

STUDIES ON FRESHWATER ROTIFERS OF KERALA

Thesis submitted to the University of Calicut
for the award of the Degree of

Doctor of Philosophy in Zoology

By

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March-2003

DEDICATED TO MY PARENTS

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DECLARATION

This is to certify that the contents included in my thesis entitled “ **Studies on Freshwater Rotifers of Kerala**” is my original work and it has not been formed the basis of award of any other Degree/Diploma.

Date : 24th February 2003.



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Certified that the thesis entitled “**Studies on Freshwater Rotifers of Kerala**” submitted by Mr. Francy K Kakkassery is an original piece of work based on his studies under my supervision and guidance in the Department of Zoology, Christ College, Irinjalakuda, Kerala.

I also certify that no part of this thesis has been submitted to any other organization for the award of any Degree /Diploma



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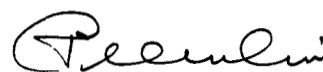
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I am forwarding herewith the thesis entitled "**Studies on the Freshwater Rotifers of Kerala**" submitted by Mr. Francy K Kakkassery for evaluation and award of degree of Doctor of Philosophy under the Faculty of Sciences, University of Calicut. He has worked in the Department of Zoology, Christ College, under the guidance of Dr.C. K.Gopinathan Nayar.



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Chapter - 1

GENERAL INTRODUCTION

GENERAL INTRODUCTION

The rotifers, commonly known as wheel animalcules, are unsegmented bilaterally symmetrical, aquatic, microscopic animals characterised by the presence of the distinct features. They are, the presence of an apical ciliated organ called corona, the metachronal beating of the cilia gives the impression of a rotating wheel—hence the name wheel animalcules. The second diagnostic character is the presence of a muscular pharynx called mastax possessing a set of hard plates called trophi. Earlier workers including Hyman (1951) treated as rotifers under a class Rotifera belonging to the phylum Aschelminthes along with Gastrotricha, Kinorhyncha, Priapulida and Nematoda. However, rotifers are now included under a separate phylum Rotifera or Rotatoria by Pennak (1953), Edmondson (1959), Pennak (1989).

Rotifers comprising nearly 2500 species are small aquatic metazoans ranging in size from 40µm to 2.5mm, but the great majority are between 100µm and 500µm long. Rotifers are adapted to live in different type of habitats, they may be benthic, pelagic, limnetic, interstitial, epizoic and epiphytic. They are sessile or free swimming and even parasitic (Rees, 1960). Although a vast majority of rotifers live in freshwater habitats occurring in ponds, lakes, reservoirs, rivers, ditches, pools etc. A few genera are also known to occur in brackish and marine waters.

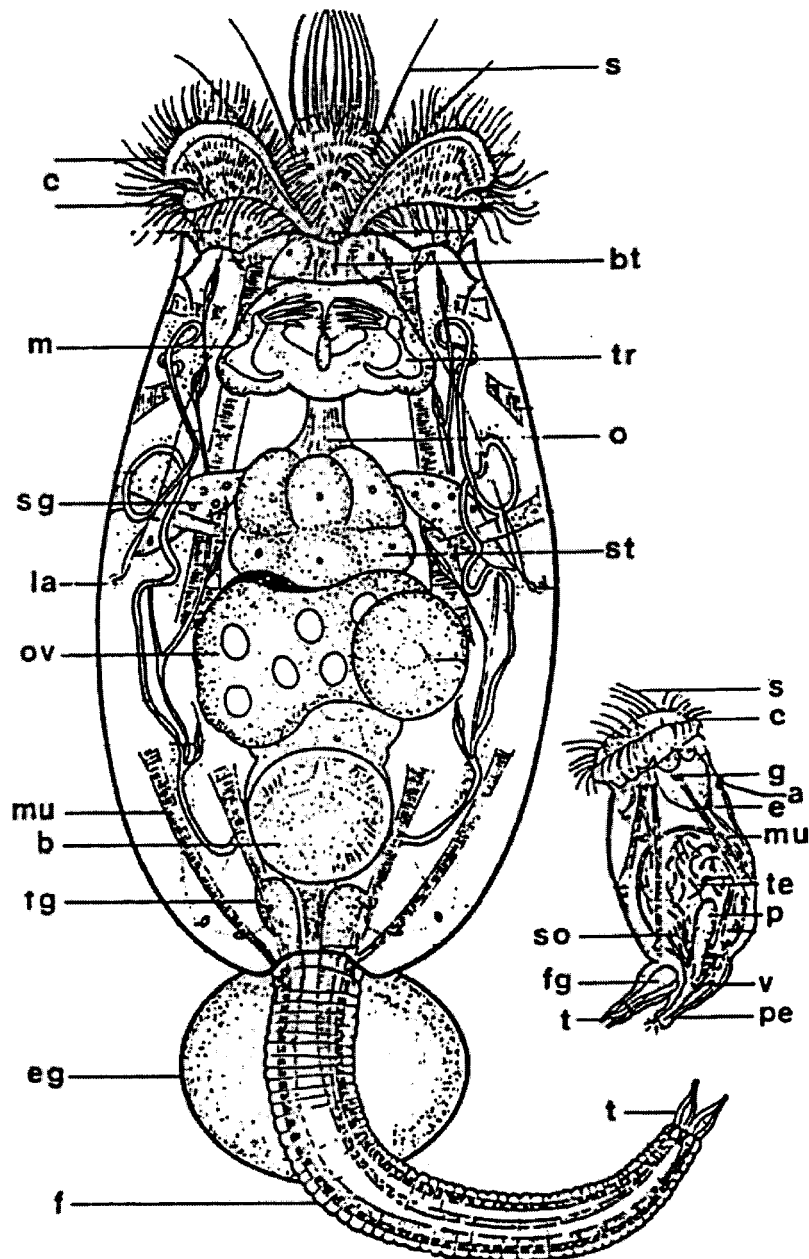
GENERAL MORPHOLOGY

Morphologically, the rotifers are saccate and cylindrical in shape. But, the bdelloides are worm-like in appearance. Typically, the rotifer body consists of four parts, head, neck, trunk and foot (Fig. A). In most rotifers, these regions are divided by folds in the body wall, but these are not considered as segments. Rotifer species can occur mainly in three forms, mictic & amictic females and males. Normally, no morphological differences distinguish

Fig: A

Inner organization of *Brachionus plicatilis*. (after Koste & Sheil, 1987)

- a - Dorsal antenna
- b - Bladder
- bt - Buccal tube
- c - Corona
- d - Eye
- e - Egg
- f - Foot
- fg - Foot gland
- g - Central ganglion
- la - Lateral antennae
- m - Mastax
- mu - Muscle
- o - Oesophagus
- ov - Ovary
- p - Prostate
- pe - Penis
- s - Sensory cirri
- sg - Stomach gland
- st - Stomach
- t - Toe
- te - Testes
- tr - Trophi
- v - Vas deferens



Female

Male

Fig: A

between the two types of females. But the males are totally different in shape and structure from the females, due to the reduction in size and absence of organ systems.

The head bears an anterior ciliated organ called “corona”, which mainly serves as a means of locomotion and food capture. Head also carries oral aperture and tactile & optic sense organs.

The trunk is filled with the body fluid and contains the organs of digestive, excretory, nervous and reproductive systems. The taxonomically important structures seen on the trunk are, trophi, vitellarium, flame bulbs and eye spots. The structure and shape of the cuticular carapace or lorica are also taxonomically significant.

The foot is an appendage that extends ventrally from the body. It usually possesses two toes, but the number varies to maximum of four. The foot also may have the pedal glands, which secrete a sticky fluid for the attachment of animal to the substratum temporarily. The shape and structure of the foot is also of great taxonomic importance.

The general morphology of male monogonont rotifers is simple, and they are highly reduced in size, and they can be considered as “mobile testes” because of the presence of large size of testes and penis in addition to corona and foot.

Corona

A striking characteristic feature of the phylum Rotifera is the presence of ciliated apical organ, corona. In many forms, the corona is comprised of two ciliated rings called the Trochus and Cingulam, and are together called circumapical band. (Fig. B). These structures are responsible for creating necessary water currents for locomotion and feeding. There is a considerable

FIG- B :

Diagrammatic Representation of the Corona of Rotifers
(after Koste, 1978)

FIG-C

Different types of Corona in some Rotifers.
(after Koste, 1978)

1. *Notommata* - type
2. *Asplanchna* - type
3. *Conochilus* -type
4. *Hexarthra* & *Testudinella*-type
5. *Brachionus* & *Euchlanis* -type
6. *Synchaeta*-type
7. *Collotheca* -type

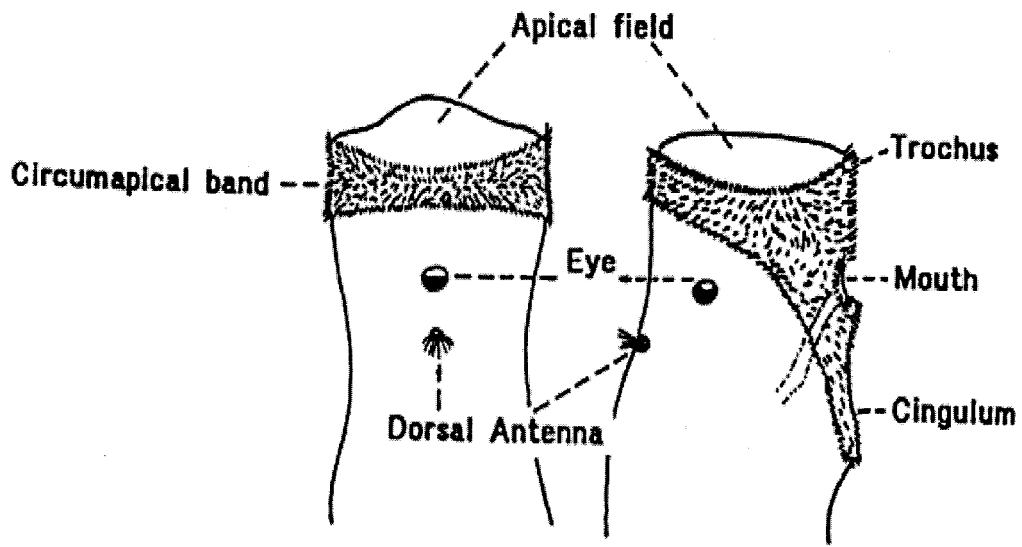


FIG-B

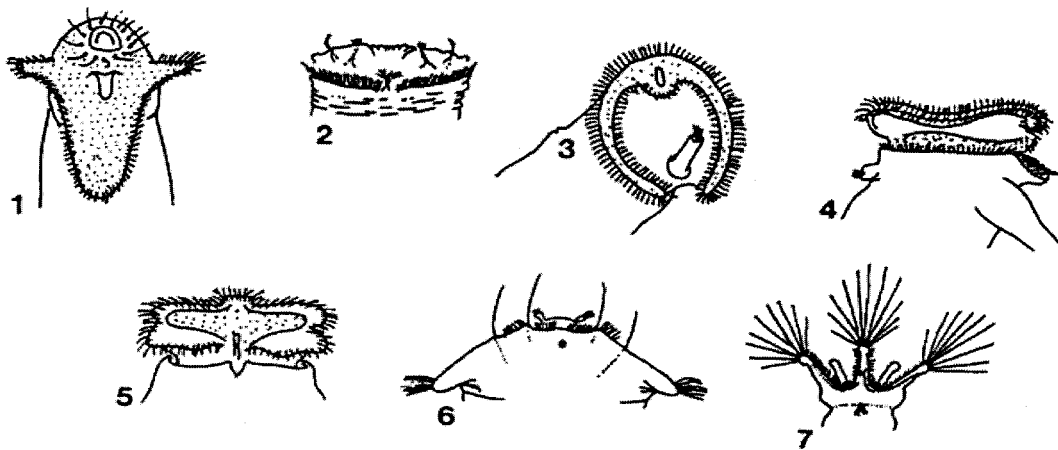


FIG-C

variation in the shape of the corona. Seven different types of coronae have been described in specific rotifer families (Fig. C), based on the placement of the mouth and distribution of cilia (Koste & Shiel, 1987), the following types can be distinguished in the Monogononta

1. *Notommata*- type: (Fig. C.1)

In this type, corona is large with ventrally placed buccal field. Trochus is weakly developed, especially in crawling or slowly swimming taxa. Corona is used both for locomotion and collecting the food.

2. *Asplanchna* - type: (Fig. C.2)

A single ring of fine cilia represents the circumapical band, the apical field has single bristles; no buccal field is present. The corona is highly reduced, and used only for locomotion purpose.

3. *Conochilus* -type: (Fig. C.3)

A broad circumapical band with long cilia surrounding the mouth, horse-shoe shaped with a ventral gap. The corona is a means for both locomotion and feeding.

4. *Hexarthra* & *Testudinella*-type: (Fig. C.4)

Corona is well developed with double circumapical band having flat lobes forming a scalloped rim; and buccal field is small. Corona is used for collecting food and locomotion.

5. *Brachionus & Euchlanis*-type: (Fig. C.5)

Corona is well –developed, buccal field extending far on the apical part of the head, with three or five tufts of cilia at the outer rim. The circumapical band is formed of a single ring of long cilia. Corona serves a means of locomotion and obtaining the food.

6. *Synchaeta*-type: (Fig. C.6)

The circumapical band with only single ring of cilia, apical field has single bristles and no buccal field is present. The well-developed auricles are present.

7. *Collotheca* -type: (Fig.C.7)

The corona is highly modified type. The circumapical band is considerably reduced or completely atrophied. The cilia, turned into long stiff bristles, forms tufts on several lobes. Usually, the corona is used only for collecting food.

The integument

Rotifers possess a syncytial integument (body wall), and it contains a filament layer of varying thickness called intracytoplasmic lamina. The lorica is a modified body wall, formed by its thickening. The rotifer species in which major portions of the body wall thickened are termed loricate and, if the body wall is thin and flexible, called illoricate.

The structure of this lorica is an extremely important character for the identification of rotifers up to species level, sometimes even the only character considered (Brachionidae, Colurellidae and Lecanidae). The morphology and structural modifications of the lorica such as spines and plaques are also highly significant for identification purpose. The spines on the lorica are also

important in buoyancy of planktonic rotifers as well as defending the animal against the predators. Many species produce and live in gelatinous or hard sheaths or tubes.

The Mastax

Once the food is collected by the corona , it enters a ventral mouth by passing through a short ciliated tube into muscular pharynx, termed mastax. It possesses a chitinous inner lining, developed as a set of jaws called trophi ,which is used to grind the food before it enters the stomach.

Rotifer trophus (Fig. D) is composed of several hard parts and associated with musculature, which articulate in a specific spatial arrangement. The basic structure of trophi mainly consists of three functional units such as incus, and paired mallei. The incus is made up of three pieces, a fulcrum and a pair of rami that move like forceps and articulate with the fulcrum at their bases. Each maleus consists of two parts, manubrium and uncus. The manubrium resembles a club shaped structure and articulates with a toothed structure called uncus.

One of the most important characteristic features, used in the identification and classification of Rotifera is the structure of the trophi, and sometimes even species may be determined based on the details of the trophi alone. Eight types of trophi are recognized based on the size and shape of the seven pieces and the presence of accessory parts. They are the following,

1. Malleate: (Fig. E)

Fulcrum is short and rami more or less pointed, in a straight angle with the fulcrum. Unci are mostly broad plates with four to seven teeth. It is seen in family Brachionidae.

FIG : D

Some examples of Trophi with accessory parts (after Koste,1978)

1. Fulcrum
2. Ramus
3. Manubrium
4. Uncus
5. Sub ramus
6. Sub uncus
7. Basal Apophysis
8. Oral plate
9. Lamina
10. Alula

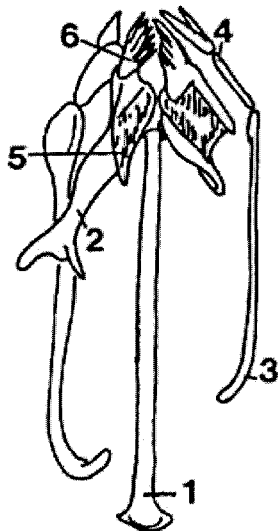
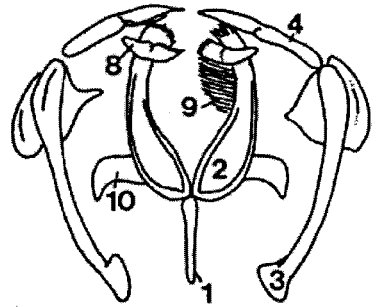
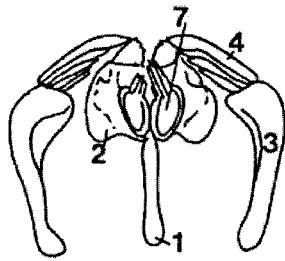


FIG : D

2. Virgate: (Fig. F)

Fulcrum is long and in many cases widened distally. Manubrium is long and sometimes asymmetrical. Unci are broad with few teeth; often one of these long and others are small. This type is seen in the genera Notommata, Polyarthra, Synchaeta and Trichocerca.

3. Cardate: (Fig.G)

Fulcrum is broad and manubrium with two shafts. This type of trophi is seen only in one family, Lindiidae.

4. Forcipate: (Fig.H)

The rami form long pincers usually armed with teeth . Unci with a single or more teeth. Manubria is long and thin . It occurs in family Dicranophoridae.

5. Incudate: (Fig.I)

The rami are long and pincer like. The fulcrum is short. Manubria and unci are highly reduced. It is seen in the family Asplanchinidae.

6. Uncinate: (Fig.J)

Unci consist of two to five well-developed teeth. Rami are strong and other parts are highly reduced. This type occurs in the family Collotheceidae.

7. Ramate: (Fig.K)

Fulcrum and manubria are short. The unci are broad and half circular plates with numerous teeth. This type is seen in the Bdelloidea only.

Different Types of Trophi

(after Koste, 1978)

- Fig – E : Malleate
- Fig – F : Virgate
- Fig – G : Cardate
- Fig – H : Forcipate
- Fig – I : Incudate
- Fig – J : Uncinate
- Fig – K : Ramate

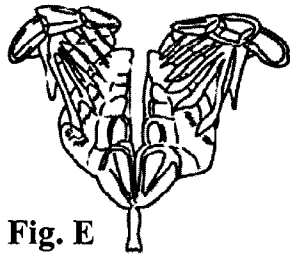


Fig. E



Fig. F

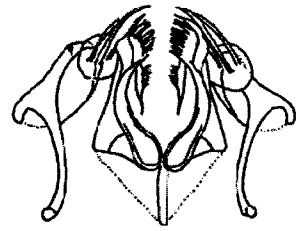


Fig. G

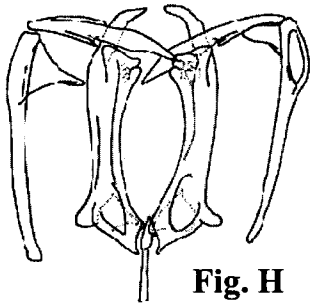


Fig. H

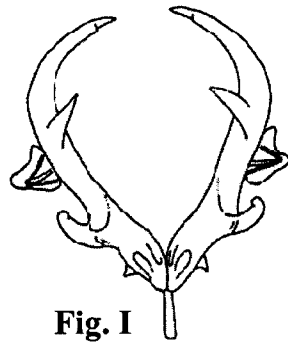


Fig. I

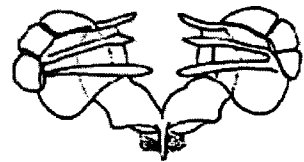


Fig. J

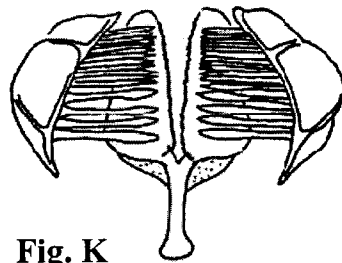


Fig. K

REPRODUCTION AND LIFE HISTORY

Three different types of reproduction are seen in the different groups of rotifers. In Seisonidea, comprising exclusively of marine rotifers, which are dimorphic and reproduce through the bisexual means. But, in Bedelloidea, the members reproduce entirely by asexual parthenogenesis. Species in Monogononta exhibit cyclical parthenogenesis, where asexual reproduction predominates but sexual reproduction also occurs occasionally (Fig .L).

Cyclic parthenogenesis in Monogononta takes place in the absence of males (amictic phase), but periodically males are produced and sexual reproduction takes place (mictic phase). Amictic females are diploid and produce diploid eggs, which are called amictic eggs, and develop parthenogenetically into females.

Normally, the life cycle of monogonont rotifers is completed through the amictic phase. But, under certain conditions, the sexual phase also occurs concurrently with in the same population, presumably initiated by a specific environmental stimulus, such as drought, light and temperature. By the effect of environmental stimulus, amictic females begin to produce amictic and mictic daughters. The newly produced amictic individuals again enter into amictic parthenogenesis. But the mictic females, which are also diploid, produce, only unfertilized eggs (n), some of which develop into males. The males mate with mictic females of same population and produce fertilized eggs ($2n$) which become the "resting eggs". The males are smaller in size and very less in number than the female, but fast swimming with short life span.

These dormant resting eggs possess thick and often sculptured wall and these are highly resistant to the adverse environmental conditions (Gilbert, 1974) and may be dispersed over wide areas by wind, water or migrating

FIG- L:

The Generalised Monogononta Rotifer Life Cycle

(After King and Snell, 1977a)

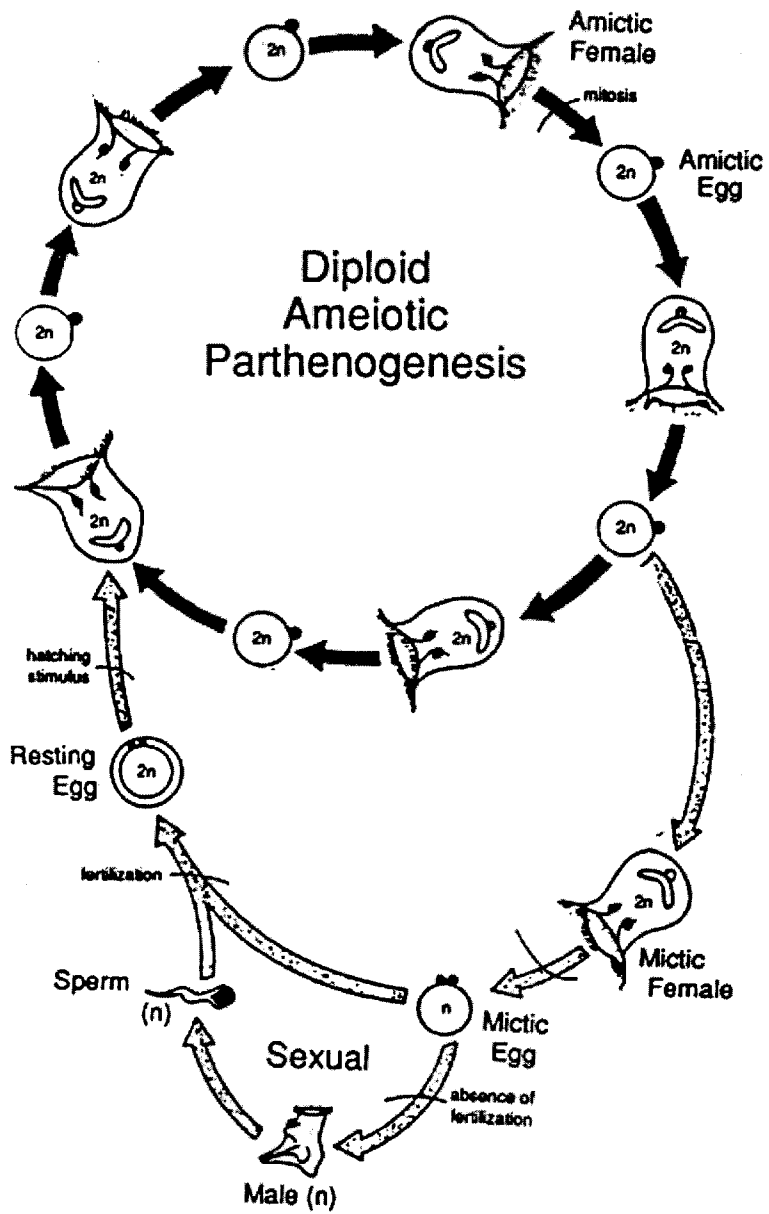


FIG - L

18

animals. After a period of dormancy, which varies among the species, resting eggs respond to species-specific environmental signals and hatch, releasing diploid, amictic females that enter in to the asexual phase of the life cycle. The stimuli that induce hatching may include changes in light, temperature, and salinity (Pourriot and Snell, 1983).

CLASSIFICATION

Rotifers were included as one of the classes of Phylum Aschelminthes by earlier taxonomists, Hyman(1951), Donner (1965), but later, many scientists, Edmonson(1959), Barnes(1980), Pennak (1989), Nogrady *et al* (1993) considered and treated as a separate Phylum. The first standard classification was proposed by Haring(1913). But, the detailed classification of Remane(1929-33) laid the foundation of the systematic works of Voigt(1957). Later, some modifications were also made by De Beauchamp(1965), Kutikova (1970), Ruttner-Kolisko (1974) Koste (1978) and Pennak(1989).

Based on the classification by Pennak(1989) the Phylum Rotifera is divided into two classes, Digononta and Monogononta .

The class Digononta is characterised by the presence of paired ovaries in the females, a ramate trophi, and the absence of secreted tube or lorica.

The class Digononta is divided into two orders, the Seisonidea and the Bdelloidea . The former order with only one genus *Seison*, with the features of lack of vitellaria, well developed males and the presence of rudimentary corona, and bisexual reproduction .They commensal on marine Crustacea – *Nebalia* .In the order Bdelloidea, almost all animals are freshwater inhabitants, ovaries with vitellaria, males are not known, corona is well developed, and reproduction is exclusively by parthenogenesis.

The class Monogononta comprises about 90% of the known species of the rotifers. The main characteristic features are the presence of single ovary, the trophi other than the ramate type, males are known in some groups and the

presence of or absence of lorica. This class is divided into three orders, they are, Ploima, Flosculariacea and Collothecacea.

The Order Ploima includes the rotifers, which are limnetic and littoral species. The salient feature of this group is the presence of foot with usually two toes.

The Order Flosculariacea comprises of both the free swimming and sessile rotifers, including colonial forms. They produce and live in gelatinous sheaths or tubes. If the foot is present, usually it does not bear the toes.

The Order Collothecacea includes those rotifers which are large in size, with lobed corona and mouth is located centrally.

My present research study is concentrated on the systematics of rotifers in the freshwater ecosystems of Kerala. Since our existing knowledge about the taxonomy and systematics of rotifers of Kerala is very limited, the present study is expected to provide a wider knowledge including taxonomy and distribution of rotifers of Kerala. This will also enable us to understand the zoogeographical distribution of varied species in India and neighbouring countries.

Chapter - 2

REVIEW OF LITERATURE

Review of Literature on Indian Rotifera

Indian Rotifera history begins with Anderson (1889), who made the first collections from various aquatic ecosystems from Calcutta (West Bengal) and described 47 species .Of these, he reported 10 new species, and followed by him Murray (1906) published a list of 32 species from high altitude areas of Sikkim Himalayas(altitude of 610m to 2440m). Among these more species were bdelloides, because the collections were made from mosses. Stewart(1908) collected and reported 17 species from the Tibet region at an altitude of 4000m.

After the three decades , Edmondson and Hutchinson (1934) added 99 species to Indian Rotifer biodiversity from the samples of Yale North India expedition team collected from 52 different localities of India, including 4 places in Punjab and North West frontier provinces , 15 localities from the Kashmir basin ,altitude of 1585m to 2620m, 24 localities in Tibet area with the altitude of 3200m-5334m. They also examined the samples from 9 localities in Nilgiri Hills, the Western Ghats, South India, at an altitude of 2133m-2316m. And they made a list of 37valid species amongst those documented earlier by Anderson (1889),but no new species were recorded from this region. The next contribution to Indian Rotifer fauna was made by Sewell (1935) the Director of Zoological Survey of India, who conducted a comprehensive survey of fauna of Salt Lake , Calcutta and added five species and reported *Asplanchna brightwelli* which is common in freshwaters in and around Calcutta. In addition to , he reported 11 species more from a tank in Indian Museum compound .

Ahlstrom (1940) published a research paper on the genera *Brachionus* and *Platytias*. Moreover, Ahlstrom (1943) , revised the genus *Keratella* and found a new variety of *Keratella quadrata* which was collected from Ootacamund lake, Nilgiri Hills, Madras State.

In the next one decade a few taxonomic papers were published by J. Donner, based on the collections made by Dr.V.Brehm from different parts of India. Donner (1949) described a new species *Höraella brehmi* from a tank in Banikpore ,Bihar and listed another 5 species of Rotifers. Donner (1953) reported and described *Trichocerca rutteneri* from the filtration bed of Madras. Subsequently, Brehm (1950) reported 3 species of rotifers including *Keratella cochlearis* from Palta Water works West Bengal. Besides, Brehm(1951) described the *Brachionus donneri* ,an extraordinary Brachionid from Almati reservoir , Madras.

The next two decades were not good periods for taxonomic research publications. The only few reports were made by Pasha (1961), who recorded six species of Lecanids, from freshwater tanks and Coovum river in the city of Madras. The species described by him were the following,

Lecane papuana (Murray,1913)

Lecane methoria (Harring and Myers,)

Lecane crepida Harring,1914

Lecane hornemanni(Ehrenberg,1834)

Monostyla hamata (Stokes,1896)

Monostyla bulla(Gosse,1851)

Hutchinson(1964) elevated the species *Filinia terminalis* to *Filinia pejleri* based on the figure given earlier by Edmondson and Hutchinson(1934) from Ootacamund lake, Madras, South India.

Then a good contribution was made by Arora in a series of publications (1962,1963a, 1963b,1965,1966a,1966b,1966c)and conducted taxonomical and ecological studies on Rotifer fauna, from polluted and clean water bodies in Nagpur city, Maharashtra State. Arora added a good number of Illoricate

rotifers (7species, including one new species, *Polyarthra multiappendiculata*), sessile rotifers(3 species ,one is new species, *Sinantherina triglandularis*), Brachionids(9 species , out of which 5 varieties)and Lecanids (15 species , out of which 4 new species and one variety such as *Lecane dorsicalis* sp.nov, *Lecane tesselata* sp.nov, *Lecane curvilinealis* sp.nov ,*Lecane longidactylus* sp.nov and *Lecane curvicornis* var.*padespares* var.nov) to Indian Rotifer fauna. They were the following,

Rotaria rotatoria (Pallas,1766)

Filinia longiseta Ehrenberg(Ehrenberg,1834)

Tetramastix opoliensis (Zacharias,1898)

Pedalia fennica var.*oxyuris* Sernov,1903

Conochiloides dossuarius Hudson,1885

Asplanchna intermedia (Hudson,1886)

Polyarthra multiappendiculata sp.nov

Sinantherina spinosa (Thorpe,1893)

Sinantherina triglandularis sp.nov

Lacinularia flosculata(O.F.Müller,1758)

Brachionus aculeatus (Hauer,1937)

Brachionus aculeatus f. *lateralis* (Hauer,1937)

Brachionus caudatus Barrois and Daday,1894

Brachionus forficula Wierzeiski,1891

Brachionus budapestinensis var. *punctatus* Daday ,1885

Brachionus angularis var.*bidens* Plate,1886

Brachionus falcatus var.*lyratus* Lammerman,1908

Brachionus urceolaris O.F.Müller,1773

Brachionus quadridetatus var.*melheni* (Barrois and Daday,1894)

Lecane leontina (Turner,1892)

Lecane bulla (Gosse,1851)

Lecane quadridentata (Ehrenberg,1832)
Lecane curvicornis(Murray,1913)
Lecane curvicornis var.*padespares* var.nov
Lecane dorsicalis sp.nov
Lecane tessellata sp.nov
Lecane curvilinealis sp.nov
Lecane longidactylus sp.nov
Epiphanes macrourus (Barrois & Daday,1894)
Mytilina ventralis (Ehrenberg,1832)
Filinia terminalis(Plate,1886)
Pedalia intermedia Wiszniewski,1929
Manfredium eudactylota (Manfredi,1927)
Macrochaetus serica (Thorpe,1893)

Wulfert (1966) also made good input to the rotifer fauna of Gujarat state & India, and reported 87 species including 9 new taxa, 5 new species,3 varieties, 1 form and 1 new combination, collected from Ajwa river and Nimeta Water works , Baroda, Gujarat. The new records were the following,

Lecane neali sp.nov
Lecane pawlowskii n. sp.
Lecane schraederi n. sp
Proales indirae n. sp
Ascomorpha saltans Bartsch var.*indica* n. var.
Brachionus bidentata Anderson f.*adorna* n. f
Lecane stenroosi (Messner) f.*californica* n .f
Lecane stenroosi (Messner) f.*lineata* n. f
Encentrum longipens n. comb

Nayar (1964,1965a) studied the morphometric variations and the Cyclomorphosis in *Brachionus calyciflorus*. Nayar(1965b)also studied the

taxonomic position of Indian genus *Keratella* and *Keratella quadrata* var. *edmonsoni* (Ahlstrom ,1943) which was described as *Keratella quadrata* var. *edmonsoni* new.comb.

Michael (1966) described a new species of colonial rotifer , *Conochilus madurai* sp.nov from Madurai, Tamil Nadu, South India.

Naidu(1967)made a plankton analysis from three places in Andhra Pradesh and reported 12 species. They were the following,

Brachionus calyciflorus Pallas,1766

Brachionus quadridentatus Hermann,1783

Brachionus urceolaris var. *urawensis* Sudzuki,1964

Brachionus sp.

Macrochaetus subquadratus (Perty,1850)

Lepadella dactyliseta (Stenroos,1898)

Lepadella similis Lucks,

Lecane papuana (Murray,1913)

Monostyla lunaris (Ehrenberg,1832)

Polyarthra longiremis Carlin,1943

Testudinella patina (Hermann,1783)

Ptygura sp. Ehrenberg

Vasisht and Gupta (1967) and Vasisht & Battish (1969,1970) added 26 species from Chandigarh to Rotifer fauna of India

Nayar(1968) reported 36 species from Rajasthan State, including one new species, *Monostyla paradeciens* sp. nov ,and out of which,14 species were reported for the first time from India. They were the following,

Anuraeopsis fissa Gosse,1851

Brachionus rubens Ehrenberg,1838

- Brachionus falcatus* Zacharias,1898
Brachionus caudatus var. *aculeatus*
Brachionus caudatus f. *majusculus* Ahlstrom,1940
Brachionus forficula Wierzejski,1891
Brachionus angularis Gosse,1851
Brachionus dimidatus (Bryce,1931)
Brachionus calyciflorus Pallas,1766
Brachionus plicatilis O.F. Müller,1786
Brachionus quadridentatus Hermann,1783
Brachionus diversicornis (Daday,1883)
Keratella tropica (Apstein,1907)
Keratella procurva (Thorpe,1891)
Keratella edmonsoni (Ahlstrom,1943)
Macrochaetus collinsi (Gosse,1867)
Mytilina ventralis (Ehrenberg,1832)
Lepadella patella (O.F.Müller,1786)
Lecane luna (O.F.Müller,1776)
Lecane papuana (Murray,1913)
Lecane tryphema Haring & Myers,1926
Lecane ploenensis (Voigt,1902)
Lecane nana (Murray,1913)
Monostyla quadridentata Ehrenberg,1832
Monostyla punctata Murray,1923
Monostyla hamata Stokes,1896
Monostyla bulla Gosse,1851
Monostyla clostocerca Schmarda,1859
Monostyla paradeciens sp. nov
Trichocerca similis (Wierzejski,1893)

Trichocerca stylata (Gosse,1851)
Polyarthra multiappendiculata Arora,1963

Filinia longiseta (Ehrenberg,1834)

Filinia pejleri Hutchinson,1964

Filinia opoliensis (Zacharias ,1898)

Hexathra mira (Hudson,1871)

Lacinularia flosculosa (O.F.Müller,1773)

Furthermore, Nayar & Nair (1969) reported 15 species of Brachionid species for the first time from Kerala, South India. Out of which, *Dipleuchlanis propatula*, *Anuraeopsis fissa lata*, *Brachionus caudatus personatus*, were new records to India, and a new variety *Brachionus forficula keralaiensis* has also been described . They were the following,

Anuraeopsis fissa fissa(Gosse,1851)

Anuraeopsis fissa lata Berzins,1962

Brachionus angularis Gosse,1851

Brachionus caudatus personatus Ahlstrom,1940

Brachionus calyciflorus Pallas,1776

Brachionus falcatus Zacharias ,1898

Brachionus forficula keralaiensis var.nov

Brachionus quadridentatus Herman,1783

Dipleuchlanis propatula(Gosse,1886)

Keratella procurva(Thorpe,1891)

Mytilina ventralis (Ehrenberg,1832)

Platyias patulus O.F.Müller, 1788

Platyias quadricornis (Ehrenberg, 1832)

Trichotria tetractis (Ehrenberg, 1830)

In addition, Nayar (1970) made significant observations on the rotifer populations of two ponds in Pilani, Rajasthan, and emphasised the role of temperature as a single factor controlling the population of *Keratella tropica*. Besides , Nair & Nayar (1971) reported 18 species of the rotifers, of these, *Lepadella ehrenbergi*, *Lepadella cristata*, *Lepadella ovalis* and *Lepadella*

patella were reported for the first time from Kerala and one rotifer *Lepadella cristata* was a new record from India.

Anuraeopsis fissa fissa Gosse, 1851

Anuraeopsis fissa lata Berzins, 1962

Brachionus quadridentatus Hermann, 1783

Brachionus calyciflorus Pallas, 1776

Brachionus angularis Gosse, 1851

Brachionus falcatus Zacharias, 1898

Brachionus forficula Wierzejski, 1891

Brachionus caudatus f. *personatus* Ahlstrom, 1940

Keratella tropica (Apstein, 1907)

Keratella procurva (Thorpe, 1891)

Mytilina ventralis (Ehrenberg, 1832)

Platyias patulus O.F.Müller, 1788

Macrochaetus subquadratus Perty, 1850

Trichotria tetractis (Ehrenberg, 1830)

Lepadella ovalis (O.F.Müller, 1786)

Lepadella patella (O.F.Müller, 1786)

Lepadella ehrenbergi Haring, 1916

Lepadella cristata Haring, 1913

Rajendran (1971) described a new species *Conchhilus arboreus* sp.nov from Madurai, Tamil Nadu .

Nair (1972) enlisted 4 sessile rotifers from Irinjalakuda , Kerala , of these 3 were new records from India. They were the following,

Lacinularia flosculosa (O.F.Müller, 1773)

Sinantherina ariprepes (Edmondson, 1939)

Ptygura pilula (Cubit, 1872)

Collothea discophora (Skorikov, 1903)

Michael (1973) made the preliminary knowledge on the taxonomy of Rotifers from Tamil Nadu, and published a book titled, “ A guide to the study of Freshwater organisms” in which he contributed a chapter on Rotifera with 20 commonly occurring rotifers with diagrams and taxonomic key.

From Andhra Pradesh, Dhanapathi (1974a,1974b,1975a,1975b, 1976a,1976b, 1976c,1977,1978b) added a good number of rotifers to Indian fauna ,including a new species . Dhanapathi (1974a) reported first time the occurrence of a new sub species *Platyias quadricornis andhraensis* sub sp. nov. from Hussain Sagar reservoir in Hyderabad. In the same year, Dhanapathi (1974b) recorded twenty species of rotifers belonging to 9 genera , and described a new Brachionid species, *Brachionus durgae* and a new variety *Brachionus calyciflorus hymani* var.nov in the family Brachionidae . They were the following,

- Brachionus bidentata* Anderson,1889
- Brachionus quadridentatus* Hermann,1783
- Brachionus falcatus* Zacharias,1898
- Brachionus durgae* sp.nov
- Brachionus caudatus* Barrois & Daday,1894
- Brachionus forficula* Wierzejski,1891
- Brachionus calyciflorus* hymani var.nov
- Brachionus calyciflorus* var.*dorcas* Gosse,1851
- Brachionus diversicornis* Daday,1883
- Brachionus angularis* Gosse,1851
- Keratella tropica* Apstein,1907
- Keratella cochlearis* Gosse,1851
- Platyias patulus* O.F.Müller,1788
- Platyias quadricornis* Ehrenberg,1832
- Macrochaetus serica* Thorpe,1893
- Mytilina ventralis* Ehrenberg,1832

Euchlanis orpha Gosse, 1887

Beauchampiella eudactylosum Remane, 1929

Trichotria tetractis Ehrenberg, 1813

Epiphanes clavulata Ehrenberg, 1832

Tripleuchlanis plicata, which Dhanapathi (1975a) reported from Municipal Tank, Kaikalur Krishna Dt, Andhra Pradesh, was the first record of this species from India. Later, Dhanapathi (1975b) recorded 11 species of freshwater rotifers belonging to 6 genera and 3 families from different parts of Andhra Pradesh. Moreover, a new species, *Asplanchnopus* was described from the Edward's Tank, Bhimavaram. They were the following,

Cephalodella forficula Ehrenberg, 1832

Cephalodella piulca Myers, 1924

Eospora najas Ehrenberg, 1830

Eosphora anthadis Harring & Myers, 1921

Notommata copeus Ehrenberg, 1834

Dicranophorus dolerus Harring & Myers, 1927

Dicranophorus tegillus Harring & Myers, 1927

Asplanchna brightwelli Gosse, 1850

Asplanchna intermedia Hudson, 1886

Asplanchnopus bhimavaramensis sp.nov

Asplanchnopus hyalinus Harring, 1917

Dhanapathi(1976a) described a new species of *Euchlanis brahmae*, from Edwards Tank ,Bhimavaram, Andhra Pradesh. In the same year , Dhanapathi (1976b)also reported 18 species of rotifers , belonging to genus *Lecane* and family Lecanidae, including two new species of rotifers , *Lecane donnerianus* sp. nov and *Lecane bidentata* sp.nov from Andhra Pradesh. They were the following,

Lecane curvicornis(Murray, 1913)

Lecane unguolata(Gosse, 1887)

Lecane donnerianus sp.nov

Lecane bidentata sp.nov
Lecane leontina(Turner,1892)
Lecane luna (O.F. Müller,1776)
Lecane papuana(Murray,1913)
Lecane ludwigii (Eckstein,1883)
Lecane lauterborni (Hauer,1924)
Lecane inopinata (Harring & Myers,1927)
Lecane hornemanni(Ehrenberg,1881)
Monostyla bulla (Gosse,1851)
Monostyla styrax (Harring & Myers,1926)
Monostyla quadridentata(Ehrenberg,1832)
Monostyla tethis (Harring & Myers,1926)
Monostyla stenroosi(Meissner,1908)
Monostyla hamata (Stokes,1896)

Dhanapathi(1976c) described a new species ,*Lecane eswari* sp.nov from Andhra Pradesh. Dhanapathi(1977) studied the distribution of *Brachionus calyciflorus* in India and one of the varieties ,*Brachionus* var. *borgerti* was reported first time from India. Dhanapathi (1978b) described a new rotifer genus and a new species, *Pseudoeuchlanis longipedis* gen.et.sp.nov, belonging to family Brachionidae from Andhra Pradesh.

Sharma, B.K made a remarkable contribution to the knowledge of Indian Rotifer fauna especially to North Indian rotifer biodiversity by publishing innumerable number of research papers from 1976 to 2000.

Sharma(1978a) enlisted 36 lecanid rotifers including a new combination ,*Lecane luna* f. *dorsicalis* from different parts of West Bengal State.

Lecane (Lecane) aculeata (Jakubski, 1912)
Lecane (Lecane) arcuata Harring, 1914
Lecane (Lecane) crepida Harring, 1914

- Lecane (Lecane) curvicornis* Murray, 1913
- Lecane (Lecane) curvicornis* var. *miamensis* Myers, 1941
- Lecane (Lecane) flexilis* (Gosse, 1886)
- Lecane (Lecane) leontina* (Turner, 1892)
- Lecane (Lecane) ludwigii* (Eckstein, 1883)
- Lecane (Lecane) ludwigii* f. *brevicaudata* Hauer, 1938
- Lecane (Lecane) ludwigii* f. *lacunculata* Hauer, 1938
- Lecane (Lecane) ludwigii* f. *laticaudata* Hauer, 1938
- Lecane (Lecane) luna* (O.F.Müller, 1776)
- Lecane (Lecane) luna* f. *dorsicalis* Comb. nov
- Lecane (Lecane) nana* (Murray, 1913)
- Lecane (Lecane) ohioensis* (Herrick, 1885)
- Lecane (Lecane) papuana* (Murray, 1913)
- Lecane (Lecane) ploenensis* (Voigt, 1902)
- Lecane (Lecane) pusilla* Harring, 1914
- Lecane (Lecane) ungulata* (Gosse, 1887)
- Lecane (Lecane) verecunda* Harring & Myers, 1926
- Lecane (Hemimonostyla) inopinata* Harring & Myers, 1929
- Lecane (Hemimonostyla) sympoda* Hauer, 1929
- Lecane (Monostyla) bulla* Gosse, 1851
- Lecane (Monostyla) clostocerca*(Schmarda, 1859)
- Lecane (Monostyla) crenata* (Harring, 1913)
- Lecane (Monostyla) decipiens* (Murray, 1913)
- Lecane (Monostyla) furcata* Murray, 1913
- Lecane (Monostyla) hamata* (Stokes, 1859)
- Lecane (Monostyla) lunaris* (Ehrenberg, 1832)
- Lecane (Monostyla) quadridentata* (Ehrenberg, 1832)
- Lecane (Monostyla) pawlowskii* Wulfert, 1966
- Lecane (Monostyla) pyriformis* (Daday, 1905)
- Lecane (Monostyla) sinuta* (Hauer, 1938)
- Lecane (Monostyla) stenroosi* (Meissner, 1908)

Lecane (Monostyla) thalera (Harring & Myers, 1926)

Lecane (Monostyla) unguitata (Fadeev, 1925)

Sharma (1978b) also listed 13 species belonging to the genus *Lepadella* including one new species *Lepadella triprojectus* sp.nov and form *Lepadella ovalis* f. *larga*, collected from Calcutta and neighbouring areas. Of these, 7 species were new records from this region.

Lepadella acuminata (Ehrenberg, 1834)

Lepadella aspicora Myers, 1934

Lepadella aspida Harring, 1916

Lepadella ehrenbergi (Perty, 1850)

Lepadella heterostylata (Murray, 1913)

Lepadella imbricata Harring, 1916

Lepadella ovalis (O.F.Müller, 1786)

Lepadella ovalis f. *larga* new.form

Lepadella patella (O.F.Müller, 1773)

Lepadella quadricarinata (Stenroos, 1898)

Lepadella rhombiodes (Gosse, 1884)

Lepadella rhombiodula (Bryce, 1890)

Lepadella triprojectus sp.nov

Lepadella tripetera Ehrenberg, 1830

Sharma (1978c) described one new species ,*Lecane lateralis* sp.nov and new form , *Lecane crepida* f. *bengalensis* of genus *Lecane* , family Lecanidae from the collections made from Calcutta and neighbouring areas.

Sharma (1979c) reported 41 freshwater rotifers taxa belonging to 5 Eurotatorien families such as Brachionidae, Euchlanidae, Mytilinidae, Trichotridae and Colurellidae. Of these , 29 were new records from North – Eastern region of Indian sub Continent and 7 were new records from India.

Anuraeopsis coelata (De Beauchamp, 1932)

Anuraeopsis fissa (Gosse, 1851)

Brachionus angularis Gosse, 1851

- Brachionus bidentata* Anderson, 1889
- Brachionus bidentata* f. *adorna* Wulfert, 1966
- Brachionus budapestinensis* Daday, 1885
- Brachionus calyciflorus* var. *dorcas* (Gosse, 1851)
- Brachionus calyciflorus* f. *anuraeiformis* (Brehm, 1909)
- Brachionus calyciflorus* cf. *borgerti* (Apstein, 1907)
- Brachionus caudatus* var. *personatus* Ahlstrom, 1940
- Brachionus caudatus* var. *aculeatus* (Hauer, 1937)
- Brachionus caudatus* v. *aculeatus* f. *lateralis* (Hauer, 1937)
- Brachionus caudatus* f. *vulgatus* Ahlstrom, 1940
- Brachionus diversicornis* (Daday, 1883)
- Brachionus forficula* Wierzejski, 1891
- Brachionus forficula* f. *minor* (Voronkov, 1913)
- Brachionus falcatus* Zacharias, 1898
- Brachionus patulus* O.F. Müller, 1786
- Brachionus plicatilis* O.F. Müller, 1786
- Brachionus pterodinoides* Rousselet, 1913
- Brachionus quadridentatus* Hermann, 1783
- Brachionus quadridentatus mirabilis* (Daday, 1897)
- Brachionus quadridentatus* var. *cluniorbicularis* (Skorikov, 1893)
- Brachionus rubens* Ehrenberg, 1838
- Brachionus urceolaris* O.F. Müller, 1773
- Keratella cochlearis* (Gosse, 1851)
- Keratella lenzi* Hauer, 1938
- Keratella procurva* (Thorpe, 1891)
- Keratella quadrata* (O.F. Müller, 1786)
- Keratella tropica* (Apstein, 1907)
- Platylas quadricornis* (Ehrenberg, 1832)
- Euchlanis dilatata* Ehrenberg, 1832
- Euchlanis oropha* Gosse, 1887
- Dipleuchlanis propatula* (Gosse, 1886)

Tripleuchlanis plicata (Levander, 1894)

Mytilina acanthophora Hauer,1938

Mytilina ventralis (Ehrenberg,1832)

Mytilina ventralis f. *longidactyla* Wulfurt,1965

Macrochaetus sericus (Thorpe,1893)

Trichotria tetractis (Ehrenberg, 1830)

Colurella bicuspidata Ehrenberg, 1832

Sharma(1979d) recorded 25 eurotatorien species from Calcutta and Lower Bengal , of these 18 species were new reports from the West Bengal state and 6 species were new records from India.

Cephalodella auriculata (O.F. Müller,1773)

Cephalodella catellina (O.F. Müller,1776)

Cephalodella forficula(Ehrenberg,1832)

Cephalodella gibba(Ehrenberg,1832)

Cephalodella mucronata Haring & Myers, 1924

Scaridium longicaudum (O.F. Müller,1786)

Trichocerca braziliensis(Murray,1913)

Trichocerca rattus (O.F. Müller,1776)

Trichocerca similis (Wierzejski,1893)

Trichocerca tigris (O.F. Müller,1786)

Trichocerca weberi (Jennings,1903)

Asplanchna brightwelli Gosse,1850

Asplanchna priodonta Gosse,1850

Polyarthra vulgaris Carlin,1943

Dicranophorus forcipatus (O.F. Müller,1773)

Dicranophorus lutkeni(Bergendal, 1892)

Conochiloides natans (Silego,1900)

Hexarthra mira (Hudson,1871)

Pompholyx sulcata Gosse,1851

Testudinella patina (Hermann, 1783)

Filinia longiseta (Ehrenberg, 1834)

Filinia opoliensis (Zacharias, 1898)

Filinia pejleri Hutchinson, 1964

Höraella brehmi Donner, 1949

Rotaria neptunia (Ehrenberg, 1832)

Sharma (1980a) reported 20 rotifer species belonging to the family Brachionidae from various localities in Punjab State, North-West India. Of these, 8 species were new records to North West India and one, a new record from India.

Brachionus diversicornis (Daday, 1883)

Brachionus falcatus Zacharias, 1898

Brachionus forficula Wierzejski, 1891

Brachionus leydigi Cohn, 1862

Brachionus patulus O.F. Müller, 1786

Brachionus plicatilis O.F. Müller, 1786

Brachionus quadridentatus Hermann, 1783

Brachionus rubens Ehrenberg, 1838

Brachionus urceolaris O.F. Müller, 1773

Keratella lenzi Hauer, 1938

Keratella procurva (Thorpe, 1891)

Keratella tropica (Apstein, 1907)

Platyias quadricornis (Ehrenberg, 1832)

Sharma (1980b) reported 36 species from Sambalpur, Orissa. Out of these, 15 species were added to the rotifer fauna list of Orissa state and one species, *Lepadella longiseta* Myers, 1934 was a new record from India.

Anuraeopsis coelata (De Beauchamp, 1932)

Brachionus angularis Gosse, 1851

Brachionus bidentata Anderson, 1889

- Brachionus calyciflorus* Pallas, 1776
- Brachionus caudatus* Borris & Daday, 1894
- Brachionus diversicornis* (Daday, 1883)
- Brachionus falcatus* Zacharias, 1898
- Brachionus forficula* Wierzejski, 1891
- Brachionus patulus* O.F.Müller, 1786
- Brachionus quadridentatus* Hermann, 1783
- Brachionus rubens* Ehrenberg, 1838
- Keratella procurva* (Thorpe, 1891)
- Keratella tropica* (Apstein, 1907)
- Platylabus quadricornis* (Ehrenberg, 1832)
- Euchlanis dilatata* Ehrenberg, 1832
- Mytilina ventralis* (Ehrenberg, 1832)
- Trichotria tetractis* (Ehrenberg, 1830)
- Lepadella longiseta* Myers, 1934
- Lepadella ovalis* (O.F.Müller, 1786)
- Lepadella patella* (O.F.Müller, 1786)
- Lepadella rhombiodes* (Gosse, 1884)
- Lecane (Lecane) crepida* Murray, 1913
- Lecane (Lecane) leontina* (Turner, 1892)
- Lecane (Lecane) ludwigii* (Eckstein, 1883)
- Lecane (Lecane) luna* (O.F.Müller, 1776)
- Lecane (Lecane) unguolata* (Gosse, 1887)
- Lecane (Monostyla) bulla* Gosse, 1851
- Lecane (Monostyla) clostocerca* Schmarda, 1859
- Lecane (Monostyla) decipiens* (Murray, 1913)
- Lecane (Monostyla) hamata* (Stokes, 1859)
- Lecane (Monostyla) quadridentata* (Ehrenberg, 1832)
- Polyarthra vulgaris* Carlin, 1943
- Testudinella patina* (Hermann, 1783)
- Filinia longiseta* (Ehrenberg, 1834)

Filinia opoliensis (Zacharias,1898

Höraella brehmi Donner,1949

Jothi and Sehgal (1980) studied the rotifer fauna from the high mountains of Jemmu and Kashmir.

Sharma & Michael (1980) published a research paper which dealt with the synopsis of taxonomic studies on Indian Rotatoria. They made a comprehensive check list of total 241 rotifer species which were reported so far from India. These rotifers were reported from India belong to 21 Eurotatorien families and 48 genera. And they also included the state-wise check list of the recorded rotifer species.

Saksena (1984) studied the form variation of Indian loricate rotifers such as *Brachionus calyciflorus*, *Keratella tropica* , *Keratella valga*, and *Platyias patulus* . He stated that temperature was not only a key factor for the variation but other factors such as nutrients, pH, dissolved oxygen ,food availability, inter specific competition and the presence of *Asplanchna* sp also influenced the form variation among the rotifers.

Sharma & Sharma (1984) reported 35 species of rotifers belonging to 13 families from Punjab state, of these ten species were new to this state and 8 new to North – Western India.

Euchlanis dilatata Ehrenberg ,1832

Euchlanis triquetra Ehrenberg ,1838

Dipleuchlanis propatula (Gosse,1886)

Mytilina acanthophora Hauer,1938

Mytilina ventralis (Ehrenberg,1832)

Trichotria tetractis (Ehrenberg, 1830)

Lepadella aspida (Harring,1916)

Lepadella ovalis (O.F.Müller, 1786)

Lepadella patella (O.F.Müller, 1786)
Lepadella triptera (Ehrenberg, 1830)
Lecane (Lecane) crepida Harring, 1914
Lecane (Lecane) leontina (Turner, 1892)
Lecane (Lecane) ludwigii (Eckstein, 1883)
Lecane (Lecane) luna (O.F.Müller, 1776)
Lecane (Lecane) unguolata (Gosse, 1887)
Lecane (Monostyla) bulla (Gosse, 1851)
Lecane (Monostyla) clostocerca (Schmarda, 1859)
Lecane (Monostyla) decipiens (Murray, 1913)
Lecane (Monostyla) furcata (Murray, 1913)
Lecane (Monostyla) hamata (Stokes, 1896)
Lecane (Monostyla) quadridentata (Ehrenberg, 1832)
Lecane (Monostyla) unguitata (Fadeev, 1925)
Cephalodella forficula (Ehrenberg, 1832)
Cephalodella gibba (Ehrenberg, 1832)
Trichocerca similis (Wierzejski, 1893)
Trichocerca weberi (Jennings, 1903)
Asplanchna brightwelli Gosse, 1850
Polyarthra vulgaris Carlin, 1943
Filinia opoliensis (Zacharias, 1898)
Filinia pejleri Hutchinson, 1964
Filinia longiseta (Ehrenberg, 1834)
Hexarthra mira (Hudson, 1871)
Testudinella patina (Hermann, 1783)
Pompholyx sulcata Hudson, 1885
Höraella brehmi Donner, 1949

Sharma & Saksena (1984) studied the form variations in the rotifer *Brachionus calyciflorus*, such as *B. calyciflorus dorcas* and *B. calyciflorus ampiceros* were recognised from the Perennial Impoundment in India. He

revealed that the form *B. calyciflorus amphiceros* was the most abundant form and the occurrence was attributed to the presence of carnivore rotifer, *Asplanchna brightwelli* in the tank.

Sharma & Pant(1984 and 1985) studied the Zooplankton species composition in two Kumaun lakes such as Lake Bhimtal and Lake Nainital . They reported that the population density of rotifers was higher in Nainital Lake than Bhimtal Lake. They recorded 66 species of rotifers out of 88 species of Zooplankters, including Copepoda and Cladocera.

Saksena & Sharma (1986) studied the morphological variations of freshwater rotifer , *Keratella tropica* from perennial pond, Janaktal, Gwalior, Madhya Pradesh and the morphological forms ,viz. *reducta* , *asymmetrica* and *heterospina* were recognised .

Saksena & Kulkarni (1986) studied the rotifer fauna of two Sewage channels of Gwalior and reported twenty species of rotifer species belonging to 5 families and 11 genera. They were the following,

- Brachionus angularis* Gosse,1851
- Brachionus bidentata* Anderson,1889
- Brachionus calyciflorus* Pallas,1766
- Brachionus falcatus* Zacharias, 1898
- Brachionus patulus* O.F.Müller ,1786
- Brachionus quadridentatus* Hermann,1783
- Brachionus rubens* Ehrenberg,1838
- Keratella tropica* (Apstein,1907)
- Platylabus quadricornis*(Ehrenberg,1832)
- Mytilina ventralis* (Ehrenberg,1832)
- Trichotria tetractis* (Ehrenberg, 1830)
- Lecane ludwigii* (Eckstein, 1883)

Lecane curvicornis (Murray, 1913)

Lecane luna (Muller, 1776)

Monostyla bulla Gosse, 1851

Monostyla quadridentata (Ehrenberg, 1832)

Trichocerca cylindrica (Imhof, 1891)

Polyarthra vulgaris Carlin, 1943

Testudinella patina (Hermann, 1783)

Filinia longiseta (Ehrenberg, 1834)

Saksena *et al* (1986) studied the zooplankton composition of temporary water pools of Gwalior, Madhya Pradesh and they reported the rotifers were the dominant group among the other Zooplankters. They were the following,

Brachionus calyciflorus (Pallas, 1776)

Brachionus angularis Gosse, 1851

Brachionus bidentata Anderson, 1889

Brachionus quadridentatus Hermann, 1783

Brachionus rubens Ehrenberg, 1838

Brachionus urceolaris O.F. Müller, 1773

Brachionus(Platyias) patulus O.F. Müller, 1786

Asplanchna brightwelli Gosse, 1850

Polyarthra vulgaris Carlin, 1943

Filinia longiseta (Ehrenberg, 1834)

Filinia terminalis (Edmondson & Hutchinson, 1964)

Sharma (1987a) discussed the taxonomic status of family Brachionidae from his collections and previous literatures reported from India, and presented 31 valid species including two new records, from this country. The new records were

Brachionus bennini Leissling, 1924

Brachionus patulus macracanthus Daday, 1905

Sharma(1987b) reported 30 rotifer species(32 taxa) of the genus *Lecane* and family Lecanidae , described one new species, *Lecane jaintiaensis* sp.nov, from North Eastern India. Of these, 7 taxa were new to India, while 25 taxa were new records to North Eastern region.

- Lecane (Lecane) aculeata* (Jakubski, 1912)
Lecane (Lecane) arcula Harring, 1914
Lecane (Lecane) crepida Harring, 1914
Lecane (Lecane) curvicornis f. *nitida* (Murray, 1913)
Lecane (Lecane) doryssa Harring, 1914
Lecane (Lecane) flexilis (Gosse, 1886)
Lecane (Lecane) hornemanni (Ehrenberg,1834)
Lecane (Lecane) leontina (Turner, 1892)
Lecane (Lecane) luna (Muller, 1776)
Lecane (Lecane) ludwigii (Eckstein, 1883)
Lecane (Lecane) haliclysta Harring & Myers,1926
Lecane (Lecane) inermis (Bryce,1892)
Lecane (Lecane) papuana (Murray, 1913)
Lecane (Lecane) pertica Harring & Myers,1926
Lecane (Lecane) signifera signifera (Jennings,1896)
Lecane (Lecane) signifera f. *ploenensis*(Voigt,1902)
Lecane (Lecane) jaintiaensis sp.nov
Lecane (Lecane) ungulata (Gosse,1887)
Lecane(Hemimonostyla) inopinata Harring & Myers,1926
Lecane (Monostyla) bulla Gosse, 1851
Lecane (Monostyla) clostocerca(Schmarda, 1859)
Lecane (Monostyla) decipiens (Murray, 1913)
Lecane (Monostyla) furcata Murray, 1913
Lecane (Monostyla) hamata (Stokes, 1859)
Lecane (Monostyla) lunaris lunaris(Ehrenberg, 1832)
Lecane (Monostyla) lunaris f.*crenata* (Harring,1913)

Lecane (Monostyla) pyriformis (Daday, 1905)
Lecane (Monostyla) quadridentata (Ehrenberg, 1832)
Lecane (Monostyla) scutata(Harring & Myers, 1926)
Lecane (Monostyla) stenroosi (Meissner, 1908)
Lecane (Monostyla) thienemanni (Hauer,1938)
Lecane (Monostyla) unguitata (Fadeev,1925)

Sharma(1987c) made an extensive survey of freshwater rotifers from the Orissa state and he reported 69 species(75 taxa) belonging to 22 genera and 13 families . Of these 33 species (37 taxa) were new records to this state .

Anuraeopsis coelata (De Beauchamp, 1932)
Anuraeopsis fissa (Gosse, 1851)
Brachionus angularis Gosse, 1851
Brachionus bidentata Anderson,1889
Brachionus budapestinensis Daday, 1885
Brachionus calyciflorus f. dorcas (Gosse,1851)
Brachionus calyciflorus f. anuraeiformis (Brehme,1909)
Brachionus calyciflorus f. borgerti (Apstein,1907)
Brachionus caudatus f. personatus Ahlstrom, 1940
Brachionus caudatus f. aculeatus (Hauer,1937)
Brachionus diversicornis (Daday,1883)
Brachionus forficula Wierzejski ,1891
Brachionus forficula f.minor (Voronkov,1913)
Brachionus falcatus Zacharias, 1898
Brachionus patulus O.F.Müller ,1786
Brachionus patulus macracanthus (Daday,1893)
Brachionus plicatilis O.F.Müller ,1786
Brachionus quadridentatus Hermann,1783
Brachionus quadridentatus f. cluniorbicularis (Skorikov, 1893)
Brachionus quadridentatus f. melheni (Borris & Daday,1894)
Brachionus rubens Ehrenberg,1838

- Keratella lenzi* Hauer, 1938
Keratella procurva (Thorpe, 1891)
Keratella tropica (Apstein, 1907)
Platyias quadricornis (Ehrenberg, 1832)
Euchlanis dilatata Ehrenberg, 1832
Dipleuchlanis propatula (Gosse, 1886)
Tripleuchlanis plicata (Levander, 1894)
Mytilina acanthophora Hauer, 1938
Mytilina ventralis (Ehrenberg, 1832)
Macrochaetus sericus (Thorpe, 1893)
Trichotria tetractis (Ehrenberg, 1830)
Lepadella acuminata (Ehrenberg, 1834)
Lepadella (*Lepadella*) *longiseta* Myers, 1937
Lepadella (*Lepadella*) *ovalis* (O.F.Müller, 1786)
Lepadella (*Lepadella*) *patella* (O.F.Müller, 1786)
Lepadella (*Lepadella*) *rhombiodes* (Gosse, 1884)
Lepadella (*Heterolepadella*) *ehrenbergi* (Perty, 1850)
Lepadella (*Heterolepadella*) *heterostyla* (Murray, 1917)
Lecane (*Lecane*) *aculeata* (Jakubski, 1912)
Lecane (*Lecane*) *curvicornis* Murray, 1913
Lecane (*Lecane*) *crepida* Haring, 1914
Lecane (*Lecane*) *flexilis* (Gosse, 1886)
Lecane (*Lecane*) *leontina* (Turner, 1892)
Lecane (*Lecane*) *ludwigii* (Eckstein, 1883)
Lecane (*Lecane*) *luna* (O.F.Müller, 1776)
Lecane (*Lecane*) *lateralis* Sharma, 1978
Lecane (*Lecane*) *ungulata* (Gosse, 1887)
Lecane (*Hemimonostyla*) *inopinata* Haring & Myers, 1929
Lecane (*Monostyla*) *bullata* Gosse, 1851
Lecane (*Monostyla*) *clostocerca* (Schmarda, 1859)
Lecane (*Monostyla*) *decipiens* (Murray, 1913)

Lecane (Monostyla) hamata (Stokes, 1859)
Lecane (Monostyla) pyriformis (Daday, 1905)
Lecane (Monostyla) stenroosi (Meissner, 1908)
Lecane (Monostyla) unguitata (Fadeev, 1925)
Cephalodella mucronata Haring & Myers, 1924
Scaridium longicaudum (O.F. Müller, 1786)
Trichocerca (Trichocerca) cylindrica (Imhof, 1891)
Trichocerca (Trichocerca) flagellata Hauer, 1937
Trichocerca (Trichocerca) rattus (O.F. Müller, 1776)
Trichocerca (Diurella) similis (Wierzejski, 1893)
Asplanchna brightwelli Gosse, 1850
Polyarthra vulgaris Carlin, 1943
Testudinella patina (Hermann, 1783)
Pompholyx sulcata Hudson, 1885
Filinia longiseta (Ehrenberg, 1834)
Filinia opoliensis (Zacharias, 1898)
Filinia pejlery Hutchinson, 1964
Höraella brehmi Donner, 1949

In the same year, Sharma & Sharma (1987a) recorded 10 species of rotifers belonging to the genus *Lepadella*, of these he described a new species, *Lepadella nartiangensis* sp.nov and *Lepadella patella* f. *elongata* a new form from North Eastern region of India. Out of these, two species were new records from India and six species were new reports from North Eastern region.

Lepadella acuminata (Ehrenberg, 1834)
Lepadella cristata (Rousselet, 1893)
Lepadella dactyliseta (Stenroos, 1898)
Lepadella ovalis (O.F. Müller, 1786)
Lepadella patella (O.F. Müller, 1786)
Lepadella patella f. *elongata* new form
Lepadella rhombiodes (Gosse, 1884)

Lepadella nartiangensis sp.nov

Lepadella triptera Ehrenberg, 1830

Lepadella (Heterolepadella) ehrenbergi (Perty, 1850)

Lepadella (Heterolepadella) heterostylata (Murray, 1913)

Sharma & Sharma (1987b) recorded 9 species of family Notommatidae from North-Eastern India. Of these, the genus *Monommata* was reported first time from India. Besides, 4 species were new records from India and 8 species were new records to this region.

Cephalodella gibba (Ehrenberg, 1832)

Cephalodella mucronata Myers, 1924

Cephalodella ventripes Dixon-Nuttall, 1901

Cephalodella catellina (O.F.Müller)

Cephalodella forficata (Ehrenberg, 1832)

Cephalodella intuta Myers 1934

Sarma (1988) reported 25 rotifers as new records to India from the plankton samples collected from the various localities of India, but mostly from Delhi region.

Cyrtonia tuba (Ehrenberg, 1834)

Epiphanes macrourus (Barrois & Daday, 1894)

Liliferotrocha subtilis (Rodewald, 1940)

Microcodides chleana (Gosse, 1886)

Brachionus dimidiatus (Bryce, 1931)

Keratella ticinensis (Callerio, 1920)

Notholoc labis (Gosse, 1887)

Platyias leloupi (Gillard, 1957)

Euchlanis incisa Carlin, 1939

Mytilina bisulcata (Lucks, 1912)

Wolga spinifera (Western, 1894)

Lecane (Lecane) althausi Rudescu, 1960

Lecane (Lecane) doryssa Harring,1914
Lecane (Lecane) elongata Harring & Myers,1926
Lecane (Monostyla) bifurca (Bryce,1892)
Lecane (Monostyla) lamellata thalera (Harring & Myers,1926)
Lecane(Hemimonostyla) blachei Brezins,1973
Cephalodella gigantea Remane,1933
Notommata arndti Remane ,1933
Trichocerca (Trichocerca) pusilla (Lauterborn,1898)
Testudinella emarginula (Stenroos,1898)
Ptygura melicerta Ehrenberg1832
Ptygura tacita Edmondson ,1970
Filinia cornuta (Weisze,1847)
Collotheca mutabilis (Hudson,1885)
Collotheca ornata (Ehrenberg,1832)
Collotheca trilobata (Collins,1872)

Sharma & Sharma (1988) reported 35 species of rotifers from Ambala district ,Haryana state, of these 20 species were new records from North West region.

Brachionus angularis Gosse,1851
Brachionus bidentata Anderson,1889
Brachionus budapestinensis Daday, 1885
Brachionus caudatus Borris& Daday,1885
Brachionus calyciflorus Pallas,1766
Brachionus diversicornis (Daday,1883)
Brachionus falcatus Zacharias, 1898
Brachionus forficula Wierzejski ,1891
Brachionus quadridentatus Hermann,1783
Brachionus patulus O.F.Müller ,1786
Brachionus rubens Ehrenberg,1838
Keratella procurva (Thorpe,1891)

Keratella tropica (Apstein,1907)
Platylas quadricornis(Ehrenberg,1832)
Euchlanis dilatata Ehrenberg ,1832
Mytilina acanthophora Hauer,1938
Mytilina ventralis (Ehrenberg,1832)
Trichotria tetractis (Ehrenberg, 1830)
Colurella obtusa (Gosse,1886)
Lepadella ovalis (O.F.Müller, 1786)
Lepadella patella (O.F.Müller, 1773)
Lecane curvicornis Murray, 1913
Lecane luna (Muller, 1776)
Lecane bulla Gosse, 1851
Lecane clostocerca(Schmarda, 1859)
Cephalodella forficula(Ehrenberg,1832)
Cephalodella mucronata Haring & Myers, 1924
Trichocerca similis (Wierzejski,1893)
Asplanchna brightwelli Gosse,1850
Polyarthra vulgaris Carlin,1943
Hexarthra cf. mira (Hudson,1871)
Filinia longiseta(Ehrenberg,1834)
Filinia opoliensis (Zacharias,1898)]
Testudinella patina (Hermann, 1783)
Pompholyx sulcata Gosse,1851

Patil & Gouder (1989) published a book entitled “ Freshwater Invertebrates of Dharwad” and they contributed a chapter “Rotifera” and described 61 species with diagrams. This work is considered as a reference for the taxonomic studies of the Freshwater invertebrates of Karnataka State.

Sampathkumar (1990) studied the taxonomic composition and distribution of rotifer *Brachionus* populations in four freshwater fish ponds

from Tuticorin , Tamil Nadu, and reported total 7 species(10 taxa). They were the following,

Brachionus calyciflorus v. *anuraeiformis* Brehm,1909

Brachionus calyciflorus v. *dorcas* Gosse,1851

Brachionus calyciflorus v. *hymani* Dhanapathi , 1974

Brachionus plicatilis O.F.Müller,1786

Brachionus angularis v. *angularis* Gosse,1851

Brachionus angularis v. *bidens* Plate,1886

Brachionus urceolaris v. *urawensis* Suduzki,1964

Brachionus caudatus v. *aculeatus* Hauer,1937

Brachionus falcatus v. *lyratus* Lemmerman,1908

Brachionus quadridentatus v. *rhenanus* Lauterborn,1893

Sharma (1990) added to the rotifer fauna list ,9 species and a sub species of genus *Testudinella* from North-Eastern India. Of these , 6 were new records from India and 8 species were new reports from North Eastern region.

Testudinella patina patina (Hermann, 1783)

Testudinella patina intermedia (Anderson,1889)

Testudinella brevicaudata (Yamamoto,1951)

Testudinella parva parva (Ternetz,1892)

Testudinella parva bidentata (Ternetz,1892)

Testudinella parva semiparva (Hauer,1938)

Testudinella tridentata (Smirnov,1931)

Testudinella greeni(Koste,1981)

Testudinella emarginula (Stenroos, 1898)

Sharma (1991) contributed a chapter on Rotifera to the book , “ Animal resources of India” published by Zoological survey of India. He made an attempt to present a concise account of the Indian Rotifer research history , enumeration of rotifer species from India , geographical distribution and

current research studies. He reported 310 rotifer species(345 taxa) belonging to 24 families and 60 genera so far from India.

Sharma (1991) made an admirable effort to study the status and distribution of some new records of rotifers from India comparing with specimens collected from various localities in West Bengal and Indian rotifer research papers.

Sharma & Dudani (1992) reported 53 species (57 species and sub species) belonging to 22 genera and 16 families from five fishponds from Bihar state. Among these, *Filinia longiseta saltator*, *Mytilina ventralis macracantha*, *Trichocerca bicristata* and *Trichocerca rattus carinata* were the first reports from India. And they noticed some of the *Brachionus falcatus* infected by microsporid , a parasite ,*Bertramia asperospora*, and it was the first report of parasitism on the rotifers from India.

Anuraeopsis fissa (Gosse, 1851)

Brachionus angularis Gosse, 1851

Brachionus calyciflorus dorcas (Gosse, 1851)

Brachionus calyciflorus anuraeiformis (Brehm, 1909)

Brachionus caudatus personatus Ahlstrom, 1940

Brachionus caudatus aculeatus (Hauer, 1937)

Brachionus diversicornis (Daday, 1883)

Brachionus falcatus Zacharias, 1898

Brachionus forficula Wierzejski, 1891

Brachionus mirabilis (Daday, 1897)

Brachionus patulus O.F.Müller, 1786

Brachionus quadridentatus Hermann, 1783

Brachionus rubens Ehrenberg, 1838

Keratella tropica (Apstein, 1907)

Platyias quadricornis (Ehrenberg, 1832)

Epiphanes macrourus (Barrois & Daday, 1894)
Euchlanis dilatata Ehrenberg, 1832
Euchlanis triquetra Ehrenberg, 1838
Dipleuchlanis propatula (Gosse, 1886)
Beauchampiella eudactylota (Gosse, 1886)
Mytilina ventralis (Ehrenberg, 1832)
Mytilina ventralis macracantha (Gosse, 1886)
Trichotria tetractis (Ehrenberg, 1830)
Colurella uncinata (O.F.Müller, 1773)
Lepadella acuminata (Ehrenberg, 1834)
Lepadella heterostyla (Murray, 1913)
Lepadella ovalis (O.F.Müller, 1786)
Lepadella patella (O.F.Müller, 1786)
Lecane (Lecane) curvicornis (Murray, 1913)
Lecane (Lecane) leontina (Turner, 1892)
Lecane (Lecane) ludwigii (Eckstein, 1883)
Lecane (Lecane) luna (O.F.Müller, 1776)
Lecane (Lecane) papuana (Murray, 1913)
Lecane (Lecane) signifera (Jennings, 1896)
Lecane (Lecane) ungulata (Gosse, 1887)
Lecane (Monostyla) bulla (Gosse, 1851)
Lecane (Monostyla) clostocerca (Schmarda, 1859)
Lecane (Monostyla) lunaris (Ehrenberg, 1832)
Lecane (Monostyla) pyriformis (Daday, 1905)
Lecane (Monostyla) quadridentata (Ehrenberg, 1832)
Lecane (Monostyla) unguitata (Fadeev, 1925)
Trichocerca bicristata (Gosse, 1887)
Trichocerca pusilla (Lauterborn, 1898)
Trichocerca similis (Wierzejski, 1893)
Trichocerca rattus carinata (Ehrenberg, 1830)
Scaridium longicaudum (O.F.Müller, 1786)

Polyarthra vulgaris Carlin, 1943
Asplanchna priodonta Gosse, 1850
Hexarthra mira (Hudson, 1871)
Filinia longiseta (Ehrenberg, 1834)
Filinia longiseta saltator (Gosse, 1886)
Filinia opoliensis (Zacharias, 1898)
Filinia pejlerei Hutchinson, 1964
Testudinella patina (Hermann, 1783)
Testudinella emarginula (Stenroos, 1898)
Höraella brehmi Donner, 1949
Rotatoria neptunia (Ehrenberg, 1832)

Battish (1992) published a book entitled “ Freshwater Zooplankton of India” with one chapter on Rotifers, described 47 species with diagrams. Furthermore he made a check list of 242 species of rotifers from India with some modification of Sharma & Michael (1980). The described rotifer species were the following,

Brachionus calyciflorus Pallas, 1766
Brachionus quadridentatus Hermann, 1783
Brachionus rubens Ehrenberg, 1838
Brachionus caudatus Barrois and Daday, 1894
Brachionus caudatus personatus Ahlstrom, 1940
Brachionus caudatus aculeatus Hauer 1937
Brachionus caudatus apsteni (Fadeev, 1925)
Brachionus caudatus vulgatus Ahlstrom, 1940
Brachionus falcatus Zacharias, 1989
Brachionus forficula Wierzejski, 1891
Brachionus bidentata Anderson 1889
Brachionus budapestinensis Daday 1885
Brachionus angularis Gosse, 1851

Brachionus diversicornis (Daday,1883)
Brachionus patulus Müller ,1786
Brachionus plicatilis O.F. Muller,1776
Platyias quadricornis (Ehrenberg,1832)
Keratella procurva (Thorpe,1891)
Anuraeopsis fissa (Gosse,1851)
Anuraeopsis navicula Rousselet, 1892
Mytilina ventralis (Ehrenberg,1832)
Euchlanis dilatata Ehrenberg,1832
Lepadella bicornis Vasisht and Battish ,1971
Lepadella crestata Vasisht and Battish ,1971
Lepadella ovalis (O.F. Muller,1786)
Lepadella patella (O.F. Muller,1786)
Colurella obtusa (Gosse,1886)
Lecane luna (O.F. Muller,1776)
Lecane inopinata Haring & Myers,1926
Lecane ploenensis (Voigt, 1902)
Lecane sp.
Monostyla quadridentata Ehrenberg,1832
Monostyla bulla Gosse,1851
Monostyla decipines Murray,1913
Monostyla closterocerca Schmarda ,1859
Monostyla sp.I
Monostyla sp.II
Scaridium longicaudum (O.F. Muller,1786)
Trichocerca porcellus (Gosse,1886)
Asplanchna intermedia Hudson,1886
Polyarthra multiappendiculata Arora ,1962
Testudinella mucronata (Gosse ,1886)
Filinia terminalis (Plate,1886)
Filinia opoliensis (Zacharias,1898)

Filinia longiseta (Ehrenberg,1834)

Philodina citrina (Ehrenberg,1832)

Rotaria rotatoria (Pallas,1776)

Sharma(1993) made an interesting observation of the presence of freshwater rotifers in 25 domestic wells in the state of West Bengal . He enlisted 9 rotifer species belonging to 5 families and 6 genera.

Brachionus quadridentatus Hermann, 1783

Mytilina bisulcata (Lucks,1912)

Trichotria tetractis (Ehrenberg, 1830)

Colurella uncinata (O.F.Müller, 1773)

Lepadella patella (O.F.Müller, 1786)

Lecane (Lecane) aculeata (Jakubski, 1912)

Lecane (Lecane) luna (O.F.Müller, 1776)

Lecane (Monostyla) clostocerca(Schmarda, 1859)

Lecane (Monostyla) decipiens (Murray, 1913)

Segers *et al* (1994) recorded 15 rotifers of Monogononts for the first time from India. They were the following,

Lecane acanthinula (Hauer,1938)

Lecane aspasia Myers,1917

Lecane monostyla (Daday,1897)

Lecane rutteneri Hauer,1938

Lecane simonneae Segers,1993

Lepadella costatoides Segers,1992

Lecane cf. favorita Klement, 1962

Lecane minuta (Montet,1918)

Lecane triba Myers,1934

Notommata pachyura (Gosse,1886)

Notommata saccigera Ehrenberg,1832

Sinantherina semibullata (Thorpe,1889)

Trichocerca chattoni (De Beauchamp, 1907)

Trichocerca kostei Segers,1993

Taphrocampa selenura (Gosse,1887)

Sharma & Naik (1996) reported 72 species of rotifers , belonging to 30 genera and 17 families , from the samples collected from 600kms stretch of River Narmada in Madhya Pradesh. It was the first record of the richness of rotifer species in the rivers of India.

Brachionus angularis Gosse,1851

Brachionus bennini Leissling,1924

Brachionus bidentata inermis (Rousselet,1906)

Brachionus calyciflorus Pallas,1766

Brachionus caudatus personatus Ahlstrom, 1940

Brachionus caudatus aculeatus (Hauer, 1937)

Brachionus diversicornis (Daday, 1883)

Brachionus falcatus Zacharias, 1898

Brachionus forficula Wierzejski, 1891

Brachionus patulus O.F.Müller, 1786

Brachionus plicatilis O.F.Müller ,1786

Brachionus quadridentatus Hermann,1783

Keratella cochlearis (Gosse,1951)

Keratella tropica (Apstein,1907)

Platylabus quadricornis(Ehrenberg,1832)

Anuraeopsis navicula Rousselet,1910

Euchlanis dilatata Ehrenberg ,1832

Dipleuchlanis propatula (Gosse,1886)

Mytilina ventralis (Ehrenberg,1832)

Mytilina bisulcata (Lucks,1912)

Mytilina mucronata (O.F.Müller,1773)

Lophocharis salpina (Ehrenberg,1834)

Trichotria pocillum (O.F.Müller,1776)

- Macrochaetus sericus* (Thorpe,1893)
- Colurella uncinata* (O.F.Müller, 1773)
- Lepadella* (*Lepadella*) *ovalis* (O.F.Müller, 1786)
- Lepadella* (*Lepadella*) *patella* (O.F.Müller, 1786)
- Lepadella* (*Lepadella*) *rhombiodes* (Gosse, 1884)
- Lepadella triptera* Ehrenberg, 1830
- Lepadella* (*Heterolepadella*) *aspicora* Myers, 1934
- Lecane* (*Lecane*) *aculeata* (Jakubski, 1912)
- Lecane* (*Lecane*) *hastata* (Murray,1913)
- Lecane* (*Lecane*) *hornemanni*(Ehrenberg,1834)
- Lecane* (*Lecane*) *inermis*(Bryce1892)
- Lecane* (*Lecane*) *leontina* (Turner, 1892)
- Lecane* (*Lecane*) *ludwigii* (Eckstein, 1883)
- Lecane* (*Lecane*) *luna* (O.F.Müller, 1776)
- Lecane* (*Lecane*) *papuana* (Murray, 1913)
- Lecane* (*Lecane*) *signifera ploenensis* Voigt,1909
- Lecane* (*Lecane*) *ungulata* (Gosse, 1887)
- Lecane* (*Hemimonostyla*) *inopinata* Harring & Myers, 1926
- Lecane* (*Monostyla*) *bullata* Gosse, 1851
- Lecane* (*Monostyla*) *clostocerca*(Schmarda, 1859)
- Lecane* (*Monostyla*) *hamata* (Stokes, 1859)
- Lecane* (*Monostyla*) *lunaris* (Ehrenberg, 1832)
- Lecane* (*Monostyla*) *quadridentata* (Ehrenberg, 1832)
- Lecane* (*Monostyla*) *stenroosi* (Meissner, 1908)
- Lecane* (*Monostyla*) *thienemanni* (Hauer,1938)
- Cephalodella gibba*(Ehrenberg,1832)
- Cephalodella mucronata* Harring & Myers, 1924
- Scaridium longicaudum* (O.F. Müller,1786)
- Trichocerca pusilla* (Lauterborn,1898)
- Trichocerca capucina* Wierzejski & Zacharias,
- Trichocerca weberi* (Jennings,1903)

Trichocerca similis (Wierzejski,1893)
Asplanchna brightwelli Gosse,1850
Asplanchna priodonta Gosse,1850
Polyarthra vulgaris Carlin,1943
Synchaeta oblonga Ehrenberg,1832
Pleosoma hudsoni (Imhof,1891)
Dicranophorus forcipatus (O.F. Müller,1786)
Ascomorpha ovalis (Bergendal ,1892)
Gastropus hyptopus (Ehrenberg,1838)
Hexarthra mira (Hudson,1871)
Pompholyx complanata Gosse,1851
Testudinella patina (Hermann, 1783)
Testudinella parva (Ternetz,1892)
Filinia longiseta (Ehrenberg, 1834)
Filinia opoliensis (Zacharias, 1898)
Höraella brehmi Donner, 1949
Rotatoria neptunia (Ehrenberg,1832
Rotaria rotatoria (Pallas,1766)
Philodina roseola (Ehrenberg

Dhanapathi (1997) studied the morphological variations of three rotifers such as *Brachionus falcatus*, *Brachionus quadridentatus* and *Mytilina ventralis* based on the collections from two tropical ponds, Bhimavaram, Andhra Pradesh . He suggested that the temperature plays a major role in the occurrence of such variations in rotifers in the tropical regions. The variations in *Mytilina ventralis* were reported for the first time from India.

Sharma & Sharma (1997) recorded 35 species of rotifers belonging to the family Lecanidae from Tripura state in North Eastern India.

- Lecane acanthinula*(Hauer,1938)
Lecane aculeata (Jakubski, 1912)
Lecane batillifer (Murray,1913)
Lecane braumi Koste,1988
Lecane bulla Gosse, 1851
Lecane crepida Harring, 1914
Lecane curvicornis curvicornis Murray, 1913
Lecane curvicornis f.nitida (Murray,1913)
Lecane clostocerca(Schmarda, 1859)
Lecane hamata (Stokes, 1896)
Lecane hastata (Murray,1913)
Lecane hornemanni (Ehrenberg,1834)
Lecane inermis (Bryce,1892)
Lecane inopinata Harring & Myers, 1926
Lecane lateralis Sharma,1978
Lecane levistyla (Olofsson,1917)
Lecane leontina (Turner, 1892)
Lecane ludwigii (Eckstein, 1883)
Lecane luna (O.F.Müller, 1776)
Lecane lunaris (Ehrenberg, 1832)
Lecane monostyla (Daday, 1893)
Lecane nana (Murray, 1913)
Lecane obtusa (Murray,1913)
Lecane ohioensis (Herrick,1885)
Lecane papuana (Murray, 1913)
Lecane pertica Harring & Myers,1926
Lecane pyriformis (Daday, 1905)
Lecane quadridentata (Ehrenberg, 1832)
Lecane scutata (Harring & Myers,1926)
Lecane signifera signifera (Jennings,1896)
Lecane signifera f. ploenensis(Voigt,1902)

Lecane sinuta (Hauer,1938)
Lecane simonneae Segers,1993
Lecane sola Hauer,1936
Lecane thienemanni (Hauer,1938)
Lecane unguitata (Fadeev,1925)
Lecane ungulata (Gosse,1887)

Unni & Fole (1997) studied the distribution and diversity of freshwater rotifers in Kanhargaov Reservoir, Chhindwara , Madhya Pradesh. They reported 21 rotifer species, including the two dominant genera *Brachionus* and *Keratella* during the period from January 1990 to December 1991.

Unni & Naik (1997) studied the distribution and ecology of Zooplankton in the River Narmada and reported the Rotifers were the dominant community among the Zooplankters . They also observed that the *Brachionus* and *Keratella* were good bio-indicators of the sewage pollution, and the genus *Filinia* were good indicators of the domestic pollution.

Segers & Babu (1999) reported 24 rotifer species including one new species, *Polyarthra indica* sp.nov, from high- altitude Lake , Devikulam, Kerala. They were the following,

Brachionus quadridentatus Hermann,1783
Hexarthra intermedia (Wiszniewski,1929)
Keratella sp.
Lacinularia elliptica Shephard,1897
Lecane bulla (Gosse,1851)
Lecane curvicornis (Murray,1913)
Lecane furcata (Murray,1913)
Lecane haliclysta Haring & Myers,1926
Lecane hamata (Stokes,1896)
Lecane lateralis Sharma,1978
Lecane leontina (Turner,1892)

Lecane luna (O.F.Müller,1776)
Lecane lunaris (Ehrenberg,1832)
Lepadella rhomboides (Gosse,1886)
Mytilina ventralis (Ehrenberg,1832)
Plationus patulus (O.F. Müller,1786)
Polyarthra cf. dolichoptera Idelson,1925
Polyarthra indica sp.nov
Polyarthra cf.vulgaris Carlin,1943
Proales fallaciosa Wulfert,1937
Synchaeta pectinata Ehrenberg,1832
Testudinella patina (Hermann,1783)
Trichocerca pusilla (Jennings,1903)
Trichocerca similis (Wierzejski,1893)

Dhanapathi (2000) published a monograph “Taxonomic notes on the rotifers from India” which dealt with about 310 rotifer species reported from India during the period from 1889-2000. He included the taxonomic description of 162 species of rotifers with diagrams and few photographs.

Dhanapathi & Sarma (2001) reported 19 rotifer species including a new species, *Lindia intermedia* sp.nov ,belonging to 14 genera and 12 families from the plankton samples collected from different localities in Andhra Pradesh.

Brachionus urceolaris O.F. Müller,1773
Brachionus caudatus f. *aculeatus* Hauer,1937
Diplois daviesiae Gosse,1886
Lindia intermedia sp.nov
Taphrocampa selenura Gosse.1887
Trichocerca rattus (O.F. Müller,1773)
Testudinella patina (Hermann, 1783)
Testudinella mucronata (Gosse,1886)

Höraella brehmi Donner, 1949
Filinia longiseta (Ehrenberg, 1834)
Filinia pejleri Hutchinson, 1964
Filinia opoliensis (Zacharias, 1898)
Hexarthra mira (Hudson, 1871)
Hexarthra intermedia (Wiszniewski, 1929)
Conochiloides dossuarius Hudson, 1885
Floscularia ringens (L., 1758)
Lacinularia flosculosa (O.F.Müller, 1773)
Sinantharina spinosa (Thorpe, 1893)
Cupelopagis vorax (Leidy, 1857)

Narasimha Rao & Raju (2001) made Limnological investigations and observed the diversity of plankton in sewage- fed fish culture pond at Nambur near Guntur , Andhra Pradesh, and reported 15 rotifer species predominated by the genus *Brachionus*.

Durga Prasad & Padmavathi (2002) studied the biodiversity status of lake Kolleru,, including the zooplankton, in Andhra Pradesh and reported 22 species of rotifers belonging to 15 genera and 9 families. They were the following,

Brachionus angularis Gosse, 1851
Brachionus calyciflorus Pallas, 1776
Brachionus caudatus Barrois & Daday, 1894
Brachionus diversicornis (Daday, 1883)
Brachionus falcatus Zacharias, 1898
Brachionus forficula Wierzejski , 1891
Brachionus quadridentatus Hermann, 1783
Brachionus rubens Ehrenberg, 1838
Keratella tropica (Apstein, 1907)
Trichocerca sp.

Epiphanes sp.

Filinia longiseta (Ehrenberg,1834)

Asplanchna sp.

Platylabus quadricornis (Ehrenberg,1832)

Hexarthra sp.

Polyarthra sp.

Rotaria neptunia Ehrenberg

Horaella brehmi Donner ,1949

Monostyla sp.

Testudinella sp.

Lecane sp.

Euchlanis sp.

Chapter - 3

MATERIALS AND METHODS

MATERIAL & METHODS

The specimens for the present study were collected from different types of freshwater habitats such as ponds, rivers, reservoirs, canals, inundated areas from various localities of Kerala. Collections were made generally during the early hours of the day with the help of tow nets specially prepared for this purpose. A scoop net of mesh size 50 μ m equipped with a long handle was used for the collection of epiphytic and sessile forms by scooping it through the marginal weeds of lakes and ponds. Another tow net, of the same size and 28cm diameter mouth tied to a long rope, was used for the collection of limnetic forms. The net was dragged at the sub-surface level, several times, from the bank of the ponds towards the shore. Care was taken to draw the net with the uniform speed until it was hauled up. A large number of epiphytic specimens were also obtained by washing the weeds collected from the aquatic habitats in a bucket of water. This water was then filtered through the net to obtain the specimens.

The live specimens were collected by these different methods, and preserved in 5% formalin immediately after the collection, and were brought to laboratory for further studies. The specimens were analysed under binocular stereoscopic microscopes for detailed structural studies. Individual specimens were isolated from the mud, plant materials and other debris with the help of micropipettes, brush and sharp tungsten needles. Each specimen was placed on a cavity slide and mounted with glycerine jelly and covered with a cover slip for future studies. The margin of the cover slip was sealed with nail polish or DPX to prevent the desiccation. The structural details of the specimens were studied using a Stereo microscope (Medilux 12-Kyowa), under high power. The diagrams were made using camera lucida and measurements made by calibrated micrometers.

MAP - KERALA STATE - POLITICAL

Kasargod

Kannur

Wayanad

Kozhikode

Malappuram

Palakkad

Thrissur

Eranamkulam

Idukki

Delhi

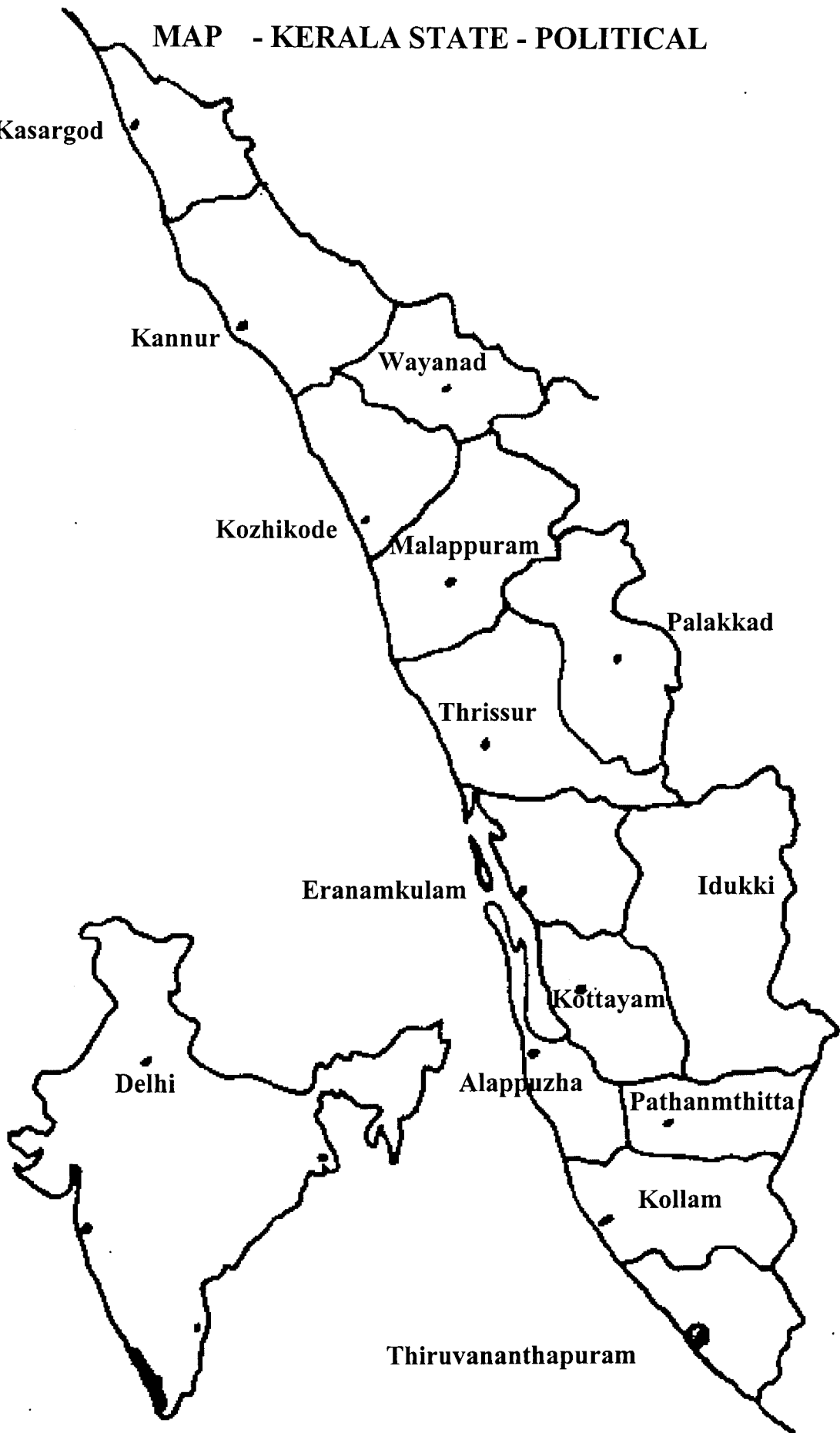
Kottayam

Alappuzha

Pathanmthitta

Kollam

Thiruvananthapuram



In order to study the 'trophies' of the rotifers, the specimens were separated, and placed in a watch glass added with 5% NaOCl, put for two minutes to dissolve the soft parts of the organism. After that, these trophies were transferred to another watch glass and washed with distilled water many times to remove the residue of NaOCl if any. Some of them were placed on slide with glycerine covered by cover slip and observed under the Stereo Binocular Research Microscope with high magnification to get good drawings by using Camera lucida. For taking scanning photographs, some of the trophies were dried, and sputter-coated with gold. Preparation was done on a circular cover slide by adding and subsequently removing the fluids with a micropipette. Then, scanned electron photographs were taken by using Scanning Electron Microscope (JEOL JSM-840) following the method of Segers (1993) and Sanoamuang & McKenzie (1993).

The temperature of water when the collections were made was determined by an ordinary mercury thermometer and pH by a portable pH meter in the field. Taxonomic status of the specimens were determined mainly by using monographic works of Koste (1978), Koste & Shiel (1987) Pennak (1989) and Segers (1995).

STUDY AREA

The present study was confined to Kerala state only. Kerala, is one of the smallest states of our country, with an area of 38,863 sq kms, located in the extreme south west coast of peninsular India with tropical climate, and lying between 8° 18' and 12° 48' N latitude and 74° 52' and 77° 22' E longitude (See Map). The western side is Arabian sea and eastern side is protected by the Western Ghats, an array of mountains with tropical rainforests. Kerala gets sufficient rain during the South West and North East monsoon, measuring about 3000mm per year. Kerala has 41 west flowing and 3 east flowing rivers, all originating from the western Ghats. The rivers of Kerala are small when compared with major rivers of India. A small state with 44 rivers and their

tributaries , large number of lakes and reservoirs ,innumerable ponds and large areas of inundated paddy fields and other wetlands, provide varied types of freshwater habitats.

For the present research study, a total number of 314 samples were collected from 110 localities from all over Kerala, and details of sampled localities were given below

ABBREVIATIONS OF THE SITES OF COLLECTIONS:

Kasaragod District.....(KAG)

KAG 1.....A roadside pond at Nileswaram

KAG 2.....A paddy field close to Kanhangad

KAG 3.....A Ditch Near Bekel Fort

KAG 4.....A pond near Kasargod town

Kannur District..... (KAN)

KAN 1.....A pond at Mela Chowa

KAN 2.....A pond at Mattannur

KAN 3.....A water Canal at Kannur

KAN 4..... Ditch near Eritty Bridge

KAN 5..... Pond at Thaliparumbu

KAN 6..... Paddy field at Valapatanam

Kozhikode District.....(KOZ)

KOZ 1..... Pond at Farooke

KOZ 2..... Roadside pond at Koilandy

KOZ 3..... Paddy fields at Mavoor

KOZ 4..... Irrigation canal at Mavoor

KOZ 5..... Pond at R. E. C

KOZ 6..... A big temple pond at Meenchantha

Wayanad District.....(WYD)

- WYD 1..... Paddy field at Kainatty
 WYD 2..... Lake at Pookot
 WYD 3..... A roadside pond at Panamaram
 WYD 4..... A small river near the Manthavady town
 WYD 5.....Stream at Tholpetty
 WYD 6.....Stream at Thirunellayi Temple
 WYD 7..... Roadside pond at Sulthan Battery

Malappuram District.....(MAL)

- MAL 1..... Paddy field at Edappal
 MAL 2a..... Bharathapuzha River
 MAL 2b..... Bharathapuzha River
 MAL 3..... A Pond at Kottakkal
 MAL 4..... A Pond at Chelari
 MAL 5..... A Canal in plantain plantations
 MAL 6..... A pond in the town of Perinthalmanna

Palakkad District.....(PKD)

- PKD 1..... Pond at Kollenkodu
 PKD 2..... Malampuzha Gardens
 PKD 3..... A pond at Vadakkenchery
 PKD 4..... A Pond at Koyalmannam
 PKD 5..... A Mosque pond at Thathamangalam
 PKD 6..... A big pond at Peruvambu

Thrissur District.....(TCR)

- TCR 1a.....Appukuttan pond, Mattom.
 TCR 1b.....Appukuttan pond, Mattom.
 TCR 2a..... Arimboor paddy field /Kol- Wetlands.

TCR 2b.....	Arimboor paddy field /Kol- Wetlands.
TCR 3a.....	Athirappilly lower stream.
TCR 3b.....	Athirappilly lower stream.
TCR 4.....	Christ college tank.
TCR 5.....	Chalakydy Paddy fields
TCR 6.....	Chakrapani rocky pool.
TCR 7.....	Chavakkad pond
TCR 8.....	Ditch near Nellore Railway station.
TCR 9.....	Kannankuzhi stream.
TCR 10.....	Kunnu big pond, Mattom.
TCR 11a.....	KuttappanKulam, Mattom.
TCR 11b.....	KuttappanKulam, Mattom.
TCR 11c.....	KuttappanKulam, Mattom.
TCR 11d.....	KuttappanKulam, Mattom.
TCR 12a.....	Monastry pond, Irinjalakuda.
TCR 12b.....	Monastry pond, Irinjalakuda.
TCR 13.....	Muriyad Kayal.
TCR 14.....	Nandikara bricks-yard.
TCR 15a.....	Navjarikulam pond, Irinjalakuda.
TCR 15b.....	Najvarikulam pond, Irinjalakuda.
TCR 16.....	Nellore paddy field.
TCR 17.....	Orozhi Pond , Aloor-Mattom
TCR 18.....	Parappukara paddy field
TCR 19.....	Peechi reservoir,Peechi
TCR 20.....	Ponmala big Pond, Aloor
TCR 21.....	Ponkothra paddy field
TCR 22.....	Pullur pond, Pullur
TCR 23.....	.Puthanpally pond,Trichur Town
TCR 24.....	Rappal bricks-yard, Rappal
TCR 25.....	S.N.Pond, Irinjalakuda
TCR 26.....	Swarnakulam, at Muthrathikkara

TCR 27.....Temporary Pond, Mattom

TCR 28..... Vazhachal waterfalls

Eranankulam District.....(EKM)

EKM 1..... Angamaly paddy fields

EKM 2..... Eloor paddy field

EKM 3..... Muvattupuzha rocky pool

EKM 4..... Paddy field at Kalamassery

EKM 5..... Periyar River near Aluva Bridge

EKM 6..... Pond at Kuruppampadi

EKM 7..... Wetland at Panagad

Alappuzha District.....(APH)

APH 1..... Temple pond at Thuravoor

APH 2..... Pond at Cherthalai

APH 3..... Vembanad Lake

APH 4..... Paddy field at Harrippad

APH 5..... Road side pond at Mavelikkara

APH 6..... A small ditch at Kayamkulam

APH 7..... Ditches in the Pathiramanal Island

Kottayam District.....(KTM)

KTM 1..... A roadside pond at Vaikkaom

KTM 2..... A small irrigation canal at Kaduthuruthi

KTM 3..... A small stream at Kuruvilangadu

KTM 4..... Paddy fields at near Karithas Hospital

KTM 5..... River in the town of Kottayam

KTM 6..... Kumarakom Bird Sanctuary

KTM 7..... A ditch at Kanjikuzy

KTM 8..... A small pond at Kanjirapilly

KTM 9..... A small well at Mundakayam.

Idukki District.....(IDY)

IDY 1..... Boothathankettu reservoir

IDY 2..... Devikulam Upper lake

IDY 3..... Kokkara wayal ditch

IDY 4.....Munnar small canal

IDY 5a..... Periyar lake

IDY 5b..... Periyar lake

Pathanmthitta District.....(PTH)

PTH 1.....Small pond near the Thiruvalla railway station

PTH 2..... Reservoir at Gavi

PTH 3..... Stream in Reserve forest near Pamba

Kollam District.....(KOL)

KOL 1..... Sasthamcotta lake.

KOL 2..... A pond at Karunagapilly

KOL 3.....Asthamudi Kayal, near K.S.R.T .C stand

KOL 4..... A wetland at Chavarra

KOL 5..... A ditch at Thankassery

KOL 6..... A pond at Kadkkal

Thiruvananthapuram District.....(TVM)

TVM 1..... Neyyar Dam Reservoir

TVM 2..... Aruvikkara Dam reservoir

TVM 3..... Akkulam lake

TVM 4..... A stream at Cheria Ullur

TVM 5..... Pond inside the Veli Park

TVM 6..... A wetland near Technopark

TVM 7..... A small pond near Petta junction

TVM 8..... River near Karamana

TVM 9..... Pond at Papanamkode

TVM 10..... Paddy fields at Attingal

LOCALITIES

Kasargod District.....(KAG)

1. A roadside pond at Nileswaram (Kasargod District)

A small roadside pond located at Nileswaram, on the way from Kannur to Kasargod. The water was clear with some aquatic weeds, dominated by *Hydrilla* sp.

Date of collection: 12/ 12 /1994

No: of collections: 2.

pH: 6.8. ,Temperature: 27° C

2. A paddy field close to Kanhangad.

The collections were made from the small canals in the paddy fields near to the Kasargod town.

Date of collection: 12/ 12 /1994

No: of collections: 2.

pH: 6.9.,Temperature: 28° C

3. Ditch Near Bekal Fort.

The samples were collected from the small ditches near by Bekal fort the water colour was muddy in nature.

Date of collection: 12/ 12 /1994

No: of collections: 3.

pH: 7.,Temperature: 29° C

4. A pond near Kasargod town.

The collections were made from a small pond located in the sub urban area of Kasargod town. The water was very green in colour and devoid of any aquatic weeds.

Date of collection: 12/ 12 /1994

No: of collections: 2.

pH: 7.2, Temperature: 28° C

Kannur District..... (KAN)

1. A pond at Mela Chowa (Kannur distict).

A small pond on the way to Mela Chowa from Kannur Town. The water colour was slightly green .

Date of collection: 7 / 01 /1995

No: of collections: 2.

pH: 6. 9. Temperature: 26° C

2. A pond at Mattannur (Kannur district).

A pond near the Mattannur town, covered two third of area with *Hydrilla* sp.

Date of collection: 7/ 01 /1995

No: of collections: 3.

pH: 7.1, Temperature: 28° C

3. A water Canal at Kannur (Kannur district).

A small canal near the paddy field on the way to Kannur from Thalassery

Date of collection: 9/ 01 /1995

No: of collections: 2.

pH: 6.6. ,Temperature: 28° C

4. Ditch near Eritty Bridge (Kannur district).

A stagnant ditch near the Eritty bridge, the colour of water is brown due to the sewage from the town.

Date of collection: 7/ 01 /1995

No: of collections: 2.

pH: 6.8.,Temperature: 28° C

5. Pond at Thaliparumbu (Kannur district).

A pond near the town Thaliparambu , with very green water due to algal growth (*Chlorella* sp.).

Date of collection: 10/ 01 /1995

No: of collections: 4.

pH: 6.9.,Temperature: 27° C

6. Paddy field at Valapatanam (Kannur district).

A small area of paddy field on the way to Valpattanam from Kannur.

Date of collection: 10/ 01 /1995

No: of collections: 2.

pH: 7.,Temperature: 29° C

Kozhikode District.....(KOZ)

1. Pond at Farook (Kozhikode district)

A large pond situated near Farook town, at an average depth of 2 meters, connected to near paddy fields. The pond was more or less covered with weeds like *Salweenia* sp. and *Echiornia* sp. at the time of collection. The water was so peculiar with yellowish in colour

Date of collection: 6 / 03 /1992

No: of collections: 2.

pH: 7. 4. Temperature: 28° C

2. Roadside pond at Koilandy (Kozhikode district).

A small pond located on the side of the Calicut Kannur road, 10kms away from Calicut city. The pond is covered with many types of aquatic plants dominated by *Salvinia* sp.

Date of collection: 9/04 /1995.

No: of collections: 3.

pH: 7.2 Temperature: 28° C.

3. Paddy fields at Mavoor (Kozhikode district).

A paddy field near Mavoor Rayons factory not used for agriculture. Collections were made from a ditch inside the field. Water was little turbid, bottom full of mud. No weeds and algal growth were observed.

Date of collection: 9 / 03 /1992.

No. of collections: 2.

pH: 6.5. Temperature: 31° C.

4 . Irrigation canal at Mavoor (Kozhikode district).

A small canal near Mavoor Rayons factory. Water was clear and devoid of weeds.

Date of collection: 9 / 03 /1992.

No. of collections: 2

pH: 6. Temperature: 32° C.

5. Pond at R. E. C (Kozhikode district).

A small pond situated inside the Regional Engineering college campus at Calicut.

Date of collection: 12 / 8 / 95

No: of collections: 1.

pH: 7.1, Temperature: 26°C.

6. A big temple pond at Meenchantha (Kozhikode district).

A big temple pond ,more than 3 acres just behind the Government Arts & Science College , covered with green filamentous algae and marginal vegetation.

Date of collection: 12 / 10 / 95

No: of collections: 3.

pH: 7.4, Temperature: 28°C.

Wayanad District.....(WYD)

1. Paddy field at Kainatty, Kalpetta (Wayanad district).

Small paddy field near Kalpetta town. The collections were made from a ditch in the paddy field.

Date of collection: 7 / 03 /1992.

No: of collections: 2.

pH: 6. 2. Temperature: 27° C

2. Lake at Pookot (Wayanad district).

Pookot lake is a water body of about 7.5 ha. surrounded by a chain of hills maximum of 800 meters above m.s.l, situated in Vythiri taluk of Wayanad district.

Date of collection: 7/03/1992

No: of collections: 3.

pH: 7.2, Temperature: 26°C.

Date of collection: 14 /0 8 / 95

No: of collections: 4

pH: 7.4, Temperature: 27°C.

3. A roadside pond at Panamaram (Wayanad district).

A small road side pond with green algae and marginal vegetation.

Date of collection: 15 /0 8 / 95

No: of collections: 1.

pH: 7.2, Temperature: 27°C.

4. A small river near the Manthavady town (Wayanad district).

The plankton samples were collected from the small ditches near the small river close to the Manthavady Town.

Date of collection: 15 /0 8 / 95

No: of collections: 2.

pH: 7.4, Temperature: 26°C.

5. Stream at Tholpetty, (Wayanad district).

A small stream on the way to Tholpetty , the samples were collected from the ditches in the rocky bottom.

Date of collection: 16 /0 8 / 95

No: of collections: 3.

pH: 7., Temperature: 24°C.

6. Stream at Thirunellayi Temple, (Wayanad district).

The samples were collected from the famous stream, Papanashini, just close to Thirunellayi temple .

Date of collection: 16 /0 8 / 95

No: of collections: 3.

pH: 7., Temperature: 24°C.

7. Roadside pond at Sulthan Battery, (Wayanad district).

The plankton samples were collected in the small pond near the Sulthan Battery . The water was clear with out algae and weeds.

Date of collection: 17 /0 8 / 95

No: of collections: 2.

pH: 7., Temperature: 24°C.

Malappuram District.....(MAL)

1. Paddy field at Edappal (Malappuram district).

The samples were collected from the small canals in the paddy field 3 Kilometers away from Edappal town.

Date of collection: 20/12/ 97

No: of collections: 2.

PH: 7., Temperature: 24°C.

2. Bharathapuzha River (Malappuram district)

The collections were made from some water pockets among sand dunes of the river bank near Kuttipuram bridge. Water was clear and no algal growth was noticed.

a. Date of collection: 17 /03 /1994

No: of collections: 5.

pH: 6.9, Temperature: 27° C.

The water flow was more and it was mixed with sand and soil.

b. Date of collection: 9/ 09/ 1999

No: of collections: 2.

pH: 7.2, Temperature: 27° C.

3. A Pond at Kottakkal, (Malappuram district).

A small pond in the Muslim Mosque at Kottakkal . The water is so green with high density of green algae .

Date of collection: 9/ 09/ 1999

No: of collections: 1.

pH: 7.4, Temperature: 28° C.

4. A Pond at Chelari (Malappuram district).

This pond was made by the excavation of laterite located in Chelari, near Calicut University on the high way to Calicut. The pond with an area of 50m² and average depth of 2m . The water is green in colour because of the presence of green algae.

Date of Collection: 20/12/1997

No. of collections: 2

pH: 7.2 Temperature: 27° C

5. Canal in plantain plantations, near Manjery (Malappuram district).

The samples were collected from the canal in the Plantain plantations near the road side on the way from Kottakal to Manjery

Date of Collection: 20/02/1998

No. of collections: 3.

pH: 7.4 Temperature: 27° C

6. A pond in the town of Perinthalmanna, (Malappuram district)

A pond in the town Perinthalmanna , on the way to Kozhikode, covered with green algae and *Hydrilla* sp.

Date of Collection: 21/02/1998

No. of collections: 2.

pH: 6.4 Temperature: 27° C

Palakkad District.....(PKD)

1. Pond at Kollenkodu (Palakkad district).

A small circular pond with approximate diameter of 12 meters and average depth of 2 meters, situated in a paddy field. Surface was covered with weeds.

Date of collection: 3 / 11 / 1992.

No: of collections: 3.

pH: 7.2 Temperature: 28° C.

2. Malampuzha Gardens (Palakkad district).

This sample were taken from the small canal inside the Malampuzha Gradens. It is a stagnant water body with aquatic plant Ambel. The water was clear .

Date of collection: 15/9/1996

No. of collections: 2.

pH: 7.2, Temp: 27° C.

3. A pond at Vadakkenchery (Palakkad district).

A medium sized pond located just 2 kilometers before Vadakkencherry town. Water lily is prominent flora in the pond.

Date of collection: 22/12/2000

No. of collections: 2.

pH: 6.8, Temp: 29° C.

4. A Pond at Koyalmannam (Palakkad district).

The samples were collected from a big pond at Koyalmannam near the National High Way -47 on the way to Palakkad

Date of collection: 22/12/2000

No. of collections: 3.

pH: 6.9, Temp: 28° C.

5. A Mosque pond at Thathamangalam (Palakkad district).

A big pond near the Muslim mosque in the town Thathamangalam. The water is clear with *Hydrilla* sp.

Date of collection: 15/12/2000

No. of collections: 2.

pH: 7.2, Temp: 29° C.

6. A big pond at Peruvambu (Palakkad district).

A big pond (4 ha) at Peruvambu , 8 kilometers away from Palakkad town to the direction of Chittur. This pond is connected to neighbouring paddy fields. This big pond is called by villagers as "Kuthirakulam".

Date of collection: 15/12/2000

No. of collections: 2.

pH: 7., Temp: 28° C.

Thrissur District.....(TCR)

1. Appukuttan pond, Mattom (Thrissur district).

A small circular pond, nearly 8 meters in diameter filled with greenish water due to abundant growth of algae mainly *Chlorella sp.*

a. Date of collection: 19 / 02 / 1991

No. of collections: 4

pH: 7.1 , Temperature : 26° C.

The water was slightly greenish in colour because of the overflow of water immediately after monsoon rain.

b. Date of collection: 16/08/ 1995

No .of collections: 2.

PH: 7.3 , Temperature : 28° C.

2. Arimboor paddy field /Kol- Wetlands (Thrissur district).

A vast inundated area in Monsoon season and then the water is pumped out and used for the cultivation of paddy in December. It is a special type of water ecosystem. Water was clear and weeds like *Eichornia sp.* & *Salvinia sp.* were present.

a. Date of collection: 6 / 01 / 1992

No: of collections: 5.

pH: 7.8, Temperature : 27°C

This collection was made immediately after the monsoon torrential rains. The water was so clear with out any weeds.

b. Date of collection: 12 / 08/ 1997.

No: of collections: 3.

pH: 7.0, Temperature : 26°C.

3. Athirappilly lower stream (Thrissur district).

Upper Stream of Chalakudy River and the collections were made through the rocky bank. Water was very clear.

a. Date of collection: 19 /03 /1992.

No: of collections: 3.

pH: 7. Temperature : 26°C

The water was so turbulent, but the collections were made in the side pools .

b. Date of collection: 19 /09 / 1996.

No: of collections: 6.

pH: 7. Temperature : 24°C

4. Christ college tank (Thrissur district).

This is a small concrete tank of 0.5 x 0.5 x 0.5 meter size, situated in the college garden. Water was slightly dark in colour due to organic matters. The surface of the water was partially covered by duck weeds (*Lemna* sp.)

Date of collections: 16 /0 5 /1993

No: of collection: 3.

pH: 7.6. Temperature: 29° C.

5. Paddy field at Chalakudy (Thrissur district).

A Paddy field is near Chalakudy railway station. Collections were made from a small irrigation canal within the paddy field. Water was rich with filamentous algae.

Date of collection: 13 /0 6 / 1992.

No. of collections: 3.

pH: 7.1. Temperature: 30° C.

6. Chakrapani rocky pool (Thrissur district).

A small granite quarry with rainwater situated within the Vettilappara, Teak-wood plantation. Water was dark brown in colour due to organic nutrients of different types of decayed leaves.

Date of collection: 20 /0 4 /1994.

No: of collections: 2.

pH: 8. Temperature: 33° C.

7. Pond at Chavakkad (Trichur district).

A small pond in Coconut plantation , covered with weed of *Salvinia sp.*, green coloured water , and only 2kms away from sea shore.(Blangad beach)

Date of collection : 5/ 08/ 1995.

No. of collections: 2.

pH: 8., Temperature: 29° C.

8. Ditch near Nelloy Railway station (Thrissur district).

A small monsoon ditch situated close to Nelloy railway station.

Date of collection: 10 /0 8 /1993

No: of collections: 1.

pH: 7.2. Temperature: 28° C.

9. Kannankuzhi stream (Thrissur district).

This is one of the tributaries of Chalakudy river. Collections were made near the bank having marginal aquatic weeds.

Date of collection: 19 / 03 /1992.

No: of collections: 2.

pH: 7. Temperature: 27° C

10. Kunnu big pond, Mattom (Thrissur district).

Large pond with approximate area of 0.5 acre and the water surface was covered with mainly water hyacinth (*Eichornia sp.*)

Date of collection: 12 / 12 / 92

No: of collections: 2.

pH: 7.1 Temperature: 27° C.

11 .KuttappanKulam, Mattom (Trichur district).

This pond is a small & shallow temporary one and dries up in summer. The surface is covered with green algae and *Hydrilla* sp. along with marginal vegetation.

a. Date of collection: 9/08/1991

No. of collections: 3

pH: 7.2, Temperature: 27° C.

b. Date of collection: 2/10/1994

No. of collections: 4

pH: 7., Temperature: 26° C.

c. Date of collection: 8/12/1996

No. of collections: 3

pH: 6.9, Temp: 27° C.

d. Date of Collection: 6/ 01/2000

No. of collections: 4

pH: 6.8, Temp: 30° C.

12. Monastery pond, Irinjalakuda (Thrissur district).

A small pond near Christ college Monastery, the surface of water was heavily covered with the weed *Salvinia* sp. and *Hydrilla* sp.

a. Date of collection: 9/08/1991

No. of collections: 2.

pH: 7.1, Temperature: 28° C.

b. Date of Collection: 3/09/1994

No: of collection: 3.

pH: 7., Temperature: 27° C.

13. Muriyad Kayal (Thrissur district).

It is an inundated paddy field where water was slightly brownish in colour due to decaying hay and other organic matters.

Date of collection: 2 / 02 / 1996.

No: of collection: 2.

pH: 6.8, Temperature: 29° C.

14. Nandikara bricks-yard (Thrissur district).

An abandoned bricks-yard situated near the church, Nandikara. Collections were made from small ditches in yard. Water was very clear and no algal growth observed.

Date of collection: 2 / 2 / 1992

No: of collection: 2.

pH: 7.5. Temp: 32° C.

15 . Najvarikulam pond, Irinjalakuda (Thrissur district).

A pond with an area of 0.25 acres, protected by cement walls, with an outlet. Water surface was covered with aquatic weeds.

a. Date of collection: 12 / 2 /1992

No: of collections: 2.

pH: 6.6. Temperature: 32° C

b. Date of collection: 08 / 10 / 1994.

No: of collections: 2.

pH: 7.8. Temperature: 29° C

16. Nelloy paddy field (Thrissur district).

A paddy field near Kurumaly river. The collections were made from a newly prepared paddy nursery, which contained slightly turbid water.

Date of collection: 2 / 02 /1994

No: of collection: 2.

pH: 7.9.,Temp: 30°C.

17. Orozhi Pond , Aloor-Mattom(Trichur dictrict).

A rectangular pond with an area of 30 m²,completely covered by Water hyacinth (*Eichornia azuria*).

Date of collection: 2/1/1995

No. of collections: 2

pH: 6.8, Temp 28° C.

18 .Parappukara paddy field (Thrissur district).

Inundated paddy field. Collections were made during the monsoon period.

Date of collection: 8 / 07 /1996.

No. of collections: 3

pH: 7.5., Temperature: 28°C.

19.Peechi reservoir (Thrissur district).

A reservoir for irrigation and drinking water supply, situated in Trichur district with latitude 76° 23 E and longitude 10° 32 N.

Date of collection: 28/05/1991,

No: of collections: 3.

pH: 6.9., Temperature: 28°C.

20. Ponmala big Pond, Aloor (Trichur district).

Granite quarry , at an area of 30m² and at an average depth of 3m, filled with clear water.

a. Date of Collection : 10/11/1996

No. of Collections: 2.

pH: 6.8, Temp: 25°C.

b. Date of Collection: 12/3/1998

No. of collections: 3

pH: 6.5, Temperature: 28°C.

21. Ponkothra paddy field (Thrissur district).

Inundated paddy field with monsoon rainwater. Collections were made during early monsoon period.

Date of collection: 18 / 6 / 96.

No: of collections: 3.

pH: 6.5, Temperature: 28°C.

22. Pullur pond (Thrissur district).

A pond near Pullur Mission Hospital, contains lot of weeds.

Date of collection: 28 / 0 3 / 1992

No. of collections: 1.

PH: 7.2, Temp. 28°C.

23. Puthanpally pond (Thrissur district).

A protected pond situated near Puthanpally church, at Trichur town . Water was slightly greenish in colour due to growth of algae. No other aquatic weeds.

Date of collection: 28 / 0 4 / 1992

No. of collections: 2.

PH: 7.2, Temp. 28°C

24 . Rappal bricks-yard (Thrissur district).

Collections were made from a small ditch inside the yard. Water was slightly turbid.

Date of collection: 24 /0 4 / 1995

No. of collections: 1.

pH: 7.7, Temperature: 27°C.

25. S.N.Pond, Irinjalakuda (Thrissur district).

Protected pond with size of 38 x 26.5 meters and average depth of 3.2 meters and situated in Irinjalakuda Municipality area. Pond has one outlet. Normally used for bathing and washing clothes.

Date of collection: 29 /02 /1992

No. of collections: 3

pH: 6.9, Temp: 30° C.

26 .Swarnakulam at Muthrathikkara(Thrissur district).

A pond with a size of 35 x 22 meters and 3.2 meters depth. *Eichornia* sp. was the common weed.

Date of collection : 20 / 01 /1992.

No. of collections: 2

pH: 7.3, Temperature: 31° C.

27. Temporary Pond, Hill Quarters, Mattom (Trichur district).

The water was stored in a small pond in the top of a hill with diameter of 10 at an average depth of 50cm after the heavy monsoon rain. No weeds were present.

Date of Collection : 18/7/ 1996

No. of collections: 4

pH : 6.5, Temp: 29°C.

28. Vazhachal waterfalls (Thrissur district).

A Waterfall situated in the Chalakudy river upper region of Athirappilly Water falls. Collections were made near the river bank.

Date of collection; 7 / 04 / 1994

No: of collections: 2.

pH:6.9, Temp: 28° C.

Ernakulam District.....(EKM)

1. Angamaly paddy fields (Ernakulam district).

A paddy field is near to N H 47 near Angamaly town. The collections were made after monsoon season. The water was slightly greenish in colour at the time of collection due to the presence of green algae.

Date of collection: 19 / 8 / 1998

No: of collections : 3.

pH: 7.6. Temperature : 28° C.

2. Eloor paddy field (Ernakulam district).

A small paddy field near Eloor Industrial area (Udyogamandal),no agricultural operation at the time of collection. Samples were collected from a small ditch near one irrigation canal. Water was slightly turbid and no algal growth were observed.

Date of collection: 4 /02 / 1992.

No: of collections: 3.

pH: 7. 1. Temperature: 28° C

3. Muvattupuzha rocky pool (Ernakulam district).

A small rocky pool near Nirmala college Muvattupuzha. Water was slightly greenish having no weeds.

Date of collection: 18 / 08 /1992

No. of collections: 2.

pH: 7.2., Temperature: 29° C.

4. Paddy field at Kalamassery (Ernakulam district).

The samples were collected from the paddy fields at Kalamassery near the NH-47.

Date of collection: 18 / 01 /1997

No. of collections: 2.

pH: . 6.8, Temperature: 31° C.

5. Periyar River near Aluva Bridge (Ernakulam district).

The samples were collected from the Periyar River, just below the Aluva bridge

Date of collection: 18 / 01 /1997

No. of collections: 4.

pH: .7.2, Temperature: 28° C.

6. Pond at Kuruppampadi (Ernakulam district).

A medium sized pond at Kuruppampadi near road side , on the way to Kothmanglam. The water was clear with water lilies.

Date of collection: 13 / 02 /1998

No. of collections: 1.

pH: .7.5, Temperature: 27° C.

7. Wetland at Panagad (Ernakulam district).

Samples were collected from Panangad, the water logged sub urban areas of Ernakulam . Most of this area is marshy and opens to the Cochin backwaters.

Date of collection: 18 / 01 /1997

No. of collections: 6

pH: 6.3, Temperature: 28° C.

Idukki District.....(IDY)

1. Boothathankettu reservoir (Idukki district).

The reservoir situated in Idukki district The reservoir is the part of Thattaekadu bird sanctuary. Maximum depth of the reservoir is 15 meters.

Date of collection : 17 / 4 / 94

No: of collections: 4.

pH: 7.2 Temperature: 27° C.

2. Devikulam Upper lake (Idukki district).

A small lake of about 4.6 hectares situated in Western Ghats region at a latitude: 10° 6' N and longitude: 77° 9' E with an altitude of 2025 meters. Collections were made through aquatic weeds mostly of *Sirpus* sp. and *Utricularia* sp.

Date of collection: 10 / 12 /1995.

No: of collections: 2.

pH: 7.2. Temperature: 12° C.

3. Kokkara wayal ditch (Idukki district).

A small ditch situated inside the Periyar tiger reserve. The approximate size is 6 x 5 meters and average depth 2 meters. Pond is used as a drinking water source by wild animals. Aquatic weeds like *Nymphae* sp., *Utricularia* sp., *Najas* sp. were present.

Date of collection: 8 /03 /1997.

No: of collections: 3.

pH: 7.2 Temperature: 28° C.

4. Munnar small canal (Idukki district).

A small canal near Munnar town. Water was slightly turbid with monsoon rain water. No weeds.

Date of collection: 14 / 08 / 1996.

No. of collections: 2

pH: 7.1, Temperature: 25° C.

5. Periyar lake (Idukki district).

This is a man - made lake situated inside the Periyar tiger reserve. Latitude: 9° 18' and 9° 40' N, Longitude: 76° 55' and 77° 25' E.

a. Date of collection: 2 / 02 / 1994

No: of collections: 3.

pH: 6.7, Temp: 26° C

b. Date of collection: 18 / 12 /1996.

No: of collections: 2.

pH: 7.5, Temp: 24° C

Alappuzha District.....(APH)

1. Temple pond at Thuravoor (Alappuzha district).

A medium sized temple pond in the Junction of Thuravoor, on the way to Alappuzha from Eranamkulam. The water was green in colour due to the blooming of green algae.

Date of collection: 13/02/1997

No. of collections: 3

pH: 6.4, Temperature: 28° C.

2. Pond at Cherthalai (Alappuzha district).

A Small pond in Cherthali on the High way side . The water was green colour due to green algae. No weeds are present.

Date of collection: 13/02/1997

No.of collections: 2

pH:6.4, Temperature: 27° C.

3. Vembanad Lake (Alappuzha district).

One of the biggest lakes in Kerala

Date of collection: 14/02/1997

No. of collections: 4

pH: 7.1, Temperature: 26° C.

4. Paddy field at Harrippad (Alappuzha district).

The samples were collected from the paddy fields near the National High way , three kilometers before Harippad town.

Date of collection: 15/02/1997

No. of collections: 2

pH: 6.8, Temperature: 28° C.

5. Road side pond at Mavelikkara (Alappuzha district).

A small pond just near the NH with water lilies at Mavellikkara .

Date of collection: 15/02/1997

No. of collections: 1

pH: 6.9, Temperature: 29° C

6. A small ditch at Kayamkulam (Alappuzha district).

The samples were collected from a small ditch at Kayamkulam .

Date of collection: 15/02/1997

No. of collections: 1

pH: 6.6, Temperature: 31° C

7. Ditches in the Pathiramanal Island (Alappuzha district).

Pathiramanal is a small island in the Vembandu lake. The samples were collected from the ditches in the Island.

Date of collection: 14/02/1997

No. of collections: 5

pH: 6.6, Temperature: 29° C.

Kottayam District.....(KTM)

1. A roadside pond at Vaikkaom (Kottayam district).

A small pond on the road side from Eranamkulam to Vaikkaom just three kilometers away from Vaikom town. The water is green colour with the weed *Eichornia* sp.

Date of collection: 14/01/1999

No. of collections: 2

pH: 6.8, Temperature: 27° C.

2. A small irrigation canal at Kaduthurithy (Kottayam district).

The samples were collected from the small irrigation canal along the side of the paddy field at Kaduthurithy.

Date of collection: 14/01/1999

No. of collections: 1

pH: 7, Temperature: 25° C.

3. A small stream at Kuruvilangadu (Kottayam district).

The plankton samples were collected from a small stream in the Rubber plantation at Kuruvilangadu.

Date of collection: 14/01/1999

No. of collections: 2

pH: 7.1, Temperature: 24° C.

4. Paddy fields near Karithas Hospital (Kottayam district).

Date of collection: 14/01/1999

No. of collections: 3

pH: 6.8, Temperature: 29° C.

5. River in the town of Kottayam (Kottayam district).

The collections were made from a river in Kottayam. The water was slightly greenish, and flowing slowly.

Date of collection: 14/01/1999

No. of collections: 3

pH: 7, Temperature: 27° C.

6. Kumarakom Bird Sanctuary (Kottayam district).

The plankton samples were collected from the water bodies inside the Bird sanctuary. A good number of migratory and native water birds were there. An ideal small wetlands for birds. The water colour is green with *Eichornia* sp. and *Salvenia* sp. weeds.

Date of collection: 14/01/1999

No. of collections: 6

pH: 6.6-6.9, Temperature: 24°C-27° C.

7. A ditch at Kanjikuzy (Kottayam district).

The samples were collected from a ditch at Kanjikuzy , 5 kilometers away from Kottayam town towards to Kumaly.

Date of collection: 15/01/1999

No. of collections: 1

pH: 6.9, Temperature: 26° C.

8. A pond at Kanjirappilly (Kottayam district).

A medium sized pond near Kanjirappilly town , covered with water lilies and *Hydrilla* sp.

Date of collection: 15/01/1999

No. of collections: 2

pH: 6.8, Temperature: 28° C.

9. A small well at Mundakayam (Kottayam district).

The collections were made from a small well in the Rubber plantations at Mundakayam.

Date of collection: 15/01/1999

No. of collections: 1

pH: 7.1, Temperature: 24° C.

Pathanmthitta District.....(PTH)

1. A small pond near the Thiruvalla railway station (Pathanmthitta district).

A small pond near Thiruvalla railway station, covered with green algae and marginal vegetation predominated by *Colocasia* sp.

Date of collection: 19/01/1998

No. of collections: 2

pH: 7.2, Temperature: 26° C

2. Reservoir at Gavi (Pathanmthitta district).

Gavi reservoir is located in the middle of reserve forest in Western Ghats, 35 kilometers away from Vandiperiyar town towards the East. This area is the part of Pathnamthitta district very close to Sabarimala.

Date of collection: 19/12/2001

No. of collections: 6

pH: 7.1, Temperature: 25° C

3. Stream in Reserve forest near Pamba (Pathanmthitta district).

The plankton samples were made from the forest stream located in the reserve forest near Pamba.

Date of collection: 19/12/2001

No. of collections: 3

pH: 7.1, Temperature: 19° C

Kollam District.....(KOL)

1. Sasthamcotta lake (Kollam district).

A freshwater lake situated in Kollam district. Latitude : 10°. 32' N, longitude: 76°. 23' E. Water was very clear with out any weeds.

a. Date of collection: 20/ 4/1992.

No. of collections: 4.

pH:6.9, Temperature: 26°C.

b. Date of collection: 20/ 08/1999.

No. of collections: 3.

pH: 7., Temperature: 26°C.

2. A pond at Karunagapilly (Kollam district).

A medium sized pond located on the side of the National High way to Trivandrum. The water is clear and most of the surface area is covered with water lilies.

Date of collection: 12/ 10/1997.

No. of collections: 2.

pH: 6.8, Temperature: 28°C

3 . A wetland at Chavarra (Kollam district).

A water logged area with a lot of sub merged vegetation along the road side of N.H near to Chavara town.

Date of collection: 12/ 10/1997.

No. of collections: 2.

pH: 7.1, Temperature: 28°C

4. Asthamudi Kayal near K.S.R.T .C stand (Kollam district).

Ashtamudi Lake or Kayal is the second largest lake in Kerala and it covers a good portion of west side of Kollam district. The collections were made from the lake , close to K.S.R.T.C stand.

Date of collection: 12/ 10/1997.

No. of collections: 3.

pH:6.9, Temperature: 26°C

5. A ditch at Thankassery(Kollam district).

The plankton samples were collected from a small ditch on the way to Thankassery beach.

Date of collection: 12/ 10/1997.

No. of collections: 1.

pH: 7.3, Temperature: 30°C

6. A pond at Kadakkal (Kollam district).

A small pond near the Kadakkal town, center region covered with green algae and margins with different types vegetations.

Date of collection: 14/ 10/1997.

No. of collections: 3.

pH: 7.2, Temperature: 29°C

Thiruvananthapuram District.....(TVM)

1. Neyyar Dam Reservoir (Thiruvananthapuram district).

This is a big reservoir about 40kms away from Trivandrum city. Water is slightly green in colour devoid of any type of weeds.

Date of Collection: 8/01/1998

No. of Collection: 3

pH: 6.9, Temp: 27° C.

2. Aruvikkara Dam reservoir (Thiruvananthapuram district).

This reservoir is located about 25 kilometers away from Trivandrum city. This water reservoir is also devoid of weeds . The water colour is slightly green .

Date of Collection: 8/01/1998

No. of Collection: 3

pH: 6.9, Temp: 27° C.

3. Akkulam lake (Thiruvananthapuram district).

Akkulam lake is located 3 Kilo meters away from Ullur junction and 10 kilometers is away from Trivandrum city. A vast area is covered with water floating weed *Eichornia* sp. and *Colocasia* sp.

Date of Collection: 9/01/1998

No. of Collection: 4

pH: 6.4, Temp: 26° C.

4. A stream at Cheria Ullur (Thiruvananthapuram district).

The plankton samples were collected from a small stream at Cheriaullur.

Date of Collection: 9/01/1998

No. of Collection: 2

pH: 7.2, Temp: 26° C.

5. Pond in side the Veli Park (Thiruvananthapuram district).

A pond inside the Veli park . The water is clear with *Hydrilla* sp., and marginal vegetation.

Date of Collection: 10/01/1998

No. of Collection: 2

pH: 6.9, Temp: 28° C.

6. A Wetland near Technopark at Kazhakuttam (Thiruvananthapuram district).

A water logged area is located on the two sides of bye pass road in front of Technopark road.

Date of Collection: 10/01/1998

No. of Collection: 2

pH: 7.3, Temp: 28° C.

7. A small pond at Petta Junction(Thiruvananthapuram district).

The samples were collected from a small pond near Petta junction, covered with *Colocasia* sp.

Date of Collection: 10/01/1998

No. of Collection: 2

pH: 6.8, Temp: 24° C.

8. River near Karamana (Thiruvananthapuram district).

The plankton samples were collected from the river at Karamana , 4 kilometers away from East Fort , Thiruvanthapuram.

Date of Collection: 11/01/1998

No. of Collection: 2

pH: 7.2, Temp: 26° C.

9. Pond at Papanamkode (Thiruvananthapuram district).

A small pond near the Papanamkode K.S.R.T.C workshop, covered with water hyacinth, *Eichornia* sp.

Date of Collection: 11/01/1998

No. of Collection: 1

pH: 7.3, Temp: 25° C.

10. Paddy fields at Attingal (Thiruvananthapuram district).

The collections were made from the small area of paddy field on the side of National High way at Attingal.

Date of Collection: 13/01/1998

No. of Collection: 2

pH: 6.3, Temp: 27° C.

Chapter - 4

FAUNESTIC AND SYSTEMATIC STUDY

22

SYSTEMATIC ACCOUNT

Based on the classification by Pennak (1989) the Phylum Rotifera is divided into two classes, Digononta and Monogononta

The present study has revealed the occurrence of 108 species of Rotifera belonging to 30 genera under 16 families from Kerala State, India.

CLASS: MONOGONONTA

ORDER : PLOIMA

I. Family: Epiphanidae Bartos, 1959

Epiphanids are semiloricated or illoricated soft specimens . *Epiphanes* spp. , are an important group in the plankton of reservoirs, lakes and ponds ,which appear seasonally. Larger *Epiphanes* sometimes may be confused with *Asplanchna* species. All can be separated on the unci dentition. Other species of Epiphanids are littoral in habit.

1. *Epiphanes brachionus* (Ehrenberg,1837)

(Plate 1 Fig: a)

Description: This is a soft and semiloricated rotifer ,and foot is very distinct from the body with three pseudosegments . The unci of trophi has four teeth.

Occurrence: KAG 3, KOZ 1, KOZ 5, WYD 2, WYD 7, MAL 4, PKD 6, TCR 2a, TCR 10, TCR 26, TCR 27, EKM 3, KTM 8 and IDY 2.

Measurements:

Length of body	:	660 μ m
Width of body	:	356 μ m
Length of toes	:	33 μ m

Distribution: This species was reported from Punjab, Kashmir & Ladakh (Edmondson and Hutchinson , 1934); and subsequently recorded from two Kumaun lakes in the Himalayas namely Nainital and Bhimtal by Sharma & Pant(1984 & 1985) in the month of May and June.

Remarks: This is first report from Kerala State and South India. In fact, it was reported from high altitude lakes from North India, but here, a good number of species were collected from both hilly region and plain lands in the months of April to May.

2. *Epiphanes clavulata* (Ehrenberg, 1832)

(Plate : 1 Fig: b), (Plate : 41 Fig : E)

Description: This is a large specimen, easily confused with *Asplanchna* sp. when it is contracted. The body is transparent and sacciform. Foot is short and retractile with very small toes. Gonad is band shaped and bends like horseshoe. Generally they feed on other rotifers. The uncus of trophi has six teeth.

Occurrence : TCR 1a and KTM 1

Measurements:

Total length	:	416 μ m
Contracted	:	360 μ m
Length of toes	:	12 μ m

Distribution: This species was reported for the first time from Andhra Pradesh by Dhanapathi (1974b) .

Remarks: The occurrence of this species is the first report from Kerala State. And this is considered as a rare species ,collected only from two localities from Kerala. This specimen showed very close similarity with the organism collected from Andhra Pradesh.

3. *Epiphanes macrourus* (Barrois & Daday,1894)

(Plate : 1 Fig: C)

Description: The body is saccate shaped. Dorsal antenna is clearly visible in lateral view. The foot is worm like and the toes are short and generally curved outwardly. In female, the foot bends over the egg. The uncus of trophi has seven teeth.

Occurrence: KAG 4, KAN 5,KOZ 1, TCR,2a, TCR 26, TCR 27and KTM 8.

Measurements:

Length body	:	169 μ m
Length of foot	:	90 μ m
Length of toes	:	9 μ m

Distribution: This species was reported in the Northern part of India, from Nagpur in the Oxidation ponds by Arora (1965 & 1966c) and from Delhi by Sarma(1988); Bihar (Sharma & Dudani, 1992).

Remarks: This is the first report from Kerala State and South India .12 specimens were collected from five localities of this region. The collected specimen showed very close similarity with Delhi specimen.

4. *Proalides subtilis* Rodewald ,1940

(Plate : 1 Fig: d)

Description: The body is elongated and cylindrical in shape. The important characteristic feature is the rudimentary variable shaped foot with retractable toes.

Occurrence: TCR 26 and APH 6.

Measurements:

Length of the body : 283um

Length of toes : 35µm

Distribution: This species was reported first time from Delhi ,India by Sarma(1988).

Remarks: This is the first report from Kerala State and South India. Only two specimens were collected from two localities of Kerala. The specimen agrees with the description of Delhi specimens.

II. Family: Brachionidae Ehrenberg, 1838

These rotifers are common in plankton samples. The characteristic features of this group are the presence or absence of antero- posterior spines /facets on lorica , and foot.

5. *Anuraeopsis coelata* de Beauchamp, 1932

(Plate : 2 Fig : a)

Description: The lorica is granulated with U shaped sinus at the anterior end and no teeth are present inside the sinus. There is ornamentation on both middle and caudal parts of the dorsal lorica and there is a suture on the ventral lorica.

Occurrence: KOZ 1,TCR 2a TCR 2b, TCR 15a ,TCR 15b and KOL 4

Measurements:

Length of lorica : 92 μ m

Width of lorica : 45 μ m

Distribution: Earlier record of this was from Baroda (Wulfert,1966); West Bengal, North Eastern region (Sharma, 1979c);Orissa State (Sharma,1980b); Ajwa reservoir , near Baroda , Gujarat , W. India(Jayangaudar,1980); Orissa state (Sharma 1987c) India (Sudzuki,1989).

Remarks : This species shows close similarity with the forms of West Bengal and Orissa (Sharma ,1979c, & 1980b). And it differs from Gujarat (Wulfert ,1966)

because of the absence of teeth at the anterior margin. This is the new record from Kerala State and South India.

6. *Anuraeopsis fissa* (Gosse,1851)

(Plate : 2 Fig : b & c)

Description: The lorica is made up of two plates, with the dorsal one rounded. The lorica is more or less cylindrical and pointed posteriorly. Many of the specimens carry eggs with a nipple. This species is clearly distinguishable from others in the possession of 1) truncated caudal extremity, 2) nearly straight pectoral margin, 3) stand-up collared or V-shaped occipital margin, 4) a pair of knob like projections at the antero-lateral corner, 5) central position of the widest & highest parts, 6) depressed, oblique occipital margin.

Occurrence : KAG 2, KAG 3 , KAN 1, KOZ 1, KOZ 3, KOZ 5, WYD 2, WYD 7, MAL 3, PKD 2, PKD 6, TCR 1a, TCR 2a, TCR 1b, TCR 3a, TCR 7, TCR 11a, TCR 11d, TCR 14, EKM 3, APH 5 , IDY 3, KOL 4, TVM 6 and TVM 9.

Measurements:

Length of lorica : 60 μ m

Width of lorica : 33 μ m

Distribution: This species was reported earlier from, Punjab (Edmondson & Hutchinson,1934); Nimeta Water works, near Baroda (Wulfert,1966); Kerala (Nayar & Nair, 1969);Fish pond in Barrackpore, West Bengal(Michael, 1968); Rajasthan (Nayar,1968); Two ponds at Pilani , Rajasthan (Nayar, 1970); Kerala (Nayar & Nair, 1969); Kerala (Nair & Nayar, 1971); Punjab (Vasisht & Battish,1971b); Tamil Nadu (Michael,1973); River Yamuna (Rai, 1974); Jemmu (J&K) (Jothi & Sehgal,1979);

West Bengal , North East India (Sharma, 1979c); Punjab State ,North West India (Sharma, 1980a); Ajwa reservoir , near Baroda , Gujarat , W. India (Jayangaudar,1980); Orissa state (Sharma 1987c) ; Two Kumaun Himalayan Lakes (Sharma & Pant, 1984& 1985); Karnataka (Patil & Gouder, 1989); Bihar (Sharma & Dudani ,1992).

Remarks: This species was reported from almost all the parts of India including Kerala. A good number of specimens were collected from twenty three localities of Kerala. And it is considered as a common species which is cosmopolitan in distribution .

7.*Brachionus angularis* Gosse,1851

(Plate : 2 Fig : d)

Description: The lorica is stiff and ovoid in shape. The anterior and posterior regions of the body are narrow and medially wide. Anterior occipital margin with only the median spines, and all other spines are reduced . The surface dorsal plate of lorica is stippled and ventral plate is simple with out any facets. Foot opening with 'U' sinus and two short bluntly pointed spines in ventral plate.

Occurrence: KAG 3, KAN 4, KOZ 1, KOZ 4 , WYD 1, PKD 4, TCR 2b,TCR 4 , TCR 12a, TCR 20 ,TCR 23, KTM 4, KOL 1 and TVM 7.

Measurements:

Length of lorica	:	120 μ m
Width of lorica	:	97 μ m
Length of median spine	:	4 μ m
Length of posterior spine	:	7 μ m

Distribution: This species was reported earlier from, Punjab (Edmondson & Hutchinson,1934); Nimeta Water works, near Baroda (Wulfert,1966); Roshnara tank, Naini Lake , Indranagar tank, Stoking Tank & Nursery Tank, Delhi(George , 1966); Fish pond in Barrackpore, West Bengal(Michael, 1968& 1969); Two tanks near Nagpur (Arora,1966c); Oxidation ponds in Nagpur(Arora , 1962 & 1966d); Rajasthan(Nayar,1968); Two ponds at Pilani , Rajasthan(Nayar, 1970); North India (Vasisht & Battish,1971a); River Yamuna (Rai, 1974); West Bengal , North East India(Sharma, 1979c); Orissa State (Sharma , 1980b) Two sewage channels from Gawlior(Saksena & Kulkarni,1986); Gawlior(Saksena *et al* ,1986); Orissa state (Sharma 1987c); Haryana State(Sharma& Sharma, 1988); Bihar (Sharma & Dudani, 1992); River Narmada, Madhya Pradesh(Sharma & Naik, 1996);

In South India, Kerala (Nayar & Nair, 1969); Kerala ,Nair & Nayar(1971); Tamil Nadu (Michael,1973); Andra Pradesh (Dhanapathi,1974b);Bhairideverkop Pond ,Karnataka(Patil & Gouder, 1982);Karnataka (Patil & Gouder, 1989);Andhra Pradesh (Narasimha Rao & Raju,2001);Andra Pradesh (Durga Prasad & Padmavathi , 2002).

Remarks: This species is a common one , and very good numbers have been collected from many localities of Kerala State.

8. *Brachionus bidentatus f. inermis* (Rousselet,1906)

(Plate : 2 Fig : e)

Description: Lorica is rigid and smooth with dorsal and ventral plates. Anterior margin of dorsal plate with 6 spines, in which lateral and median spines are more or less same in length and sub median are short. Anterior margin of the ventral plate is straight ,with out spines. Posterior lateral spines are totally absent. Foot sheath is flanked by two bluntly pointed spines which are slightly asymmetrical.

Occurrence : TCR 4 .

Measurements:

Length of lorica	:	250 μ m
Width of lorica	:	167 μ m
Anterior lateral spine	:	37 μ m
Anterior sub median spine	:	12 μ m
Anterior median spine	:	24 μ m

Distribution: Earlier the species *Brachionus bidentatus* and a form *Brachionus bidentatus* f. *adorna* were reported from India. *Brachionus bidentatus* was recorded for the first time from India, in Calcutta (Anderson,1889) . And later it was reported from various localities such as Punjab, Kashmir and Ladakh(Edmondson and Hutchinson,1934); Indranagar tank, Stoking Tank & Nursery Tank ,Delhi(George , 1966);River Yamuna (Rai, 1974); Andra Pradesh (Dhanapathi,1974b); Punjab State ,North West India(Sharma, 1976 & Sharma,1980a);Orissa, East India(Sharma,1978c); *Brachionus bidentatus* f. *adorna* was reported from West Bengal, North-Eastern India(Sharma, 1979c); Dal Lake ,Himalayan Lakes (Vass & Zutshi,1983); Two Kumaun Himalayan Lakes (Sharma & Pant, 1984& 1985); Two sewage channels from Gawlior(Saksena & Kulkarni,1986); Gawlior(Saksena *et al* ,1986); Orissa state (Sharma 1987c); Haryana State(Sharma& Sharma, 1988); River Narmada, Madhya Pradesh(Sharma & Naik, 1996).

Remarks: Earlier *Brachionus bidentatus* and *Brachionus bidentatus* f. *adorna* were reported from India . A good number of specimens were collected only from one locality, a one meter square cement tank at the Christ college garden. This species was seen in association with *Brachionus angularis*. This is a new record from India as well as from Oriental region.

9. *Brachionus calyciflorus* Pallas, 1766

(Plate : 3 Fig : a)

Description: The lorica is soft, and anterior margin with 4 spines in which median spines are longer than the others with swollen bases. Posterior and postero-lateral spines are also with swollen bases. This species is found to be one of the most variable ones. This is a cosmopolitan, eurytherm and seen in vast numbers together in alkaline water and polluted shallow water. In many localities, the predatory rotifer species *Asplanchna* was present in the same population of *Brachionus calyciflorus*.

Occurrence: KAG 1, KAG 4, KAN 2, KOZ 1, KOZ 2, KOZ 3, KOZ 5, KOZ 6, WYD 3, WYD 7, MAL 4, PKD 3, PKD 5, TCR 1a, TCR 1b, TCR 2a, TCR 6, TCR 11a, TCR 12a, TCR 15a, TCR 26, EKM 2, EKM 4, EKM 6, APH 5, APH 6, KTM 6, KTM 8, IDY 1, PTH 1, KOL 1, KOL 5, TVM 2, TVM 5, TVM 6 and TVM 9.

Measurements:

Length of lorica	:	225 μ m
Width of lorica	:	150 μ m
Length of anterior lateral spine	:	42 μ m
Length of anterior median spine	:	50 μ m
Length of posterior lateral spine	:	50 μ m
Length of posterior median spine	:	33 μ m

Distribution: This species was reported earlier from, Punjab, Kashmir and Ladakh (Edmondson & Hutchinson, 1934); Oxidation ponds in Nagpur (Arora, 1962 & 1966d); Two tanks near Nagpur (Arora, 1966b & 1966c); Two ponds at Pilani, Rajasthan (Nayar, 1964 & 1965b); Rajasthan (Nayar, 1968); Punjab State, North West

India(Sharma, 1976 &1980a); Jemmu (Jothi & Sehgal,1979);North East India(Sharma, 1979c); Dal Lake ,Himalayan Lakes (Vass & Zutshi,1983); Orissa, East India (Sharma,1980b); Two Kumaun Himalayan Lakes (Sharma & Pant,1985);Two sewage channels from Gawlior (Saksena & Kulkarni,1986); Haryana State(Sharma& Sharma, 1988); Gawlior(Saksena *et al* ,1986); River Narmada, Madhya Pradesh(Sharma & Naik, 1996).

It was reported from South India , Andra Pradesh (Naidu,1967); Kerala (Nayar & Nair, 1969); Kerala (Nair & Nayar 1971); Tamil Nadu(Michael,1973); Many localities in Andra Pradesh(Dhanapathi, 1977); Karnataka (Patil & Gouder,1989) ; Tamil Nadu (Sampathkumar, 1990); Andhra Pradesh (Narasimha Rao & Raju,2001); Andra Pradesh (Durga Prasad & Padmavathi , 2002).

Remarks: This species was collected from thirty six localities of this state. And this one was the commonest species in the whole collection . They showed variations in number of spines and in size. There are differences of opinion on the systematics of this polymorphic species. Nayar (1965b) studied extensively the cyclomorphosis of this species and stated that the production of additional structures such as postero-lateral spines were mainly due the sufficient quantity of food available for them. But , there is another opinion by Gilbert(1967) that there is a correlation between the spine development in *B. calyciflorus* and presence of predatory rotifer *Asplanchna* in the same population. The observation made in this research study also supported the correlation of *B. calyciflorus* with *Asplanchna*.

10. *Brachionus caudatus* Barrois & Daday,1884

(Plate : 3 Fig : b)

Description: The lorica is stiff , and the median anterior spines are not so long . The lateral anterior spines are also present. Sub-median anterior spines are totally absent. Lorica terminates in two stout spines , usually divergent and strongly flexed ventrally.

Occurrence: MAL 2a, KOZ 1, TCR 2a, TCR 19, EKM 5, IDY 1, IDY 5a, PTH 2, TVM 1.

Measurements:

Length of lorica	: 170 μ m
Width of lorica	: 150 μ m
Length of lateral spines	: 16 μ m
Length of median anterior spine	: 25 μ m
Length of Posterior spines	: 70 μ m

Distribution: Oxidation ponds in Nagpur (Arora , 1962 & 1966c); Ajwa reservoir , near Baroda , Gujarat , Nimeta Water works, near Baroda (Wulfert,1966); Indranagar tank, Stoking Tank & Nursery Tank, Delhi (George , 1966); Two ponds at Pilani , Rajasthan(Nayar,1970); Andhra Pradesh (Dhanapathi, 1974b) Punjab State ,North West India(Sharma, 1976); Orissa, East India(Sharma,1978c); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant,1985); Haryana State(Sharma& Sharma, 1988); Andhra Pradesh (Narasimha Rao & Raju,2001); Andhra Pradesh (Durga Prasad & Padmavathi , 2002).

Remarks: This species was collected from nine localities of this State. A variety of this species , *Brachionus caudatus personatus* was reported by Nayar & Nair (1969) from Irinjalakuda, of this State.

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11. *Brachionus diversicornis* (Daday,1883)

592.52176

(Plate : 3 Fig : e)

FRA/S

Description: This species was easily identified by the presence of long antero-lateral spines . Anterior median spines are very short , and anterior sub-median spines are totally absent. Two posterior lateral spines are divergently present ,of these left is often reduced .

Occurrence: KAG 4, KOZ 1, KOZ 5, MAL 6, PKD 6, TCR 2a, TCR 26 and KOL 2.

Measurements :

Length of lorica	:	221 μ m
Width of lorica	:	160 μ m
Length of anterior lateral spine	:	96 μ m
Length of right posterior lateral spine	:	107 μ m
Length of left posterior lateral spine	:	25 μ m

Distribution: Two Shallow ponds in Delhi(George , 1961b); Storage Reservoir of Ajwa , near Baroda , Gujarat ; Nimeta Water works, near Baroda (Wulfert,1966); Fish pond in Barrackpore, West Bengal(Michael, 1968); Roshnara tank, Naini Lake , Indranagar tank, Stoking Tank & Nursery Tank Delhi(George , 1966); Rajasthan (Nayar,1968) ; North West India, (Vasisht & Battish,1971a); Andra Pradesh (Dhanapathi,1974b); River Yamuna (Rai, 1974); Orissa (Sharma,1980b); North West India(Sharma, 1980a);West Bengal, North East India (Sharma,1979c); Orissa State (Sharma 1987c); Haryana State(Sharma& Sharma, 1988); Karnataka (Patil & Gouder, 1989);Bihar (Sharma & Dudani, 1992);River Narmada, Madhya Pradesh(Sharma & Naik, 1996); Andra Pradesh (Durga Prasad & Padmavathi , 2002).

NB 2995

Remarks : This species was reported from almost all the different regions of India. But, this is the first report from Kerala state.

12. *Brachionus donneri* Brehm, 1951

(Plate : 3 Fig : c & d)

Description: The lorica is covered by a gelatinous sheath, and highly flattened dorso-ventrally. There are two lateral antennae with conical protuberance. The posterior spines of the foot openings are blunt shaped. The anterior margin of ventral and dorsal lorica is with six short blunt spines.

Occurrence: TCR 19.

Measurements:

Length of lorica	:	173 μ m
Width of lorica	:	158 μ m
Depth of anterior sinus	:	20 μ m
Depth of posterior sinus	:	52 μ m

Distribution: This species was reported first time in India from Madras by Brehm (1951). But simultaneously it was collected in 14th February 1951 by Bruno Bērziņš from Grand lake, Tonic Sap, Cambodia, but published only in 1973. Chengalath *et al* (1973) also reported the same from Sri Lanka.

Remarks: This is very a interesting species and a rare specimen, collected only three from Peechi Reservoir, Trichur in the dry season, when the dilution is minimum (15th April) . This specimen was very difficult to find out from the plankton sample because of the presence of gelatinous sheath, many algae and debris attached to the same. And it is the first report from Kerala State and second report from India.

13. *Brachionus durgae* Dhanapathi, 1974

(Plate : 4 Fig : a)

Description: The lorica is rounded in shape and smooth. It is divided into dorsal and ventral plates, compressed dorso-ventrally. The dorso-anterior margin with equally long six spines, and 'V' shaped prominent sinus. The ridges are present on the anterior edges. The foot opening is present just below the center of the ventral side of the body with anchor shaped spines. Foot sheath also is developed.

Occurrence: TCR 2a.

Measurements:

Length of lorica	:	260 μ m
Width of lorica	:	196 μ m
Length of anterior spine	:	16 μ m

Distribution: The first report in India was from Hussain Sagar Lake, Hyderabad, Andhra Pradesh by Dhanapathi (1974b). And later on Sharma (1983), Chandrasekhar & Kodarkar (1995) reported this species from other parts of India. It was also reported by Sudzuki *et al.*, (1992) from Japan.

Remarks: This species was collected only from a single locality, the Kol- fields of Trichur, and it is the first report from Kerala. The population was very limited, and collected only two specimens.

14. *Brachionus falcatus* Zacharias, 1898

(Plate : 4 Fig : b)

Description: This species is characterised by the presence of extremely long sub-median anterior spines of variable length . The anterior median and lateral spines are absent. The postero-lateral spines are inwardly arched, their points sometimes pointing slightly outwards .

Occurrence : KAN 5, KOZ 1, KOZ 5, MAL 5, PKD 2, TCR 2a, TCR 26 and EKM 7.

Measurements :

Length of lorica	:	166 μ m
Width of lorica	:	151 μ m
Length of anterior sub-median spine	:	118 μ m
Length of anterior median spine	:	25 μ m
Length of posterior spine	:	162 μ m

Distribution: Tank near Nagpur central India(Arora , 1962& 1966c); Storage Reservoir Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Roshnara tank, Naini Lake , Indranagar tank, Stoking Tank & Nursery Tank Delhi(George , 1966); Rajasthan(Nayar,1968); Punjab (Vasisht & Battish,1971b); River Yamuna (Rai, 1974); Punjab State ,North West India(Sharma, 1976 &1980a); West Bengal , North East India (Sharma, 1979c); Orissa, East India(Sharma,1980b); Two Kumaun Himalayan Lakes, Utter Pradesh (Sharma & Pant,1985); Two sewage channels from Gawlior(Saksena & Kulkarni,1986); Orissa state (Sharma 1987c); Haryana State(Sharma& Sharma, 1988); Bihar (Sharma & Dudani, 1992); River Narmada, Madhya Pradesh(Sharma & Naik, 1996).

In South India, Kerala (Nayar & Nair, 1969 and Nair & Nayar, 1971); Tamil Nadu(Michael,1973);Karnataka (Patil & Gouder,1989);Andhra Pradesh (Narasimha Rao & Raju,2001); Andra Pradesh (Durga Prasad & Padmavathi , 2002).

Remarks : This species is a common one , and was reported earlier from Kerala State by Nayar & Nair(1969). In the present study , specimens were collected from various localities , especially from a single locality , wetlands of Panagad , Eranamkulam District.

15. *Brachionus forficula* Wierzejski,1891

(Plate : 4 Fig : c)

Description: This species is medium sized, anterior lateral spines not so long. The median spines are short and sub-median spines are absent. Posterior spines are large and bent inwards with characteristic knee like swelling . Variable forms were available in the different samples.

Occurrence: KAG 2, KAN 6, KOZ 2, KOZ 6, MAL 4, PKD 1,TCR 2b, TCR 4, TCR 11a, TCR 13, TCR 24, EKM 5, APH 3 and TVM 3.

Measurements:

Length of lorica	: 111 μ m
Width of lorica	: 97 μ m
Length of anterior lateral spine	:17 μ m
Length of anterior median spine	:10 μ m
Length of posterior lateral spine	:86 μ m

Distribution: Tank near Nagpur, Central India (Arora , 1962& 1966c); Storage Reservoir Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Fish pond in Barrackpore, West Bengal(Michael, 1968); Rajasthan(Nayar,1968); Punjab (Vasisht & Battish,1971b); North East India(Sharma, 1979c); Punjab State ,North West India(Sharma, 1980a); Orissa State (Sharma,1980b); Orissa state (Sharma 1987c); Haryana State(Sharma& Sharma, 1988Bihar (Sharma & Dudani, 1992); River Narmada, Madhya Pradesh(Sharma & Naik, 1996);

In South India, Kerala (Nayar & Nair, 1969); Kerala (Nair & Nayar , 1971); Tamil Nadu (Michael,1973); Andra Pradesh (Dhanapathi,1974b);); Karnataka (Patil & Gouder, 1989);Andhra Pradesh (Narasimha Rao & Raju,2001); Andra Pradesh (Durga Prasad & Padmavathi , 2002).

Remarks : A large number of specimens were obtained from thirteen localities from different regions of Kerala. Earlier, a new variety, *Brachionus forficula keralaiensis* , was reported by Nayar & Nair(1969) from Irinjalakuda, of this State.

16. *Brachionus plicatilis* O.F. Muller,1786

(Plate : 4 Fig : d)

Description: The lorica is soft and oval. The dorsal and ventral plate with out lateral dividing line. It has six anterior spines , the median spines are little longer than the others. No spines are present on the posterior side. Shape and size are variable.

Occurrence: TCR 2a, EKM 7, APH 7, KOL 4 and TVM 3.

Measurements:

Length of lorica	:	135µm
Width of lorica	:	116 µm
Anterior median spines	:	14µm

Distribution: This species was reported earlier from Ladakh & Tibet (Edmondson & Hutchinson, 1934); Rajasthan (Nayar, 1968); North Eastern India (Sharma, 1979c); Punjab State , North West India (Sharma, 1980a); Orissa state (Sharma 1987c); Karnataka (Patil & Gouder, 1989); Tamil Nadu (Sampathkumar, 1990); River Narmada, Madhya Pradesh (Sharma & Naik, 1996); Andhra Pradesh (Narasimha Rao & Raju, 2001).

Remarks: This species was collected from five localities of this State. And these localities were either backwaters or the semi saline aquatic ecosystems. A good number of specimens were collected from these localities for the present study. This is the first record from Kerala State.

17. *Brachionus quadridentatus* Hermann, 1783

(Plate : 5 Fig : a)

Description: Lorica barrel-shaped, swollen at its posterior region.. Anterior dorsal margin with six well developed spines, of these , medians are the longest and bent outwards, laterals slightly divergent. Anterior median spines are long. The ventro-posterior portion of the lorica forms a typical tubular sheath surrounding the foot opening. Posteriorly it has two stout and parallel lateral spines .Lorica is markedly stippled.

Occurrence: KAG 4, KOZ 1, KOZ 2, MAL 4, TCR 2a, TCR 10 and TCR 20.

Measurements:

Length of lorica	:	151 μ m
Width of lorica	:	123 μ m
Length of anterior lateral spine	:	22 μ m
Length of anterior median spine	:	27 μ m
Length of anterior sub-median spine	:	11 μ m
Length of posterior lateral spine	:	41 μ m

Distribution: Tank near Nagpur central India(Arora , 1962& 1966c); Storage Reservoir Ajwa, Nimeta Water works, near Baroda (Wulfert,1966);Rajasthan(Nayar,1968); Naini Lake , Indranagar tank, Stoking Tank & Nursery Tank Delhi(George , 1966); North West India, (Vasisht & Battish,1971a); Punjab State ,North West India (Sharma, 1976); West Bengal, North East India (Sharma,1979c); Punjab State ,North West India(Sharma, 1980a); Orissa, East India(Sharma,1980b); Jemmu (Jothi & Sehgal,1979); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant,1985); Two sewage channels from Gawlior(Saksena & Kulkarni,1986); Gawlior(Saksena *et al* ,1986); Orissa state (Sharma 1987c); Haryana State (Sharma& Sharma, 1988); Bihar (Sharma & Dudani, 1992); West Bengal (Sharma ,1993); River Narmada, Madhya Pradesh (Sharma & Naik, 1996).

South India (Naidu, 1967); Kerala (Nayar & Nair, 1969); Kerala (Nair & Nayar, 1971); Tamil Nadu(Michael,1973); Andra Pradesh (Dhanapathi,1974b); Karnataka (Patil & Gouder, 1989); Kerala (Segers & Babu,1999); Andra Pradesh (Durga Prasad & Padmavathi , 2002).

Remarks: This species is very common, widely distributed , highly variable, having an extensive Synonymy. It was collected from six localities of this State.

18. *Brachionus rubens* Ehrenberg,1838

(Plate : 5 Fig : b)

Description: Anterior margin with six spines, of these median and lateral spines are slightly elongated. A deep sinus is present in between median spines , generally deeper than *Brachionus plicatilis*. Foot opening with a rectangular aperture dorsally and a larger ,rather oval aperture ventrally.

Occurrence: KAN 2, KOZ 5, TCR 2a, TCR 20, APH 2 and KOL 6.

Measurements:

Length of lorica	: 132 μ m
Width of lorica	: 101 μ m
Length of anterior median spine	: 23 μ m
Length of anterior sub-median spine	: 7 μ m
Length of anterior lateral spine	: 13 μ m

Distribution: Rajasthan(Nayar,1968); Two ponds at Pilani , Rajasthan(Nayar,1970); North West India, (Vasisht & Battish,1971a); River Yamuna (Rai, 1974); Punjab State ,North West India(Sharma, 1976); West Bengal , North East India(Sharma, 1979c); Punjab State ,North West India(Sharma, 1980a); Orissa, East India(Sharma,1980b); Bhairideverkop Pond ,Karnataka(Patil & Gouder, 1982); Two sewage channels from Gawlior(Saksena & Kulkarni,1986); Gawlior(Saksena *et al* ,1986); Orissa state (Sharma 1987c); Haryana State(Sharma& Sharma, 1988); Karnataka (Patil & Gouder, 1989) Bihar (Sharma & Dudani, 1992); Andhra Pradesh (Narasimha Rao & Raju,2001);Andra Pradesh (Durga Prasad & Padmavathi , 2002).

Remarks: The lorica of this species shows very close similarity with *Brachionus urceolaris*, and sometimes confused with the same. But, this species is distinguished from *Brachionus urceolaris*, due to the median and lateral spines which are reduced in length. And it was obtained from six localities of Kerala State. Even though , the species was reported from other regions of India, this is the first report from Kerala State.

19. *Brachionus urceolaris* O.F. Muller,1773

(Plate : 5 Fig : c)

Description: Lorica is oval and more or less rounded posteriorly. It is divided into a dorsal and a ventral plate. Anterior dorsal margin with six pointed spines, medians longer than laterals, laterals longer than sub-medians. Anterior ventral margin undulate, with a shallow central sinus flanked on either side by a pointed

protuberance. Posterior spines absent. Foot opening with a rectangular aperture dorsally and a larger oval aperture in the ventral plate.

Occurrence : WYD 2, PKD 6 , TCR 5 and TCR 2a

Measurement:

Length of lorica	: 144 μ m
Width of lorica	: 121 μ m
Length of anterior lateral spine	: 12 μ m
Length of anterior median spine	: 27 μ m
Length of anterior sub-median spine	: 4 μ m

Distribution: Tank near Nagpur Central India(Arora ,1966b); Oxidation ponds in Nagpur(Arora , 1962 & 1966c); River Yamuna (Rai, 1974); North West India(Sharma, 1976 &1980a); West Bengal , North East India(Sharma, 1979c); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant,1985); Two sewage channels from Gawlior(Saksena & Kulkarni,1986); Gawlior(Saksena *et al* ,1986);

In South India, Karnataka (Patil & Gouder, 1989); Andra Pradesh (Dhanapathi & Sarma, 2000); Andhra Pradesh (Narasimha Rao & Raju,2001).

Remarks: This species shows close similarity with *Brachionus rubens* .It was recorded only from four localities of North and Central Kerala. This is the first report from Kerala State.

20. *Keratella cochlearis* (Gosse,1951)

(Plate : 6 Fig : a)

Description: This species is characterized by the presence of a single, and medium sized caudal spine . The dorsal side of lorica with a median longitudinal line , and the facets are arranged symmetrically on either side.

Occurrence: TCR 3b.

Measurements:

Length of lorica	:	109 μ m
Width of lorica	:	54 μ m
Anterior spines	:	16 μ m-14 μ m-25 μ m
Posterior spine	:	39 μ m

Distribution: Punjab, Kashmir & Ladakh (Edmondson and Hutchinson , 1934); Tank near Nagpur central India(Arora , 1962 & 1966c); Two ponds at Pilani , Rajasthan (Nayar,1970); Andhra Pradesh (Dhanapathi,1974b); West Bengal , North East India (Sharma, 1979c); Dal Lake ,Himalayan Lakes (Vass & Zutshi,1983); Karnataka (Patil & Gouder, 1989); River Narmada, Madhya Pradesh(Sharma & Naik, 1996).

Remarks: This specimen is smaller than the animal which was reported from Andhra Pradesh by Dhanapathi, but bigger than the description given by Sharma from West Bengal. This species is considered as a rare one and recorded only from a single locality of Central Kerala. And this is a new record from Kerala State.

21. *Keratella procurva* (Thorpe,1891)

(Plate : 7 Fig : a)

Description: The dorsal side of lorica with plaques. Three median plaques are present. the posteromedian plaque is pentagonal and terminates in a short median line. There are two postero-lateral spines, in which the right one is reduced and sometimes totally absent.

Occurrence: TCR 2b, EKM 6 and KTM 7.

Measurements:

Length of lorica : 102 μ m
 Width of lorica : 54 μ m
 Length of anterior spines : 17-13-24 μ m
 Length of posterior spines : 25-75 μ m

Distribution: Rajasthan(Nayar,1968); Kerala (Nayar & Nair, 1969); Kerala (Nair & Nayar, 1971); North East India(Sharma,1979c); Punjab State ,North West India(Sharma, 1980a); Orissa, East India(Sharma,1980b); Orissa State (Sharma 1987c); Haryana State(Sharma& Sharma, 1988)

Remarks: This species was reported in South India, from Kerala by Nayar & Nair (1969& 1971) and after that it has not been reported from other parts of South India so far. Three specimens were collected from only three localities of Central Kerala.

22. *Keratella tecta* (Gosse,1851)

(Plate : 6 Fig : b)

Description: This species is a close relative of *Keratella cochlearis* , except in the absence of caudal spine. . The dorsal side of lorica with a median longitudinal line , and the facets are arranged symmetrically on either side.

Occurrence : TCR 13 and TCR 2a

Measurements:

Length of lorica : 103 μ m
 Width of lorica : 64 μ m
 Length of anterior spines :12-12-23 μ m

Distribution: Rice field of Thailand (Heckman, 1979); West & East Malaysia & Singapore(Fernando & Zanki,1981);Impoundment Kinda, Central Burma (Koste & Tobias , 1990).

Remarks: Two specimens were collected from two localities of Central Kerala. And this is the first report from India. Earlier it was reported from South East Asia.

23. *Keratella tropica* (Apstein,1907)

(Plate : 6 Fig : c & d)

Description: The lorica is ornamented with polygonal markings on the surface. Anteriorly, there are six spines, in which the medians are longer and curved outwardly, the laterals and sub-medians are of equal length. The lorica has posteromedian remnant after postmeridian plaque. Two posterior spines are present , and they are unequal in size.

Occurrence : KAN 4, KOZ 6, MAL 1, PKD 4,TCR 2a,TCR 26, KTM 4 and TVM 7

Measurements:

Length of lorica	:	103 μ m
Width of lorica	:	68 μ m
Length of anterior spines	:	25 μ m- 21 μ m- 33 μ m
Length of posterior spines	:	58 μ m- 13 μ m

Distribution: Tank near Nagpur central India(Arora , 1962& 1966c); Roshnara tank, Naini Lake , Indranagar tank, Stoking Tank & Nursery Tank Delhi(George , 1966); Rajasthan(Nayar, 1965a &1968); Fish pond in Barrackpore, West Bengal(Michael, 1968); Reservoir Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Two

ponds at Pilani , Rajasthan(Nayar,1970); Punjab (Vasisht & Battish,1971b); River Yamuna (Rai, 1974); Punjab State ,North West India(Sharma, 1976 &1980a); Jemmu (Jothi & Sehgal,1979); West Bengal ,North East India(Sharma, 1979c); Ajwa reservoir , near Baroda , Gujarat , W. India(Jayangaudar,1980); Orissa, East India(Sharma,1980b); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant,1985); Two sewage channels from Gawlior(Saksena & Kulkarni,1986); Orissa state (Sharma 1987c); Haryana State(Sharma& Sharma, 1988); Bihar (Sharma & Dudani, 1992); River Narmada, Madhya Pradesh(Sharma & Naik, 1996).

In South India, Kerala (Nayar & Nair, 1969); Kerala (Nair & Nayar, 1971); Tamil Nadu(Michael,1973); Andra Pradesh (Dhanapathi,1974b); Bhairideverkop Pond, Karnataka(Patil & Gouder, 1982); Karnataka (Patil & Gouder, 1989); Andra Pradesh (Durga Prasad & Padmavathi , 2002).

Remarks: This species is very common and widely distributed. It was reported earlier from different regions of India, Including Kerala. A good number of specimens were collected from eight localities of Kerala.

24. *Platyias leloupi* Gillard, 1957

(Plate : 8 Fig : c & d)

Description: The lorica is oval shaped and the dorso ventral plates are flattened . The anterior region is wider than posterior end. There are two spines present at the anterior end ,which are long with closely placed bases . They are acutely pointed at the tip and curved outwardly.

The posterior spines are also long and pointed with widely separated bases. The dorsal plate of lorica is not having polygonal markings. Lorica with long keel under the triangular frontal dorsal plaque.

Occurrence : KAN 2, KOZ 1, KOZ 6, MAL 6, TCR 2a, TCR 11a and TCR 26.

Measurements:

Body length : 314 μ m
 Body Width : 264 μ m
 Anterior spines : 85 μ m
 Posterior spines : 100 μ m

Distribution: The first report of this specimen was from near Nagpur, Central part of India by Arora (1966a) as a new species *Platyias longispinosus* and later it was synonymised with *Platyias leloupi* (Sharma,1987a); Delhi (Sarma,1988).

Remarks : The collected specimen very shows very close similarity with the animal which was recorded from near Nagpur by Arora. It is reported for first time from Kerala State and South India.

25. *Platyias quadricornis* (Ehrenberg,1832)

(Plate : 8 Fig : a & b)

Description : The body is strongly loricated and dorsal anterior margin with two blunt median spines and two long pointed spines at the posterior end. The dorsal plate is projected outwardly with many facets. No keel present below the frontal plaque, but there is one pentagonal facet , and below this two hexagonal facets.

Occurrence: KOZ 4, TCR 17, TCR 2b, TCR 24 and EKM 2.

Measurements:

Body length : 231 μ m
 Body width : 214 μ m
 Anterior spines : 45 μ m
 Posterior spines : 53 μ m

Distribution: This species was reported from Northern part of India, Punjab, Kashmir & Ladakh (Edmondson and Hutchinson, 1934); North West India (Vasishth & Battish, 1971a); Punjab State, North West India (Sharma, 1976 & 1980a); Jammu (Jothi & Sehgal, 1979); West Bengal, North East India (Sharma, 1979c); Orissa, East India (Sharma, 1980b); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant, 1985); Two sewage channels from Gawlior (Saksena & Kulkarni, 1986); Orissa State (Sharma, 1987c); Haryana State (Sharma & Sharma, 1988); Bihar (Sharma & Dudani, 1992); Bihar (Sharma & *et al*, 1992); Madhya Pradesh, Central India (Sharma & Naik, 1996).

In the southern part of India, the first report was from Kerala (Nayar & Nair, 1969); Tamil Nadu (Michael, 1973); Andhra Pradesh (Dhanapathi, 1974b), Karnataka (Patil & Gouder, 1989); Andhra Pradesh (Durga Prasad & Padmavathi, 2002).

Remarks: This species was reported from almost all the regions of India. A good number of specimens were obtained from five localities of North and Central parts of Kerala.

26. *Platyonus patulus* O.F.Müller, 1786

(Plate : 7 Fig : b)

Description: The lorica is rectangular in shape. The anterior margin of lorica has ten conspicuous spines, four on dorsal side, four on ventral side and two on lateral sides. The dorsal medians are longer and curved to ventral side. The foot opening surrounded with two asymmetrical spines. The dorsal plate of lorica with a frontal trapezoid plaque, and median is pentagonal in shape. The foot is three segmented. The lateral antenna is present on the base of caudal spines.

Occurrence: KAG 1, KAG 3, KAN 1, KAN 5, KAN 6, KOZ 1, KOZ 5, WYD 2, WYD 7, MAL 3, PKD 4, PKD 5, PKD 6, TCR 1a, TCR 2b, TCR 3b, TCR 11c, TCR 12b, TCR 18, TCR 23, TCR 26, EKM 3, EKM 5, APH 1, APH 4, KTM 2, KTM 6, IDY 5b, KOL 3, TVM 5, TVM 9 and TVM 10.

Measurements:

Length of lorica	: 154 μ m
Width of lorica	: 116 μ m
Length of anterior spines	: 22-29-36 μ m
Length of posterior spines	: 51 μ m

Distribution: Punjab, Kashmir & Ladakh (Edmondson and Hutchinson, 1934); Punjab, (Vasisht & Battish, 1971b); North Eastern India (Sharma, 1979c); Punjab State, North West India (Sharma, 1980a); Orissa, East India (Sharma, 1980b); Two sewage channels from Gawlior (Saksena & Kulkarni, 1986); Gawlior (Saksena *et al*, 1986); Orissa state (Sharma 1987c); Haryana State (Sharma & Sharma, 1988); Bihar (Sharma & Dudani, 1992); River Narmada, Madhya Pradesh (Sharma & Naik, 1996);

Kerala, Nayar & Nair (1969); Kerala (Nair & Nayar 1971); Andhra Pradesh (Dhanapathi, 1974b); Karnataka (Patil & Gouder, 1989); Kerala (Segers & Babu, 1999).

Remarks: This species was previously known as *Platyias patulus*, and recently Segers *et al* (1993) erected a new genus *Plationus*, based on the SEM studies of both genera *Brachionus* and *Platyias*. This is a very common species, and shows some variations in the length of spines. A good number specimens were collected from thirty two localities of Kerala State.

III. Family: Euchlanidae Bartos,1959

This family is characterised by the presence of dorsal and ventral plates of lorica, are connected by deep inward folded lamella or sulci. Ventral plate is generally narrower than the dorsal one. Foot is segmented and more or less elongated trophi. Corona is *Euchlanis* type and malleate trophi.

27. *Dipleuchlanis propatula* (Gosse,1886)

(Plate : 9 Fig : a, b & c)

Description: The Body is oval shaped. The dorsal plate is concave and narrower than the ventral plate. The posterior portion is gradually narrows and becomes pointed at the end. The two plates are connected together by cuticle, which is in tri-lobed condition. Foot is short and three jointed. The toes are very long and slender. The mastax is modified malleate type.

Occurrence: KAG 4, KOZ 3, TCR 2a, and TCR 19.

Measurements:

Length of dorsal plate	:	132 μ m
Length of ventral plate	:	139 μ m
Width of dorsal plate	:	67 μ m
Width of ventral plate	:	102 μ m
Length of toes	:	73 μ m

Distribution: This species was reported for the first time from Kerala, South India (Nayar & Nair, 1969). Later it was recorded from West Bengal, North East India (Sharma, 1979c); Punjab State, North West India (Sharma & Sharma, 1984); Orissa state (Sharma 1987c); Karnataka (Patil & Gouder, 1989); Sudzuki (1989); Bihar (Sharma & Dudani, 1992); River Narmada, Madhya Pradesh (Sharma & Naik, 1996).

Remarks: Seven specimens were collected from four localities of North and Central Kerala. The specimens do not show much variations.

28. *Euchlanis dilatata* Ehrenberg, 1832

(Plate : 9 Fig : d & e)

Description: The body is oval in shape. The dorsal plate is semicircular and ventral plate as large as dorsal. Two plates are joined laterally by membranous, longitudinal sulci. The posterior end of the dorsal plate divided medially by a deep elongate notch with the shape of inverted 'U'. Foot slender and two-jointed. Toes about one-third the length of the dorsal plate, blade-like and fusiform in shape.

Occurrence: MAL 2a , PKD 5, MAL 1, TCR 2b, TCR 10, TCR 11d, TCR 12b , TCR 22, KTM 1, IDY 4 and KOL 2.

Measurements:

Length of dorsal Plate	:	285µm
Width of dorsal plate	:	214µm
Length of ventral plate	:	250µm
Width of ventral plate	:	185µm
Length of toes	:	35µm

Distribution: Punjab, Kashmir & Ladakh (Edmondson and Hutchinson , 1934); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant, 1985); Punjab State , North West India (Sharma & Sharma, 1984); North East India (Sharma, 1979c) ; Orissa, East India (Sharma, 1980b); River Yamuna , Rai (1974); India (Sharma & Michael, 1980); Punjab State , North West India (Sharma, 1976); Storage Reservoir Ajwa, Nimeta Water works, near Baroda (Wulfert, 1966); North West India (Vasisht &

Battish,1971a); Orissa State (Sharma 1987c); Haryana State(Sharma& Sharma, 1988); Karnataka (Patil & Gouder, 1989);Bihar (Sharma & Dudani, 1992); River Narmada, Madhya Pradesh(Sharma & Naik, 1996).

Remarks: This species was a common in plankton samples and they were collected from eleven localities of different regions of Kerala. However, it is reported for the first time from Kerala State.

29. *Euchlanis incisa* Carlin,1939

(Plate : 10 Fig : a, b & c)

Description : Body is ovoid in shape . The dorsal plate convex with median elongated keel ,extending from anterior to posterior ‘V’ notch. The dorsal and ventral plates connected longitudinally by a deep sulci. Foot with two joints , and toes are slender and fusiform.

Occurrence: KAN 3, TCR 2b and TCR 19.

Measurements:

Length of dorsal Plate	:	188µm
Width of dorsal plate	:	147µm
Length of ventral plate	:	178µm
Width of ventral plate	:	123µm
Length of toes	:	28µm

Distribution: This species was reported first from India Delhi(Sarma,1988). Before that it has been recorded from other parts of Asia, Sri Lanka (Fernando, 1980a); W&E Malaysia & Singapore (Fernando &Zanki,1981), and later from Malaysia & Sri Lanka(Sudzuki,1989)

Remarks: This species is considered as a rare one, and it was reported in India only from Delhi . Three specimens were collected from three localities of North and Central Kerala. This is the second report from India , and first time record from Kerala State and South India . This species agrees with the description of Sri Lankan specimens.

30. *Tripleuchlanis plicata* (Levander, 1894)

(Plate : 10 Fig : d & e)

Description: The lorica is ovoid in shape. The dorsal and ventral plates are of same size and connected by lateral longitudinal sulci. . The foot is three jointed and the toes are short, ending in sharp points. Mastax is modified malleate type.

Occurrence: KOZ 1 and KOZ 3.

Measurements:

Length of Dorsal plate	:	103 μ m
Length of Ventral plate	:	105 μ m
Toes	:	37 μ m

Distribution: This species was reported first from Municipal tank, Kaikalur (Dhanapathi, 1975a); and later from West Bengal , North East India(Sharma, 1979c); Orissa state (Sharma 1987c).

Remarks: This species is not commonly encountered in plankton samples. Only four specimens were collected from two localities of North Kerala. This species can be easily identified from the samples due to its special shape and big size. This is the first report from Kerala State.

II. Family: Mytilinidae Bartos, 1959

The rotifers are loricate ones. The ventral plate and dorsal plates are firmly fused. Cross sections of the lorica mostly triangular or nearly rhomboid form. Ventral plate and dorso-lateral plates firmly fused. Long dorsal plate with or without Sulcus, and sometimes with double keel . The foot with minimum of three segments , and toes are pointed. All species are littoral and benthic, and occasionally found as the plankton.

31. *Lophocharis salpina* (Ehrenberg,1834)

(Plate : 11 Fig : a)

Description: The lorica is strong and rigid. A distinctive dorsal keel is present , starting from anterior region till the end of posterior region of the lorica. Anterior margin of the lorica with broad sinus on dorsal and ventral plates . The truncate portion is equipped with denticles .

Occurrence: TCR 2a.

Measurements:

Length of dorsal lorica	:	112 μ m
Width of dorsal lorica	:	81 μ m
Length of toes	:	26 μ m

Distribution: This was reported first from Sohawa, Jhelum Dt. ,Punjab, North India by Edmondson & Hutchinson (1934); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant,1985); India (Sudzuki,1989); River Narmada, Madhya Pradesh(Sharma & Naik, 1996).

Remarks: Earlier this species was reported only from Northern part of India. Three specimens were collected from a single locality of Central Kerala. This is the first time report from Kerala State and South India.

32. *Mytilina acanthophora* Hauer, 1938

(Plate : 11 Fig : b)

Description: The lorica is granulated. The dorsal plate is convex in shape. Anterior end of the body with two triangular spine like structures. An inverted 'U' shaped sinus present on the posterior end of the lorica. The foot is two segmented with very long toes, more or less equal to two third of the body.

Occurrence: KOZ 4 & TCR 2b

Measurements:

Length of lorica : 163 μ m

Width of lorica : 98 μ m

Length of toe : 85 μ m

Distribution: This species was reported firstly from the West Bengal , North East India (Sharma, 1979c); Punjab state, North West India (Sharma & Sharma, 1984); Orissa state (Sharma 1987c); Haryana State (Sharma & Sharma, 1988); India (Sudzuki, 1989).

In South India ,it was reported from Dharwad, Karnataka (Patil & Gouder, 1989)

Remarks: This species was reported earlier from Northern and Eastern regions of India. In South India, it was recorded from Karnataka State . Two specimens were collected from two localities of Northern and Central parts of this State , and it is a new record to Kerala State.

33. *Mytilina bisulcata* (Lucks,1912)

(Plate : 11 Fig : c)

Description: The body is long and laterally compressed . Anterior spines are absent. The toes are long & strong , and pointed at the tip.

Occurrence: MAL 2a and PKD 6.

Measurements:

Length of lorica	:148 μ m
Width of lateral side of lorica	: 85 μ m
Length of Toes	: 55 μ m

Distribution: This species was reported first in India from Delhi(Sarma,1988); West Bengal (Sharma,1993); River Narmada, Madhya Pradesh(Sharma & Naik, 1996).

Remarks: This species is considered as a rare one and recorded only from Northern part of India ,and this is reported for the first time from Kerala and South India.

34. *Mytilina ventralis* (Ehrenberg,1832)

(Plate : 11 Fig : d)

Description: Anterior lorica margin is granulated and margin with two ventral spines .There are two spines seen on the posterior end of ventral lorica, and one on dorsal side .

Occurrence: KAG 2, KAN 5, KOZ 6, MAL 5, PKD 3, TCR 2a, TCR 8, TCR 13, TCR 17, TCR 24, EKM 4, APH 7, KTM 1, IDY 5b and TVM 10.

Measurements:

Length of lorica	:	163 μ m
Width of lorica	:	90 μ m
Anterior ventral spine	:	9 μ m
Posterior ventral spine	:	36 μ m
Posterior dorsal spine	:	21 μ m
Length of toe	:	50 μ m

Distribution: This species was widely distributed and reported from almost all the parts of India. And it has been reported from Calcutta(Anderson,1889); Punjab, Kashmir and Ladakh(Edmondson& Hutchinson,1934); Sakardhara tank, near Nagpur (Arora, 1965); Storage Reservoir Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Rajasthan(Nayar,1968); Punjab (Vasisht & Battish,1971b); West Bengal , North East India(Sharma, 1979c); Orissa, East India(Sharma,1980b); Jemmu (Jothi & Sehgal,1980); Punjab State ,North West India(Sharma &Sharma,1984); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant,1985); Two sewage channels from Gawlior(Saksena & Kulkarni,1986); Orissa state (Sharma 1987c); Haryana State(Sharma& Sharma, 1988); Bihar (Sharma & Dudani, 1992); River Narmada, Madhya Pradesh(Sharma & Naik, 1996).

In South India, the first report was from Kerala (Nayar & Nair, 1969);(Nair & Nayar, 1971). Later , it was recorded from Andhra Pradesh(Dhanapathi,1974b); Karnataka (Patil & Gouder, 1989); Kerala, Segers & Babu(1999).

Remarks: This species is one of the commonest ones , recorded from all over India. This species is reported from fifteen localities of Kerala State and large number of specimens were collected. They do not show much variations in general.

IV Family: Trichotridae Bartos,1959

These rotifers are with loricate head and body. The dorsal surface with facets , mostly granulated and with spicules or spines. Foot is freely movable or with stiff joints. Trophi is malleate . They are seen on the aquatic macrophytes and periphyton. And they are migrants as plankters.

35. *Macrochaetus collinsi* (Gosse,1867)

(Plate : 12 Fig : a)

Description: The lorica is more or less rounded, and margins with minute spinules. Moreover, there are some large spines present on the anterior and lateral margins. The identification of this species is based on the presence of two anterolateral spines, two anteriomedian spines and two posteriomedian spines on the dorsal side of lorica, with total of 3 pairs spines. Shape, size ,length and number of the spinules on margin are variable. But, the number of dorsal spines is constant.

Occurrence: KOZ 3, KOZ 1, PKD 5 and TCR 2a .

Measurements:

Length of lorica	:	110µm
Width of lorica	:	104µm
Length of toe	:	23µm

Distribution: This species was reported from Storage Reservoir Ajwa, Nimeta Water works, near Baroda, Gujarat (Wulfert,1966), and later it was also recorded from Rajasthan(Nayar,1968).

Remarks: Six specimens were collected from four localities of North and Central Kerala, and they were bigger in size than the species reported from Rajasthan. No information was available from south India, and the present report of this specimen is the first from Kerala and South India.

36. *Macrochaetus danneli* Koste & Shiel, 1983

(Plate : 12 Fig : b)

Description : The dorsal and ventral plates of lorica are granulated. A blunt keel is present on the dorsal side of the lorica. The margins of the lorica is ornamented with minute spinules. The spines are totally absent on the dorsal side of the lorica, except one pair of rudimentary antero-submedian spines are present.

Occurrence: TCR 11c.

Measurements :

Length of lorica	:	127 μ m
Width of lorica	:	130 μ m
Length of foot	:	33 μ m
Length of toes	:	17 μ m

Distribution : This species was recorded in the world only from a single locality Buffalo Billabong, Megela Creek, Northern Territory, Australia. And a close relative of this species *Macrochaetus americanus* n.sp. was reported from Brasil by Segers & Sarma (1993)

Remarks : The occurrence of this species is the second report in the world and first report from Kerala, India and Asia. The specimen shows very close similarity with the description of Australian specimen. Only one specimen was collected from a single locality, a small pond, in Mattom, Trichur, Central Kerala.

37. *Macrochaetus sericus* (Thorpe, 1893)

(Plate : 12 Fig : c)

Description: The lorica is broad , dorsal side with 4 pairs of spines arranged symmetrically . Two toes are slender and pointed with equal length.

Occurrence : KOZ 1 and KOZ 2.

Measurements:

Length of lorica	:	105 μ m
Width of lorica	:	98 μ m
Length of foot	:	57 μ m
Length of toe	:	28 μ m

Distribution: This species has been reported first from Sakardhara tank, near Nagpur, Central India (Arora, 1965); West Bengal, North East India (Sharma,1979c); Orissa state (Sharma 1987c); River Narmada, Madhya Pradesh(Sharma & Naik, 1996). In South India, reported from Edward Tank, Bhimavaram, Andhra Pradesh(Dhanapathi,1974b); Dharwad, Karnataka(Patil & Gouder,1989).

Remarks: This species was reported from two localities of North Kerala , and three specimens were collected. It was reported earlier from South India, but, this is the first time from Kerala state.

38. *Macrochaetus subquadratus* Perty,1850

(Plate : 12 Fig : d)

Description: The shape of lorica is more or less hexagonal and dorsal side bears 10 spines(5 pairs) with variable size and shape. Anterolateral spines are more prominent.

Occurrence : KOZ 1.

Measurements:

Length of lorica	:	103 μ m
Width of lorica	:	96 μ m
Length of foot	:	30 μ m
Length of toe	:	14 μ m

Distribution: This species was first reported from India, Cuddaph, Andhra Pradesh by Naidu(1967). And later it was recorded from Kerala (Nair & Nayar,1971).

Remarks: The specimen described by Naidu , has only three pairs of spines present on the dorsal side of lorica. It is to be presumed that it is *Macrochaetus collinsi* , identified as *Macrochaetus subquadratus* by mistake .

39. *Trichotria tetractis* (Ehrenberg,1830)

(Plate : 12 Fig : e)

Description: The body is vase -shaped, the antero- lateral margins of the lorica pointed. The foot with 3 segments , and first segment with a pair of spines and curved towards the dorsal side. The second foot segment is longer than the others. The two toes are very long with pointed ends. In Some of the specimens , the dorsal and ventral sides of the lorica are with ornamentations.

Occurrence : KAN 5, KOZ 6, TCR 2a, TCR 12b and TCR 14.

Measurements:

Length of lorica	:	100 μ m
Width of lorica	:	56 μ m
Length of toe	:	85 μ m

Distribution: It was reported first from Punjab, Kashmir (Edmondson and Hutchinson,1934). Storage Reservoir Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Nagpur in the Oxidation ponds by Arora (1965 & 1966c); West Bengal , North East India(Sharma, 1979c); Orissa, East India(Sharma,1980b); Punjab State ,North West India (Sharma &Sharma,1984);Two sewage channels from Gawlior(Saksena & Kulkarni,1986); Orissa State (Sharma 1987c); Haryana State(Sharma& Sharma, 1988); India (Sudzuki,1989); Bihar (Sharma & Dudani,1992); West Bengal (Sharma ,1993); Madhya Pradesh(Unni & Fole,1997);

In South India, the first report from Kerala (Nayar & Nair, 1969); (Nair & Nayar,1971) and from Andra Pradesh (Dhanapathi,1974b), Karnataka(Patil & Gouder,1989).

Remarks: This is a common species and was reported earlier from different regions of India including Kerala state. Seven specimens were collected from five localities of North and Central Kerala.

VI. FAMILY: Colurellidae Bartos, 1959

They are small rotifers, usually found with littoral vegetation. Lorica is either laterally compressed with ventral or dorsal apertures ,or dorso-ventrally flattened with out such apertures. Sometimes, a hood or head shield also present.

40. *Colurella obtusa* (Gosse,1886)

(Plate : 13 Fig : a, b & c)

Description: The lorica is laterally compressed and forms a single structure with ventral aperture. The lateral sides of valves of the lorica are rounded.

Occurrence : KOZ 2, PKD 2 , TCR 15a , TCR 17 and KTM 8.

Measurements:

Length of lorica : 77 μ m
 Width of lorica : 42 μ m
 Length of toes : 14 μ m

Distribution: Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant,1985); India (Sharma& Michael,1980); Haryana (Sharma&Sharma,1988); India (Sudzuki,1989).

Remarks : This species was reported only from Northern regions of India. And this was recorded from high altitude Himalayan lakes. But this was collected from plain lands of Kerala State. Because of the small size there is a chance to overlook its presence in the plankton samples. This is the first time report from Kerala State and South India.

41. *Colurella uncinata* (O.F. Muller,1773)

(Plate : 13 Fig : d & e)

Description : The lorica is laterally compressed and forms a single structure with ventral aperture. The posterior region of lorica jointed together and formed as spine like structure which is curved into ventral side. Foot two segmented and toes are short and pointed.

Occurrence : KAG 3, KAN 6, KOZ 4, MAL 5, PKD 1,TCR 2a, TCR 4, TCR 10 , EKM 4 and TVM 6.

Measurements:

Length of lorica	:	86 μ m
Width of lorica	:	55 μ m
Length of toe	:	18 μ m

Distribution: Fish pond in Barrackpore, West Bengal (Michael, 1968); West Bengal (Sharma, 1992& 1993);Madhya Pradesh(Sharma & Naik,1996).

Remarks: This species was collected from different regions of Kerala State. A good number of species were recorded from plankton samples. It was reported earlier from North and East regions of India, but, this is the new record to Kerala State and South India.

42. *Lepadella acuminata* (Ehrenberg,1834)

(Plate : 14 Fig : a & b)

Description : The lorica is composed of two plates which are dorso-ventrally compressed. There are two openings on the anterior side and posterior side for the head and foot respectively. The lorica is in oval shape. The posterior side of the lorica is modified as a pointed projection. There are two curved ridges running parallel to the edges of the dorsal plates, beginning from the anterior third of the body .The anterior side of the dorsal plate has a granulated collar. The ventral plate is flat. The cross section of the body is semicircular in shape. Three-segmented foot is present, of which third one is longer than the others. The toes are medium sized and straight.

Occurrence: KOZ 1, TCR 11c and TVM 4.

Measurements:

Length of lorica	:	92 μ m
Width of lorica	:	62 μ m
Length of toe	:	23 μ m

Distribution: This species was reported from Nilgiri Hills , Ootty, South India (Edmondson and Hutchinson,1934);India(Sharma& Michael,1980); West Bengal , North East India(Sharma, 1978b); North Eastern India(Sharma &Sharma, 1987a); Orissa state (Sharma 1987c); Bihar (Sharma & Dudani,1992, Sharma *et al*, 1992)

Remarks: This species was reported first time from India, Nilgiri Hills. And later it was recorded from different parts of the India. Here, it is recorded only from three localities . This species is a new record to Kerala State .

43. *Lepadella aspicora* Myers 1934.

(Plate : 14 Fig : c & d)

Description: The body is rounded in shape. The foot is 4 segmented , and the last segment longer than the others. Antero-ventral sinus is 'U' shaped and posterior-ventral notch is inverted "U" shaped. Toes are unequal in size.

Occurrence : TCR 11b.

Measurements:

Length of lorica	:	61 μ m
Width of lorica	:	52 μ m
Length of long toe	:	22 μ m
Length of short toe	:	17 μ m

Distribution: This species was recorded first time from India, West Bengal (Sharma,1978b); River Narmada, Madhya Pradesh(Sharma & Naik, 1996).

Remarks: Only three specimens were collected from a single locality from this State. Earlier, it was reported from north and East region of India. And this species is recorded for the first time from Kerala State and South India.

44. *Lepadella costatoides* Segers,1992

(Plate : 14 Fig : e & f)

Distribution : Antero-lateral tips of dorsal lorica end in two pointed tips. The postero-lateral side of dorsal lorica modified as two pointed spines .The dorsal side of lorica with three pairs of sub longitudinal striations .

Occurrence : TCR 11b.

Measurements:

Length of lorica : 77 μ m

Width of lorica : 58 μ m

Length of toe : 30 μ m

Distribution: This species was reported first time from India & Asia by Segers *et al*,1994, from Kerala State. It was already reported from Africa, Arabia, South America and Europe.

Remarks : This species is considered as a rare one. Only two specimens were collected from a single locality of Central Kerala. And it was reported first time from India & Asia by Segers *et al*,1994, from Kerala State.

45. *Lepadella discoidea* Segers, 1993

(Plate : 15 Fig : a & b)

Description : The body is disc(circular) shaped . The dorsal plate of lorica is convex(semicircular) and ventral plate is flat. In the anterior side, the head aperture is 'U' shaped sinus on the ventral side. Three-segmented foot is present; the last segment is longer than the others. Two equal –sized toes are present.

Occurrence: KOZ 2.

Measurements:

Length of lorica	:	106 μ m
Width of lorica	:	98 μ m
Length of toe	:	30 μ m

Distribution: This species has been recorded from West Bengal(Sharma,1978),North Eastern India(Sharma & Sharma,1987a) as *Lepadella ovalis* f. *larga*. But Segers (1993) designated this species as *Lepadella discoidea* n. sp. In South India , it has been reported as *Lepadella ovalis* f. *larga* from Karnataka (Patil & Gouder,1989)

Remarks: This species is larger and more rounded than the *Lepadella ovalis* , which was recorded earlier from Kerala by Nair & Nayar (1971). Three specimens were collected from a single locality of Northern region of Kerala. So this is the first report from Kerala State.

46. *Lepadella ehrenbergi* (Perty,1850)

(Plate : 15 Fig : c & d)

Description: The body is rhomboid in form. The postero-lateral margins of the body modified as triangular projections which are curved upwards to dorsal side. The dorsal plate is arched and ventral plate is flat. The foot is three-segmented , the last segment is longer than others. A pair of unequal sized toes is present.

Occurrence : KOZ 1, KOZ 2 , TCR 2b, and TVM 9.

Measurements :

Length of lorica : 69 μ m

Width of lorica : 77 μ m

Length of long toe : 22 μ m

Length of short toe : 15 μ m

Distribution: This species was reported first from India, Calcutta(Anderson,1889); West Bengal (Sharma,1978b);North Eastern –India(Sharma & Sharma,1987a). Orissa State (Sharma 1987c); In South India , it was recorded from Kerala State by Nair & Nayar (1971).

Remarks: This species is reported from four localities of Kerala State. And these specimens are bigger than the specimen reported by (Nair & Nayar,1971).

47. *Lepadella cf. favorita* Klement,1962

(Plate : 15 Fig : e, f & g)

Description: The dorsal plate of lorica semicircular with six rounded ridges .The ventral plate is more or less flat. The foot is three-segmented , with two equal toes.

Occurrence : TCR 11a.

Measurements:

Length of lorica : 70 μ m
 Width of lorica : 56 μ m
 Length of toe : 16 μ m

Distribution: This species was reported only from Kerala in India by Segers *et al*, (1994) . Earlier it was reported from Favourite Park near Ludwigsburg, Wurttemberg, Germany by Klement (1962).

Remarks: This is a very rare species , recorded only from a single locality of Central Kerala.

48. *Lepadella minuta* (Montet, 1918)

(Plate : 16 Fig : a & b)

Description : The body is very small and ovoid in shape. The margins on the anterior and posterior sides are straight. Two deep sinuses are seen on the anterior and posterior regions of the ventral plate of lorica .

Occurrence: TCR 11a.

Measurements:

Length of lorica : 46 μ m
 Width of lorica : 31 μ m
 Length of toe : 15 μ m

Distribution: In India, this species was reported only from Kerala (Segers *etal*,1994), and it has not been recorded from other parts of country so far.

Remarks: This specimen is very small and easy to be overlooked by researchers. And this species was also collected from the same locality where the *Lepadella* cf. *favorita* were found.

49. *Lepadella ovalis* (O.F. Muller,1786)

(Plate : 16 Fig : c & d)

Description: The body is ovoid or circular in shape. Dorsal plate of lorica is convex, and ventral plate is flat. Anterior side of the ventral plate has 'U' shaped head aperture and posterior side has ovoid foot opening. The foot is three-segmented with two equal short toes.

Occurrence : KOZ 3, KOZ 6 TCR 2a, and TCR 15a.

Measurements:

Length of lorica	:	161 μ m
Width of lorica	:	127 μ m
Length of toe	:	32 μ m

Distribution: Punjab, Kashmir and Ladakh(Edmondson& Hutchinson,1934); North west India(Vasisht & Batish,1971a); River Yamuna (Rai, 1974); West Bengal (Sharma, 1978b);Punjab State ,North West India(Sharma ,1976); Orissa, East India(Sharma,1980b); Punjab State ,North West India(Sharma &Sharma,1984); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant,1984 & 1985); North East India(Sharma & Sharma 1987a); Orissa State (Sharma 1987c); Haryana (Sharma&Sharma,1988); India (Sudzuki,1989); Bihar (Sharma & Dudani,1992); River Narmada, Madhya Pradesh(Sharma & Naik, 1996).

In South India, It was reported from Kerala(Nair & Nayar,1971); Dharwad, Karnataka(Patil & Gouder,1989).

Remarks: Even though this was reported from all over India and considered as a common one, but, this species is recorded only from four localities of North and Central Kerala.

50. *Lepadella patella* (O.F. Muller,1786)

(Plate : 16 Fig : e, f & g)

Description: The body is ovoid or circular. The dorsal plate arched and ventral plate is flat. The anterior margin of the dorsal plate with 'U' shaped head aperture and the posterior part of the ventral plate with 'V' shaped foot opening. The foot has three-segments, and a pair of toes are short & equal sized .

Occurrence : KAG 2, TCR 2b, TCR 11c , KTM 6, PTH 1 and KOL 3.

Measurements:

Length of lorica : 67 μ m

Width of lorica : 35 μ m

Length of lorica : 19 μ m

Distribution : Punjab, Kashmir and Ladakh(Edmondson& Hutchinson,1934);Storage Reservoir Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Rajasthan(Nayar,1968); Fish pond in Barrackpore, West Bengal(Michael, 1968); North west India(Vasisht & Batish,1971a); Punjab State ,North West India(Sharma ,1976); West Bengal (Sharma, 1978b); Orissa, East India(Sharma,1980b);Punjab State ,North

West India(Sharma &Sharma,1984); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant,1985); North East India(Sharma, 1987a); North Eastern region (Sharma & Sharma, 1987a); Orissa State (Sharma 1987c); Haryana State (Sharma & Sharma,1988); Bihar (Sharma & Dudani,1992); West Bengal (Sharma ,1993);River Narmada, Madhya Pradesh (Sharma & Naik, 1996).

In South India , this species was reported only from Kerala(Nair & Nayar,1971).

Remarks: This species is also widely distributed in India. And seven specimens were collected from six localities of Kerala State.

51. *Lepadella rhomboides* (Gosse,1886)

(Plate : 17 Fig : a, b & c)

Description: The body is elongated, and oval shaped. The dorsal plate of lorica is arched with prominent keel, and bounded with lateral grooves. The sinus on the anterior side of dorsal plate is 'U' shaped and ventral sinus is 'V' shaped. Foot opening is 'U' shaped . The foot is three-segmented ,of which the last segment is longer than the others. Toes are short and pointed.

Occurrence : KAN 3 , PKD 6, TCR 2b, TCR 6, TCR 17, TCR 27, APH 3 and TVM 4 .

Measurements:

Length of lorica	:	105µm
Width of lorica	:	67µm
Length of toe	:	23µm

Distribution: Punjab, & Nilgiri Hills (Edmondson & Hutchinson, 1934); Nimeta Water works, near Baroda (Wulfert, 1966); India (Sharma & Michael, 1980); West Bengal, North East India (Sharma, 1978b); Orissa, East India (Sharma, 1980b); North East India (Sharma & Sharma, 1987a); Orissa state (Sharma 1987c); River Narmada, Madhya Pradesh (Sharma & Naik, 1996); Dharwad, Karnataka (Patil & Gouder, 1989); Kerala, Segers & Babu (1999).

Remarks: A good number of specimens were collected from eight localities of Kerala State. The specimens do not show much variations.

52. *Lepadella triba* Myers, 1934

(Plate : 17 Fig : d & e)

Description: The body is elongated and ovoid. The dorsal plate is evenly arched with out anterior sinus and ventral plate is flat. Anterior side of ventral plate with 'V' shaped head opening & posterior side with inverted 'U' shaped foot opening.

Occurrence : TCR 11a.

Measurements:

Length of lorica	:	92µm
Width of lorica	:	53µm
Length of toe	:	24µm

Distribution: In India, this species was reported first time from India, Mattom, Kerala State by Segers *et al* (1994). But it was recorded earlier from other parts of Asia, Sri Lanka (Fernando, 1980a); Thailand & Sri Lanka (Sudzuki, 1989); Sri Lanka, Dothella Mahamewa & Hettayiali (Chengalath, Fernando & Koste, 1973); Bung – Borapet, C. Thailand (Koste, 1975 a)

Remarks : This species is reported from only one locality, and five specimens were collected from a small pond, Mattom, Trichur, Central Kerala.

VI. FAMILY: Lecanidae Bartos, 1959

These rotifers are small ones and characterised by the presence of shield shaped lorica with one or two long toes. The identification is mainly based on the morphology of lorica, but Segers (1995) made use of SEM ultra structure of trophi for the first time. Most of this group are epiphytic or littoral and occasionally seen in Plankton.

53. *Lecane aculeata* (Jakubski, 1912)

(Plate : 18 Fig : a & b)

Description: Lorica is rigid and elongated. The dorsal plate is narrow at the anterior and posterior regions, but medially wider than the ventral plate, and it is ornamented. In the anterior margin, there are two antero-lateral, acutely pointed spines present. Ventral plate is elongated with transverse and longitudinal foldings. Foot segment plate projects out side with two long toes, and claws are totally separated.

Occurrence : KAG 2, KAN 5, KOZ 1, KOZ 6, WYD 2, MAL 6, TCR 26 and KOL 6.

Measurements:

Length of dorsal lorica	:	64µm
Width of dorsal lorica	:	48µm
Length of ventral lorica	:	67µm
Width of ventral lorica	:	40µm

Length of toe	:	24 μ m
Length of claw	:	5 μ m
Length of antero-lateral spine	:	11 μ m

Distribution: This species was reported first time from India, Punjab (Edmondson and Hutchinson, 1934); Later, West Bengal (Sharma 1978a); North Eastern India and Orissa state (Sharma, 1987b & 1987c); West Bengal, India (Sharma, 1993); North – Eastern India (Sharma & Sharma, 1997); River Narmada, Madhya Pradesh (Sharma & Naik, 1996).

Remarks: Compared with the description and measurements of the specimen from West Bengal by Sharma (1978a), the present specimen is longer in size. This species is a new record to Kerala state and first report to South India. This species is considered as cosmopolitan and encountered in tropical and sub tropical regions than the temperate regions.

54. *Lecane arcula* Harring, 1914

(Plate : 18 Fig : c & d)

Description: The lorica is short and stiff. The dorsal plate of lorica is narrower in anterior region and posterior region, but medially wider than the ventral plate. The dorsal plate of lorica is ornamented, but ventral plate with transverse and longitudinal foldings. There are two antero-lateral acutely pointed spines present, but smaller than *Lecane aculeata*. The toes are short, acutely pointed and widely separated.

Occurrence : TCR 12b.

Measurements:

Length of dorsal lorica	:	74 μ m
Width of dorsal lorica	:	58 μ m
Length of ventral lorica	:	77 μ m
Width of ventral lorica	:	50 μ m

Length of toe	:	28 μ m
Length of claw	:	7 μ m
Length of antero-lateral spine	:	4 μ m

Distribution: This species has been reported earlier from Storage Reservoir Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); West Bengal (Sharma 1978a); North-Eastern India(Sharma,1987b).

Remarks: This species was reported earlier from North and Eastern parts of India. But, this report is for the first time from Kerala and South India.

55. *Lecane bifurca* (Bryce,1892).

(Plate : 18 Fig : e & f)

Description: The body is very short and easily overlooked . The lorica is very soft and inconsistent in shape. There are two small lateral projections present at the posterior side .The foot is pseudosegmented with single toe bifurcated terminally bearing very short claws.

Occurrence : KOZ 1, KOZ 3, WYD 1, TCR 17, TCR 25 and EKM 6.

Measurements:

Length of dorsal lorica	:	48 μ m
Width of dorsal lorica	:	47 μ m
Length of ventral lorica	:	60 μ m
Width of ventral lorica	:	46 μ m
Length of toe	:	14 μ m
Length of claw	:	3 μ m

Distribution: This species was reported first time from India by Sarma(1988) in Yamuna river at Delhi .Later, it was recoded from the paddy fields of Puri in Orissa State by Sharma (1991) .

Remarks : The collected specimen was exactly the same as the specimen's drawings of Sarma (1988) and Sharma(1991). This is the first record of this species from Kerala State and South India.

56. *Lecane bulla* (Gosse,1886)

(Plate : 19 Fig : a & b)

Description: The lorica is very typical , egg shaped. There is no much distinction between dorsal plate of lorica with ventral plate. The anterior region of the lorica with 'U' shaped sinus. Single and long toe with terminal split of pseudoclaws. Accessory claws are present at the base of pseudoclaws.

Occurrence : KAG 2, KAG 4, KAN 2, KOZ 1, KOZ 6, WYD 1, WYD 6, MAL 1, MAL 4, PKD 3, TCR 2a, TCR 5, TCR 11a, TCR 15b, TCR 22, EKM 2, APH 2, APH 7, KTM 6, KTM 8, PTH 1, KOL 1 and TVM 7.

Measurements:

Length of dorsal lorica	:	103 μ m
Width of dorsal lorica	:	77 μ m
Length of ventral lorica	:	101 μ m
Width of ventral lorica	:	71 μ m
Length of toe	:	68 μ m
Length of claw	:	32 μ m

Distribution: Punjab, Kashmir & Ladakh (Edmondson and Hutchinson,1934); Madras (Pasha,1961);Sakardhara tank, near Nagpur (Arora, 1965&1966c); Indranagar tank, Stoking Tank & Nursery Tank Delhi(George , 1966); Storage Reservoir Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Rajasthan (Nayar,1968); Punjab (Vasisht & Battish,1971b); Andra Pradesh (Dhanapathi,1976b); West Bengal, (Sharma ,1978a); Ajwa reservoir , near Baroda , Gujarat , W. India (Jayangaudar, 1980); Orissa State (Sharma,1980b); Dal Lake ,Himalayan Lakes (Vass & Zutshi,1983); Punjab State ,North West India(Sharma &Sharma,1984); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant,1984& 1985); Two sewage channels from Gawlior(Saksena & Kulkarni,1986);West Bengal , North- Eastern India(Sharma, 1987b); Orissa (Sharma,1987c); Haryana State (Sharma & Sharma,1988); Karnataka State(Patil & Gouder,1989); Bihar State (Sharma & Dudani,1992); Bihar State(Sharma *et al* ,1992); River Narmada ,Madhya Pradesh (Sharma & Naik,1996);Madhya Pradesh (Unni & Fole 1997);River Narmada, Madhya Pradesh (Unni & Naik, 1997); North –Eastern India(Sharma & Sharma, 1997); Kerala (Segers & Babu,1999).

Remarks: This species is very common and found numerously in plankton samples And earlier it was reported from different regions of India.

57. *Lecane closterocerca* (Schmarda,1859)

(Plate : 19 Fig : c & d)

Description: The lorica is smooth and rounded in shape. Dorsal plate is narrow at anterior side and medially wider than the ventral plate. Ventral plate is having longitudinal foldings. Foot is pseudosegmented, slightly projecting , and bears a single, medium sized toe which tapers to acute pointed end without claw.

Occurrence: KAN 4, KOZ 1, KOZ 3, WYD 7, MAL 1, TCR 2b, TCR 7, TCR 11b, TCR 13 and EKM7

Measurements

Length of dorsal lorica	:	47 μ m
Width of dorsal lorica	:	46 μ m
Length of ventral lorica	:	55 μ m
Width of ventral lorica	:	43 μ m
Length of toe	:	28 μ m

Distribution: Punjab, Kashmir & Ladakh (Edmondson and Hutchinson,1934); Storage Reservoir Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Nursery Tank Delhi(George , 1966); Rajasthan(Nayar,1968); Fish pond in Barrackpore, West Bengal(Michael, 1968); West Bengal, North-Eastern India(Sharma,1978a); Orissa, East India(Sharma,1980b);Punjab State ,North West India(Sharma &Sharma,1984); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant,1984& 1985); North- Eastern India(Sharma,1987b); Orissa (Sharma ,1987c); Haryana State(Sharma & Sharma,1988);Bihar State(Sharma& Dudani,1992); Bihar State(Sharma *et al* ,1992); West Bengal(Sharma,1993); River Narmada ,Madhya Pradesh (Sharma & Naik,1996); North-Eastern India (Sharma & Sharma,1997).

Remarks: This species is found to be common in many places along with the weeds. This species was reported earlier from North , Central and East part of India. But, this is the first time report of this species from Kerala and South India.

58. *Lecane crepida* Harring,1914

(Plate : 19 Fig : e & f)

Description: Lorica is stiff and medium sized. Dorsal plate of lorica is relatively narrower than ventral plate. Two antero-lateral spines are present. Dorsal plate with few longitudinal folds .Foot segment is elongated and projected outwardly. Foot bears two elongated toes with pointed claws.

Occurrence : KOZ 1 , PKD 2, TCR 2a, TCR 3b, TCR 16 and EKM 4.

Measurements:

Length of dorsal lorica	:	81 μ m
Width of dorsal lorica	:	49 μ m
Length of ventral lorica	:	80 μ m
Width of ventral lorica	:	55 μ m
Length of toe	:	35 μ m
Length of claw	:	9 μ m
Length of antero-lateral spine	:	6 μ m

Distribution: Madras (Pasha,1961);Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); West Bengal , North East India(Sharma, 1978a& 1978c); Orissa, East India(Sharma,1980b);Punjab State ,North West India(Sharma &Sharma,1984); North- Eastern India(Sharma,1987b); Orissa State(Sharma,1987c); North- Eastern India(Sharma& Sharma ,1997).

Remarks: The new species *Lecane neali* , described by Wulfert(1966)is the synonym of *Lecane crepida* . Sharma(1978c) described a new variety of *Lecane crepida f. bengalensis* from Calcutta and neighbouring areas. And the new species *Lecane vasishthi*, described by Sharma (1980) is also the synonym of *Lecane crepida*.

This species is very easy to distinguish from the other Lecanids due to its shape. Some times it may be confused with *Lecane eswari* , but can be separated due to the presence of its strongly projecting pseudosegment. This species is not so common in the collections. This is the first report from Kerala and South India.

59. *Lecane curvicornis* (Murray 1913)

(Plate : 20 Fig : a & b)

Description: Lorica is stiff and medium sized. Dorsal plate of lorica is narrower than the ventral plate. Small antero-lateral spines are present. Ventral plate of lorica is longer and wider than the dorsal plate. Foot is pseudosegmented and without projection. It bears two long toes with pseudoclaws and accessory claws.

Occurrence : KOZ 1, MAL 3, TCR 2b, TCR 17, TCR 24 and APH 4.

Measurements:

Length of dorsal lorica	:	124 μ m
Width of dorsal lorica	:	105 μ m
Length of ventral lorica	:	130 μ m
Width of ventral lorica	:	110 μ m
Length of Toe	:	65 μ m
Length of claw	:	11 μ m
Length of antero-lateral spine	:	3 μ m

Distribution : This species was reported first time from India at Sakardhara tank, near Nagpur (Arora, 1965&1966c); Nimeta Water works, near Baroda (Wulfert,1966); Andhra Pradesh State (Dhanapathi,1976b); West Bengal , North East India(Sharma, 1978a); Two sewage channels from Gawlior(Saksena & Kulkarni,1986);North-Eastern India(Sharma,1987b); Orissa State(Sharma,1987c);Haryana State(Sharma & Sharma,1988);Bihar State(Sharma& Dudani,1992); Bihar State(Sharma *et al* ,1992); North-Eastern India(Sharma & Sharma,1997); Kerala (Segers & Babu,1999).

Remarks: This species is very close to *Lecane unguitata*, but differs by its relatively smaller size and shorter claws. Two new species of Arora(1965), such as *Lecane curvilinealis* and *Lecane longidactyla* synonymies with *Lecane curvicornis* .This species is not common in the plankton samples .

60. *Lecane doryssa* Haring,1914

(Plate : 20 Fig : c & d)

Description: Lorica is stiff and small. Dorsal plate of lorica is narrow at the anterior region and posterior regions, but medially wider than the ventral plate. Dorsal plate is highly ornamented. Ventral plate has the transverse and longitudinal foldings with ornamentations. Foot pseudosegmented and is elongated with two short toes. Toes are relatively long, with separated claws.

Occurrence: KOZ 3.

Measurements:

Length of dorsal lorica	:	56 μ m
Width of dorsal lorica	:	53 μ m
Length of ventral lorica	:	64 μ m
Width of ventral lorica	:	50 μ m
Length of toe	:	25 μ m
Length of claw	:	13 μ m

Distribution: North- Eastern India (Sharma,1987b); Ponds in Belgharia, Calcutta (Sarma,1988).

Remarks: Only two specimens were collected from a single locality (Mavoor factory canal at Calicut). And it is considered as a rare species. The earlier report of this species was only from North –Eastern region of India. And it is the first report from Kerala State as well as South India.

61. *Lecane furcata* (Murray,1913)

(Plate : 21 Fig : a & b)

Description: The lorica is stiff and more or less rounded in shape. Dorsal plate of lorica anteriorly is narrower and medially wider than the ventral plate. Ventral plate with transverse and longitudinal folds. Pseudosegment is simple not projected outwardly. Single toe with a terminal fissure which is $\frac{1}{4}$ of the toe length .

Occurrence: KOZ 1, KOZ 6, WYD 2, PKD 6, TCR 2a, TCR 11c, TCR 17 and KTM 5.

Measurements:

Length of dorsal lorica	:	67 μ m
Width of dorsal lorica	:	62 μ m
Length of ventral lorica	:	77 μ m
Width of ventral lorica	:	58 μ m
Length of Toe	:	28 μ m
Length of claw	:	5 μ m

Distribution: North West India (Sharma, 1976); West Bengal , North- Eastern India (Sharma, 1978a); Punjab State ,North West India(Sharma &Sharma,1984); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant, 1985); North Eastern India(Sharma,1987b); Kerala State,(Segers & Babu,1999).

Remarks: A good number of specimens were collected from various localities. In the description given by Sharma (1978a), the length of dorsal plate is larger than the ventral plate. But, in the present specimens the ventral plate is larger than the dorsal plate which shows close similarity with the type material description from Rio de Janeiro, Brazil (Harring & Myers, 1926).

62. *Lecane hamata* (Stokes, 1896)

(Plate : 21 Fig : c & d)

Description: Lorica is rigid and ovoid in shape. Dorsal plate is anteriorly narrower and medially wider than the ventral plate. Anterior margin of ventral plate with a deep 'U' shaped sinus whereas the dorsal plate with shallow sinus. Antero-lateral projections are prominent. The foot Pseudosegment is slightly projected with a single toe, tapering to pointed end.

Occurrence: KAN 3, KOZ 1, KOZ 3, WYD 1, MAL 5, PKD 6, TCR 1b, TCR 2a, TCR 5, TCR 25 and APH 5.

Measurements:

Length of dorsal lorica	:	62 μ m
Width of dorsal lorica	:	47 μ m
Length of ventral lorica	:	75 μ m
Width of ventral lorica	:	39 μ m
Length of toe	:	27 μ m

Distribution: Punjab & Kashmir (Edmondson & Hutchinson, 1934); Madras, (Pasha, 1961); Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert, 1966); Rajasthan (Nayar, 1968); Fish pond in Barrackpore, West Bengal (

Michael, 1968); Two ponds at Pilani , Rajasthan(Nayar,1970); Andra Pradesh (Dhanapathi,1976b); West Bengal, North-Eastern India(Sharma,1978a); Orissa, East- India(Sharma,1980b); Punjab State ,North West India(Sharma &Sharma,1984); North Eastern India(Sharma,1987b); Orissa state(Sharma ,1987c); Narmada River, Madhya Pradesh(Sharma & Naik,1996); North –Eastern India(Sharma & Sharma ,1997); Kerala (Segers & Babu,1999).

Remarks: This species is widely distributed and reported from all over India . A good number of specimens were collected from eleven localities of Kerala state.

63. *Lecane hastata* (Murray,1913)

(Plate : 22 Fig : a & b)

Description: The lorica is soft more or less cylindrical in shape. Dorsal plate of lorica is narrower than the ventral plate. The anterior margins of dorsal plate and ventral plate are nearly straight and coincident. Ventral plate is longer than its width. Foot Pseudosegment is square in shape and not projected outwardly. Toes are parallel sided with long claws .

Occurrence : TCR 2b.

Measurements:

Length of dorsal lorica	:	88 μ m
Width of dorsal lorica	:	76 μ m
Length of ventral lorica	:	101 μ m
Width of ventral lorica	:	86 μ m
Length of toe	:	35 μ m
Length of claw	:	14 μ m

Distribution: This species has been reported first time from India ,Nimeta Water works, near Baroda (Wulfert,1966); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant, 1985); River Narmada, Madhya Pradesh(Sharma & Naik,1996) North –Eastern India (Sharma & Sharma ,1997).

Remarks: Only three specimens were collected from one locality for the present study. It is not a widely distributed species, and in India it was recorded only from three places. So the present report of this species is the first from Kerala State and South India.

64. *Lecane hornemanni* (Ehrenberg,1834)

(Plate : 22 Fig : c & d)

Description: Lorica is very soft and easily deformed. Dorsal plate is wider than the ventral plate. Head aperture margins are nearly coincident, straight or slightly convex, with rounded antero-lateral corners. Ventral plate is with incomplete transverse folds. Foot plate is broad, and coxal plates are rounded. Toes are flexible , parallel sided and toes tips asymmetrical with out claws.

Occurrence : TCR 2a.

Measurements:

Length of dorsal lorica	:	77 μ m
Width of dorsal lorica	:	65 μ m
Length of ventral lorica	:	82 μ m
Width of ventral lorica	:	60 μ m
Length of toe	:	28 μ m

Distribution: Kashmir (Edmondson & Hutchinson,1934); Madras(Pasha, 1961);Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Andra Pradesh (Dhanapathi,1976b); North East India(Sharma,1987b); River Narmada, Madhya Pradesh(Sharma & Naik, 1996); North- Eastern India(Sharma& Sharma ,1997).

Remarks: This species was collected only from a single locality of Central Kerala. It was reported earlier from southern part of India, Madras & Andhra Pradesh. And this the first time report from Kerala State.

65. *Lecane inopinata* Haring & Myers,1926

(Plate : 22 Fig : e & f)

Description: Lorica is soft and oval in shape. The dorsal plate is narrower in anterior region, bur medially wider than the ventral plate. Anteriorly, dorsal plate and ventral margins are coincident. Ventral plate is more or less same size of dorsal with longitudinal and transverse foldings. Foot pseudosegment is simple and not projected outwardly. Toes are slender with separated claws, and 1/3 of length is fused together .

Occurrence : KOZ 1 and KOZ 3.

Measurements:

Length of dorsal lorica	:	50µm
Width of dorsal lorica	:	45µm
Length of ventral lorica	:	56µm
Width of ventral lorica	:	42µm
Length of toe	:	23µm
Length of claw	:	4µm

Distribution: Andra Pradesh (Dhanapathi,1976b); West Bengal , North- Eastern India(Sharma, 1978a);North East India(Sharma,1987b); Orissa State(Sharma,1987c); River Narmada, Madhya Pradesh(Sharma & Naik,1996); North-Eastern India (Sharma & Sharma,1997).

Remarks: This species may be confused with *Lecane undulata*, but, in *Lecane inopinata* 30% the toes are fused , in *Lecane undulata* , the toes are fused only at the basal region. Compared with the description of the specimen of Sharma (1978a), the present specimen is smaller in size. A few numbers of specimens were collected from a single locality, a pond near Mavoor Rayons factory at Calicut. This is a new record to Kerala state.

66. *Lecane leontina* (Turner,1892)

(Plate : 23 Fig : a & b)

Description: The lorica is stiff. The dorsal plate of lorica is narrower than the ventral plate. The anterior margins of two plates of lorica are concave, with deep sinus. Ventral plate of lorica is elongated with incomplete transverse foldings. And antero-lateral spines are present. Toes are long with needle like pseudoclaws.

Occurrence : KAN 2, KOZ 1, WYD 3, PKD 6,TCR 2b, TCR 12b, TCR 22, EKM 1, KTM 3, IDY 3, KOL 2 and TVM 10.

Measurements:

Length of dorsal lorica	:	135µm
Width of dorsal lorica	:	110µm
Length of ventral lorica	:	163µm

Width of ventral lorica	:	108 μ m
Length of toe	:	83 μ m
Length of claw	:	11 μ m

Distribution: Sakardhara tank, near Nagpur (Arora, 1965&1966c); Andra Pradesh (Dhanapathi,1976b); Orissa, East India(Sharma,1980b); Punjab State ,North West India(Sharma & Sharma,1984); West Bengal , North- Eastern India(Sharma, 1978a); North East India(Sharma,1987b); Orissa State (Sharma,1987c); Karnataka (Patil & Gouder, 1989); Bihar State(Sharma & Dudani,1992); Bihar State (Sharma *et al*,1992); River Narmada, Madhya Pradesh(Sharma & Naik,1996); North-Eastern India (Sharma & Sharma,1997); Kerala (Segers & Babu,1999).

Remarks: This species is one of the biggest *Lecane sp.* in the family Lecanidae. So it is very easy to recognize and separate out from plankton samples . A good number of specimens were recorded from the plankton samples collected from Kerala State.

67. *Lecane ludwigi* (Eckstein,1883)

(Plate : 23 Fig : c & d)

Description: Lorica is stiff and ovoid in shape. The dorsal plate of lorica is narrower in anterior region and medially wider than the ventral plate .The anterior margin ventral plate is concave , but dorsal plate is slightly concave, and antero-lateral spines are present. Ventral plate is elongated and conical shaped at the posterior region, with longitudinal and transverse foldings. Foot pseudosegment is simple and not projected outwardly. The toes are long and parallel sided tapering into points ,with out claws.

Occurrence : KAG 1, KAG 4, KAN 5, KOZ 1, MAL 6, PKD 6, TCR 2a, TCR 12a, TCR 21 and APH 5.

Measurements:

Length of dorsal lorica	:	100 μ m
Width of dorsal lorica	:	80 μ m
Length of ventral lorica	:	123 μ m
Width of ventral lorica	:	71 μ m
Length of toe	:	39 μ m

Andra Pradesh (Dhanapathi,1976b);Jemmu (Jothi & Sehgal,1979); Orissa, East India(Sharma,1980b); India(Sharma & Michael,1980); Punjab State ,North West India(Sharma & Sharma,1984); Two sewage channels from Gawlior(Saksena & Kulkarni,1986); West Bengal , North- East India(Sharma, 1978a); North East India(Sharma,1987b); Orissa State(Sharma,1987c); Karnataka State (Patil & Gouder, 1989); Bihar State (Sharma & Dudani,1992); Bihar State (Sharma *et al*,1992); River Narmada, Madhya Pradesh(Sharma & Naik,1996); North-Eastern India (Sharma & Sharma,1997).

Remarks: This species is very common and collected from various localities. Because of the large size, it is easy to locate and separate from the plankton samples. This species is reported for the first time from Kerala State.

68. *Lecane luna* (O.F. Muller,1776)

(Plate : 24 Fig : a & b)

Description: Lorica is stiff and more or less rounded in shape. Dorsal plate of lorica is narrower than the ventral plate. Anterior margins of dorsal and ventral plate of lorica are concave and antero-lateral spines are present. Dorsal plate is circular in shape , but the ventral plate is longer than the wide and smooth. Foot pseudosegment is simple and not projected. Toes are parallel sided, needle-like and short with pseudoclaws and accessory claws.

Occurrence : KAG 2, KAN 1, KOZ 1, KOZ 4, WYD 1, MAL 4, PKD 3, PKD 6, TCR 2a, TCR 15b, TCR 27, APH 7, KTM 4, IDY 2 and TVM 6.

Measurements:

Length of dorsal lorica	:	101 μ m
Width of dorsal lorica	:	102 μ m
Length of ventral lorica	:	123 μ m
Width of ventral lorica	:	99 μ m
Length of toe	:	46 μ m
Length of claw	:	8 μ m

Distribution: Punjab , Kashmir & Ladakh (Edmondson & Hutchinson,1934); Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Stoking Tank & Nursery Tank Delhi(George , 1966);Rajasthan(Nayar,1968); Two ponds at Pilani, Rajasthan(Nayar,1970); Punjab, (Vasisht & Battish,1971b); Andra Pradesh Dhanapathi,1976b); Dal Lake ,Himalayan Lakes (Vass & Zutshi,1983); West Bengal, North-Eastern India(Sharma, 1978a); Orissa, East India(Sharma,1980b); Punjab State ,North West India(Sharma & Sharma,1984); Two sewage channels from Gawlior(Saksena & Kulkarni,1986); North East India (Sharma,1987b); Orissa State (Sharma,1987c); Haryana State, (Sharma & Sharma,1988); Karnataka State (Patil & Gouder, 1989); Bihar State(Sharma & Dudani,1992); Bihar State (Sharma *et al*,1992); West Bengal(Sharma,1993); River Narmada, Madhya Pradesh(Sharma & Naik,1996); North-Eastern India (Sharma & Sharma,1997); Kerala (Segers & Babu,1999).

Remarks: This species is very common and reported from all over India. It was collected from many localities in Kerala for this present study.

69. *Lecane lunaris* (Ehrenberg,1832)

(Plate : 24 Fig : c & d)

Description: Lorica is stiff and ovoid in shape. The dorsal plate of lorica is anteriorly narrower, medially same and as wide as ventral plate. The anterior margin of the dorsal plate is straight, but very deep concavity on ventral plate. Foot pseudosegment is simple and not projected outwardly. Single elongated toe with short pseudoclaws and accessory claws.

Occurrence : KAG 4, KAN 5, KOZ 1, KOZ 5, PKD 5, TCR 2a, TCR 10, TCR 12a, TCR 26, APH 3, KTM 7, PTH 2, KOL 3 and TVM 9.

Measurements:

Length of dorsal lorica	:	87 μ m
Width of dorsal lorica	:	76 μ m
Length of ventral lorica	:	91 μ m
Width of ventral lorica	:	75 μ m
Length of toe	:	52 μ m
Length of claw	:	8 μ m

Distribution: Punjab, Kashmir & Ladakh (Edmondson & Hutchinson,1934); Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); South India (Naidu,1967) North Eastern India (Sharma,1987b); West Bengal, North-Eastern India (Sharma, 1978a); Dal Lake, Himalayan Lakes (Vass & Zutshi,1983); North Eastern India (Sharma,1987b) Bihar State (Sharma & Dudani,1992); Bihar State (Sharma *et al*,1992); River Narmada, Madhya Pradesh (Sharma & Naik,1996); North-Eastern India (Sharma & Sharma,1997); Madhya Pradesh (Unni & Fole,1997); Kerala (Segers & Babu,1999).

Remarks: This species is also widely distributed and the commonest among the *Lecane* group. And many specimens were collected from different localities of Kerala State.

70. *Lecane monostyla* (Daday,1897)

(Plate : 25 Fig : a & b)

Description: The lorica is stiff and ovoid in shape. Dorsal plate of lorica is wider than the ventral plate. Dorsal plate of lorica is with prominent flexible lateral extensions, which helps it for easy identification. Anterior margins of dorsal plate and ventral plate are straight and coincident. Ventral plate of lorica is longer than wide, with transverse and longitudinal folds. Foot pseudosegment is simple and slightly projecting type. Single toe tapering in to pointed end with out claws.

Occurrence : TCR 3a.

Measurements:

Length of dorsal lorica	:	48 μ m
Width of dorsal lorica	:	42 μ m
Length of lateral extension	:	19 μ m
Length of ventral lorica	:	56 μ m
Width of ventral lorica	:	35 μ m
Length of toe	:	18 μ m

Distribution: Kerala State (Segers *et al*,1994); North-Eastern India (Sharma & Sharma,1997).

Remarks: This species is very peculiar and easily identified because of the presence of dorso-lateral extensions. And it is considered as a rare one. It was reported only from two places in India, Kerala State and West Tripura. Three specimens were collected from the forest region near to Athirappilly water falls, Chalakudy , Trichur.

71. *Lecane obtusa* (Murray,1913)

(Plate : 25 Fig : c & d)

Description: Lorica is stiff and ovoid in shape. Dorsal plate of lorica is wider than the ventral plate. The anterior margins of the dorsal and ventral lorica are straight and slightly convex. Antero-lateral corners are angulated. Foot pseudosegment is simple with single medium sized toe. Toes with two completely separated short claws.

Occurrence: KOZ 1 & KOZ 2 .

Measurements:

Length of dorsal lorica	:	67 μ m
Width of dorsal lorica	:	63 μ m
Length of ventral lorica	:	74 μ m
Width of ventral lorica	:	50 μ m
Length of toe	:	34 μ m
Length of claw	:	8 μ m

Distribution: Belur, in Howrah district, India(Sharma, 1979a); North-Eastern India (Sharma & Sharma,1997).

Remarks : This species was collected only from two localities of Northern part of Kerala State. Earlier this species was reported only from North-Eastern part of India. This is a new record to Kerala State and South India.

72. *Lecane papuana* (Murray,1913)

(Plate : 26 Fig : a & b)

Description: Lorica is rigid and ovoid in shape. Anteriorly , dorsal lorica narrower and medially as wide as ventral plate. The anterior margin of dorsal lorica is straight, but lateral semicircular projections and concavity are present in the middle on the anterior margin of ventral lorica. Ventral plate of lorica is longer than the wide and with transverse foldings. Foot pseudosegment is simple and not projecting type.

Occurrence : KOZ 1, KOZ 3 and KOZ 4.

Measurements:

Length of dorsal lorica	:	100 μ m
Width of dorsal lorica	:	91 μ m
Length of ventral lorica	:	112 μ m
Width of ventral lorica	:	88 μ m
Length of toe	:	43 μ m
Length of claw	:	7 μ m

Distribution: Punjab , Kashmir & Ladakh (Edmondson & Hutchinson,1934); Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Rajasthan(Nayar,1968); West Bengal , North East India (Sharma, 1978a); North East India(Sharma,1987b); Bihar State(Sharma & Dudani,1992); Bihar State (Sharma *et al*,1992); River Narmada, Madhya Pradesh(Sharma & Naik,1996); North-Eastern India (Sharma & Sharma,1997).

In South India, Madras (Pasha,1961); from Andhra Pradesh , this species was reported earlier by (Naidu,1967),and later by (Dhanapathi,1976b).

Remarks: This species was collected and reported from three localities of Northern Kerala. The occurrence of this species is the first record from Kerala State.

73. *Lecane pertica* Haring & Myers,1926

(Plate : 26 Fig : c & d)

Description: Lorica is stiff and vase shaped. Dorsal plate of lorica is wider than the ventral plate and with ornamentations. The anterior margins of the dorsal and ventral plates are straight and coincident. Ventral plate is elongated with transverse and

longitudinal folds. Foot pseudosegment is rectangular in shape and projected outwardly. Two long toes with out claws, tapering to the pointed ends.

Occurrence : TCR 11d and TCR 12b.

Measurements:

Length of dorsal lorica	:	88 μ m
Width of dorsal lorica	:	60 μ m
Length of ventral lorica	:	102 μ m
Width of ventral lorica	:	53 μ m
Length of toe	:	50 μ m

Distribution: North-Eastern India(Sharma,1987b); North-Eastern India (Sharma & Sharma,1997).

Remarks: Only three specimens were collected from the two localities of central part of Kerala for the present study. Earlier this species was reported only from the North –Eastern part of India by Sharma. This species neither very common nor rare. And this species is the first report from Kerala State and South India.

74. *Lecane pusilla* Haring,1914

(Plate : 27 Fig : a & b)

Description: Lorica is flexible and truncate in size. Dorsal plate of lorica is anteriorly narrower and medially wider than the ventral plate. The anterior margins of dorsal plate and ventral plates are straight and coincident. Ventral plate is ornamented with transverse foldings, and slightly longer than the wide. Foot pseudosegment is simple not projected outwardly. Toes are medium sized with complete separated claws.

Occurrence : KOZ 2.

Measurements:

Length of dorsal lorica	:	44 μ m
Width of dorsal lorica	:	40 μ m
Length of ventral lorica	:	50 μ m
Width of ventral lorica	:	37 μ m
Length of toe	:	18 μ m
Length of claw	:	5 μ m

Distribution: West Bengal, North East India(Sharma, 1978a).

Remarks: Only two specimens were collected from a single locality (a small pond at Kannur road side) for the present study. Earlier record of this species only from West Bengal by Sharma (1978a) . It is considered as a rare species. This report is first time to Kerala State and South India.

75. *Lecane pyriformis* (Daday,1905)

(Plate : 27 Fig : c & d)

Description: Lorica is stiff and more or less rounded in shape. Dorsal plate of lorica is wider than the ventral plate. Ventral plate is slightly longer than the wide with transverse and longitudinal foldings. Anterior margins of the dorsal and ventral plate are coincident and slightly convex. Foot pseudosegment is simple and not projecting outwardly. A single toe with out claw tapers into pointed end from medially onwards.

Occurrence : KAN 5, MAL 4, PKD 4, TCR 2a, TCR 14, TCR 18, TCR 26 and TVM 9.

Measurements:

Length of dorsal lorica	:	50 μ m
Width of dorsal lorica	:	48 μ m
Length of ventral lorica	:	52 μ m
Width of ventral lorica	:	41 μ m
Length of toe	:	23 μ m

Distribution: West Bengal ,North East India (Sharma,1978a); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant,1984& 1985); North Eastern India (Sharma,1987b); Orissa State (Sharma,1987c); Bihar State(Sharma & Dudani,1992); Bihar State (Sharma *et al*,1992); North-Eastern India (Sharma & Sharma,1997).

Remarks: This species was reported only from some states of Northern and North-Eastern part of India. Eight specimens were collected from eight localities distributed all over the Kerala state. This is a new record to Kerala State and South India.

76. *Lecane quadridentata* (Ehrenberg,1832)

(Plate : 27 Fig : e & f)

Description: This species is easily distinguished by the presence of a pair of curved elongated projections medially on the dorsal head aperture. Lorica is stiff and ovoid in shape. Dorsal plate of lorica is narrower than the ventral plate. The anterior margin of the dorsal plate with two prominent outward curved antero-median projections. Ventrally, the anterior margin is with deep 'U' shaped sinus . Ventral plate is longer than wide with completed transverse foldings. Antero-lateral corners have projections. Foot pseudosegment is projecting outwardly. Single toe with accessory claws.

Occurrence : KOZ 1, MAL 6, PKD 5, TCR 2a, TCR 3a and TCR 12a.

Measurements:

Length of dorsal lorica with spine	:	130 μ m
Width of dorsal lorica	:	80 μ m
Length of ventral lorica	:	120 μ m
Width of ventral lorica	:	90 μ m
Length of toe	:	76 μ m
Length of claw	:	24 μ m
Length of anterior spine	:	40 μ m

Distribution: Calcutta & neighbouring areas (Anderson,1889);Punjab , Kashmir & Ladakh (Edmondson & Hutchinson,1934);Sakardhara tank, near Nagpur (Arora, 1965&1966c); Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Rajasthan(Nayar,1968);Vasisht & Battish(1971b); Andra Pradesh (Dhanapathi,1976b); West Bengal , North –Eastern India(Sharma, 1978a); Orissa, East India(Sharma,1980b); Punjab State ,North West India(Sharma & Sharma,1984); Two sewage channels from Gawlior(Saksena & Kulkarni,1986); North Eastern India(Sharma,1987b); Karnataka State (Patil & Gouder, 1989); Bihar State (Sharma & Dudani,1992); Bihar State (Sharma *et al*,1992); River Narmada, Madhya Pradesh (Sharma & Naik,1996); North-Eastern India (Sharma & Sharma,1997); Madhya Pradesh, (Unni & Fole,1997); Andhra Pradesh (Narasimha Rao & Raju,2001).

Remarks: This species is widely distributed in India. And it was collected from various localities for the present study. This species is very easy to locate and separate due to the presence of anterior curved spine and considerable size. This is the first report to Kerala State.

77. *Lecane rutteneri* Hauer, 1938

(Plate : 28 Fig : a & b)

Description: Lorica is rigid and more or less rounded in shape. At anterior region, the dorsal plate of lorica is narrower and medially wider than the ventral plate. The anterior margins of dorsal plate and ventral plate of lorica are straight and coincident, slightly convex. Ventral plate of lorica is longer than the wide with transverse and longitudinal foldings. Foot pseudosegment is simple and not projected outwardly. Two toes are parallel sided with the claws not separated.

Occurrence : TCR 19.

Measurements:

Length of dorsal lorica	:	50 μ m
Width of dorsal lorica	:	55 μ m
Length of ventral lorica	:	63 μ m
Width of ventral lorica	:	55 μ m
Length of toe	:	27 μ m
Length of claw	:	8 μ m

Distribution: Kerala State (Segers *et al* ,1994)

Remarks: This species is considered as a rare one, and only two specimens were collected from a single locality of central part of Kerala. It was reported first time from Kerala State and has not been reported any part of India so far.

78. *Lecane signifera* (Jennings, 1896)

(Plate : 28 Fig : c & d)

Description: The lorica is stiff and ovoid in shape. The dorsal plate of lorica is wider than the ventral plate. The anterior margins of the dorsal plate and ventral plate are straight and coincident. There are two antero-lateral spines present. Ventral plate is

longer than the wide with transverse and longitudinal folds. Foot pseudosegment square in shape not projected outwardly. Two toes with out claws , which tapers into points .

Occurrence : KAN 3, KOZ 3, KOZ 5, WYD 4, MAL 1, PKD 2, TCR 2a, TCR 11c, TCR 17, EKM 5, KTM 6 and KOL 6.

Measurements:

Length of dorsal lorica	:	100 μ m
Width of dorsal lorica	:	67 μ m
Length of ventral lorica	:	110 μ m
Width of ventral lorica	:	60 μ m
Length of toe	:	39 μ m
Length of claw	:	5 μ m

Distribution: North East India(Sharma,1987b); Bihar State(Sharma & Dudani,1992); North-Eastern India (Sharma & Sharma,1997); Bihar State (Sharma *et al*,1992).

Remarks: This species is the commonest in the plankton samples, collected for the present study. It was reported earlier only from North India and North-Eastern India. This is the new record to Kerala State and first report from South India.

79. *Lecane simonneae* Segers 1993

(Plate : 28 Fig : e & f)

Description: Lorica is rigid and vase shaped. Anteriorly dorsal plate of lorica is narrow and medially wider than the ventral plate. The anterior margins of the dorsal plate is folded and ventral plate is straight, and coincident. Foot pseudosegment is triangular in shape with lateral lobes , and projecting type. Two toes are long and tapering into pointed ends.

Occurrence : TCR 11d .

Measurements:

Length of dorsal lorica	:	72 μ m
Width of dorsal lorica	:	53 μ m
Length of ventral lorica	:	83 μ m
Width of ventral lorica	:	43 μ m
Length of toe	:	40 μ m

Distribution: Kerala State (Segers *et al* ,1994);North-Eastern India (Sharma & Sharma,1997).

Remarks: This species was reported first time in India, from Kerala(Segers *et al* 1994). Later it was reported from North- Eastern India by Sharma & Sharma(1997) .It is not widely distributed and considered as a rare one. Four specimens were collected from a single locality for the present study. This species shows very close similarity with *Lecane rhytida* from Nicaragua, but there are some differences such as general shape of the lorica, foot pseudosegment and toes.

80. *Lecane tenuiseta* Harring, 1914

(Plate : 29 Fig : a & b)

Description: Lorica is soft and ovoid in shape. Anteriorly dorsal plate of lorica is narrow, and medially as wide as ventral plate. The anterior margins of the dorsal plate and ventral plate are straight, parallel and coincident. Foot pseudosegment is simple and not projecting type. Two medium sized toes with completely separated claws.

Occurrence : TCR 17 .

Measurements:

Length of dorsal lorica	:	62 μ m
Width of dorsal lorica	:	53 μ m
Length of ventral lorica	:	66 μ m
Width of ventral lorica	:	51 μ m
Length of toe	:	30 μ m
Length of claw	:	10 μ m

Distribution: This species has been reported earlier from different places in South East Asian countries, Kalimantan (Borneo) , Indonesia (Koste, 1988a); Thailand & Indonesia (Sudzuki, 1989) ; Bung- Borapet ,C.Thailand (Koste,1975a); Impoundment Kinda, C Burma (Koste & Tobias, 1990).

Remarks: Only two specimens were collected from a temporary pond near paddy field at Mattom, Trichur district. This species is reported for the first time from India. Although this species is considered as common , but in India it is found rarely.

81. *Lecane unguitata* (Fadeev,1925)

(Plate : 29 Fig : c & d)

Description: Lorica is stiff and more or less rounded in shape. Dorsal plate of lorica is narrower than the ventral plate. The anterior margin of the dorsal plate is straight , but the ventral plate is concave .The ventral plate is longer than the wide . Foot pseudosegment simple and not projected outwardly. Single toe with two long pesudoclaws .

Occurrence : TCR 11a.

Measurements:

Length of dorsal lorica	:	84 μ m
Width of dorsal lorica	:	81 μ m
Length of ventral lorica	:	91 μ m
Width of ventral lorica	:	81 μ m
Length of toe	:	37 μ m
Length of claw	:	11 μ m

Distribution: Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); West Bengal , North-Eastern India(Sharma, 1978a); Punjab State ,North West India(Sharma & Sharma,1984); North- Eastern India(Sharma,1987b); Orissa State(Sharma,1987c); Bihar State(Sharma & Dudani,1992); Bihar State (Sharma *et al*,1992); North-Eastern India (Sharma & Sharma,1997).

Remarks: Earlier this species was reported from different states of North India. Three specimens were collected from a single locality of central part of this state. This report is the first time from Kerala State and South India.

82. *Lecane ungulata* (Gosse,1887)

(Plate : 29 Fig : e & f), (Plate : 40 Fig : D)

Description: Lorica is big and vase shaped. The dorsal plate of lorica is narrower than the ventral plate. The anterior margin of the dorsal plate is straight, but the ventral plate margin is slightly concave. Foot pseudosegment is simple and not projected outwardly. Two long toes are present , with incompletely separated pseudoclaws .

Occurrence : KAG 2, WYD 5, KOZ 1, MAL 6, PKD 2, TCR 2a, TCR 4 , TCR 11c, TCR 18, APH 6 and PTH 1.

Measurements:

Length of dorsal lorica	:	142 μ m
Width of dorsal lorica	:	128 μ m
Length of ventral lorica	:	182 μ m
Width of ventral lorica	:	142 μ m
Length of toe	:	82 μ m
Length of claw	:	34 μ m

Distribution: Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Andra Pradesh (Dhanapathi,1976b); West Bengal , North-Eastern India(Sharma, 1978a); Orissa, East India(Sharma,1980b); Punjab State ,North West India(Sharma & Sharma,1984); North East India(Sharma,1987b); Orissa State(Sharma,1987c); Bihar State(Sharma & Dudani,1992); Bihar State (Sharma *et al*,1992); River Narmada, Madhya Pradesh(Sharma & Naik,1996); North-Eastern India (Sharma & Sharma,1997).

Remarks: This species is one of the biggest ones in the *Lecane* genus. So it is easy to recognize and isolate from the plankton samples. It is widely distributed all over India. This species synonymies with *Lecane donnerianus* n.sp . This species is the first report from Kerala State.

VIII . FAMILY: Notommatidae Remane, 1933

They are diverse assemblage of illoricate or partially loricate ones. And they are separated into two sub families on the basis of the presence or the absence of whorl of bulbous glands between the stomach and intestine.

83. *Cephalodella gibba* (Ehrenberg, 1832) . Plate : 30 Fig : a & b

Description: The body is laterally compressed and elongated . Lateral clefts narrow anteriorly and wide in posteriorly. Toes are long and slightly curved outwardly.

Occurrence : KOZ 2 , KOZ 3 , TCR 2a and TVM 5.

Measurements:

Length of lorica : 243 μ m
 Width of lorica : 121 μ m
 Length of toes : 112 μ m

Distribution: Punjab, & Kashmir (Edmondson& Hutchinson,1934); Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); West Bengal, North East India(Sharma, 1979d); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant,1984& 1985); Punjab State ,North West India(Sharma & Sharma,1984); North Eastern region (Sharma & Sharma, 1987b); River Narmada, Madhya Pradesh(Sharma & Naik, 1996).

Remarks: Earlier this species was recorded only from North India. This is the first report from Kerala State and South India.

84. *Notommata copeus* Ehrenberg,1834

(Plate : 30 Fig : c), (Plate : 40 Fig :C)

Description: The specimen is large. The body is illloricated, elongated and transparent. The head , neck and abdomen distinct by transverse foldings. The foot with two broad segments . Corona projects as bluntly pointed chin. Abdomen rounded posteriorly. Tail is characteristic with conical projection ending in a blunt point. Toes slender and conical in shape.

Occurrence : KOZ 6, PKD 6, TCR 2a, TCR 11a and EKM 4 .

Measurements:

Total length(contractd) : 250 μ m
 Length of toes : 52 μ m

Distribution: Punjab, Kashmir& Ladakh (Edmondson& Hutchinson,1934); Andra Pradesh (Dhanapathi,1975b).

Remarks: This species is somewhat big in size, and very easily distinguishable from the plankton samples. This is the first report from Kerala State.

85. *Notommata pachyura*(Gosse) *f. triangulata* Kirkman,1906

(Plate:30 Fig: d & e)

Description: The body is bag shaped with two lateral protuberances. Head and neck are very distinct. The foot is two segmented with toes which are slender, long and taper to a point . Mastax is virgate type.

Occurrence : TCR 11a and TCR 12b.

Measurements:

Total length(contractd) : 260 μ m
 Length of toes : 57 μ m

Distribution: This species was reported first time from Kerala and India by Segers *et al* (1994). And it was reported earlier from other parts of Asia, Kalimantan (Borneo) Indonesia (Koste,1988a); Indonesia (Sudzuki,1989).

Remarks: Five specimens were collected from two localities of central region of this state, associated with *Hydrilla* and filamentous green algae. They showed very close similarity in size and structure.

86. *Notommata saccigera* Ehrenberg, 1832

(Plate : 31 Fig : a & b)

Description : Body is fusiform and abdomen is bulging type. The head and neck is separated by the transverse foldings. The trophi is asymmetric and virgate type. Foot with two joints, and toes are slender & ending in points.

Occurrence : TCR 11a.

Measurements :

Total length : 300 μ m

Width of body : 112 μ m

Length of toes : 25 μ m

Distribution : This species was reported first time from India, from Kerala by Segers *et al* (1994). And it was recorded earlier from neighbouring countries of South East Asia, West & East Malaysia & Singapore (Fernando & Zankai, 1981); Malaysia (Sudzuki, 1989).

Remarks : Three specimens were collected from a single locality, Kol-fields, which is an inundated area of Central Kerala.

87. *Monommata arndti* Remane, 1933

(Plate : 31 Fig : c)

Description: This specimen is a illoricate, and with elongated body. There is a constriction in between head and abdomen. The foot is very short and not distinctively jointed. The toes are very long, unequal and twice the length of the body. The bases of the toes are swollen, and right toe is longer than the left.

Occurrence : KOZ 2, MAL 6 TCR 2a, and TCR 12a .

Measurements:

Total length : 510 μ m
 Length of right toe : 362 μ m
 Length of left toe : 290 μ m

Distribution: This species was recorded in India for the first time from Delhi(Sarma,1988).

Remarks: The specimens of this species were collected from four localities of this State. And this is the second report from India and first report from Kerala State and South India.

88. *Scaridium longicaudum* (O.F. Muller,1786)

(Plate : 31 Fig : d)

Description : The lorica is cylindrical and thin. The body is divided in to head ,trunk and foot . The foot is long and three segmented with two toes which are short and equal in size. Mastax is virgate.

Occurrence: KAG 1, KAG 4, KAN 5, KOZ 1, PKD 2, TCR 2b, TCR 17, EKM 3 and APH 3

Measurements :

Total length : 308 μ m
 Length of foot : 80 μ m
 Length of toe : 102 μ m

Distribution: Punjab & Kashmir (Edmondson and Hutchinson,1934);Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); West Bengal , North East India(Sharma, 1979d); Orissa state (Sharma 1987c); Bihar (Sharma & Dudani, 1992); River Narmada, Madhya Pradesh (Sharma & Naik, 1996).

In South India ,it was reported only from Andhra Pradesh (Dhanapathi,1978b).

Remarks: This species is cosmopolitan in distribution, and twelve specimens were collected from nine localities of Kerala State. The occurrence of this species is the first report from Kerala State.

IX . FAMILY: Trichocercidae Remane, 1933

The animals under this family are very common in plankton collections and littoral in habit. And it is very interesting that they are seen with *Volvox* colonies during the seasonal blooms. They are loricate forms , and species are identified by dimensions and trophi structure.

89. *Trichocerca bicristata* (Gosse,1887)

(Plate : 32 Fig : a, b & c)

Description: The body is medium sized. The anterior and posterior regions are narrow, and middle portion is bulged. Two projections are present on the corona. There are two ridges which run on dorsal lorica, separated by a wide depression.

Occurrence : TCR 2b, TCR 24 and KOL 1.

Measurements :

Total length	:	366µm
Body length(including foot)	:	200µm

Length of right toe	:	183 μ m
Length of left toe	:	20 μ m

Distribution: This species has been reported from Bihar (Sharma *et al*,1992) and Bihar (Sharma & Dudani, 1992); It was recorded earlier from South Asia, Sri Lanka, fairly common in Lakes & Ponds, (Chengalath, Fernando & Koste,1973); Sri Lanka (Fernando,1980a); And in South East Asia, Malaysia & Sri Lanka (Sudzuki,1989); Kalimantan(Borneo)Indonesia(Koste,1988a); West & East Malaysia & Singapore (Fernando & Zankai,1981); Fish Ponds in Thailand (Boomsom,1984a).

Remarks : This species was reported only from two localities of Bihar State. Three specimens were collected from only three localities of central Kerala. This is the first report from Kerala State and South India.

90. *Trichocerca braziliensis* (Murray,1913)

(Plate : 32 Fig : d & e)

Description: The body is short and plump with distinctive double keel. The body is broad behind the keel, and tapers at the posterior side. Left toe is longer than the body. Right ramus with markedly bifurcate alula, left ramus with single spine like process.

Occurrence : KOZ 1.

Measurements :

Total length	:	272 μ m
Contracted lorica	:	127 μ m
Length of left toe	:	152 μ m
Length of right toe	:	34 μ m

Distribution : This species was reported first time from India, West Bengal , North East India(Sharma, 1979d).

Remarks: Two specimens were collected only from one locality in Northern part of Kerala. This species was recorded earlier only from Northern part of India, and considered as a rare one. This is the first record from Kerala, and South India.

91. *Trichocerca cylindrica* (Imhof,1891)

(Plate : 32 Fig : f & g)

Description: The body is elongated and cylindrical . There is a pointed spine curved ventrally present on the anterior margin of median dorsal lorica. The keel is short and striated . The foot with two toes , the left one is long and right one very short, like spine.

Occurrence : KAG 4, KAN 1, KOZ 3, MAL 4,TCR 2a, TCR 7, APH 7 and KOL 4.

Measurements:

Length of body	:	202 μ m
Width of body	:	83 μ m
Length of anterior spine	:	28 μ m
Length of left toe	:	103 μ m
Length of right toe	:	11 μ m

Distribution: Punjab State ,Kashmir & Ladakh (Edmondson and Hutchinson,1934); Dal Lake ,Himalayan Lakes (Vass & Zutshi,1983);Two Kumaun Himalayan Lakes (Sharma & Pant, 1984& 1985); Two sewage channels from Gawlior (Saksena & Kulkerni,1986); Orissa State (Sharma 1987c).

In South India, it has been reported only from Dharwad, Karnataka(Patil & Gouder,1989).

Remarks : Eight specimens were collected from eight localities of different regions of Kerala. And this is the first report from Kerala State.

92. *Trichocerca kostei* Segers,1993

(Plate : 33 Fig : a, b & c)

Description: The body is elongated and ,slightly curved and relatively soft- loricated. The keel present on the dorsal side is two-third of the body. Foot is short with two unequal toes , both slightly curved. The left toe is approximately twice the length of right toe. This species is characterized by the asymmetrical shape of trophus.

Occurrence : TCR 11b and TCR 12b.

Measurements:

Length of body	:	225 μ m
Width of body	:	72 μ m
Length of left toe	:	80 μ m
Length of right toe	:	48 μ m

Distribution: This species was reported first to the scientific world from Nigeria (Segers,1993), and later on recorded from, Wodonga, Australia. This was recorded from Kerala (Segers *et al* , 1994) and it was the first report from India and Asia .

Remarks: This species is recorded from two localities in the central Kerala, two ponds with same type of vegetation(*Hydrilla* and green algae) .

93. *Trichocerca pusilla* (Lauterborn,1898)

(Plate : 33 Fig : d, e & f)

Description: The body is ovoid in shape and anterior and posterior regions are narrower than the middle portion. In preserved specimens, the anterior margin of lorica with blunt foldings. Foot is short with two toes in which the left is long and right is small.

Occurrence : KOZ 1 and KOZ 2.

Measurements :

Length of body	:	155 μ m
Width of body	:	88 μ m
Length of left toe	:	83 μ m
Width of right toe	:	30 μ m

Distribution: This species was recorded first from India, Delhi (Sarma ,1988); Bihar (Sharma & Dudani,1992,Sharma *et al*,1992);Madhya Pradesh (Sharma & Naik, 1996). In South India, it was reported from Kerala (Segers & Babu,1999).

Remarks : The specimen was described by Sarma(1988) from Delhi with only one toe, but in the description of Koste(1978), it has two toes in which left one is long and right one is very short. The right toe may be overlooked by Sarma .The present species agrees with the description of Koste.

94. *Trichocerca similis* (Wierzejski,1893)

(Plate : 34 Fig : a & b)

Description: The body is slender & elongated ,and anterior margin with equal spines .The dorsal keel starting from the bases of anterior spines and runs two-third of the body. Foot is two segmented with two toes which are unusually short.

Occurrence : KOZ 1 and KOZ 3.

Measurements:

Length of body	:	192 μ m
Width of body	:	55 μ m
Length of anterior spine	:	31 μ m
Length of left toe	:	48 μ m
Length of right toe	:	33 μ m

Distribution: Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Rajasthan (Nayar,1968); West Bengal , North East India (Sharma, 1979d); Jemmu (Jothi & Sehgal,1979); Punjab State ,North West India(Sharma &Sharma,1984); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant, 1985); Punjab State ,North West India (Sharma 1976, Sharma & Sharma,1988); Ajwa reservoir , near Baroda , Gujarat , W. India (Jayangaudar,1980); Orissa State (Sharma 1987c); Haryana State (Sharma& Sharma, 1988); Bihar (Sharma & Dudani,1992,Sharma *et al*,1992); Meghalaya (Sharma,1995); Madhya Pradesh (Sharma & Naik ,1996).

In South India, it was reported from Dharwad, Karnataka(Patil & Gouder,1989) and from Kerala(Segers& Babu,1999).

Remarks: Even though this species was reported from different parts of India, here it is recorded only from two localities of Northern Kerala.

95. *Trichocerca weberi* (Jennings,1903)

(Plate : 34 Fig : c & d)

Description: The body is short and curved in shape. There is a sharp spine present on the right anterior margin of lorica. The keel is present on the lorica and it has two-third length of lorica . The foot with two equal short toes.

Occurrence : TCR 19.

Measurements :

Length of body	:	112 μ m
Width of body	:	44 μ m
Length of anterior spine	:	8 μ m
Length of toe	:	35 μ m

Distribution : Punjab, Kashmir & Ladakh (Edmondson and Hutchinson , 1934); West Bengal , North East India(Sharma, 1979d); Punjab State ,North West India(Sharma & Sharma,1984); Bihar (Sharma *et al*,1992); Madhya Pradesh (Sharma & Naik, 1996).

Remarks: This species was recorded only from one locality, Peechi reservoir, of this State. The specimen showed close similarity with the organisms described from Northern part of India. It is reported first time from Kerala and South India.

X. FAMILY: Synchaetidae Remane,1933

There are four genera, of which Polyarthra is a common one in the plankton. They are generally soft cuticled animals. The body is conical ,pyriform, cup , bell shaped and vasiform or saccate. Mastax is virgate with complex paired hypopharynx muscles. Generally , Synchaetids can be identified to genus on the gross morphology , and to species by trophi structure.

96. *Polyarthra vulgaris* Carlin,1943

(Plate : 35 Fig : a)

Description: Body is illoricate and cylindrical. Each side of anterior region has six appendages, these are about as long as body, spear shaped and with lateral teeth. Two dorso-lateral and two ventro-lateral bundles of paddles, each consisting of three paddles, are located at the shoulder region. Each bundle of paddles is attached to a

recessed area of integument, which is greatly thickened and folded. The paddles are arranged one above the other so that they overlap slightly. Each paddle is lance-shaped and has a central thickening extending nearly its entire length. Lateral antennae situated at the posterior end of body.

Occurrence : TCR 1b, TCR 2b, TCR 17, TCR 11b, TCR 20, EKM 6, APH 5, KTM 4, PTH 2 and TVM 3.

Measurements :

Length of lorica : 141 μ m

Width of lorica : 95 μ m

Distribution : West Bengal , North East India(Sharma, 1979d); Dal Lake ,Himalayan Lakes (Vass & Zutshi,1983); Two sewage channels from Gawlior(Saksena & Kulkarni,1986); Punjab State ,North West India(Sharma 1976, Sharma & Sharma,1984); Roshnara tank, Naini Lake , Indranagar tank, Stoking Tank & Nursery Tank Delhi(George , 1966); Fish pond in Barrackpore, West Bengal(Michael, 1968); Orissa, East India(Sharma,1980b); Gawlior(Saksena *et al* ,1986); Haryana State(Sharma& Sharma, 1988); Orissa State (Sharma 1987c); Bihar (Sharma & Dudani, 1992); River Narmada, Madhya Pradesh(Sharma & Naik, 1996); Kerala, Segers & Babu(1999).

Remarks : This species is very common, and recorded from plankton samples which were collected from ten localities of central and southern part of Kerala. A striking feature is , they were totally absent in the samples collected from Northern part of Kerala. Segers & Babu(1999) , reported a new species ,*Polyarthra indica*, from a high altitude lake, at Devikulam, Kerala State.

XI. FAMILY: Asplanchnidae Haring & Myers, 1926

The animals belong to family Asplanchnidae are very large, and omnivores or carnivores saccate rotifers. They are common in the standing waters. The trophus is incudate, horizontal in the mastax with apices facing posteriorly which is used to catch the prey. The structure of trophi and the shape of the vitellarium are the features for the identification of the species in the genus level.

97. *Asplanchna brightwelli* (Gosse, 1850)

(Plate : 35 Fig : b & c)

Description: The Body is transparent, thin and sacciform. Trophi is incudate with rami possessing hornlike projections at outer margins of the base and inner spines at the middle. Vitellarium is an important diagnostic feature, which is horse-shoe shaped.

Occurrence : KAG 1, MAL 2b, PKD 4, TCR 2b, TCR 1a, TCR 26, EKM 3 and IDY 4.

Measurements :

Length of the body : 420 μ m

Width of the body : 240 μ m

Distribution: Punjab, Kashmir & Ladakh (Edmondson and Hutchinson, 1934); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant, 1984 & 1985); West Bengal, North East India (Sharma, 1979d); Fish pond in Barrackpore, West Bengal (Michael, 1968); Punjab State, North West India (Sharma & Sharma, 1984); Gawlior (Saksena *et al*, 1986); Orissa State (Sharma 1987c); Haryana State (Sharma &

Sharma, 1988); River Narmada, Madhya Pradesh(Sharma & Naik, 1996). In South India, it was reported only from Andra Pradesh (Dhanapathi,1975b).

Remarks: This species was recorded from eight localities of this state, including mountain region. And this is the first time report from Kerala State. The collected specimens showed very good similarity with the description of specimens from Andhra Pradesh.

XII . FAMILY: Dicranophoridae Remane ,1933

Generally, these are seen in the littoral region , in and around submerged vegetation and occasionally found in plankton samples. They are herbivores, carnivores and some are parasites. Identification is based on the general morphology and structure of trophi.

98. *Dicranophorus epicharis* Harring & Myers,1928 Plate : 35 Fig : d

Description : The body is comparatively short in size with straight ventral surface. The corona is placed on the ventral surface elongated to head region . Abdomen is also short and cylindrical. Foot is short with elongated toes.

Occurrence : TCR 11b.

Measurements :

Total body length	: 212 μ m
Width of body	: 41 μ m
Length of toes	: 43 μ m

Distribution : Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert,1966);Ajwa reservoir , near Baroda , Gujarat , W. India(Jayangaudar,1980).

Remarks : Earlier, this species was reported only from Gujarat State, India . But, in this present study, three specimens were collected from single locality in this region,

and this is the first time report from Kerala State and South India. . *Dicranophorus myriophylli*, was reported from Ladakh by Edmondson & Hutchinson(1934). Two species of genus *Dicranophorus* , *D. dolerus* and *D. tegillus* were reported from Andhra Pradesh by Dhanapathi (1975b) .The other relative species, *Dicranophorus forcipatus* (Anderson,1989)and *Dicranophorus lutkeni*, were reported from West Bengal, North East India by Sharma(1979d). *Dicranophorus forcipatus* was also reported from River Narmada, Madhya Pradesh (Sharma & Naik, 1996).

99. *Dicranophorus grandis* Haring ,1832. Plate : 35 Fig : e

Description : The body is transparent and the ventral surface is straight. The posterior part of abdomen with a bulging. The corona is ventral. The rami of Trophi broad with projections. Foot is short and toes are long with blunt ends.

Occurrence : TCR 17.

Measurements :

Total body length : 200 μ m

Width of body : 75 μ m

Length of toes : 43 μ m

Distribution: Six species of genus *Dicranophorus* reported from various parts of India so far, such as *Dicranophorus myriophylli*, by Edmondson & Hutchinson(1934), *Dicranophorus epicharis* (Wulfert,1996 & Jayangaudar,1980) *Dicranophorus dolerus* and *Dicranophorus tegillus*(Dhanapathi ,1975b) *Dicranophorus forcipatus* and *Dicranophorus lutkeni* Sharma(1979d).

Remarks: Three specimens were collected from a single locality of Central Kerala. This species is being reported first time from Kerala State.

XIII . FAMILY: Testudinellidae Bory De St Vincent,1826

Testudinellids are common in plankton samples . They are small , spherical with undulating margin , circular , ovoid, pyriform with dorso-ventrally flattened plates.

100. *Pompholyx sulcata* Hudson,1885

(Plate : 36 Fig : a)

Description: The lorica is ovoid in shape. There is a lobe like projection on the anterior edge of dorsal lorica ,and a sinus is present ventrally.

Occurrence : TCR 2a, TCR 15b and TCR 20.

Measurements :

Length of lorica : 80 μ m

Width of lorica : 64 μ m

Distribution: Punjab, Kashmir & Ladakh (Edmondson and Hutchinson , 1934); Fish pond in Barrackpore, West Bengal(Michael, 1968); West Bengal , North East India(Sharma, 1979d); Punjab State ,North West India(Sharma 1976, Sharma & Sharma,1984); Orissa state (Sharma 1987c); Haryana State(Sharma& Sharma, 1988).

Remarks : This specimen was collected only from three localities, and these were smaller in size compared to the organisms described from North East India. This species is reported first time from Kerala State and South India.

101. *Testudinella emarginula* (Stenroos,1898)

(Plate : 36 Fig : b)

Description : The body is oval and dorso-ventrally flattened. The anterior opening is bulged outwardly. The foot opening is just above the posterior end.

Occurrence : KOZ 5.

Measurements:

Length of lorica : 112 μ m

Width of lorica : 80 μ m

Distribution : This species was recorded earlier from Delhi (Sarma,1988);North Eastern India(Sharma,1990); Bihar (Sharma & Dudani, 1992).

Remarks : The species described from Delhi(Sarma,1988) has a slit like marking on the extreme posterior end of lorica , but the specimen collected from this region has no marking on the posterior end of the lorica .This species was collected only from one locality in this State, and is reported first time from Kerala State and South India.

102. *Testudinella patina* (Hermann,1783)

(Plate : 36 Fig : c)

Description: The body is transparent, circular and dorso-ventrally flattened with a prominent lobe anteriorly . The foot opening is circular and located in the middle of ventral side of the body.

Occurrence : KOZ 1,WYD 7, MAL 6, PKD 3, TCR 2a, TCR 6, TCR 13 and PTH 1.

Measurements:

Length of lorica : 154 μ m

Width of lorica : 140 μ m

Distribution : This species was recorded from West Bengal (Anderson, 1889); Punjab & Kashmir (Edmondson and Hutchinson, 1934); Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert, 1966); Roshnara tank, Naini Lake, Indranagar tank, Stoking Tank & Nursery Tank Delhi (George, 1966); Fish pond in Barrackpore, West Bengal (Michael, 1968); Punjab State, North West India (Sharma, 1976); West Bengal, North East India (Sharma, 1979d); Orissa, East India (Sharma, 1980b); Punjab State, (Sharma & Sharma, 1984); Two Kumaun Himalayan Lakes, Uttar Pradesh (Sharma & Pant, 1984 & 1985); Two sewage channels from Gawlior (Saksena & Kulkarni, 1986); Orissa State (Sharma 1987c); Haryana State (Sharma & Sharma, 1988); Meghalaya & Different Places of North East India (Sharma, 1990); Bihar (Sharma & Dudani, 1992); River Narmada, Madhya Pradesh (Sharma & Naik, 1996);

In South India, Chittoor, Andhra Pradesh (Naidu, 1967, Dhanapathi & Rama Sarma, 2000); Dharwad, Karnataka (Patil & Gouder, 1989); Tamil Nadu (Michael, 1973); Kerala (Segers & Babu, 1999).

Remarks : This species is considered as common one, and it was reported from the different parts of the country. In this state, it is recorded from Northern Central and Southern regions. And they do not show much variations.

XIV . FAMILY: Flosculariidae Haring ,1913

Flosculariids are tubular solitary or colonial, sessile or planktonic rotifers. Some of them build distinctive cases for shelter. The shape of the corona is significant in determining genera.

103. *Limnias melicerta* Weisse, 1848

(Plate : 37 Fig : a)

Description: This Rotifer constructs a tall transparent tube which is beautifully ornamented with rings, the formation of which has caused much speculation. It is the writer's very good fortune to discover that each ring is caused by the deposition of a complete circlet of mucus which hardens while the Rotifer rests with its body swollen at the mouth of the tube. The first section at the base of the tube is a cuff of plain mucus exuded on the plant by a very small larva, and the ringed additions are built up on this structureless foundation. The commoner related species, *L. ceratophylli* constructs an opaque tube without rings, but here again the first section is laid down as a translucent cylinder excreted by the newly-settled larva.

Occurrence : TCR 11d.

Measurements:

Length of body : 371 μ m

Width of the body : 48 μ m

Distribution: This species was reported first time from India, Calcutta , by Anderson (1889). After that , it has not been yet reported from other parts of India . This species has been reported from other Asian countries , such as Singapore, (Karunakaran & Johnson, 1978) , Thailand, Malaysia, Singapore, Indonesia and Sri Lanka (Sudzuki, 1989).

Remarks : This species is reported for the first time from Kerala State and South India, only from one locality with three specimens . Anderson (1889), recorded another species , *Limnias ceratophylli* from Calcutta.

104. *Sinanotherina semibullata* (Thorpe,1889)

(Plate : 37 Fig : b)

Description: This rotifer was collected as a colony of about 60 members, attached to vegetation. The corona is particular in *Sinanotherina* with a rectangular shape, and has two dark wart like structures on the anterior part of dorsum , and characterised by the presence of 9 pairs of glands .

Occurrence: TCR 2b, TCR 19, TCR 16.

Measurements:

Length of body : 230 μ m

Width of body : 89 μ m

Distribution : This species was recorded first time in India, from Kerala State by Segers *et al* (1994). It was found in other Asian countries, Sri Lanka (Mendis & Fernando, 1962; Fernando ,1969 & 1980a, Sudzuki,1989). In Sri Lanka, it was abundant in rice fields (Chengalath , Fernando & Koste ,1973).

Remarks : It was found as a colony with about 60 members , and collected only from two localities ,Peechi reservoir & Nelayi paddy fields. The first species of genus *Sinanotherina socialis* , was reported from Calcutta by Anderson(1889) . *Sinanotherina spinosa* and *Sinanotherina triglandularis* were reported from Nagpur (Arora,1963b), Andra Pradesh (Dhanapathi & Sarma, 2000). *Sinanotherina ariprepes* was recorded from Kerala by Nair (1972).

XV. FAMILY: Hexarthridae Bartos 1959

This family is recognized by its characteristic Pyriform body with six setose arms. One dorsal , two dorso-lateral , two ventro-lateral and one lateral. Single genus *Hexarthra* belongs to this family.

105. *Hexarthra intermedia* (Wiszniewski,1929)

(Plate : 37 Fig : c), (Plate : 39 Fig : A & B)

Description: The body is conical and large . The ventral arm has one pair of hooks and eight filaments. The unci of trophus with 3 large and 2 small teeth present. Foot is absent .

Occurrence : TCR 2a, TCR 10, TCR 20, APH 6 and KTM 7.

Measurements :

Length of body : 175 μ m

Width of body : 128 μ m

Description : Two tanks near Nagpur (Arora,1966c&1966d); (Rai, 1974); Oxidation ponds at Bezon Bagh, Nagpur(Arora , 1965 & 1966a); Near Bhopal(Arora, 1967); Fish pond in Barrackpore, West Bengal(Michael, 1968); Kerala (Segers & Babu,1999); Andhra Pradesh (Dhanapathi & Rama Sarma, 2000).

Remarks : These specimens were collected from five localities of this state and they showed very close similarity with description of specimen from Andhra Pradesh.

XVI. FAMILY: Filiniidae Bory De St Vincent,1824

This group is distinguished by the presence of long setae. They are common in the plankton of ponds and lakes. *Filinia* sp. are distinguished by body /setae lengths and /or ratios.

106. *Filinia camascela* Myers, 1938

(Plate : 38 Fig : a)

Description: This is a pot shaped loricate rotifer with lateral sides rounded , and posterior region is narrowed and ends as a caudal spine. There are two spines with swollen bases , which originate from the antero- lateral sides of the body.

Occurrence : IDY 1.

Measurements :

Length of body(with out caudal spine) :	86 μ m
Width of body (with out lateral spines) :	83 μ m
Length of lateral spine :	111 μ m
Length of caudal spine :	88 μ m

Distribution : The first report of this species from Panama, Central America (Myers,1938), and later a new sub species, *Filinia camascela cambododgenesis* n.subsp. was recorded from various localities from Cambodia (Berzins,1973).

Remarks: This specimen shows close similarity with description of Panama specimen. And only three organisms were collected from a reservoir channel, Thattekkad, Kerala, South India. This species showed very good similarity with Cambodian specimens. The occurrence of species in Kerala State is the first report from India.

107. *Filinia longiseta* (Ehrenberg,1834)

(Plate : 38 Fig : b)

Description : The body is cylindrical or barrel shaped with two antero-lateral , and one posterior, ventrally placed long spine like an appendage(setae). The body is not loricated, and it is soft and transparent form.

Occurrence : KAN 1, KOZ 5, PKD 6 TCR 2a and TCR 1a.

Measurements:

Length of body	:	142 μ m
Width of body	:	89 μ m
Length of antero-lateral setae	:	375 μ m
Length of posterior setae	:	250 μ m

Distribution : Punjab, Kashmir & Ladakh (Edmondson and Hutchinson , 1934); Roshnara tank, Naini Lake , Indranagar tank, Stoking Tank & Nursery Tank Delhi (George , 1966); Nimeta Water works, near Baroda (Wulfert,1966); Two tanks near Nagpur (Arora,1966a); Oxidation ponds in Nagpur(Arora , 1966d); Rajasthan (Nayar,1968); Fish pond in Barrackpore, West Bengal(Michael, 1968 & 1969); Two ponds at Pilani , Rajasthan(Nayar,1968 &1970); River Yamuna (Rai, 1974); Punjab State ,North West India(Sharma,1976); Orissa, East India (Sharma,1978c); West Bengal & North East India(Sharma,1979d); Ajwa reservoir , near Baroda , Gujarat , W. India(Jayangaudar,1980) ; Orissa, East India(Sharma,1980b); Dal Lake ,Himalayan Lakes (Vass & Zutshi,1983); Punjab State ,North West India(Sharma &Sharma,1984); Two sewage channels from Gawlior,(Saksena & Kulkarni,1986); Gawlior (Saksena *et al* ,1986); Orissa State, (Sharma 1987c); Haryana State (Sharma& Sharma, 1988); Bihar (Sharma & Dudani, 1992); River Narmada, Madhya Pradesh(Sharma & Naik, 1996).

In South India, Tamil Nadu (Michael,1973); Karnataka(Patil & Gouder, 1989); Andra Pradesh (Dhanapathi & Sarma, 2000); Andra Pradesh (Durga Prasad & Padmavathi , 2002).

Remarks : This is one of the common species of genus *Filinia* and reported from almost all the regions of India. But, this was found from six localities in this state with a good number of specimens , and is recorded first time from Kerala.

108. *Filinia opoliensis* (Zacharias,1898)

(Plate : 38 Fig : c)

Description : The body is long and cylindrical. The anterior side of the body has two unequal long broad-based setae and posterior side has also two ,of which one is very long and the other is small.

Occurrence : TCR 20

Measurements :

Length of body	:	200 μ m
Width of the body	:	60 μ m
Length of long anterior setae	:	223 μ m
Length of short setae	:	193 μ m
Length of long posterior setae	:	216 μ m

Distribution: This species was reported from Indranagar tank, Stoking Tank & Nursery Tank Delhi (George , 1966); Storage Reservoir of Ajwa, Nimeta Water works, near Baroda (Wulfert,1966); Tank near Nagpur (Arora,1966c); Rajasthan (Nayar,1968); West Bengal , North East India (Sharma, 1979d);Two ponds at Pilani , Rajasthan(Nayar,1970); Orissa, East India (Sharma,1980b); West India (Jayangaudar,1980); Punjab State, (Sharma & Sharma,1984); Orissa State (Sharma 1987c); Haryana State (Sharma& Sharma, 1988); Bihar (Sharma & Dudani, 1992); River Narmada, Madhya Pradesh(Sharma & Naik, 1996).

In South India, the first report from Karnataka(Patil & Gouder,1989); Andhra Pradesh (Dhanapathi & Rama Sarma, 2000).

Remarks: This species was found only in one locality of central Kerala, and three specimens were collected from two samples . This species is reported first time from Kerala State.

Chapter - 5

**LIST OF ROTIFER SPECIES REPORTED
FROM KERALA STATE**

LIST OF SPECIES REPORTED FROM KERALA STATE

CLASS: MONOGONONTA

A. ORDER : PLOIMA

I. Family: Epiphanidae Bartos, 1959

1. *Epiphanes brachionus* (Ehrenberg,1837)
2. *Epiphanes clavulata* (Ehrenberg, 1832)
3. *Epiphanes macrourus* (Barrois & Daday,1894)
4. *Proalides subtilis* Rodewald ,1940

II. Family: Brachionidae Ehrenberg,1838

5. *Anuraeopsis coelata* de Beauchamp, 1932
6. *Anuraeopsis fissa* (Gosse,1851)
7. *Brachionus angularis* Gosse,1851
8. *Brachionus bidentatus* f. *inermis* (Rousselet,1906)
9. *Brachionus calyciflorus* Pallas ,1766
10. *Brachionus caudatus* Barrois & Daday,1884
11. *Brachionus diversicornis* (Daday,1883)
12. *Brachionus donneri* Brehm,1951
13. *Brachionus durgae* Dhanapathi ,1974
14. *Brachionus falcatus* Zacharias,1989
15. *Brachionus forficula* Wierzejski,1891
16. *Brachionus plicatilis* O.F. Muller,1776
17. *Brachionus quadridentatus* Hermann ,1783
18. *Brachionus rubens* Ehrenberg,1838
19. *Brachionus urceolaris* O.F. Muller,1773
20. *Keratella cochlearis* (Gosse,1951)
21. *Keratella procurva* (Thorpe,1891)

22. *Keratella tecta* (Gosse,1851)
23. *Keratella tropica* (Apstein,1907)
24. *Platyias leloupi* Gillard, 1957
25. *Platyias quadricornis* (Ehrenberg,1832)
26. *Plationus patulus* O.F.Müller, 1786

III. Family: Euchlanidae Bartos,1959

27. *Dipleuchlanis propatula* (Gosse,1886)
28. *Euchlanis dilatata* Ehrenberg,1832
29. *Euchlanis incisa* Carlin,1939
30. *Tripleuchlanis plicata* (Levander,1894)

IV. Family: Mytilinidae Bartos, 1959

31. *Lophocharis salpina* (Ehrenberg,1834)
32. *Mytilina acanthophora* Hauer,1938
33. *Mytilina bisulcata* (Lucks,1912)
34. *Mytilina ventralis* (Ehrenberg,1832)

V. Family: Trichotridae Bartos,1959

35. *Macrochaetus collinsi* (Gosse,1867)
36. *Macrochaetus danneli* Koste & Sheil,1983
37. *Macrochaetus sericus* (Thorpe,1893)
38. *Macrochaetus subquadratus* Perty,1850
39. *Trichotria tetractis* (Ehrenberg,1830)

VI. Family: Colurellidae Bartos, 1959

40. *Colurella obtusa* (Gosse,1886)
41. *Colurella uncinata* (O.F. Muller,1773)
42. *Lepadella acuminata* (Ehrenberg,1834)
43. *Lepadella aspicora* Myers 1934
44. *Lepadella costatoides* Segers,1992
45. *Lepadella discoidea* Segers,1993
46. *Lepadella ehrenbergi* (Perty,1850)
47. *Lepadella* cf. *favorita* Klement,1962
48. *Lepadella minuta* (Montet, 1918)
49. *Lepadella ovalis* (O.F. Muller,1786)
50. *Lepadella patella* (O.F. Muller,1786)
51. *Lepadella rhomboides* (Gosse,1886)
52. *Lepadella triba* Myers,1934

VII . Family: Lecanidae Bartos, 1959

53. *Lecane aculeata* (Jakubski,1912)
54. *Lecanidae arcula* Harring, 1914
55. *Lecane bifurca* (Bryce,1892)
56. *Lecane bulla* (Gosse,1886)
57. *Lecane closterocerca* (Schmarda,1859)
58. *Lecane crepida* Harring,1914
59. *Lecane curvicornis* (Murray1913)
60. *Lecane doryssa* Harring,1914
61. *Lecane furcata* (Murray,1913)
62. *Lecane hamata* (Stokes,1896)
63. *Lecane hastata* (Murray,1913)
64. *Lecane hornemanni* (Ehrenberg,1834)

65. *Lecane inopinata* Harring & Myers, 1926
66. *Lecane leontina* (Turner, 1892)
67. *Lecane ludwigi* (Eckstein, 1883)
68. *Lecane luna* (O.F. Muller, 1776)
69. *Lecane lunaris* (Ehrenberg, 1832)
70. *Lecane monostyla* (Daday, 1897)
71. *Lecane obtusa* (Murray, 1913)
72. *Lecane papuana* (Murray, 1913)
73. *Lecane pertica* Harring & Myers, 1926
74. *Lecane pusilla* Harring, 1914
75. *Lecane pyriformis* (Daday, 1905)
76. *Lecane quadridentata* (Ehrenberg, 1832)
77. *Lecane rutteneri* Hauer, 1938
78. *Lecane signifera* (Jennings, 1896)
79. *Lecane simonneae* Segers 1993
80. *Lecane tenuiseta* Harring, 1914
81. *Lecane unguitata* (Fadeev, 1925)
82. *Lecane ungulata* (Gosse, 1887)

VIII . Family: Notommatidae Remane, 1933

83. *Cephalodella gibba* (Ehrenberg, 1832)
84. *Notommata copeus* Ehrenberg, 1834
85. *Notommata pachyura* (Gosse) f. *triangulata* Kirkman, 1906
86. *Notommata saccigera* Ehrenberg, 1832
87. *Monommata arndti* Remane, 1933
88. *Scaridium longicaudum* (O.F. Muller, 1786)

IX .Family: Trichocercidae Remane, 1933

- 89. *Trichocerca bicristata* (Gosse,1887)
- 90. *Trichocerca braziliensis* (Murray,1913)
- 91. *Trichocerca cylindrica* (Imhof,1891)
- 92. *Trichocerca Kosteï* Segers,1993
- 93. *Trichocerca pusilla* (Lauterborn,1898)
- 94. *Trichocerca similis* (Wierzejski,1893)
- 95. *Trichocerca weberi* (Jennings,1903)

X . Family: Synchaetidae Remane,1933

- 96. *Polyarthra vulgaris* Carlin,1943

XI . Family: Asplanchnidae Haring & Myers,1926

- 97. *Asplanchna brightwelli* (Gosse,1850)

XII . Family: Dicranophoridae Remane ,1933

- 98. *Dicranophorus epicharis* Haring & Myers,1928
- 99. *Dicranophorus grandis* Haring, 1913

B. ORDER : FLOSCULARIACEA**XIII . Family: Testudinellidae Bory De St Vincent,1826**

- 100. *Pompholyx sulcata* Hudson,1885
- 101. *Testudinella emarginula* (Stenroos,1898)
- 102. *Testudinella patina* (Hermann,1783)

XIV . Family: Flosculariidae Haring ,1913

- 103. *Limnias melicerta* Weisse,1848
- 104. *Sinantherina semibullata* (Thorpe,1889)

XV. Family: Hexarthridae Bartos 1959

105. *Hexarthra intermedia* (Wiszniewski, 1929)

XVI. Family: Filinidae Bory De St Vincent, 1824

106. *Filinia camascela* Myers, 1938

107. *Filinia longiseta* (Ehrenberg, 1834)

108. *Filinia opoliensis* (Zacharias, 1898)

Chapter - 6

TAXONOMY KEY

Total 16 families and 30 genera and 108 species

Taxonomic key to the classes of Phylum Rotifera

1. Ovary paired.....Class Digononta
Ovary single.....Class Monogononta

Taxonomic key to the orders of Class Monogononta

1. Trophi is very small and uncinata type.....Order Collotheceae
Trophi is not uncinata type.....2
- 2 (1) Trophi is malleoramata type.....Order Flosculariacea
Trophi is not malleoramataOrder Ploima

Taxonomic key to the families of Order Flosculariacea

2. Rotifers with movable appendages for swimming.....2
Rotifers with out appendages.....3
- 2 (1) Rotifers with highly muscled arm-like appendages.....
.....Family Hexarthridae
Rotifers with 3 long appendages.....Family Filinidae
- 3 (1) Ventral antenna is very long.....Family Conochilidae
Ventral antenna is other type.....4
- 4 (3) Individuals usually living in a colonies.....Family Flosculariidae
individuals free-swimming without colonies.....
.....Family Testudinellidae

Taxonomic key to the Genus and species of family Hexarthridae

Paired caudal appendages are present and the trophus with 3 large
and 2 small unci teeth.....*Hexarthra intermedia* Wiszniewski
(Plate : 37 Fig :c), (Plate : 39 Fig : A & B)

Taxonomic key to the species of Genus *Filinia*

1. The shape of lorica is more or less circular
..... *Filinia camascela* Myers
The shape of lorica is cylindrical.....2
- 2 (1) Two anterolateral setae which have swollen bases and posterior
setae situated at the caudal end.....*Filinia opoliensis*(Zacharias)
(Plate : 38 Fig :c)

Two long anterolateral setae with out swollen bases and one
posterior seta, situated ventrally.....*Filinia longiseta* (Ehrenberg)
(Plate : 38 Fig :b)

Taxonomic key to the Genera of family Flosculariidae

1. Corona bilobed.....*Limnias* Schrank
Corona not lobed.....*Sinantherina* Bory De St.Vincent

Taxonomic key to the species of Genus *Limnias*

Small horns behind the corona ; body case with distinct annular rings
.....*Limnias melicerta* Weisse
(Plate : 37 Fig : a)

Taxonomic key to the species of Genus *Sinantherina*

- Colonial & pelagic, and Corona is kidney shaped
 *Sinantherina semibullata* (Thorpe)
 (Plate : 37 Fig : b)

Taxonomic key to the Genera of family of Testudinellidae

1. Small spherical rotifers with median occipital lip or undulating margin; may have longitudinal grooves.....*Pompholyx* Gosse

Discoid, circular to Pyriform or ovoid ,dorso-ventrally flattened 'plate' slightly convex to triangular in section
 *Testudinella* Bory de St. Vincent

Taxonomic key to the species of Genus *Pompholyx*

- Body length less than 100um and the cuticle with striations
*Pompholyx sulcata*(Hudson)
 (Plate : 36 Fig :a)

Taxonomic key to the species of Genus *Testudinella*

1. The lorica is circular, and anterior end of lorica with prominent anteriomedianlobe.....*Testudinella patina*(Hermann)
 (Plate : 36 Fig :c)

The lorica is oval, and anterior end giving appearance of emerging out.....*Testudinella emarginula*(Stenroos)
 (Plate : 36 Fig :b)

Taxonomic key to the families of Order Ploima

- 1 Trophi incudate type.....Family Asplanchnidae
 Trophi not incudate type.....2
- 2 (1) Trophi forcipate type.....3
 Trophi not forcipate type.....4
- 3 (2) Corona resembling *Notommata type* creeping ,littoral forms.....
Family Dicranophoridae
 Corona ventralFamily Notommatidae
- 4(2) Trophi virgate type.....5
 Trophi malleate type.....6
- 5 (4) Trophi with complex paired hypopharynx muscles and
 manubrium with wide lamina.....Family Synchaetidae
 Trophi assymetrical,foot short with bristle like toes.....
Family Trichocercidae
- 6 (4) Body is strongly loricated.....7
 Body is not strongly loricated.....Family Epiphanidae
- 7 (6) Ventral plate with deep caudal foot opening. Family Colurellidae
 Lorica is different type.....8
- 8 (7) Head , body and foot are loricated.....Family Trichotridae
 Lorica is different type.....9

- 10 (8) Ventral and dorsal plates of lorica are firmly fused
Family Mytilinidae
 Lorica plates are different type..... 11
- 11 (10) Dorsal and ventral plates of lorica connected by inwardly folded
 lamella.....Family Euchlanidae
 Lorica is different type.....12
- 12 (11) Lorica is dorso-ventrally flattened with dissimilar dorsal and
 ventral plates.....Family Lecanidae
 Lorica is not dorso-ventrally flattened and lorica with or with out
 Spines.....Family Brachionidae

Taxonomic key to the Genus of family Asplanchnidae

The body with out foot and toes, broad lamellae behind rami apices,
 which are symmetrical*Asplanchna brightwelli*(Gosse)
 (Plate : 35 Fig :b & c)

Taxonomic key to the Genus of family Dicranophoridae

Body is fusiform with out deep furrows, toes are short.....
*Dicranophorus* (O.F.Müller)

Taxonomic key to the species of Genus *Dicranophorus*

1. Unci of trophus is single toothed.....
*Dicranophorus grandis* (Ehrenberg)
 (Plate : 35 Fig : f)
- Unci 3-tothed ,toes are parallel sided and tips blunt ended
*Dicranophorus epicharis* (Harring & Myers)
 (Plate : 35 Fig :d & e)

Taxonomic key to the Genera of Family Notommatidae

1. Foot and toes longer than the Body.....2
 Foot and toes shorter than the body.....3

- 2 (1)Toes of dissimilar length ; foot short mostly two , rarely three segmented.....*Monommata* Bartsch
 Toes of similar length ; foot three segmented and very long..
*Scaridium* Ehrenberg

- 3 (1) Corona triangular, placed ventrally.....*Notommata* Ehrenberg
 Corona rounded , placed anteriorly
*Cephalodella* Bory De St. Vincent

Taxonomic key to the species of Genus of *Monommata*

- Toes of dissimilar length.....*Monommata arndti* Remane
 (Plate : 31 Fig : c)

Taxonomic key to the species of Genus of *Scaridium*

- Body length less than 300um....*Scaridium longicaudum*(O.F.Müller)
 (Plate : 31 Fig : d)

Taxonomic key to the species of Genus of *Notommata*

1. Cylindrical ,fusiform or conical body ,with out lateral extensions (alae).....2
 Body with pronounced alae.....
*Notommata pachyura* (Gosse)*f. triangulata* Krikman
 (Plate : 30 Fig : d & e)

- 2 (1) Body length greater than 500um; caudal process with articulated tip, does not reach base of toes*Notommata copeus* (Ehrenberg)
 (Plate : 30 Fig : c), (Plate : 40 Fig : C)

Body length less than 500um ; caudal process with out articulated tip, reaches base of toes.....*Notommata saccigera* Ehrenberg
 (Plate : 31 Fig : a & b)

Taxonomic key to the species of Genus of *Cephalodella*

Body length less than 300um, toes length less than
 100um*Cephalodella gibba*(Ehrenberg)
 (Plate : 30 Fig : a & b)

Taxonomic key to the Genus of family Synchaetidae

Illoricate body, saccate –cuboidal , cuticle is thin but rigid ,foot is absent lateral bundles of rigid serrated fins.....
*Polyarthra* (Ehrenberg)

Taxonomic key to the species of Genus *Polyarthra*

Ventral fins are present , fin width is less than 15µm.....
*Polyarthra vulgaris* Carlin
 (Plate : 35 Fig : a)

Taxonomic key to Genus of Family *Trichocercidae*

Foot present ,toes bristle like ,often of considerable length.....
*Trichocerca* Lamarck

Taxonomic key to species of Genus of *Trichocerca*

1. Toes are similar length of RT at least 1/3 length of LT.....2
 Toes are unequal length, RT highly reduced.....4
- 2 (1)Anterior margin with one long spine.....
 *Trichocerca weberi* (Jennings)
 (Plate : 34 Fig : c & d)

 Jennings Anterior margin with two equal long spines.....
 *Trichocerca similis*(Wierzejski)
 (Plate : 34 Fig : a & b)
- 4 (1)Lorica anterior margin without projections.....5
 Lorica anterior margins with blunt projections/spines.....6
- 5 (4) Body tapers in posterior 1/3;toes curved ventrally.....
 *Trichocerca bicristata* (Gosse)
 (Plate : 32 Fig : a, b & c)

 Body slender, not constricted posteriorly.....
*Trichocerca braziliensis*(Murray)
 (Plate : 32 Fig : d & e)

- 6 (4)Anterior margin spine is long.....*Trichocerca cylindrica*(Imhof)
 (Plate : 32 Fig : f & g)
 Anterior margin with blunt/triangular projection.....7
- 7 (6) Anterior margin with blunt projection.....
*Trichocerca pusilla*(Jennings)
 (Plate : 33 Fig : d, e & f)
- Anterior margin with triangular projection.....
 *Trichocerca kostei* Segers
 (Plate : 33 Fig : a, b & c)

Taxonomic key to the Genera of family Epiphanidae

1. Toes lacking or retractile & body worm shaped
 *Proalides* De Beauchamp
 Toes are short & corona with a large groups of cilia.....
 *Epiphanes* Ehrenberg

Taxonomic key to Genus *Proalides* Beauchamp

- Foot is rudimentary with retractable toes.....
*Proalides subtilis* Rodewald
 (Plate : 1 Fig : d)

Taxonomic key to the species of Genus *Epiphanes* Ehrenberg

1. Foot is indistinct or short..... *Epiphanes clavulata*(Ehrenberg)
 (Plate : 1 Fig : b), (Plate : 41 Fig : E)
 Foot with three segments or annulated, vermiform and long.....2

- 2 (1) Foot is annulated and cuticle is soft.....
*Epiphanes macrourus* (Barrois and Daday)
 (Plate : 1 Fig : c)

- Foot with three pseudosegments and cuticle is semiloricated.....
*Epiphanes brachionus* (Ehrenberg)
 (Plate : 1 Fig : a)

Taxonomic key to the Genera of Family Colurellidae

1. Lorica laterally compressed ,with ventral aperture.....
*Colurella* Bory De St Vincent
 Lorica dorso-ventrally flattened, without such apertures.....
*Lepadella* Bory De St Vincent

Taxonomic key to the species of Genus *Colurella*

- Lorica valve slender , posteriorly downward.....
*Colurella uncinata* (O.F.Müller)
 (Plate : 13 Fig : d & e)

- Lorica valve rounded, plump.....*Colurella obtusa*(Gosse)
 (Plate : 13 Fig : a, b & c)

Taxonomic key to the Sub Genus of Genus *Lepadella*

- Toes are equal length , entirely
*Eulepadella* Hauer
 Toes are unequal length*Heterolepadella*Bartos

- 7 (1) Dorsal lorica with median keel.....8
 Dorsal lorica without median keel.....9
- 8 (7) Posterior lorica tapers to an acute point
*Lepadella acuminata*(Ehrenberg)
 (Plate : 14 Fig : a & b)
- Posterior lorica is rounded *Lepadella rhombiodes* (Gosse)
 (Plate : 17 Fig : a, b & c)
- 9 (7)Dorsal lorica with 6 rounded ridges,
 *Lepadella cf. favorita* Klement
 (Plate : 15 Fig : e, f & g)
- Dorsal lorica with 6 longitudinal ribs
 *Lepadella costatoides* Segers
 (Plate : 14 Fig : e & f)

Taxonomic key to the species of Genus of *Heterolepadella*

- Lorica is oval and with out posterolateral pointed spurs.....
*Lepadella (H) aspicora* Myers
 (Plate :14 Fig : c & d)
- Lorica is rhomboidal , with posterolateral pointed spurs.....
 *Lepadella (H)ehrenbergi*(Perty)
 (Plate : 15 Fig : c & d)

Taxonomic key to the Genera of family Trichotriidae

1. Lorica with distinct elongated spines on dorsal surface.....
*Macrochaetus* Perty
 Lorica without spines*Trichotria* Bory de St. Vincent

Taxonomic key to the species of Genus *Macrochaetus*

1. Only one pair of rudimentary antero-submedian spines are present on the dorsal surface..... *Macrochaetus danneeli* (Koste & Sheil)
 (Plate : 12 Fig : b)
 More spines are present.....2
- 2 (1) Central dorsal pair of spines are present . Two anterolateral spines ,two anteriomedian spines, two antero-submedian spines and two posteriomedian spines are also present.....
*Macrochaetus subquadratus*(Perty)
 (Plate : 12 Fig : d)
 Central dorsal pair of spines are absent.....3
- 3 (2) Two anterolateral spines ,two anteriomedian spines, two Posteriomedian spines are present...*Macrochaetus collinsi* (Gosse)
 (Plate : 12 Fig : a)
 Two anterolateral spines ,two anteriomedian spines, two.....
 anterosubmedian spines and two posteriomedian spines are present..... *Macrochaetus sericus*(Thorpe)
 (Plate : 12 Fig : c)

Taxonomic key to the species of Genus *Trichotria*

Cross-section is hexagonal , three foot segments, and toes projecting beyond lorica margin. Lateral lorica not very expanded*Trichotria tetractis*(Ehrenberg)
 (Plate : 12 Fig : e)

Taxonomic key to the Genera of family Mytilinidae

1. Lorica is thin with double keel, with out ornamentation and toes are long.....*Mytilina* Bore de St Vincent

 Lorica rigid with single keel, with ornamentation and toes are short*Lophocharis* Ehrenberg

Taxonomic key to the species of Genus *Mytilina*

1. Lorica stout and anterior margin granulated with two ventral spines.....*Mytilina ventralis*(Ehrenberg)
 (Plate : 11 Fig : d)
 Lorica thin , anterior margin not granulated2.
- 2 (1)Ventral anterior-margin of lorica with variable projections and toes are long *Mytilina acanthophora* Hauer
 (Plate : 11 Fig : b)

 Ventral anterior margin without projections and toes are short
 *Mytilina bisulcata* Lucks
 (Plate : 11 Fig : c)

Taxonomic key to the species of Genus *Lophocharis*

Anterior margin of lorica strongly serrated ,and dorsal keel
 transverse.....*Lophocharis salpina*(Ehrenberg)
 (Plate : 11 Fig : a)

Taxonomic key to the Genera of Family Euchlanidae

1. Dorsal plate arched, concave ,narrower than arched ventral plate
*Dipleuchlanis* De Beauchamp
 Dorsal plate arched, convex and triangular.....2
2. (1) dorsal and ventral plates nearly same size ,connected by a lateral
 double longitudinal membrane within a stiff projection.....
*Tripleuchlanis* Myers
 With and without lateral longitudinal sulci.....*Euchlanis* Ehrenberg

Taxonomic key to the species of Genus of *Dipleuchlanis*

The toes with swelling before the pointed ends.....
*Dipleuchlanis propatula*(Gosse)
 (Plate : 9 Fig : a, b & c)

Taxonomic key to the species of Genus of *Tripleuchlanis*

Lorica is ovoid in shape ,dorsal and ventral plates are in same size,
 foot glands and reservoirs are elongated.....
*Tripleuchlanis plicata*(Levander)
 (Plate : 10 Fig : d & e)

Taxonomic key to the species of Genus of *Euchlanis*

Cross section of lorica more or less arched to semicircular.....
*Euchlanis dilatata* Ehrenberg
 (Plate : 9 Fig : d & e)

Cross section of lorica triangular , dorsal plate with high keel
 *Euchlanis incisa* Carlin
 (Plate : 10 Fig : a, b & c)

Taxonomic key to the species of Genus *Lecane*

1. Toes separate, mostly spread.....2
 Toes partially or completely fused , mostly held together.....19
- 2 (1) Anterolateral corners rounded ,head aperture margins convex or straight*Lecane hornemanni* (Ehrenberg)
 (Plate : 22 Fig : c & d)
 Anterolateral corners with acute projections.....3
- 3 (2) Foot pseudosegment is projecting type.....4
 Foot pseudosegment is not projecting type.....5
- 4 (3) Dorsal plate anteriorly as wide as ventral plate .Lateral margins of ventral plate reach anterior margin. Head aperture margins straight.*Lecane pertica* Harring & Myers
 (Plate : 26 Fig : c & d)
 Dorsal plate anteriorly narrower than the ventral plate. Head aperture margins slightly concave.....*Lecane simonneae* Segers
 (Plate : 28 Fig : e & f)

- 5 (3) Posterior margin of the foot is rounded.....
*Lecane signifera*(Jennings
 (Plate : 28 Fig : c & d)
 Posterior margin of foot plate with projections.....6
- 6 (5)Dorsal plate medially wider than ventral plate.....
*Lecane ludwigii*(Eckstein)
 (Plate : 23 Fig : c & d)
 Dorsal plate medially not wider than ventral plate.....7
- 7 (6)Anterolateral corners angulate or rounded.....8
 Anterolateral corners with acute projections.....12
- 8 (7) Dorsal plate anteriorly wider than or as wide as ventral plate.....
*Lecane rutteneri* Hauer
 (Plate : 28 Fig : a & b)
 Dorsal plate anteriorly narrower than ventral plate.....9
- 9 (8)Ventral plate with out longitudinal folds, toes with pseudoclaws
*Lecane papuana* (Murray)
 (Plate : 26 Fig : a & b)
 A pair of longitudinal on ventral plate is present, toes with real
 claws.....10
- 10 (9)Claws relatively long.....11
 Claws short..... *Lecane pusilla* Harring
 (Plate : 27 Fig : a & b)

- 11 (10) Foot pseudosegment scarcely projecting. Lorica distinctly longer than the wide, mostly smooth.....
*Lecane tenuiseta* Harring
 (Plate : 27 Fig : a & b)
- Foot segment distinctly projecting .Lorica only slightly longer than wide ,ornamented.....*Lecane doryssa* Harring
 (Plate : 20 Fig : c & d)
- 12 (7) Claws with basal swelling.....*Lecane hastata*(Murray)
 (Plate : 22 Fig : a & b)
 Claws smoothly tapering , or claws completely separated.....13
- 13 (12)Foot pseudosegment scarcely projecting.....14
 Foot pseudosegment clearly projecting.....17
- 13 (13) Posterior margin of ventral plate with distinct, variably shaped projection.....*Lecane leontina*(Turner)
 (Plate : 23 Fig : a & b)
 Posterior margin of foot plate smoothly rounded or broadly truncate.....15
- 14 (14)Pseudoclaws 20um or longer.....*Lecane ungulata*(Gosse)
 (Plate : 29 Fig : e & f), (Plate : 40 Fig : D)
 Pseudoclaws shorter than 20um.....16
- 15 (15)Anterior margin of dorsal plate much narrower than the ventral plate. Head aperture margins strongly lunate, antero-lateral spines broad based..... *Lecane luna*(Muller)
 (Plate : 24 Fig : a & b)

Anterior margin of dorsal plate only slightly narrower than ventral plate. Head aperture margins straight or concave, antero-lateral spines narrow shaped.....*Lecane curvicornis*(Murray)

(Plate : 20 Fig : a & b)

17 (13)Foot plate especially separated , projecting

.....*Lecane crepida* Harring

(Plate : 19 Fig : e & f)

Foot plate not projecting.....18

18 (17)Lorica elongate, antero-lateral spines long.....

.....*Lecane aculeata* (Jakubski)

(Plate : 18 Fig : a & b)

Lorica less elongate , antero- lateral spines are short

.....*Lecane arcula* Harring

(Plate : 18 Fig : c & d)

19(1)Toes partly fused (10%-90%),held together or,rarely spread.....*Lecane inopinata* Harring & Myers

(Plate : 22 Fig : e & f)

Toes totally fused ,occasionally with minute fissure only, or with non fused claws

20

20 (19) Claws long. Coxal plates normal..... 21

Claws short ,diverging .Coxal plates spines.....

.....*Lecane bifurca*(Bryce)

(Plate : 18 Fig : e & f)

- 21 (20) Toe with claws or terminal fissure..... 22
 Toe smoothly tapering to point..... 27
- 21 (21) Lorica egg –shaped ,occasionally soft. Ventral and dorsal head
 aperture margins with deep sinuses*Lecane bulla* (Gosse)
 (Plate : 19 Fig : a & b)
 Lorica dorso-ventrally flattened ,not egg –shaped 23
- 23 (22) Head aperture margin dorsally with a pair of long ,curved
 median projections ,ventrally concave.....
*Lecane quadridentata*(Ehrenberg)
 (Plate : 27 Fig : e & f)
 Dorsal head aperture margin without such projections..... 24
- 24 (23) Dorsal plate anteriorly wider than plate, claws completely
 separated*Lecane obtusa*(Murray)
 (Plate : 25 Fig : c & d)
 Dorsal plate anteriorly as wide as or narrower than ventral plate ...25
- 25 (24) Toes with completely separated claws.....
*Lecane furcata* Murray
 (Plate : 21 Fig : a & b)
 Toes with terminal fissure or inconspicuously separated claws.... 26
- 26 (25) Ventral and dorsal head aperture margins variable : straight to
 strongly concave.....*Lecane lunaris*(Ehrenberg)
 (Plate : 24 Fig : c & d)
 Dorsal head aperture margin with median notch.....
*Lecane unguitata*(Fadeev)
 (Plate : 29 Fig : c & d)

- 27 (21) Dorsal plate with lateral extensions.....
*Lecane monostyla*(Daday)
 (Plate : 25 Fig : a & b)
 Dorsal plate without such extensions..... 28
- 28 (27) Dorsal plate anteriorly wider than ,or as wide as the ventral..
*Lecane pyriformis*(Daday)
 (Plate : 27 Fig : c & e)
 Dorsal plate anteriorly narrower than ventral..... 29
- 29 (28) Antero-lateral corners angulate
*Lecane closteroerca*(Schmarda)
 (Plate : 19 Fig : c & d)
 Antero-lateral corners with sharp projections.....
*Lecane hamata*(Stokes)
 (Plate : 21 Fig : c & d)

Taxonomic key to the Genera of Family Brachionidae

1. Foot present.....2
 Foot absent.4
- 2 (1) Foot is pseudosegmented *Platyionus* Segers,Murugan&Dumont
 Foot is true segmented.....3
- 3 (2) Foot is jointed with two toes *Platyias* Harring
 Foot is ringed ,tube shaped and with two toes.... *Brachionus* Pallas
4. Dorsal plate with facets & spines.....*Keratella* Bory de St. Vincent
 Dorsal plate without facets & spines..... *Anuraeopsis* Lauterborn

Taxonomic key to the species of Genus *Platyonus*

1. Caudal spines are short, and foot opening with asymmetrical spines
*Platyonus patulus* (Müller)
 (Plate : 7 Fig : b)

Taxonomic key to the species of the Genus *Platyias*

1. Dorsal plate of lorica with long triangular keel
*Platyias leloupi* Gillard
 (Plate : 18 Fig : c & d)
 Keel is absent, but one pentagonal facet , and just below this two
 hexagonal facets..... *Platyias quadricornis*(Ehrenberg)
 (Plate : 8 Fig : a & b)

Taxonomy key to the species of Genus *Brachionus*

1. Anterior margin of lorica with 2 spines (anterior median spines)
*Brachionus angularis* Gosse
 (Plate : 2 Fig : d)
 More than 2 spines..... 2
- 2 (1) Anterior margin of lorica with 4 spines..... 3
 More than 4 spines.....7
- 3 (2) Anterior spines are in equal size with swollen bases ,posterior
 and postero-lateral spines if present also with swollen bases.....
*Brachionus calyciflorus* Pallas
 (Plate : 3 Fig : a)

- Anterior spines are not equal in size without swollen bases.....4
- 4 (3) Antero-lateral spines are longer 5
 Anterior spines are more or less equal in size..... .7
- 5(4) Posterior spines are unequal in size.....
*Brachionus diversicornis*(Daday)
 (Plate :3 Fig : e)
- Posterior spines are almost in equal size.....6
- 7 (5)Posterior spines are small and sometimes truncate
*Brachionus caudatus* Barrois & Daday
 (Plate : 3 Fig : b)
- Posterior spines long curved and never truncate.....
 *Brachionus forficula* Wierzejski
 (Plate : 4 Fig : c)
- 7 (2)Anteriorly, 6 spines are present8
 Anteriorly, more than 6 spines are present(12spines).....
*Brachionus donneri* Brehm
 (Plate : 3 Fig : c & d)
- 8 (7)Spines are prominent and unequal in size.....9
 Spines are small and more or less equal in size.....11
- 9 (8) Anterior sub median spines are long and curved outwardly
 *Brachionus falcatus* Zacharias
 (Plate : 4 Fig : b)
- Anterior sub median spines are short 10

- 10 (9) Antero-lateral spines are longer than the median and sub –median spines.....*Brachionus bidentata f.inermis* (Rousselet)

(Plate : 2 Fig : e)

Antero-median spines are longer and foot opening tube like.....
.....*Brachionus quadridentatus*(Hermann)

(Plate : 5 Fig : a)

- 11 (8) Antero-median spines are asymmetrical and tip of spine pointing towards to median axis of lorica*Brachionus rubens* Ehrenberg

(Plate : 5 Fig : b)

Antero-median spines are symmetrical12

- 12 (11) Lorica circular and eggs are attached with prominent thread like structures..... *Brachionus durgae* Dhanapathi

(Plate : 4 Fig : a)

Lorica not circular and no prominent thread present.....13

- 13 (12) Dorsal foot opening is rectangular and antero-dorsal part of l orica with straight ridges below the spines

.....*Brachionus urceolaris*(O.F.Müller)

(Plate : 5 Fig : c)

Dorsal foot opening is other shape and antero-lateral part of lorica without ridges..... *Brachionus plicatilis*(O.F.Müller)

(Plate : 4 Fig : d)

Taxonomic key to the species of Genus *Keratella*

1. Posterior spine present.....2

Posterior spine absent.....*Keratella tecta* (Gosse)

(Plate : 6 Fig : b)

2. (1) Two posterior spines present, one is long and other is short.....3
 One caudal spine present.....*Keratella cochlearis*(Gosse)
 (Plate : 6 Fig : a)
2. (2)Posteromedian remnant present under posteromedian plaque.....
*Keratella tropica* (Apstein)
 (Plate : 6 Fig : c & d)
- Posteromedian remnant absent and postmeridian plaque.....
 terminates in a median line.....*Keratella procurva* (Thorpe)
 (Plate : 7 Fig : a)

Taxonomic key to the Genus *Anuraeopsis*

1. Body is ovate and anterior margin smooth.....
*Anuraeopsis fissa*(Gosse)
 (Plate : 4 Fig : b & c)
- Body is navicular and dorsal plate with ribs and facets.....
*Anuraeopsis coelata* De Beauchamp
 (Plate : 2 Fig : a)

Chapter – 7

DISCUSSION

Discussion

The rotifers form one of the most abundant metazoans of the freshwaters and a major constituent of the zooplankton, both numerically and in terms of species numbers. About 2500 species of rotifers are so far reported around the world and the number is likely to increase with more sampling efforts from unexplored regions.

The reported presence of nearly 500 species from India by Sharma (1991) with limited number of collections from this vast country indicates the species richness of this group. The occurrence of 108 species of rotifers from the freshwaters of Kerala State with an area of 38863 sq.km shows the abundance of this group in this part of the country. Since the present data is based on 314 samples collected from 110 localities, the number can be much higher with more extensive collections from more localities and during different seasons of the year.

Faunestic studies made by earlier workers (Nayar & Nair 1969, Nair & Nayar 1971, Nair 1972, Segres *et al* 1997, Segers & Babu 1999) reported 59 species of rotifers from this state. The present study has added another 64 new records from Kerala, raising the total number to 123 species. Out of the 64 new records of rotifers from Kerala, 40 are new records from South India and Five species viz. *Keratella tecta* (Gosse, 1851), *Lecane tenuista* Haring, 1914, *Macrochaetus danneli* Koste & Sheil, 1983, *Filinia camascela* Myers, 1938 and *Brachionus bidentatus f. inermia* (Rousselet, 1906) are reported first time from India. Among the 108 species reported in the present study, family Lecanidae is represented by 30 species, Brachionidae by 22 species and colurellidae by 13 species. Genera wise *Lecane*, *Brachionus* and *Lepadella* are the most abundant.

One of the notable observations in the present study is the numerical abundance and high degree of diversity shown by the rotifers in the inundated paddy fields - the 'kol - fields'. Out of the 108 species, 67 species are reported from the paddy fields. This species richness and abundance can be attributed to the presence of organic matter formed by decaying of hay immediately after the rain thus providing an ideal environment for the growth and reproduction of these organisms. The sporadic increase in the number is possible because of their predominantly parthenogenetic type of reproduction. Another significant observation was the presence of 42 species of rotifers from a pond rich in organic matter at Ferok near Calicut. Numerically species of *Lecane* and *Brachionus* were most abundant in the collections made from this pond.

There has been not much intra specific variation in the specific collected from different regions of the state. This is probably because of the interconnected water bodies all over this small geographical region.

Rotifer biodiversity of the Indian Subcontinent can be assessed by the presence of 310 species belonging to 24 families out of the 29 families reported all over the world by Koste (1978). Sharma and Michael (1980) reported 241 species belonging to 21 families. Sharma (1991) while studying the geographical distribution of rotifers in India based on earlier works, observed Bengal had the highest number of rotifer species (148), followed by Gujarat with 87 and Orissa with 78, and Kerala had only 24 species. Later Segers *et al* (1994), Segers and Babu (1999) reported 59 species and now the number has been increased to 108 indicating the possibility of more number of species with more intensive collections are made.

The species composition of the rotifers of Kerala shows some similarity with that of Africa. Similar observations were also made by Sharma and Michael (1980), Sharma (1991), De Ridder (1986), Segers *et al* (1994) indicating the zoogeographical relationship between these two continents.

New records of Rotifera from India

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Abstract

Fifteen species of monogonont Rotifera are recorded from India for the first time. These are *Lecane acanthinula* (Hauer), *L. aspasia* Myers, *L. monostyla* (Daday), *L. ruttneri* (Hauer), *L. simonneae* Segers, *Lepadella costatoides* Segers, *L. cf. favorita* Klement, *L. minuta* (Montet), *L. triba* Myers, *Notommata pachyura* (Gosse), *N. saccigera* Ehrenberg, *Sinantherina semibullata* (Thorpe), *Trichocerca chattoni* (De Beauchamp), *T. kostei* Segers and *Taphrocampa selenura* (Gosse). Taxonomic and/or zoogeographic notes are added, when appropriate.

Introduction

The Indian rotifer fauna is relatively well-studied. The earliest records are from West Bengal (Anderson, 1889), but later the number of publications on Indian Rotifera rapidly increased, reporting from different parts of the Indian sub-continent (e.g., Arora, 1966; Brehm, 1950; Dhanapathi, 1978; Edmondson & Hutchinson, 1934; Hauer, 1937a; Naidu, 1967; Nair & Nayar, 1971; Nayar, 1968; Nayar & Nair, 1969; Pasha, 1961; Vasisht & Battish, 1971 and Wulfert, 1966). The species record of Indian Rotifera, as reported in these works, was listed by Sharma & Michael (1980). Recent studies on rotifer assemblages in the Delhi region (Sarma, 1988), provided taxonomic information on the representatives of single genera, occurring in a larger part of India (Sharma, 1987; 1990; Sharma & Sharma, 1987), or dealt with rotifers as part of the complete zooplankton taxocoenosis (Patil & Gouder, 1989). All these

studies resulted in a species record of about 300 from India.

During the present study, which was based on plankton samples collected in different localities from Kerala and Delhi, 15 species of monogonont Rotifera, not previously recorded from India, were found. Some of these which are of special taxonomic or zoogeographic interest, are commented upon.

Material and methods

Rotifers were collected using a 50 µm mesh in different localities of Kerala and Delhi. Samples were preserved in 5% formalin and analyzed using a binocular dissection microscope.

Trophi were isolated by dissolving tissues using NaOCl. All figures were drawn using a camera lucida on a Medilux 12 (Kyowa) microscope. Scanning electron microscopy (SEM) of

Trichocerca kostei was performed with a JEOL JSM-840 microscope following the method of Segers (1993) and Segers & Dumont (1993; see also Sanoamuang & McKenzie, 1993).

Results and discussion

The Rotifera which are new to the Indian fauna are listed in Table 1. Remarkable are the presence in this list of such species as *Notommata pachyura*, *N. saccigera* and *Taphrocampa selenura*. These are all rather common, cosmopolitan (except *N. saccigera*), yet illoricate species. They may have been overlooked in the past, as illoricate species are sometimes not recognised as rotifers, and are extremely difficult to identify in preserved condition. *Lecane monostyla*, *Sinantherina semibullata* and *Trichocerca chattoni* are cosmopolitan species (Koste, 1978; De Ridder, 1981), their appearance in India, therefore, confirms their known area. Except *T. chattoni*, all species listed as new to India are littoral, again demonstrating that the importance of these habitats has been underestimated in faunistical and zoogeographical studies

Table 1. List of species, new to India.

Species	Locality
<i>Lecane acanthinula</i> (Hauer, 1938) (Fig. 1)	Wazirabad, Delhi
<i>L. apasia</i> Myers, 1917 (Fig. 2)	Wazirabad, Delhi
✓ <i>L. monostyla</i> (Daday, 1897)	Athirapilly, Kerala
✓ <i>L. rutneri</i> Hauer, 1938 (Fig. 3)	Athirapilly, Kerala
✓ <i>L. simonneae</i> Segers, 1993 (Fig. 4)	Mattom, Kerala
<i>Lepadella costatoides</i> Segers, 1992 (Fig. 6)	Mattom; Irinjalakuda, Kerala
<i>L. cf. favorita</i> Klement, 1962 (Figs 7a-7-c)	Mattom, Kerala
<i>L. minuta</i> (Montet, 1918) (Fig. 9)	Mattom, Kerala
<i>L. triba</i> Myers, 1934 (Fig. 8)	Mattom, Kerala
<i>Notommata pachyura</i> (Gosse, 1886) (Fig. 10) (both f. <i>typica</i> and f. <i>triangulata</i> Kirkman, 1906)	Mattom; Irinjalakuda, Kerala
<i>N. saccigera</i> Ehrenberg, 1832 (Fig. 11)	Mattom, Kerala
<i>Sinantherina semibullata</i> (Thorpe, 1889)	Peechi, Kerala
<i>Trichocerca chattoni</i> (De Beauchamp, 1907)	Hydrabad, Andhra Pradesh
<i>T. kostei</i> Segers, 1993 (Figs 12a-f)	Mattom; Irinjalakuda, Kerala
<i>Taphrocampa selenura</i> (Gosse, 1887)	Bhimital, Uttar Pradesh

(Segers *et al.*, 1991; 1992). Some rare or otherwise interesting species are the following:

Lecane acanthinula (Hauer, 1938)

Fig. 1

Material: Five specimens in a sample from Wazirabad (New Delhi, 2 January 1987)

L. acanthinula was described from two localities in Java (Indonesia), and was rediscovered recently in a series of samples from Salalah, Oman (Segers & Dumont, 1993). Our record is the third of this apparently rare species. Judging from the few records available, *L. acanthinula* is an oriental species.

Lecane aspasia Myers, 1917

Fig. 2

Material: Four specimens collected in Wazirabad (New Delhi, 28 November 1985)

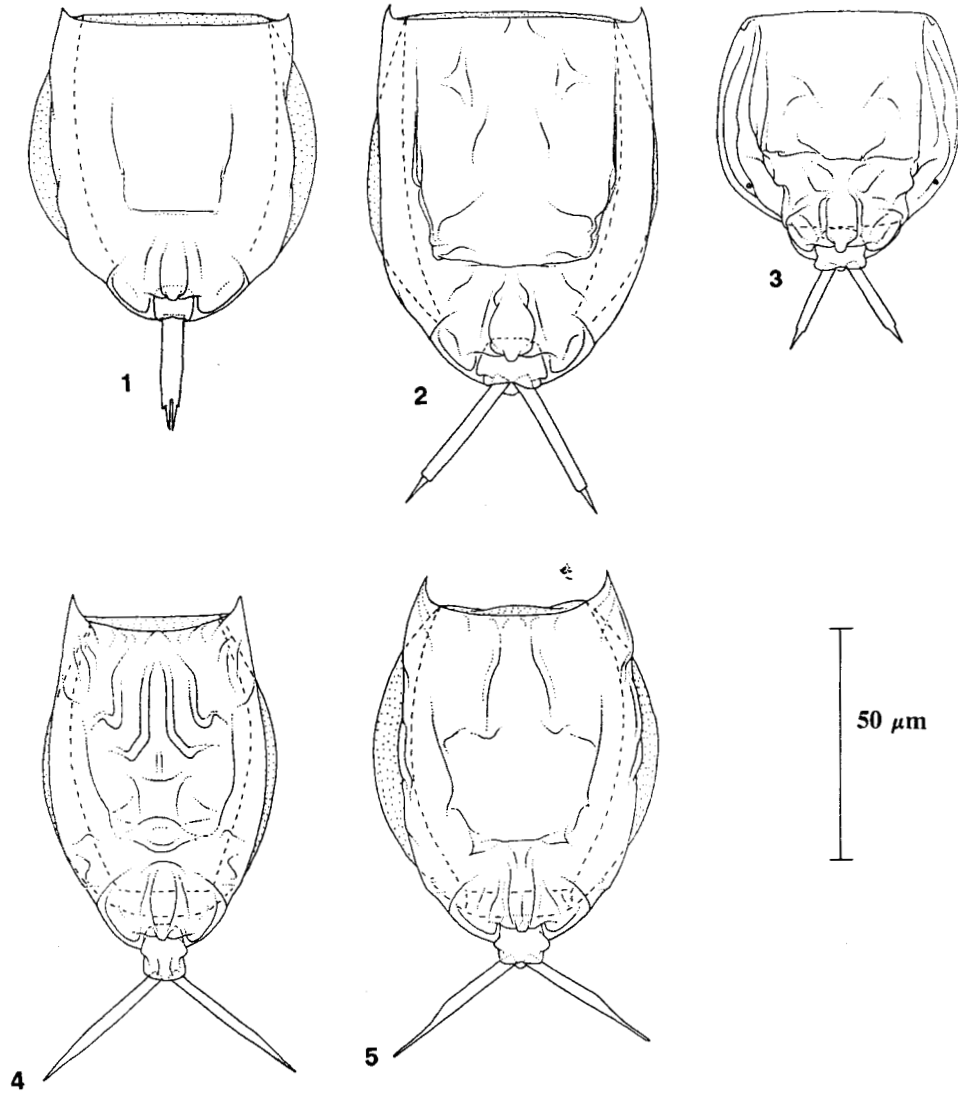
The species is relatively rare, but appears to be widely distributed. Illustrated records are from California (Myers, 1917; Haring & Myers, 1926), Sumatra (Hauer, 1937b; 1938) and Hungary (Varga, 1939). The Australian record by Bērziņš' (1982) may concern a misidentification of, presumably, *L. haliclysta* Haring & Myers, judging from the poor figure. The species was collected recently in Lake Globoku (Russia) by one of us (HS). A defined range can at present not be provided for the species.

Lecane rutneri Hauer, 1938

Fig. 3

Material: Ten specimens from Athirapilly (Kerala, 2 April 1991).

Records of this species are from South America (Brazil), Africa (Madagascar and Nigeria: Segers *et al.*, 1993), Arabia, Australia and Indonesia (see Segers & Dumont, 1993). We can add the Philippines (leg. S. M. Torralba) and India to this list. These records point out that *L. rutneri* is pantropical/pansubtropical.



Figs 1–5. *Lecane* spp., ventral view. 1: *L. acanthinula* (Hauer, 1938); 2: *L. aspasia* Myers, 1917; 3: *L. rutneri* Hauer, 1938; 4: *L. simonneae* Segers, 1993; 5: *L. rhytida* Harring & Myers, 1926 (Nicaraguan specimen).

Lecane simonneae Segers, 1993

Fig. 4

Material: Four specimens from a pond at Mattom (Kerala, 9 August 1991).

L. simonneae was described only recently, and was listed as an endemic to the floodplain of the river Niger by Segers *et al.* (1993). The presence of the species in samples from India suggests that it may have been overlooked, and possibly confused with the closely resembling *L. rhytida*

(Fig. 5: Nicaraguan specimen). The two species can, however, be separated by their differently shaped foot pseudosegment and toes.

Lepadella costatoides Segers, 1992

Fig. 6

Material: Numerous specimens from Mattom (Kerala, 9 August 1991), and from Irinjalakuda (Kerala, 9 September 1991).

The species was only recently differentiated from the similar *L. costata* Wulfert. Segers *et al.* (1992) record the species from Africa, Arabia, South America and Europe. Our record is the first for Asia. As the Belgian record concerns captures in a hothouse (Segers *et al.*, 1991), the species may be a pan(sub)tropical warm stenotherm.

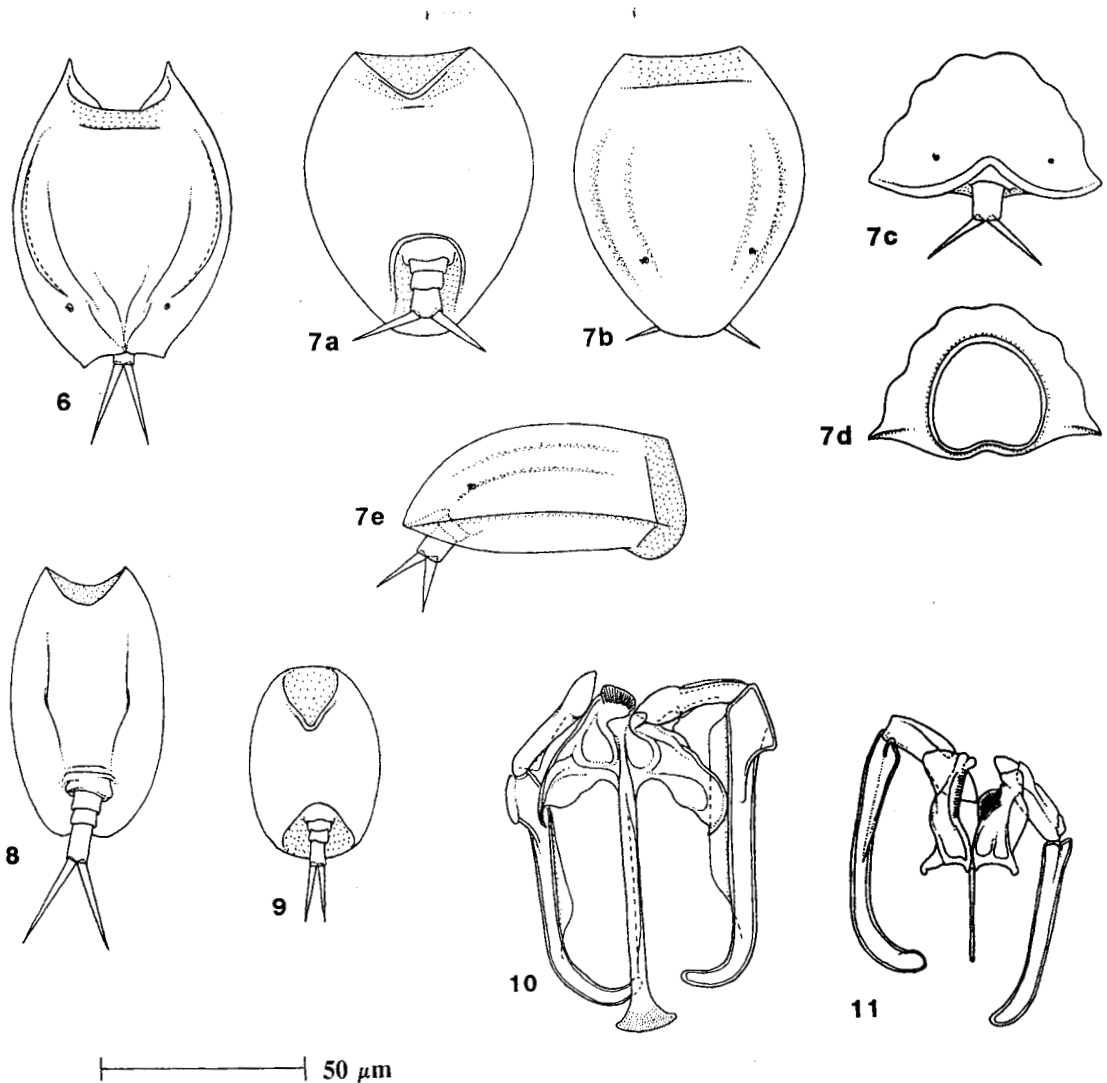
One of the Indian specimens (Fig. 6) had a slightly asymmetric posterior margin of the foot

aperture, reminding of, but not as pronounced as in *L. costatoides* f. *christineae*.

Lepadella cf. *favorita* Klement, 1962
Figs 7a–e

Material: A single specimen from Mattom (Kerala State, 9 August 1991).

Lepadella favorita has not been seen again since

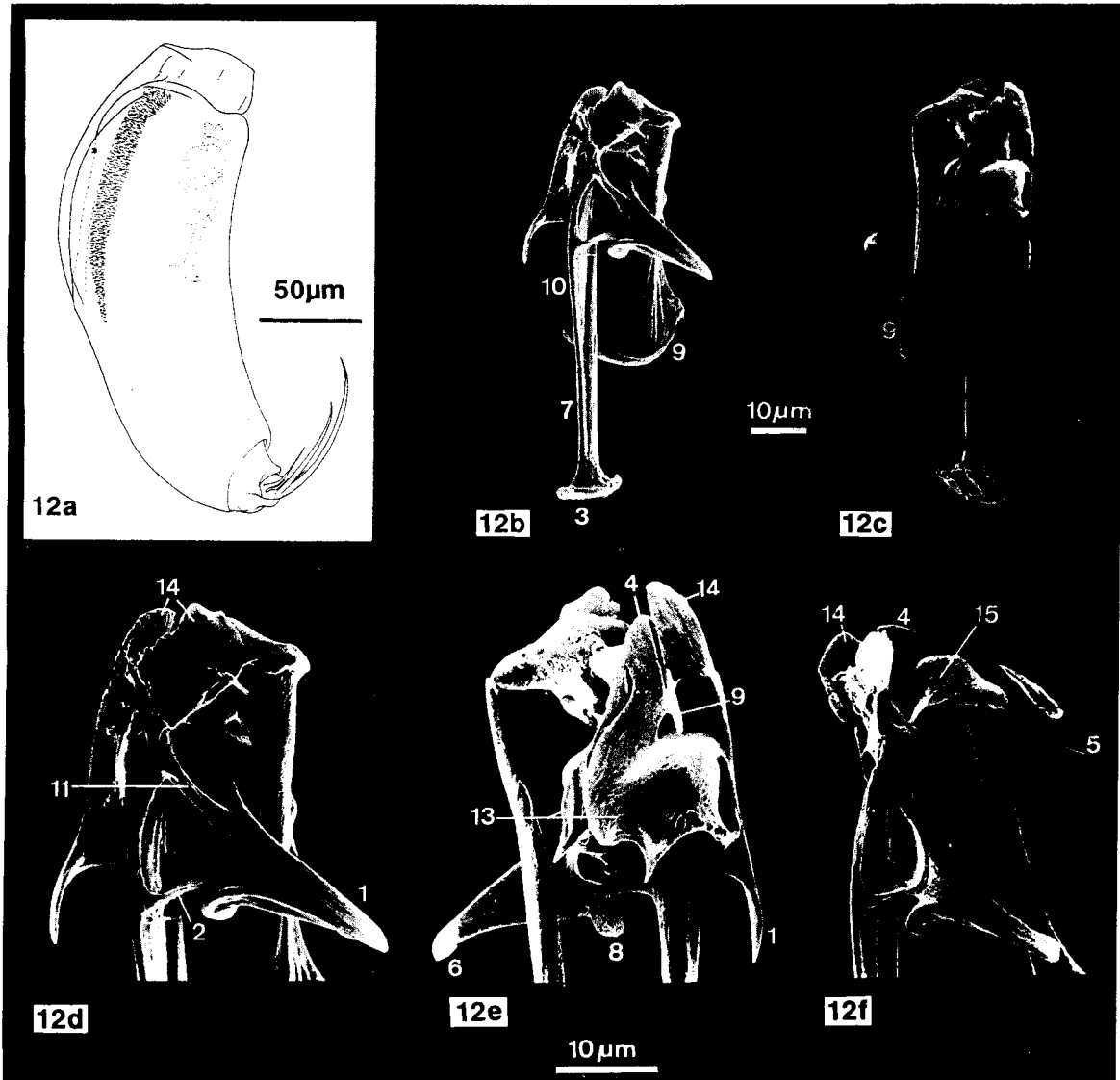


Figs 6–11. *Lepadella* spp. 6: *L. costatoides* Segers, 1992, dorsal view; 7a–e: *L. cf. favorita* Klement, 1962, a: ventral view, b: dorsal view, c: caudal view, d: frontal view, e: lateral view; 8: *L. triba* Myers, 1934; 9: *L. minuta* (Montet, 1918). Figs 10–11. *Notommata* spp., trophi. 10: *Notommata pachyura* (Gosse, 1886), ventral view; 11: *N. saccigera* Ehrenberg, 1832, dorsal view.

its description. Our specimen differs in a number of aspects from Klement's (1962) description, but, as the animal does not resemble any of the other

known species of *Lepadella*, we tentatively identify it as such.

The specimen has a differently shaped head



Figs 12a–f. *Trichocerca kostei* Segers, 1993. a: habitus, lateral view; b–f: trophi, S.E.M. photographs. b: ventrolateral view; c: dorsal view; d: detail, ventrolateral view; e: id., dorsal view; f: id., lateral view.

- | | |
|--|-----------------------------|
| 1: alulus | 9: manubrium |
| 2: basal ligament | 10: median crest of fulcrum |
| 3: basal plate of fulcrum | 11: proximal ligament |
| 4: dorsal proximal projection of ramus | 12: ramus |
| 5: dorsal projection of left supramus | 13: supramus |
| 6: external branch of left alulus | 14: suprauncus |
| 7: fulcrum | 15: uncus |
| 8: inner branch of left alulus | |

aperture (with collar), a more egg-shaped and higher lorica and six instead of five shallow, rounded ridges on the lorica, as reported by Klement (1962). The dimensions of the present animal are as follows (in μm): Lorica length 70 (60), lorica width 56 (47), lorica height 39 (27), head aperture width 28 (13), ventral sinus depth 11 (13.5), foot aperture length 24 (16), toe length 16 (10) (of Klement between brackets).

T. kostei Segers, 1993
Figs 12a–f

Material: Numerous specimens from Mattom (Kerala State, 9 August 1991), and from Irinjalakuda (Kerala, 9 September 1991).

T. kostei was described from Nigeria, but was also recorded from Australia (Segers, 1993). The present records extends the known area of this species to India, making it a paleo(sub)tropical species.

As numerous specimens of *T. kostei* were available, a S.E.M.-study of its trophus was performed in order to provide a more detailed description of the species.

T. kostei is especially characterised by its strongly asymmetric trophus. The fulcrum (Figs 12b, c) is long, and is terminally dilated forming a basal plate. Ventrally, there is a median crest starting from about midway to the tip of the fulcrum. It is connected to the left ramus by a basal and a proximal ligament. The right manubrium and uncus (Fig. 12e) are vestigial, and can only be seen as a short rod, projecting from between a ventral (fused supraunci) and a dorsal proximal projection of the right ramus, in dorsal view. The right alulus (Fig. 12e) is straight and points downwards. An external striation of the fused right supraunci is less evident in S.E.M. than using light microscopy, a striation of the inner side (Fig. 12d), on the other hand, is more apparent. The left ramus (Fig. 12d) of the Indian specimens has a less differentiated suprauncus than in the Nigerian material, although the general shape is the same. The left alulus (Figs 12d–f) is bifid, with an elongate, outwardly directed

external branch, having a curved tip and a rounded inner branch. The left uncus (Fig. 12f) appears robust, and lies between the suprauncus and an antero-dorsal projection of the left ramus. The left manubrium (Figs 12b, c) is strong and has a conspicuous, large terminal crutch, bearing an external lamella.

Suprarami (Figs 12c, e) are present both left and right, the right one is most conspicuous. Both bear a sharp distal projection, the left one has an additional sharp, dorsal projection (Fig. 12f).

The external morphology as represented in Fig. 12a appears different from the Nigerian specimens. This, however, resulted from a slightly different orientation of the animal drawn, rather than being taxonomically significant.

Conclusion

Of the fifteen taxa, newly recorded from India here, the majority are littoral, and cosmopolitan or cosmopolitan. *Lecane acanthinula* is oriental, *T. kostei* may be a warm-stenothermal old world species, whereas the area of *L. aspasia*, *L. simonae* and of *Lepadella* cf. *favorita* is insufficiently known.

After having abandoned the 'potential cosmopolitanism' (Jennings, 1900; Haring & Myers, 1928, Rutner-Kolisko in Dumont, 1980) for all Rotifera, recent zoogeographical studies stressed the importance of two categories only (endemic versus cosmopolitan species: Dumont, 1983; Shiel, 1981; Shiel & Koste, 1986). The area of some of the species treated above illustrates that rotifer zoogeography is richer than was previously thought, in that more complex and/or circumscribed distributional patterns, although being rare, definitely occur (see Pejler, 1977; Segers *et al.*, 1993). A more profound study of the taxonomically difficult, but relatively diverse groups of littoral rotifers promises to be most rewarding in trying to reach definitive conclusions on the global distribution patterns of rotifers.

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246A

PLATES

Plate -1

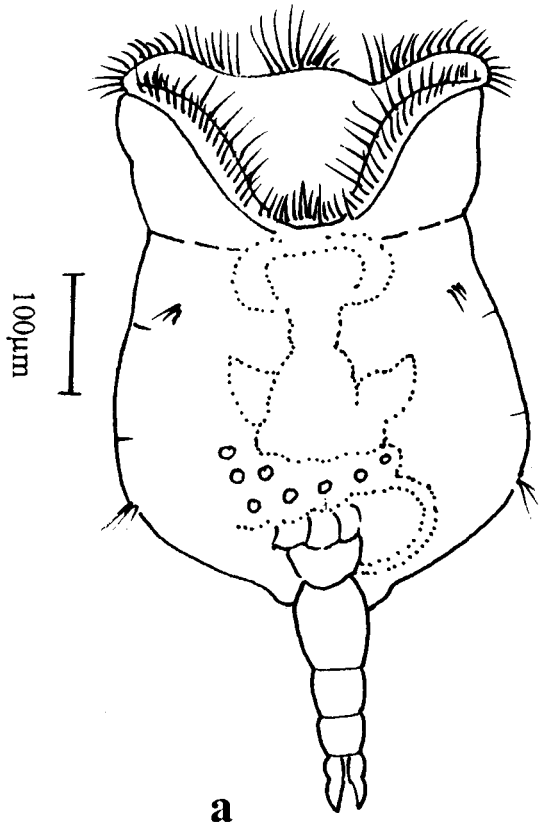
Figs:

a . *Epiphanes brachionus* (Ehrenberg)

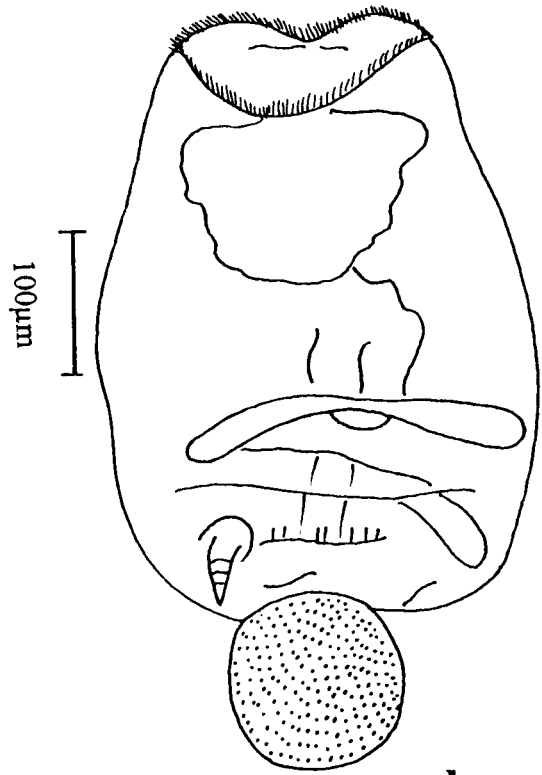
b . *Epiphanes clavulata* (Ehrenberg)

c . *Epiphanes macrourus* (Barrois & Daday)

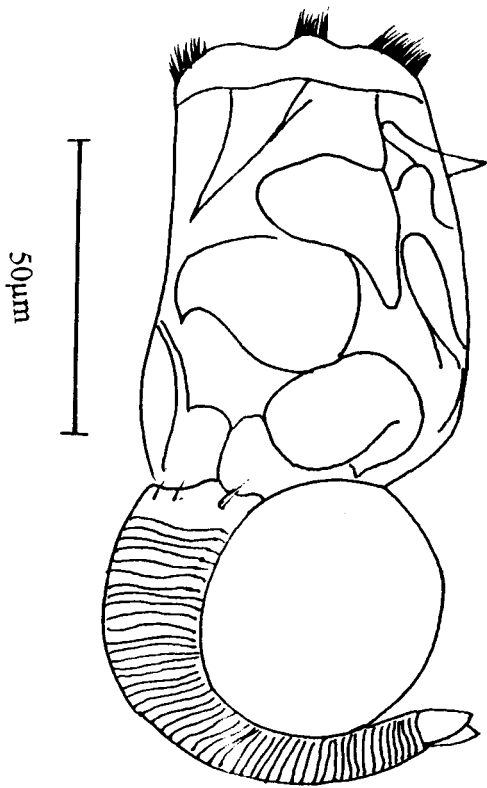
d . *Proalides subtilis* Rodewald



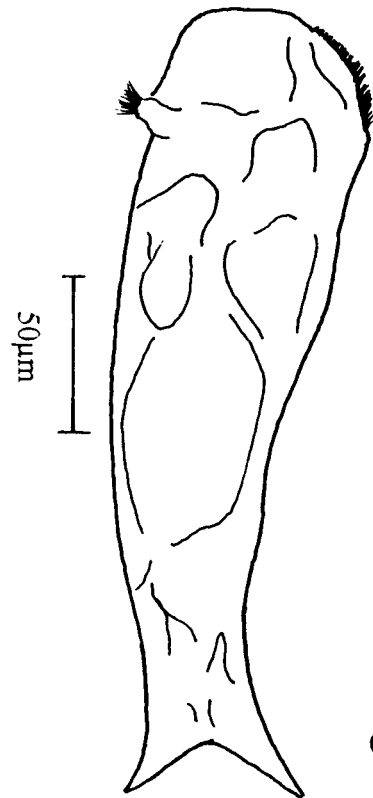
a



b



c



d

Plate-1

Plate -2

Figs:

a . *Anuraeopsis coelata* de Beauchamp

b . *Anuraeopsis fissa* (Gosse) with egg, lateral

c . *Anuraeopsis fissa* (Gosse) dorsal

d . *Brachionus angularis* Gosse , dorsal

e . *Brachionus bidentatus* f. *inermis* (Rousselet) ,dorsal

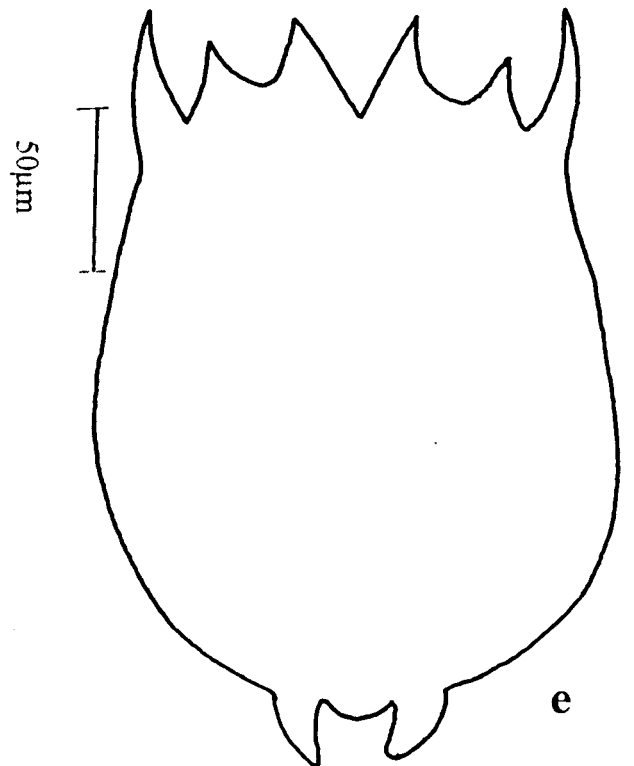
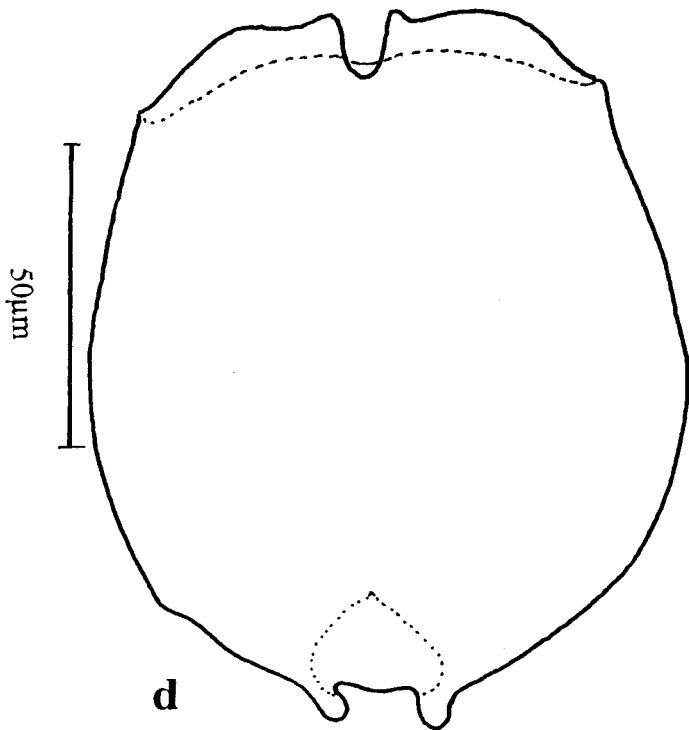
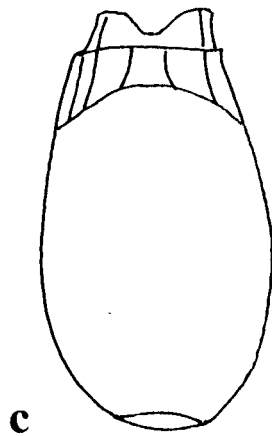
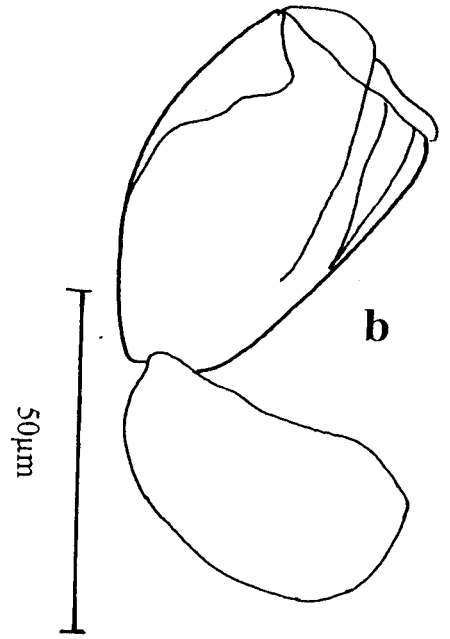
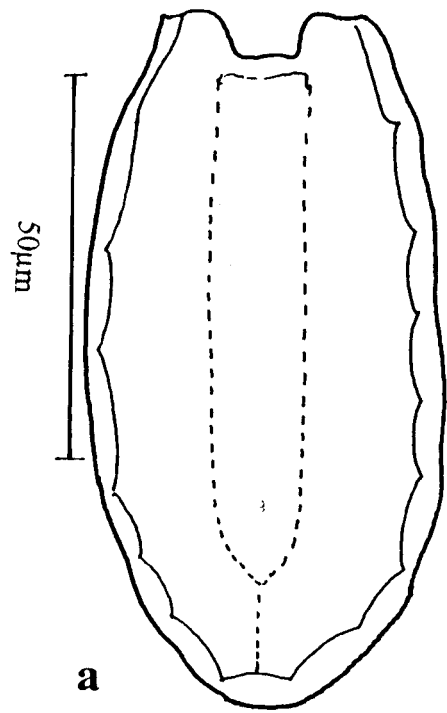


Plate-2

Plate –3

Figs:

- a . *Brachionus calyciflorus* Pallas , dorsal.
- b . *Brachionus caudatus* Barrois & Daday, dorsal.
- c. *Brachionus donneri* Brehm, with sheath.
- d. *Brachionus donneri* Brehm, dorsal.
- e. *Brachionus diversicornis* (Daday) ,dorsal.

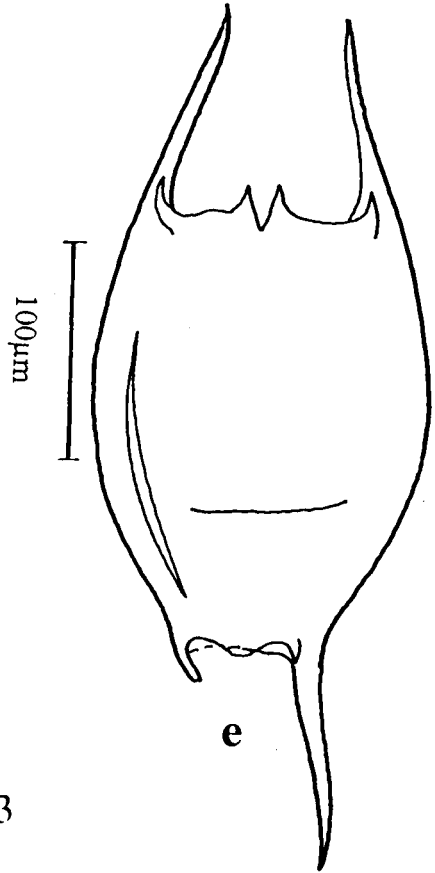
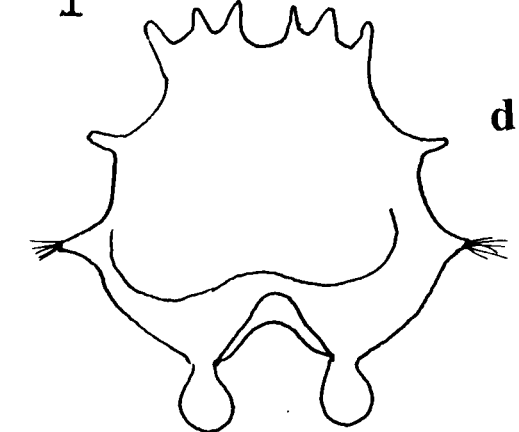
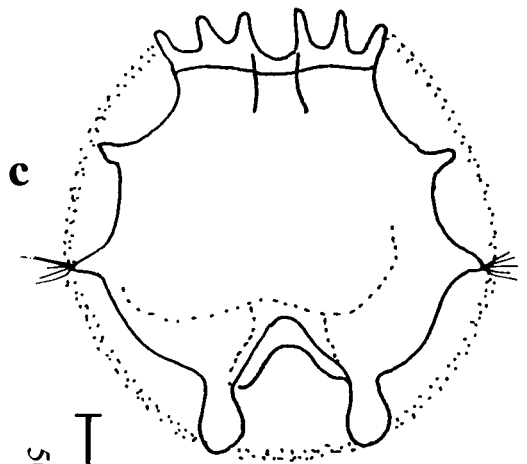
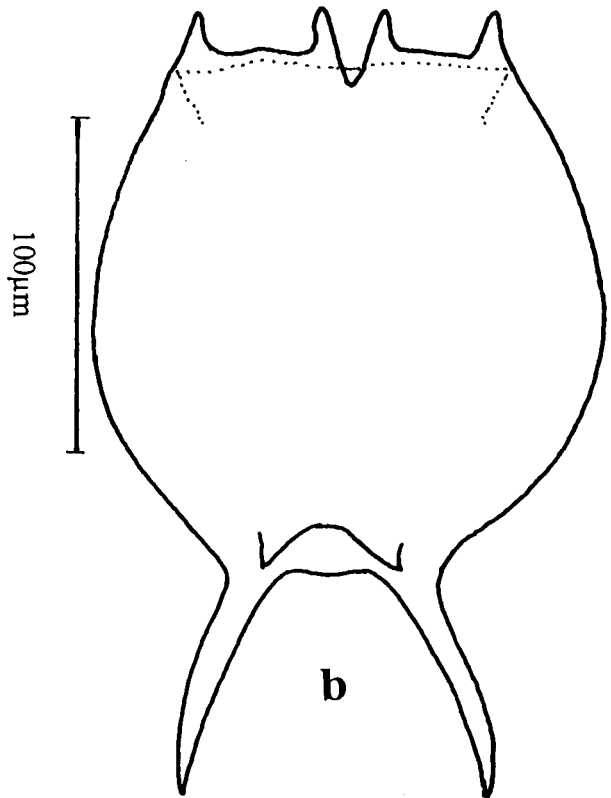
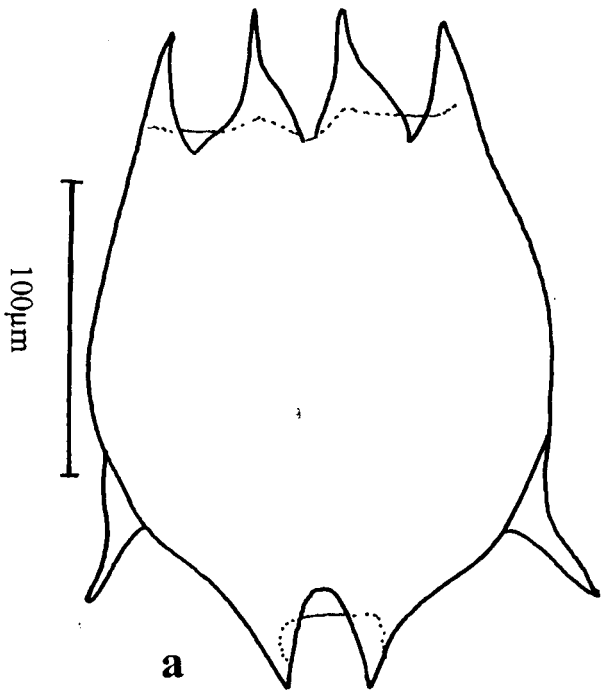


Plate-3

Plate -4

Figs:

a . *Brachionus durgae* Dhanapathi

b . *Brachionus falcatus* Zacharias

c . *Brachionus forficula* Wierzejski

d . *Brachionus plicatilis* O.F. Muller

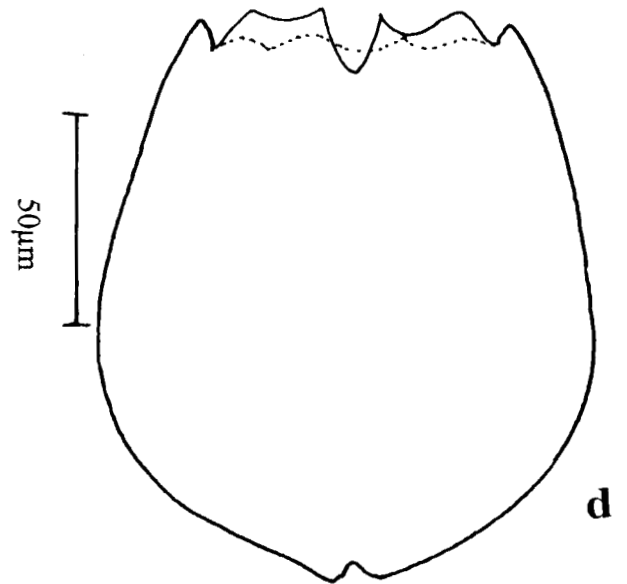
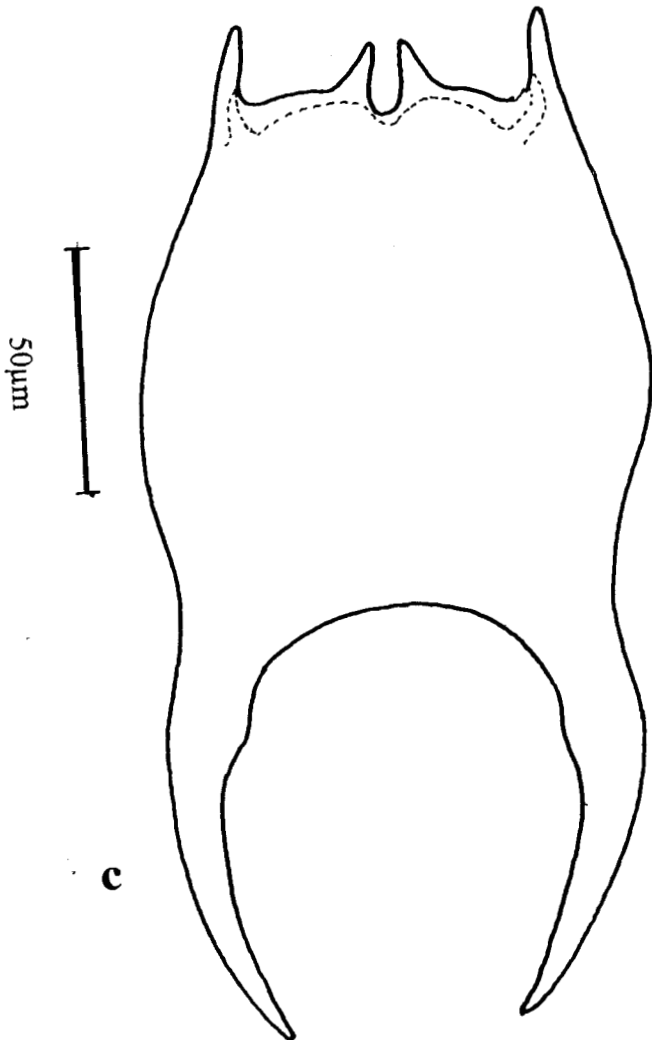
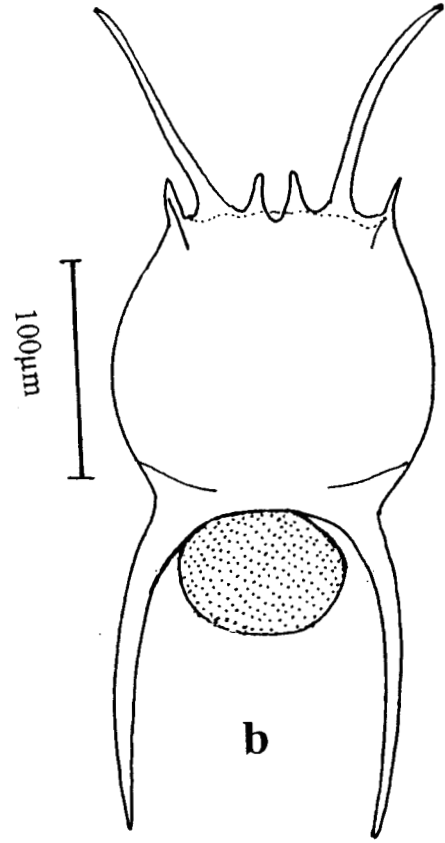
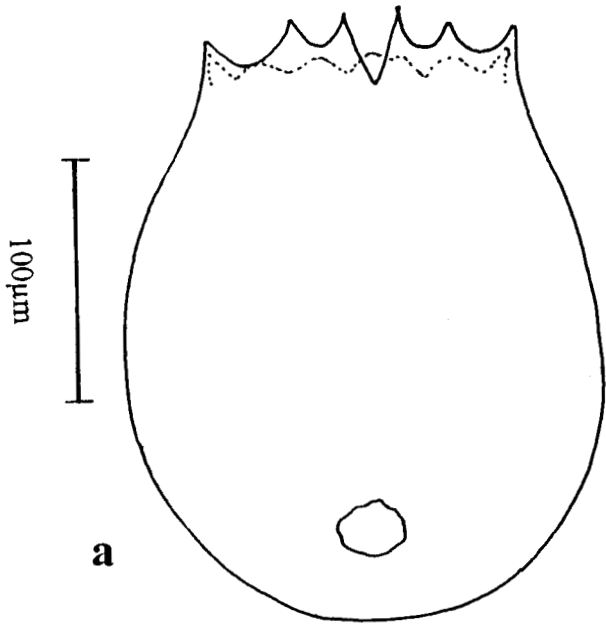


Plate-4

Plate -5

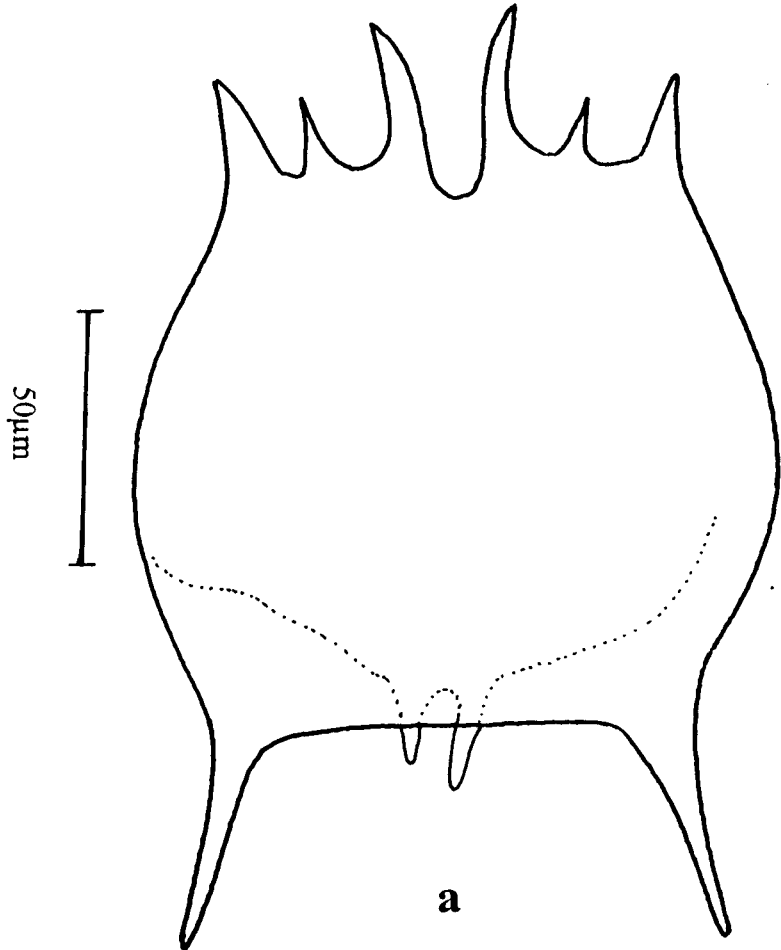
Figs:

a . *Brachionus quadridentatus* Hermann

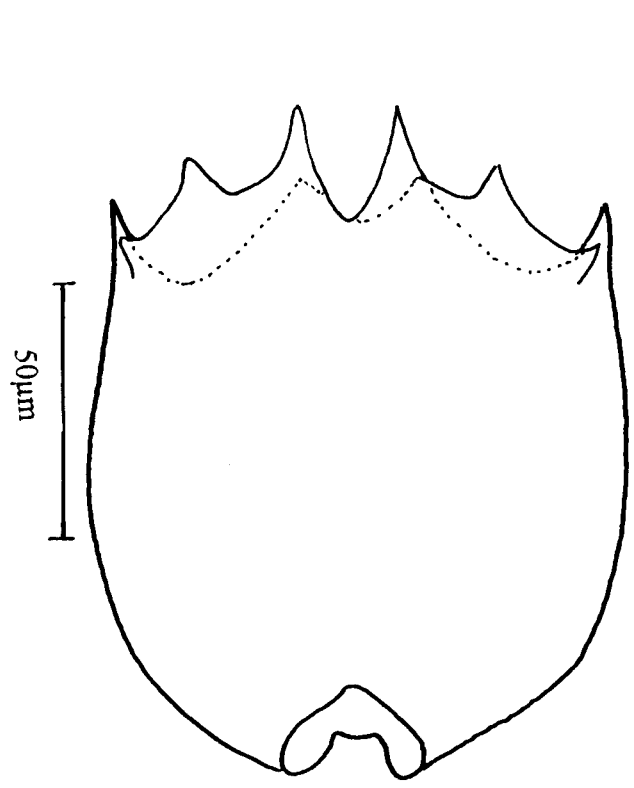
b . *Brachionus rubens* Ehrenberg

c . *Brachionus urceolaris* O.F. Muller

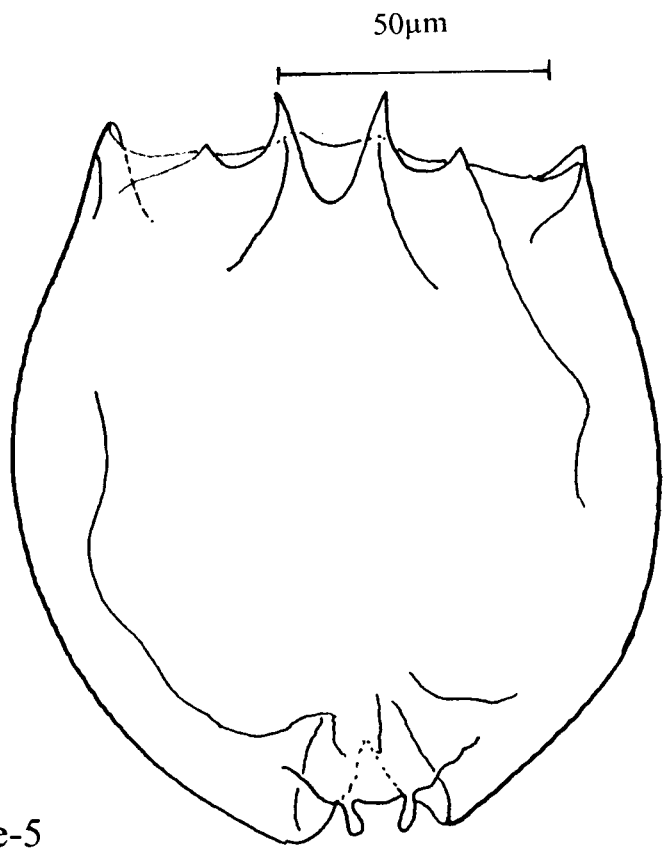
K



a



b



c

Plate-5

Plate -6

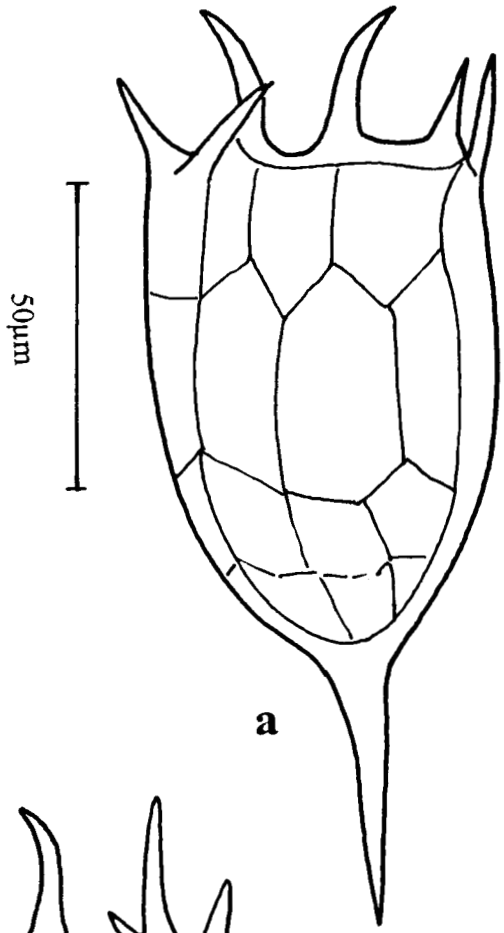
Figs:

a . *Keratella cochlearis* (Gosse)

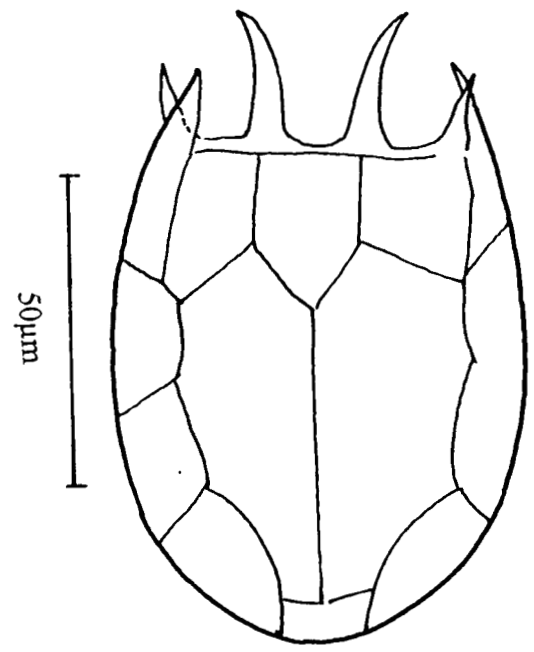
b . *Keratella tecta* (Gosse)

c . *Keratella tropica* ((Apstein)

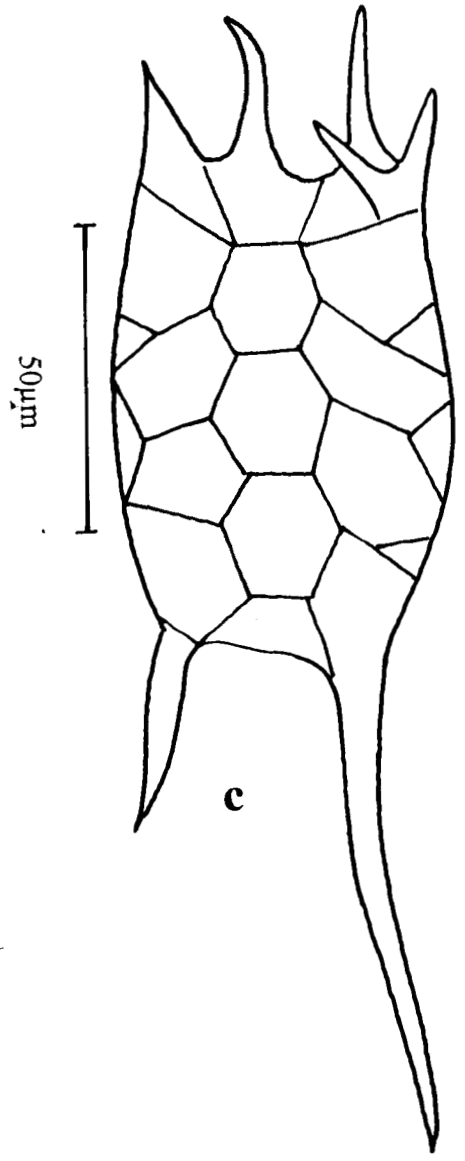
d . *Keratella tropica* ((Apstein) ,lateral



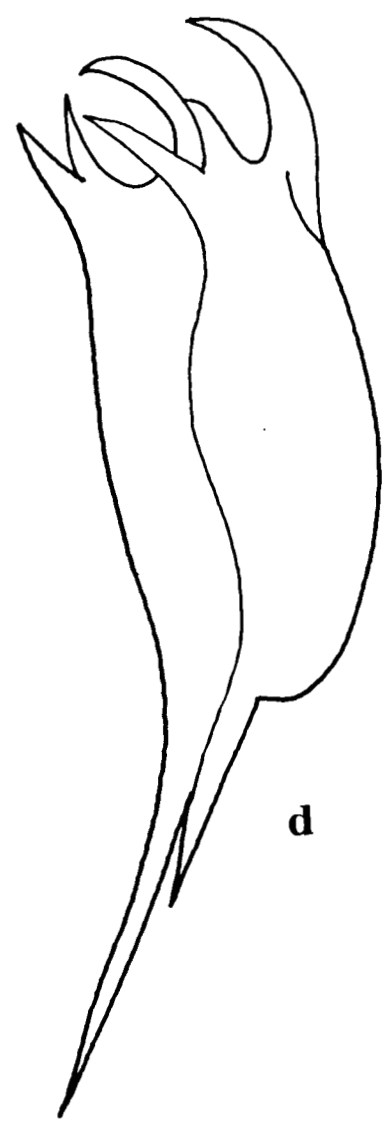
a



b



c



d

Plate-6

Plate-7

Figs:

- a. *Keratella procurva* (Thorpe)
- b. *Plationus patulus* O.F.Müller

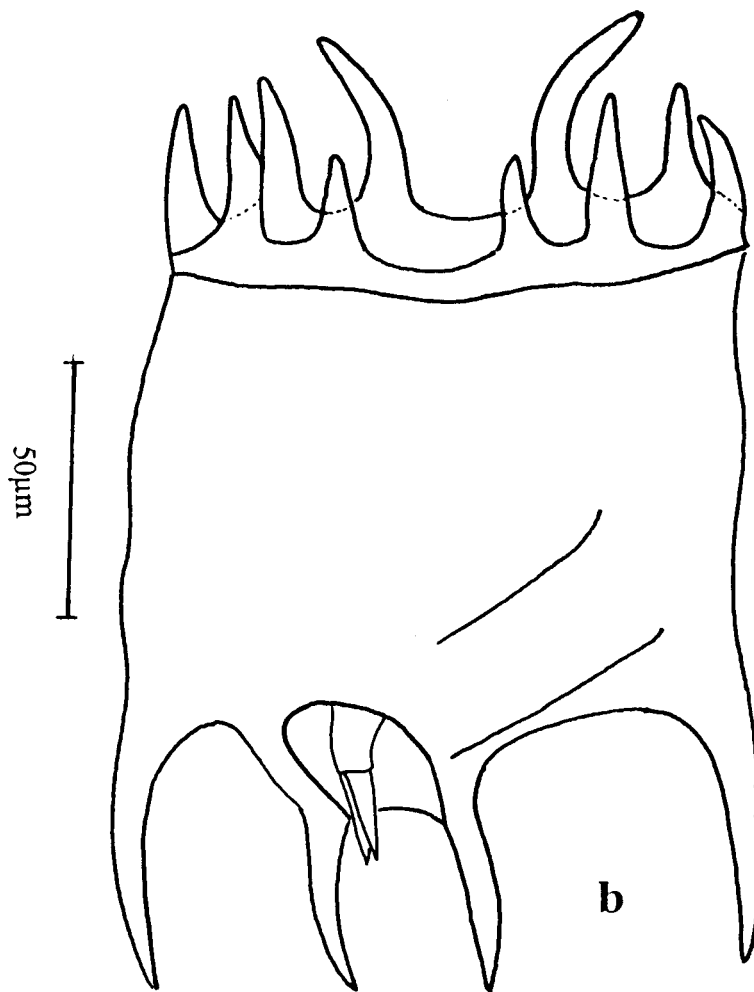
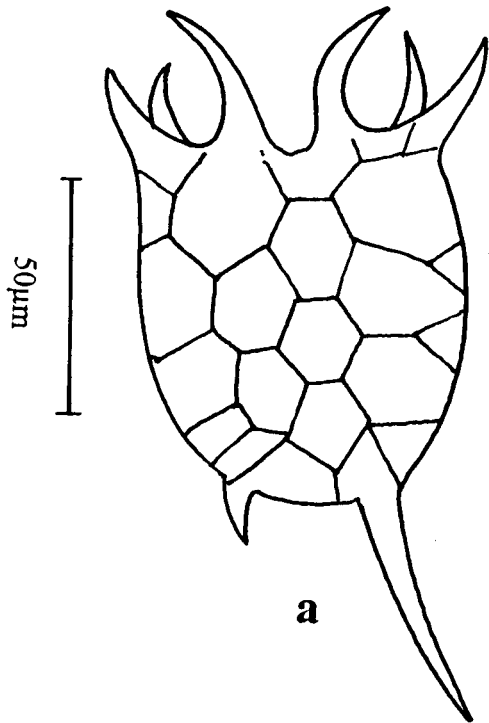


Plate -8

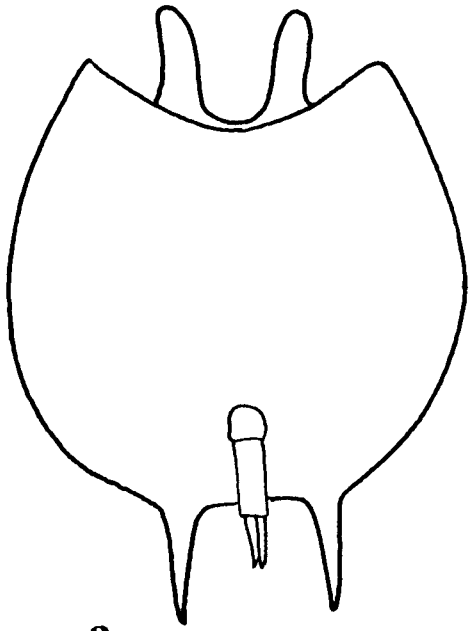
Figs:

a . *Platyias quadricornis* (Ehrenberg) dorsal

b . *Platyias quadricornis* (Ehrenberg) ventral

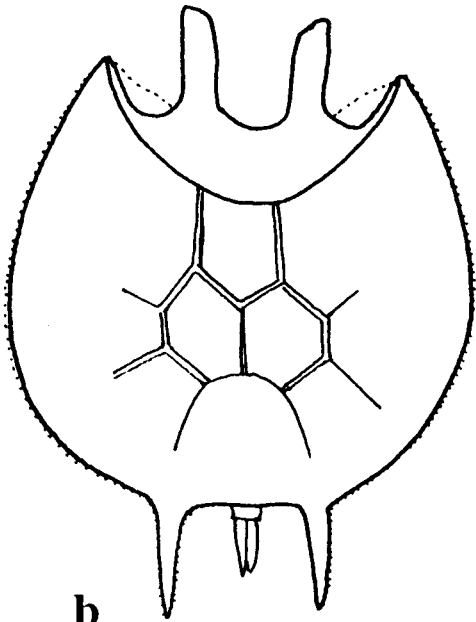
c. *Platyias leloupi* Gillard, dorsal

d. *Platyias leloupi* Gillard, ventral

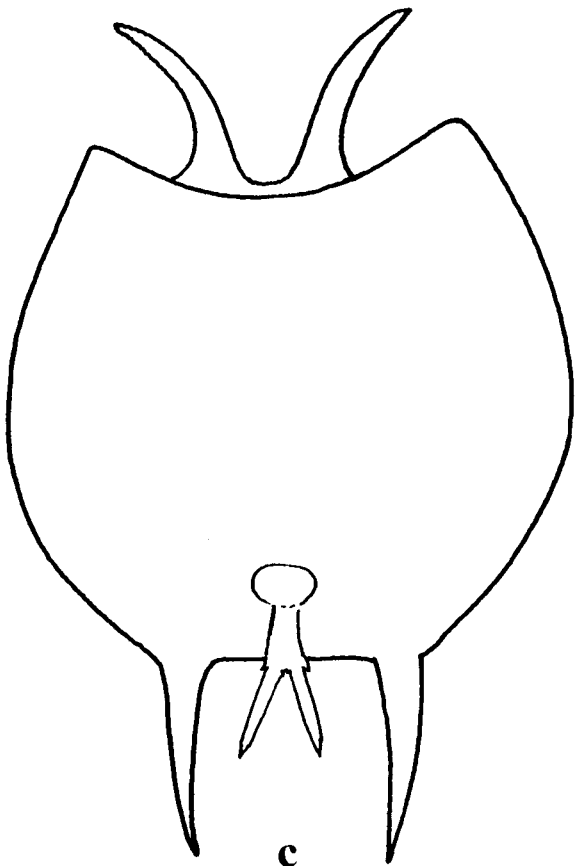


a

100µm

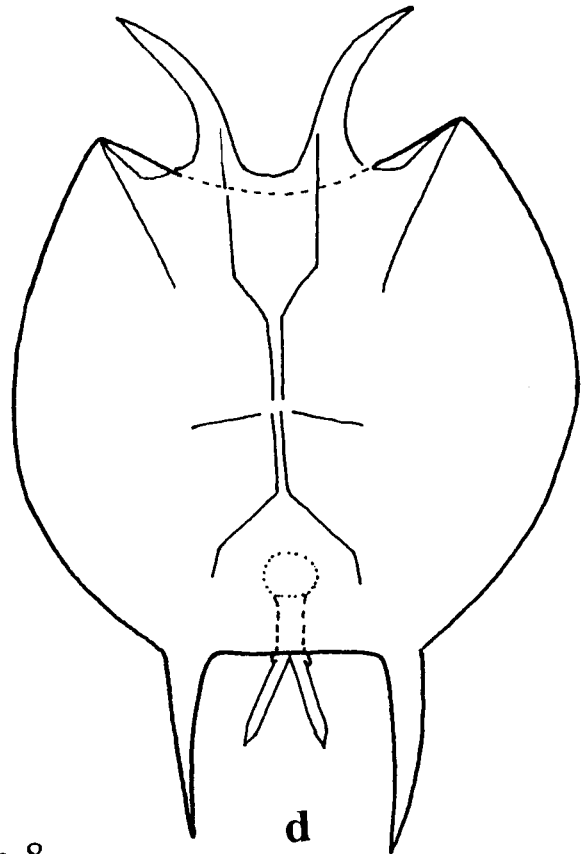


b



c

100µm



d

Plate-8

Plate -9

Figs:

- a . *Dipleuchlanis propatula* (Gosse), ventral
- b . *Dipleuchlanis propatula* (Gosse), dorsal
- c . *Dipleuchlanis propatula* (Gosse),lorica cross-section
- d . *Euchlanis dilatata* Ehrenberg
- e . *Euchlanis dilatata* Ehrenberg, lorica cross-section

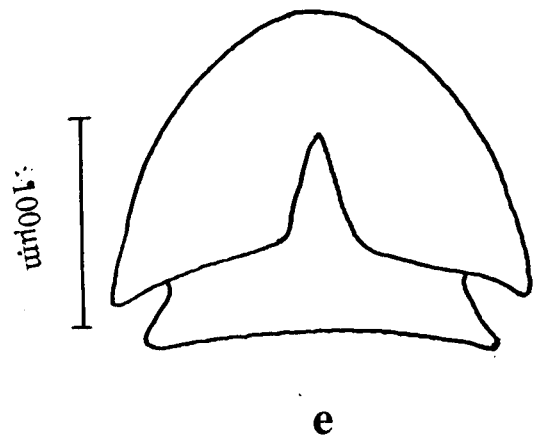
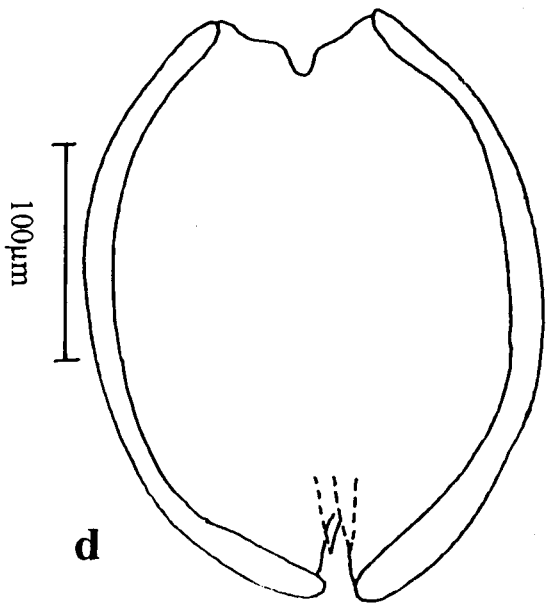
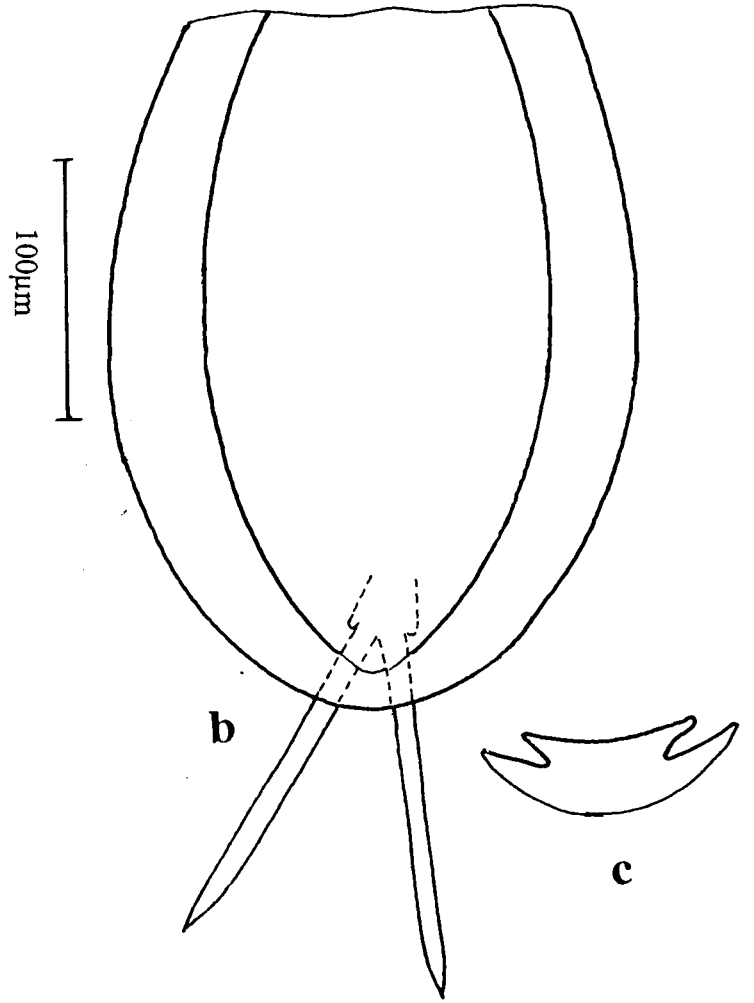
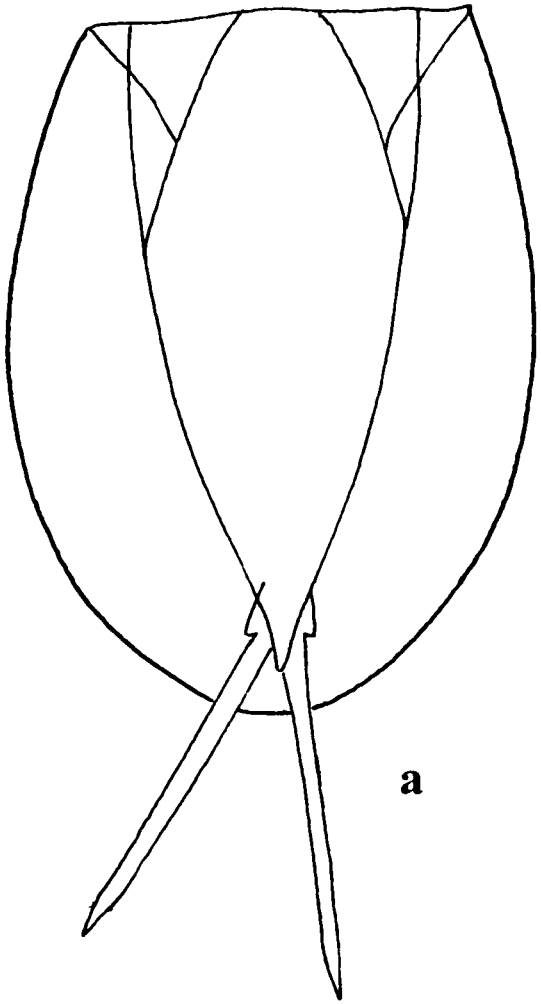
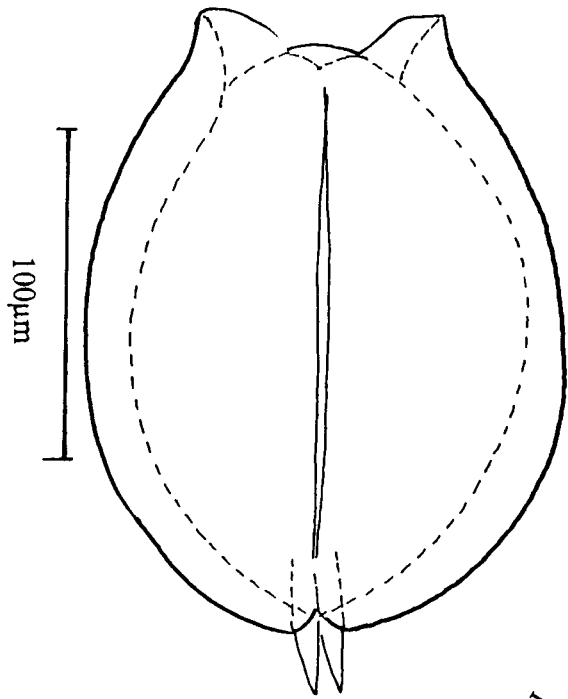


Plate-9

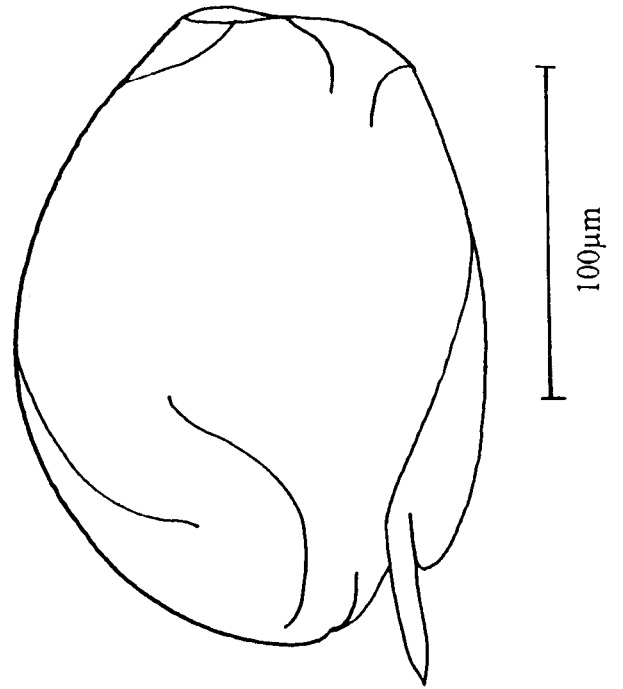
Plate -10

Figs:

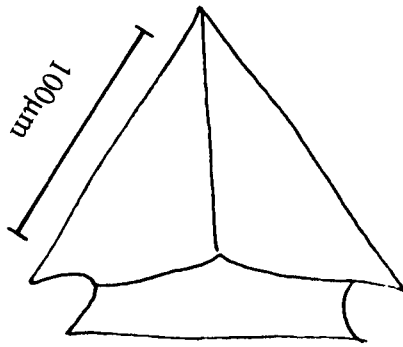
- a . *Euchlanis incisa* Carlin, dorsal
- b . *Euchlanis incisa* Carlin, lateral
- c . *Euchlanis incisa* Carlin, lorica cross-section
- d . *Tripleuchlanis plicata* (Levander),dorsal
- e . *Tripleuchlanis plicata* (Levander),lateral



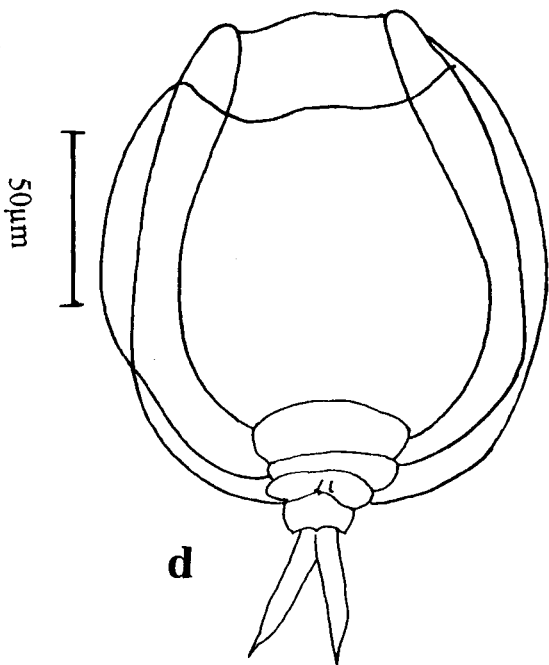
a



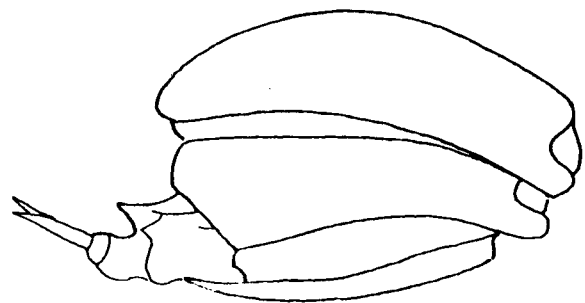
b



c



d



e

Plate-10

Plate -11

Figs:

a . *Lophocharis salpina* (Ehrenberg)

b . *Mytilina acanthophora* Hauer

c . *Mytilina bisulcata* (Lucks)

d . *Mytilina ventralis* (Ehrenberg)

W

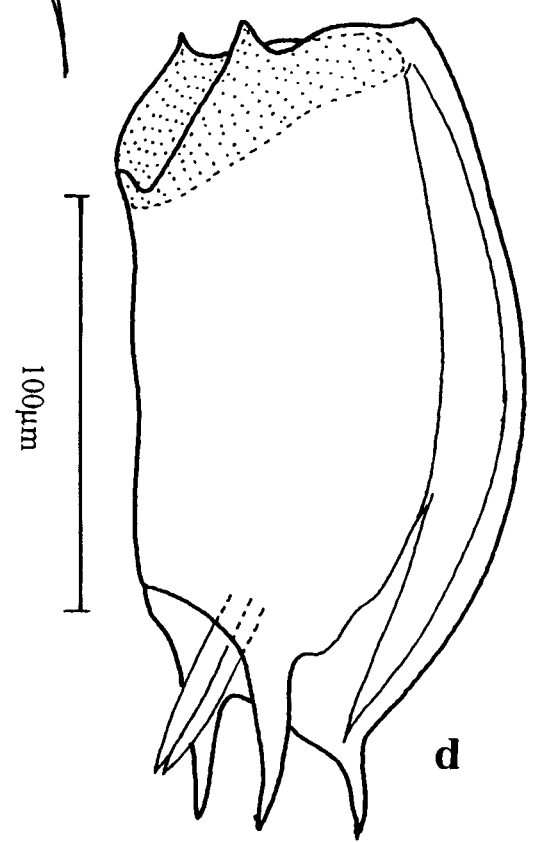
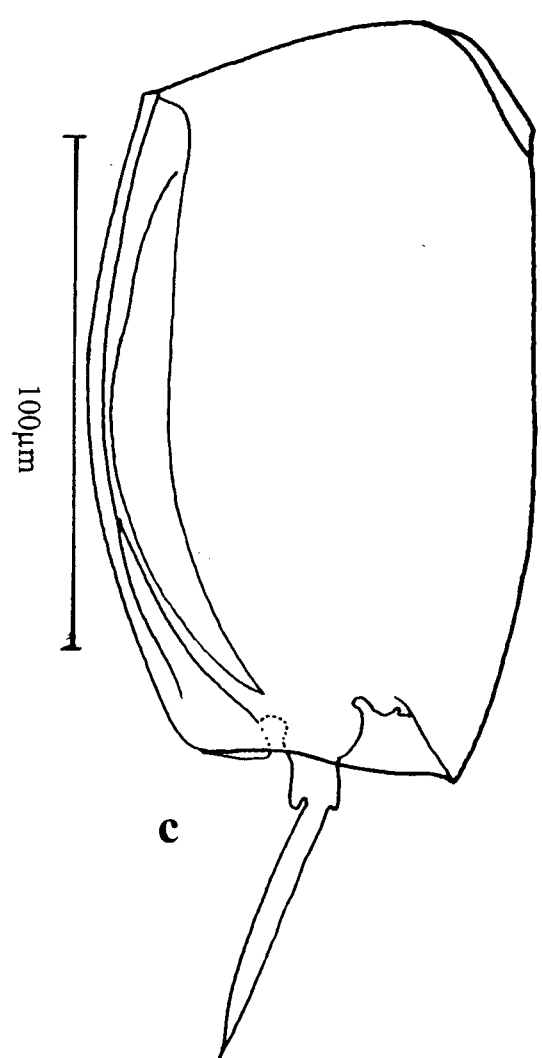
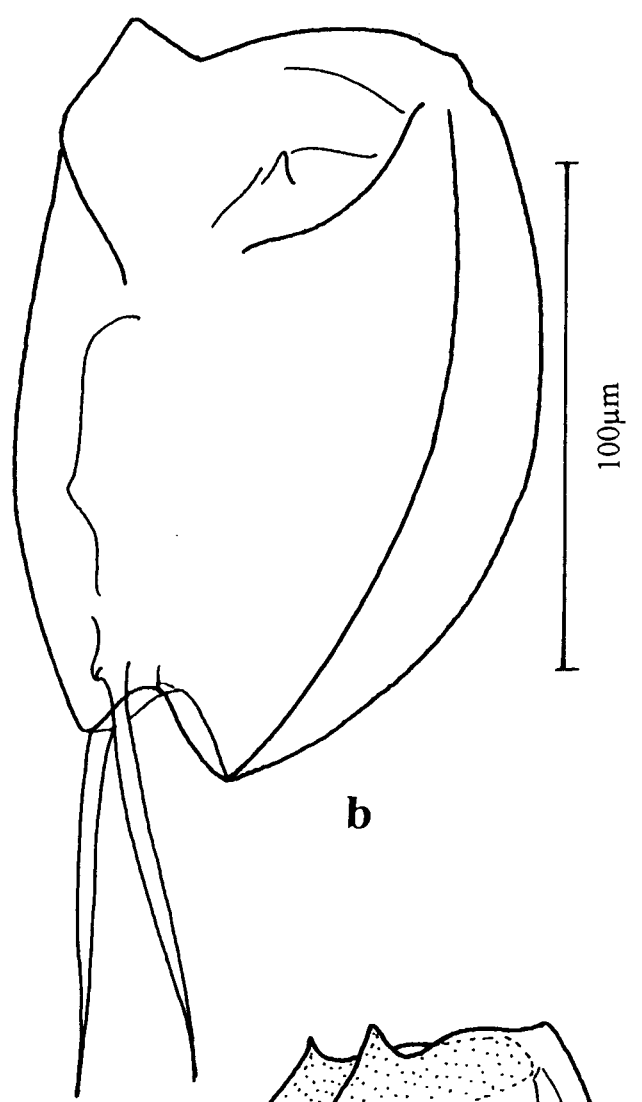
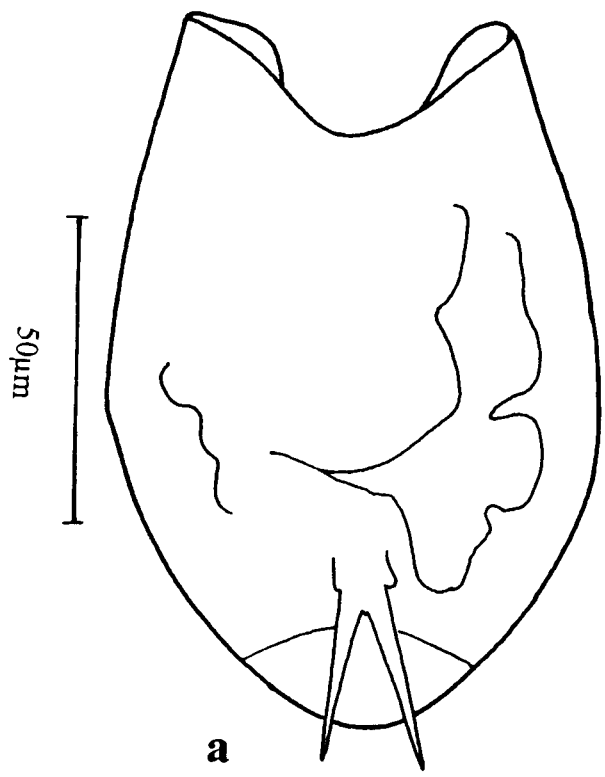


Plate-11

Plate -12

Figs:

- a . *Macrochaetus collinsi* (Gosse)
- b . *Macrochaetus danneli* Koste & Sheil
- c . *Macrochaetus sericus* (Thorpe)
- d . *Macrochaetus subquadratus* Perty
- e . *Trichotria tetractis* (Ehrenberg)

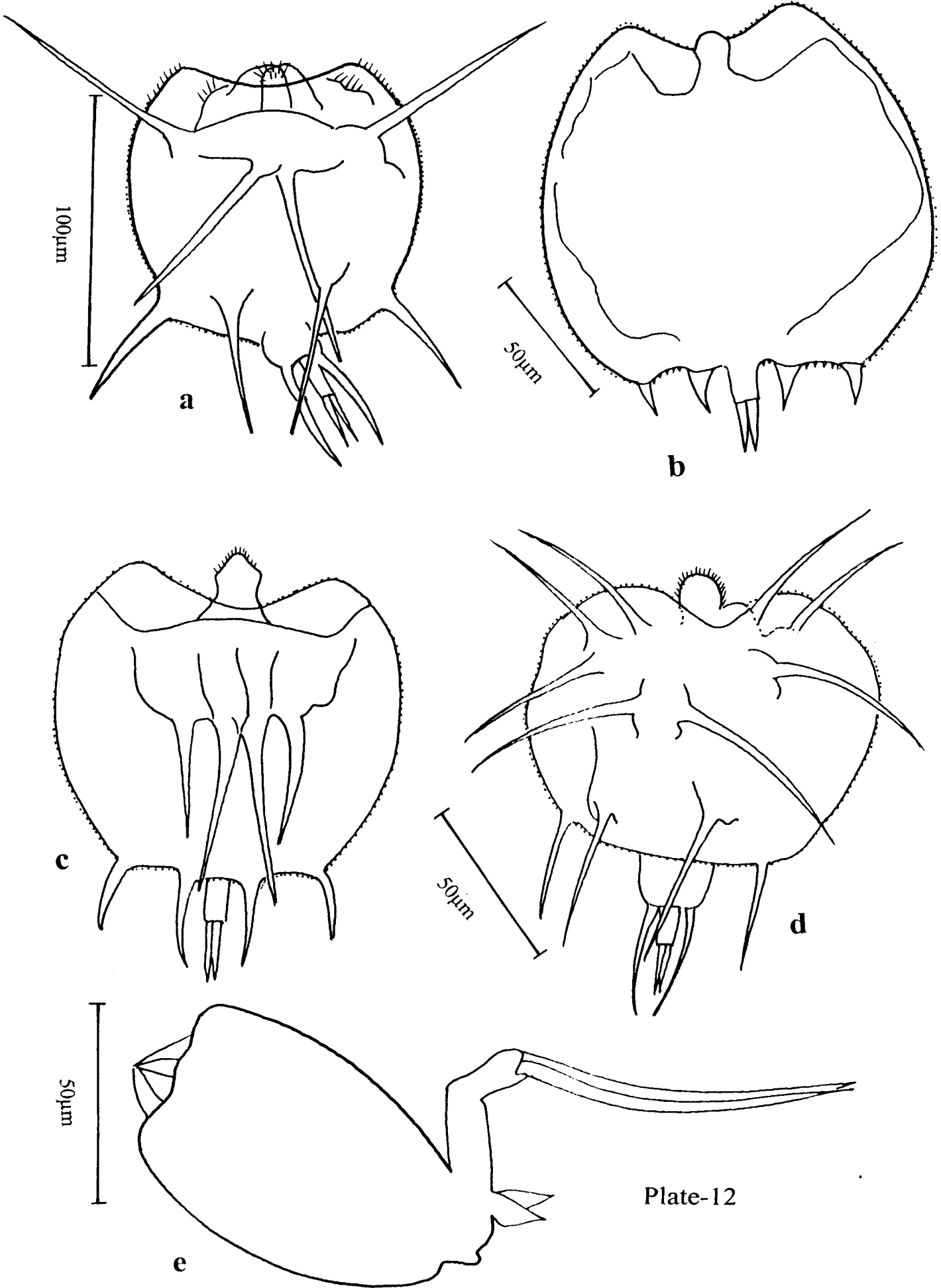
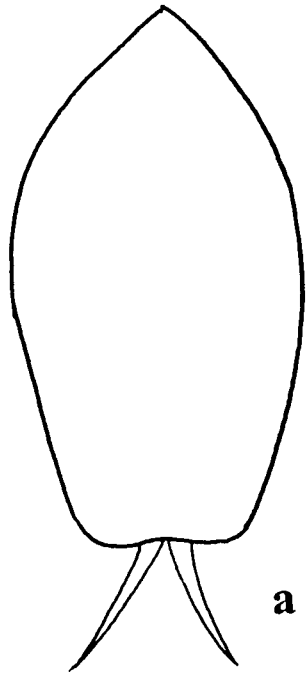


Plate-12

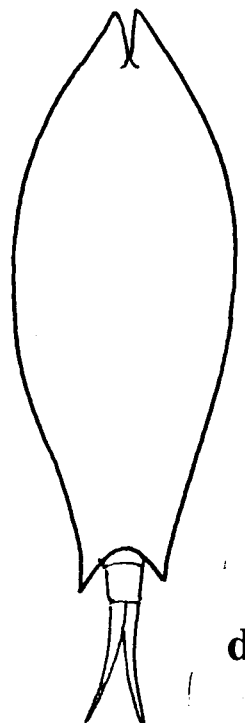
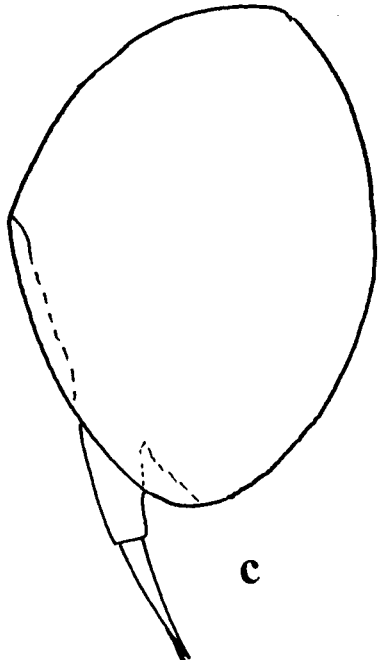
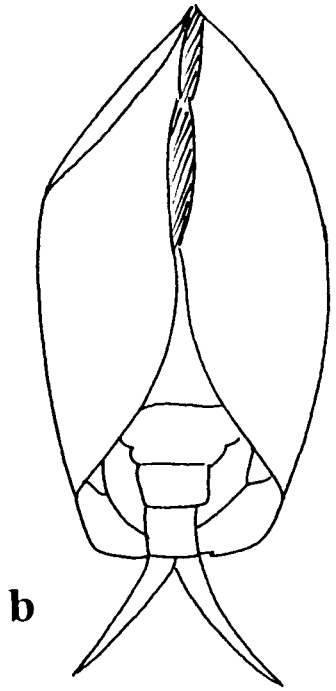
Plate -13

Figs:

- a . *Colurella obtusa* (Gosse),dorsal
- b . *Colurella obtusa* (Gosse),ventral
- c . *Colurella obtusa* (Gosse),lateral
- d . *Colurella uncinata* (O.F. Muller),dorsal
- e . *Colurella uncinata* (O.F. Muller) ,lateral



50µm



50µm

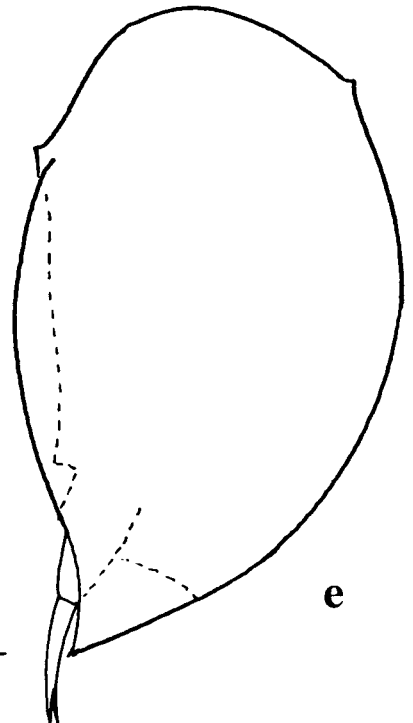


Plate-13

Plate -14

Figs:

a . *Lepadella acuminata* (Ehrenberg), dorsal

b . *Lepadella acuminata* (Ehrenberg), ventral

c . *Lepadella aspicora* Myers ,dorsal

d . *Lepadella aspicora* Myers, ventral

e. *Lepadella costatoides* Segers, dorsal

f. *Lepadella costatoides* Segers, .ventral

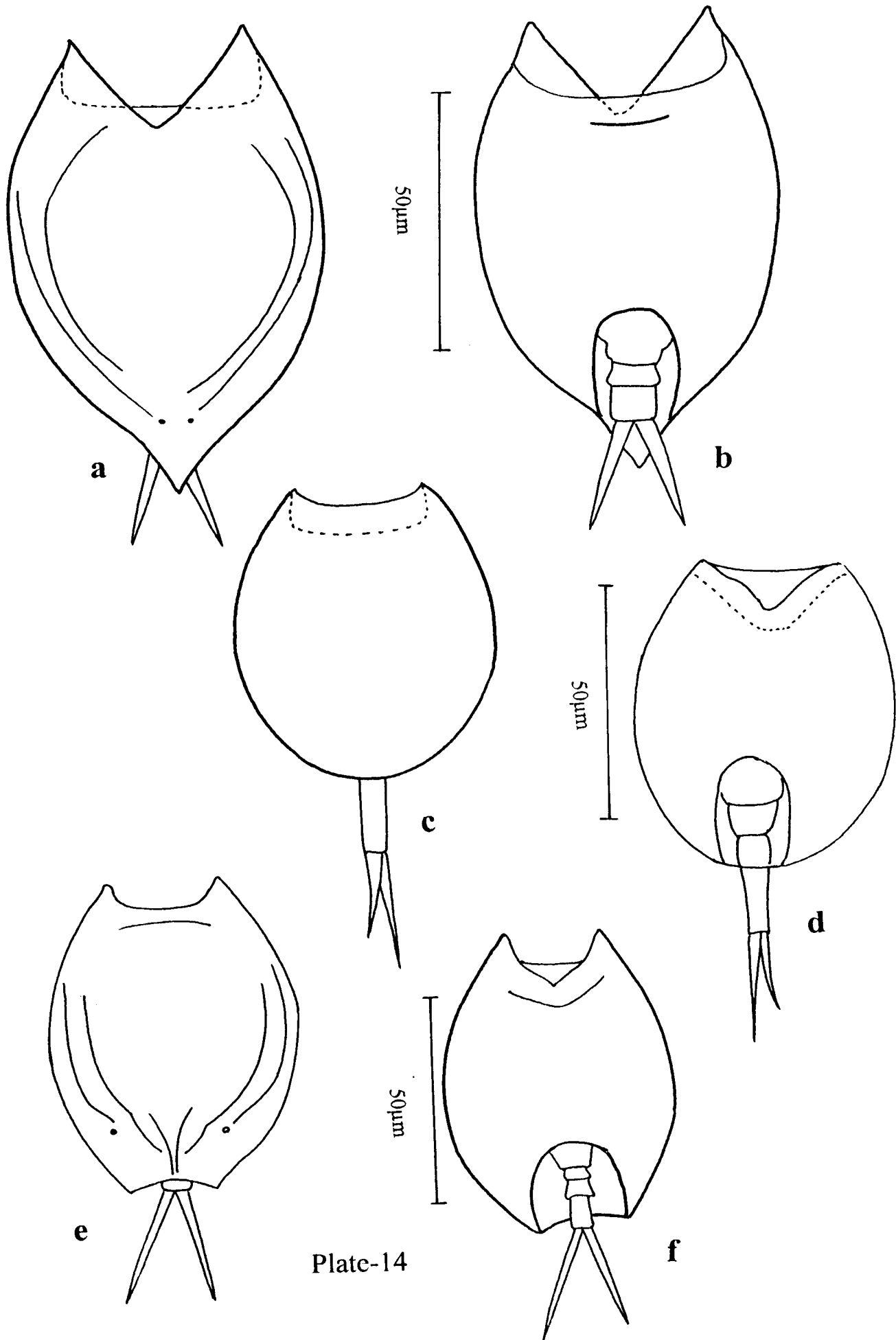


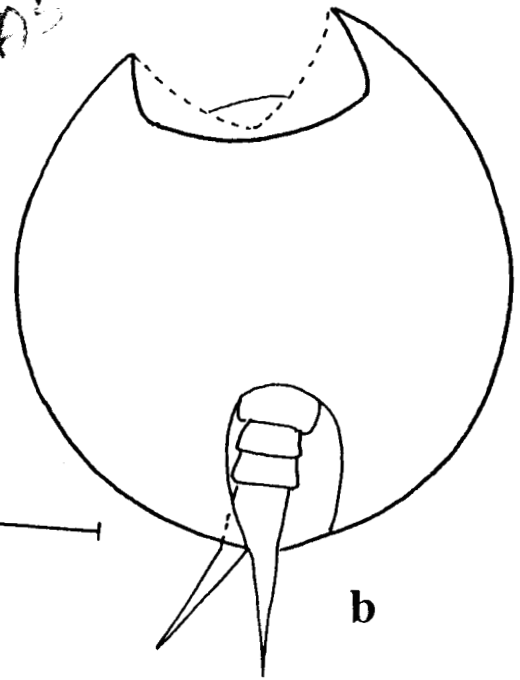
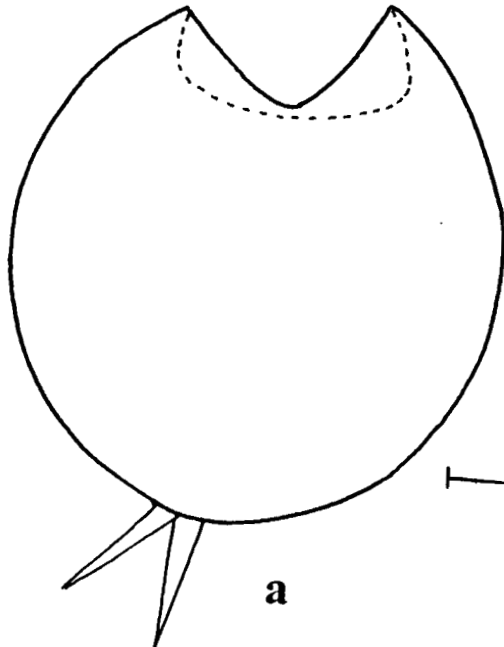
Plate-14

Plate -15

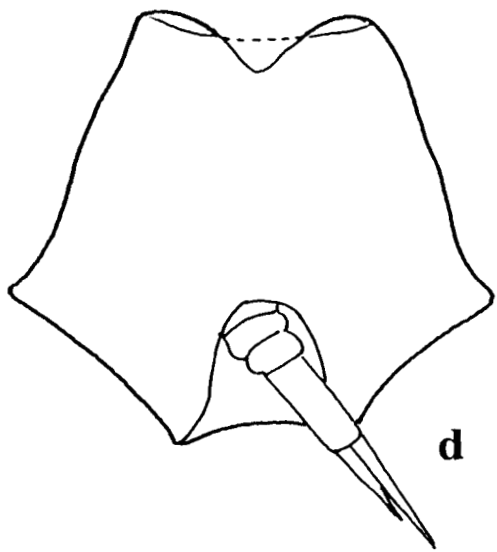
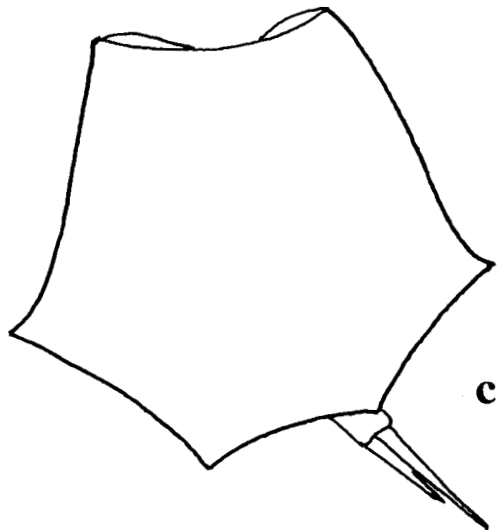
Figs:

- a . *Lepadella discoidea* Segers, dorsal
- b . *Lepadella discoidea* Segers, ventral
- c . *Lepadella ehrenbergi* (Perty), dorsal
- d . *Lepadella ehrenbergi* (Perty), ventral
- e . *Lepadella* cf. *favorita* Klement, dorsal
- f . *Lepadella* cf. *favorita* Klement, lorica cross-section
- g . *Lepadella* cf. *favorita* Klement, ventral

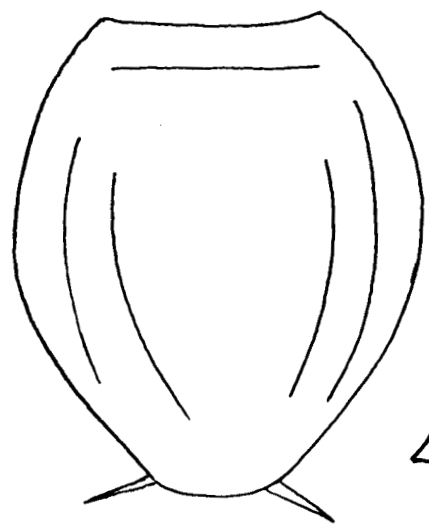
AS



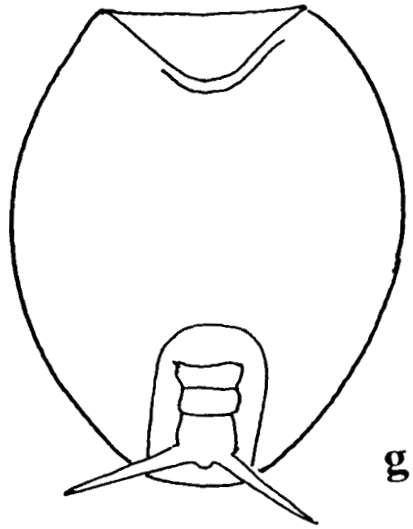
50µm



50µm



50µm



e

Plate-15

g

Plate -16

Figs:

- a . *Lepadella minuta* (Montet),dorsal
- b . *Lepadella minuta* (Montet),ventral
- c . *Lepadella ovalis* (O.F. Muller),dorsal
- d . *Lepadella ovalis* (O.F. Muller),ventral
- e . *Lepadella patella* (O.F. Muller),dorsal
- f . *Lepadella patella* (O.F. Muller),ventral
- g . *Lepadella patella* (O.F. Muller) ,lorica cross-section

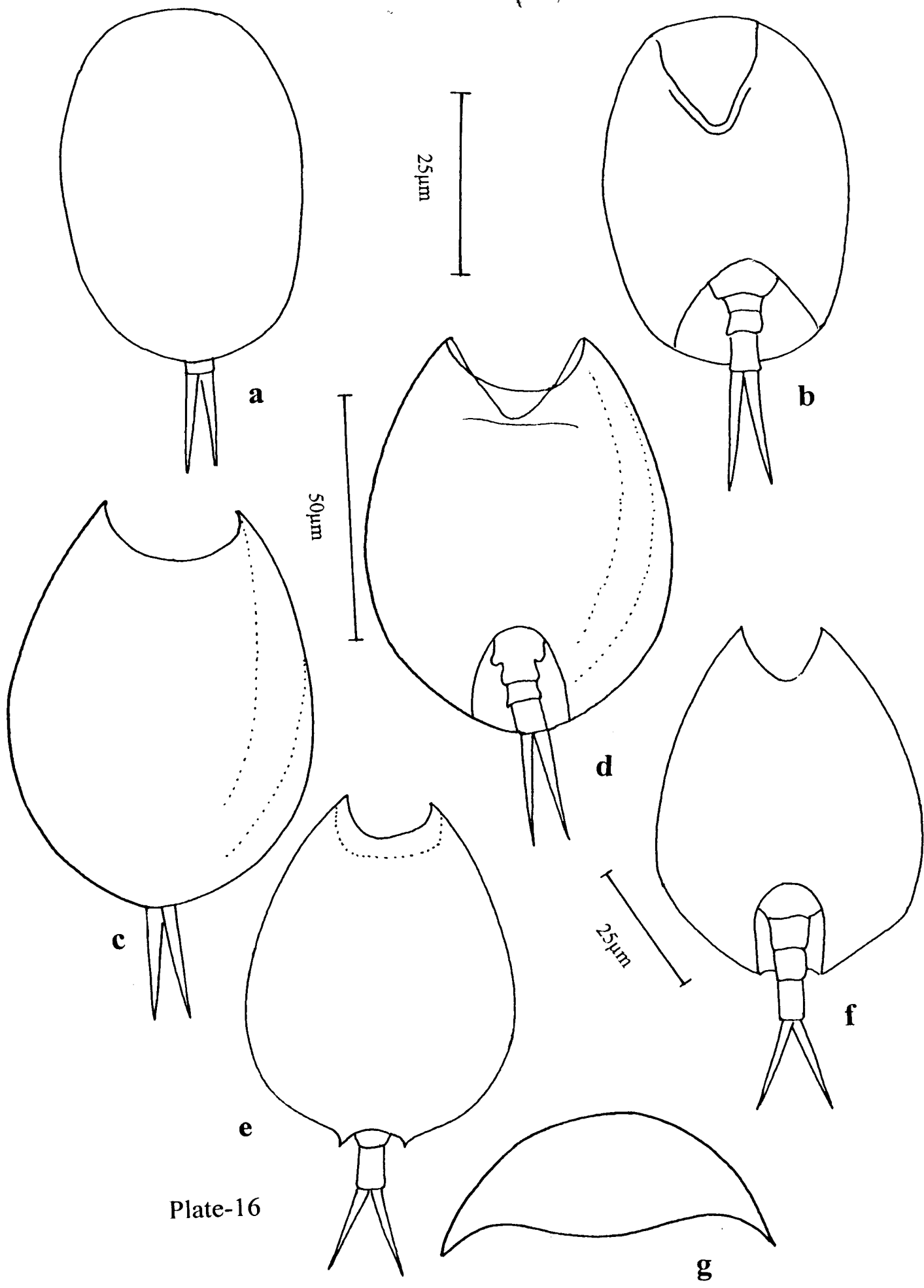


Plate-16

Plate -17

Figs:

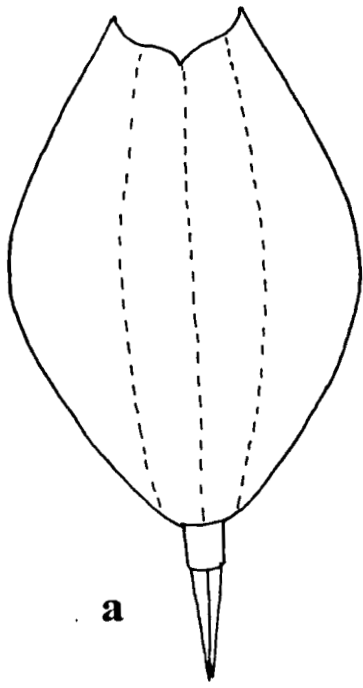
a . *Lepadella rhomboides* (Gosse),dorsal

b . *Lepadella rhomboides* (Gosse),ventral

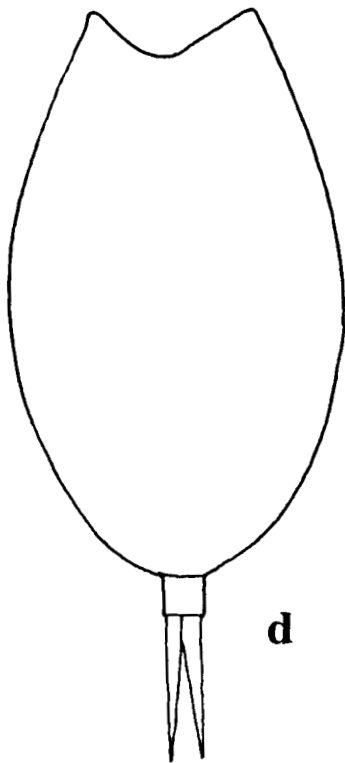
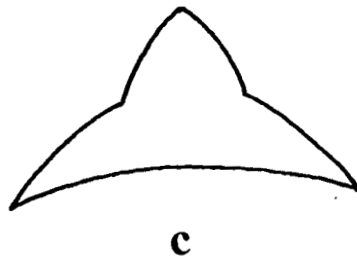
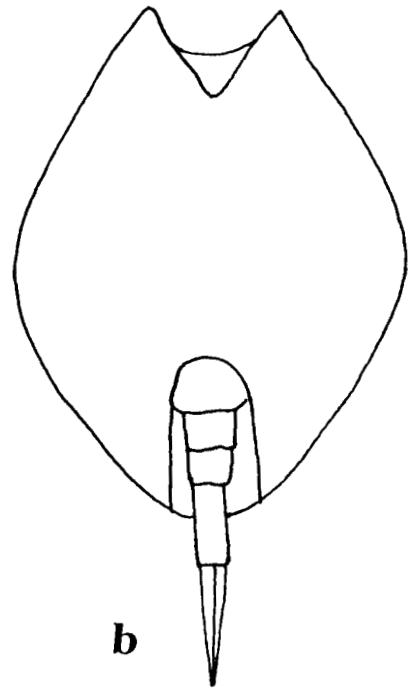
c . *Lepadella rhomboides* (Gosse),lorica cross-section

d . *Lepadella triba* Myers, dorsal

e . *Lepadella triba* Myers, ventral



50µm



50µm

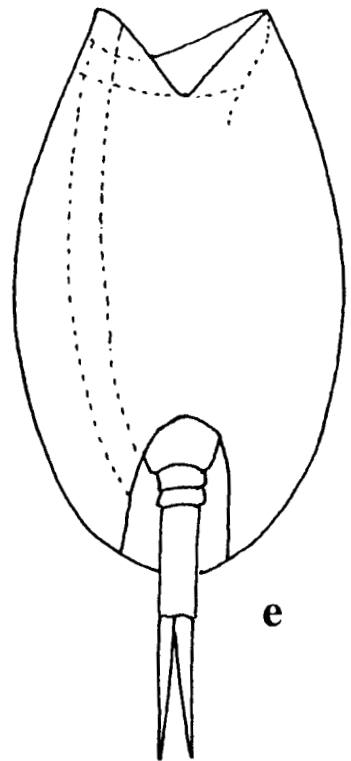
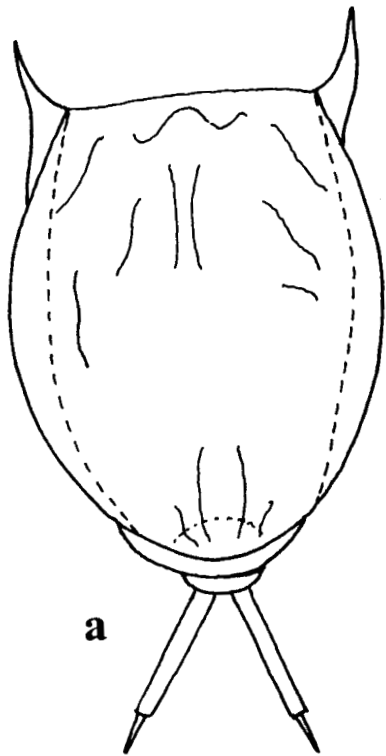


Plate-17

Plate -18

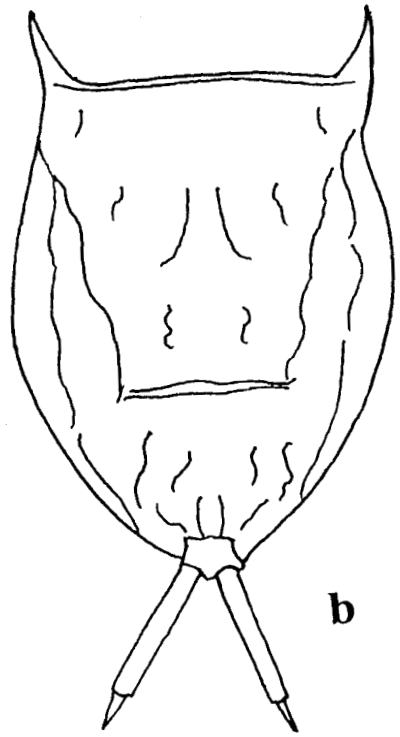
Figs:

- a . *Lecane aculeata* (Jakubski),dorsal
- b . *Lecane aculeata* (Jakubski),ventral
- c . *Lecanidae arcula* Haring, dorsal
- d . *Lecanidae arcula* Haring,ventral
- e . *Lecane bifurca* (Bryce),dorsal
- f . *Lecane bifurca* (Bryce), ventral

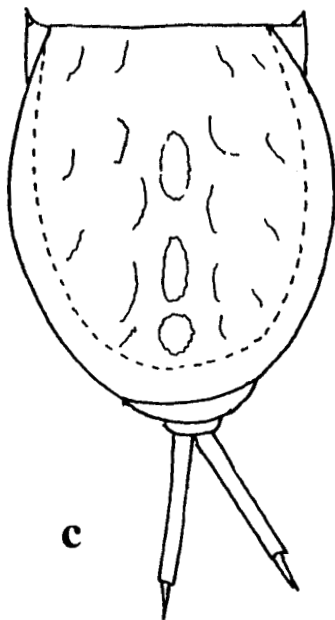


a

25μm

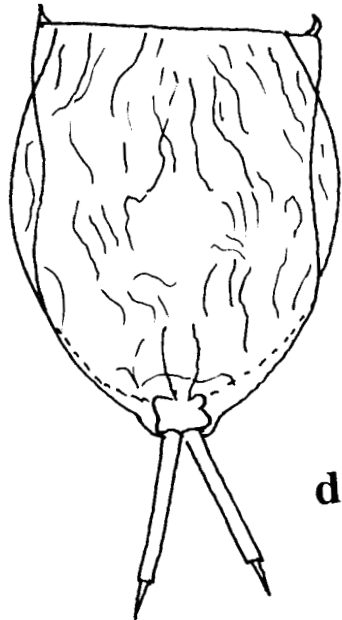


b

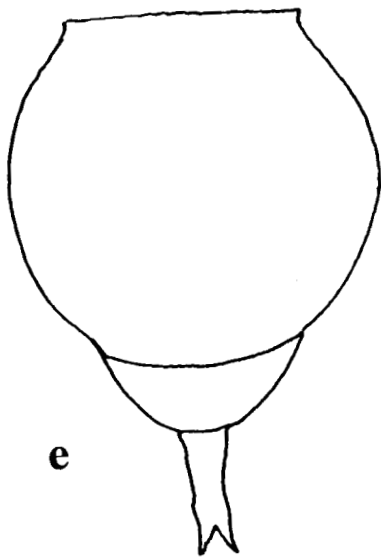


c

50μm

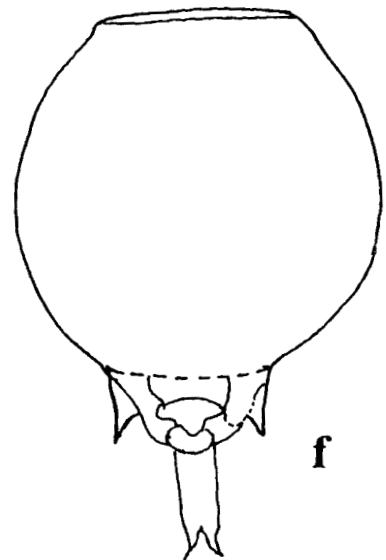


d



e

25μm



f

Plate-18

Plate -19

Figs:

a . *Lecane bulla* (Gosse),dorsal

b . *Lecane bulla* (Gosse), ventral

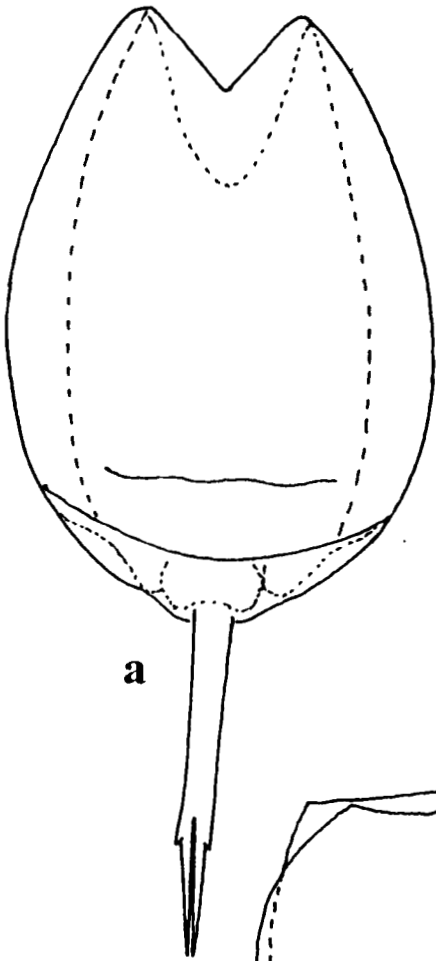
c . *Lecane closterocerca* (Schmarda),dorsal

d . *Lecane closterocerca* (Schmarda),ventral

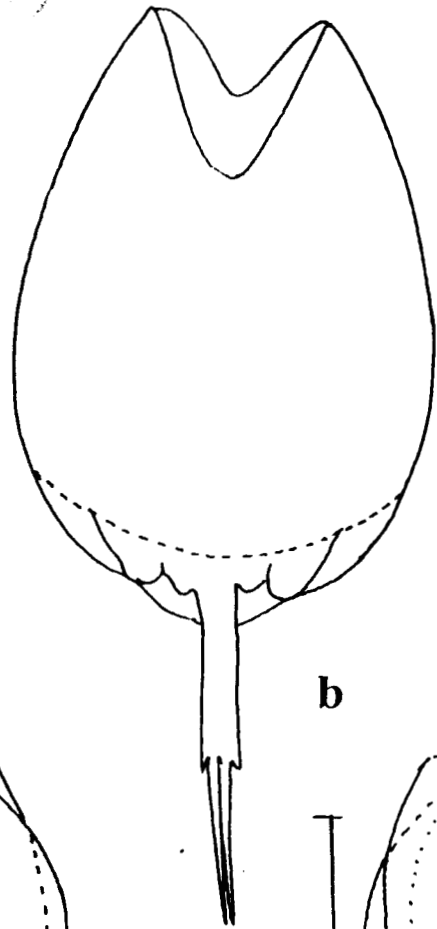
e . *Lecane crepida* Harring, dorsal

f . *Lecane crepida* Harring, ventral

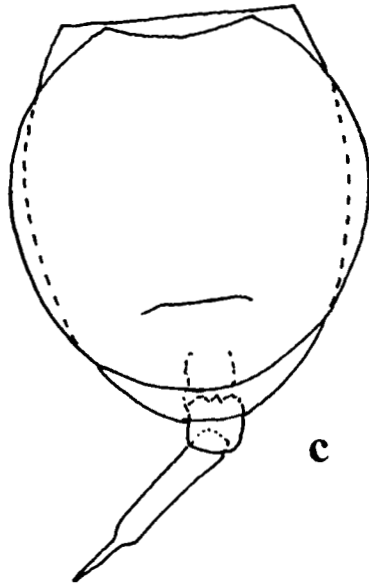
50µm



a

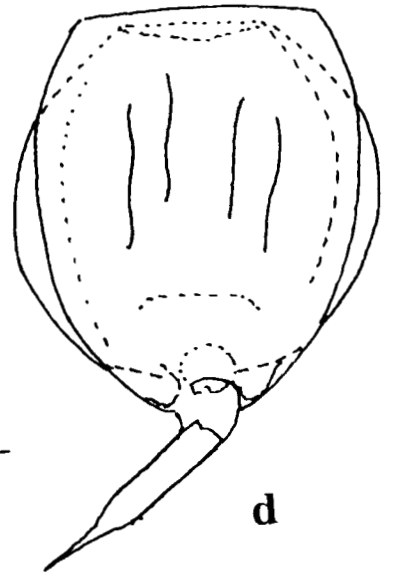


b

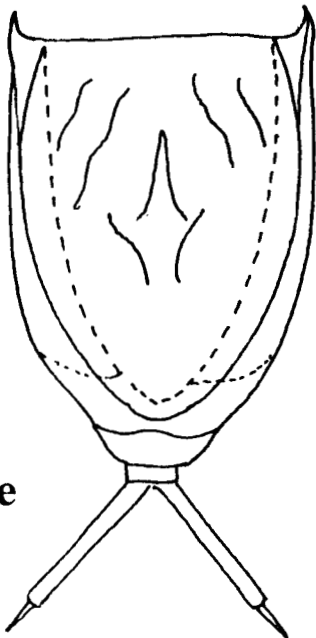


c

25µm

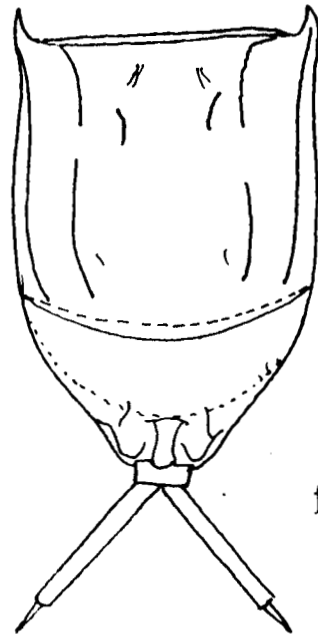


d



e

50µm



f

Plate-19

Plate -20

Figs:

a . *Lecane curvicornis* (Murray),dorsal

b . *Lecane curvicornis* (Murray),ventral

c . *Lecane doryssa* Haring, dorsal

d . *Lecane doryssa* Haring, ventral

Fig. 2

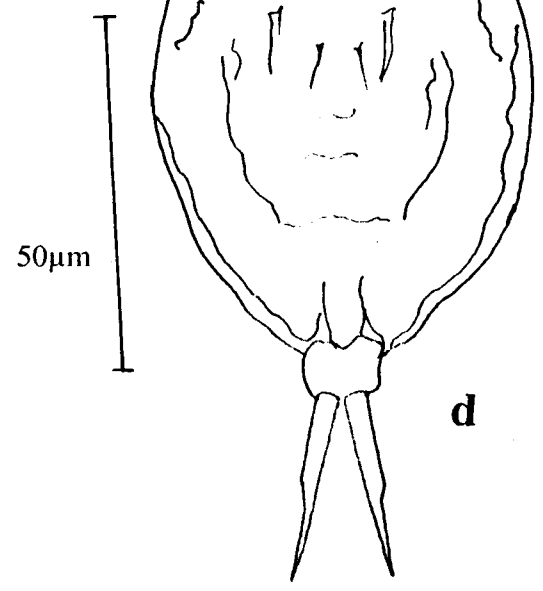
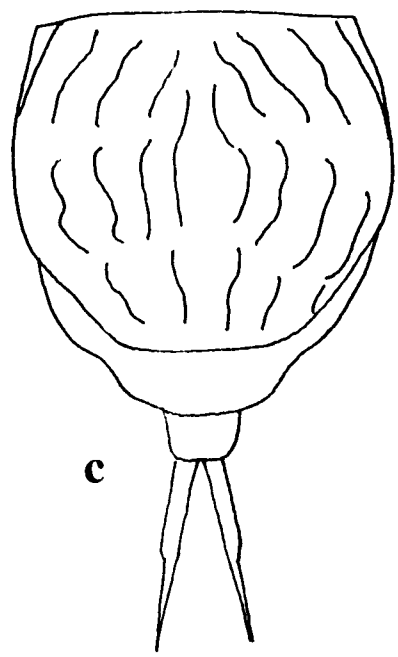
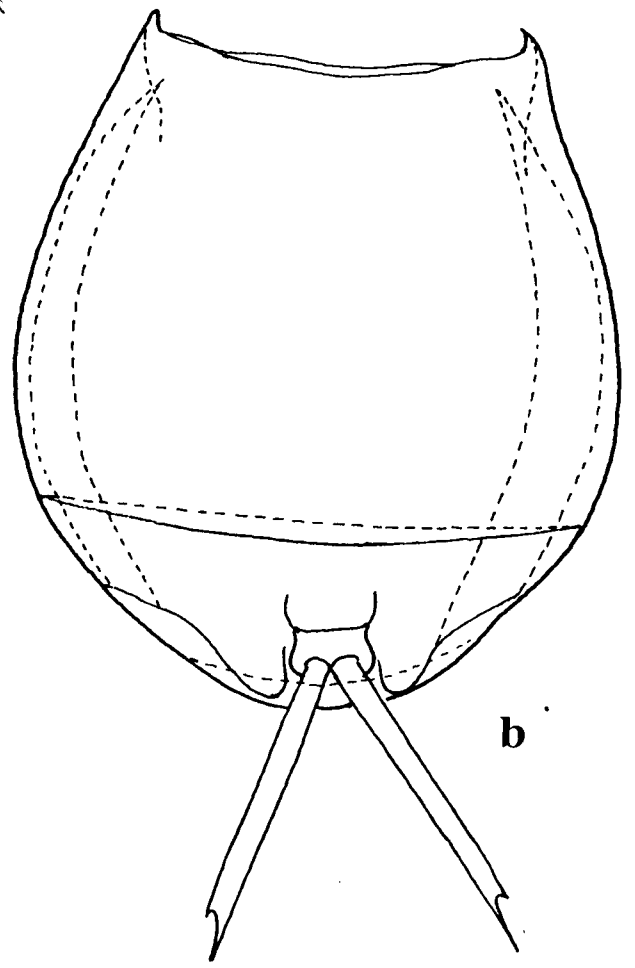
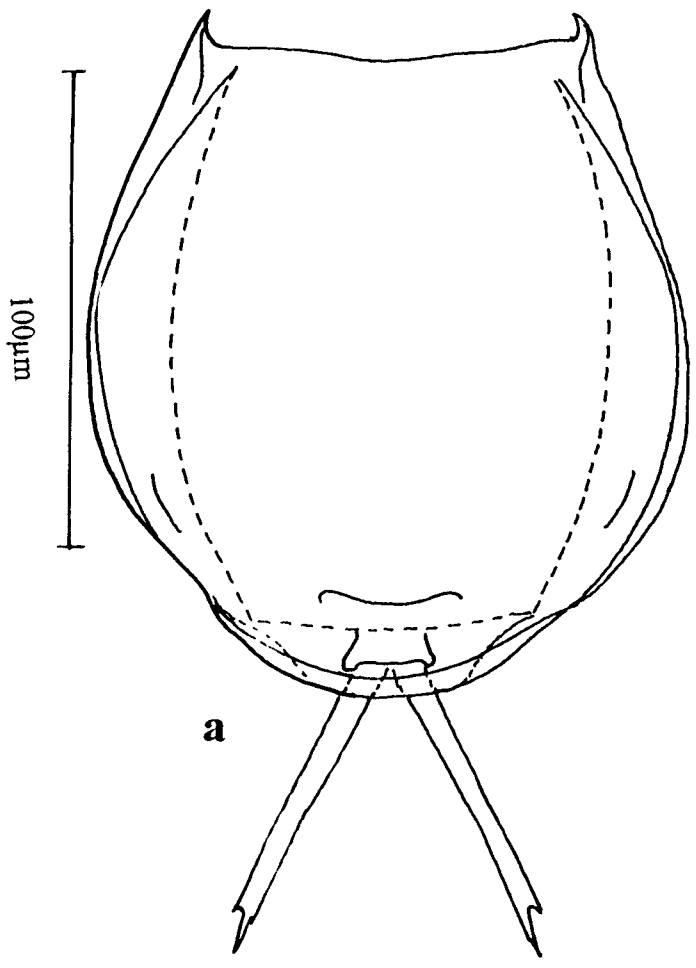


Plate-20

Plate -21

Figs:

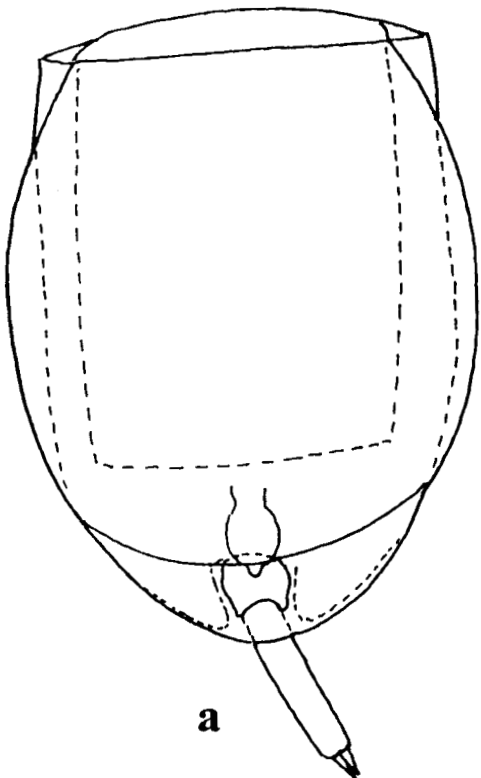
a . *Lecane furcata* (Murray),dorsal

b . *Lecane furcata* (Murray),ventral

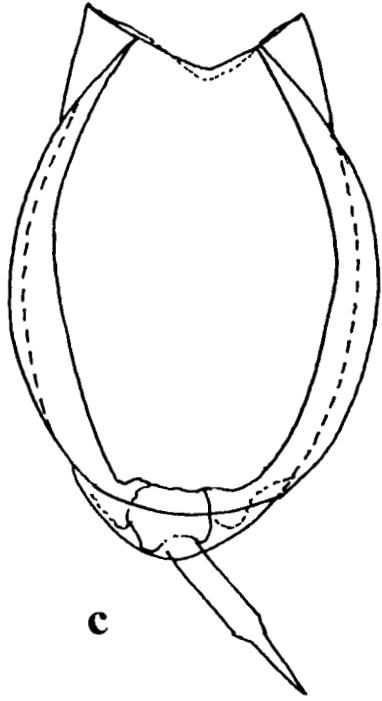
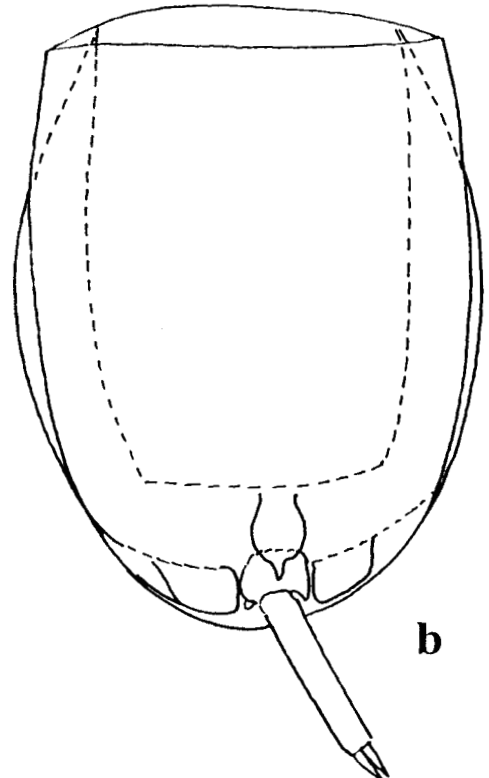
c . *Lecane hamata* (Stokes),dorsal

d . *Lecane hamata* (Stokes),ventral

017



50μm



50μm

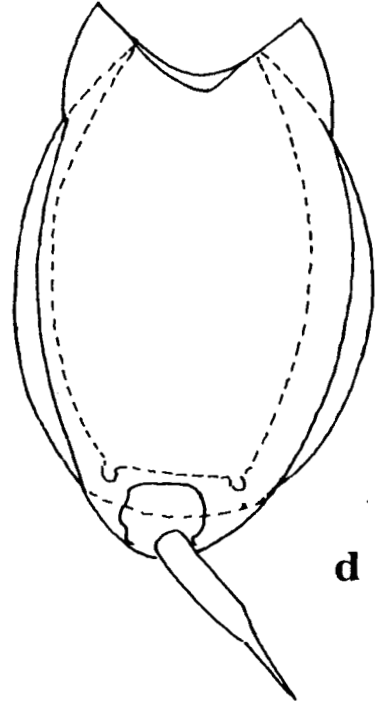


Plate-21

Plate -22

Figs:

- a . *Lecane hastata* (Murray),dorsal
- b . *Lecane hastata* (Murray),ventral
- c . *Lecane hornemanni* (Ehrenberg),dorsal
- d . *Lecane hornemanni* (Ehrenberg),ventral
- e. *Lecane inopinata* Haring & Myers,dorsal
- f. *Lecane inopinata* Haring & Myers,ventral

219

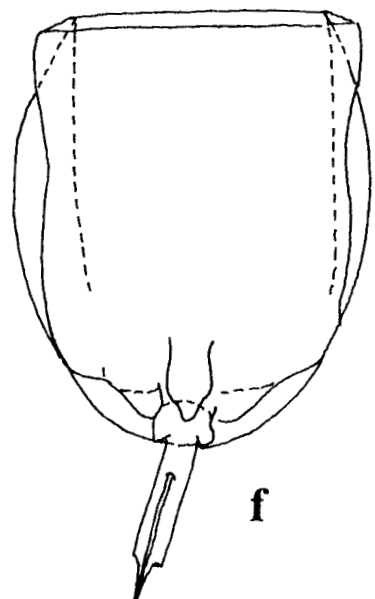
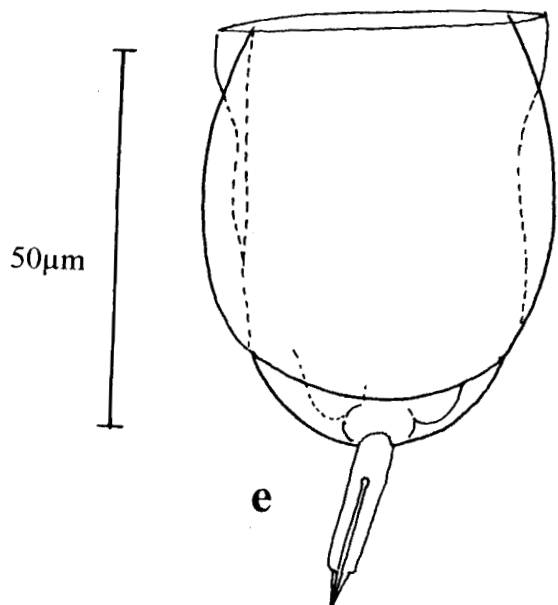
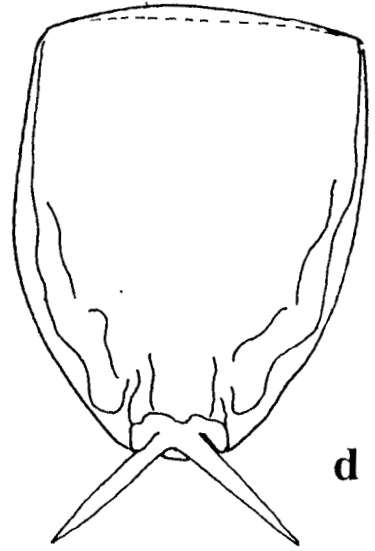
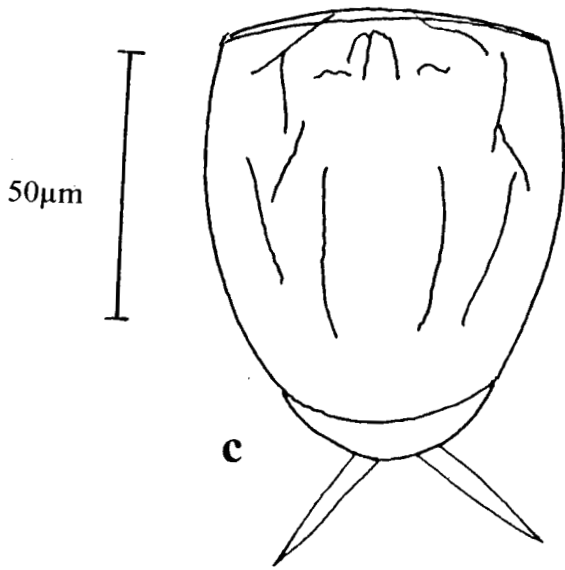
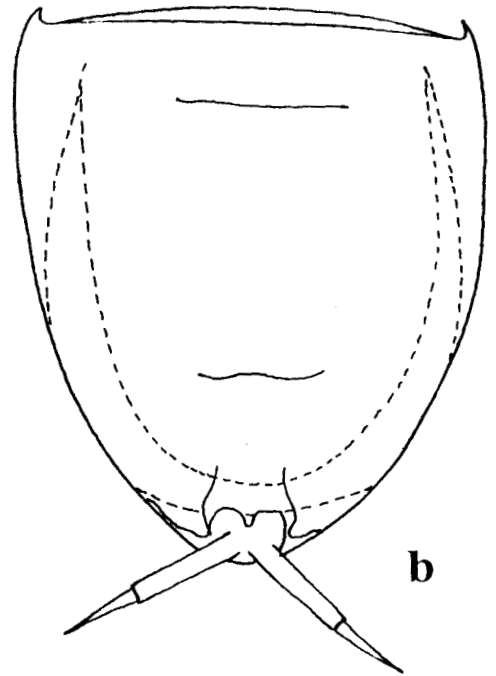
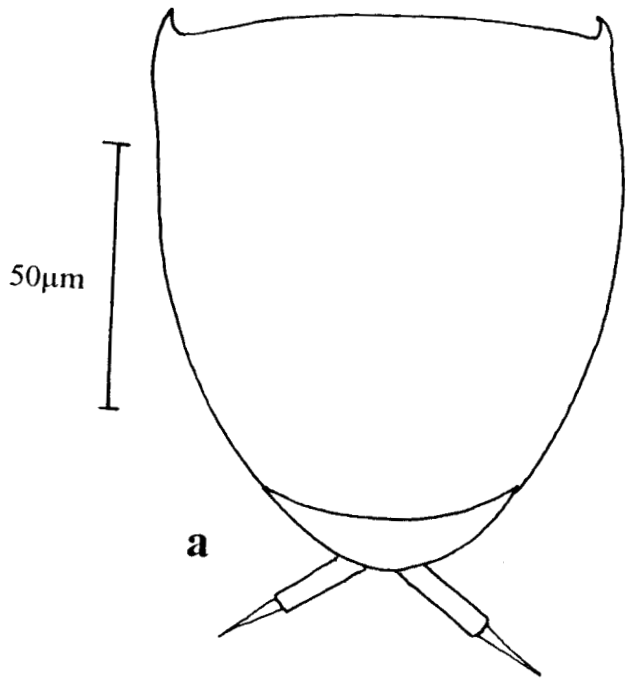


Plate-22

Plate -23

Figs:

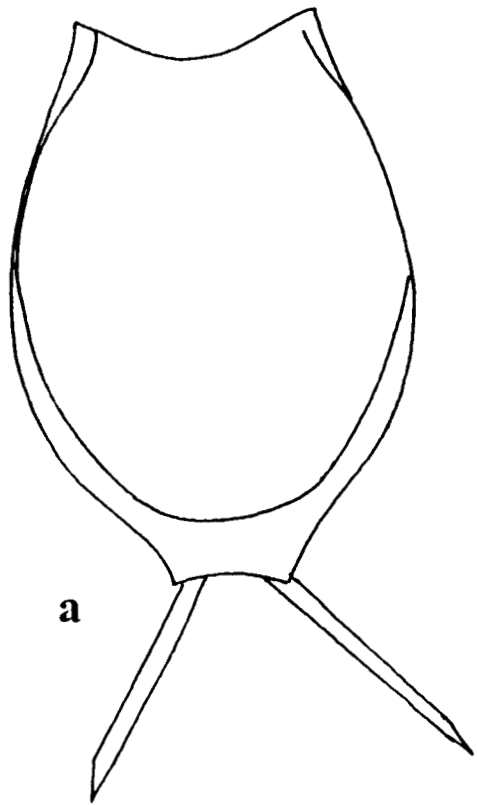
a . *Lecane leontina* (Turner),dorsal

b . *Lecane leontina* (Turner),ventral

c . *Lecane ludwigi* (Eckstein),dorsal

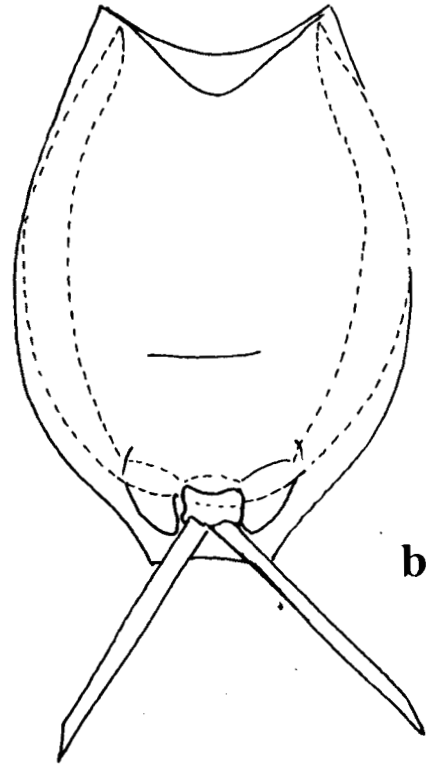
d . *Lecane ludwigi* (Eckstein),ventral

A21

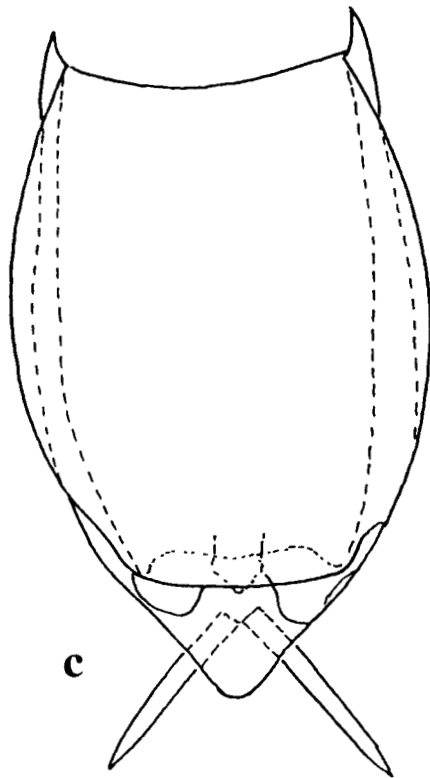


a

100μm

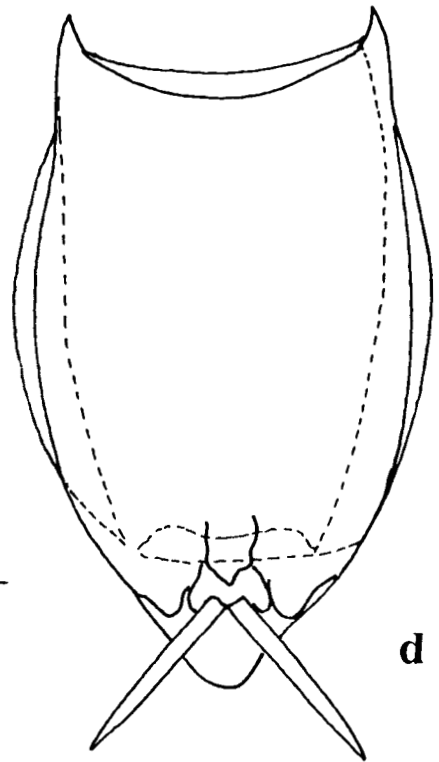


b



c

100μm



d

Plate-23

Plate -24

Figs:

a . *Lecane luna* (O.F. Muller),dorsal

b . *Lecane luna* (O.F. Muller),ventral

c . *Lecane lunaris* (Ehrenberg),dorsal

d . *Lecane lunaris* (Ehrenberg),ventral

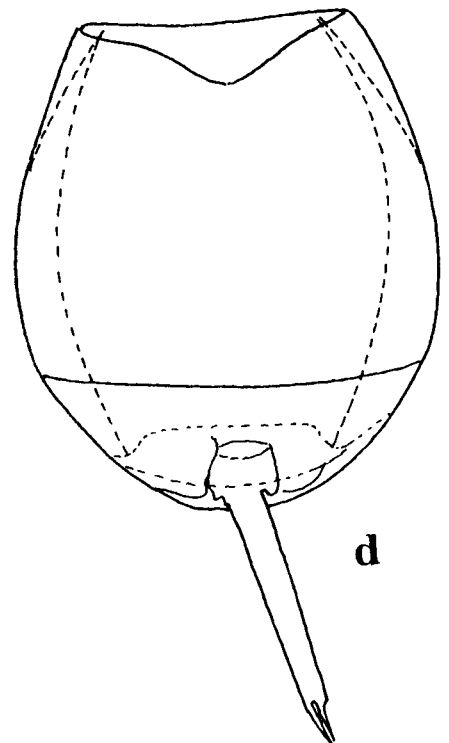
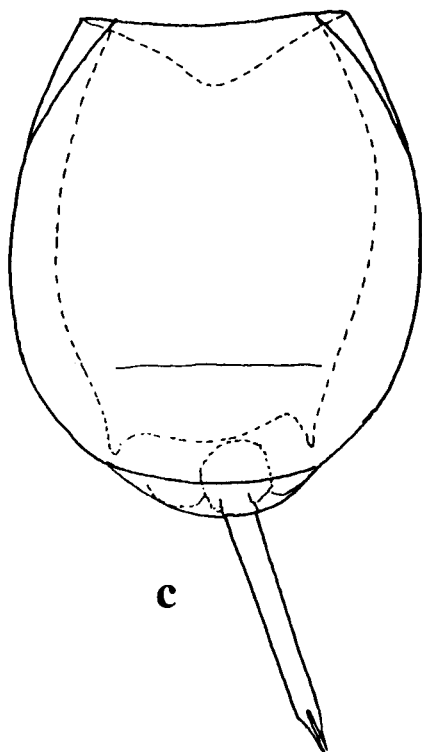
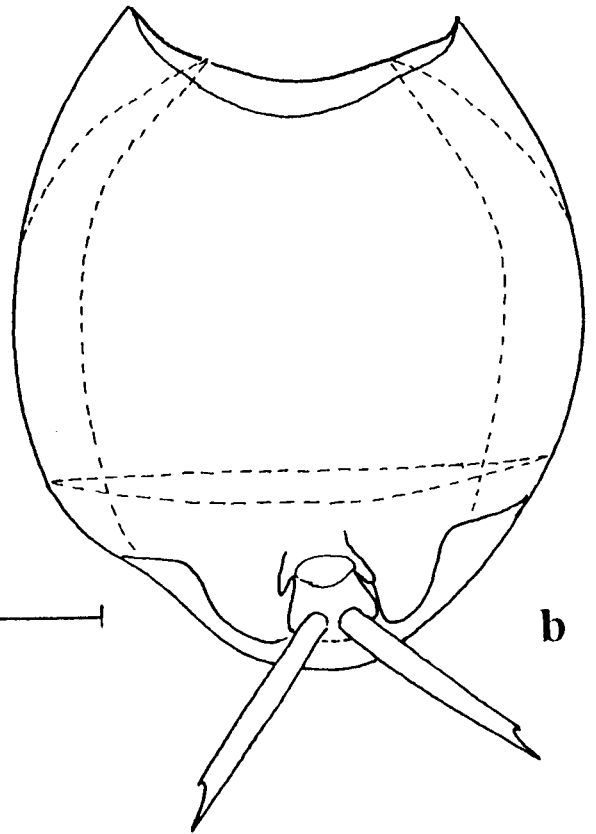
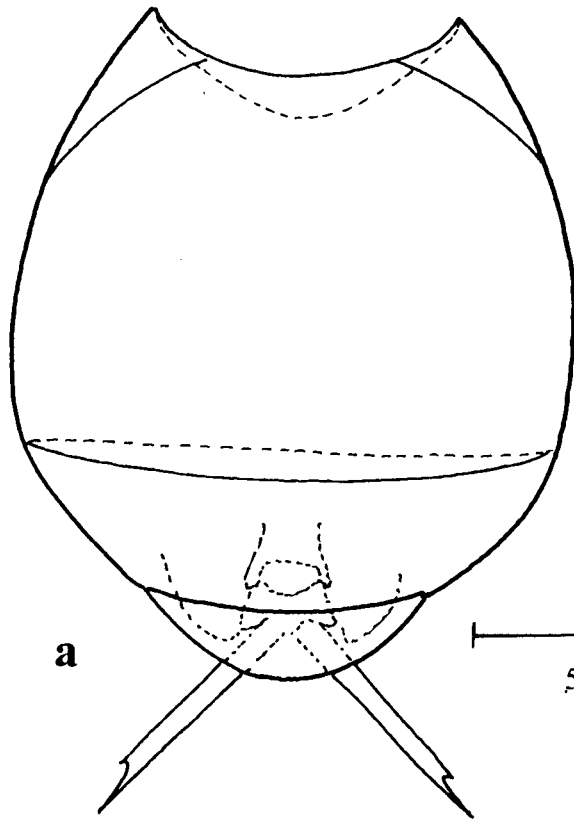


Plate-24

Plate -25

Figs:

- a . *Lecane monostyla* (Daday),dorsal
- b . *Lecane monostyla* (Daday),ventral
- c . *Lecane obtusa* (Murray),dorsal
- d . *Lecane obtusa* (Murray),ventral

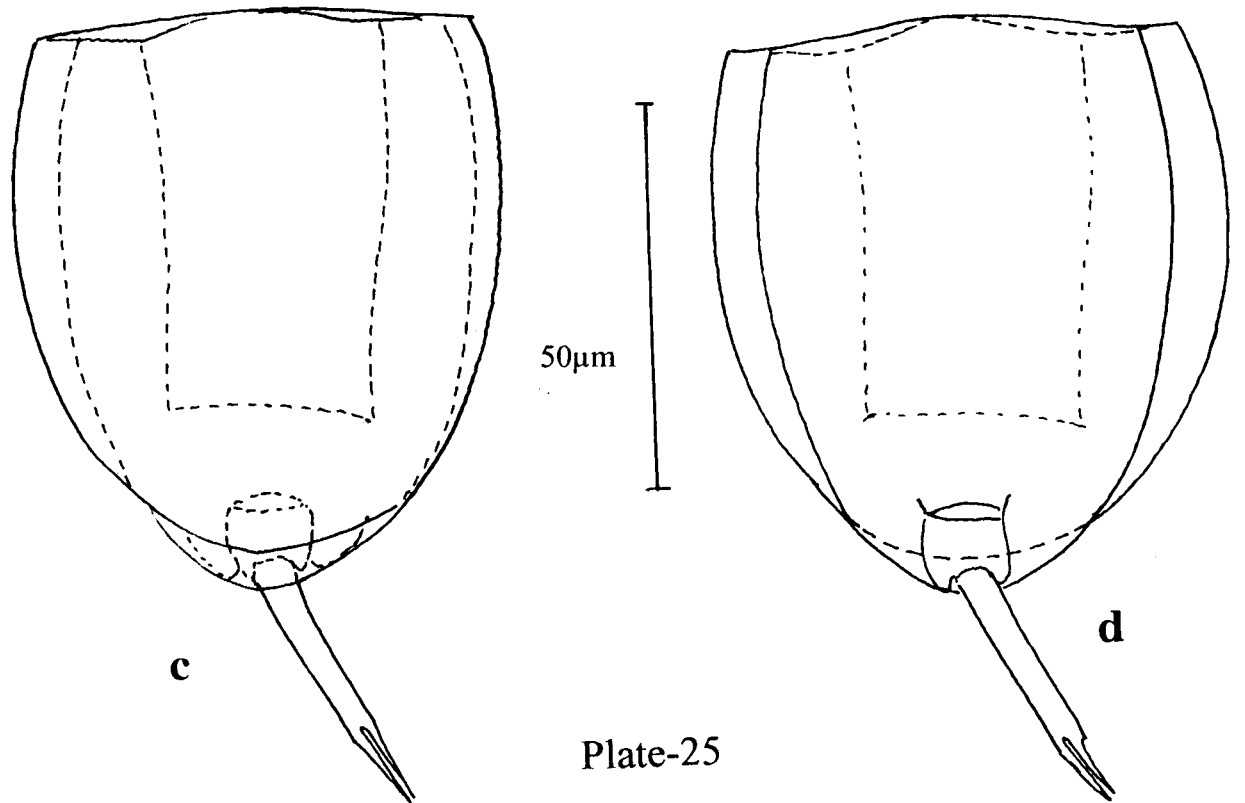
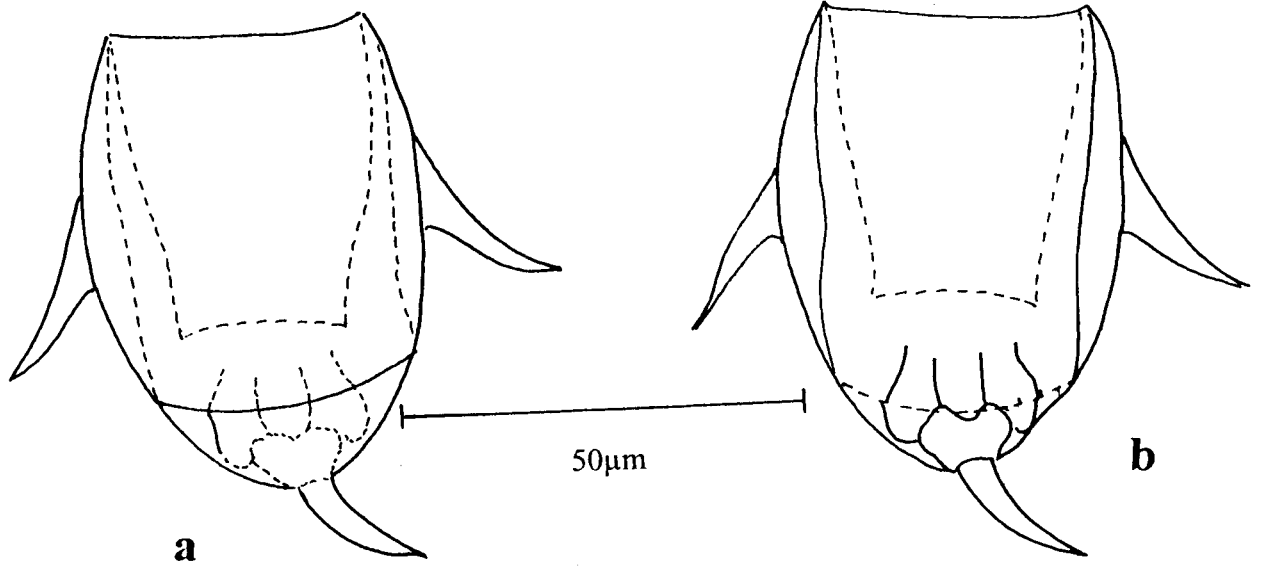


Plate-25

Plate -26

Figs:

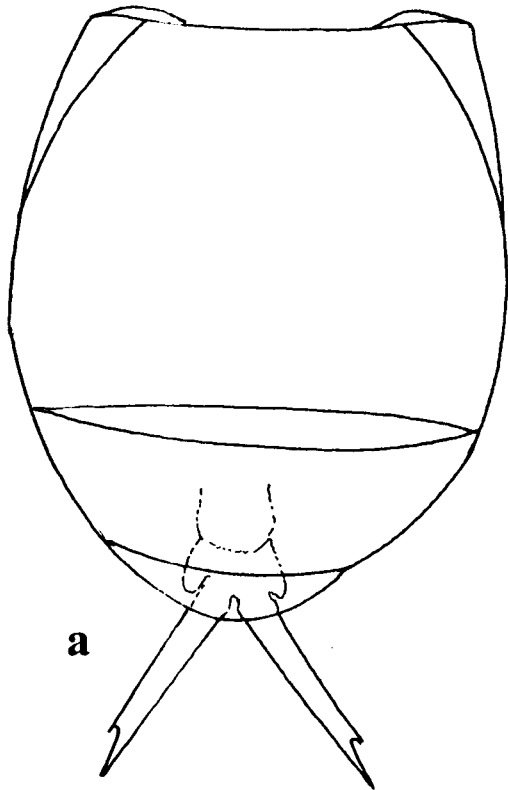
a . *Lecane papuana* (Murray).dorsal

b . *Lecane papuana* (Murray).ventral

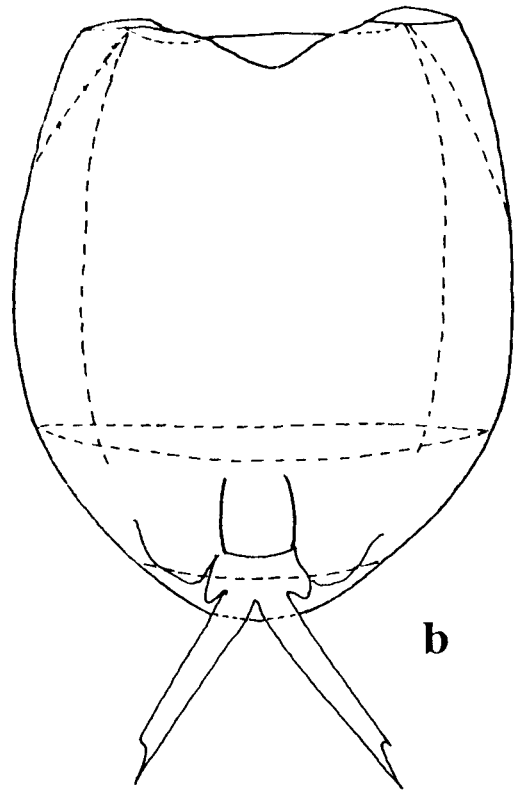
c . *Lecane pertica* Harring & Myers, dorsal

d . *Lecane pertica* Harring & Myers, ventral

A27

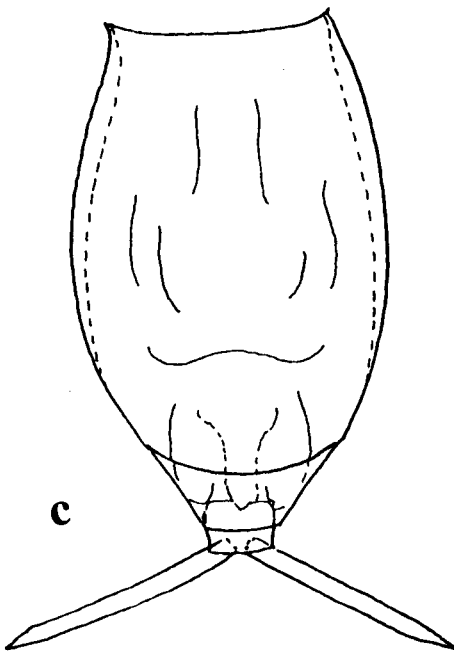


50µm

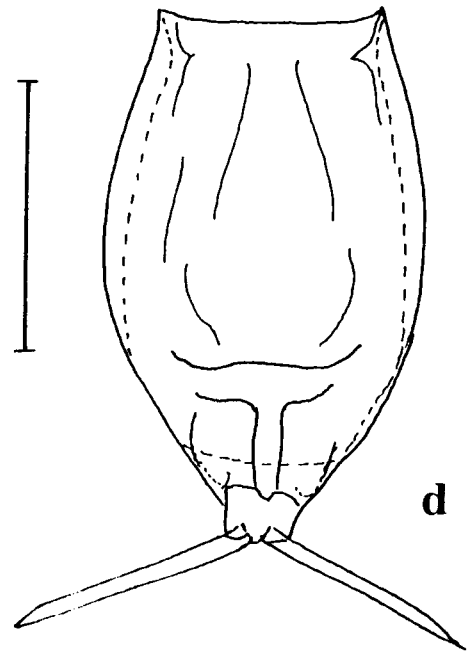


a

b



50µm



c

d

Plate-26

Plate -27

Figs:

a . *Lecane pusilla* Haring, dorsal

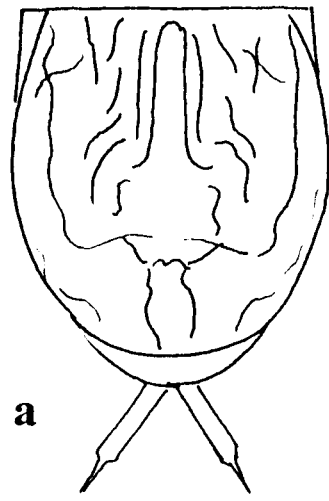
b . *Lecane pusilla* Haring, dorsal

c . *Lecane pyriformis* (Daday),dorsal

d . *Lecane pyriformis* (Daday),ventral

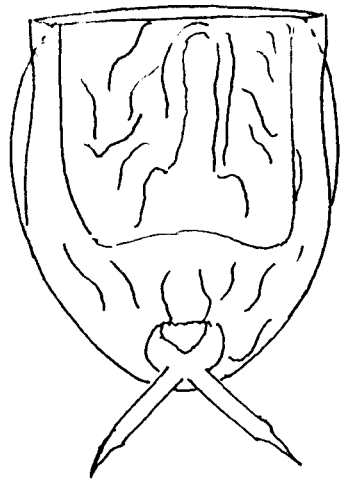
e . *Lecane quadridentata* (Ehrenberg),dorsal

f . *Lecane quadridentata* (Ehrenberg),ventral

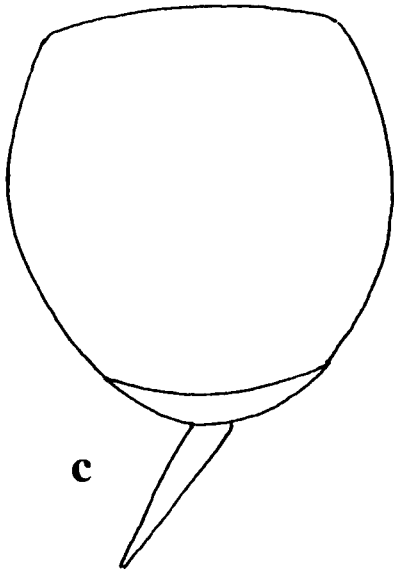


a

25μm

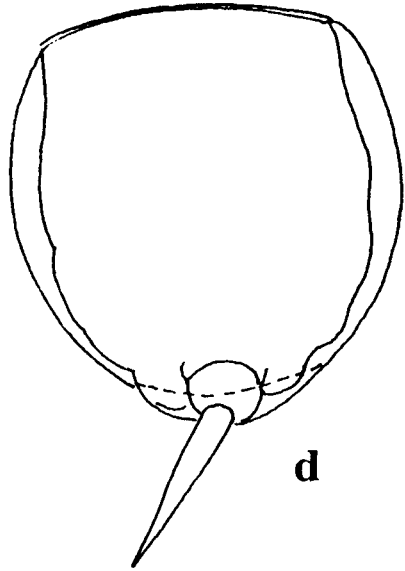


b

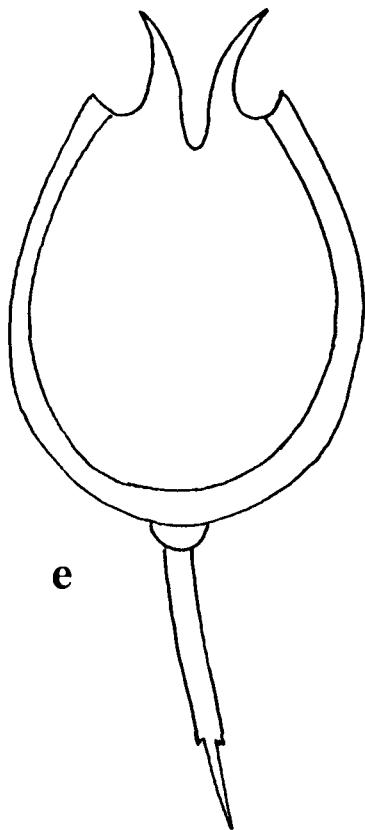


c

25μm

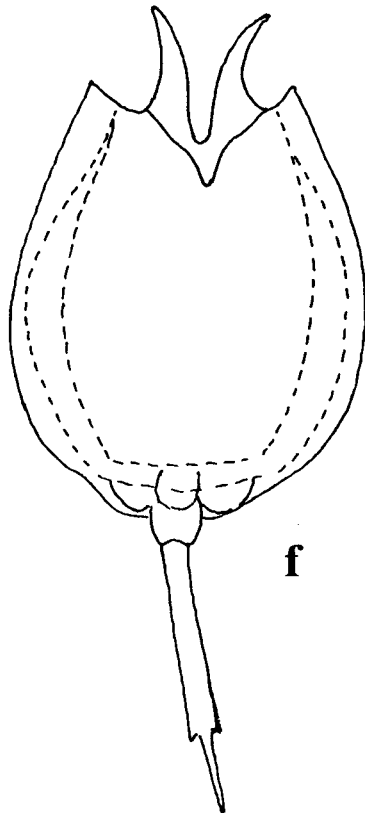


d



e

100μm



f

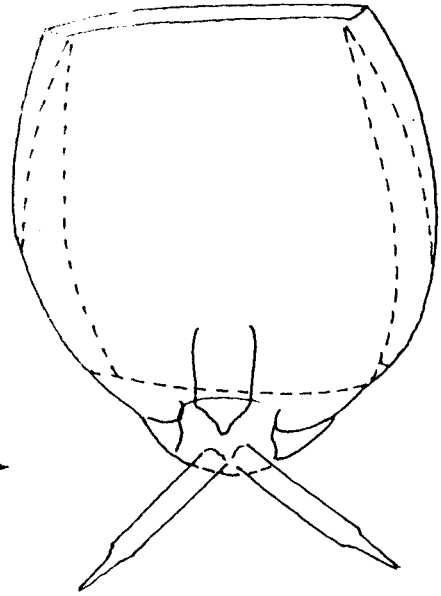
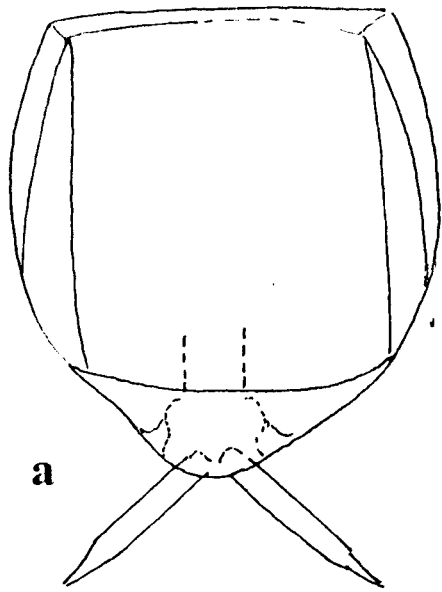
Plate-27

Plate -28

Figs:

- a . *Lecane rutteneri* Hauer, dorsal
- b . *Lecane rutteneri* Hauer, ventral
- c . *Lecane signifera* (Jennings),dorsal
- d . *Lecane signifera* (Jennings),ventral
- e . *Lecane simonneae* Segers ,dorsal
- f . *Lecane simonneae* Segers , ventral

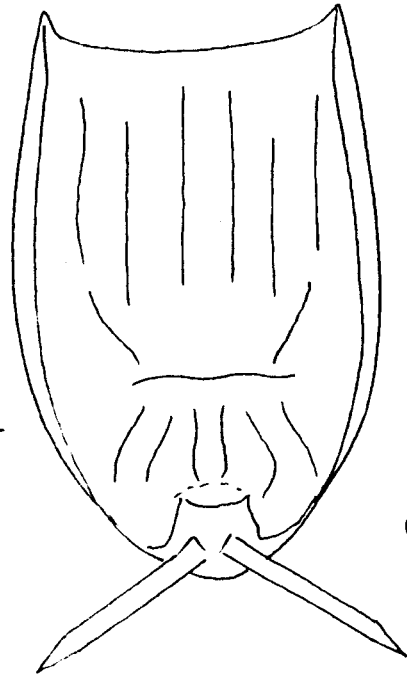
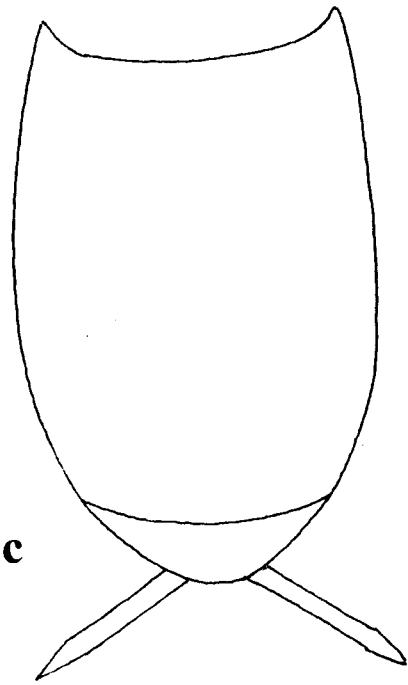
A31



50µm

a

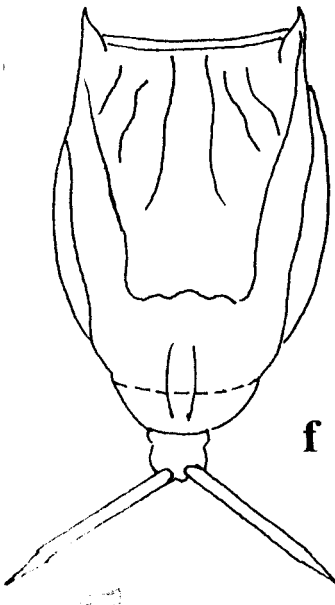
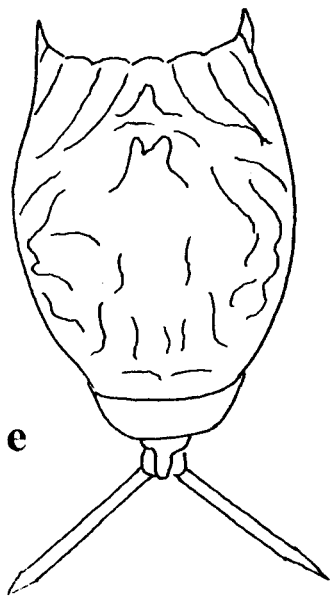
b



50µm

c

d



50µm

e

f

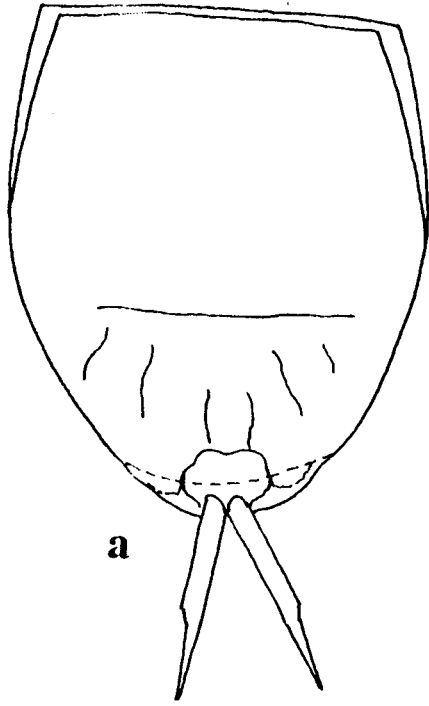
Plate-28

Plate -29

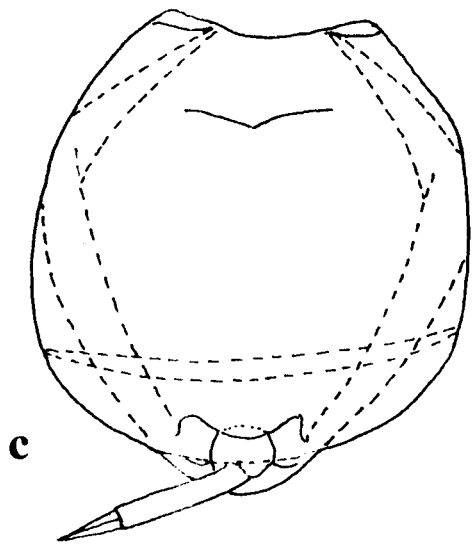
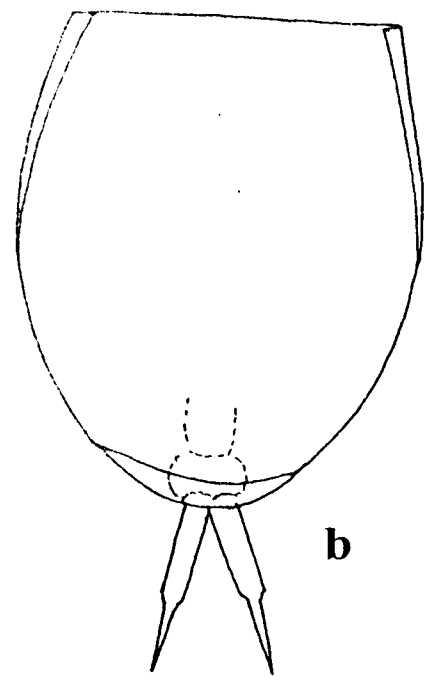
Figs:

- a . *Lecane tenuiseta* Haring, dorsal
- b . *Lecane tenuiseta* Haring, ventral
- c . *Lecane unguitata* (Fadeev),dorsal
- d . *Lecane unguitata* (Fadeev),ventral
- e . *Lecane ungulata* (Gosse),dorsal
- f . *Lecane ungulata* (Gosse),ventral

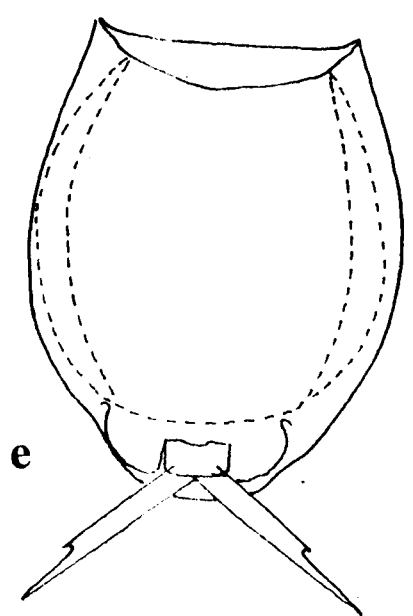
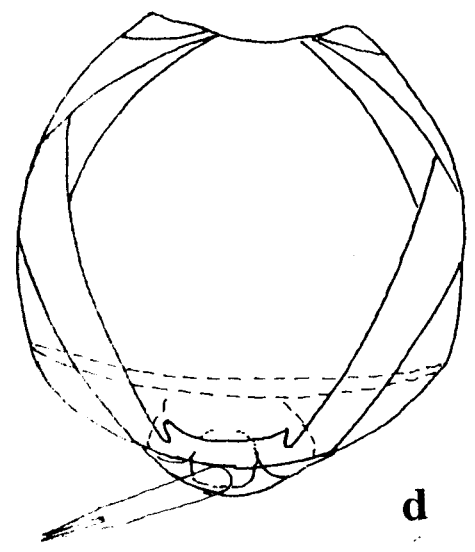
1933



50µm



50µm



100µm

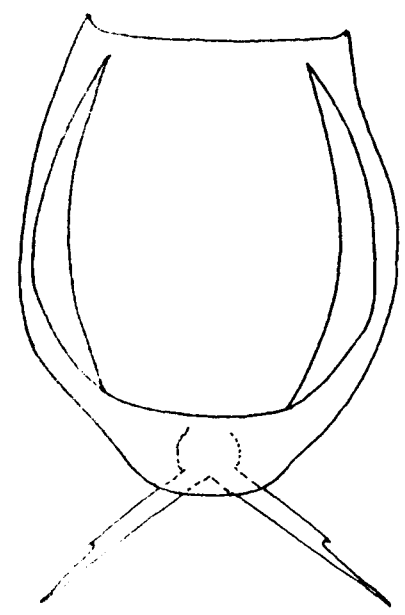


Plate-29

Plate -30

Figs:

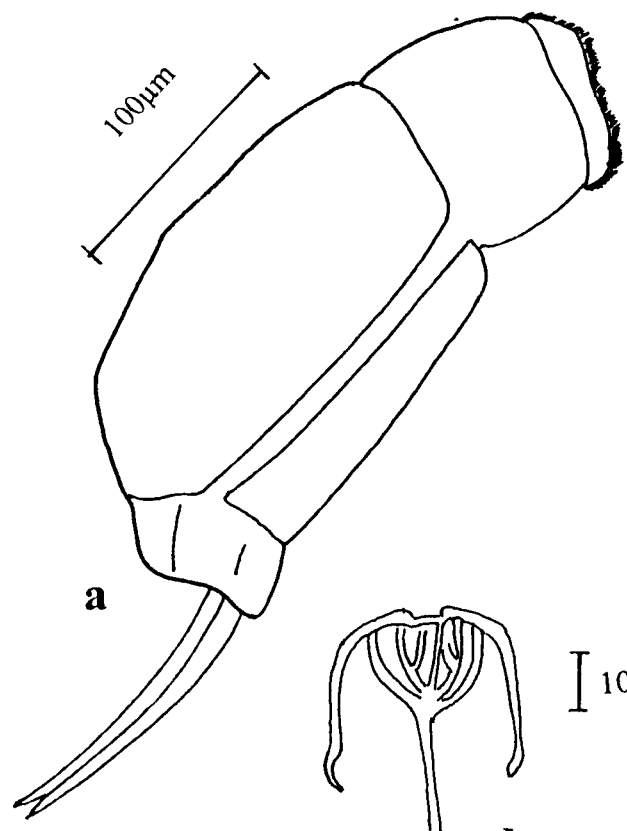
a . *Cephalodella gibba* (Ehrenberg)

b . *Cephalodella gibba* (Ehrenberg), trophi

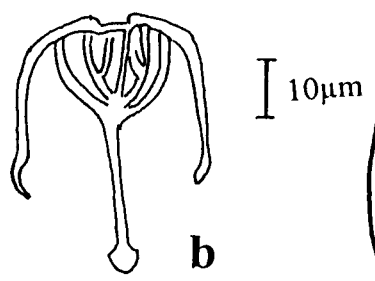
c . *Notommata copeus* Ehrenberg

d . *Notommata pachyura* (Gosse) *f. triangulata* Kirkman

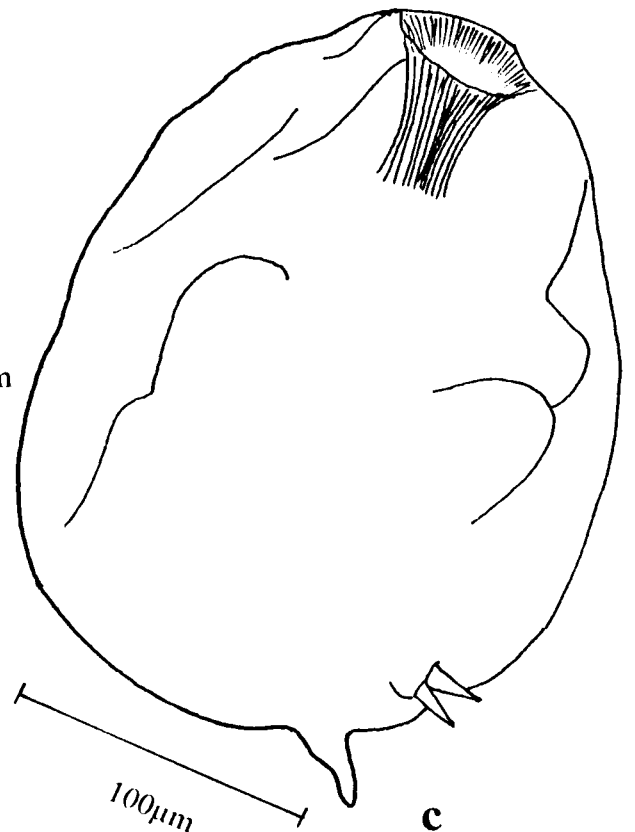
e . *Notommata pachyura* (Gosse) *f. triangulata* Kirkman, trophi



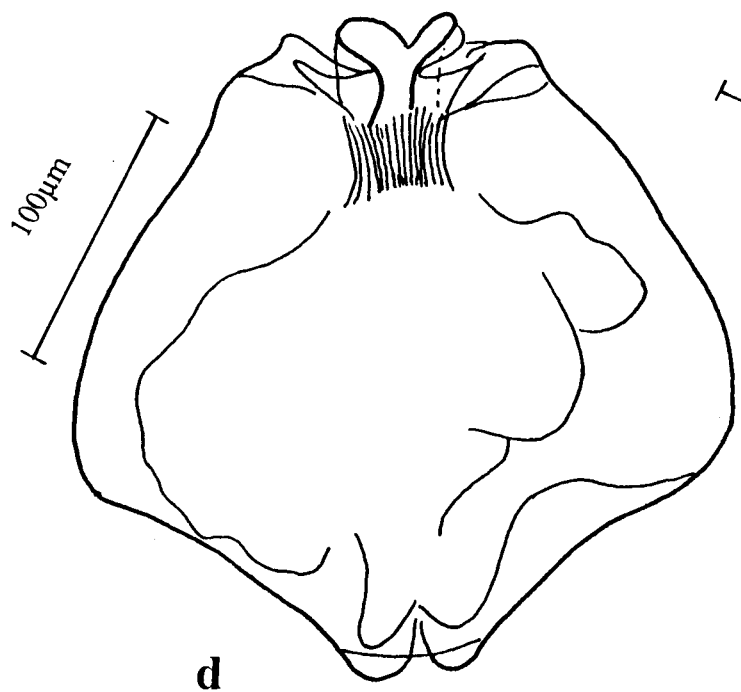
a



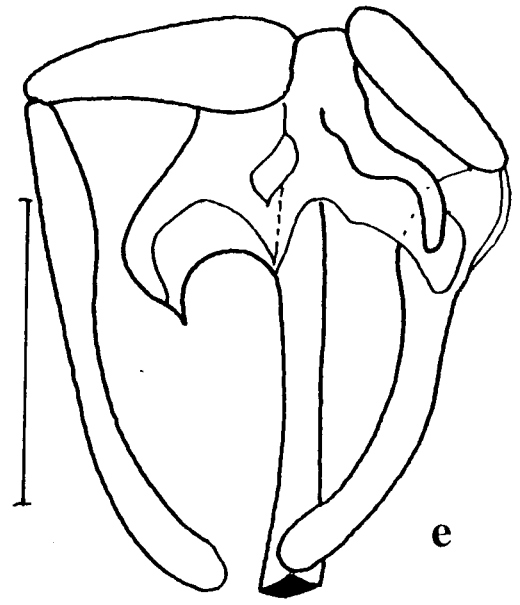
b



c



d



e

Plate-30

Plate -31

Figs:

- a. *Notommata saccigera* Ehrenberg
- b. *Notommata saccigera* Ehrenberg, trophi
- c. *Monommata arndti* Remane
- d. *Scaridium longicaudum* (O.F. Muller)

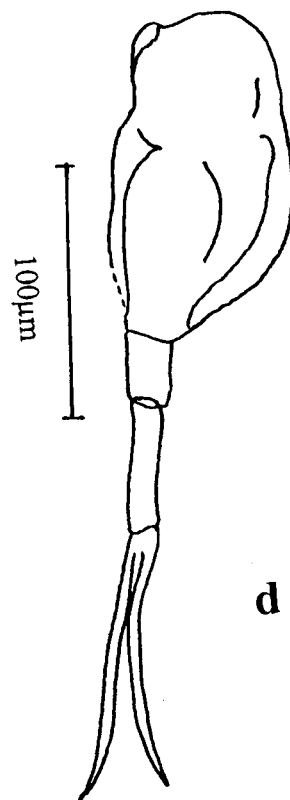
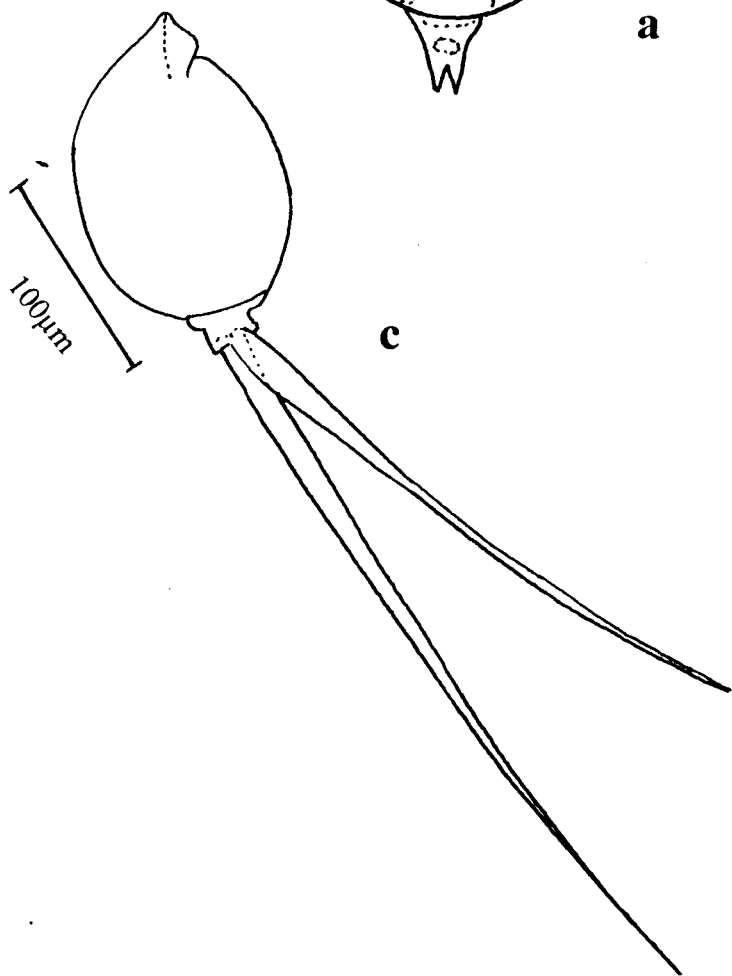
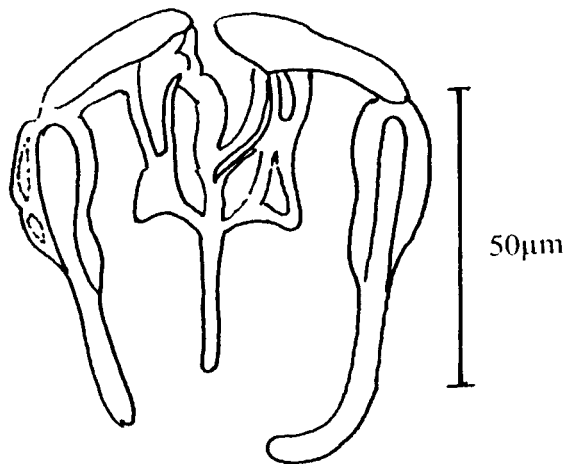
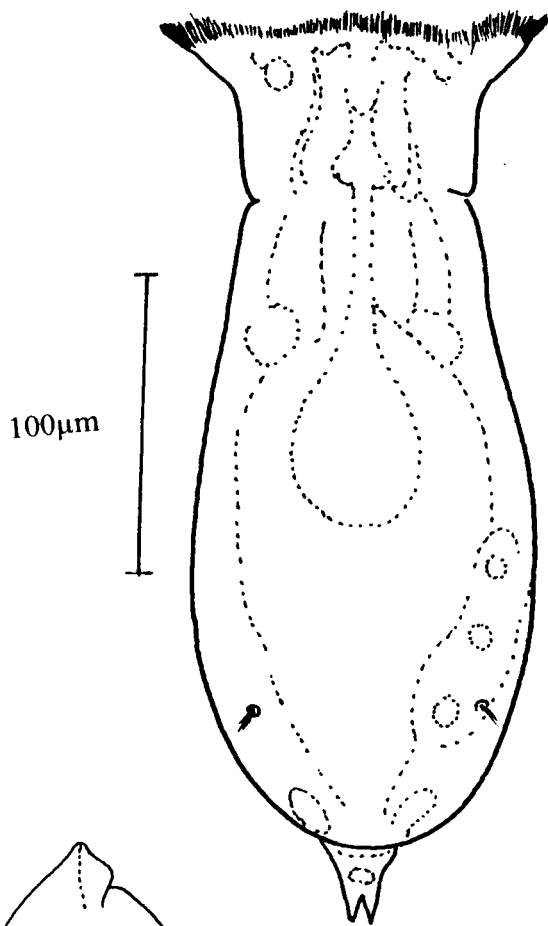


Plate-31

Plate -32

Figs:

- a . *Trichocerca bicristata* (Gosse)
- b . *Trichocerca bicristata* (Gosse) ,posterior region
- c . *Trichocerca bicristata* (Gosse),trophi
- d. *Trichocerca braziliensis* (Murray)
- e. *Trichocerca braziliensis* (Murray) ,trophi
- f. *Trichocerca cylindrica* (Imhof)
- g. *Trichocerca cylindrica* (Imhof), trophi

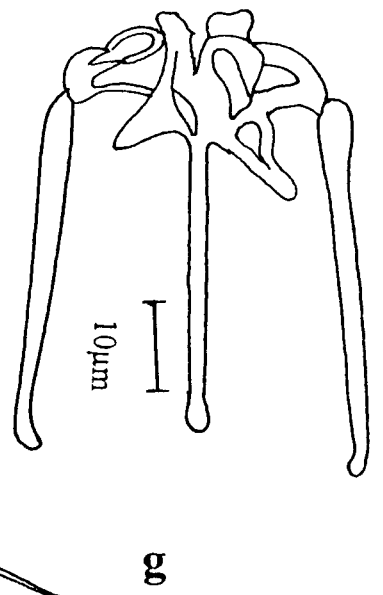
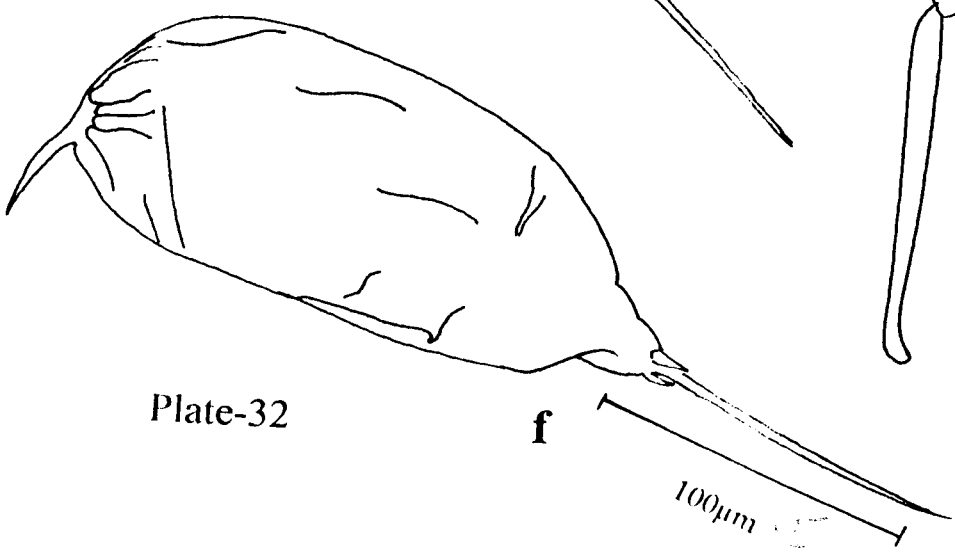
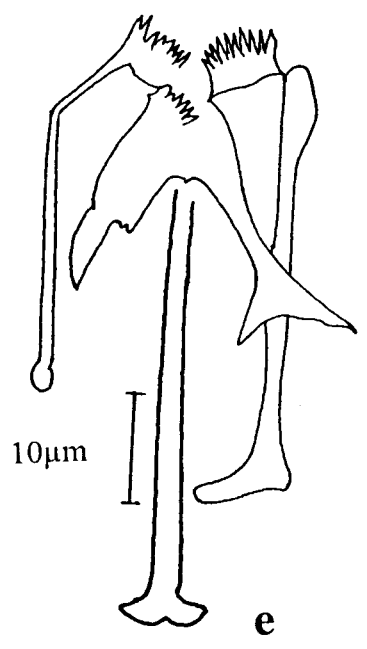
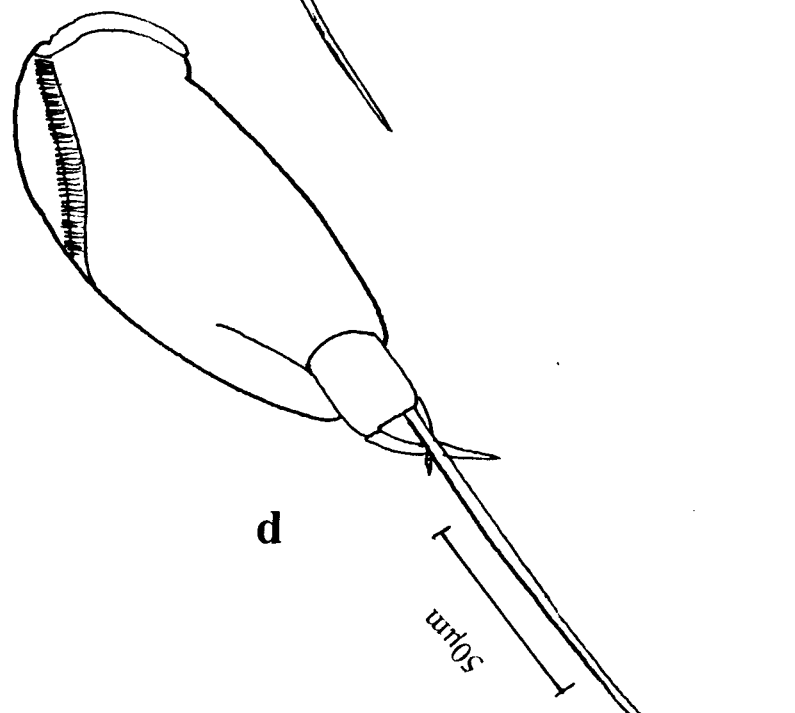
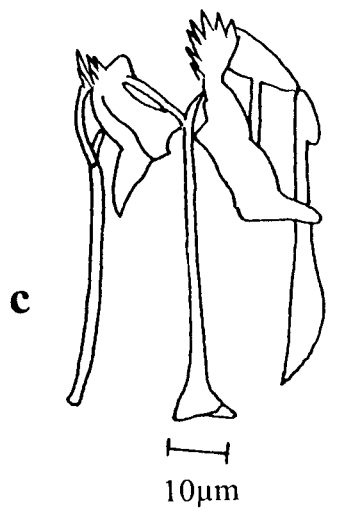
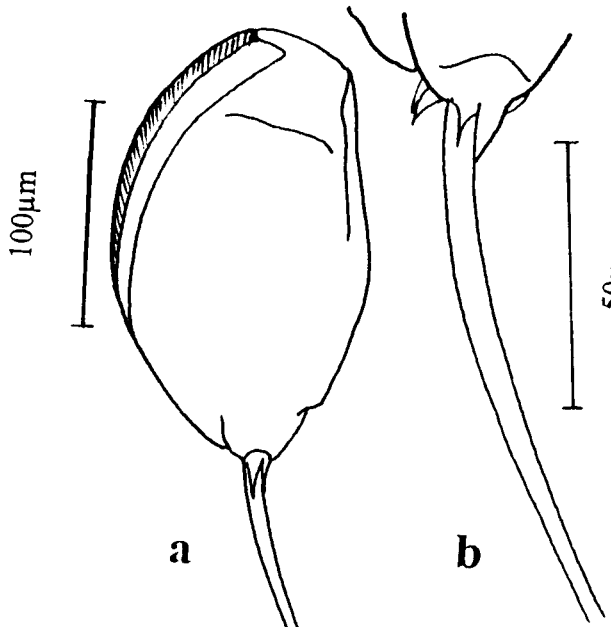
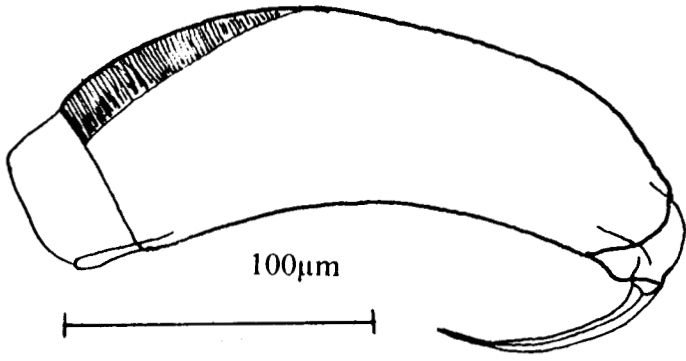


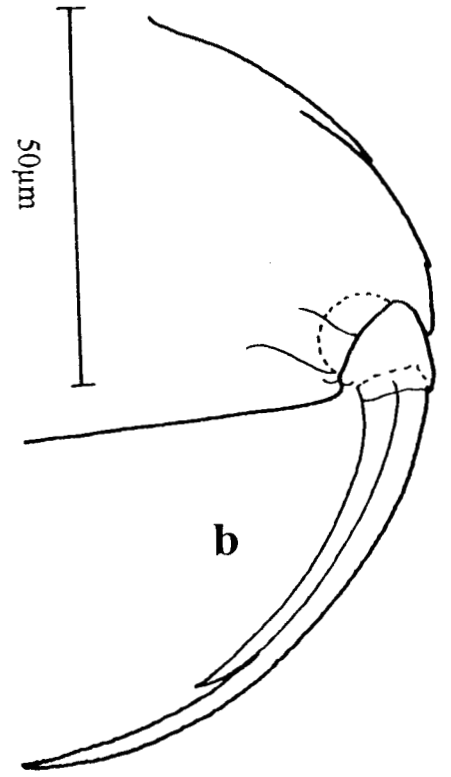
Plate -33

Figs:

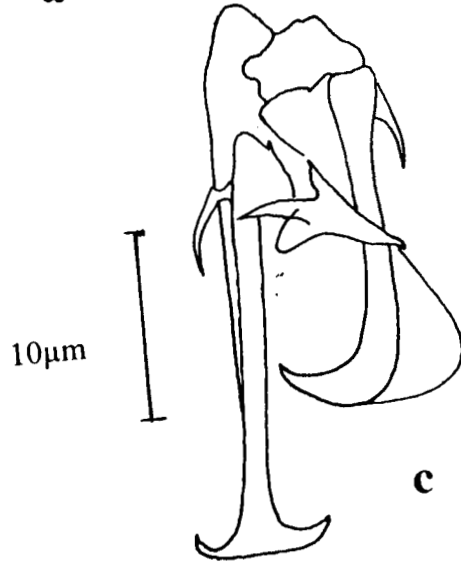
- a . *Trichocerca kostei* Segers
- b . *Trichocerca kostei* Segers, posterior region
- c. *Trichocerca kostei* Segers, trophi
- d . *Trichocerca pusilla* (Lauterborn)
- e. *Trichocerca pusilla* (Lauterborn), trophi
- f. *Trichocerca pusilla* (Lauterborn), posterior region.



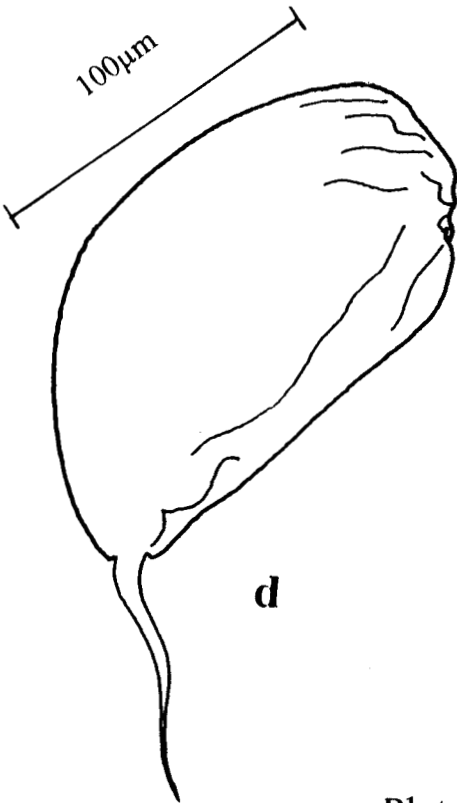
a



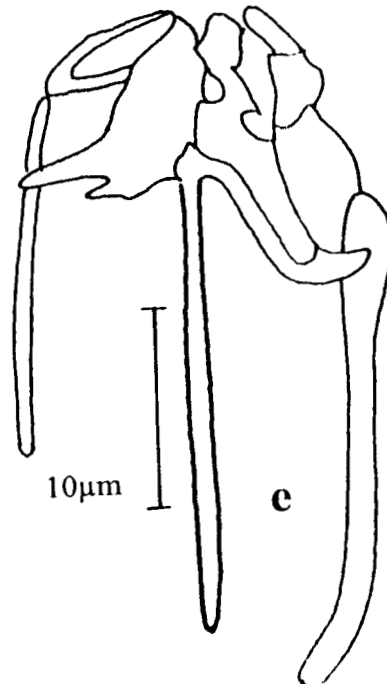
b



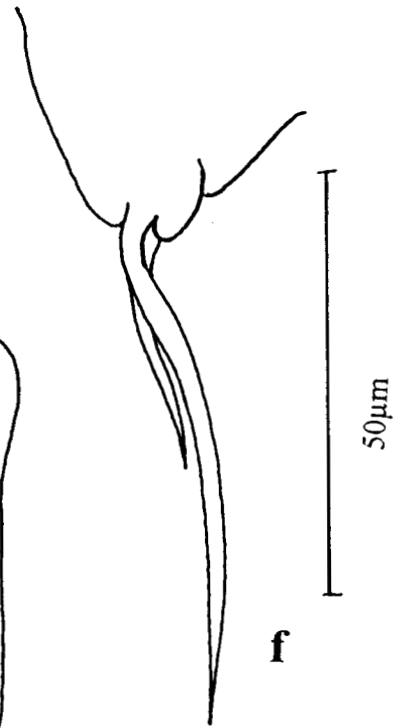
c



d



e



f

Plate -34

Figs:

- a . *Trichocerca similis* (Wierzejski)
- b . *Trichocerca similis* (Wierzejski), trophi
- c . *Trichocerca weberi* (Jennings)
- d. *Trichocerca weberi* (Jennings), trophi

A483

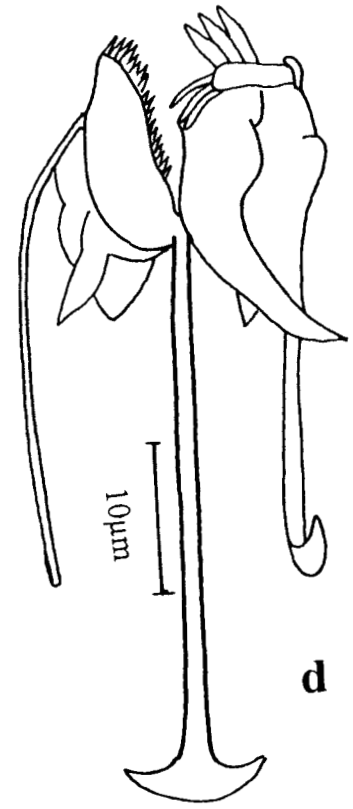
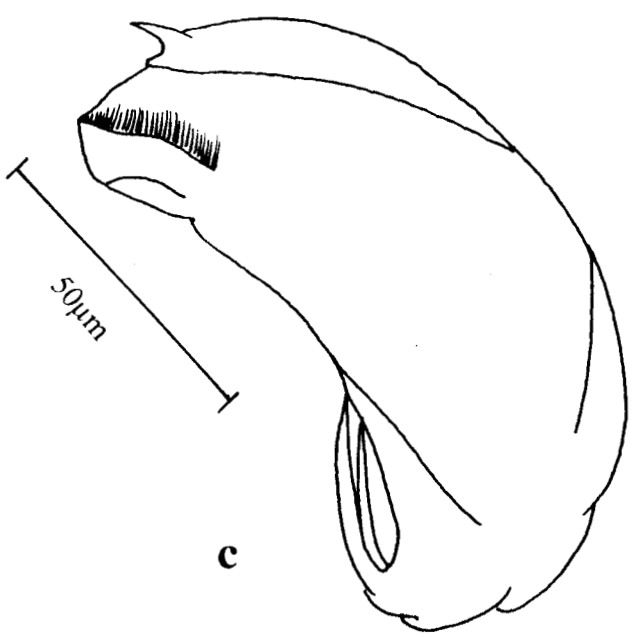
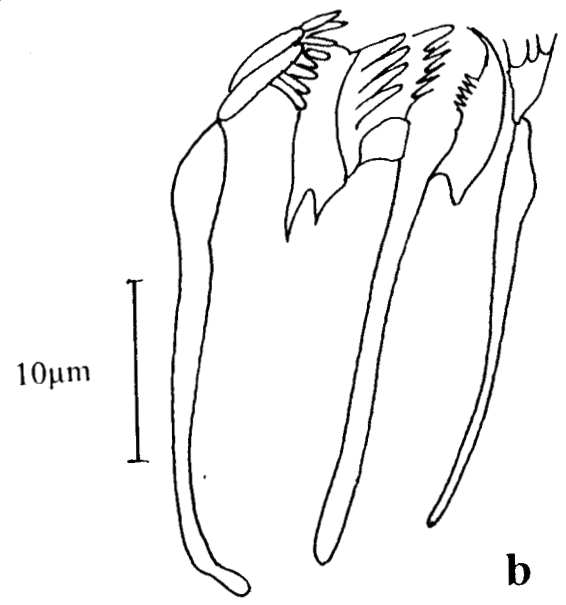
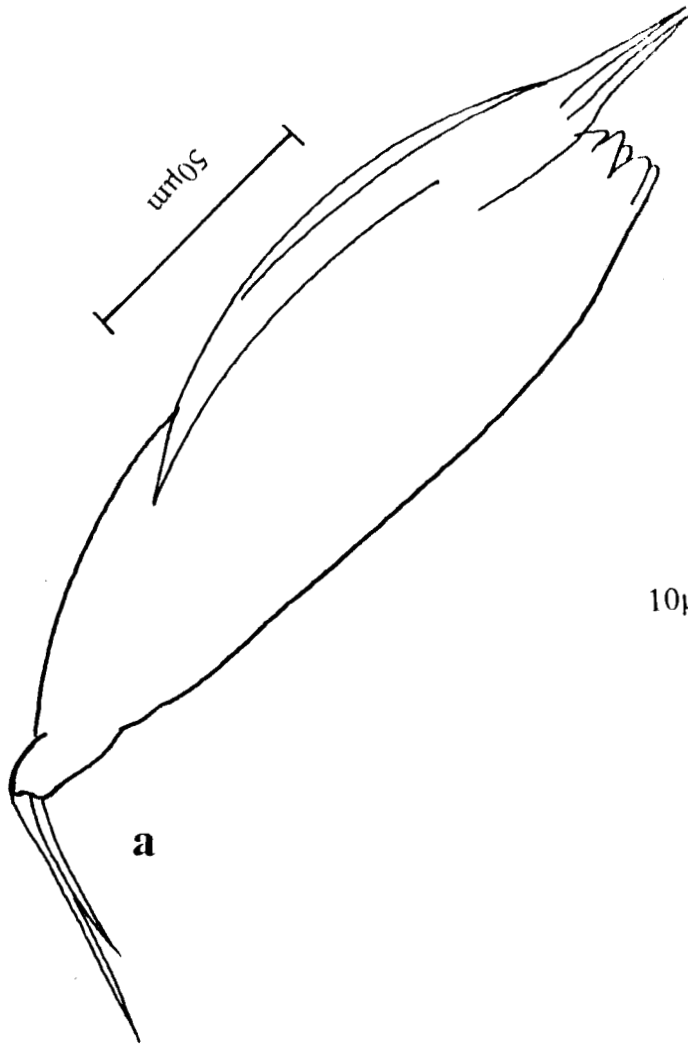


Plate- 34

Plate -35

Figs:

a . *Polyarthra vulgaris* Carlin

b . *Asplanchna brightwelli* (Gosse)

c. *Asplanchna brightwelli* (Gosse) , trophi

d . *Dicranophorus epicharis* Haring & Myers

e. *Dicranophorus epicharis* trophi

f. *Dicranophorus grandis* Haring

045

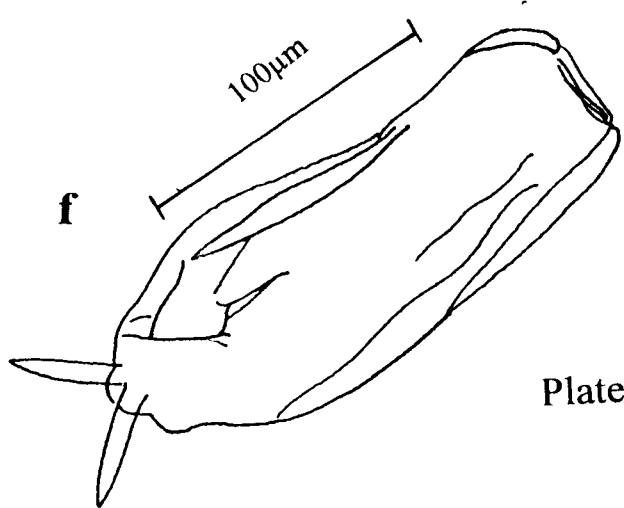
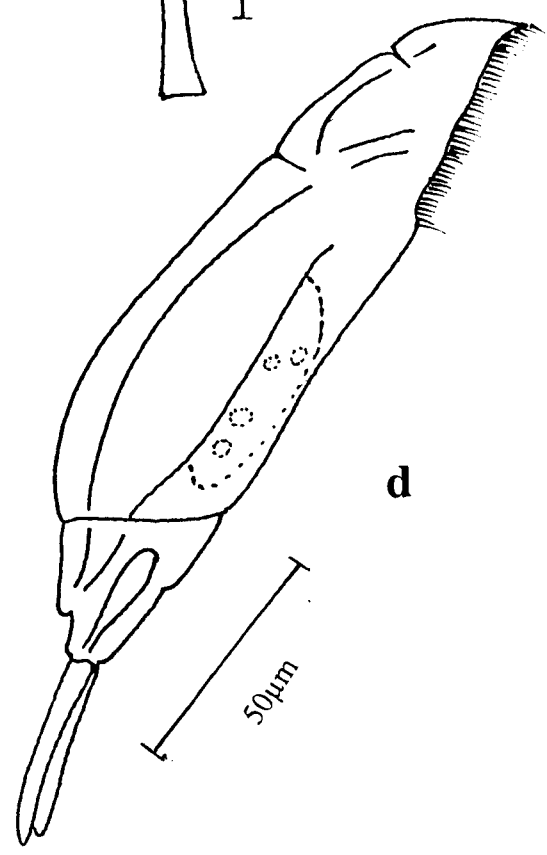
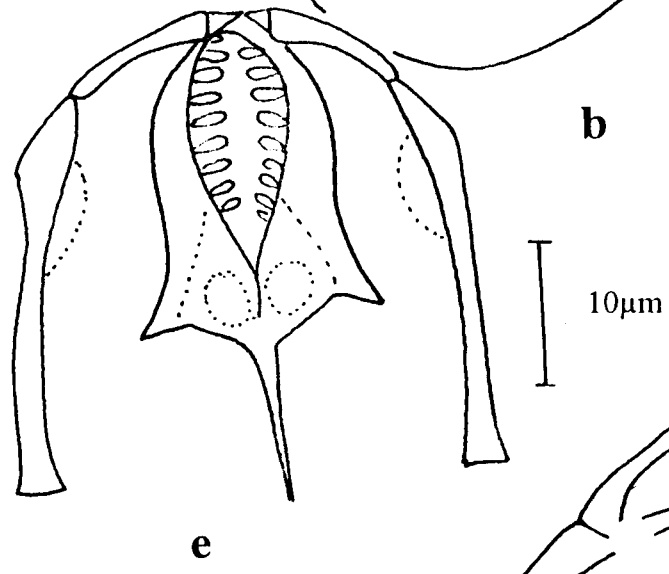
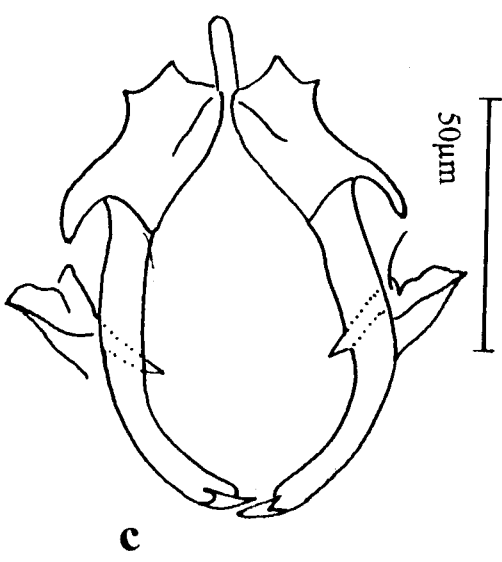
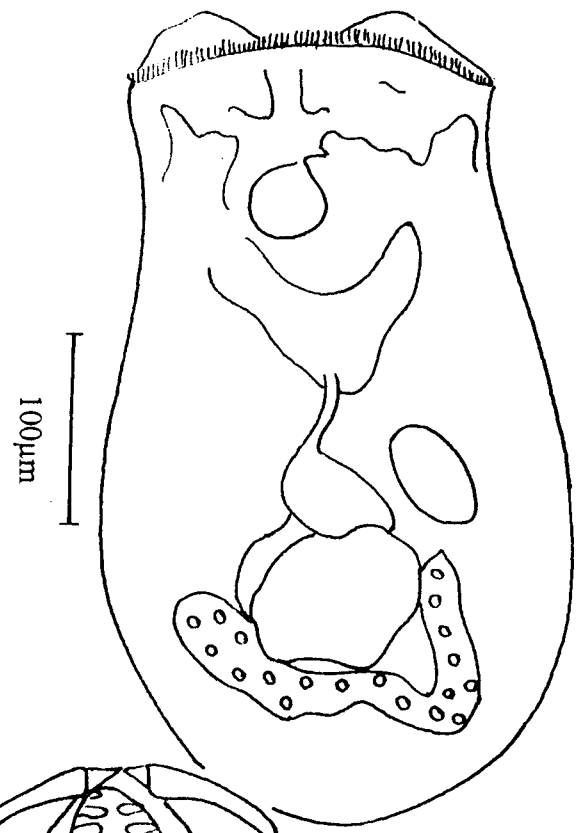
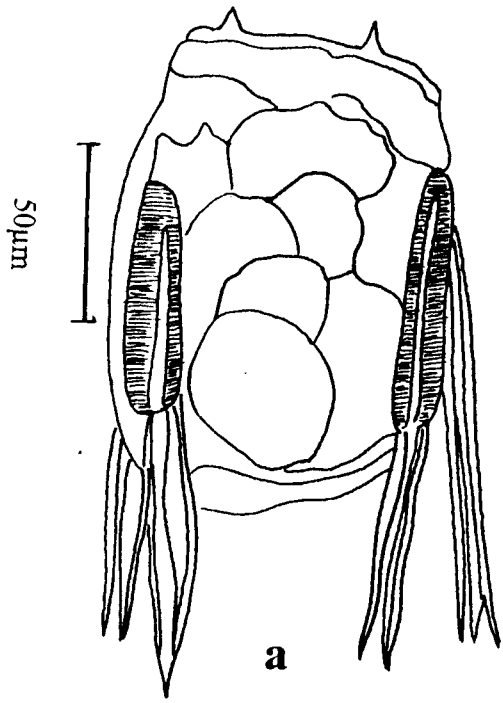


Plate-35

Plate -36

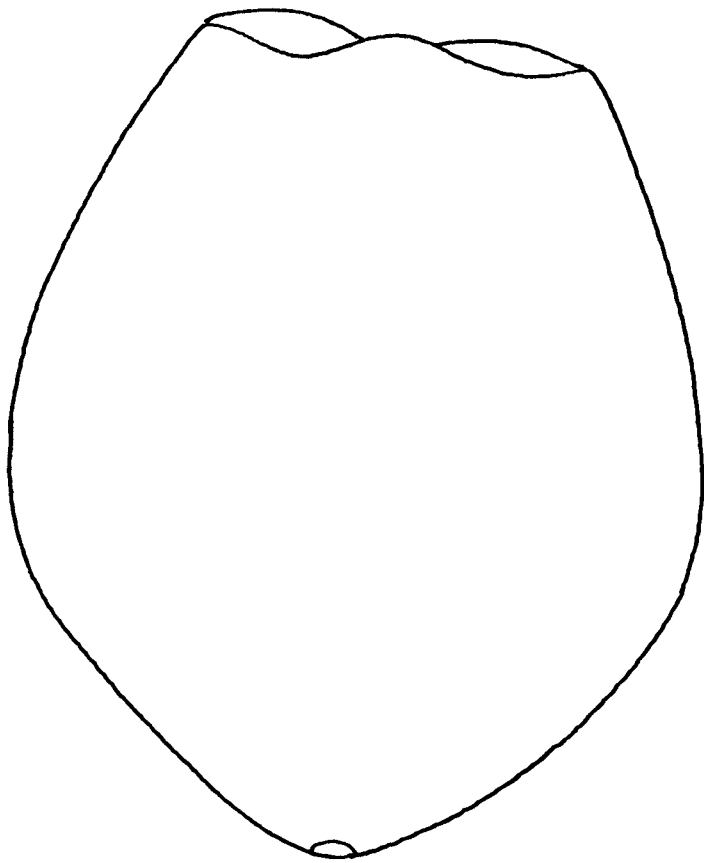
Figs:

a . *Pompholyx sulcata* Hudson

b . *Testudinella emarginula* (Stenroos)

c. *Testudinella patina* (Hermann)

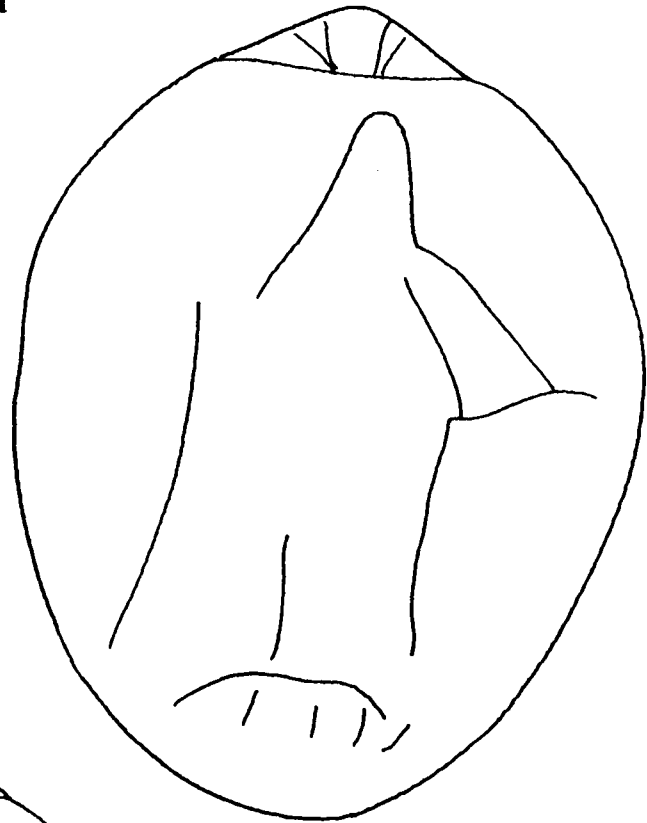
A4P7



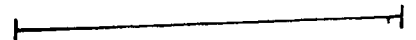
a



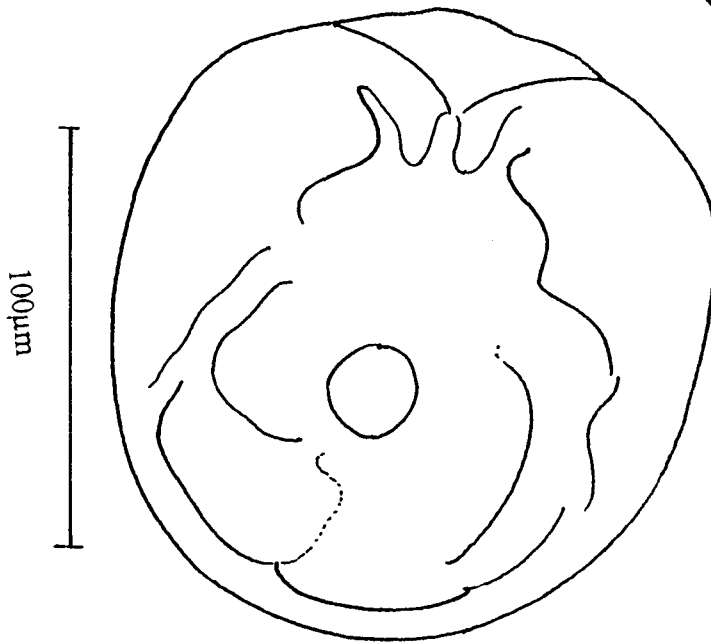
25μm



b



50μm



100μm

c

Plate-36

Plate -37

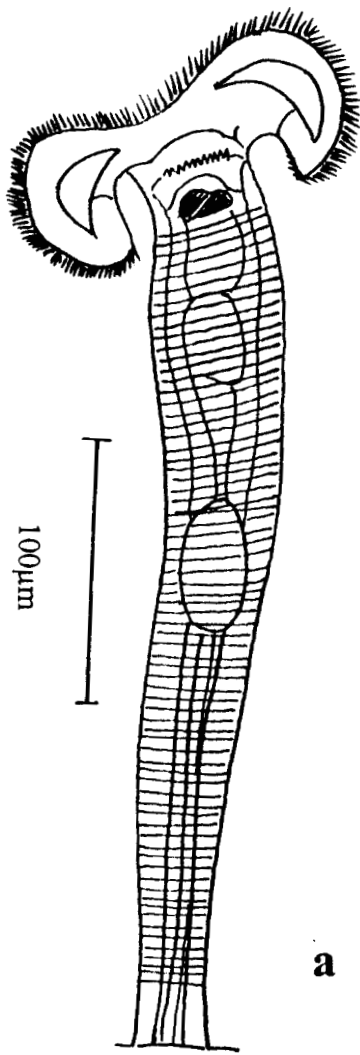
Figs:

a . *Limnias melicerta* Weisse

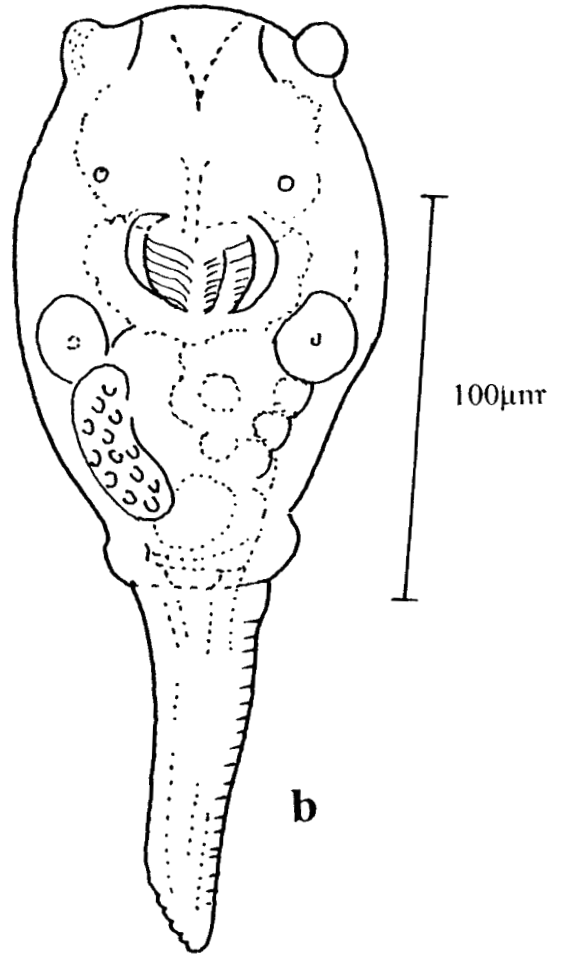
b . *Sinantherina semibullata* (Thorpe)

c . *Hexarthra intermedia* (Wiszniewski)

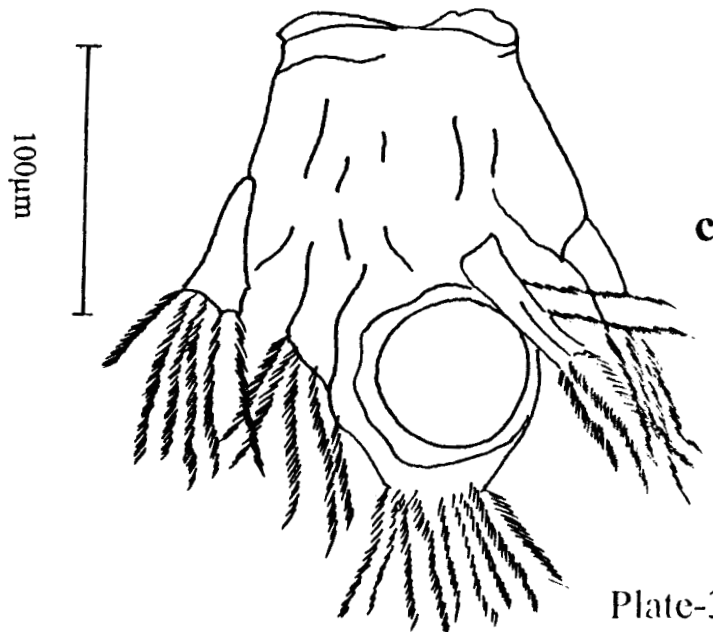
A49



a



b



c

Plate-37

Plate -38

Figs:

a . *Filinia camascela* Myers

b . *Filinia longiseta* (Ehrenberg)

c . *Filinia opoliensis* (Zacharias)

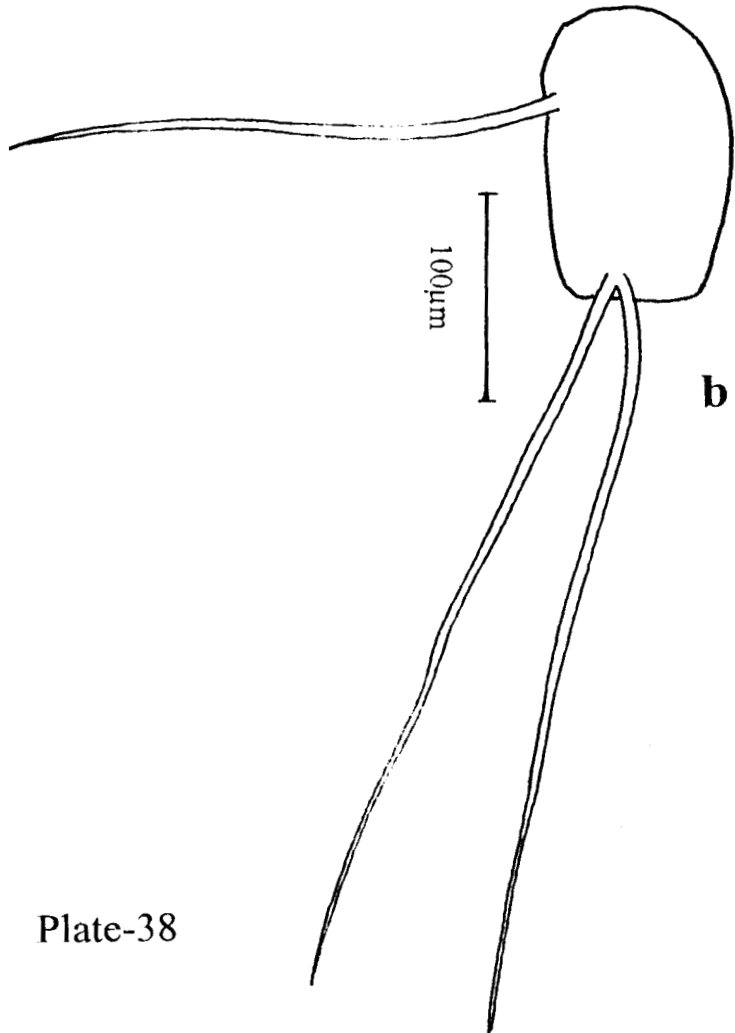
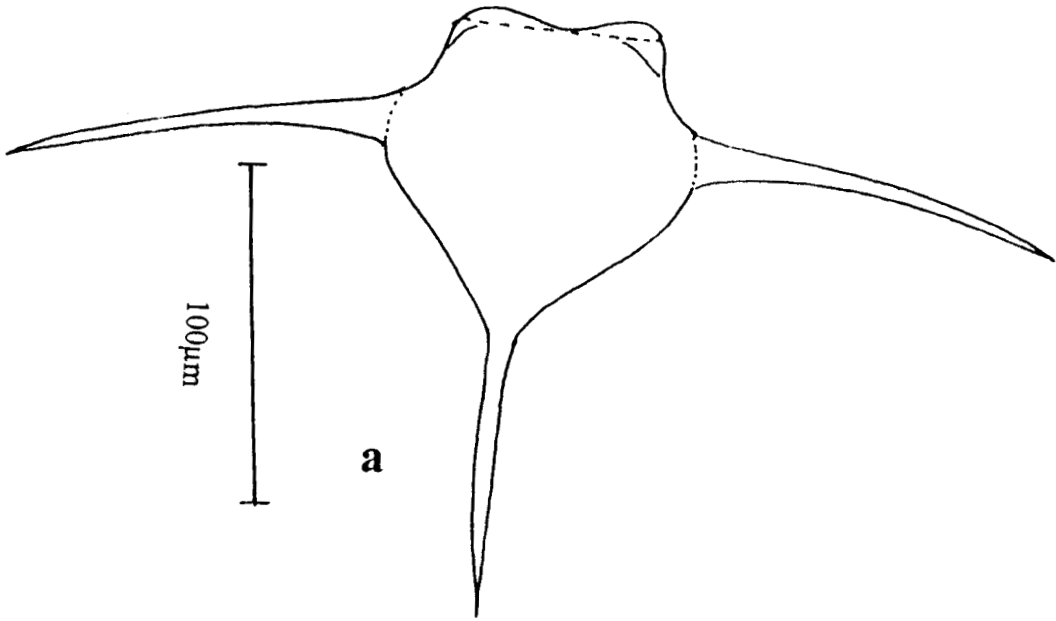
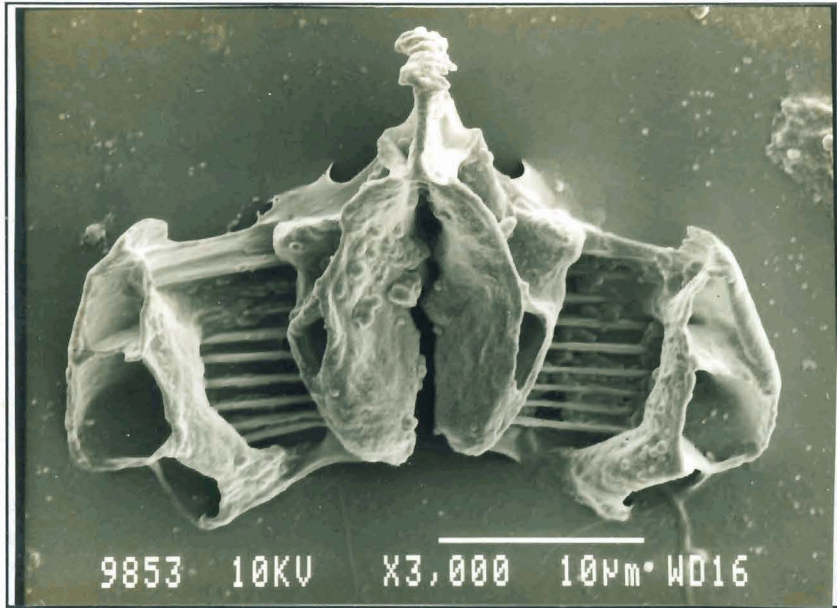
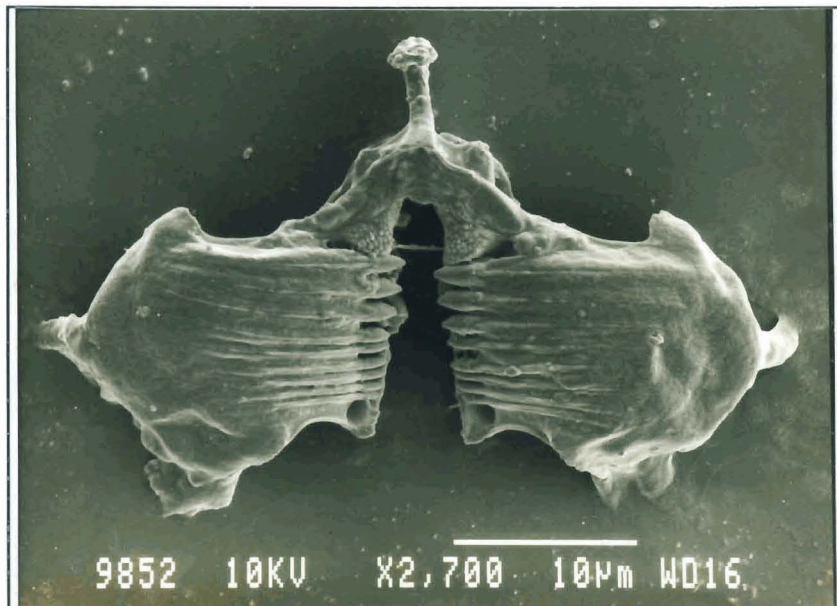


Plate-38



SEM Photograph of Trophi of *Hexarthra intermedia*
Dorsal view

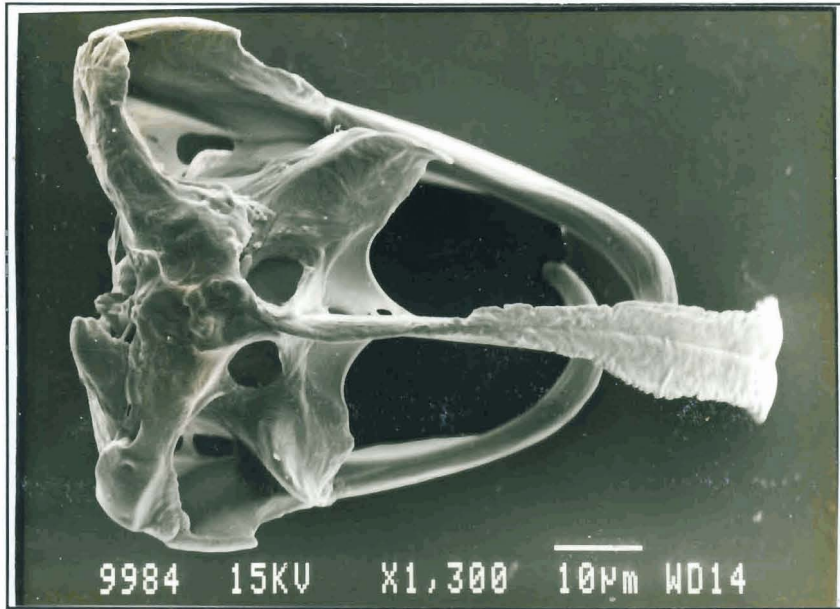
A



SEM Photograph of Trophi of *Hexarthra intermedia*
Ventral view

B

Plate 39



SEM Photograph of Trophi of *Notommata copeus*
Dorsal view

C



SEM Photograph of Trophi of *Lecane unguolata*
Dorsal view

D

Plate 40

A54



SEM Photograph of Trophi of *Epiphanes clavulata*
Dorsal view

E
Plate 41

NB 2995



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592.52176

FRA/S