Figs. 20-22. front views; 23. side view). 24 -26. Different views of spores of *Thelohanellus rohitae* (Fig. 24. front view of frresh spore, Figs. 25 & 26. side view of stained spores showing sutural ridge (fig. 25) and polar filament (Fig.26).

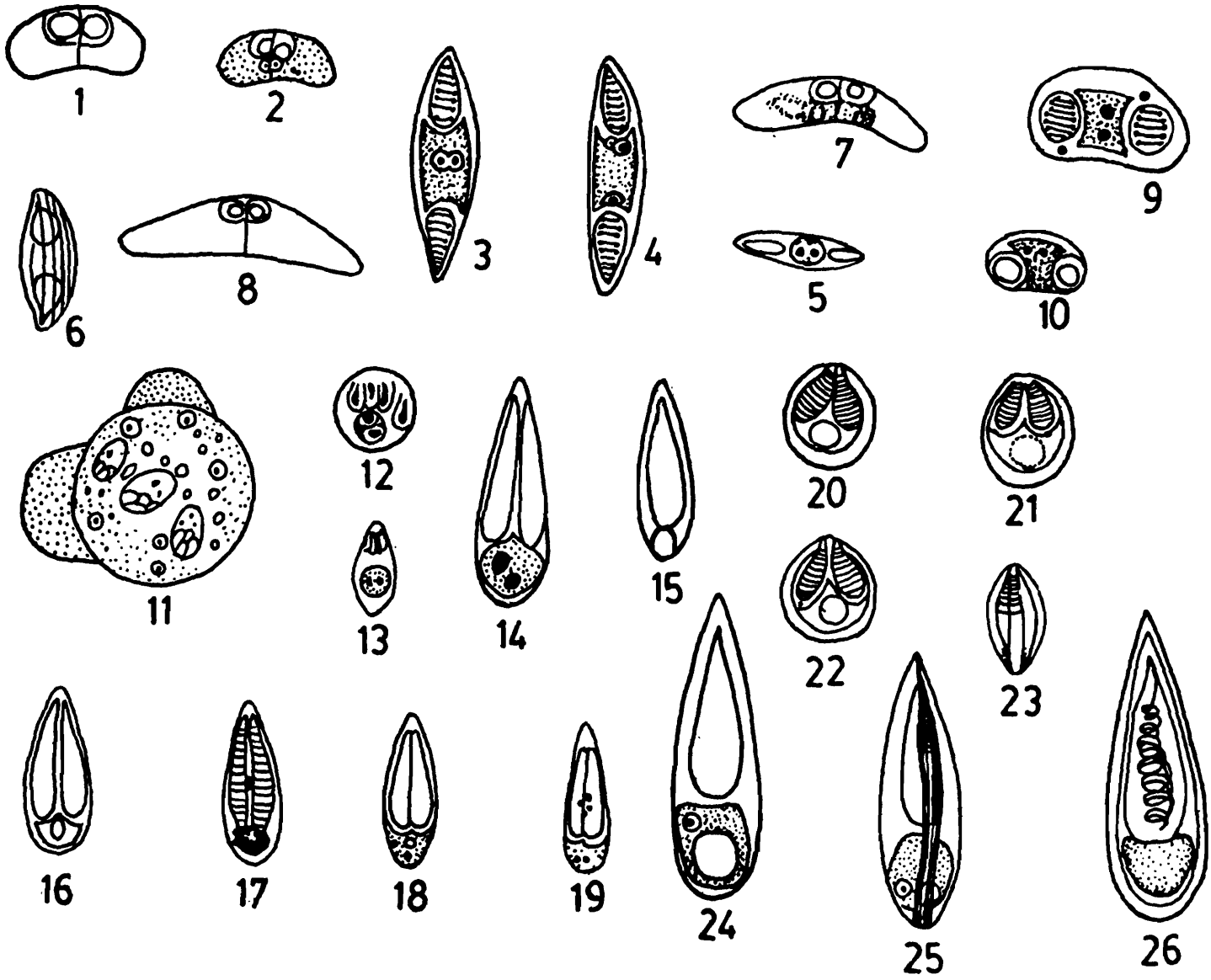

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Plate – 11

Figs. 1-21. Showing some myxozoan parrasites of fishes of West Bengal. 1-2. Traophozoite (fig. 1) and spores (figs. 2 and 3) of *Chloromyxum mrigalae*. 4-11. Different view of spores of *Myxobolus* opecies (figs. 4 and 5. *M. branchialis;* figs. 6 and 7 *M. indicum;* figs. 8 and 9. *M. barbi;* figs. 10 and 11. *M. sphericum*). 12-15. Different views of spores of *Hennequya* species (figs. 12 and 13. *H. latesi;* figs. 14 and 15. H. (= *Unicauda*) *ophicephali*). 16 and 17. Different views of spores of *Thelohanellus mrigale*. 18 and 19. Different views of spores of *Neohanneguya tetraradiata*. 20. Trophozoite of *chloromyxum amphipnoui*. 21. Spore of *Spahaeromyxa theraponi*.

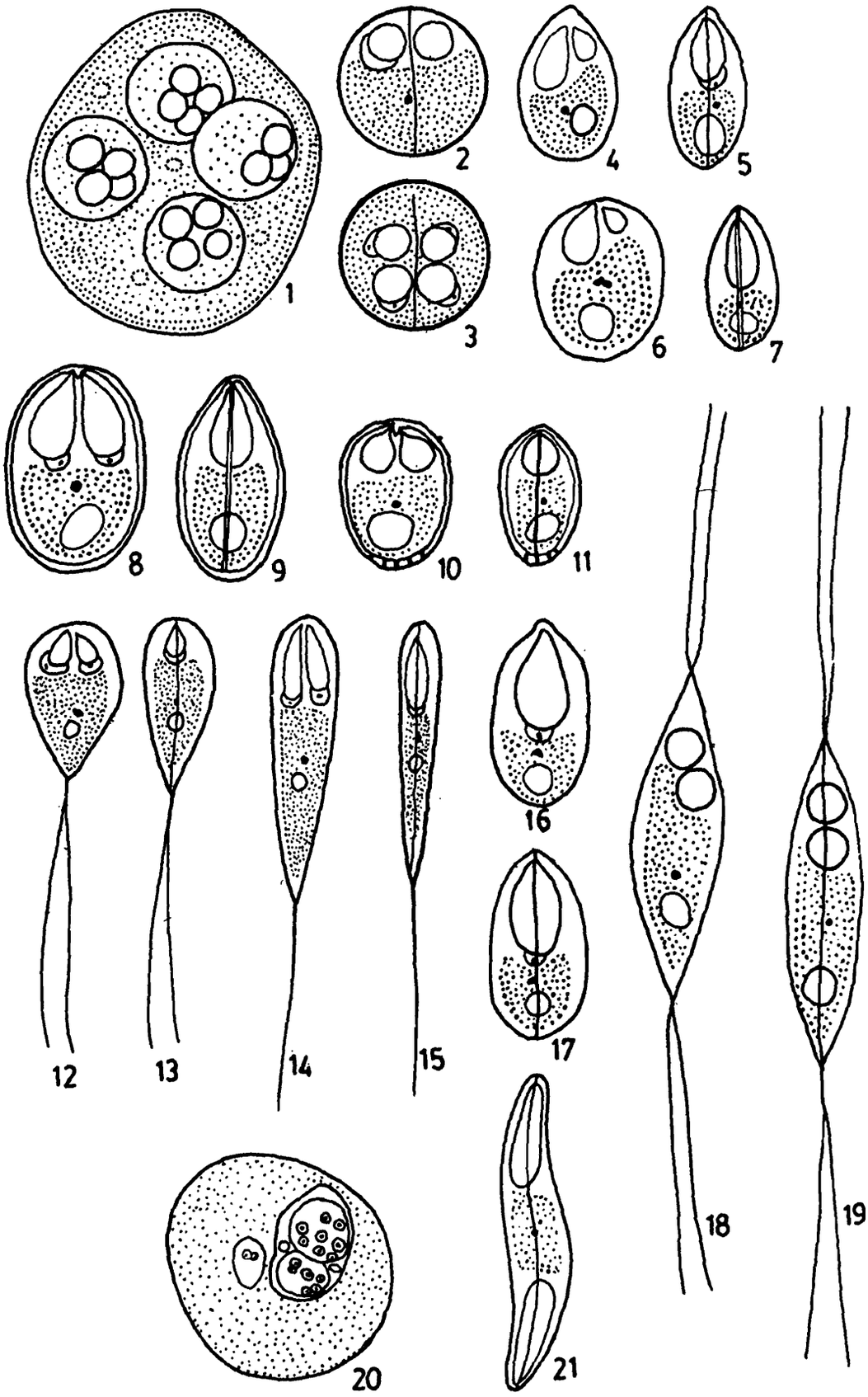

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Plate – 12

Figs. 1-6 Showing six species of endocommesal ciliates of some marine and estuarine molluscs of West Bengal. 1. ***Cristigera susamai*** Jamadar and Choudhury. 2. ***Scyphidia bengalensis*** Jamadar and Choudhury. 3. ***Boveria teredeinidi*** Nelson. 4. ***Ancistrumina obtusae*** Jamadar and Choudhury. 5. ***Ancistrocoma pelseneeri*** Chatton and Lwoff. 6. ***Fenchelia sagarica*** Jamadar and Choudhury.

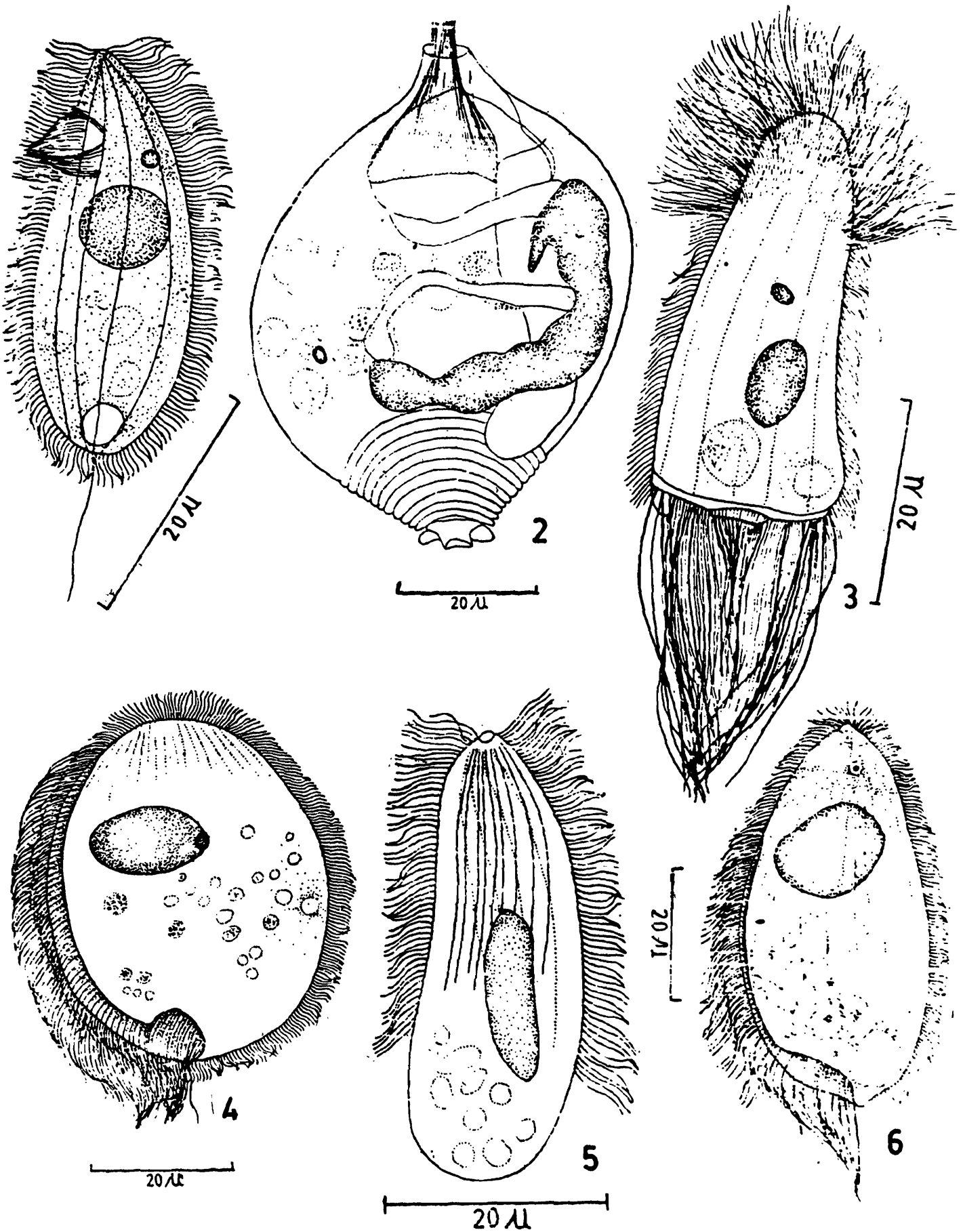
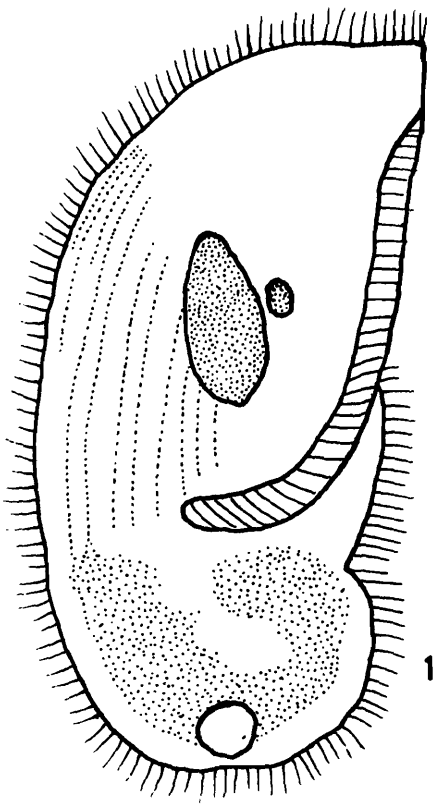

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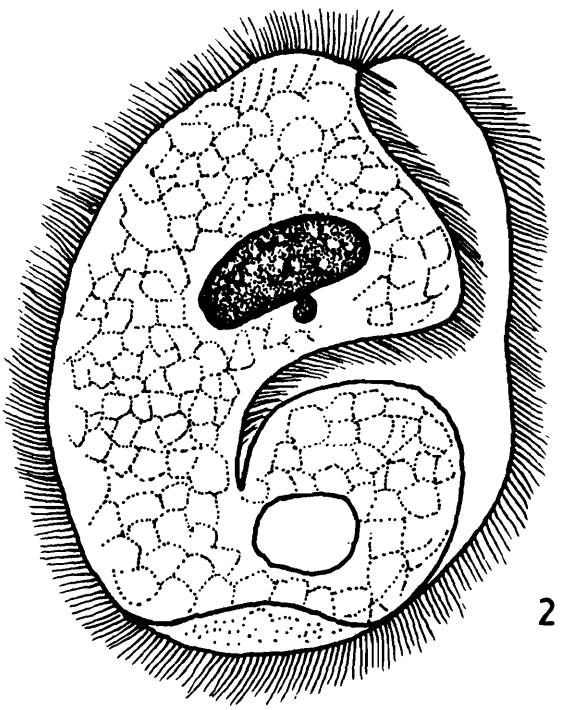
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Figs. 1-3. Showing three species of endocommensal heterotrichid ciliates infaunating gastropod molusc (fig. 1.) toad and frog (figs. 2-3). 1. *Nyctotherus kempi* Ghosh. 2. *Nyctotheroides cordiforrmis* (Ehrenberg). 3. *Sicuophora macropharyngeus* (Bezzenberger).



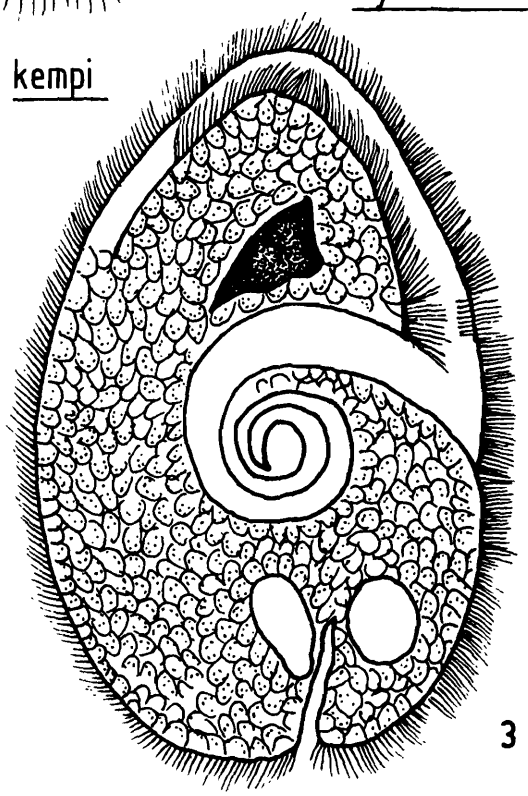
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Nyctotherus kempi



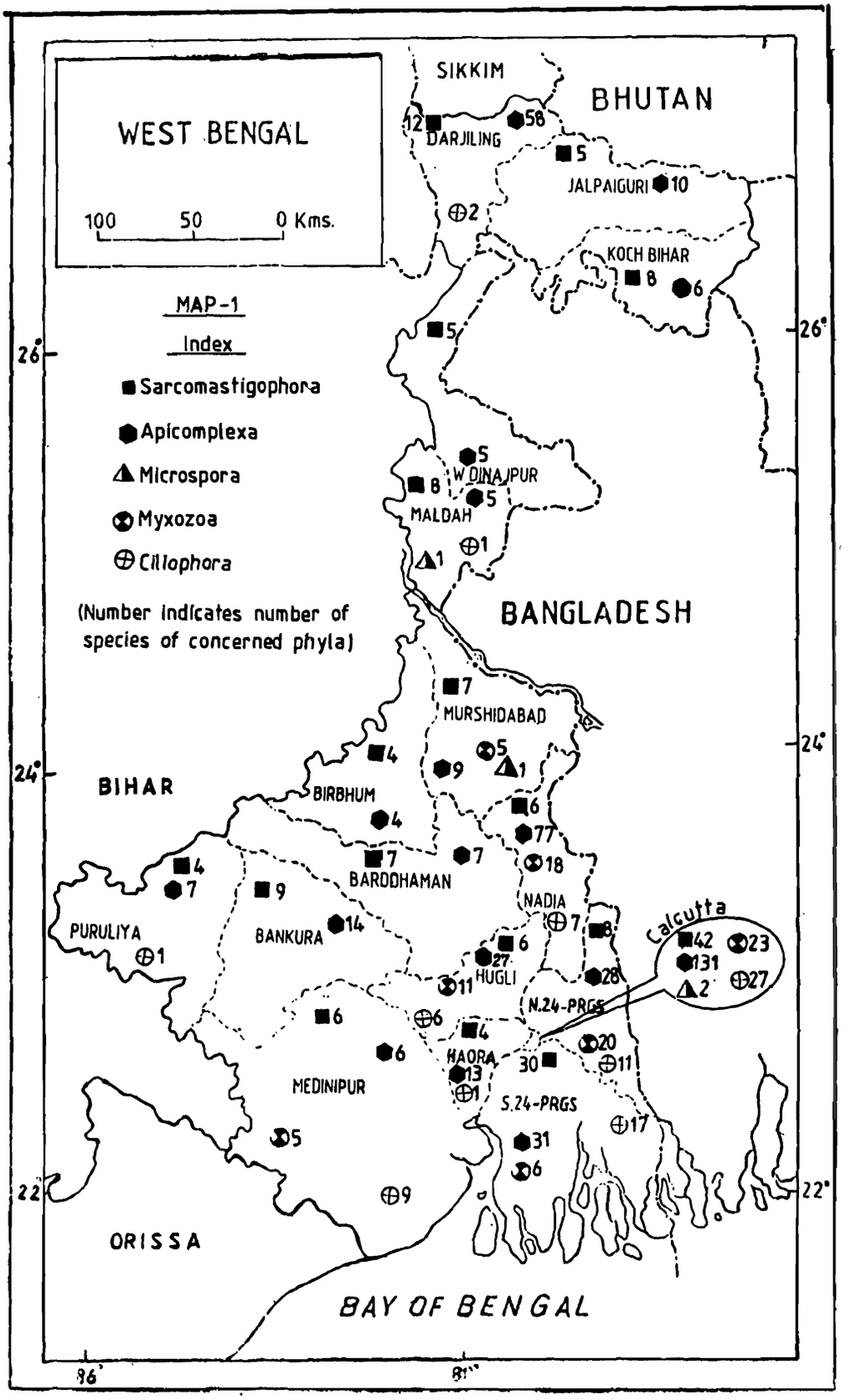
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Nyctotheroides cordiformis

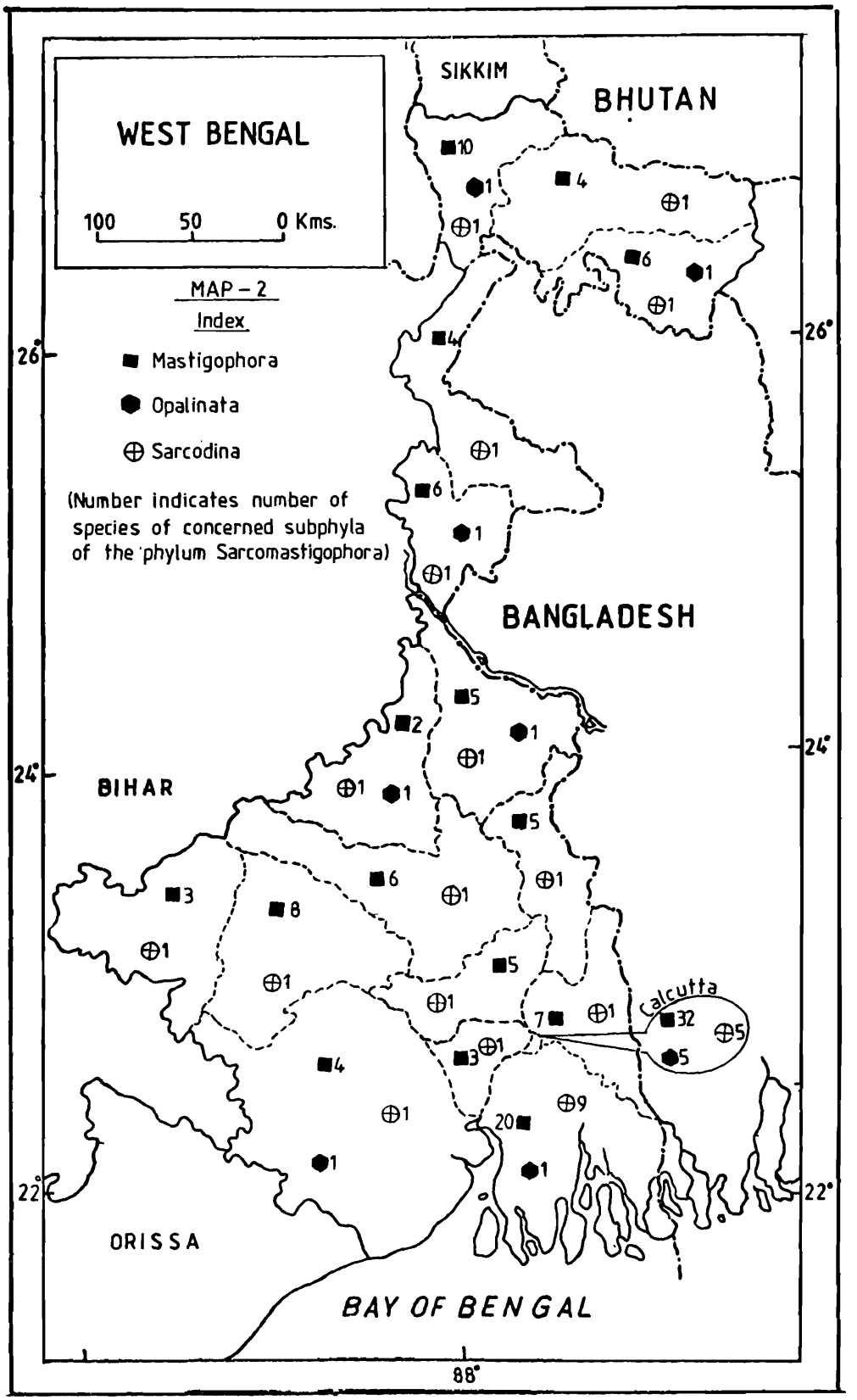


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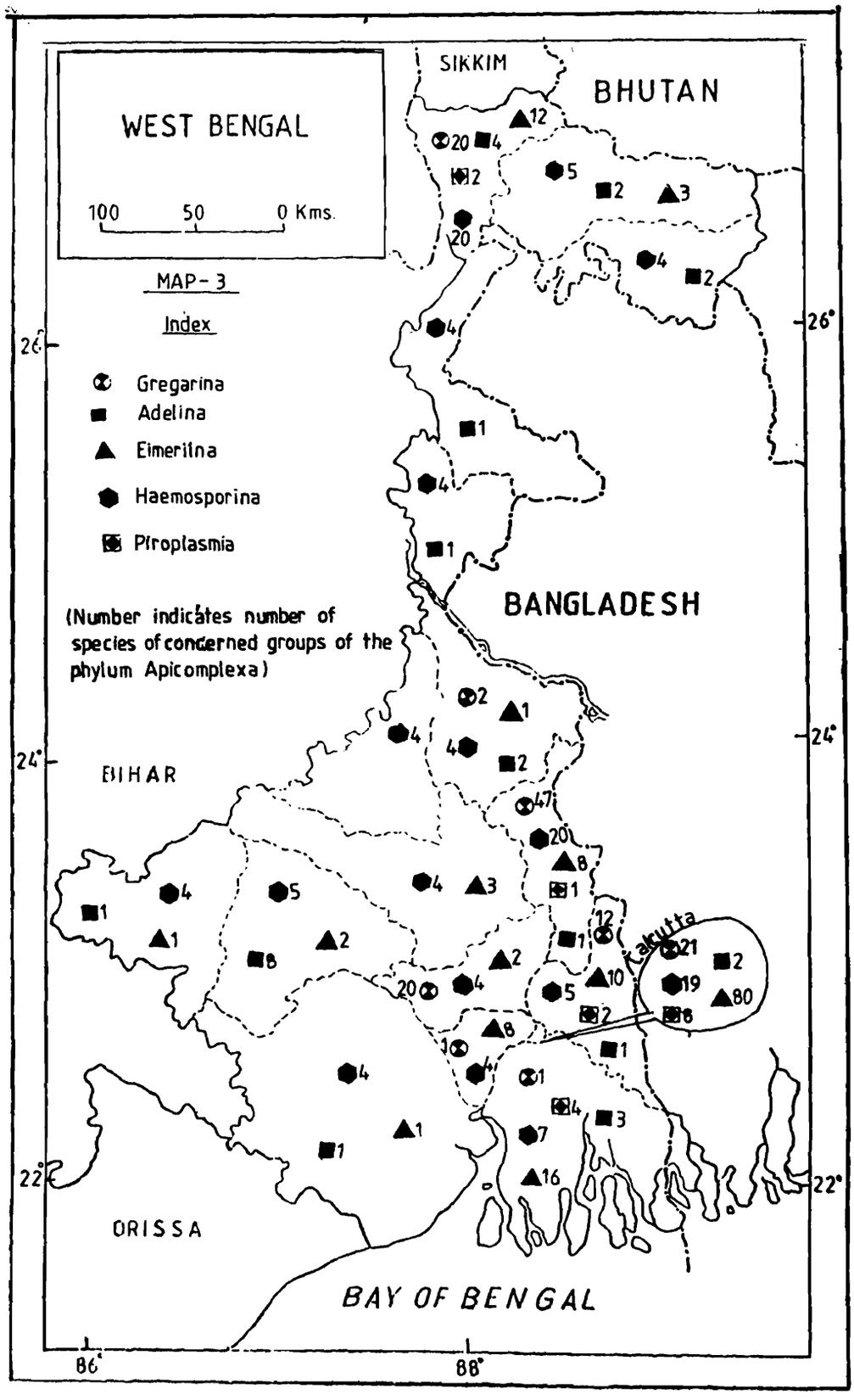
Sicuophora macropharyngeus



Map 1. Showing district-wise distribution of parasitic protozoans (in number of species) belonging to five different phyla viz., Sarcomastigophora, Apicomplexa, Microspora, Myxozoa and Ciliphora.



Map 2. Showing district wise distribution of parrasitic protozoans (In number of species) belonging to three different subphyla viz., Mastigophora, Opalinata and Sarcodina of the Phylum Sarcomastigophora.



Map 3. Showing district-wise distribution of different groups of the phylum Apicomplexa viz., Gregarina, Adelina, Eimerina, Haemosporina and Piroplasmia in number of species.

SUMMARY

A comprehensive taxonomic account of parasitic protozoa recorded and reported so far from West Bengal is presented in this paper. This includes 596 species of parasitic protozoa belonging to 5 Phyla, 11 Classes, 22 Orders, 63 families and 131 genera, recovered from 351 host-species (133 invertebrate and 218 vertebrate species). Further, diagonstic feature of each species, its detail host and locality record and, district-wise distribution in West Bengal is incorporated. Key to the families, genera and species are also given in this paper for the aid in identification of species.

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SYMBIOTIC PROTOZOA

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INTRODUCTION

Symbiotic Protozoa include two major taxonomic groups, namely, the flagellates inhabiting the gut of wood-eating termites and roaches and, the ciliates found in the rumen of ruminant mammals. These protozoa exhibit obligatory mutualistic relationship between them and their hosts. The termite flagellates represent large number of genera and species under several families and orders. The ruminant ciliates on the other hand belong to a few genera under one family Ophryoscolecidae with a very few exceptions.

First publication on termite flagellates from West Bengal was made by Simons (1890) who gave a brief account of two flagellates from the gut of termites of Calcutta without mentioning any generic or specific status of those flagellates and their host. Incidentally this is also the first publication on symbiotic flagellates from India. Then, after a long gap Chakravarty and Banerjee (1956) described three species of hypermastigid flagellates from the gut of an undetermined species of *Heterotermes* from Calcutta. Subsequently Das (1972-77, 1983) made a detailed taxonomic study of flagellate symbiotes from four species of termite hosts of West Bengal and recorded 28 species including 8 new ones. Tiwari (1977, 1978, 1981) also described one new species of hypermastigid and reported several known species of termite flagellates from this state.

So far as ruminant ciliates are concerned Ghosh (1922) is the pioneer worker from West Bengal as well as from India. He (*op. cit.*) dealt with 42 species of ciliates from the rumen contents of cows and goats, procured from public slaughter house located at Tangra, Calcutta. Subsequently Das Gupta (1935), Banerjee (1955) and, Choudhury and Chatterjee (1960) contributed to the subject from this state.

It is worth mentioning here that Ghosh's aforesaid work has never been referred, till date, by any of his subsequent worker on this group from India and outside. This has caused considerable taxonomic inconvenience since Ghosh *(op. cit)* described 13 new species and one new genus in the said publication. Original description of these new taxa is very inadequate. But, text- figures of those taxa are of standard quality and reveal many taxonomic features in most of the cases. Under the circumstances, an attempt has been made here to determine proper taxonomic status of these species in the light of current taxonomic knowledge on this group.

In all, 31 species of termite flagellates and 96 species of ruminant ciliates have been reported/collected from this state. These are being dealt with in the present communication. In addition, key to the families, genera and species of these protozoa is also incorporated to facilitate identification of this group.

MATERIAL AND METHODS

Termites were collected from different districts of West Bengal and from different habitats like timber depots, wood and logs, cemented brick built wall, plywood and pitch boards. The living flagellates were studied in fresh smears of gut contents diluted with 67% Locke's solution or 0.5% saline water. For the collection of ruminant ciliates stomach contents of the ruminant mammals were procured from slaughter houses and diluted with normal saline. For permanent preparation of both termite flagellates and ruminant ciliates uniform smears of the gut contents were drawn on slides, fixed in Schaudinn's and Carnoy's fluid, stained in Heidenhain's and Delafield's haematoxylin and mounted in DPX.

MORPHOLOGY AND TERMINOLOGY

Most of the terminologies used in this communication have already been dealt with in earlier two papers on Protozoa of West Bengal (Das *et al.*, in press). The remaining ones are represented diagramatically in plates (1–3).

Systematic list of symbiotic protozoa hitherto known from West Bengal

Phylum	SARCOMASTIGOPHORA	
Subphylum	MASTIGOPHORA	
Class	ZOOMASTIGOPHOREA	
Order	OXYMONADIDA	
Family	OXYMONADIDAE	
Genus	***Oxymonas*** Janicki	
1. *O. bengalensis* Das	*Cryptotermes havilandi*	Calcutta
2. *O. bosei* Das	*Neotermes bosei*	Jalpaiguri, Koch Bihar
3. *O. grandis* Cleveland	*Neotermes bosei*	Jalpaiguri, Koch Bihar
4. *O. parvula* Kirby	*Cryptotermes havilandi*	South 24-Parganas
Order	TRICHOMONADIDA	
Family	MONOCERCOMONADIDAE	
Genus	***Tricercomitus*** Kirby	
5. *T divergens* Kirby	*Cryptotermes havilandi*	Calcutta
Family	DEVESCOVINIDAE	
Genus	***Devescovina*** Foa	
6. *D. glabra* Grassi	*Cryptotermes havilandi*	Calcutta, Koch Bihar, South 24-Parganas, West Dinajpur

7. *D. lemniscata* Kirby	*Cryptotermes havilandi*	Calcutta, South 24-Parganas
8. *D. steini* Das	*Cryptotermes havilandi*	Calcutta, South 24-Parganas
Genus	***Foaina*** janicki	
9. *F. nana* (Kirby)	*Crypotetermes havilandi*	South 24-Parganas
10. *F. reflexa* Kirby	*Cryptotermes havilandi*	South 24-Parganas
11. *F. solita* Kirby	*Crypotetermes havilandi*	South 24-Parganas
Family	CALONYMPHIDAE	
Genus	***Stephanonympha*** Janicki	
12. *S. minuta* Das and Choudhury	*Neotermes bosei*	Jalpaiguri, Koch Bihar
13. *S. pyriformis* Das and Choudhury	*Cryptotermes havilandi*	Calcutta, Koch Bihar
	Neotermes bosei	Koch Bihar
14. *S. silvestrii* Janicki	*Cryptotermes havilandi*	Calcutta
Order	HYPERMASTIGIDA	
Family	HOLOMASTIGOTIDAE	
Genus	***Holomastigotoides*** Grassi and Foa	
15. *H. bengalensis* Chakravarty and Banerjee	*Heterotermes indicola*	Calcutta, Jalpaiguri, Koch Bihar, Maldah
	Heterotermes sp.	Calcutta
	Coptotermes heimi	South 24-Parganas, West Dinajpur
16. *H. campanula* (de Mello)	*Heterotermes indicola*	Calcutta, Jalpaiguri, Koch Bihar, South 24-Parganas, West Dinajpur
	Coptotermos heimi	Maldah
17. *H. emersoni* Das	*Coptotermes heimi*	Calcutta, Jalpaiguri, Murshidabad, South 24-Parganas
18. *H. globosus* de Mello	*Heterotermes indicola*	Calcutta, Jalpaiguri, North 24-Parganas
19. *H. hartmanni* Koidzumi	*Coptotermes heimi*	South 24-Parganas
20. *H. hollandei* Das	*Heterotermes indicola*	Maldah, Murshidabad, North 24-Parganas, West Dinajpur
21. *H. magnus* Uttangi	*Hetertermes indicola*	Koch Bihar, Maldah, North 24-Parganas

22. *H. ogivalis* de Mello	*Coptotermes heimi*	Birbhum, Jalpaiguri, Medinipur, Murshidabad, South 24-Parganas
	Heterotermes indicola	South 24-Parganas
23. *H. rayi* Karandikar and and Vittal	*Coptotermes heimi*	Birbhum, Medinipur, Murshidabad, South 24-Parganas
24. *H. sphaeroidalis* de Mello	*Coptotermes heimi*	Murshidabad,
	Heterotermes indicola	Birbhum, Calcutta, Koch Bihar
Family	SPIROTRICHONYMPHIDAE	
Genus	***Spirotrichonympha*** Grassi and Foa	
25. *S. bhadreshwarensis* Tiwari	*Coptotermes heimi*	Hugli
26. *S. froilanoi* Karandikar and Vittal	*Coptotermes heimi*	Birbhum, Jalpaiguri, South 24-Parganas, West Dinajpur
27. *S. pyriformis* Chakravarty and Banerjee	*Heterotermes indicola*	Calcutta, West Dinajpur
	Heterotermes sp.	Calcutta
28. *S. roonwali* Das	*Coptotermes heimi*	Birbhum, Maldah, South 24-Parganas, West Dinajpur
Genus	***Pseudotrichonympha*** Grassi and Foa	
29. *P. cardiformis* Karandikar and Vittal	*Coptotermes heimi*	Birbhum, Darjeeling, Jalpaiguri, Koch Bihar, Maldah, Medinipur, Murshidabad, South 24-Parganas
	Heterotermes indicola	South 24-Parganas
30. *P. indica* Chakravarty and Banerjee	*Coptotermes heimi*	Darjiling, South 24-Parganas
	Heterotermes indicola	Birbhum, Calcutta, Koch Bihar, Maldah, Murshidabad
	Heterotermes sp.	Calcutta
31. *P. subapicalis* Karandikar and Vittal	*Coptotermes heimi*	South 24-Parganas
	Heterotermes indicola	South 24-Parganas

Phylum	CILIOPHORA	
Class	KINETOFRAGMINIPHOREA	
order	TRICHOSTOMATIDA	
Family	ISOTRICHIDAE	
Genus	***Dasytricha*** Schuberg	
32. *D. ruminantium* Schuberg	*Capra hircus*	Calcutta
Genus	***Isotricha*** Stein	
33. I. *prostoma* Stein	*Capra hircus*	Calcutta
order	ENTODINIOMORPHA	
Family	OPHRYOSCOLECIDAE	
Genus	***Diplodinium*** Schuberg	
34. *D. anisacanthum* da Cunha	*Capra hircus*	Calcutta
35. *D. bengalensis* Chowdhury and Chatterjee	*Capra hircus*	Calcutta
36. *D. conicum* Ghosh	*Capra hircus*	Calcutta
37. *D. consors* (Dogiel)	*Capra hircus*	Calcutta
38. *D. costatum* Dogiel	*Capra hircus*	Calcutta
39. *D. cristagalli* Dogiel	*Capra hircus*	Calcutta
40. *D. cylindricum* ghosh	Goat	Calcutta
41. *D. dentatum* (Stein)	Goat	Calcutta
42. *D. dicanthum* (Dogiel)	Domestic goat	Calcutta
	Buffalo	Calcutta
43. *D. flabellum* Kofoid and Mac Lennan	Domestic buffalo	Calcutta
44. *D. indicum* Banerjee	Cow	Calcutta
	Domestic goat	Calcutta
45. *D. longinucleatum* Chowdhury and Chatterjee	Goat	Calcutta
46. *D. monacanthum* (Dogiel)	Cow	Calcutta
	Barking deer	Darjiling
	Domestic goat	Calcutta
47. *D. minor* (Dogiel)	Cow	Calcutta
	Goat	Calcutta
48. *D. pentacanthum* (Dogiel)	Sheep	Calcutta
	Goat	Calcutta
49. *D. psittacium* (Dogiel)	Domestic goat	Calcutta

50. *D. quadridentatum* Ghosh	Goat	Calcutta
51. *D. tetracanthum* (Dogiel)	Goat	Calcutta
52. *D. triacanthum* (Dogiel)	Goat	Calcutta
53. *D. tuberculatum* (Ghosh)	Goat	Calcutta
Genus	***Diploplastron*** Kofoid and Mac Lennan	
54. *D. affine*	*Capra hircus*	Calcutta
Genus	***Elytroplastron*** Kofoid and Mac Lennan	
55. *E. bubali* (Dogiel)	*Capra hircus*	Calcutta
Genus	***Entodinium*** Stein	
56. *E. acutonucleatum* Kofoid and Mac Lennan	Buffalo	Calcutta
57. *E. acutum* Kofoid and and Mac Lennan	Buffalo	Calcutta
	Sheep	Calcutta
58. *E. anteronucleatum* forma *dilobum* Dogiel	*Capra hircus*	Calcutta
59. *E. anteronucleatum* forma *leave* dogeil	*Capra hircus*	Calcutta
60. *E. anteronucleatum* forma *monolobum* Dogiel	*Capra hircus*	Calcutta
61. *E. bengalensis* Banerjee	Buffalo	Calcutta
62. *E. biconcavum* Kofoid and Mac Lennan	Goat	Calcutta
63. *E. brevispinum* Kofoid and Mac Lennan	Goat	Calcutta
64. *E. bursa* Stein	*Capra hircus*	Calcutta
65. *E. carinospinum* ghosh	*Capra hircus*	Calcutta
66. *E. caudatum* Stein	*Capra hircus*	Calcutta
	Buffalo	Calcutta
67. *E. chatterjeei* Das Gupta	*Capra hircus*	Calcutta
	Buffalo	Calcutta
68. *E. cylindricum* Chowdhury and Chatterjee	Goat	Calcutta
69. *E. dogieli* comb. nov.	*Capra hircus*	Calcutta
	Buffalo	Calcutta
70. *E. dubardi* Buisson	*Capra hircus*	Calcutta
	Buffalo	Calcutta
	Sheep	Calcutta
	Barking deer (*Muntiacus muntjak*)	Darjiling

71. *E. ellipsoideum* Ghosh	Goat	Calcutta
72. *E. elongatum* Ghosh	Goat	Calcutta
73. *E. ekendrae* Das Gupta	*Capra hircus*	Calcutta
74. *E. furca* forma *dilobum*	*Capra hircus*	Calcutta
Dogiel	Sheep	Calcutta
75. *E. harendrai* Chowdhury and Chatterjee	Goat	Calcutta
76. *E. indicum* Kofoid and and Mac Lennan	Buffalo	Calcutta
77. *E. jumnapari* Chowdhury and Chatterjee	Goat	Calcutta
78. *E. laterale* Kofoid and	*Capra hircus*	Calcutta
Mac Lennan	Buffalo	Calcutta
79. *E. longinucleatum* dogiel	*Capra hircus*	Calcutta
	Domestic buffalo	Calcutta
	Sheep	Calcutta
	Barking deer (*Muntiacus muntjak*)	Darjiling
80. *E. mammilo-carinatum* Ghosh	Cow	Calcutta
81. *E. minutum* Chowdhury and Chatterjee	Goat	Calcutta
82. *E. mukundai* Chowdhury and Chatterjee	Cow	Calcutta
83. *E. muntiacum* Banerjee	Barking deer (*Muntiacus muntjak*)	Darjiling
	Goat	Calcutta
84. *E. nanellum* dogiel	*Capra hircus*	Calcutta
	Domestic sheep	Calcutta
85. *E. nudum* ghosh	Goat	Calcutta
86. *E. ovatum* Ghosh	Goat	Calcutta
87. *E. ovinum* Dogiel	*Capra hircus*	Calcutta
88. *E. ovoidonucleatum* Das Gupta	*Capra hircus*	Calcutta
89. *E. quadrispinosum* Ghosh	Goat	Calcutta
90. *E. rectangulatum* Kofoid and Mac Lennan	*Capra hircus*	Calcutta
91. *E. rhomboideum* Kofoid and Mac Lennan	Goat	Calcutta

92. *E. rostratum* Fiorentini	Buffalo	Calcutta
93. *E. setnai* Das Gupta	*Capra hircus*	Calcutta
94. *E. simplex* Dogiel	*Capra hircus*	Calcutta
95. *E. spinosum* Ghosh	Cow	Calcutta
	Goat	Calcutta
96. *E. submammilatum* Ghosh	Goat	Calcutta
97. *E. subsphericum* Ghosh	Cow	Calcutta
98. *E. tricostatum* Kofoid and Mac Lennan	*Bos indicus*	Calcutta
Genus	***Eodinium*** Kofoid and Mac Lennan	
99. *E. lobatum* Kofoid and Mac Lennan	Cow	Calcutta
	Buffalo	Calcutta
Genus	***Epidinium*** Craley	
100. *E. bengalensis* (Ghosh)	Cow	Calcutta
101. *E. bovis* Banerjee	Cow	Calcutta
102. *E. cattanei* (Fiorentini)	*Capra hircus*	Calcutta
	Cow	Calcutta
103. *E. caudatum* (Fiorentini)	Cow	Calcutta
	Goat	Calcutta
104. *E. eberloini* (da Cunha)	Cow	Calcutta
105. *E. ecaudatum* (Fiorentini)	*Capra hircus*	Calcutta
106. *E. parvicaudatum* (Awerin zew and Mutafoa)	Goat	Calcutta
107. *E. quadricaudatum* (Sharp)	Goat	Calcutta
108. *E. spinosum* (Ghosh)	Cow	Calcutta
109. *E. tricaudatum* (Sharp)	Goat	Calcutta
Genus	***Eremoplastron*** Kofoid and Mac Lennan	
110. *E. asiaticus* Banerjee	Cow	Calcutta
111. *E. bovis* (Dogiel)	Buffalo	Calcutta
112. *E. brevispinum* Kofoid and Mac Lennan	*Capra hicus*	Calcutta
113. *E. magnodentatum* Kofoid and Mac Lennan	Buffalo	Calcutta
114. *E. rostratum* (fiorentini)	*Capra hircus*	Calcutta
	Buffalo	Calcutta

	Genus	***Eudiplodinium*** Dogiel	
115.	*E. maggii*	Goat	Calcutta
		Buffalo	Calcutta
		Sheep	Calcutta
		Barking deer	Darjiling
	Genus	***Metadinium*** Awerinzew and Mutafowa	
116.	*M. carinatum* Ghosh	Cow	Calcutta
117.	*M. medium* Awerinzew and Mutafowa	*Capra hircus*	Calcutta
118.	*M. quadratum* Ghosh	Cow	Calcutta
119.	*M. rotundatum* Kofoid and Christenson	Cow	Calcutta
	Genus	***Ophryoscolex*** Stein	
120.	*O. eberleini* Ghosh	Not mentioned	Calcutta
121.	*O. inermis* Stein	Goat	Calcutta
122.	*O. spinousus* Kofoid and Mac Lennan	Cow	Calcutta
123.	*O. tricoronatus* (Dogiel)	*Capra hircus*	Calcutta
	Genus	***Ostracodium*** Dogiel	
124.	*O. mammosum* (Railliet)	Cow	Calcutta
125.	*O. rugoloricatum* Kofoid	Buffalo	Calcutta
	Genus	***Polyplastron*** Dogiel	
126.	*P. bengalensis* Chowdhury and Chatterjee	Goat	Calcutta
	Genus	***Triplodinium*** Ghosh	
127.	*T. bovis* ghosh	Cow	Calcutta

Host – parsites list of symbiotic protozoa from west Bengal

	Phylum	ARTHROPODA	
	Class	INSECTA	
	Order	ISOPTERA	
	Family	KALOTERMITIDAE	
1.	*Cryptotermes havilandi* (Sjostedt)	*Devescovina glabra*	Das (1974b); Tiwari and Ray (1981)
		Devescovina lemniscata	Das (1974b)

		Devescovina steini	Das (1974b)
		Foaina nana	Das (1977)
		Foaina reflexa	Das (1977)
		Foaina solita	Das (1977)
		Oxymonas bengalensis	Das (1974)
		Oxymonas parvula	Das (1974)
		Tricercomitus divergens	Das (1983)
		Stephanonympha pyriformis	Das and Choudhury (1972) ; Tiwari and Ray (1981)
		Stephanonympha sylvestrii	Das and Choudhury (1972)
2.	*Neotermes bosei*	*Oxymonas bosei*	Das (1974a) ; Tiwari and Ray (1981)
		Oxymonas grandis	Das and Choudhury (1972); Tiwari and Ray (1981)
		Stephanonympha minuta	Das and Choudhury (1972); Tiwari and Ray (1981)
		Stephanonympha pyriformis	Tiwari and Ray (1981)
	Family	RHINOTERMITIDAE	
3.	*Coptotermes heimi* (Wasmann)	*Holomastigotoides bengalensis*	Chakravarty and Banerjee (1956); Das (1976); Tiwari (1978); Tiwari and Ray (1981)
		Holomastigotoides campanula	Das (1976)
		Holomastigotoides emersoni	Das (1976); Tiwari and Ray (1981)
		Holomastigotoides hartmanni	Tiwari (1978)
		Holomastigotoides ogivalis	Das (1976); Tiwari and Ray (1981)
		Holomastigotoides rayi	Das (1976)
		Holomastigotoidess sphaeroidalis	Das (1976)
		Pseudotrichonympha cardiformes	Das (1976); Tiwari and Ray (1981)
		Pseudotrichonympha indica	Chakravarty and Banerjee (1976); Tiwari and Ray (1981)
		Pseudotrichonympha subapicalis	Tiwari (1978)

	Spirotrichonympha bhadresh-warensis	Tiwari (1977)
	Spirotrichonympha froilanoi	Das (1976); Tiwari and Ray (1981)
	Spirotrichonympha roonwali	Das (1976); Tiwari and Ray (1981)
4. *Heterotermes incicola*	*Holomastigotoides bengalensis*	Das (1976)
	Holomastigotoides Campanula	Das (1976)
	Holomastigotoides globosus	Das (1976)
	Holomastigotoides hollandaei	Das (1976); Tiwari and Ray (1981)
	Holomastigotoides magnus	Das (1976)
	Holomastigotoides ogivalis	Tiwari (1978)
	Holomastigotoides sphaeroidalis	Das (1976)
	Pseudotrichonympha cardiformis	Tiwari (1978)
	Pseudotrichonympha indica	Das (1976)
	Spirotrichonympha pyriformis	Tiwari and Ray (1981)
5. *Heterotermes* sp.	*Holomastigotoides bengalensis*	Chakravarty and Banerjee (1956)
	Pseudotrichonympha indica	Chakravarty and Banerjee (1956)
	Spirotrichonympha pyriformis	Chakravarty and Banerjee (1956)
Phylum	CHORDATA	
Order	ARTIODACTYLA	
Family	BOVIDAE	
6. *Bos indicus* Linnaeus Cow/Domestic cow	*Diplodinium indicum*	Banerjee (1955)
	Diplodinium monacanthum	Banerjee (1955)
	Diplodinium minor	Banerjee (1955)
	Entodinium mammilo-carinatum	Ghosh (1922)
	Entodinium spinosum	Ghosh (1922)
	Entodinium subsphericum	Ghosh (1922)
	Entodinium tricostatum	Banerjee (1955)
	Eodinium lobatum	Banerjee (1955)
	Epidinium bengalensis	Ghosh (1922)
	Epidinium bovis	Banerjee (1955)
	Epidinium cattanei	Banerjee (1955)
	Epidinium caudatum	Ghosh (1922)

	Epidinium eberleini	Banerjee (1955)
	Epidinium spinosum	Ghosh (1922)
	Eremoplastron asiaticus	Banerjee (1955)
	Metadinium carinatum	Ghosh (1922)
	Metadinium quadratum	Ghosh (1922)
	Metadinium rotundatum	Banerjee (1955)
	Ophryoscolex spinosus	Banerjee (1955)
	Ostracodium mammosum	Banerjee (1955)
	Triplodinium bovis	Ghosh (1922)
7. *Bubalus bubalis* (Linnaeus) Buffalo/Domestic buffalo	*Diplodinium dicanthum*	Banerjee (1955)
	Diplodinium flabellum	Banerjee (1955)
	Entodinium acutonucleatum	Banerjee (1955)
	Entodinium acutum	Banerjee (1955)
	Entodinium bengalensis	Banerjee (1955)
	Entodinium caudatum	Banerjee (1955)
	Entodinium chatterjeei	Banerjee (1955)
	Entodinium dogieli comb. nov. (= *Entodinium elongatum* – a junior homonym)	Banerjee (1955)
	Entodinium dubardi	Banerjee (1955)
	Entodinium indicum	Banerjee (1955)
	Entodinium laterale	Banerjee (1955)
	Entodinium longinucleatum	Banerjee (1955)
	Entodinium rostratum	Banerjee (1955)
	Eodinium lobatum	Banerjee (1955)
	Eremoplastron bovis	Banerjee (1955)
	Eremoplastron magnodentatum	Banerjee (1955)
	Eremoplastron rostratum	Banerjee (1955)
	Eudiplodinium maggii	Banerjee (1955)
	Ostracodium rugoloricatum	Banerjee (1955)
8. *Capra hircus* Linnaeus Goat/Domestic goat	*Dasytricha ruminantium*	Das Gupta (1935)
	Diplodinium anisacanthus	Das Gupta (1935)
	Diplodinium bengalensis	Chowdhury and Chatterjee (1960)
	Diplodinium conicum	Ghosh (1922)

Diplodinium consors	Das Gupta (1935)
Diplodinium costatum	Das Gupta (1935)
Diplodinium cristagalii	Das Gupta (1935)
Diplodinium cylindricum	Ghosh (1922)
Diplodinium dentatum	Chowdhury and Chatterjee (1960)
Diplodinium dicanthum	Chowdhury and Chatterjee (1960)
Diplodinium indicum	Chowdhruy and Chatterjee (1960)
Diplodinium longinucleatum	Chowdhury and Chatterjee (1960)
Diplodinium monacanthum	Chowdhury and Chatterjee (1960)
Diplodinium minor	Chowdhury and Chatterjee (1960)
Diplodinium pentacanthum	Chowdhury and Chatterjee (1960)
Diplodinium psittacium	Chowdhury and Chatterjee (1960)
Diplodinium quadridentatum	Ghosh (1922)
Diplodinium tetracanthum	Chowdhury and Chatterjee (1960)
Diplodinium triacanthum	Chowdhury and Chatterjee (1960)
Diplodinium tuberculatum	Ghosh (1922)
Diploplastron affine	Das Gupta (1935)
Elytroplastron bubali	Das Gupta (1935)
Entodinium anteronucleatum forma *dilobum*	Das Gupta (1935)
Entodinium anteronucleatum forma *leave*	Das Gupta (1935)
Entodinium anteronucleatum forma *monolobum*	Das Gupta (1935)
Entodinium biconcavum	Das Gupta (1935)
Entodinium brevispinum	Chowdhury and Chatterjee (1960)
Entodium bursa	Das Gupta (1935)
Entodinium carinospinum	Ghosh (1922)
(= *Entodinium lobosospinosum*)	Das Gupta (1935)

Entodinium caudatum	Das Gupta (1935)
Entodinium chatterjeei	Das Gupta (1935)
Entodinium cylindricum	Chowdhury and Chatterjee (1960)
Entodinium dogieli com. nov. (= *Entodininium elongatum* a junior homonym)	Das Gupta (1935)
Entodinium dubardi	Das Gupta (1935)
Entodinium ellipsoideum	Ghosh (1922)
Entodinium elongatum	Ghosh (1922)
Entodinium ekendrae	Das Gupta (1935)
Entodinium furca forma *dilobum*	Das Gupta (1935)
Entodinium harendrae	Chowdhury and Chatterjee (1960)
Entodinium jumnapari	Chowdhury and Chatterjee (1955)
Entodinium laterale	Das Gupta (1935)
Entodinium longinucleatum	Das Gupta (1935)
Entodinium minutum	Chowdhury and Chatterjee (1960)
Entodinium mukundai	Chowdhury and Chatterjee (1960)
Entodinium muntiacum	Chowdhury and Chatterjee (1960)
Entodinium nanellum	Das Gupta (1935)
Entodinium nudum	Ghosh (1922)
Entodinium ovatum	Ghosh (1922)
Entodinium ovinum	Das Gupta (1935)
Entodinium ovoidonucleatum	Das Gupta (1935)
Entodinium quadrispinosum	Ghosh (1922)
Entodinium rectangulatum	Das Gupta (1935)
Entodinium rhomboideum	Banerjee (1955)
Entodinium setnai	Das Gupta (1935)
Entodinium simplex	Das Gupta (1935)
Entodinium spinosum	Ghosh (1922)
Entodinium submammilatum	Ghosh (1922)
Epidinium cattanei	Das Gupta (1935)

	Epidinium caudatum	Ghosh (1922); Das Gupta (1935)
	Epidinium ecaudatum	Das Gupta (1935)
	Epidinium parvicaudatum	Chowdhury and Chatterjee (1960)
	Epidinium quadricaudatum	Ghosh (1922)
	Epidinium tricaudatum	Ghosh (1922)
	Eremoplastron brevispinum	Das Gupta (1935)
	Eremoplastron rostratum	Das Gupta (1935)
	Eudiplodinium maggii	Das Gupta (1935)
	Isotricha prostoma	Das Gupta (1935)
	Metadinium medium	Das Gupta (1935)
	Ophryoscolex inermis	Ghosh (1922)
	Ophryoscolex tricoronatus	Das Gupta (1935)
	Polyplastron bengalensis	Chowdhury and Chatterjee (1960)
9. *Ovis* sp. Sheep/Domestic sheep	*Diplodinium pentacanthum*	Banerjee (1955)
	Elytroplastron bubali	Banerjee (1955)
	Entodinium acutum	Banerjee (1955)
	Entodinium dubardi	Banerjee (1955)
	Entodinium furca forma *dilobum*	Banerjee (1955)
	Entodinium longinucleatum	Banerjee (1955)
	Entodinium nanellum	Banerjee (1955)
	Entodinium parvicaudatum	Banerjee (1955)
	Eudiplodinium maggii	Banerjee (1955)
Family	CERVIDAE	
10. *Muntiacus muntjak* Barking deer	*Diplodinium monacanthum*	Banerjee (1955)
	Entodinium dubardi	Banerjee (1955)
	Entodinium longinucleatum	Banerjee (1955)
	Entodinium muntiacum	Banerjee (1955)
	Eudiplodinium maggii	Banerjee (1955)
Miscellaneous		
11. Host not mentioned	*Ophryoscolex eberleini*	Ghosh (1922)

SYSTEMATIC ACCOUNT

Subkingdom PROTOZOA
Phylum SARCOMASTIGOPHORA
Subphylum MASTIGOPHORA
Class ZOOMASTIGOPHOREA
Order OXYMONADIDA
Family OXYMONADIDAE

Diagnosis : Both attached (sessile) and motile phases present; attached phase with a conspicuous rostellum anterior end of which forming a tubular or flattened outgrowth for attachment with hosts' intestine; in motile phase rostellum less conspicuous; blepharoplasts 2 in number located near the shoulder of the axostyle; flagella 2 pairs – one pair arising from each blepharoplast; axostyle present; uni – or multinucleate, occuring in the intestine of kalotermitid termites.

Genus *Oxymonas* Janicki

Diagnosis : Predominantly uninucleate, axostyle conspicuous resembling a slender stilleto, a pennant or a broad scimiter; recurvant portion of axostyle often extending backward from the holdfast into the body.

Key to the species

1. Axostyle slender resembling a stilleto, nucleus with a karyosome.....2
   Axostyle broad resembling a scimiter, nucleus without any karyosome.....*O.grandis*
2. Karyosome large, central or slightly eccentric surrounded by a distinct halo, axostyle never projecting beyond the posterir part of the body.....3
   Karyosome minute, eccentric, not surrounded by halo, axostyle slender and sometimes projecting far beyond the posterior part of the body.....*O. parvula*
3. Body broadly ovoidal, axostyle extending slightly below the nucleus.....*O. bosei*
   Body sub-elliptical, axostyle reaching upto the posterior end of the body.....*O. bengalensis*

1. *Oxymonas bengalensis* Das

1974. *Oxymonas bengalensis* Das, *Acta Protozool.*, **12**, p. 336.

Material examined : Sev. exs.,Ballygunj lake area, Calcutta, 5.ix. 1969, Coll. A.K. Das.

Diagnosis : Body usually subelliptical with pointed posterior end ; dimensions 68(42.5-98.6) µm × 16.6(15.3-17) µm; rostellum very conspicuous, occasionally bifurcating at its anterior end; axostyle stout and stilleto-shaped, reaching posterior end of the body; nucleus ovoid, karyosome large, round, centrally located and surrouded by a distinct halo.

Host : *Cryptotermes havilandi* (Sjostedt); *location* : gut.

Distribution : India : West Bengal (Calcutta district)

2. *Oxymonas bosei* Das

1974. *Oxymonas bosei* Das, *Acta Protozool.*, **12**, p. 337.

Material examined : Sev. exs., Atiamochar beat, Jalpaiguri, 17.v.1971, Coll. A.K. Das; Sev. exs., Koch Bihar forest range, Koch Bihar , 17. v. 1971, Coll. A.K. Das.

Diagnosis : Body broadly ovoidal, dimensions 204.6 (172-236.2) μm × 38.2 (31-48.6)μm ; rostellum conspicuous, axostyle stilleto-shaped extending little below the nucleus; nucleus elliptical, karyosome large, ovoid, almost centrally located, surrounded by a distinct halo.

Host : *Neotermes bosei* Snyder; *location* : gut

Distribution : India : West Bengal (Jalpaiguri and Koch Bihar districts).

Remarks : This species was collected from the gut of preserved termite specimens (preserved in 70% alcohol) applying some special methodology (*see* Das, 1974). Tiwari and Ray (1981) also collected this species from Jalpaiguri district from the gut of the type host.

3 *Oxymonas grandis* Cleveland

1935. *Oxymonas grandis* Cleveland, *Biol. Bull.*, **69**, p. 54.

1974. *Oxymonas grandis* : Das, *Acta Protozool.*, **12**, p. 340.

Materrial examined : Sev. exs., Atiamochar beat, Jalpaiguri, 17.v.1971, Coll. A.K. Das ; Sev. exs.,Koch Bihar Forest range, Koch Bihar, 21.v.1971, Coll. A.K. Das.

Diagnosis : Body ellipsoid, often irregular, dimensions 158.3 (78.7-266.2) μm × 30.7 (18.7-45) μm; rostellum conspicuous; axostyle resembling a scimiter in shape, recurvant portion of axostyle also conspicuous; nucleus ovoid, karyosome absent.

Host : *Neotermes bosei* Snyder; *location* : gut.

Distribution : India : West Bengal (Jalpaiguri and Koch Bihar districts).

Remarks : Das (1974) reported this species from West Bengal from Jalpaiguri and Koch Bihar districts. Subsequently Tiwari and Ray (1981) also collected this species from Jalpaiguri district from the gut of *Neotermes bosei.*

4. *Oxymonas parvula* Kirby

1926. *Oxymonas parvula* Kirby, *Univ. Calif. Publs. Zool.*, **29**, p. 116.

1974. *Oxymonas parvula* : Das, *Acta Protozool.*, **12**, p, 399.

Material examined : Sev. exs., Jagannathpur, Falta, South 24-Parganas, 7. iv.1970, Coll. A.K. Das.

Diagnosis : Body ovoid or slender with round or truncate posterior end; dimensions 31.1 (23.8.45.9) μm × 5.9 (3.4-8.5) μm rostellum minute or as large as body length; axostyle slender, projecting sometimes far beyond the posterior end of the body; nucleus oval or round, karyosome small spherical, eccentric and not surrounded by halo.

Host : *Cryptoterrmes havilandi* (Sjostedt), *location* : gut

Distribution : India : West Bengal (South 24-Parganas district).

Order TRICHOMONADIDA

Key to the families

1. Nucleus single, mastigont also single with 3 to 6 flagella.....2
   Nucleus multiple, four flaagella attached to each mastigont.....
   .....Family CALONYMPHIDAE

2. Three anterior flagella and a stout trailing flagellum, generally adherent in part to the body surface, cresta present.....Family DEVESCOVINIDAE
   Three to six flagella present, trailing flagellum free or adherent, but without any cresta
   .....Family MONOCERCOMONDADIDAE

Family MONOCERCOMONADIDAE

Genus *Tricercomitus* Kirby

Diagnosis : Small, with 3 anterior flagella and a very long trailing flagellum, adhering to body surface until close to posterior end; nucleus far anterior, no endosome, relatively large blepharoplast with a parabasal body and an axial filament.

5. *Tricercomitus divergens* Kirby

1930. *Tricercomitus divergens* Krby, *Univ. Calif. Publ. Zool.*, **33**, p. 403.

Material examined : 4 exs., Ballygunj lake area, Calcutta, 7. ix. 1970, Coll. A.K. Das,

Diagnosis : Ellipsoid, more rounded posteriorly, 7-15 µm × 3-4 µm in dimension; three anterior flagella and one stout trailing flagellum, axial filament distinct.

Host : *Cryptotermes havilandi* (Sjostedt); *location* : gut.

Distribution : India : West Bengal (Calcutta district).

Family DEVESCOVINIDAE

Key to the genera

Trailing flagellum 1 to 1-5 times the length of the body, parabasal body spiralled around axostyle or posterior part of the nucleus 1/2 turn to 5 turns.....
.....Genus ***Devescovina***

Trailing flagellum exceeding twice the length of the body, parabasal body not coiled aroud exostyle).....Genus ***Foaina***

Genus *Devescovina* Foa

Key to the species

1. Trailing flagellum cord shaped, (posteromedial edge of cresta longer than anteromedial)
   .....*D. glabra*

Trailing flagellum band shaped.....2

2. Body elongated with pointed posterior end, axostyle bent and sinuous..... ..... *D lemniscata*

Body ovoidal with broadly round posterior end, axostyle a straight rod protruding out from the posterior part of the body.....*D. steini*

6. *Devescovina glabra* Grassi

1917. *Devescovina glabra* Grassi, *Mem. R. Acad.* Lincei (5), **12**, p. 54.

1941. *Devescovina glabra* : Kirby, *Univ. Calif. Publ. Zool.* **45**, p. 39.

Material examined : Sev. exs., Ballygunj Lake area, Calcutta, 8. ix. 1970, Coll. A.K. Das; Sev. exs., Jagannathpur (Falta), South 24-Parganas, 2. vi. 1971, Coll. A.K. Das.

Diagnosis : Body elongated with pointed posterior end, 34-44.2 μm × 10.2-15.3 μm in dimensions, trailing flagellum cord shaped, cresta varing from 5.7 μm to 6.2 μm, posteromedial edge of cresta longer than anteromedial edge; parabasal body usually turning 1-5 times around the axostyle, axostyle straight or little curved with stout anterior and filamentous posterior end.

Host : *Cryptotermes havilandi* (Sjostedt), *location* : gut.

Distribution : India : West Bengal (Calcutta, Koch Bihar and West Dinajpur districts).

Remarks : Das (1974) was the first to report this species from West Bengal. Subsequently Tiwari and Ray (1981) collected it from Koch Bihar and West Dinajpur districts from the above mentioned termite host.

7. *Devescovina lemniscata* Kirby

1926. *Devescovina lemniscata* Kirby, *Univ. Calif, Publs. Zool.*, **29**, p. 103.

Material examined : Sev. exs., Ballygunj lake area, Calcutta, 8.ix. 1970, Coll. A.K. Das; Sev. exs., Jagannathpur (Falta), South 24-Parganas, 2.vi. 1971, Coll. A.K. Das.

Diagnosis : Body more or less pyriform with bluntly pointed posterior end, 51-71. 4 μm × 11.9-22.1 μm in dimensions; trailing flagellum resembling a broad ribbon in its middle part; cresta measuring 11-12.7 μm with broad proximal and pointed distal end, number of parabasal turns varying from 1-4; one turn of parabasal observed in specimens from the host, *Cryptotermes havilandi*, axostyle bent or sinuous in posterior portion of the body.

Host : *Cryptotermes havilandi* (Sjostedt), *location* : gut.

Distribution : India : West bengal (Calcutta and South 24-Parganas districts).

Remarks : Das (1974) observed an interesting phenomenon of cytoplasmic extrusion in this species. In a nutshell, this phenomenon consists of an extrusion of a major cytoplasmic mass from the posterior part of the body and development of remaining small anterior portion as a full fledged adult organism.

8. *Devescovina steini* Das

1974. *Devescovina steini* Das, *Arch. Protistenk.*, **116**, p. 186.

Material examined : 21 exs., Jagannathpur (Falta), South 24-Parganas, 2.vi. 1971, Coll. A.K. Das.

Diagnosis : Body ovoidal with broadly round posterior end, 34-44.2 µm X 18.7 - 25.5 µm in dimension; trailing flagellum broad ribbon like, parabasal body turning twice around the axostyle in a close spiral; axostyle stout at anterior end gradually tapering and ultimately protruding out of the posterior part of the body to a considerable length.

Host : *Cryptotermes havilandi* (Sjostedt); *location* : gut.

Distribution : India : West Bengal (Calcutta and South 24-Parganas districts).

Genus *Foaina* Janicki

Key to the species

1. Parabasal body with 'U' shaped bend.....*F. reflexa*
   Parabasal body without such bend.....2
2. Parabasal body with a long free filament, conspicuous clear area anterolateral to anterior end of the capitulum.....*F. nana*
   Parabasal body short and restricted to dorsal side of nucleus, conspicuous clear area anterolateral to anterior end of capitulum absent.....*F. solita*

9. *Foaina nana* (Kirby)

1926. *Paradevescovina nana* Kirby, *Univ. Calif. Publs. Zool.*, **29**, p. 114.

1929. *Devescovina kirbyi* de Mello and de Brito (partim), *Archos. Esc. med. Cir* (Nova) Goa (A) **5**, p. 599.

1942. *Foaina nana* Kirby, *Univ. Calif. Publs. Zool.*, **45**, p. 190.

Material examined : 10 exs., Jagannathpur (Falta), South 24-Parganas, 2. vi. 1977, Coll. A.K. Das.

Diagnosis : Small, 11.9-21.6 µm X 3.44-6.8 µm in dimensions; anterior flagela slender, three in number and longer than the body length; trailing flagellum resembling a stout cord having 2-4 times the length of the body; a well marked clear area visible anterolateral to the anterior end of capitulum; cresta long and narrow; parabasal body generally running over dorsal side of posterior portion of nucleus; axostyle moderately stout projecting out from the posterior end of the body.

Host : *Cryptotermes havilandi* (Sjostedt); *location* : gut.

Distribution : India : West Bengal (South 24-Paraganas district).

10. *Foaina reflexa* Kirby

1942. *Foaina reflexa* Kirrby, Univ. *Calif. Publs. Zool.*, **45**, p. 206,

Material examined : 7 exs., Jagannathpur (Falta), South 24-Parganas, 2. vi. 1971, Coll. A. K. Das.

Diagnosis : Body ovoidal, 25.5-42.5 μm × 15.5-28 μm in dimension, anterior flagella three in number and equal to the length of the body, trailing flagellum resembling a stout cord, but occasionally band shaped exceeding twice the body length; cresta long but narrow; part of the parabasal body near blepharoplast showing a 'U'- shaped bend; axostyle stout, projecting out of posterior part of the body to a distance of 10.2 to 18.0 μm.

Host : *Cryptotermes havilandi* (Sjostedt); *location* : gut.

Distribution : India : West Bengal (South 24-Paraganas district).

Remarks : Kirby (1942) observed a clear area anterolateral to the capitulum of the axostyle. However, such area is not traceable in present specimens (*see* Das, 1977).

11. *Foaina solita* Kirby

1929. *Devescovina kirbyi* de Mello and de Brito (partim), *Archos. Esc. med. Cir (Nova) Goa* (A). **5**, p. 699.

1942. *Foaina solita* Kirrby, *Univ. Calif. Publs. Zool.*, **45**, p. 182.

Materrial examined : 8 exs., Jagannathpur (Falta), South 24- Parganas, 2, vi. 1971, Coll. A.K. Das.

Diagnosis : Small, dimensions 7.6-17 μm × 3.2 - 9.2 μm; anterior flagella similar to those of *F. nana* in structure and number; trailing flagellum resembling a stout cord with a length 2-5 times the length of the body; parabasal body short and restricted to dorsal side of nucleus; axostyle moderately stout with or without enlarged cusp and projecting out from posterior part of the body.

Host : *Cryptotermes havilandi* (Sjostedt), *location* : gut.

Distribution : India : West Bengal (South 24-Parganas district).

Family CALONYMPHIDAE

Genus *Stephanonympha* Janicki

Diagnosis : Oval but plastic, numerous nuclei spirally arranged in the anterior half; karyomastigont present; axial filament forming a bundle.

Key to the species

1. Nuclei arranged in a single spiral series.....*S. minuta*
   Nuclei arranged in more than one spiral series.....2
2. Nuclei arranges in 2-3 spiral series.....*S. silvestrii*
   Nuclei arranged in 8-9 spiral series.....*S. pyriformis*

12. *Stephanonympha minuta* Das and Choudhury

1972. *Stephanonympha minuta* Das and Choudhury, *Proc. zool. Soc., Calcutta,* **25**, p. 26.

Material exaamined : Sev. exs., Koch Bihar Forest Range, Koch Bihar, 17. v. 1971, Coll. A.K. Das; 5 exs., Jalpaiguri, 27. iii. 1985, Coll. A.K. Das.

Diagnosis : Body oval with broad anterior and bluntly pointed posterior ends, 28-26 μm × 20-29.7 μm in dimensions; nuclei oval, 6-10 in number and set closely to form a single spiral series near the anterior end of the body.

Host : *Neotermes bosei* Snyder; *location* : gut.

Distribution : India : West Bengal (Jalpaiguri and Koch Bihar districts).

Remarks : This species of flagellate was recovered from the gut of such host species which had been preserved in alcohol for long period.

13. *Stephanonympha pyriformis* Das and Choudhury

1972. *Stephanonympha pyriformis* Das and Choudhury, *Proc. zool. Soc., Calcutta,* **25**, p. 27.

Material examined : Sev. exs., Ballygunj lake area, Calcutta, 26. vii. 1970, Coll. A.K. Das; Sev. exs., Jagannathpur (Falta), South 24-Parganas, 2. vi. 1971, Coll. A.K. Das.

Diagnosis : Body shape pyriform with bluntly pointed posterior end, 70.2-86.7 μm X 38-47.5μm in dimensions, nuclei ovoid or slightly elongated, numerous and embedded in a series of 8-9 concertric spirals occupying almost one-third portion of anterior end of the body; axial bundle running through the middle of the body and reaching almost its post rior extremity.

Host : *Cryptotermes havilandi* (Sjostedt), and *Neotermes bosei* Snyder; *location* : gut.

Distribution : India : West Bengal (Calcutta, Koch Bihar and South 24-Parganas districts).

Remarks : Das and Choudhury (1972) described this species from the termite host *Cryptotermes havilandi* collected from Calcutta. Tiwari and Ray (1981) recorded this species from Koch Bihar district from both the above mentioned hosts.

14. *Stephanonympha silvestrii* Janicki

1911. *Stephanonympha silvestrii* Janicki, *Biol. Central.*, **31** : 325.

Material examined : Sev. exs., Ballygunj lake area, Calcutta, 8. ix. 1970. Coll, A.K. Das.

Diangonis : Oval or rounded, 45-56.2 μm X 31.5-41.2 μm in dimension; nuclei fusiform containing distinct chromatin granules and embedded closely in 2 or 3 spiral series occupying anterior portion of the body; axial bundle extending in the same fashion as in the preceeding species.

Host : *Cryptotermes havilandi* (Sjostedt); *location* : gut

Distribution : India : West Bengal (Calcutta district).

Remarks : Grassi (1971) described two varieties of *Stephanonympha silvestrii* from termites, one from *Cryptotermes havilandi* and the other from *Neotermes erythraeus* and named them as *S. silvestrii* var. cryptotermes havilandi and *S. silvestrii* var. *neotermes erythrei*, respectively. Kirby (1926) changed these clumsy quadrinominals to *S. havilandi* and *S. erythrei* respectively. Accordingly, Das and Choudhury (1972) reported *S. havilandi* from West Bengal.

Since *S. silvestrii* and *S. havilandi* are identical in all morphological characters except in dimensions the latter is rightly considered by Grassi (1917) as the variety of the former and,

therefore, can not be considered as a separate species. Hence *S. havilandi* which has been earlier recorded from West Bengal (Das and Choudhury), 1972) is synonymised under *S. silvestrii* (*see* Das, 1983).

Order HYPERMASTIGIDA

Key to the families

1. Flagella arranged in spiral rows.....2
   Flagella not arranged in spiral rows, (flagella not in tufts, posterior portion of the body not flagellated).....Family EUCONYMPHIDAE
2. Spiral rows of cilia 12-40, a mass of dense cytoplasm usually surrounding ovoid nuceus near anterior end.....Family HOLOMASTIGOTIDAE
   Spiral rows of cilia comparatively less in number, flagella deeply embedded in cytoplasm in anterior region, arising from one to several bands.....Family SPIROTRICHONYMPHIDAE

Family HOLOMASTIGOTIDAE

Genus ***Holomastigotoides*** Grassi and Foa

Diagnosis : As for the family

Key to the species

1. Prenuclear zone present.....2
   Prenuclear zone absent.....9
2. Posterior portion of the body glabrous.....3
   Posterior portion of the body not glabrous.....4
3. Posterior one-fifth of the body without any flagella.....*H. magnus*
   A small posterior portion of the body without any flagella and longer flagella occupying the posterior most portion of the body.....*H. bengalensis*
4. Flagella of uniform size.....5
   Flagella of the posterior portion of the body much longer.....6
5. Body exactly spherical in shape.....*H. spheroidalis*
   Body resembling an 'inverted cup' with finger-like projection at the anterior end.....*H. ogivalis*
6. Longer flagella occupying the posterior fifth of the body.....*H. rayi*
   Longer flagella occupying only the posterior extremity of the body.....7
7. More or less round in shape, having moderately projected finger-like elevation with apical pit at anterior end.....*H. hollandai*
   Body oval, elliptical or club-shaped without any apical pit at anterior end.....8

8. Body elliptical or club-shaped with considerable elevation at anterior end forming a nipple-like structure.....*H. emersoni*

   Body oval or elliptical and slightly narrowed at anterior end.....*H. hartmanni*

9. Body resembling a bell jar without any apical knob.....*H. campanula*

15. *Homomastigotoides bengalensis* Chakravarty and Banerjee

1956. Holomastigotoides bengalensis Chakravarty and Banerjee, *Proc. zool. Soc., Calcutta,* **9**, p. 36.

Material examined : Sev. exs., Calcutta, 9. vi. 1970, Coll A.K. Das; 3 exs., Krishna Palli, Maldah town, 22. iii. 1984, Coll. A.K. Das; Sev. exs., Jalpaiguri town, 27. iii. 1985, Coll. A.K. Das; 3 exs., Koch Bihar town, 10. iv. 1986, Coll. A.K. Das.

Diagnosis : Body more or less oval, occasionally elliptical, anterior end bluntly pointed resembling a nipple and posterior end rounded; 8.3-107.1 μm in dimension; flagella of two types, shorter ones covering a major portion of the body in dexiotriopic manner, leaving a small glabrous portion; this portion without having any flagella; longer flagella occupying posterior most portion of the body; axostyle well developed extending almost up to posterior extremity of the body; prenuclear zone conical and densely granulated.

Hosts : *Heterotermes indicola* (Wasmann), *Heterotermes* sp and *Coptotermes heimi* (Wasmann); location : gut

Distribution : India : West Bengal (Calcutta, Jalpaiguri, Koch Bihar, Maldah, South 24-Parganas and West Dinajpur districts).

Remarks : Das (1974), Tiwari (1978) and , Tiwari and Ray (1981) reported this species from Calcutta, South 24- Parganas and West Dinajpur districts respectively.

16. *Holomastigotoides campanula* (de Mello)

1921. *Leidya campanula* del Mello, *Argqu. Indo-Port. Med Hist. Nat.,* **1**, p. 179.

1927. *Holomastigotoides campanula* de Mello, *Trans. 7th Congr. East Assoc. Trop. Med.,* **2**, p. 591.

Material examined : Sev. exs., Indian Museum campus, Calcutta, 9.vi.1970, Coll. A.K. Das; 5 exs., Berhampur, Murshidabad, 24.iii. 1984, Coll. A.K. Das; 3 exs., Sainthia, Birbhum, 12.iv.1984, Coll. A.K. Das, 2 exs., Jalpaiguri town, 27.iii. 1986, Coll. A.K. Das.

Diagnosis : Body resembling exactly a bell jar without apical knob; 42.5-69.1μm X 56.1-73.3μm in dimension; flagella of two types, shorter ones arranged all over the body in dexiotropic rows and longer ones restricted to posterior extremity of the body; axostyle short but district, prenuclear zone absent.

Hosts : *Heterotermes indicola* (Washman), *H. malabaricus* Snyder; *Copotermes heimi* (Wasman); *location* : gut.

Distribution : India : West Bengal (Birbhum, Calcutta, Jalpaiguri, Murshidabad and South 24-Parganas districts); Diu, Karnataka.

17. ***Holomastigotoides emersoni*** Das

1976. *Holomastigotoides emersoni* Das, *Acta Protozool.*, **15**, p. 105.

Material examined : Sev. exs., Falta, South 24-Parganas, 17.viii.1970, Coll. A.K. Das; 4 exs., Berhampur, Murshidabad, 24.iii.1984, Coll. A.K. Das, 4 exs., Jalpaiguri town, 27.iii. 1986, Coll. A.K. Das.

Diagnosis : Body elliptical or club-shaped, maximum width being near posterior half of the body; anterior end of the body considerably elevated forming a nipple like structure and posterior end broadly round; flagella of two types, shorter ones covering major portion of the body dexiotropically and longer ones restricted only to posterior extremity; axostyle indistinct; dense and homogeneous prenuclear zone present.

Host : *Coptotermes heimi* (Wasmann); *location* : gut.

Distribution : India : West Bengal (Calcutta, Jalpaiguri, Murshidabad and South 24-Parganas districts).

18. ***Holomastigotoides globosus*** de Mello

1937. *Holomastigotoides globosus* de Mello, *C.R. XII. Congr. Inst. Zool. Lisb.*, **2**, p. 1370.

Material examined : Sev. exs., Barrackpore, North 24-Parganas, 13.viii.1970, Coll. A.K. Das; Sev. exs., Calcutta, 9.ix.1971, Coll. A.K. Das; 8 exs., Jalpaiguri town, 27.iii. 1987, Coll. A.K. Das.

Diagnosis : Body typically oval; 90.5-124.1μm X 56.1-81.6 μm in dimensions; flagella of one type covering entire body dexitropically, axostyle moderately developed reaching almost middle of the body; prenuclear zone lacking.

Hosts : *Heterotermes indicola* (Wasmann), *H. malabaricus* Snyder, *Coptotermes* sp.; *location* : gut.

Distribution : India : West Bengal (Calcutta, Jalpaiguri and North 24-Parganas districts); Daman, Diu and Karnataka.

19. ***Holomastigotoides hartmanni*** Koidzumi

1921. *Holomastigotodies hartmanni* Koidzumi, *Parasitology*, **13**, p. 235.

Diagnosis : Oval or elliptical with slightly narrowed anterior end, 93.75-175.5 μm X 63.65-86.25μm in dimensions; flagella of two types, shorter ones covering the entire body dexiotropically and longer ones restricted to posterior extremity of the body; prenuclear zone well dveloped.

Host : *Coptotermes heimi* (Wasmann); *location* : gut.

Distribution : India; West Bengal (South 24-Parganas district).

Remarks : Tiwari (1978) reported this species from West Bengal.

20. ***Holomastigotoides hollandei*** Das

1976. *Holomastigotodies hollandei* Das, *Acta Protozool.*, **15**, 103.

Material examined : Sev. exs., Barrackpore, North 24-Parganas, 13.viii. 1970, Coll. A.K. Das; 10 exs., Maldah town, 22.iii.1984, Coll. A.K. Das.

Diagnosis : Body more or less round with finger like projection at the anterior end bearing apical pit; 45.9-96 µm × 30.6-73.1µm in dimensions; posterior extremity of the body, thickly studded with much longer flagella; axostyle fibrillar and well developed, reaching obliquely almost the posterior part of the body; prenuclear zone conspicuous.

Host : *Heterotermes indicola* (Wasmann); *location* : gut.

Distribution : India : West Bengal (Maldah, Murshidabad, North 24-Parganas and West Dinajpur districts).

Remarks : Das (1974) described this species from North 24-Parganas, West Bengal while Tiwari and Ray (1981) reported it from Murshidabad and West Dinajpur districts.

21. ***Holomastigotoides magnus*** Uttangi

1962. Holomastigotoides magnus Uttangi, J. Karnatak Univ., **7**, p. 188.

Material examined : Sev. exs., Barrackpore, North 24-Pargnas, 13.viii.1970, Coll. A.K. Das; 4 exs., Krishna Palli, Maldah town, 22.iii.1984, Coll. A.K. Das 8 exs., Koch Bihar town, 10.iv.1986, Coll. A.K. Das.

Diagnosis : Body comparitively large and ovoidal; both anterior and posterior ends broadly round, 100.3-170 µm X 74.8-102 µm in dimensions; flagella of one type covering major protion of the body dexiotropically leaving a posterior glabrous region measuring about one-fifth of the body length; axostyle fibrous and moderately developed reaching beyond the middle of the body; prenuclear zone clearly visible in stained preparation.

Distribution : India : West Bengal (Koch Bihar, Maldah and North 24-Parganas districts); Gujarat and Karnataka.

22. ***Holomastigotoides ogivalis*** de Mello

1937. *Holomastigotoides ogivalis* de Mello, *C.R. XII Congr. Int.* Zool. Lisb., 1935, 2, p. 1373.

Material examined : Sev. exs., Haldia, Medinipur, 3.vi.1970, Coll. A.K. Das; Sev. exs., Falta, South 24-parganas, 17.viii.1970, Coll. A.K. Das.; 5 exs., Sainthia, Birbhum, 12.iii. 1984, Coll. A.K. Das; 6 exs., Jalpaiguri, 27.iii.1986, Coll. A.K. Das.

Diagnosis : Body shape resembling an inverted cup with a blunt finger like elevation at the anterior end; 71.4-91.8 µm × 34-74.8 µm in dimension; shorter flagella covering the entire body dexiotropically while longer flagella thickly set at the posterior extremity of the body; axostyle short but distinct; prenuclear zone present.

Hosts : *Coptotermes heimi* (Wasmann); *Coptoptermes* sp.; *location* : gut.

Distribution : India : West Bengal (Birbhum, Jalpaiguri, Medinipur, Murshidabad and South 24-Parganas districts); Daman and Karnataka.

23. *Holomastigotoides rayi* Karandikar and Vittal

1954. *Holomastigotoides rayi* Karandikar and Vittal, *J. Univ. Bombay*, 23B, p. 18.

1976. *Holomastigotoides rayi* : Das, *Acta protozool.*, 15, p. 112.

Material examined : Sev. exs., Haldia, Medinipur, 3.vi 1970, Coll. A.K. Das; Sev. exs., Falta, South 24 Parganas, 17.viii.1970, Coll. A.K. Das; 6 exs., Berhampur, Murshidabad, 24. iii.1984, Coll. A.K. Das; 4 exs., Sainthia, Birbhum, 12.iv.1984, Coll. A.K. Das.

Diagnosis : Body oval, sometimes with apical pit, 88.4-125.8 μm X 61.2-70.5 μm in dimensions; flagella of two types, first type covering the body dexiotropically while the second type, sometimes longer (Das, 1976), sometimes of almost equal length (Karandikar and Vittal, 1954) setting irregularly around one- fifth of the posterior region of the body; axostyle faintly visble; prenuclear zone distinct in stained preparation.

Host : *Coptotermes heimi* (Wasmann); *location* : gut.

Distribution : India : West Bengal (Birbhum, Medinipur, Murshidabad and South 24-Parganas districts); Karnataka.

24. *Holomastigotoides spheroidalis* de Mello

1937. *Holomastigotoides spheroidalis* de Mello, *C.R. XII. Congr. Int. Zool. Lisb.* 1935, 2, p. 1373.

1976. *Holomastigotoides spheroidalis* : Das, *Acta protozool.*, **15** : p. 109.

Material examined : Sev. exs., Indian Museum Campus, Calcutta, 9.vi.1970, Coll. A.K. Das; 2 exs., Sainthia, Birbhum, 12.iv.1984, Coll. A.K. Das; 5 exs., Koch Bihar town, 10.iv.1986, Coll. A.K. Das.

Diagnosis : Body spherical, 67.5-86.2 μm in diameter; flagella of one type, covering entire body dexiotropically; nucleus circular and located very near a point at anterior end from which flagellar bands seem to diverge out; axostyle well developed, prenuclear zone distinct.

Hosts : *Coptotermes heimi* (Wasmann), *Coptotermes* sp.; *Heterotermes indicola* (Wasmann), *Heterotermes malabaricus* Snyder; *location* : gut.

Distribution : India : West Bengal (Birbhum, Calcutta, Koch Bihar districts); Daman and Karnataka.

Family SPIROTRICHONYMPHIDAE

Genus *Spirotrichonympha* Grassi and Foa

Diagnosis : Elongate, pyriform, flagella deeply embedded in cytoplasm in anterior region, arising from one to several bands; mass of dense cytoplasm conical and its base indistinct.

Key to the species

1. Axostyle distinct.....2
   Axostyle absent.....3
2. Body pyriform with finger-like projection at anterior end bearing a hyaline apical cap ..... *S. roonwali*

Body cone-shaped, conspicuously long flagella spreading out from posterior surface in a brush-like manner..... .....*S. froilanoi*

3. Body pear-shaped with average dimension 30.02 µm × 1[illegible] [illegible]eus with 5 chromosomes..... .....*S. pyriformis*

Body pear-shaped with average dimensions 50.4 µm × 27.3 µm; nucleus with 6 chromosomes.....*S. bhadreswarensis*

25. *Spirotrichnympha bhadreshwarensis*

1977. *Spirotrichonympha bhadreshwarensis* Tiwari, *Curr. Sci.*, **46**, p. 232.

Diagnosis : Body more or less pear-shaped with pointed anterior and slightly compressed posterior end, a short tubule originating at the anterior end; nucleus spherical, located at anterior third of the body having scattered choromatin granules and 6 chromosomes; axostyle not found.

Host : *Coptotermes heimi* (Wasmann), *location* : gut.

Distribution : India : West Bengal (Hugli district).

Remarks : Tiwari (1978) described this species from West Bengal.

26. *Spirotrichonympha froilanoi* Karandikar and Vittal

1954. *Spirotrichonympha froilanoi* Karandikar and Vittal, *J. Univ. Bombay*, **23B**, p. 20.

Material examined : Sev. exs., Falta, South 24-Parganas, 17. viii. 1970, coll. A. K. Das; 3 exs., Sainthia, Birbhum, 12. iv. 1984, Coll. A. K. Das; 8 exs., Jalpaiguri town, 27. iii. 1985, Coll. A. K. Das.

Diagnosis : Body cone-shaped, anterior portion narrowed to a blunt end and posterior extremity broadest, 20.4-42.5 µm × 11.9-27.2 µm in dimensions; nucleus round and located near anterior third of the body; four flagellar bands originating from the centroblepharoplast, covered by apical operculum; conspicuously long flagella spreading out from posterior surface in a brush-like manner; axostyle distinct and cord-like in post nuclear region extending obliquely towards posterior extremity and occasionally protruding out from the body.

Hosts : *Coptotermes heimi* (Wasmann), *Heterotermes malabaricus* Snyder; *location* : gut.

Distribution : India : West Bengal (Birbhum, Jalpaiguri, South 24-Parganas and West Dinajpur districts); Karnataka.

Remarks : Earlier Das (1974) and, Tiwari and Ray (1981) reported this species from West Bengal.

27. *Spirotrichonympha pyriformis* Chakravarty and Banerjee

1956. *Spirotrichonympha pyriformis* Chakravarty and Banerjee, *Proc. zool. Soc., Calcutta*, **9**, p. 40.

Diagnosis : Body pear-shaped, anterior end terminating to a point, average dimensions 30.02 µm × 15.48 µm; nucleus spherical, located at anterior third of the body, possessing eccentric nucleus, scattered chromatin granules and chromosomes; axostyle not found.

Host : *Heterotermes indicola* (Wasmann), *Heterotermes* sp., *location* : gut.

Distribution : India : West Bengal (Calcutta and West Dinajpur districts).

Remarks : Chakravarty and Banerjee (1956) described this species from Calcutta and Tiwari and Ray (1981) reported it from Balurghat, West Dinajpur district.

28. ***Spirotrichonympha roonwali*** Das

1974. *Spirotrichonympha roonwali* Das, *Acta Protozool.*, **15**, p. 116.

Material examined : Sev. exs., Falta, South 24-Parganas, 17. viii. 1970, Coll. A. K. Das; 3 exs., Sainthia, Birbhum, 12. iv. 1984, Coll. A. K. Das.

Diagnosis : Body pyriform in shape with a finger-like projection at anterior end bearing a hyaline apical cap or operculum, greatest width near posterior end of the body, nucleus more or less round located below anterior third of the body; axostyle thin extending beyond the middle of the body.

Host : *Coptotermes heimi* (Wasmann), *location* : gut.

Distribution : India : West Bengal (Birbhum, Maldah, South 24-Parganas and West Dinajpur districts).

Remarks : Das (1974) described this species from Falta, South 24-Parganas, and Tiwari and Ray (1981) recovered it from Maldah and Raiganj (West Dinajpur district).

Family EUCONYMPHIDAE

Genus ***Pseudotrichonympha*** Grassi and Foa

Diagnosis : Anterior portion consisting of apical cap and campanula; campanular surface covered with three types of flagella, first type shortest and immobile strictly confined to rostral tube, second type longest and arranged below frist type in a thick circular band, third type arranged in longitudinal rows in leiotropic manner covering rest of the body excepting short glabrous end.

Key to the species

1. Campanula anterior and medially placed.....2
   Campanula disposed obliquely one side of the median axis and distinctly subapical..... .....*P. subapicalis*
2. Body heart-shaped with sphaerita like microorganisms.....*P. cardiformis*
   Body elongated and truncated at both ends, (nucleus with scattered chromatin granules).....*P. indica*

29. ***Pseudotrichonympha cardiformis*** Karandikar and Vittal

1954. *Pseudotrichonympha cardiformis* Karandikar and Vittal, *J. Univ. Bombay*, **23(B)**, p. 2.

Material examined : Sev. exs., Haldia, Medinipur, 3. vi. 1970, Coll. A. K. Das; Sev. exs.,

Falta, South 24-Parganas, 17. viii. 1970, Coll. A. K. Das; 7 exs., Krishna Palli, Maldah town, 22. iii. 1984, Coll. A. K. Das; 2 exs., Berhampur, Murshidabad, 24. iii. 1984, Coll. A. K. Das; 6 exs., Sainthia, Birbhum, 12. iv. 1984, Coll. A. K. Das; 4 exs., Jalpaiguri town, 27. iii. 1986, Coll. A. K. Das; 3 exs., Koch Bihar town, 10. iv. 1986, Coll. A. K. Das.

Diagnosis : Body typically heart-shaped, anterior part consisting of bell-like campanula demarcated by a faintly stained circlet-like line from the rest of the body; campanula placed mid apically at anterior end of the body; nucleus spherical and located generally above the middle region of the body, endoplasm with sphaerita-like micro-organisms.

Hosts : *Coptotermes heimi* (Wasmann), *Heterotermes indicola* (Wasmann), *Heterotermes malabaricus* Snyder; *location* : gut.

Distribution : India : West Bengal (Birbhum, Darjiling, Jalpaiguri, Koch Bihar, Maldah, Medinipur, Murshidabad and South 24-Parganas districts); Karnataka.

Remarks : Earlier Das (1974) and, Tiwari and Ray (19810 reported this species from West Bengal.

30. *Pseudotrichonympha indica* Chakravarty and Banerjee

1956. *Pseudotrichonympha indica* Chakravarty and Banerjee, *Proc. zool. Soc., Calcutta,* **9**, p. 42.

Material examined : Sev. exs., Indian Museum Campus, 9.vi.1970, Coll. A. K. Das; Sev. exs., Falta, South 24-Parganas, 17.viii.1970, Coll. A. K. Das; 6 exs., Krishna Palli, Maldah town 22.iii.1984, Coll. A. K. Das; Sev. exs., Berhampur, Murshidabad, 24.iii.1984, Coll. A. K. Das; 4 exs., Sainthia, Birbhum, 12.iv.1984, Coll. A. K. Das; Sev. exs., Koch Bihar town, 10.iv.1986, Coll. A. K. Das.

Diagnosis : Body much elongated with its broadest part being almost near the middle; 165-221.2 μm × 22.5-52.5 μm in dimensions; campanular region very short in comparison to body length; campanula located mid apically at anterior end; nucleus more or less round located near middle of the body (rarely near posterior region) containing scattered chromatin granules.

Hosts : *Coptotermes heimi* (Wasmann), *Heterotermes indicola* (Wasmann), *Heterotermes* sp.; *location* : gut.

Distribution : India, West Bengal (Birbhum, Calcutta, Darjiling, Koch Bihar, Maldah, Murshidabad and South 24-Parganas districts).

Remarks : Chakravarty and Banerjee (1956) described this species from Calcutta, West Bengal. Subsequently Das (1974) and, Tiwari and Ray (1981) reported it from this state.

31. *Pseudotrichonympha subapicalis* Karandikar and Vittal

1954. *Pseudotrichonympha subapicalis* Karandikar and Vittal, *J. Univ. Bombay,* **23(B)**, p. 8.

Diagnosis : Body generally rounded, swollen anteriorly and narrowed posteriorly to a blunt end; 172.5-205 μm × 82.5-90 μm in dimension; campanula disposed obliquely one side of the median axis and distinctly subapical; nucleus spherical, located at anterior region of the body (occasionally in the middle).

Hosts : *Coptotermes heimi* (Wasmann); *Heterotermes indicola* (Wasmann); *location* : gut.

Distribution : India; West Bengal (South 24-Parganas district), Karnataka.

Remarks : Tiwari (1978) reported this species from West Bengal from the gut of *Heterotermes indicola.*

Phylum CILIOPHORA
Class KINETOFRAGMINOPHOREA
Order TRICHOSTOMATIDA
Family ISOTRICHIDAE

Diagnosis : Cytostome located at or near antapical pole, body ovoid with uniform dense somatic ciliation, in stomach of ruminants.

Key to the genera

Body ovoid with dense longitudinal ciliary rows, karyophore present.....***Isotricha***
Body oval, cilia in longitudinal spiral rows, karyophore lacking.....***Dasytricha***

Genus ***Dasytricha*** Schuberg

32. ***Dasytricha ruminantium*** Schuberg

1888. *Dasytricha ruminantium* Schuberg, *Zool. Jahrb.*, **3**, p. 365.

Diagnosis : Oval, flattened, 50-75 μm X 30-40 μm in dimensions, ciliation uniform, characterised by arrangement of cilia in spiral rows.

Host : *Capra hircus; location* : stomach.

Distribution : India : West Bengal (Calcutta district); Karnataka.

Remarks : Das Gupta (1935) recorded this species from West Bengal from the stomach contents of goat collected from the slaughter house of Tangra, Calcutta.

Genus ***Isotricha*** Stein

33. ***Isotricha prostoma*** Stein

1858. *Isotricha prostoma* Stein, *Abh. d. K. Bohmischen Gesell. der wiss,* **10**, p. 69.

Diagnosis : Body ovoid, with dense longitudinal rows, 80-195 μm × 53-85 μm.

Host : *Capra hircus; location* : stomach.

Distribution : India : West Bengal (Calcutta district), Karnataka.

Remarks : Das Gupta (1935) reported this species from the stomach contents collected from the slaughter house at Tangra, Calcutta.

Order ENTODINIOMORPHOA
Family OPHRYOSCOLECIDAE

Diagnosis : Synciliary tufts limited mainly to oral or adoral area, skeletal plates usually present, number of contractile vacuoles variable (1-15), in the stomach of artiodactylan ruminants and in one species in rodent (in guineapig).

Key to the genera*

1. Adoral zone of membranellae at truncate anterior end, without dorsal zone of membranellae and skeletal plate.....***Entodinium***
   With both adoral and dorsal zones of membranellae, with or without skeletal plate.....2
2. Without any skeletal plate, both adoral and dorsal zones located at the same level.....3
   With skeletal plate, adoral and dorsal zones at the same or at different level.....4
3. Macronucleus straight, rod-like beneath the dorsal surface.....***Eodinium***
   Macronucleus with its anterior third bent ventrally at an angle of 30°-90° beneath the right side of the body.....***Diplodinium***
4. Adoral and doral zones located at same level.....5
   Adoral and dorsal zones located at different level.....11
5. With one skeletal plate.....6
   With more than one skeletal plates.....8
6. Skeletal plate narrow.....7
   Skeletal plate broad, (cytopharyngeal fibrils thick extended to posterior end).....
   .....***Ostracodinium***
7. Macronucleus triangular or rod-like, anterior end of which often bent ventrally.....
   .....***Eremoplastron***
   Macronucleus rod-like with its anterior end enlarged to form a hook, opening dorsally.....***Eudiplodinium***
8. Two skeletal plates beneath the right surface, no other skeletal plate present.....9
   Two skeletal plates beneath the right surface plus other additional plates.....10
9. Macronucleus with 2-3 distal lobes .....***Metadinium***
   Macronucleus narrow rod-like .....***Diploplastron***
10. Three longitudinal plates beneath left surface connected by cross bars in addition to one or two skeletal plates beneath right surface .....***Polyplastron***
    A small plate beneath ventral surface and a long plate below left side, (conspicuous fibrils beneath dorsal-right side) .....***Elytroplastron***
11. Elongate and twisted around the main axis, dorsal zone behind the anterior end of body, three skeletal plates with secondary plates, two contractile vacuoles.....***Epidinium***
    Body not twisted around main axis, dorsal zone lying some distance behind anterior end, encircling three-fourth the distance around the middle of the body, three skeletal plates, 9-15 contractile vacuoles in two rows.....***Ophryoscolex***

* Genus ***Triplodinium*** described by Ghosh (1921) could not be included in the key due to its inadequate description.

Genus ***Diplodinium*** Schuberg

So far, 20 species of *Diplodinium* have been reported from this state.

Key to the species

1. Body with caudal fan ending in spines 2
   Body without any caudal fan as above 3
2. Left side of the body extending posteriorly, forming a caudal fan with 2 to 7 spines, dorsal surface of the body without spine ..... *D. cristagalli*
   Right side of the body extending posteriorly, forming caudal fan with 5 to 7 spines, posterior dorsal surface with 2 small spines ..... *D. flabellum*
3. Body with broad and truncated posterior end 4
   Body with narrow or conical posterior end 6
4. Posterior end of the body with 3 small unequal lobes with a slit between them and placed somewhat laterally ..... *D. tuberculatum*
   Posterior end of the body with 6 spines 5
5. All caudal spines incurved, macronucleus heavy, rod-like ..... *D. dentatum*
   Caudal spines straight, only the dorsal one slightly incurved, macronucleus very elongated ..... *D longinucleatum*
6. Posterior end of the body provided with a preanal sickle-shaped spine, movably jointed with the body..... *D consors*
   Posterior end of the wihtout such spine 7
7. Posterior end of the body tapering and conical 8
   Posterior half of the body triangular 14
8. With one caudal spine 9
   With more than one caudal spines 11
9. Longitudinal cuticular groove present along the right surface of the body, with relatively large ventral spine ..... *D monacanthum*
   Longitudinal cuticular groove absent, ventral spine relatively small 10
10. Ventral spine thin and acute, macronucleus stout rod-like ..... *D psittaceum*
    Ventral spine thick, with pronounced caudal lobe, macronucleus large ..... *D indicum*
11. With two caudal spines ..... *D dicanthum*
    With three caudal spines ..... *D tricanthum*
    With four caudal spines 12
    With five caudal spines ..... *D pentacanthum*

With six caudal spines 13

12. A distinct lingitudinal cuticular groove present along right dorso-lateral surface, macronucleus heavy rod-like with its anterior third bent vertically at an angle ....*D tetrcanthum*

Longitudinal cuticular groove lacking, macronucleus elongated band-lke ....*D quadridentatum*

13. Posterior end with a central rounded process surrounded by six short spines, macronucleus elongated .....*D cylindricum*

Posterior end with six spines but without any central rounded process; macronucleus stout rod-like with its anterior end bent vertically at an angle .....*D anisacanthum*

14. Body irregularly conical, a second conical process on the longer side of the body displacing peristome on one side .....*D conicum*

Body oval or broadly oval without any second conical process 15

15. Body broadly oval, endoplasmic sack extending into operculum 16

Body oval, endoplasmic sack not extending into operculum .....*D minor*

16. Body 80-180 μm in length, macrounucleus slender hook-like with two distinct limbs .....*D costatum*

Body 63-86 μm, macronucleus broad and heavy with rounded anterior and posterior ends and without any sharp concavity on ventral side .....*D bengalensis*

34. *Diplodinium anisacanthum* da Cunha

1914. *Diplodinium anisacanthum* da Cunha, *Mem. Inst. Oswaldo Cruz.*, **6**, p. 58.

Diagnosis : Body marked by a tapering of posterior half, giving it somewhat a conical shape, a longitudinal cuticular groove along dorso-lateral surface, 46-67 μm in length, with 6 caudal spines - one ventral, one dorsal and 2 on each side; macronucleus stout rod-like with its anterior end bent vertically at an angle.

Hosts : *Bos indicus* and *Capra hircus; location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Karnataka.

Remarks : Das Gupta (1935) recorded this species from West Bengal from the host *Capra hircus.*

35. *Diplodinium bengalensis* Chowdhury and Chatterjee

1960. *Diplodinium bengalensis* Chowdhury and Chatterjee, *Proc. zool. Soc.*, Calcutta, **13**, p. 58.

Diagnosis : Body broadly oval and truncated anteriorly, 63-86 μm in length; on right side a narrow cuticular dorsal thickenning starting from the dorsal zone of memberanellae and running posteriorly upto the anus forming an angular projection; ventral lobe of ectoplasmic thickening forming a prominet smooth rounded projection without any caudal spine.

Host : Goat : *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

36. *Diplodinium conicum* Ghosh

1922. *Diplodinium conicum* Ghosh, *Sir Asutosh Mookherjee Silver Jublilee Volumes* (Science), **2**, 106.

Diagnosis : Body irregularly conical, widest anteriorly and somewhat flattened laterally, 110μm in length; a second conical process on the longer side of the body displacing peristome on one side; cutcular thickenning more anteriorly and less so posteriorly round the anal canal; macronucleus stout, short and band-like.

Host : Goat; *location* ; stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

37. *Diplodinium consors* (Dogiel)

1925. *Diplodinium bubalidis* forma *consors* Dogiel, *Ann. Parasitol., Paris,* p. 124.

1927. *Anoplodinium bubalidis* forma *consors* Dogiel, *Arch. Protistenk.,* **59**, p. 98.

Diagnosis ; Body oval, both dorsal and ventral surfaces strongly convex, 65-108 μm in length; posterior end of the body provided with a preanal sickle shaped spine movably joined with the body; endoplasmic sac simple, not extending anteriorly into the operculum; macronucleus relatively short and broad.

Host : *Capra hircus; location* ; stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) found this species in one case only in the rumen of *Capra hircus* from West Bengal.

38. *Diplodinium costatum* Dogiel

1925. *Diplodinium costatum* forma *major* Dogiel, *Ann. Parasitol.,* Paris, p. 121.

1927. *Anoplodinium costatum* forma *major* Dogiel, *Arch. Protistenk.,* **59**, p. 102.

Diagnosis : Body broadly oval, truncated anteriorly and triangular posteriorly, 80-180 μm in length, a narrow longitudinal cuticular thickenning extending along right dorsal surface from the anterior end to the anus, endoplasmic sac having an anterior diverticulum extending into the operculum, macronucleus in the form of hook with two distint limbs.

Host : *Capra hircus ; location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) observed this species from West Bengal in two cases in the rumen of *Capra hircus.*

39. *Diplodinium cristagalli* Dogiel

1927. *Diplodinium cristagalli* Dogiel, *Arch. Protistenk.,* **59**, p. 9.

1927. *Anoplodinium cristagalli* forma *cristagalli* Dogiel, *Arch. Protistenk.,* **59**, p. 91.

Diagnosis : Body triangular in lateral view, 77-100 µm in length; left side of the body extending posteriorly to form a prominent caudal fan with two to seven spines; macronucleus hatchet-shaped, its anterior end not strongly developed.

Host : *Capra hircus; location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) reported this species from the rumen of *Capra hircus* from Calcutta.

40. ***Diplodinium cylindricum*** Ghosh

1922. *Diplodinium cylindricum* Ghosh, *Sir. Asutosh Mookherjee Silver Jubilee Volumes* (Science), **2,** p. 107.

Diagnosis : Body cylindrical, subtruncate at both ends, anterior end with three irregular lobes, 100 µm in length; posterior end with a central rounded process, surrounded by six short spines directed towards the centre.

Host : Goat ; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

41. ***Diplodinium dentatum*** (Stein)

1858. *Entodinium dentatum* Stein, *Abh. d.k. Bohmischen Gesell der Wiss,* **10,** p. 70.

1888. *Diplodinium dentatum* Schuberg, *Zool, Jahrb.,* **3,** 404.

Diagnosis : Body relatively short and heavy, posterior end of the body broad and truncated, compressed laterally, 65-82 µm in length; with six large incurved caudal spines, ventral spine longest, dorsal spine a continuation of a heavy longitudinal dorsal rib; macronucleus heavy rod-like with its anterior third bent vertically at an angle.

Host : Goat ; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Choudhury and Chatterjee (1960) reported this species from this state from the rumen contents of goat.

42. ***Diplodinium dicanthum*** (Dogiel)

1927. *Anoplodium denticulatum* forma *dicanthum* Dogiel, *Arch. Protistenk.,* **59,** p. 80.

1932. *Diplodinium dicanthum* Kofoid and Mac Lennan, *Univ. Calif. Publs. Zool.,* **37,** p. 80.

Diagnosis : Body relatively short and heavy, tapering posteriorly, 50-70 µm in length; both dorsal and ventral surfaces convex but dorsal convexity greater; with two caudal spines ventral spine long and a second smaller spine on the right latero-ventral portion of the body; a distinct longitudinal cuticular groove present along the right dorso-lateral surface.

Hosts : *Bos gaurus,* domestic goat and buffalo. *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Karnataka.

Remarks : Banerjee (1955) and, Chowdhury and Chatterjee (1960) reported this species from West Bengal from the rumen of domestic buffalo and goat respectively.

43. ***Diplodinium flabellum*** Kofoid and Mac Lennan

1932. *Diplodinium flabellum* Kofoid and Mac Lennan, *Univ. Calif. Publs. Zool.*, **37**, p. 86.

Diagnosis : Body laterally compressed, roughly triangular in lateral view, tapering rapidly from mid-region to rounded posterior end, 82-118 µm in length; right side extending posteriorly forming a prominent caudal fan with five to seven spines, spines may simple, bifurcate, even trifurcate; macronucleus stout rod-like.

Hosts : *Bos indicus* and domestic buffalo; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Banerjee (1955) recorded this species from West Bengal from domestic buffalo.

44. ***Diplodinium indicum*** Banerjee

1955. *Diplodinium indicum* Banerjee, *Proc. Zool., Soc.*, **8**, p. 92.

Diagnosis : Somewhat oval with flattened anterior and tapering extremities, 130-180 µm in length; left posterior extremity ending in a curved spine and right posterior extremity ending in a blunt posterior lobe; macronucleus larger in size.

Hosts : Cow and goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Banerjee (1955) described this species from West Bengal from rumen of cow, subsequently Chowdhury and Chatterjee (1960) recorded it from domestic goat.

45. ***Diplodinium longinucleatum*** Chowdhury and Chatterjee

1960. *Diplodinium longinucleatum* Chowdhury and Chatterjee, *Proc. zool. Soc., Calcutta,* **13**, p. 59.

Diagnosis : Body relatively elongate, anterior and posterior ends sharply truncated and laterally compressed, 83-104 µm in length; with six large and prominet caudal spines, ventral spine being longest; dorsal spine slightly incurved and the rest of the spines almost straight, macronucleus very elongated, slender and rod-like.

Host : Goat ; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta distrcit).

46. ***Diplodinium monacanthum*** (Dogiel)

1927. *Anoplodinium denticulatum* forma *monacanthum* Dogiel, *Arch, Protistenk.*, **59**, p. 80.

Diagnosis : Morphologically similar to *D. dicanthum* except in spination, 50-68 µm in length, with single caudal spine, 10-17 µm in length; a longitudinal cuticular groove present along the right dorso-lateral surface.

Hosts : *Bos gaurus,* cow, goat and Barking deer; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta and Darjiling districts); Karnataka.

Remarks : Banerjee (1955) was the first to report this species from West Bengal in the rumen of cow and barking deer. Subsequently Chowdhury and Chatterjee (1960) recorded it from this state from domestic goat.

47. ***Diplodinium minor*** (Dogiel)

1925. *Diplodinium costatum* forma *minor* Dogiel, *Ann. Prasitol. Paris*, p. 121.

1927. *Anoplodinium costatum* forma *minor* Dogiel, *Arch. Protistenk.*, **59**, p. 103.

Diagnosis : Body oval, truncated anteriorly, strongly compressed laterally and somewhat triangular in lateral views in the posterior third of the body, 53-80 μm in length; a narrow longitudinal cuticular line extending along right dorsal surface from the base of outer dorsal furrow to dorsal edge of the anal opening ; endoplasmic sack not extending into the operculum; macronucleus relatively stout and hatchet-shaped.

Hosts : *Bos gaurus, Muntiacus muntjak* and domestic cow and goat; *location* : stomach (intestine).

Distribution : India : West Bengal (Calcutta district); Karnataka, Orissa.

Remarks : Banerjee (1955) and, Chowdhury and Chatterjee (1960) recorded this species in the rumen of cow and goat respectively from West Bengal.

48. ***Diplodinium pentacanthum*** (Dogiel)

1927. *Anoplodinium denticulatum* forma *pentacanthum* Dogiel, *Arch. Protistenk.*, **59**, p. 82.

Diagnosis : Morphologically similar to *D. dicanthum* excepting number and disposition of caudal spines; caudal apine five in number, one relatively large ventral spine, a second smaller spine on lateroventral edge of the right surface, a third small spine on dorsal edge, the fourth spine present on laterodorsal edge of the right side and the fifth one on the left side.

Hosts : *Bos gaurus*, domestic goat and sheep; *location* : stomach (intestine).

Distribution : India : West Bengal (Calcutta districts); Karnataka.

Remarks : Banerjee (1955) and, Chowdhury and Chatterjee (1960) recorded this species from this state from the hosts sheep and goat respectively.

49. ***Diplodinium psittacium*** (Dogiel)

1927. *Anoplodinium psittacium* Dogiel, *Arch. Protistenk.*, **59** ; p. 93.

1932. *Diplodinium psittacium* Kofold and Mac Lennan, *Univ. Calif. Publs. Zool.*, **37**, p. 81.

Diagnosis : Body rounded, 95-150 μm in length, laterally compressed; oral area relatively small in diameter, operculum short but conspicuous and relatively broad; a low narrow rib arising on the posterior half of ventral mid line and ending at anus in short acute spine; a flange arising in the posterior quarter of the dorsal mid-line and disappearing near anus; macro nucleus a stout rod.

Gists : cow and goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Tamil Nadu.

Remarks : Chowdhury and Chatterjee (1960) recorded this species in the rumen of domestic goat from this state.

50. *Diplodinium quadridentatum* Ghosh

1922. *Diplodinium quadridentatum* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Valumes (Science)*, **2**, p. 108.

Diagnosis : Body band-shaped and tapering at both ends; four curved caudal spines placed at equal distance from one another; macronucleus elongated, band-like.

Host : Goat ; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

51. *Diplodinium tetracanthum* (Dogiel)

1927. *Anoplodinium denticulatum* forma *tetracanthum* Dogiel, *Arch. Protistenk.*, **59**, p. 82.

1932. *Diplodinium tetracanthum* : Kofoid and Mac Lennan, *Univ. Calif Publs. Zool.*, **37**, p. 80.

Diagnosis : Morphologically similar to *D. dicanthum* excepting number and disposition of caudal spines; 53-56 μm in length, one large ventral spine, second smaller spine, on right latero-ventral edge, third small spine on dorsal edge and the fourth spine on left lateroventral edge.

Hosts : *Bos gaurus*, goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Karnataka.

Remarks : Chowdhury and Chatterjee (1960) recorded this species from West Bengal in the rumen of goat.

52. *Diplodinium tricanthum* (Dogiel)

1927. *Anoplodinium denticulatum* forma *tricanthum* Dogiel, *Arch. Protistenk.*, **59**, p. 81.

1932. *Diplodinium tricanthum* : Kofoid and Mac Lennen, *Univ. Calif. Publs. Zool.*, **37**, p. 80.

Diagnosis : Morphologically similar to *D. dicanthum* excepting spination , 64 μm in length, caudal spines three in number; disposition of these spines as in *D. tetracanthum* but , spine on right laterodorsal edge lacking.

Hosts : *Bos gaurus* and goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district) : Karnataka.

Remarks : Chowdhury and Chatterjee (1960) recorded in thc rumen of domestic goat from this state.

53. *Didinium tuberculatum* Ghosh

1922. *Didinium tuberculatum* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volumes (Science)*, **2**, p. 107.

Diagnosis : Body elongately oval, wide in the middle, tapering anteriorly and rounded posteriorly; 100 μm in length; posterior end with three unequal lobes, with a slit between them and placed somewhat laterally; macronucleus elongated, stout and band-like.

Host : Goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

54. ***Diploplastron affine*** (Dogiel and Fedorowa)

1925. *Diplodinium affine* Dogiel and Fedorowa, *Zool. Anz.*, **62.**, p. 100.

Diagnosis : Body small, oval, operculum small, two skeletal plates near right surface, contractile vacuoles two; macronucleus narrow rod-like; endoplasmic sac extending posteriorly beyond anterior end of rectum; rectum narrrow and tubular.

Host : *Capra hircus; location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) observed this species once only in the rumen of *Capra hircus* in Calcutta. This is so far the only record of this species from India.

Genus ***Elytroplastron*** Kofoid and Mac Lennam

55. ***Elytroplastron bubali*** (Dogiel)

1928. *Diplodinium (Polyplastron) bubali* Dogiel, *Ann. Parasitol. Paris*, **6.** p. 332.

1932. *Elytroplastron bubali* Kofoid and Mac Lennan, *Univ. Calif. Publs. Zool.*, **37**, p. 121.

Diagnosis : Body ellipsodial, 90-195 μm in length, laterally compressed and posterior end smoothly rounded without lobes or spines; oral area relatively large, inclined ventrally, four skeletal plates–two extending diagonally from the edge of adoral membranellae zone across the middle of the body, gradually fading in that region, one very short triangular plate on left ventral side just behind left adoral zone, the fourth plate lying beneath the left surface, extending posteriorly and dorsally from the base of the operculum; contractile vacuoles four, macronucleus elongate with a deep indentation in its left dorsal side.

Hosts : *Bos indicus, Capra hircus,* sheep; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Tamil Nadu.

Remarks : Das Gupta (1935) and Banerjee (1955) recorded this species from West Bengal in the rumen of *Capra hircus* and domestic sheep respectively.

Genus ***Entodinium*** Stein

As many as 43 species of *Entodinium* have been reported so far from West Bengal.

Key to the species

1. Without any caudal process 2
   With caudal lobes or spines 13
2. Macronucleus not extending beyond posterior half of the body 3
   Macronucleus extending beyond posterior half of the body 4
3. Body elongately oval, usually slightly compressed laterally with posterior end rounded; ratio of length to breadth 1.45 ..... F. *anteronucleateus* f. *laeve*
   Body broadly oval, dorsal, ventral and lateral surface exhibiting marked convexity,

both anterior and posterior ends almost rounded, ratio of length to breadth 1.21..... ..... *E. mukundai*

4. Small or very small, usually upto 50 μm in length 5
   Medium sized or large usually above 50 μm in length 12

5. Very small, almost spherical, with 9-15 μm in diameter ..... *E. minutum*
   Small, not spherical, length above 20 μm 6

6. Body elongated or elongated oval 7
   Body ovoid or broadly oval 9

7. Body markedly elongated, length-breadth ratio 2.35, endoplasmic sac with a characteristic concavity ..... *E. dogieli*
   Body elongated oval, length-breadh ratio 1.5-1.75, endoplasmic sac without any concavity 8

8. Macronucleus ovoidal to spherical and located at the middle of dorsal side, body dimensions 26-35 μm × 15-18 μm ..... *E. chatterjeei*
   Macronucleus band-shaped closely applied against dorsal surface of the body and confined to anterior two-thirds, body dimensions 38-50 μm × 21-29 μm..... ..... *E. simplex*

9. Posterior end of the body smoothly rounded, anal canal not very prominent 10
   Posterior end of the body not smoothly rounded, anal canal very prominent 11

10. Macronucleus thin wedge-shaped, broader anteriorly and lying along the dorsal mid-line, contractile vacuole single ..... *E. nanellum*
    Macronucleus thick, band-shaped extending almost up to posterior end, contractile vacuole two in number ..... *E. nudum*

11. Macronucleus large, variable in size, contractile vacuole single, situated to the left of anterior end of macronucleus ..... *E. dubardi*
    Macronucleus large, sausage-shaped, contractile vacuoles two, situated to the left of both anterior and posterior ends of macronucleus ..... *E. ovatum*

12. Body stoutly ellipsoid, anterior end flattened and posterior end rounded, macronucleus large cylindrical ..... *E. bursa*
    Body regularly oval with somewhat truncate anterior end and rounded posterior end, macronucleus large, sausage-shaped ..... *E. ovinum*

13. With only one caudal process 14
    With more than one caudal processes..... 25

14. Caudal process in the form of a prominent ventral lobe 15
    Caudal process in the form of preanal spine 33

15. Posterior dorsal region not with biconcave areas 16

Posterior dorsal region with biconcave bilateral areas ..... *E. biconcavum*

16. Macronucleus located at anterior half of the body 17
Macronucleus located at or extending beyond the middle of the b 18

17. Body elongated, posterior end provided with a bent ventral lobe, macronucleus short and massive ..... *E. anteronucleatum* f. *monolobum*
Body broadly oval, posterior end provided with a large smoothly rounded v ıtral lobe, macronucleus large, broadly oval .... *E. jumnapari*

18. Body ellipsoid or oval 19
Body elongated or rhomboidal 22

19. Macronucleus short stout or band-like, posterior end of the body forming a large rounded process with a finger-like projection ..... *E. elliposoidum*
Macronucleus large, posterior end of the body with prominent ventral lobe 20

20. Body oval, macronucleus sausage-shaped or club-shaped with slighly thickened anterior end ..... *E. harendrai*
Body elliposoidal, macronucleus elongate or band-shaped, (ventral lobe blunt and prominent, contractile vacuole single lying close against the left side of macronucleus) ..... *E. longinucleatum*

21. Body rhomboidal, posterior end terminating in a large ventral lobe ..... *E. rhomboidum*
Body elongated, posterior end terminating in a short ventral lobe 22

22. Body elongated with a short and bent ventral lobe, macronucleus very large, band-shaped extending almost from anterior to posterior end ..... *E. elongatum*
Body elongated cylindrical, with short smoothly rounded ventral lobe, macronucleus short slightly elongated rod-like ..... *E. cylindricum*

23. Ventral spine parallel to main axis, macronucleus broad wedge-shaped ..... *E. brevispinum*
Ventral spine curved dorsally, macronucleus band-shaped 24

24. Body long and slim, ventral spine large, curved dorsally ..... *E. rostratum*
Body oval, truncate anteriorly and rounded posteriorly, ventral spine small, inwardly directed near centre ..... *E. spinosum*

25. With two caudal processes 26
With more than two caudal processes 30

26. Both the processes more or less lobe-like 27
Only one process lobe-like and the other resembling spine..... *E. carinospinosum*

27. Caudal lobes of almost same size, more or less pointed, separated by a distinct bay ..... *E. furca* f. *dilobum*

Caudal lobes of different disposition, ventral preanal lobe more prominent than dorsal lobe 28

28. Macronucleus elongated, sausage-shaped ..... *E. anteronucleatum* f *dilobum*
Macronucleus narrow elongated, some what constricted in middle and bent posteriorly ..... *E submammilatum*

29. Dimensions 50-60 µm, macronucleus spherical situated near the middle of the body, commensal in the rumen of goat ..... *E. setosi*
Dimensions 25-40 µm, macronucleus spherical or oval situated at anterior part of the body, commensal in the rumen of barking deer ..... *E. muntiacum*

30. With three caudal processes 31
With more than three caudal processes 41

31. Posterior end with two rounded processes and a projecting keel on one side..... ..... *E. mammilocarinatum*
Posterior end with dorsal and ventral spines sometimes with lateral spine or lobe..... 32

32. With one dorsal and two ventral spines one on each side of ventral lobe 33
With one dorsal and one ventral spines, and one lateral lobe or spine 40

33. Posterodorsal region with bilateral biconcave areas, (oval in shape, dorsal spine broad triangular, ventral spines large, macronucleus short to long band-like)..... ..... *E. acutum*
Posterodosal region without bilateral biconcave area 34

34. Body compressed laterally 35
Body not laterally compressed 38

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Body broad, 25-40 μm in length, spines long triangular, larger one lying on the left side ..... *E. indicum*

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Body irregularly and broadly oval, strongly convex dorsally, posterior end bent ventral wards and provided with fine elongated recurved spines, contractile vacuoles two..... *E. subsphericum*

56. *Entodinium acutonucleatum* Kofoid and MacLennan

1930. *Entodinium acutonucleatum* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, **33**, pp. 503-504.

Diagnosis : Body short and stout, laterally compressed, 25-39 μm in length, dorsal surface continued posteriorly in a sharp, relatively broad, dorsal spine curving ventrally; ventral lobe with two small spines, one on each side curving dorsal ward; macronucleus elongated extending along four-fifths of the dorsal mid-line.

Hosts : Cow and Buffalo; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Karnataka, Tamil Nadu.

Remarks : Banerjee (1955) reported this species from the rumen contents of buffalo collected in Calcutta.

57. *Entodinium acutum* Kofoid and MacLennan

1930. *Entonium acutum* Kofoid and Mac Lennan, *Univ. Calif. Publs. Zool.*, **33**, p. 514.

Diagnosis : Body oval, laterally compressed, convex on both dorsal and ventral surfaces, 30-65 μm in length; a broad triangular posterodorsal spine and two large caudal spines present, all the three spines of nearly equal length; contractile vacuole single located near dorsal mid-line to the left of macroneucleus; macronucleus short to long band-like.

Hosts : Cow, buffalo and sheep; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district), Tamil Nadu.

Remarks : Banerjee (1955) reported this species from the rumen contents of buffalo and sheep, collected from different abatoir in Calcutta.

58. *Entodinium anteronucleatum* froma dilobun Dogiel

1927. *Entodinium anteronucleatum* forma *dilobum* Dogiel, *Arch. Protistenk.*, **59**, p. 50.

1935. *Entodinium anteronucleatum* : Das Gupta, *Arch Protistenk.*, **85**, p. 161.

Diagnosis : Body elongated oval, usually slightly compressed laterally; posterior end of the body provided with two lobes- ventral preanal lobe and dorsal lobe, the former more prominent; macronucleus short and massive not extending beyond the middle of the body.

Host : *Capra hircus; Location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta distrrict).

59. ***Entodinium anteronucleatum*** forma leave Dogiel

1927. *Entodinium anteronucleatum* forma *leave* Dogiel, *Arch. protistenk., 59,* p. 49.

1935. *Entodinium laeve* Das Gupta, *Arch. Protistenk.,* **85,** p. 162.

Diagnosis : General organisation as in *E. anteronucleatum* forma *dilobum* but posterior end of the body rounded and without any caudal process.

Host : *Capra hircus* ; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

60. ***Entodinium anteronucleatum*** forma *monolobum* Dogiel

1927. *Entodinium anteronucleatum* forma *monolobum* Dogiel, *Arch. Protistenk.,* **59,** P. 50.

1935. *Entodinium monolobum* : Das Gupta, *Arch. Protistenk.,* **85,** p. 161.

Diagnosis : Gneral oraganisation as in *E. anteronucleatum* forma *laeve* excepting that posterior end of the body provided with short preanal ventral lobe bent dorsalwards like a hook.

Host : *Capra hircus; location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta District).

61. ***Entodinium benglaensis*** Banerjee

1955. *Entodinium benglaensis* Banerjee, *Proc. Zool. Soc..,* **8,** p. 89.

Diagnosis : Body more or less oval with slightly tapering ends, dorsal surface concaves, ventral surface nearly flat; 35-40-μm in length; posterior end provided with three caudal spines-one arising from dorsal side, one from ventral side and the third from the right extremity of the body; all the spines of almost equal length, sharply pointed and incurved; macronucleus elongated with knob-like posterior extremity.

Host : Buffalo; *location* : stomach (rumen).

Distribution : India West Bengal (Calcutta district).

62. ***Entodinium biconcavum*** Kofoid and MacLennan

1930. *Entodinium biconcavum* Kofoid and MacLennan, *Univ. Publs. Calif. Zool.,* **33,** p. 509.

Diagnosis : Body oval, laterally compressed; 28-41 μm in length, both dorsal and ventral surfaces strongly convex; posterior dorsal region of the body depressed laterally, forming bilateral concave areas, a small blunt ventral lobe, the only caudal projection; macronucleus short stumpy to long thin band-like.

Hosts : Bos indicus; Capra hircus; location : stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Tamil Nadu.

Remarks : Das Gupta (1935) recorded this species from rumen contents of goat collected from a public abbatoir at Tangra (Calcutta).

63. *Entodinium brevispinum* Kofoid and MacLennan

1930. *Entodinium brevispinum* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, **33**, p. 521.

Dignosis : Body oval, 26-36 μm in length, laterally compressed with dorsoverntral diameter greatest near anterior end; both dorsal and ventral surfaces convex; ventral spine small, parallel to main axis: macronucleus broad wedge-shapped, one-half to two- thirds of the body length.

Hosts : Cow and Goat; *location* : Stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Tamil Nadu.

Remarks : Chowdhury and Chatterjee (1960) recorded this species from West Bengal from the rumen contents of goat.

64. *Entodinium bursa* Stein

1858. *Entodinium bursa* Stein, *Abh. D.K. Bohmischen Gessel. der Wiss.*, **10**, p. 69.

1935 *Entodinium vorax* : Das Gupta, *Arch. Protistenk.*, **85**, p. 160.

Diagnosis : Body stoutly ellipsoid, 80-121 μm × 52-83 μm in dimensions, anterior end flattened and posterior end rounded, cytostome relatively large; contractile vacuole single, lateral laying somewhat behind anterior end; macronucleus large, cylindrical extending almost from oral end to posterior end of the body.

Host : Capra hircus; location : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

65. *Entodinium carinospinosum* Ghosh

1922. *Entodinium carinospinosum* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee (Science)*, **2**, p. 106.

1927. *Entodinium loboso-spinosum* Dogiel, *Arch. Protistenk.*, **59**, p. 60.

Diagnosis : Body somewhat barrel-shapped, anterior end truncate with broad oral area; posterior end provided with two processes – one preanal gently rounded (resembling keel) and the other a spine; contractile vacuole single; macronucleus band-like.

Host Goat ; *location* : stomach : (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Dogiel (1927) described *E. lobosospinosum* and Das Gupta (1935) recorded this species from the rumen contents of *Capra hircus* from Calcutta without refering Ghosh's work (1922). The characteristic features of this species is quite similar with *E. carinospinosum*. Hence the former is synonymised with the latter.

66. *Entodinium caudatum* Stein

1858. *Entodinium caudatum* Stein, *Abh, D. K. Bohmischen Gessel der Wiss.*, **10**, p. 70.

1935. *Entodinium caudatum* : Das Gupta, *Arch. Protistenk.*, **85**, p. 162.

Diagnosis : Body oval, 35-50 μm in length; three caudal processes of different shape; of these processes the dorsal spine longest, elongated and laterally flattened curved spirally dorsal

wards; other two processes preanal and lobe-like, right lobe triangular with pointed end directed backward and left one not so broad but more rounded than right; macronucleus sausage-shaped, fitting closely against the dorsal margin of the body.

Hosts : Goat and buffalo; *location* : stomach (rumen)

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) and Banerjee (1955) recorded this species from West Bengal from rumen contents of *Capra hircus* and buffalo respectively.

67. ***Entodinium chatterjeei*** Das Gupta

1935. *Entodinium chatterjeei* Das Gupta, *Arch. Prostistenk,* **85**, p. 165

Diagnosis : Body elongated oval, 26-35 μm long, broad anteriorly, gradually tapering towards posterior end; posterior end rounded without any caudal process, ventral side slightly concave or flattened; macronucleus ovoidal to spherical situated in the middle of dorsal side.

Hosts : Buffalo and goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) and Banerjee (1955) reported this spcies from West Bengal from *Capra hircus* and buffalo respectively.

68. ***Entodinium cylindircum*** Chowdhury and Chatterjee

1960. *Entodinium cylindricum* Chowdhury and Chatterjee, *Proc. Zool Soc., Calcutta,* **13**, p. 53.

Diagnosis : Body elongated and cylindrical in lateral view, 24-35 μm in length, dorsal and ventral surfaces convex, greatest diameter at anterior two-thirds, posterior end almost rounded; dorsal surface ending posteriorly in a lip-like structure and ventral surface terminating in a short smoothly rounded lobe; macronucleus a short slightly elongated massive rod, thicker at its posterior end and situated at the mid dorsal region of the body.

Host : Goat ; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta District).

69. ***Entodinium dogieli*** comb. nov.

1927. *Entodinium elongatum* Dogiel, *Arch. Protistenk.,* **59**, p. 45.

Diagnosis : Body considerably elongated, ventral surface almost flat, dorsal surface slightly convex, 41-50 μm × 17-22 μm in dimensions, posterior end obliquely truncated and without any caudal process; contractile vacuole single lying towards anterior end of macronucleus; macronucleus short, thick, symmetrical and rounded at both poles.

Hosts : Buffalo and goat, *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Dogiel (1927) described a new species of *Entodinium* and named it as *E. elongatum.* Since name of this Dogiel's species is preoccupied by Ghosh (1922) it becomes a junior homonym.

Hence it is named as *E. dogieli* comb. nov. after the name of the author. Mention is to be made here that Das Gupta (1935) and Banerjee (1955) reported this species from Calcutta from *Capra hircus* and buffalo respectively under the name *E. elongatum.*

70. *Entodinium dubadi* Buisson

1923. *Entodinium dubardi* Buisson, *Trav. Lab. Parasitol., Paris*, **1**, p. 98.

1927. *Entodinium dubardi* : Dogiel, *Arch. Protistenk.*, **59**, p. 42.

Diagnosis : Body oval, anterior end truncated, strongly flattened latterally, 25-55 μm in length, ectoplasmic expansions of the sides relatively large, anal canal prominent, contractile vacuole single, lying left of anterior end of macronucleus; macronucleus large, band-shaped or sausage-shaped, somewhat narrowed posteriorly.

Hosts : Buffalo, goat, sheep and Barking deer, *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta and Darjiling districts) orissa.

Remarks : Das Gupta (1935) was the first to report this species from Calcutta as well as from India from the rumen contents of goat, *Capra hircus*. Subsequently Banerjee (1955) recorded it from Calcutta from buffalo and sheep and from Darjiling from the host, Barking deer, *Muntiacus muntjak.*

71. *Entodinium ellipsoideum* Ghosh

1922. *Entodinium ellipsoidem* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volumes (Science)*, **2**, p. 104.

Diagnosis : Body ellipsoid, slightly falttened; anterior end truncate, entirely occupied by peristome; posterior end forming a large rounded process with a finger-like projection; contractile vacuoles two located at posterior half of the body, at the side opposite to that of the macronucleus; short, stout and band like.

Host : Goat : *location* : stomach.

Distribution : India : West Bengal (Calcutta district).

Remarks : Kofoid and MacLennan (1927) also described a species of *Entodinium* and named it as *E. ellipsoideum.* This species is recorded from Tamil Nadu (*see* Bhatia, 1936) from the host *Bos indicus.* Since name of this Kofoid and MacLennan's species is precoccupied by Ghosh (1922) it is named as *Entodinium kofoidi* comb. nov. after the name of the senior author.

72. *Entodinium elongatum* Ghosh,

1922. *Entodinium elongatum* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volumes (Science)*, **2**, p. 103.

Diagnosis : Body elongated, 65 μm in length somewhat flattened laterally and tapering at both ends; anterior end narrow, truncate, posterior end broadly conical and pointed and, with a slightly curved rounded process on one side; contractile vacuole two, lying near macronucleus; macronucleus elongated and band-like.

Host : Goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

73. ***Entodinium ekendrae*** Das Gupta

1935. *Entodinium ekendrae* Das Gupta, *Arch. Protistenk.*, **85**, p. 163.

Diagnosis : Body broadly oval, 30-35 μm × 28-30 μm in dimensions; three caudal processes of different shapes; one of these a long spine, 18-20 μm in length arising from right side and the other two smaller and hook-like arising from left side; dorsal side convex, ventral side flat, contractile vacuole single lying close to anterior end of macronucleus; macronucleus broadly oval lying near anterior end of the body.

Host : *Capra hircus; location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

74. ***Entodinium furca*** forma ***dilobum*** Dogiel

1914. *Entodinium furca* da Cunha, *Mem. Inst. Oswaldo Cruz.*, **6**, p. 65.

1927. *Entodinium furca* forma *dilobum* Dogiel, *Arch. Protistenk.*, **59**, p. 57.

1935. *Entodinium dilobum* : Das Gupta, *Arch. Protistenk., 85*, p. 161.

Diagnosis : Body elongated oval, broadest at posterior third of the body; two caudal processes in the form of laterally flattened lobes, convex along their outer margins and concave along the inner margins; macronucleus sausage-shaped extending about the two-thirds the length of the dorsal margin of the body.

Hosts : Goat and sheep; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) and Banerjee (1955) reported this species from West Bengal from the hosts goat, *Capra hircus* and sheep respectively.

75. ***Entodinium harendrai*** Chowdhury and Chatterjee

1962. *Endodinium harendrai* Chowdhury and Chatterjee, *Proc. Zool. soc., Calcutta,* **13**, p. 52.

Diagnosis : Body oval, 27-44 μm × 20-33 μm in dimensions, dorsal surface convex, ventral surface with little anterior curvature and then ending in a short but broad smoothly rounded lobe, reaching anal opening; posterior end truncated without any caudal process; macronucleus large, sausage-shaped or club-shaped; contractile vacuole single lying dorsal side anterior to macronucleus.

Host : Goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

76. ***Entodinium indicum*** Kofoid and MacLennan

1930. *Entodinium indicum* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, **33**, P. 533.

Diagnosis : Body oblong in lateral outline, laterally compressed, tapered anteriorly towards the contracted oval opening and terminating posteriorly in three long terminal spines-one dorsal, one

ventral and one large spine on left side; contractile vacuole 25-40 μm in length, single, lying close to left side of the macronucleus; macronucleus wedge-shaped, situated in the mid-dorsal line.

Hosts : Cow and Buffalo; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district)

Remarks : Banerjee (1955) reported this species from West Bengal from the rumen contents of buffalo.

77. ***Entodinium jumnapari*** Chowdhury and Chatterjee

1960. *Entodinium jumnapari* Chowdhury and Chatterjee, *Proc. Zool Soc., Calcutta,* **13**, p. 55.

Diagnosis : Body broadly oval, both dorsal and ventral surfaces convex; 23-46 μm x 19-32 μm in dimensions; ventral, adoral and dorsal lips protruded; posterior end sharply truncated at the centre and without any spine; ventral surface terminating in a large smoothly rounded lobe, reaching the anal opening, dorsal surface also rounded near anal opening without any posterior prolongation; contractile vacuole single, lying anterior to macronucleus; macronucleus large, broadly oval situated near the dorsal wall in the anterior half of the body.

Host : Goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

78. ***Enterodinium laterale*** Kofoid and MacLennan

1930. *Enterodinium laterale* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.,* **33**, p. 518.

Diagnosis : Body short, fairly broad, 19-28 μm in length; both dorsal and ventral surfaces convex, posterior part of the body broad, terminating in three spines; dorsal spine long, thin and flattened laterally, left ventral spine fleshy and right ventral spine a small triangular flap; contractile vacuole single, lying in the middle of left side just opposite the oesophagus; macronucleus broad, wedge-shaped located along dorsal mid-line.

Hosts : Cow, buffalo and goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Tamil Nadu.

Remarks : Das Gupta (1935) and Banerjee (1955) recorded This species from West Bengal from the hosts goat, *Capra hircus* and buffalo respectively.

79. ***Entodinium longinucleatum*** Dogiel

1925. *Entodinium longinucleatum* Dogiel, *Arch. russes Protist.,* **4**, p. 43.

1930. *Entodinium longinucleatum* : Kofoid and MacLennan, *Univ. Calif. Publs. Zool.,* **33**, p. 501.

Diagnosis : Body ellipsoid, 39-51 μm in length, anterior end broad and blunt, flattened laterally, ventral lobe prominent, contractile vacoule single lying close to left side of macroneucleus; macronucleus elongate, extending along dorsal mid- line from two-thirds to three-quarters of the body length.

Hosts : *Bos indicus, Bos gaurus, Capra hircus, Muntiacus muntjak,* domestic buffalo and sheep; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta and Darjiling) districts), Karnataka and Tamil Nadu.

Remarks : Das Gupta (1935) was the first to report this species from West Bengal from the rumen contents of goat, *Capra hircus. Banerjee (1955) recorded this species from this state from the domestic buffalo and sheep and Barking deer, Muntiacus muntjak.*

80. ***Entodinium mammilo-carinatum*** Ghosh

1922. *Entodinium mammilocarinatum* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volume (Science),* **2,** p. 105.

Diagnosis : Body elongated 70 µm in length, wide towards posterior end; anterior end narrow and entirely occupied by peristome; a slight constriction round the body above middle of its length; posterior end with two rounded processes and a projecting keel on one side; contractile vacuole single; macronucleus more or less club-shaped.

Host : Cow; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

81. ***Entodinium minutum*** Chowdhury and Chatterjee

1960. *Entodinium minutum* Choudhury and Chatterjee, *Proc. zool. Soc., Calcutta,* **13,** p. 55.

Diagnosis : Very small, almost spherical, 9-15 µm in length; dorsal, ventral and lateral surfaces markedly convex; posterior end smoothly rounded and without any lobe and spine; macroneucleus small rod-shaped lying on the middle of the body on dorsal side.

Host : Goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

82. ***Entodinium mukundai*** Chowdhury and Chatterjee

1960. *Entodinium mukundai* Chowdhury and Chatterjee, *Proc. zool. Soc., Calcutta,* **13,** p. 54.

Diagnosis : Body broadly oval, 30-37 µm in length; ventral dorsal and lateral surfaces exhibiting marked convexity; both anterior and posterior ends almost rounded; posterior end devoid of any lobe or spine; contractile vacuole single and located near the anterior end of macroneucleus.

Host : Goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

83. ***Entodinium muntiacum*** Banerjee

1955. *Entodinium muntiacum* Banerjee, *Proc. zool. Soc., Calcutta,* **8,** p. 90.

Diagnosis : Body oval, 25-40 µm in length, both dorsal and ventral surfaces slightly convex, with two caudal lobes, dorsal and ventral; macronucleus ovoid to spherical and situated dorsally at anterior end.

Hosts : Barking deer and goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta and Darjiling districts).

Remarks : Banerjee (1955) and, Chowdhury and Chatterjee (1960) reported this species from this state from the hosts barking deer and goat respectively.

84. ***Entodinium nanellum*** Dogiel

1922. *Entodinium nanellum* Dogiel, *Arch. russes Protist.*, 2, p. 96.

1930. *Entodinium nanellum* : Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, 33, p. 524.

Diagnosis : Body ovoid, laterally compressed, widest in anterior half, posterior end smoothly rounded, 20-35 µm in length, both dorsal and ventral surfaces convex, dorsal move convex in anterior half while ventral more convex in posterior half; contractile vacoule single, lying left of anterior end of macronucleus wedge-shaped, lying along dorsal mid-line.

Hosts : *Bos indicus, Bos gaurus, Capra hircus* and domestic sheep; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district), Karnataka and Tamil Nadu.

Remarks : Das Gupta (1935) and Banerjee (1955) reported this species from West Bengal from the hosts *Capra hircus* and domestic sheep respectively.

85. ***Entodinium nudum*** Ghosh

1922. *Entodinium nudum* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volume (Science)*, 2, p. 102.

Diagnosis : Body greatly elongated tapering at both ends, 50 µm in length, anterior end narrow truncate, posterior end tapering to a blunt rounded process; contractile vacuoles two, lying in the anterior half of the body; macronucleus elongated.

Host : Goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

86. ***Entodinium ovatum*** Ghosh

1922. *Entodinium ovatum* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volume (Science)*, 2, p. 102.

Diagnosis : Body elongate, tapering at both ends, 55 µm in length, anterior end narrow and truncate with a deep fissure on one side, posterior end tapering to a blunt end with an oblique canal opening at one side; contractile vacuoles two: macronucleus long and band-like.

Host : Goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

87. ***Entodinium ovinum*** Dogiel

1927. *Entodinium ovinum* Dogiel, *Arch. Prostistenk.*, 59, p. 44.

1935. *Entodinium ovinum* : Das Gupta, *Arch. Prostistenk.*, 85, p. 160.

Diagnosis : Body oval with truncate anterior and rounded posterior ends, 53-69 µm in length; contractile vacuole single, large, lying left of anterior end of macronucleus; macronucleus large, sausage-shaped, extending almost from anterior end to posterior one-third of the body.

Host : *Capra hircus, Muntiacus muntjak; location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district), Orissa.

88. *Entodinium ovoidonucleatum* Das Gupta

1935. *Entodinium ovoidonucletum* Das Gupta, *Arch. Protistenk.*, **85**, p. 160.

Diagnosis : Body oval, 20-30 μm × 22-24 μm in dimensions with three differently shaped caudal processes; the longest one dorsal, 28-30 μm in length, running straight backwards and tapering to a point; the other two processes preanal and lobe- like, the right lobe triangular with pointed end slightly curved dorsal wards and the left lobe smaller and, more sharply pointed; macronucleus contractile vacuole single and located at the outer anterior side of macronucleus; macronucleus ovoid, lying at the anterior half of the body.

Host : *Capra hircus; location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

89. *Entodinium quadrispinosum* Ghosh

1922. *Entodinium quadrispinosum* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volume (Science)*, **2**, p. 104.

Diagnosis : Body elongated, somewhat barrel-shaped, 35 μm in length, anterior end truncate, posterior end with four inwardly curved spines; contractile vacuole single, located at posterior half of the body near macronucleus; macronucleus elongated band-like and tapering posteriorly.

Host : Goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

90. *Entodinium rectangulatum* Kofoid and Mac Lennan

1930. *Entodinium rectangulatum* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, **33**, p. 519.

Diagnosis : Body stout, 29-50 μm in length, laterally compressed, dorsal and ventral surfaces equally convex; posterior end of the body truncate with three caudal spines; dorsal spine flattened laterally, left ventral spine fleshy and right ventral spine flange-like, occupying one-third of the circumference of the body; contractile vacuole single, lying just opposite to oesophagus; macronucleus broad wedge-shaped, broader at anterior end, and located along the dorsal mid-line.

Hosts : *Bos indicus, Capra hircus; location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district), Tamil Nadu.

Remarks : Das Gupta (1935) reported this species from West Bengal from the host *Capra hircus.*

91. *Entodinium rhomboideum* Kofoid and MacLennan

1930. *Entodinium rhomboideum* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, **33**, p. 527.

Diagnosis : Body rhomboid, comparatively long, 30-47 μm in length, greatest diameter at the middle of the body; anterior end truncate to form a very narrow oral area, posterior end

terminating in a large smooth ventral lobe; contractile vacuole single; macronucleus thin wedge-shaped, broader anteriorly and extending one-half to two-thirds the body length.

Hosts : Cow and buffalo; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district), Tamil Nadu.

Remarks : Banerjee (1955) recorded this species from West Bengal from the rumen contents of goat.

92. ***Entodinium rostratum*** Fiorentini

1889. *Entodinium rostratum* Fiorentini, *Interno ai Protisti dello stomaco dei Bovini,* p. 19.

1930. *Entodinium rostratum* : Kofoid and MacLennan, *Univ. Calif. Publs. Zool.,* **33,** p. 505.

Diagnosis : Body long and slim, 28-41 μm in length; dorsal side terminating in a short broad dorsal lobe, the ventral side in a heavy blunt spine; contractile vacuole single, lying directly anterior to the macronucleus; macronucleus straight, rod-like, lying in the middle half of the body along dorsal mid-line.

Hosts : Cow and buffalo; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district), Tamil Nadu.

Remarks : Banerjee (1955) recorded this species from West Bengal from the rumen contents of buffalo.

93. ***Entodinium setnai*** Das Gupta

1935. *Entodinium setnai* Das Gupta, *Arch. Prostistenk.,* **85,** p. 164.

Diagnosis : Body oval, anterior and broader than the posterior, 50-60 μm in length; dorsal side convex anteriorly and ending in a blunt lobe posteriorly; ventral side more or less straight, terminating in two small pointed lobes; right lobe with a broad base and left lobe more pointed than right; contractile vacuole situated anterior to macronucleus; macronucleus spherical and situated in the middle of dorsal line.

Host : *Capra hircus; location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

94. ***Entodinium simplex*** Dogiel

1925. *Entodinium simplex* Dogiel, *Arch. russes Protist.,* **4,** p. 40.

1935. *Entodinium simplex* : Das Gupta, *Arch. Protistenk.,* 85, p. 160.

Diagnosis : Body elongated oval, with rounded posterior end and without any caudal process, 38-50 μm in length; contractile vacuole single, lying left of anterior end of macronucleus; macronucleus band-shaped and confined to anterior one third of the body.

Host : *Capra hircus, Muntiacus muntjak; location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district), Orissa.

95. ***Entodinium spinosum*** Ghosh

1922. *Entodinium spinosum* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volumes (Science),* **2,** p. 104.

Diagnosis : Body oval, 35 μm in length, truncate anteriorly and rounded posteriorly; posterior end with a small, inwardly directed spine near centre, contractile vacuole single, located posteriorly; macronucleus band-like.

Hosts : Cow and goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

96. ***Entodinium submammilatum*** Ghosh

1922. *Entodinium submammilatum* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volume (Science),* **2,** p. 103.

Diagnosis : Body elongated, 32 μm in length, somewhat flattened laterally, anterior end tapering, narrow and truncate, posterior end with a rounded process in one side and a projecting curved blunt process on the other; macronucleus narrow, elongate, somewhat constricted behind the middle and bent posteriorly; contractile vacuole two, lying on the side opposite to that of macronucleus.

Host : Goat; *location* : stomach (rumen).

Distribution : India : West bengal (Calcutta district).

97. ***Entodinium subsphericum*** Ghosh

1922. *Entodinium subsphericum* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volume (Science),* **2,** p. 105.

Diagnosis : Body irregularly and broadly oval, strongly convex dorsally, more or less straight on the other side, 50 μm in length; anterior end narrow, posterior end bent ventral wards and provided with fine elongated recurved spines; contractile vacuoles two, located at the middle of the body; macronucleus short, stout and rod-like.

Host : Cow : *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

98. ***Entodinium tricostatum*** Kofoid and MacLennan

1930. *Entodinium tricostatum* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.,* **33,** p. 532.

Diagnosis : Body short, broadly ellipsoid, 22-23 μm; three prominent ribs present - one dorsal, two ventral, running the length of the body in a weak dextral spiral; the dorsal and left ventral ribs terminating in the caudal spines, the thin blade- like right ventral rib in the lateral lobe; contractile vacuole at the left of anterior end of macronucleus; macronucleus very short, stout, lying in the dorsal rib and following its spiral course.

Host : *Bos indicus; location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Banerjee (1955) reported this species from West Bengal.

Genus *Eodinium* Kofoid and MacLennan

99. *Eodinium lobatum* Kofoid and MacLennan

1932. *Eodinium lobatum* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, **37**, p. 70.

Diagnosis : Body small, narrow, ellipsoid in dorsal view, laterally compressed, 44-66 µm in length; operculum very small; a distinct ventral lobe at posterior end; contractile vacuoles two, lying in anterior and posterior depressions on dorsal side of macronucleus; macronucleus narrow rod-like with three large depressions in its dorsal side.

Hosts : Buffalo and cow; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Tamil nadu.

Remarks : Banerjee (1955) reported this species from West Bengal in the rumen of cow and buffalo. Speciments obtained from the cow were much bigger (120 µm × 70 µm in dimension) than those obtained from buffalo (45-55 µm × 27.5-35 µm) (Banerjee, *op. cit.*)

Genus *Epidinium* Crawley

Key to the species

1. Body elongate, tapering in posterior half of the body and terminating in small rounded posterior end 2

   Body relatively short and truncate posteriorly, (five long straight caudal spines) ..... *E. cattanei*

2. Without any caudal spine 3

   With caudal spine 4

3. Smaller, 50 µm in length, posterior end with two rounded lobes, one projecting beyond the other; macronucleus short, irregularly pyriform, occupying middle of the body ..... *E. bengalensis*

   Larger, 90-152 µm in length, posterior rounded lobes not as above; macronucleus large, elongated extending to posterior part of the body ..... *E. ecaudatum*

4. With single ventral caudal spine 5

   With more than one caudal spine 6

5. Caudal spine possessing an accessory skeletal place ..... *E. eberleini*

   Caudal spine without any accessory skeletal plate ..... *E. caudatum*

6. With three caudal spines, one dorsal, one ventral and one lateral 7

   With more than three caudal spines, one dorsal, one ventral and more than one lateral 8

7. Caudal spines of equal length, body length 150-200 µm ..... *E. bovis*

   Caudal spines of unequal length, ventral spine being longest, body length 85-131µm ..... *E. tricaudatum*

8. With four unequal caudal spines, one dorsal, one ventral and two right laterals..... ..... *E. quadricaudatum*

With five unequal caudal spines, one dorsal, one ventral, two right laterals and one left lateral ..... *E. parvicaudatum*

With a peripheral circular row of six unequal spines ..... *E. spinosum*

100. *Epidinium bengalensis* (Ghosh)

1922. *Ophryoscolex bengalensis* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volumes (Science),* **2** p. 111.

Diagnosis : Body elongated tapering at both ends, 50 μm in length; posterior end with two rounded lobes; one projecting beyond the other; macronucleus short, irregularly pyriform, occupying the middle of the body; contractile vacuoles two, one near the girdle and the other near posterior lobes.

Host : Cow : *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Ghosh described this species from the rumen of cow and accommodated it under the genus *Ophryosocolex* Stein. But, its characteristic features, *viz.* i) dorsal membranellae zone just behind the anterior end of the body and ii) presence of two contractile vacuoles clearly reveal that this species actually belongs to the genus *Epidinium* Crawely.

101. *Epidinium bovis* Banerjee

1955. *Epidinium bovis* Banerjee, *Proc. zool. Soc.,* **8,** p. 96.

Diagnosis : Body more or less elongated, posterior end tapering, 150-200 μm in length; dorsal and ventral surfaces almost flat with slight convexity; with three equal sized caudal spines, one dorsal, one ventral and one lateral, all spines long, sharply pointed and slightly incurved; contractile vacuoles two; macronucleus large, elongated and dorsally placed with anterior portion broad and posterior portion gradually tapering.

Host : Cow; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

102. *Epidinium cattanei* (Fiorentini)

1889. *Diplodinium cattanei* Fiorentini, *Interno ai Protisti dello stomaco dei Bovini.,* p. 16.

1923. *Epidinium cattanei* Crawley, *Proc. Acad. nat. Sci. Philad.,* **75,** p. 412.

Diagnosis : Body relatively short and heavy 78-120 μm in length, left and dorsal surfaces concave between dorsal membranellae zone and the base of left spine, right surface convex; largest and most prominent five straight caudal spines, each spine arising from relatively broad base but tapering rapidly in proximal third so that distal two thrid appearing relatively thin, the ventral spine being the largest; contractile vacuoles two; macronucleus elongate, lying beneath the right dorsal surface.

Hosts : *Capra hircus* and cow; *location* : stomach (rumen).

Distribution : India : West bengal (Calcutta District).

Remarks : Das Gupta (1935) and Banerjee (1955) reported this species from West Bengal from rumen of *Capra hircus* and cow respectively.

103. ***Epidinium caudatum*** (Fiorentini)

1889. *Diplodinium caudotum* Fiorentini, *Interno ai Protist dello stommaco dei Bovini*, p. 24.

1923. *Epidinium caudatum* Crawley, *Proc. Acad. nat. Sci. Philad.*, **75**, p. 412.

Diagnosis : Body elongate, 85-140 µm in length, tapering towards posterior end; single caudal spine arising from the posteroventral end of the body curving dorsally and to the right; cuticle with longitudinal striations; contractile vacuoles two; macronucleus elongate, lying beneath the right dorsal surface adjacent to the edge of dorsal skeletal plate.

Hosts : *Bos gaurus, Capra hircus* and cow; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district), Karnataka.

Remarks : Ghosh (1922) was the first to report this species from Calcutta as well as from India from the rumen of cow and goat. Subsequently, Das Gupta (1935) recorded this species from this state from the host *Capra hircus*.

104. ***Epidinium eberleini*** (da Cunha)

1914. *Diplodinium eberleini* da Cunha, *Mem. Inst. Oswaldo Cruz.*, **6**, p. 62.

1933. *Epidinium eberleini* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, **39**, p. 16.

Diagnosis : Body elongate, 85-118 µm in length, with a relatively blunt posterior end; right side of the body continues posteriorly as a broad laterally flattend lobe; a narrower heavier lobe projecting from the posterior end of the left surface; a large curved spine arising from the posterior end and a long thin accessory skeletal plate extending from the middle of ventral surface to the top of the large spine.

Host : Cow ; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Tamil Nadu.

Remarks : Banerjee (1955) recorded this species from West Bengal.

105. ***Epidinium ecaudatum*** (Fiorentini)

1889. *Epidinium ecaudatum* Fiorentini, *Interno ai Protisti dello stomaco dei Bovini*, p. 15.

1923. *Epidinium ecaudatum* Crawley, *Proc. Acad. nat. Sci. Philad.*, **75**, p. 412.

Diagnosis : Body elongate, 90-152 µm; posterior half of the body tapering and terminating in small rounded posterior lobe; without any caudal spine; contractile vacuoles two; macronucleus elongate.

Host : *Capra hircus; location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) reported this species from West Bengal.

106. ***Epidinium parvicaudatum*** (Awerinzew and Mutafoa)

1914. *Ophryoscolex fasciculus* var. *parvicaudatum* Awerinzew and Mutafoa, *Arch. Protistenk., 33*, p. 113.

1933. *Epidinium parvicaudatum* Kofoid and Mac Lennan, *Univ. Calif. Publs. Zool.*, **39**, p. 11.

Diagnosis : Body relatively long, 70-120 µm × 37 µm and tapering posteriorly, ventral and left surfaces almost plain or slightly convex, dorsal and right surfaces convex; with five caudal spines - one ventral, one dorsal, one on the left side and two on the right side, ventral spine being large and curved dorsally; fine longitudinal striations over cuticle; contractile vacuoles two; macronucleus elongated rod-like.

Hosts : *Bos gaurus*, goat and sheep; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Tamil Nadu.

Remarks : Banerjee (1955) and, Chowdhury and Chatterjee (1960) reported this species from this state from the hosts sheep and goat respectively.

107. ***Epidinium quadricaudatum*** (Sharp)

1914. *Diplodinium ecaudatum* forma *quadricaudatum* Sharp, *Univ. Calif. Publs. Zool.*, **13**, p. 93.

1933. *Epidinium quadricaudatum* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, **39**, p. 10.

Diagnosis : Body elongate, tapering posteriorly, 110-119 µm in length; ventral and left surfaces considerably concave, dorsal and right surfaces convex; with four caudal spines - ventral, dorsal and two right laterals, dorsal spine being longest curved dorsally rightwards; cuticle with fine longitudinal striations, contractile vacuoles two; macronucleus elongate.

Hosts : *Bos gaurus* and goat; location : stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Karnataka.

Remarks : Ghosh (1922) recorded this species from Calcutta from the rumen of goat.

108. ***Epidinium spinosum*** (Ghosh)

1922. *Ophryoscolex spinosus* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volumes (Science)*, **2**, p. 111.

Diagnosis : Body elongate, both dorsal and ventral surfaces convex, 45 µm in length; posterior end with circular row of six caudal spines, ventral spine being longest bent rightwards; contractile vacuoles two; macronucleus elongated and band-like.

Host : Cow; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Ghosh (1922) described this species and placed it under the genus *Ophryoscolex* Stein. Original description of this species is very inadequate but, its diagram is considerably clear sufficient for determining its generic indentity. Characteristic features recorded by Ghosh (op.cit), viz. i) secondary girdle of membranellae. i.e., dorsal membraellae zone close to the anterior end of body ii) presence of two contractile vacuoles and iii) single circlet of spine clearly reveal that the present species is a member of the genus *Epidinium* Crawley.

109. *Epidinium tricaudatum* (Sharp)

1914. *Diplodinium ecaudatum* forma *tricaudatum* Sharp. *Univ. Calif. Publs. Zool.*, **13**, p. 92.

1933. *Epidinium tricaudatum* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, **39**, p. 392.

Diagnosis : Body elongate, tapering towards posterior end, 85-131 µm: ventral and left surfaces flat or slightly concave, dorsal and right surfaces convex; with three caudal spines - ventral, dorsal and right lateral; ventral spine largest and curved dorsally rightwards; contractile vacuoles two; macronucleus elongate.

Host : Goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Ghosh (1922) recorded this species from West Bengal under the name *Ophryoscolex ecaudatus* var. *tricaudatus*. This constitutes the only records of this species from India.

Genus *Eremoplastron* Kofoid and MacLennan

Key to the species

1. Posterior end of the body provided with lobes 2
   Posterior end of the body provided with spine 3
2. Posterior end with a small ventral lobe only, 52-100 µm in length ..... *E.bovis*
   Posterior end with a well pronounced ventral lobe, size of the body large, 390-456 µm in length ..... *E.asiaticus*
3. With thick dorsal flange and one large ventral caudal spine ..... *E. rostratum*
   With two caudal spines 4
4. Body ellipsoidal in side view, with two short caudal spines ..... *E.brevispinum*
   Body rectangular in side view, with two large caudal spines ..... *E. magnodentatum*

110. *Eremoplastron asiaticus* Banerjee

1955. *Eremoplastron asiaticus* Banerjee, *Proc. zool. Soc.*, **8**, p. 94.

Diagnosis : Body very big sized, 390-456 µm in length, ellipsoidal in shape and laterally compressed; dorsal and ventral surfaces slightly convex; a big smoothly rounded ventral lobe projecting from the ventral half; macronucleus rod-like and bent dorsally.

Host : Cow; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

111. *Eremoplastron bovis* (Dogiel)

1927. *Eudiplodium neglectum* forma *bovis* Dogiel, *Arch. Protistenk.*, **59**, p. 108.

1932. *Eremoplastron bovis* : Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, **37**, p. 95.

Diagnosis : Body ellipsoidal, 52-100 µm in length, compressed laterally, ventral surface more

or less flattened except posterior quarter, dorsal surface strongly convex; a small smoothly rounded ventral lobe projecting from ventral half of posterior end; contractile vacuoles two; macronucleus elongate.

Hosts : Cow, buffalo and sambar; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district), Bihar.

Remarks : Banerjee (1955) recorded this species from this state from the rumen of buffalo.

112. ***Eremoplastrom brevispinum*** Kofoid and MacLennan

1932. *Eremoplastron brevispinum* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, **37**, p. 97.

Diagnosis : Body ellipsoidal, 72-92 µm in length, laterally compressed; dorsal surface convex, ventral surface flat or slightly concave in anterior half and convex in posterior half; caudal spines two in number, short and broad, one dorsal to anus, the other ventral to it and a slight prolongation of ventral lobe; contractile vacuoles two; macronucleus rod-like.

Host : *Capra hircus*; *location* : stomach (remen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) recorded this species from West Bengal as well as from India.

113. ***Eremoplastron magnodentatum*** Kofoid and MacLennan

1932. *Eremoplastron magnodentatum* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, **37**, p. 100.

Diagnosis : Body rectangular in side view, 58-82 µm in length, anterior end with largest diameter; dorsal surface flat, ventral surface slightly convex; caudal spines two, large, laterally compressed and such placed as to give a characteristic pincer- like appearance; contractile vacuoles two; macronucleus elongate rod-like.

Host : Buffalo; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Banerjee (1955) the recorded this species from West Bengal as well as from India.

114. ***Eremoplastron rostratum*** (Fiorentini)

1889. *Diplodinium rostratum* Fiorentini, *J. microgr.*, **14**, p. 16.

1932. *Eremoplastron rostratum* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, **37**, p. 16.

Diagnosis : Body small, relatively long, 40-75 µm in length, laterally compressed, dorsal surface convex, ventral surface almost flat; caudal spine single, long, extending posteriorly from the region between anus and ventral surface; powterior third of the dorsal side of the body forming a flange-like projection; contractile vacuoles two; macronucleus rod-like.

Hosts : *Bos ugarus, Capra hircus* and Buffalo; *Location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district), Karnataka.

Remarks : Das Gupta (1935) and Banerjee (1955) reported this species from West Bengal from the hosts *Capra hircus* and buffalo respectively.

Genus ***Eudiplodinium*** Dogiel

115. ***Eudiplodinium maggii*** (Fiorentini)

1889. *Diplodinium maggii* Fiorentini, *Interno ai Protist dello stomaco dei Povini,* p. 13.

1932. *Eudiplodinium maggii* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.,* **37,** p. 168.

Dignosis : Body roughly triangular in side view, 104-255 µm in length, truncated anteriorly and tapering to a smoothy rounded posterior end; dorsal surface convex, ventral surface flat or concave anteriorly at anterior half and convex at posterior half; contractile vacuoles usually two; macronucleus elongate, rod-like with anterior end enlarged to form a hook, opening dorsally.

Hosts : *Bos gaurus,* goat, buffalo, sheep and Barking deer and sambar; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta and Darjiling distrricts), Bihar, Karnataka, Orissa and Tamil Nadu.

Remarks : Das Gupta (1935) and Banerjee (1955) reported this species from West Bengal from the hosts goat and, buffalo, sheep and Barking deer respectively.

Genus ***Metadinium*** Awerinzew and Mutafowa

Key to the species

1. Posterior end of the body truncated or smoothly rounded 2
   Posterior end of the body provided with keel and incurved spines 3
2. Sekeltal plates not fused at their posterior end, macronucleus with three dorsal obes ..... *M. medium*
   Skeletal plates fused at their posterior end, macronucleus with a large lateral lobe on its left edge ..... *M. rotundatum*
3. Posterior end rounded with a keel on one side ..... *M. carinatum*
   Posterior end with six eincurved spines arranged in pair ..... *M. quadratum*

116. ***Metadinium carinatum*** Ghosh

1922. *Metadinium carinatum* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volumes (Science),* 2, p. 108.

Diagnosis : Body broadly oval and slightly flattened, 150 µm in length, posterior end rounded with a keel on one side, both dorsall and ventral surfaces convex; contractile vacuole large single; macronucleus stout with a dilated end and placed more or less transversely.

Host : Cow; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : This species is very inadequately described by Ghosh (1922). In the description nothing is mentioned regarding skeletal plates.

117. *Metadinium medium* Awerinzew and Mutafowa

1914. *Metadinium medium* Awerinzew and Mutafowa, *Arch. Protistenk.*, **33**, p. 115.

Diagnosis : Body large and heavy, 108-224 µm in length, anteriorr end blunt, posterior end truncated and slightly rounded; skeletal plates two in number and not fused at their posterior end; two large contrractile vacuoles present; macronucleus elongate with three large dorsal lobes.

Hosts : *Bos gaurus, Bos indicus* and *Capra hircus, Muntiacus muntjak; loction* : Stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Karnataka, Orissa and Tamil Nadu.

Remarks : Das Gupta (1935) reported this species from the host *Capra hircus* from West Bengal.

118. *Metadinium quadratum* Ghosh

1922. *Metadinium quadratum* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volumes (Science)*, **2**, p. 109.

Diagnosis : Body irregularly guadrilateral, somewhat flattened with ventral surface concave and dorsal surface convex; posterior end provided with six recurved spines arranged in pairs, ventral pair of spines largest and the dorsal pair shortest; contractile vacuole single; macronucleus elongated stout and rod-like.

Host : Cow ; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : In the original description of this species Ghosh (1922) did not mention anything regarding skeletal plates.

119. *Metadinium rotundatum* Kofoid and Christenson

1934. *Metadinium rotundatum* Kofoid and Christenson, *Univ. Calif. Publs. Zool.*, **39**, p. 370.

Diagnosis : Body relatively short, 52-73 µm in length, posterior end smoothly rounded; both ventral and dorsal surfaces convex; skeletal plates two in number and fused at their posterior ends; contractile vacuoles two; macronucleus elongate with a large lateral lobe on its left edge.

Hosts : *Bos gaurus* and cow; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta distrcit); Karnataka.

Remarks : Banerjee (1955) recorded this species from this state from the rumen of cow.

Genus *Ophryoscolex* Stein

Key to the species

1. Posterior end of the body more or less tapering and with caudal spines 2
   Posterior end rounded and without any spine ..... *O. inermis*
2. Main caudal spine relatively short and stout, accessory spines in one or two rows. 3

Main caudal spine long and slender, accessory caudal spines arranged in three rows. ..... *O. tricoronatus*

3. Accessory caudal spines bifurcate and arranged in a single row ..... *O. eberleini*
   Accessory caudal spines bi- or trifurcate and arranged in two rows .....*O. spinosus*

120. *Ophryoscolex eberleini* Ghosh

1922. *Ophryoscolex eberleini* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee volumes (Science),* **2,** p. 111.

Diagnosis : Body elongated with slight neck like constriction anteriorly, 135 µm in length; anterior end tapering; posterior end abruptly tapering with a greatly curved stout spines, 'surrounded by a row of bifid teeth', contractile vacuoles four or five; macronucleus a stout band.

Host : not mentioned

Distribution : India : West Bengal (Calcutta district).

Remarks : Description of this species given by Ghosh (1922) is very inadequate. Even then, the following morphological features clearly show that this species belongs to the genus *Ophryoscolex* : i) dorsal membranellae zone situated about one-third the length of the body from the anterior pole (as evident from the figure), ii) contractile vacuoles several and iii) main caudal spines and accessory caudal spines Ghosh *(op. cit.)* 'surrounded by a row of bifid teeth' present.

121. *Ophryoscolex inermis* Stein

1858. *Ophryoscolex inermis* Stein, *Abh. D. K. Bohmischen Gesell. der Wis.,* **10.** p. 69.

1927. *Ophryoscolex inermis* : Becker and Talbot, *Iowa State Coll. J. Sci.,* **1,** p. 345.

Diagnosis : Body relatively slender, 170-190 µm in length and 65- 100 um in breadth; posterior end smooth, rounded and without any spine.

Hosts : Goat and cow ; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Ghosh (1922) recorded this species from Calcutta in the rumen of goat. It is a rare species differing from the other species of *Ophryoscolex* in having a rounded posterior end, without any spine.

122. *Ophryoscolex spinosus* Kofoid and MacLennan

1933. *Ophryoscolex spinosus* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.,* **39,** p. 23.

Diagnosis : Body relatively slender, 122-160 µm in length; all surfaces strongly convex, only middle of ventral side slightly concave; posterior end with caudal spine short and stumpy and two rows of accessory caudal spines; anterior circlet comprising simple or bifurcate spines and posterior circlet composed of bifurcate or trifurcate spines; middle skeletal plate extending up to the tip of main caudal spine; contractile vauoles ten, arranged in two rows; macronucleus elongate.

Host : Cow : *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Banerjee (1955) recorded this species from West Bengal.

123. *Ophryoscolex tricoronatus* (Dogiel)

1927. *Ophryoscolex caudatus tricinictus* Dogiel, *Arch. Protistenk.*, **59**, p. 185.

1927. *Ophryoscolex caudatus* forma *tricoronatus* Dogiel, *Arch. Protistenk.*, **59**, p. 199.

Diagnosis : Body relatively stout, 137-162 μm in length, posterior end with a long slender main caudal spine and three circlets of secondary spines; anterior circlet comprising six usually trifurcate spines, middle circlet three to five and posterior circlet three to seven spines; middle skeletal plate not extending upto the tip of main caudal spine; contractile vacuoles nine, arranged in two rows.

Host : *Capra hircus; location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Das Gupta (1935) recorded this species from West Bengal. So far, this is the only report of this species from India.

Genus *Ostracodium* Dogiel

Key to the species

With one caudal lobe, the ventral lobe ..... *O. rugoloricatum*
With two caudal lobes, one dorsal and one ventral ..... *O. mammosum*

124. *Ostracodinium mammosum* (Railliet)

1936. *Diplodinium mammosum* Railliet, 1890, Bhatia, *Fauna of British India, Protozoa; Ciliophora*, p. 338.

Diagnosis : Body 41-110 μm in length, ventral surface convex in anterior half, then flat or slightly concave and again convex in posterior part; dorsal surface convex; one dorsal caudal lobe; ventral lobe hallow on its dorsal side, skeletal plate single and broad; contractile vacuoles three; macronucleus long rod-like, with a large shallow depression near the middle of its dorsal surface.

Host : Cow ; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Tamil Nadu.

Remarks : Banerjee (1955) recorded this species from West Bengal.

125. *Ostracodium rugoloricatum* Kofoid and MacLennan

1932. *Ostracodium rugolorricatum* Kofoid and MacLennan, *Univ. Calif. Publs. Zool.*, **37**, p. 137.

Diagnosis : Body ellipsoidal in dorsal view, with both ends bluntly rounded, 84-125 μm in length; ventral surface flat or slightly concave in anterior three-quarters and convex in posterior quarter; dorsal surface flat, or slightly concave in anterior half and strongly convex in the posterior half; a flattened ventral lobe present; skeletal plate broad; contractile vacuoles three; macronucleus straight rod-like with deep depression on the middle of its left dorsal side.

Hosts : Cow and buffalo; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district); Tamil Nadu.

Remarks : Banerjee (1955) reported this species from West Bengal from the rumen of buffalo.

Genus ***Polyplastron*** Dogiel

126. ***Polyplastron bengalensis*** Chowdhury and Chatterjee

1960. *Polyplastron bengalensis* Choudhury and Chatterjee, *Proc. zool. Soc., Calcutta,* **13**, p. 65.

Diagnosis : Body stout and oval, 114-139 μm in length; posterior end with a broad and heavy ventral lobe; with four skeletal plates two on the right and two on the left side; contractile vacuoles five; macronucleus elongated with a slight mid dorsal curvature.

Host : Goat; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Genus ***Triplodinium*** Ghosh

Diagnosis : Peristome on one side; two secondary spirals of membranellae on other side placed in small conical depression and connected with each other by a row of membranellae.

127. ***Triplodinium bovis*** Ghosh

1922. *Triplodinium bovis* Ghosh, *Sir Asutosh Mookherjee Silver Jubilee Volumes (Science),* **2**, p. 112.

Diagnosis : Body elongated, 50 μm in length, slightly tapering anteriorly, more so posteriorly and somewhat flattened laterally; posterior end with three more or less flattened unequal spines; contractile vacuoles two, lying on the opposite side of the macronucleus; macronucleus elongated and somewhat fusiform.

Host : Cow ; *location* : stomach (rumen).

Distribution : India : West Bengal (Calcutta district).

Remarks : Original description of the genus *Tripodinium* Ghosh and that of the type species *T. bovis* are so inadequate that (see Ghosh, 1922) it is very difficult to determine its proper taxonomic status. In the aforesaid description nothing is mentioned regarding number and nature of skeletal plate, which is, at present, treated as an important yard-stick for assigning generic identity in the family Ophryoscolecidae. However, number of contractile vacuoles, disposition of caudal spine and the original text figure indicates that the present species is possibly a member of the genus *Diplodinium*. However, peristome and adoral zone of membranellae as drawn and described by Ghosh *(op. cit.)* show some deviation from those of the genus *Diplodinium*. No further comment on the taxonomic status of this genus is possible unless fresh material of allied specimens are available for study.

GENERAL REMARKS ON DISTRIBUTION

Symbiotic protozoa are very inadequately studied in West Bengal. Only four host-species of termites, namely, *Coptotermes heimi, Cryptotermes havilandi, Heterotermes indicola* and *Neotermes*

bosei as well as one undetermined species of *Heterotermes* have been studied in details for their flagellate symbiotes from this state resulting the record of 31 species. On the other hand, taxonomic studies of ruminant ciliates are solely based on the examination of rumen contents of buffalo, cow, goat and sheep procured mainly from the slaughter house of Tangra, Calcutta. Banerjee (1955), however, studied the rumen contents of Barking deer *(Muntiacus muntjak)* collected at Gielle Reserve forest, Darjiling district, West Bengal and recorded five species of ruminant ciliates.

Distribution of each species of symbiotic protozoa of this state is dealt with under the respective systematic account. The district-wise distribution of these protozoa is shown in the Map 1. & 2 as well as in Table—1.

TABLE – 1

District	Number of species of :		Total
	termite flagellates	ruminant ciliates	
Bankura	–	–	–
Barddhaman	–	–	–
Birbhum	8	–	8
Calcutta	14	96	110
Darjiling	2	5	7
Haora	–	–	–
Hugli	1	–	1
Jalpaiguri	10	–	10
Koch Bihar	10	–	10
Maldah	6	–	6
Medinipur	3	–	3
Murshidabad	8	–	8
Nadia	–	–	–
North 24-Parganas	3	–	3
Puruliya	–	–	–
South 24-Parganas	19	–	19
West Dinajpur	6	–	6

From the Table—1 it is quite evident that termite flatellates are reported/collected so far from 12 districts while ruminant ciliats are recorded from two districts only, viz, Calcutta and Darjiling. Interestingly, all the 96 species of ruminant ciliates recorded so are from West Bengal have also been collected from Calcutta. Five districts from which symbiotic protozoa are yet to be explored are Bankura, Barddhaman, Haora, Nadia and Puruliya.

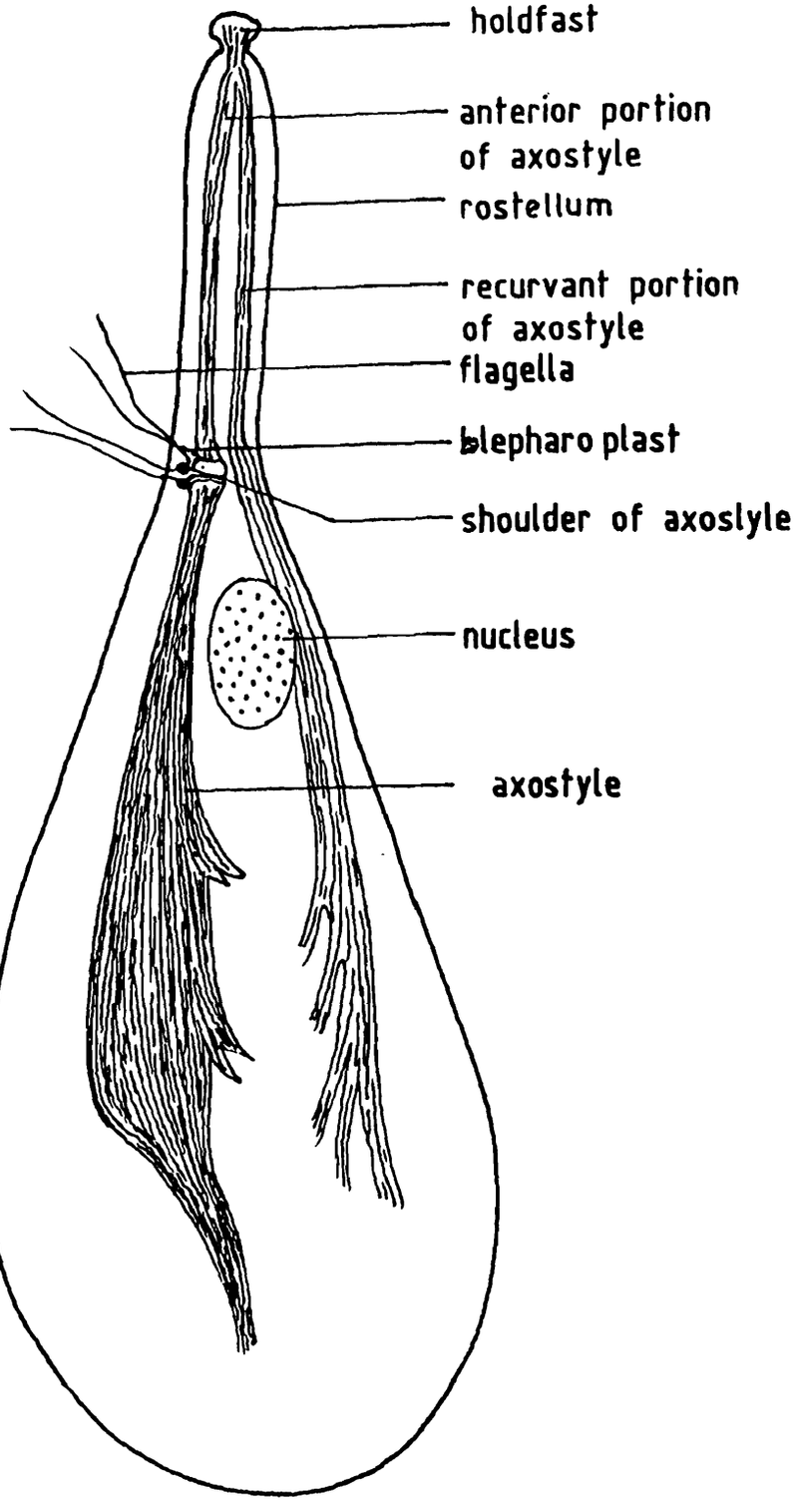


Plate - 1

Fig. 1. Showing general structures of termite flagellate, *Oxymonas* sp.

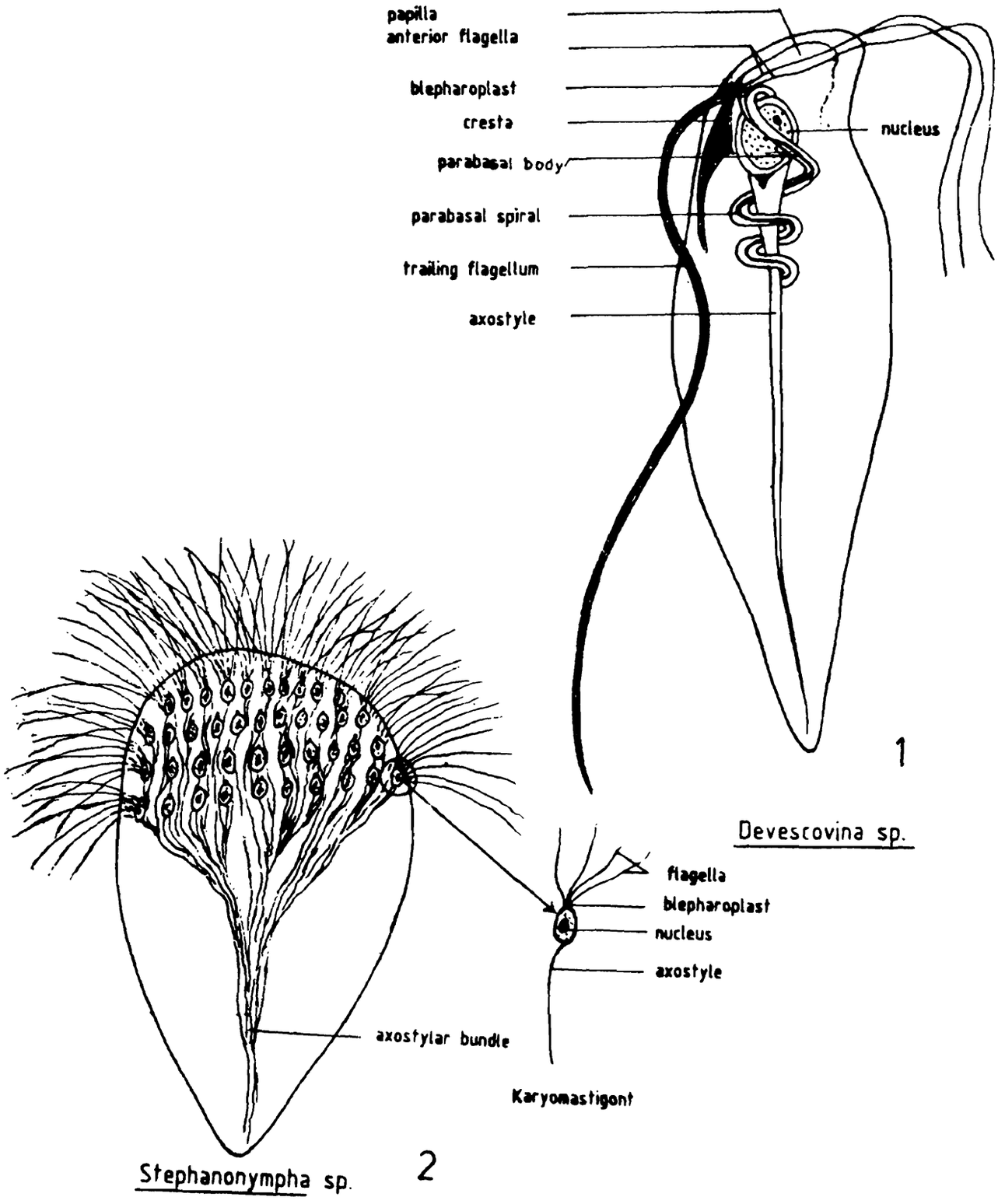


Plate - 2

Figs. 1 & 2. Showing general structures of termite flagellates, *Devescovina* sp. (Fig. 1) and *Stephanonympha* sp. (Fig. 2).

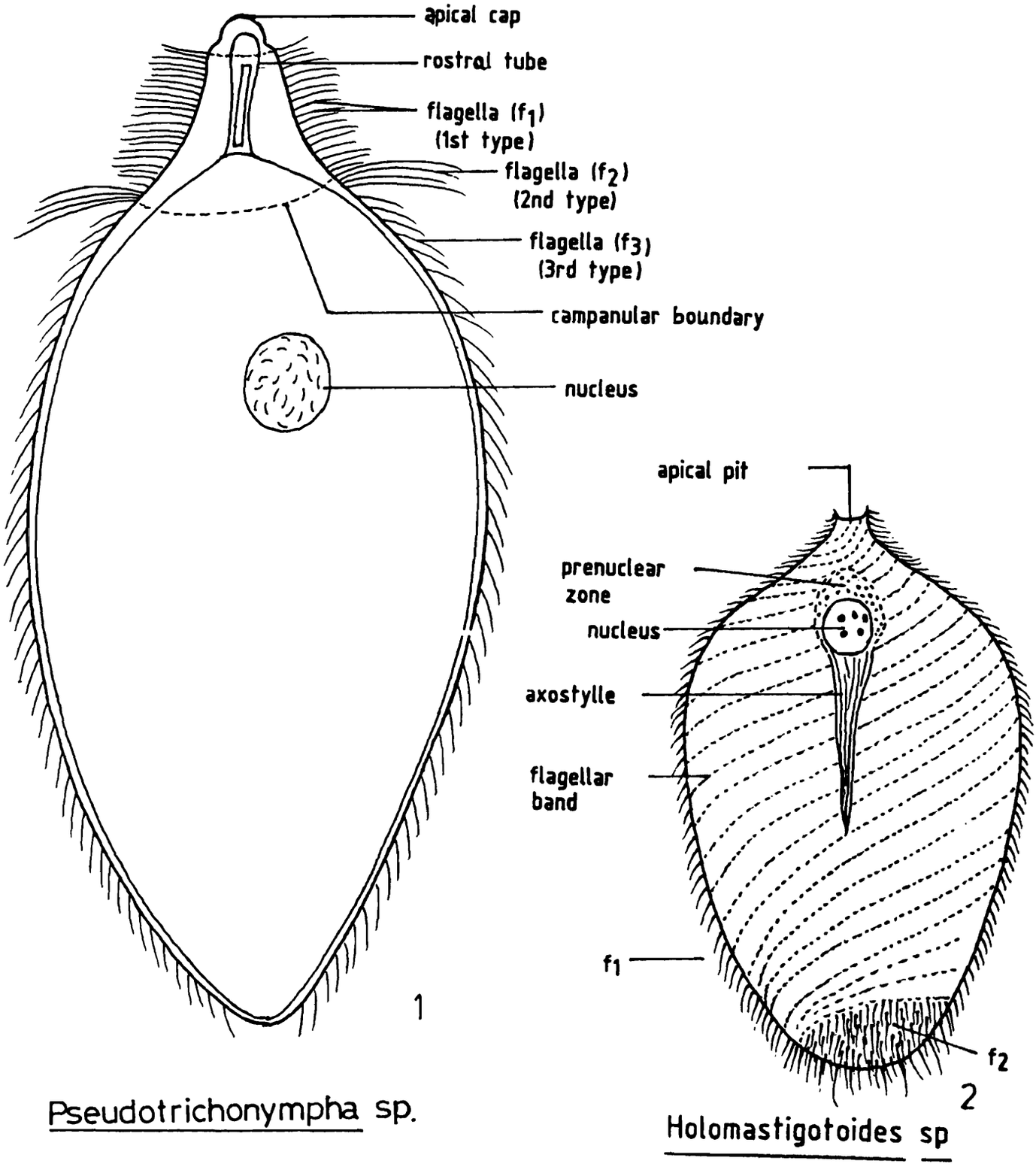


Plate 3

Figs. 1 & 2. Showing general structures of termite flagellates, *Pseudotrichonympha* sp. (Fig. 1) and *Holomastigotoides* sp. (Fig. 2).

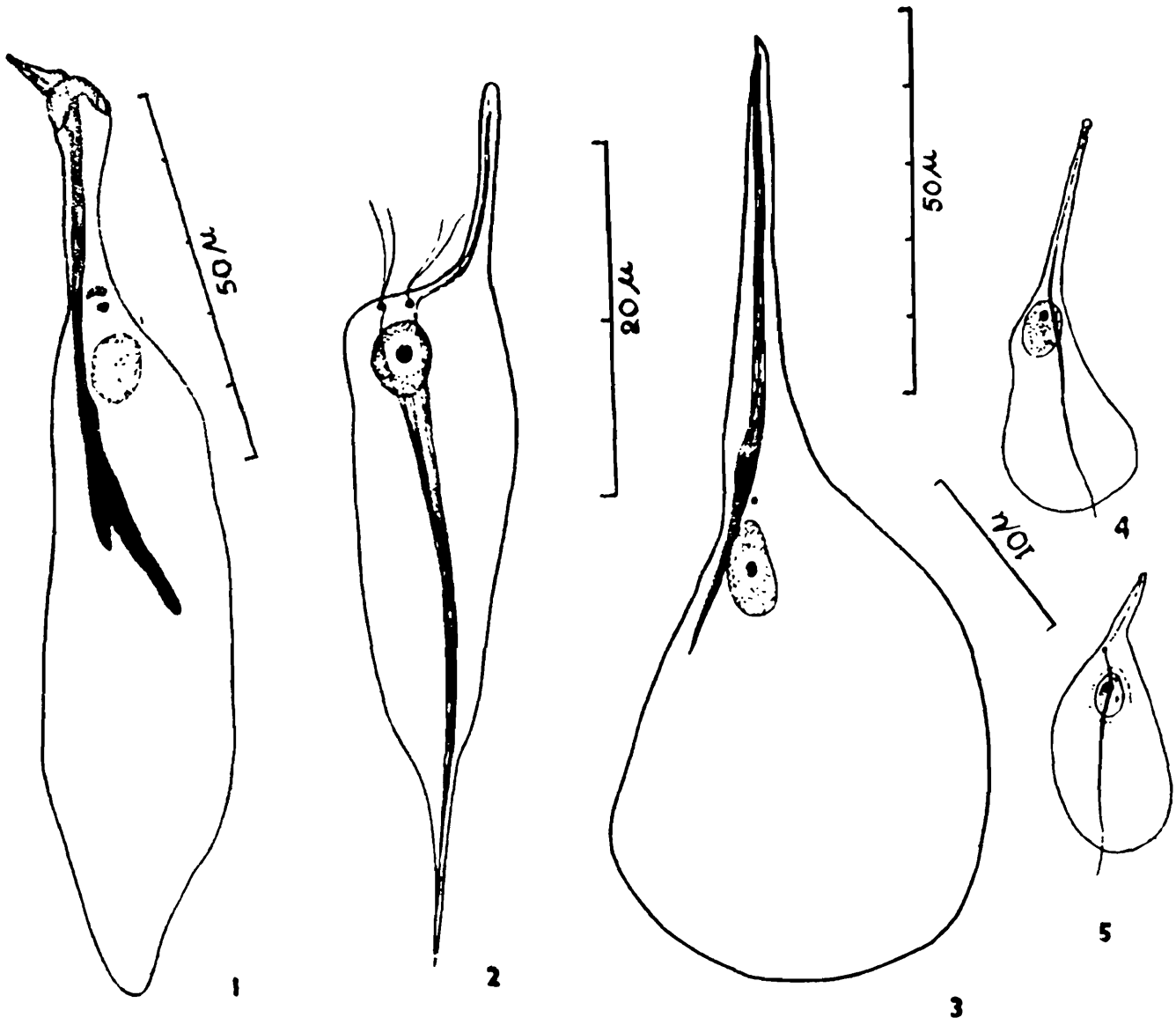


Plate 4

Figs. 1-5. Showing some oxymonadid flagellates of termites from West Bengal. 1. *Oxymonas grandis Cleveland* 2. *Oxymonas bengalensis* Das 3. *Oxymonas bosei* Das 4 & 5. *Oxymonas parvula* Kirby

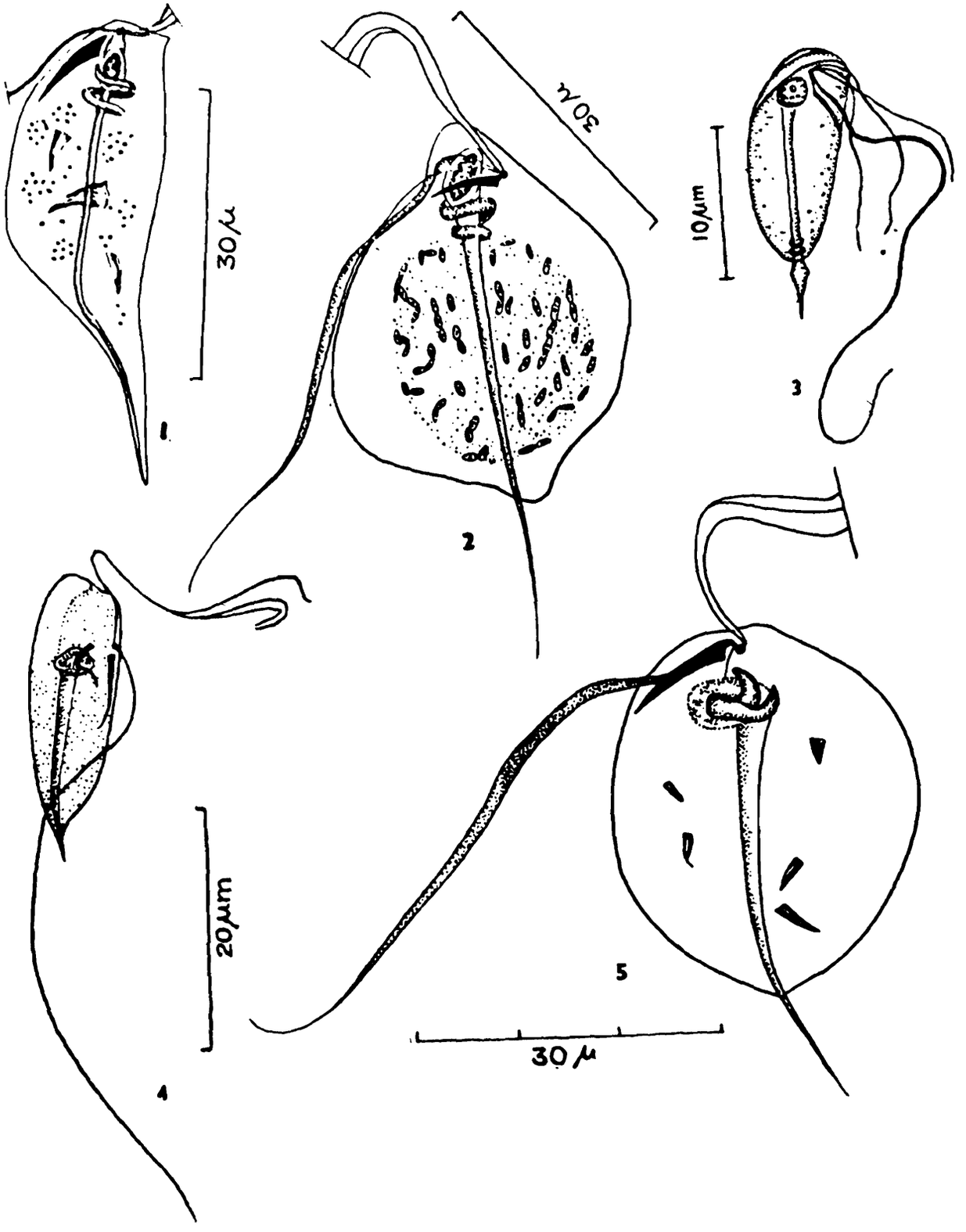


Plate - 5

Figs. 1-5. Showing some devescovinid flagellates from termites of West Bengal. 1. *Devescovina glabra* Grassi 2. *Devescovina steini* Das 3. *Foaina solita* Kirby 4. *Foaina nana* (Kirby) 5. *Foaina reflexa* Kirby

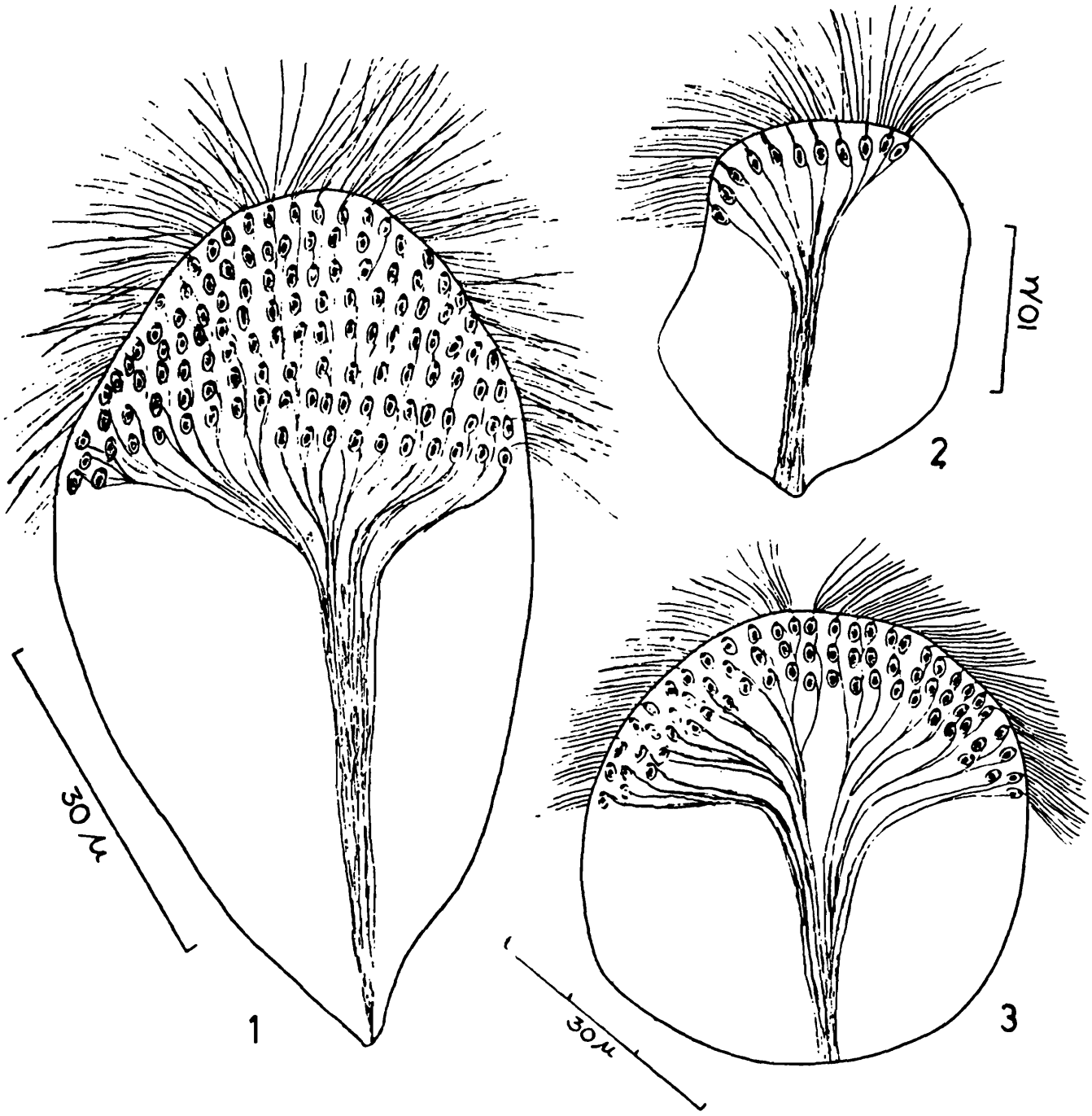
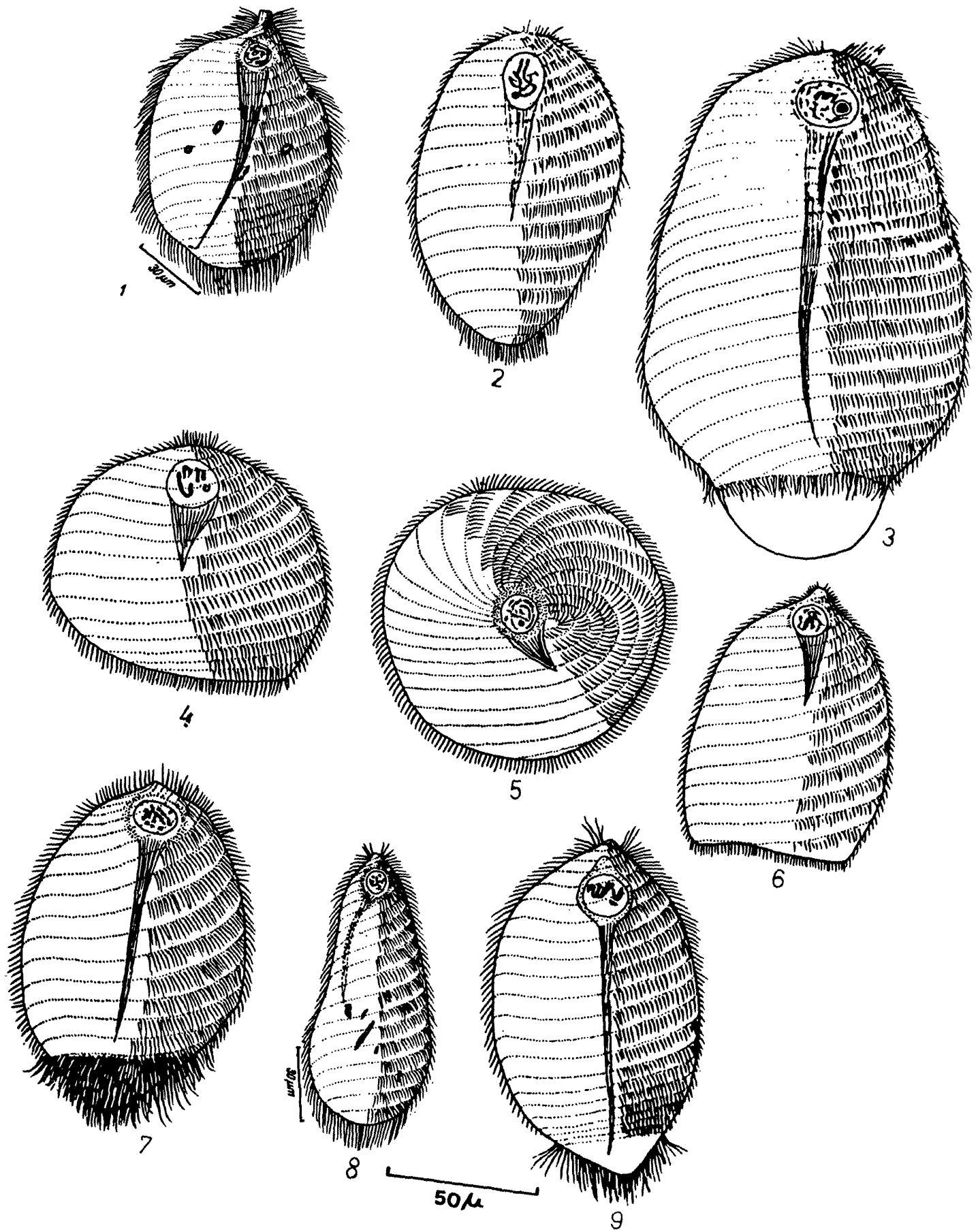


Plate 6

Figs. 1-3 Showing some calonymphid flagellates of termites from West Bengal. 1. *Stephanonympha pyriformis* Das and Choudhury 2. *Stephanonympha minuta* Das and Choudhury 3. *Stephanonympha sylvestrii* Janicki

Plate - 7

Figs. 1-9. Showing some holomastigotoidid flagellates from termites of West Bengal. 1. *Holomastigotoides hollandei* Das 2. *Holomastigotoides globosus* de Mello 3. *Holomastigotoides magnus* Uttangi 4. *Holomastigotoides campanula* (de Mello) 5. *Holomastigotoides sphaeroidalis* de Mello 6. *Holomastigotoides ogivalis* de Mello 7. *Holomastigotoides rayi* Karandikar and Vittal 8. *Holomastigotoides emersoni* Das 9. *Holomastigotoides bengalensis* Chakravarty and Banerjee (Scale of 50 μm for figs. 2-7 and 9)


1
2
3
4
5
6
7
8
9
50μ

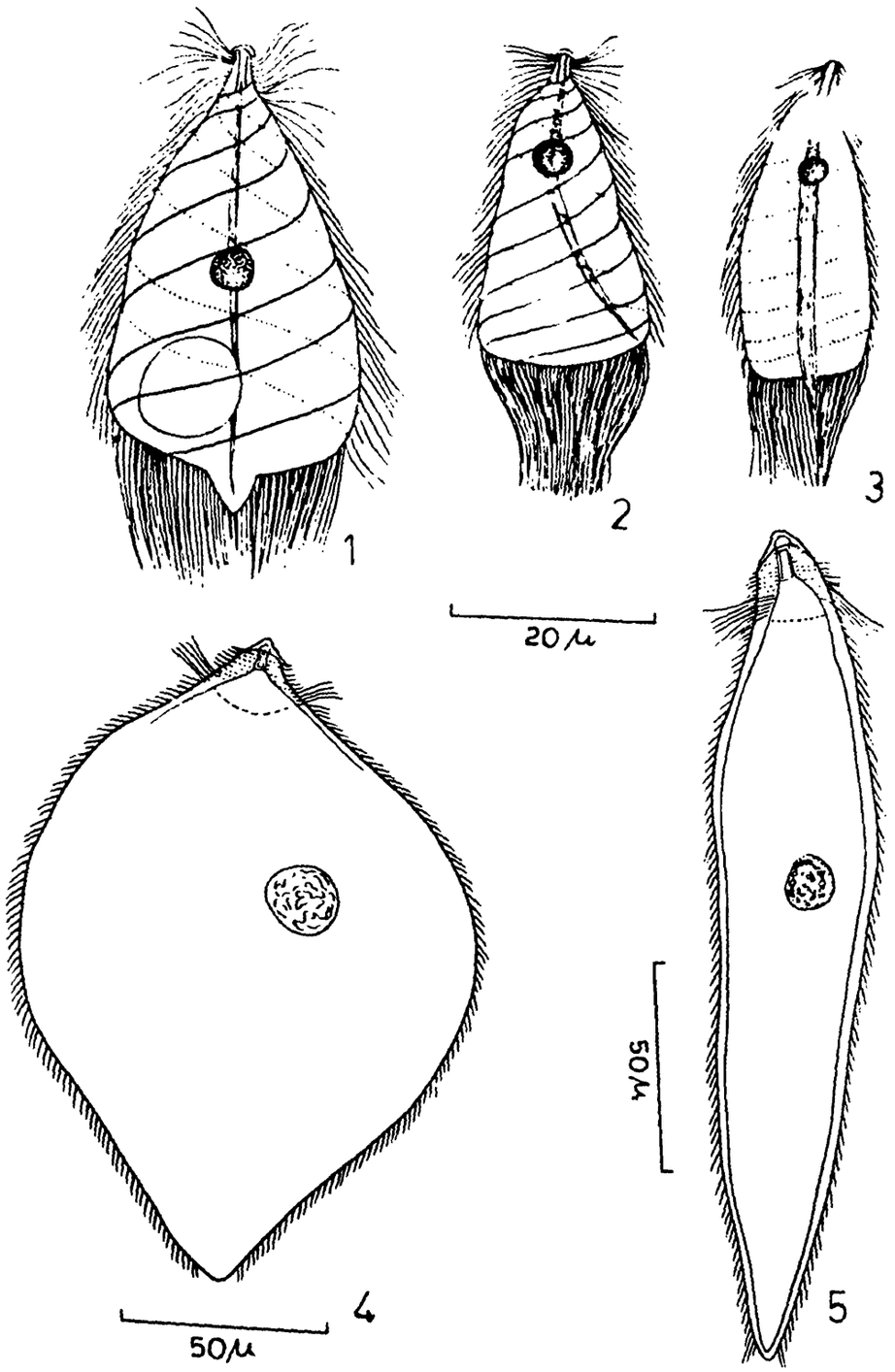


Plate - 8

Figs. 1-5 Showing some spirotrichonymphid flagellates from termites of West Bengal. 1. *Spirotrichonympha roonwali* Das 2 & 3. *Spirotrichonympha froilanoi* Karandikar and Vittal 4. *Pseudotrichonympha cardiformis* Karandikar and Vittal 5. *Pseudotrichonympha indica* Chakravarty and Banerjee

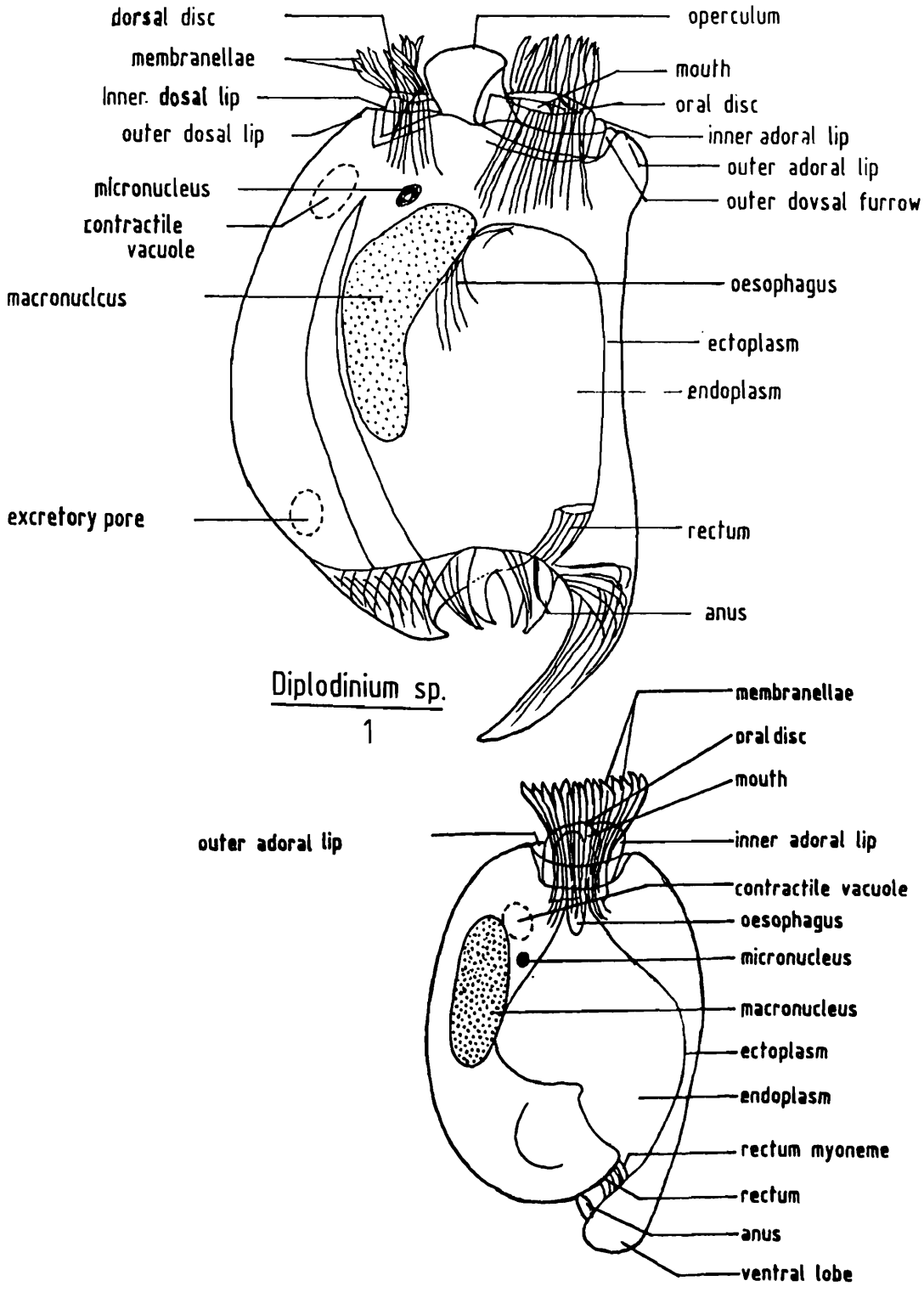


Plate - 9

Figs. 1 & 2. Showing general structures of ruminant ciliates, *Diplodinium* sp. (Fig. 1) and *Entodinium* sp. (Fig. 2).

Map 1. Showing district-wise distribution of symbiotic protozoa viz., termite flagellates and ruminant cilitates (in number of species); numerical number indicates number of species of concerned group (TF = Termite flagellate; RC = Ruminant ciliate).

BIRBHUM : TF (16, 22, 23, 24, 26, 28, 29, 30) : Total = 8

CALCUTTA : TF (1, 5, 6, 7, 8, 13, 14, 15, 16, 17, 18, 24, 27, 30) : Total = 14; RC (32-127, all the 96 species) : Total = 96

DARJILING : TF (28, 29) : Total = 2
RC (46, 70, 79, 83, 115) : Total = 5

HUGLI : TF (25) : Total = 1

JALPAIGURI : TF (2, 3, 12, 15, 16, 17, 18, 22, 26, 29) : Total = 10

KOCH BIHAR : TF (2, 3, 6, 12, 13, 15, 21, 24, 29, 30) : Total = 10

MALDAH : TF (15, 20, 21, 28, 29, 30) : Total = 6

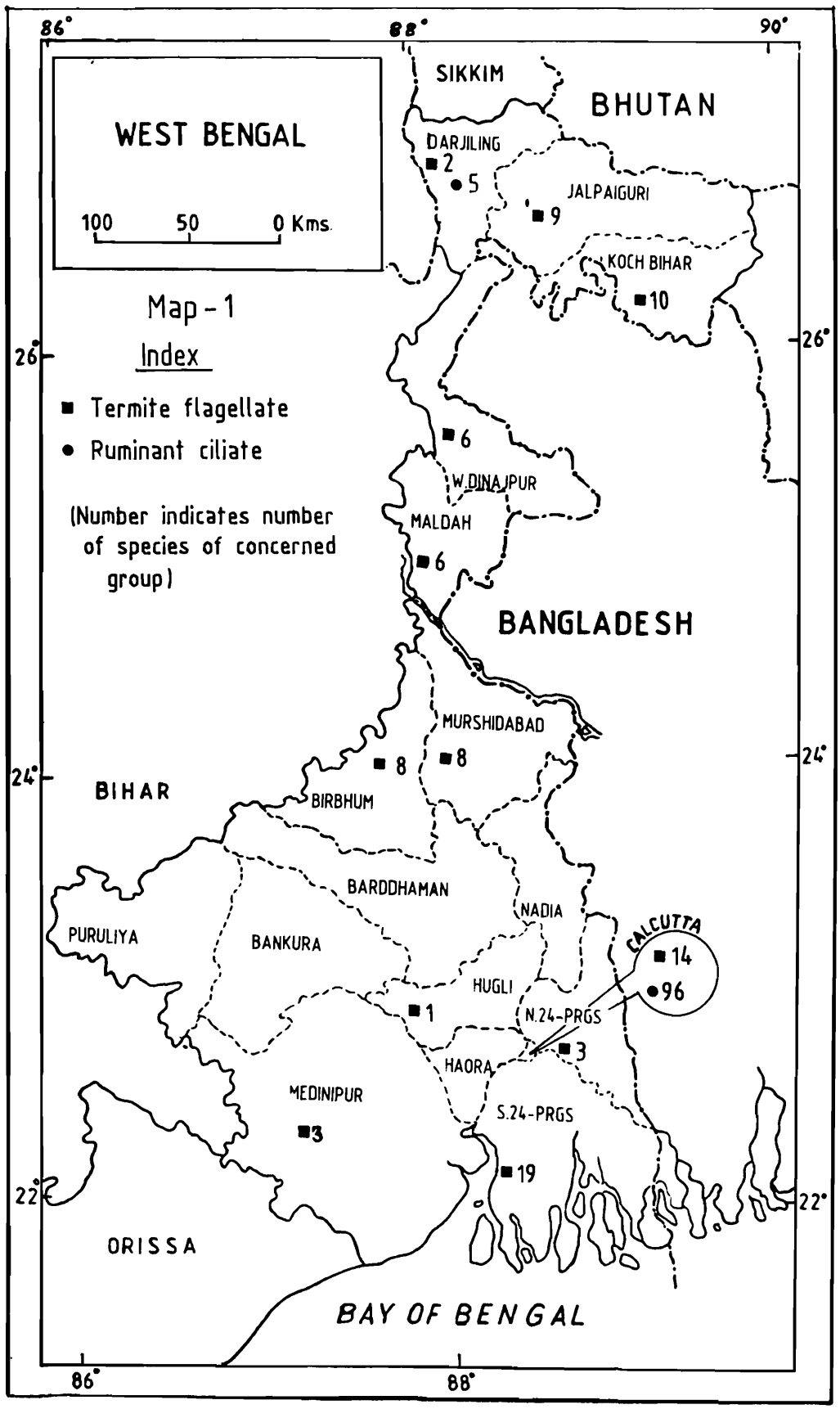
MEDINIPUR : TF (22, 23, 29) : Total = 3

MURSHIDABAD : TF (16, 17, 20, 22, 23, 24, 29, 30) : Total = 8

NORTH 24-PARGANAS : TF (18, 20, 21) : Total = 3

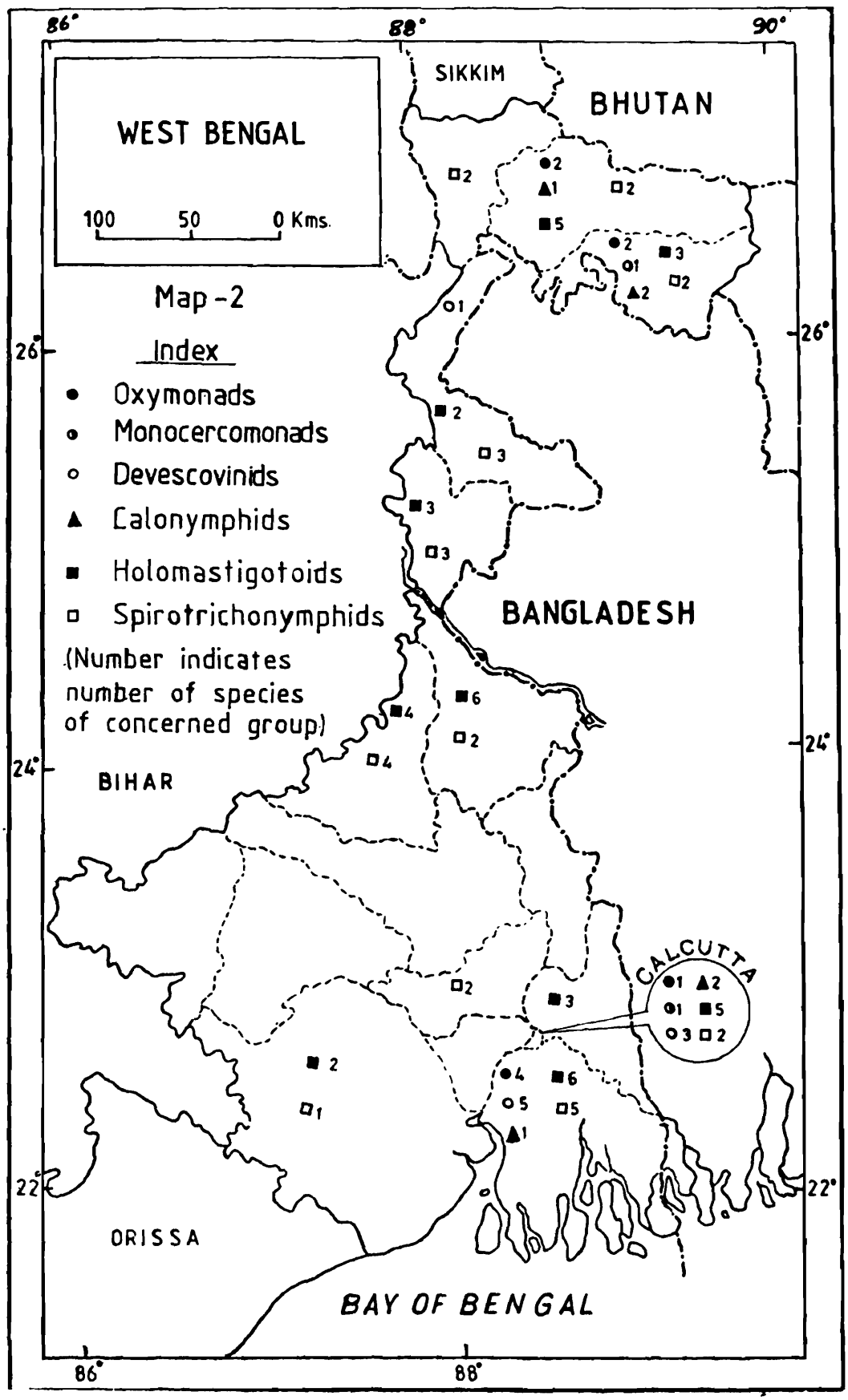
SOUTH 24-PARGANAS : TF (4, 6, 7, 9, 10, 11, 13, 15, 16, 17, 19, 22, 23, 26, 28, 29, 30, 31) : Total = 19

WEST DINAJPUR : TF (6, 15, 20, 26, 27, 28) : Total = 6


86°
88°
90°
WEST BENGAL
100 50 0 Kms.
SIKKIM
BHUTAN
DARJILING
■2
●5
JALPAIGURI
■9
KOCH BIHAR
■10
Map - 1
Index
■ Termite flagellate
● Ruminant ciliate
(Number indicates number of species of concerned group)
26°
■6
W.DINAJPUR
MALDAH
■6
BANGLADESH
MURSHIDABAD
■8
■8
24°
BIHAR
BIRBHUM
BARDDHAMAN
NADIA
PURULIYA
BANKURA
CALCUTTA
■14
●96
HUGLI
■1
N.24-PRGS
■3
HAORA
MEDINIPUR
■3
S.24-PRGS
■19
22°
ORISSA
BAY OF BENGAL
86°
88°

Map 2. Showing district-wise distribution of different groups termite flagellates viz., oxymonads (O), monocercomonads (M), devescovinids (D), holomastigotoids (H), spirotrichonymphids (S) in number of species); numerical number indicates number of species of concerned group.

BIRBHUM	:	H(16, 22, 23, 24); S(25, 28, 29, 30) : Total = 8
CALCUTTA	:	O(1); M(5); D(6, 7, 8); C(13, 14); H(15, 16, 17, 18, 24); S(27, 30) : Total = 14
DARJILING	:	S(28, 29) : Total = 2
HUGLI	:	S(25) : Total = 1
JALPAIGURI	:	O(2, 3); C(12); H(15, 16, 17, 18, 22); S(24, 26) : Total = 10
KOCH BIHAR	:	O(2, 3); D(6); C(12, 13); H(15, 21, 24); S(29, 30) : Total = 10
MALDAH	:	H(15, 20, 21); S(28, 29, 30) : Total = 6
MEDINIPUR	:	H(22, 23); S(29) : Total = 3
MURSHIDABAD	:	H(16, 17, 20, 23, 24); S(29, 30) : Total = 8
NORTH 24-PARGANAS	:	H(18, 20, 21) : Total = 3
SOUTH 24-PARGANAS	:	O(4); D(6, 7, 9, 10, 11); C(13); H(15, 16, 17, 19, 22, 23); S(26, 28, 29, 30, 31) : Total = 19
WEST DINAJPUR	:	D(6); H(15, 20); S(26, 27, 28) : Total = 6


86°
88°
90°
SIKKIM
BHUTAN
WEST BENGAL
100 50 0 Kms.
Map -2
Index
Oxymonads
Monocercomonads
Devescovinids
Calonymphids
Holomastigotoids
Spirotrichonymphids
(Number indicates number of species of concerned group)
26°
24°
22°
BIHAR
BANGLADESH
CALCUTTA
ORISSA
BAY OF BENGAL

SUMMARY

1. Taxonomic account of all the species of symbiotic protozoa reported and collected so far from West Bengal is dealth with in the present communication. This includes 127 species comprising 31 species of termite flagelltes (belonging to 1 class, 3 orders, 6 families and 8 genera) and 96 species of ruminant ciliates (under 1 class 2 orders, 2 families and 15 genera).

2. Key to all these species and their genera and families as well as their district-wise distribution are also incorporated.

3. Present taxonomic status of 13 species described by Ghosh (1922), which are never referred before by any subsequent worker till date is also dealt with in the present communication.

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