

## On species of genus *Lepadella* (Eurotatoria: Monogononta: Colurellidae) from North-Eastern India, with remarks on Indian taxa

B. K. Sharma & Sumita Sharma<sup>1</sup>

Department of Zoology, North-Eastern Hill University, Shillong-793014, INDIA

<sup>1</sup>Zoological Survey of India, Risa Colony, Shillong-793003, INDIA

Keywords: *Lepadella*, North-Eastern India, new taxa, Indian species, distribution.

### Abstract

Ten species of *Lepadella* Bory de St. Vincent, 1826, including one new species and one new form, are documented from North-Eastern India. Two of these species are new records from this country and six are new reports from N.E. region. Comments are also made on the status and distribution of various Indian taxa.

### Introduction

Very little is known about the distribution of Indian species of the genus *Lepadella*. The only significant previous contributions to this field are those of Edmondson & Hutchinson [1934], Wulfert [1966], Vasisht & Battish [1971] and Sharma [1978].

This communication is part of a wider investigation of the rotifer fauna of North-Eastern India. It deals with ten species of the genus *Lepadella* (Syn. *Eulepadella* Hauer 1926), including descriptions of a new species and one new form. Two species are new records from this country and six are new to North-Eastern region. In all, eighteen species are so far known from India. The various taxa examined are illustrated and commented upon. Additional comments are made about other Indian taxa and on the distribution of each species.

### Material and methods

The material for this study was collected from various localities in North-Eastern region (Fig. 1). The specimens were preserved in 5% formalin and mounted in Polyvinyl-lactophenol for detailed ex-

amination. All drawings, except cross-sections, were made with a camera lucida. Measurements are given in micrometers ( $\mu\text{m}$ ).

### Systematic account

The genus *Lepadella* is divided into three subgenera – *Lepadella* (Syn. *Eulepadella* Hauer 1926), *Heterolepadella* Bartos 1955, and *Xenolepadella* Hauer 1926 which have equally long and free toes, unequal and free toes, and partly fused toes respectively [Kutikova, 1970; Koste, 1978]. All of the taxa examined from North-Eastern region, and those previously reported from India [Edmondson & Hutchinson, 1934; Naidu, 1967; Nayar, 1968; Wulfert, 1966; Nayar & Nair, 1969; Vasisht & Gupta, 1967; Vasisht & Battish, 1971; Sharma, 1976, 1978, 1980a, 1980b; Sharma & Sharma, 1984; Sharma & Sharma, in press], belong to the first two subgenera.

### Taxonomic notes on taxa from the North-Eastern region

Subgenus: *Lepadella* (Syn. *Eulepadella* Hauer 1926)

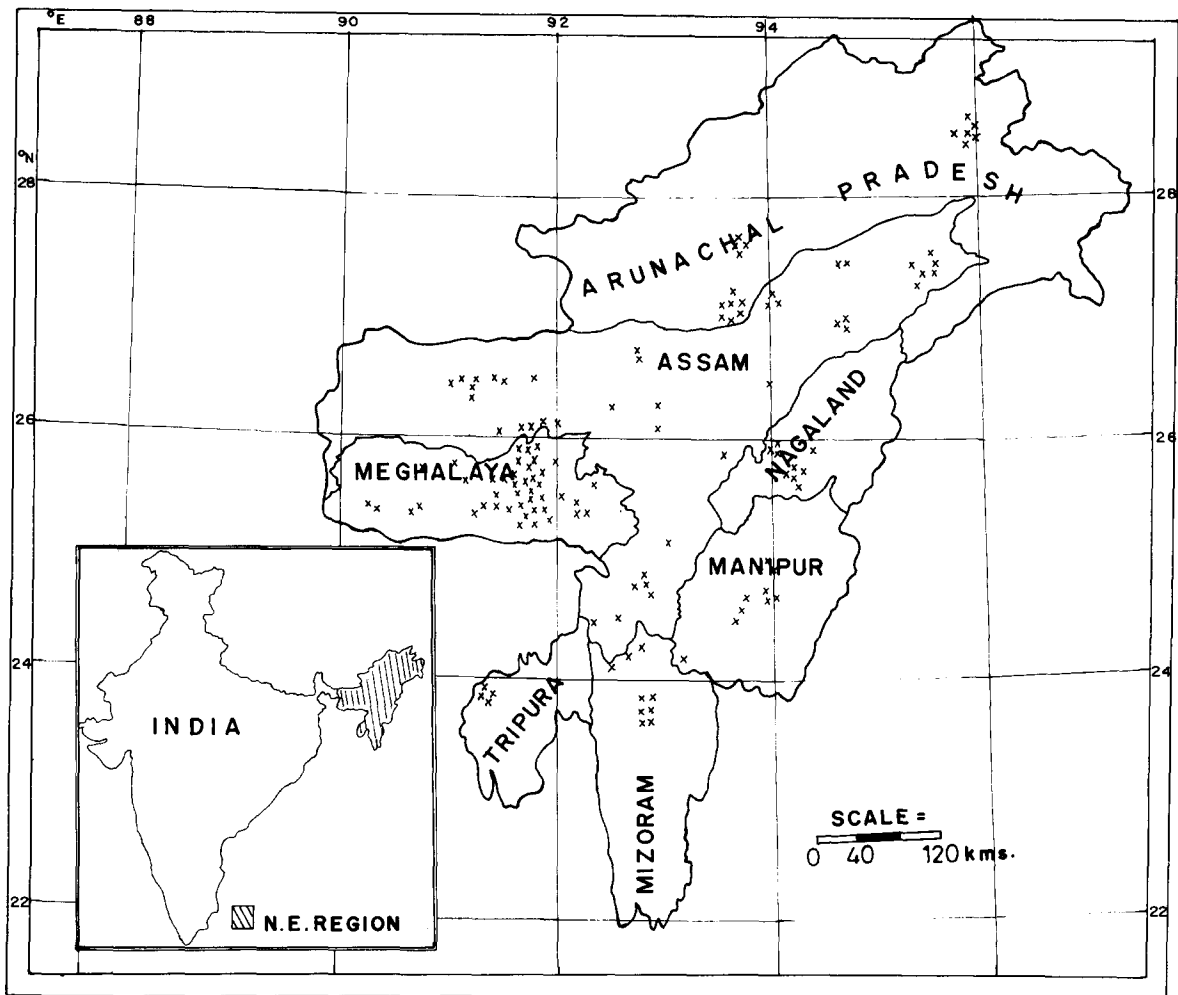


Fig. 1. Map of North-Eastern India showing sites of collection. (inset map of India, indicating North-Eastern region).

*Lepadella acuminata* (Ehrenberg 1834) (Figs. 2, 3)

**Material:** Meghalaya, Assam, Arunachal Pradesh

**Characteristics:** Posterior pointed projection of variable length.

**Measurements:** Lorica length 94–104; maximum width 58–66; anterior width 24–32; toes 22–26.

**Distribution:** Nilgiri Hills, West Bengal and Assam.

*Lepadella cristata* (Rousselet 1893) (Figs. 4–6)

**Material:** Meghalaya

**Characteristics:** Lorica with a dorsal median keel and an anterior backwardly directed crest.

**Measurements:** Lorica length 92–108; maximum width 68–70; dorsal crest 66–78; toes 28–35.

**Distribution:** New record for India.

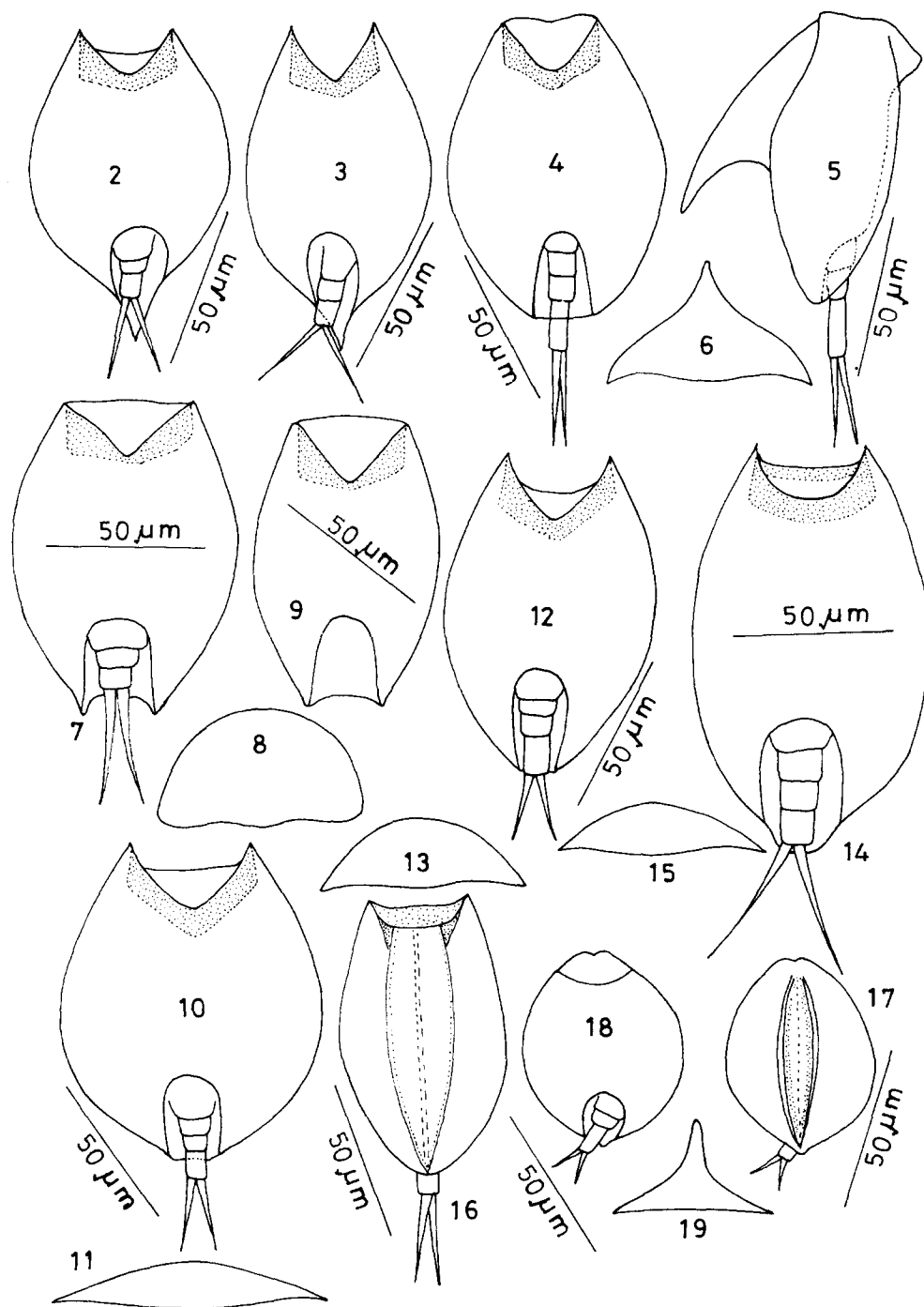
*Lepadella dactyliseta* (Stenroos 1898) (Figs. 7–9)

**Material:** Meghalaya

**Characteristics:** Dorsal plate semicircular in cross-section. Lorica produced posteriorly into distinct widely separated corners. Foot-groove almost parallel. Foot small; toes elongated and pointed.

**Measurements:** Lorica length 78–100; maximum width 54–68; anterior width 30–40; toes 24–36.

**Distribution:** New record for India.



Figs. 2–19; 2, 3: *Lepadella acuminata* (Ehrb.), ventral views; 4–6: *Lepadella cristata* (Rousselet), ventral view, lateral view and cross-section; 7–9: *Lepadella dactyliseta* (Stenroos), ventral view, cross-section, lorica (ventral view); 10, 11: *Lepadella ovalis* (Müller), ventral view and cross-section; 12, 13: *Lepadella patella* (Müller), ventral view and cross-section; 14, 15: *Lepadella patella* f. *elongata* new form, ventral view and cross-section; 16: *Lepadella rhomboides* (Gosse), dorsal view; 17–19: *Lepadella triptera* Ehrb., dorsal view, ventral view and cross-section.

*Lepadella ovalis* (Müller 1786) (Figs. 10, 11)

**Material:** Meghalaya, Assam, Nagaland, Mizoram, Manipur, Arunachal Pradesh, Tripura

**Characteristics:** Lorica oval to circular in outline; compressed dorso-ventrally. Examined specimens smaller than those from West Bengal and Orissa.

**Measurements:** Lorica length 90–112; maximum width 68–84; anterior width 24–36; toes 22–26.

**Distribution:** Widely distributed, reported previously from Kashmir, Ladak, Panjab, Haryana, Kerala, West Bengal, Orissa and Assam.

*Lepadella patella* (Müller 1773) (Figs. 12, 13)

**syn.:** *L. similis* Lucks: Naidu 1967, p. 386, Plate II, Fig. 7

**Material:** Meghalaya, Assam, Nagaland, Mizoram, Manipur, Arunachal Pradesh, Tripura

**Characteristics:** Differs from *L. ovalis* by the small size of lorica and strongly arched dorsal plate. Present specimens smaller than those reported elsewhere from this country. *L. similis* reported from Andhra Pradesh [Naidu, 1967] is apparently synonymous with *L. patella*.

**Measurements:** Lorica length 75–108; maximum width 58–74; anterior width 22–30; toes 20–26.

**Distribution:** Kashmir, Ladak, Panjab, Gujarat, Rajasthan, West Bengal, Orissa and Assam.

*Lepadella patella* f. *elongata* **new form** (Figs. 14, 15)

**Material examined:** 3 parthenogenetic females (on slides), Regd. No. R. NE 101/3, Department of Zoology, North-Eastern Hill University, Shillong. Loc.: Khanduli, Jaintia Hills, Meghalaya State. Date: 18.3.1984. Coll.: B. K. Sharma

**Characteristics:** Differs from *L. patella* f. *elongata* (Ehrb. 1834) in (i) lorica relatively elongated; (ii) anterior sinus broader; and (iii) toes elongated.

**Measurements:** Lorica length 128; maximum width 75; anterior width 36; foot 38; toes 42.

*Lepadella rhomboides* (Gosse 1884) (Fig. 16)

**Material:** Meghalaya, Assam, Nagaland, Manipur, Mizoram

**Characteristics:** Lorica broadly ovate; dorsal median keel broad, forming a faint median ridge.

**Measurements:** Lorica length 84–90; maximum width 52–56; toes 24–26.

**Distribution:** Panjab, Gujarat, Nilgiri Hills, West Bengal, Orissa and Assam.

*Lepadella triptera* Ehrenberg 1830 (Figs. 17–19)

**syn.:** *L. crestata* n.sp. Vasisht & Battish 1971, p. 191, Figs. 7–9 *L. crestata* Vasisht & Battish: Sharma 1976, p. 257.

**Material:** Meghalaya, Assam

**Characteristics:** Lorica almost circular and with slightly produced posterior end. Present specimens longer than those from West Bengal.

**Measurements:** Lorica length 58–62; maximum width 48–50; toes 12–14.

**Distribution:** Ladak, Nilgiri Hills, Panjab and West Bengal.

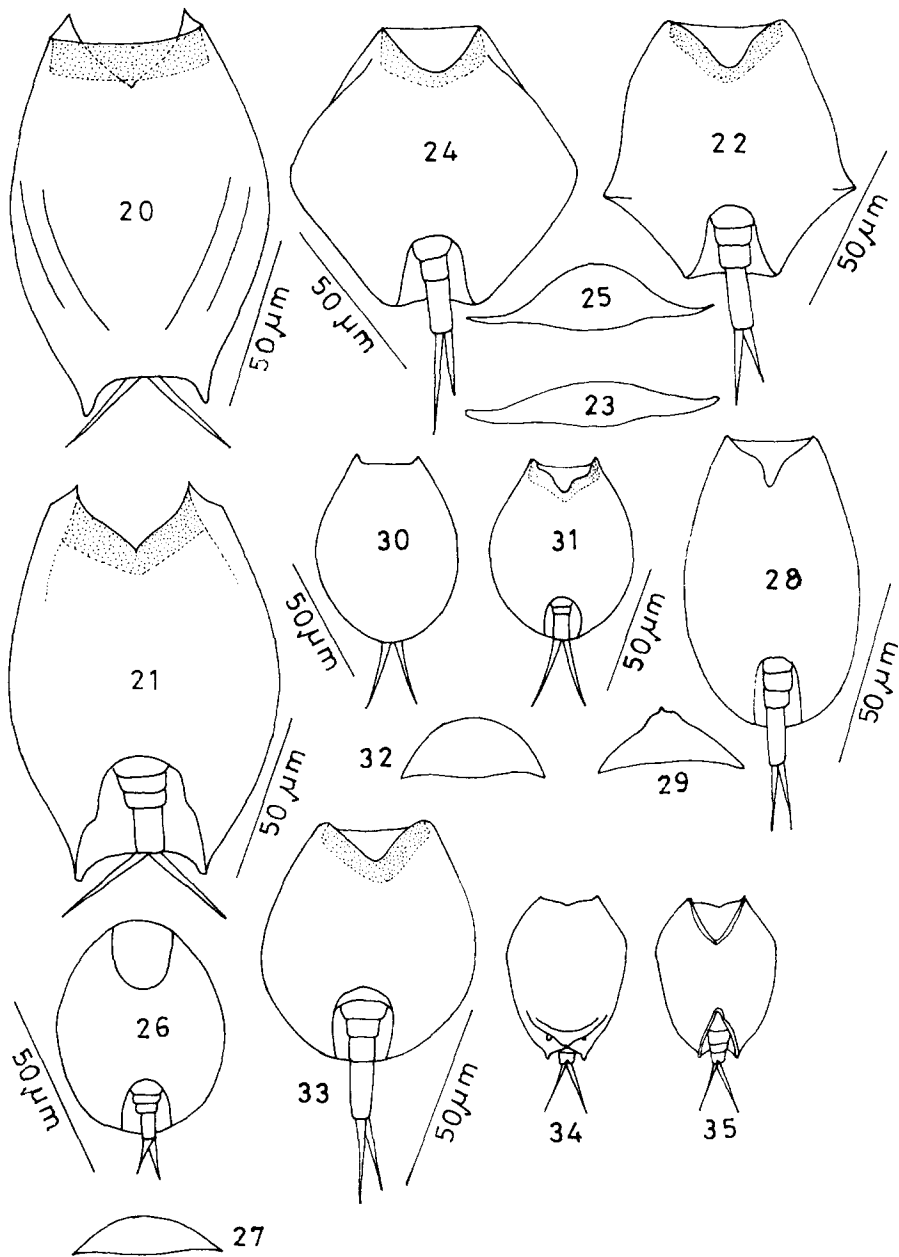
*Lepadella nartiangensis* **new species** (Figs. 20, 21)

**Holotype** (on slide): Regd. No. R. NE. 102/1, Department of Zoology, North-Eastern Hill University, Shillong. Loc.: Nartiang, Jaintia Hills, Meghalaya State. Date: 21.9.1984. Coll.: B. K. Sharma

**Paratype** (on slide): Regd. No. R. NE. 103/1, other details as per Holotype.

**Description:** Lorica elongate-oval in outline, moderately compressed dorso-ventrally. Anterior dorsal sinus broad, slightly concave and with a broad collar. Anterior ventral sinus deep and V-shaped, with a stippled collar and flanked with two triangular spines at its external angles. Posterior end of lorica almost straight and produced into two widely separated and posteriorly projecting blunt ends. Foot-groove characteristic, almost semi-circular for about first half of its length, then broadening out and diverging to posterior projections of lorica. Foot three-jointed, not projecting beyond lorica; last foot-joint longest. Toes moderately long and acutely pointed.

**Measurements:** Lorica length 118; maximum width 76; anterior width (ventral sinus) 34; anterior width (dorsal sinus) 45; length foot-groove 35;



Figs. 20–35; 20, 21: *Lepadella nartiangensis* new species, dorsal view and ventral view; 22, 23: *Lepadella (H.) ehrenbergi* (Perty), ventral view, and cross-section; 24, 25: *Lepadella (H.) heterostyla* (Murray), ventral view and cross-section; 26, 27: *Lepadella aspida* Haring, ventral view and cross-section [after Sharma & Sharma, 1984]; 28, 29: *Lepadella imbricata* Haring, ventral view and cross-section [after Sharma, 1978]; 30–32: *Lepadella longiseta* Myers, dorsal view, ventral view and cross-section [after Sharma, 1980b]; 33: *Lepadella (H.) aspicora* Myers, ventral view [after Sharma, 1978]; 34, 35: *Lepadella kostei* Wulfert, dorsal view and ventral view [after Wulfert, 1966].

maximum width foot-groove 35; foot 28; toes 30.

*Remarks:* Broadly resembles with *L. latusinus* (Hilgendorf 1899) but differs from this species as: (i) lorica elongated; (ii) characteristic shape of the anterior end; (iii) distinct shape of the foot-groove.

Subgenus: *Heterolepadella* Bartos 1955

*Lepadella (H.) ehrenbergi* (Perty 1850) (Figs. 22, 23)

*Material:* Meghalaya, Assam, Nagaland

*Characteristics:* Lorica produced laterally into two broad triangular spines. Posterior end of lorica of the examined specimens broader than those reported from West Bengal.

*Measurements:* Lorica length 70–84; maximum width 72–84; anterior width 28–38; right toe 22–26, left toe 18–22.

*Distribution:* West Bengal.

*Lepadella (H.) heterostyla* (Murray 1913) (Figs. 24, 25)

*Material:* Meghalaya, Assam, Mizoram

*Characteristics:* Lorica rhomboidal, with its edges curving upwards from the blunt lateral angles. Anterior width variable in the studied material.

*Measurements:* Lorica length 78–82; maximum width 70–82; anterior width 26–38; right toe 24–26; left toe 18–22.

*Distribution:* West Bengal.

#### *Notes on other Indian taxa*

Of the other Indian taxa of this genus, *Lepadella aspida* (Figs. 26, 27), *L. imbricata* (Figs. 28, 29), *L. longiseta* (Figs. 30–32) and *L. (H.) aspicora* (Fig. 33) can be clearly distinguished. However, some other interesting taxa are commented on below.

*Lepadella kostei* Wulfert 1966 (Figs. 34, 35)

*Material:* Locality – Nimeta water works, Baroda (Gujarat).

*Type specimens:* not designated

*Characteristics:* Distinguishable by the general outline and the distinct shape of the posterior end.

*Measurements:* Lorica length 75; maximum width 56; toes 23.

*Distribution:* Gujarat.

*Lepadella bicornis* Vasisht & Battish 1971 (Figs. 36, 37)

*Material:* Locality – Govt. Fish Farm Tanks, Chandigarh (U.T.)

*Type specimens:* not designated.

*Characteristics:* Closely resembles with *L. (H.) heterostyla* but has toes of equal length. Specimens were not presently available for examination of the toes. Hence, the status of this species needs further confirmation.

*Measurements:* Lorica length 76; maximum width 78; toes 24–26.

*Distribution:* Chandigarh (U.T.).

*Lepadella ovalis* f. *larga* Sharma 1978 (Figs. 38–40)

*L. ovalis* f. *larga* **new form:** Sharma 1978, p. 85, Figs. 19–21.

*Material:* 2 specimens (on slides), Regd. Nos. P. 3021/1 & P. 3022/1, Zoological Survey of India, Calcutta. Loc.: Maheshtala, 24-Parganas (West Bengal). Date: 13.12.1976. Coll.: B. K. Sharma

*Characteristics:* Differs from *L. ovalis* in (i) lorica broader than its length; (ii) dorsal plate more arched; (iii) shape of posterior margin of lorica; and (iv) shape of the foot-groove.

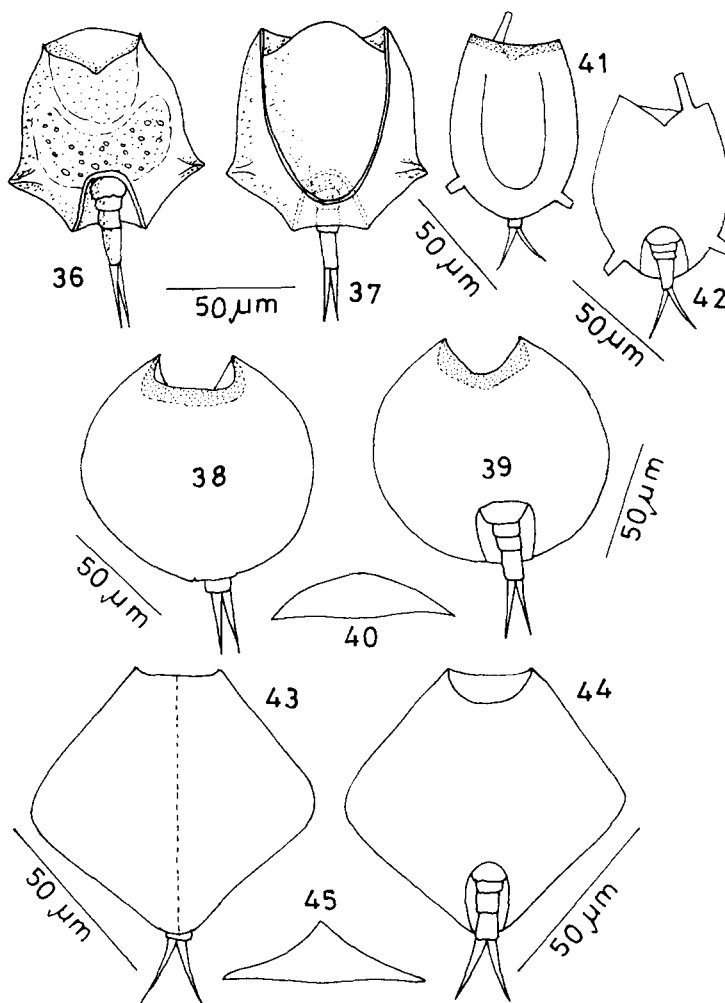
*Measurements:* Lorica length 94; maximum width 100; anterior width 32; length of foot-groove 26; foot 32; toes 25.

*Distribution:* West Bengal.

*Lepadella triprojectus* Sharma 1978 (Figs. 41, 42)

*L. triprojectus* Sharma 1978, p. 87, Figs. 34–35.

*Holotype* (on slide): Regd. No. P. 3020/1, Zoological Survey of India, Calcutta. Loc.: Indian Museum Tank, Calcutta (West Bengal). Date: 14.8.1976. Coll.: B. K. Sharma.



Figs. 36–45; 36, 37: ? *Lepadella bicornis* Vasisht & Battish, ventral view and dorsal view [after Vasisht & Battish, 1971]; 38–40: *Lepadella ovalis* f. *larga* Sharma, dorsal view, ventral view and cross-section [after Sharma, 1978]; 41,42: *Lepadella triprojectus* Sharma, dorsal view and ventral view [after Sharma, 1978]; 43–45: *Lepadella rhomboidula* (Bryce), dorsal view, ventral view and cross-section [after Sharma, 1978].

**Characteristics:** With three distinct tube-like projections. A very rare species of this genus.

**Measurements:** Lorica length 70; maximum width 55; anterior width 38; anterior projection 15; postero-lateral projections 9–9; foot-groove 20; foot 26; toes 20.

**Distribution:** West Bengal.

*Lepadella rhomboidula* (Bryce 1890) (Figs. 43–45)

**syn.:** *L. triptera* f. *rhomboidula* (Bryce): Koste 1978, p. 192, T. 62, 5a–d.

**Characteristics:** Lorica broadly rhomboid, with a median dorsal keel. Koste (1978) treats this species as a form of *L. triptera*.

**Measurements:** Lorica length 72; maximum width 78; toes 21.

**Distribution:** West Bengal.

## Discussion

The material examined from North-Eastern revealed ten species (11 taxa) of *Lepadella*, including

*L. nartiagensis* new species and *L. patella* f. *elongata* new form. In all, eighteen species (20 taxa) are documented from this country; this comprises only about 0.7% of the Indian Rotifera. *Lepadella* spp. from North-Eastern region show 58.3% similarity (vide Sorenson Index) to those reported from West Bengal. The taxonomic status of *L. bicornis* Vasisht & Battish needs to be ascertained.

A majority of the species studied show cosmopolitan distribution and comprise an important component of the periphytic rotifers. *L. ovalis* and *L. patella* are also found in plankton samples and tolerate a wide range of pH. *L. cristata*, *L. patella* f. *elongata*, *L. triptera* and *L. nartiagensis* were collected from acidic waters (pH 5.2–6.5). *L. acuminata*, *L. ehrenbergi*, *L. dactyliseta* and *L. heterostyla* were found in acidic to nearly alkaline waters (pH 5.5–7.2). *L. rhomboides* was found in habitats with pH ranging between 6.8–7.6.

*L. ovalis* and *L. patella* show a wide distribution in this region and in India as a whole. *L. rhomboides*, *L. triptera*, *L. heterostyla*, *L. nartiagensis*, *L. patella* f. *elongata* are very rare in the studied samples. *L. acuminata*, *L. dactyliseta* and *L. cristata* are fairly common in the material from paddy-fields of Meghalaya State. Of the other Indian taxa, *L. aspicora*, *L. aspida*, *L. imbricata*, *L. longiseta*, *L. rhomboidula*, *L. kostei*, *L. ovalis* f. *larga* and *L. triprojectus* are notable for their rare and restricted occurrence i.e., between 20°N–24°N. However, *L. aspida* was also collected from localities around 30°N. *L. kostei*, *L. triprojectus*, *L. ovalis* f. *larga*, *L. nartiagensis*, *L. patella* f. *elongata* represent endemic elements in the Indian fauna.

The distribution of *Lepadella* spp. in different States/Union Territories of India clearly indicates insufficient attention to the periphytic forms. West Bengal tops the list with the report of 12 species (13 taxa), followed by Meghalaya (10 species) and Assam (6 species) respectively. The samples from the paddy-fields of this region and particularly those from Meghalaya State indicated highest rotifer diversity/sample of 32–35 species which also included 6–8 species of genus *Lepadella*. Further, extensive collections from the paddy-fields of North-Eastern India especially those from hilly areas are likely to yield some more rare and interesting (even endemic) species of *Lepadella*.

## Acknowledgements

One of the authors (BKS) is grateful to the Indian National Science Academy and Committee for Science and Technology in Developing Countries for awarding him an INSA-COSTED Travel Grant Fellowship for young scientists to enable him to participate in this symposium. The senior author also thanks the British Council who generously contributed towards his expenses in Edinburgh.

## References

- Edmondson, W. T. & G. E. Hutchinson, 1934. Report on Rotatoria. 9. Yale North India Expedition. Mem. Conn. Acad. Arts Sci. 10: 153–186.
- Koste, W., 1978. Rotatoria, Monogonota. Die Rädertiere Mitteleuropas. Begründet von Max Voigt. Gebrüder Borntraeger, Stuttgart, Vols. 1 & 2, 673 pp. 234 pls.
- Kutikova, L. A., 1970. Rotifer Fauna USSR. Fauna USSR. 104. Acad. Nauk. SSSR, Leningrad, 744 pp. (in Russian).
- Naidu, K. V., 1967. A contribution to the Rotatorian fauna of South India. J. Bombay nat. Hist. Soc. 64: 384–388.
- Nayar, C. K. G., 1968. Rotifer fauna of Rajasthan. Hydrobiologia 31: 168–185.
- Nayar, C. K. G. & K. K. N. Nair, 1969. A collection of brachionid rotifers from Kerala. Proc. Indian Acad. Sci. 69: 223–233.
- Sharma, B. K., 1976. Rotifers collected from North-West India. Newsl. zool. Surv. India 2: 255–259.
- Sharma, B. K., 1978. Contributions to the rotifer fauna of West Bengal. II. Genus *Lepadella* Bory de St. Vincent, 1826. Hydrobiologia 58: 83–88.
- Sharma, B. K., 1980a. New records of Eurotatoria from Assam State, India. Bangladesh J. Zool. 8: 73–74.
- Sharma, B. K., 1980b. Contributions to the rotifer fauna of Orissa, India. Hydrobiologia 70: 225–233.
- Sharma, B. K. & Sumita Sharma (nee Das), 1984. A note on some Eurotatoria from Panjab State, India. Hydrobiologia 109: 279–282.
- Sharma, B. K. & Sumita Sharma (in press). On some collections of monogonont rotifers (Rotifera: Eurotatoria) from Haryana State, India. J. Bombay nat. Hist. Soc.
- Vasisht, H. S. & S. K. Battish, 1971. The rotifer fauna of North India. *Lepadella* and *Colurella*. Res. Bull. (N.S.) Panjab Univ. 22: 189–192.
- Vasisht, H. S. & C. L. Gupta, 1967. The rotifer fauna of Chandigarh. Res. Bull. (N.S.) Panjab Univ. 18: 485–496.
- Wulfert, K., 1966. Rotatorien aus dem Stausee Azwa und der Trinkwasser Aufbereitung der Stadt Baroda (Indien). Limnologica 4: 53–93.