

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*, *Sinanotherina 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-e)	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>Sinanotherina 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)

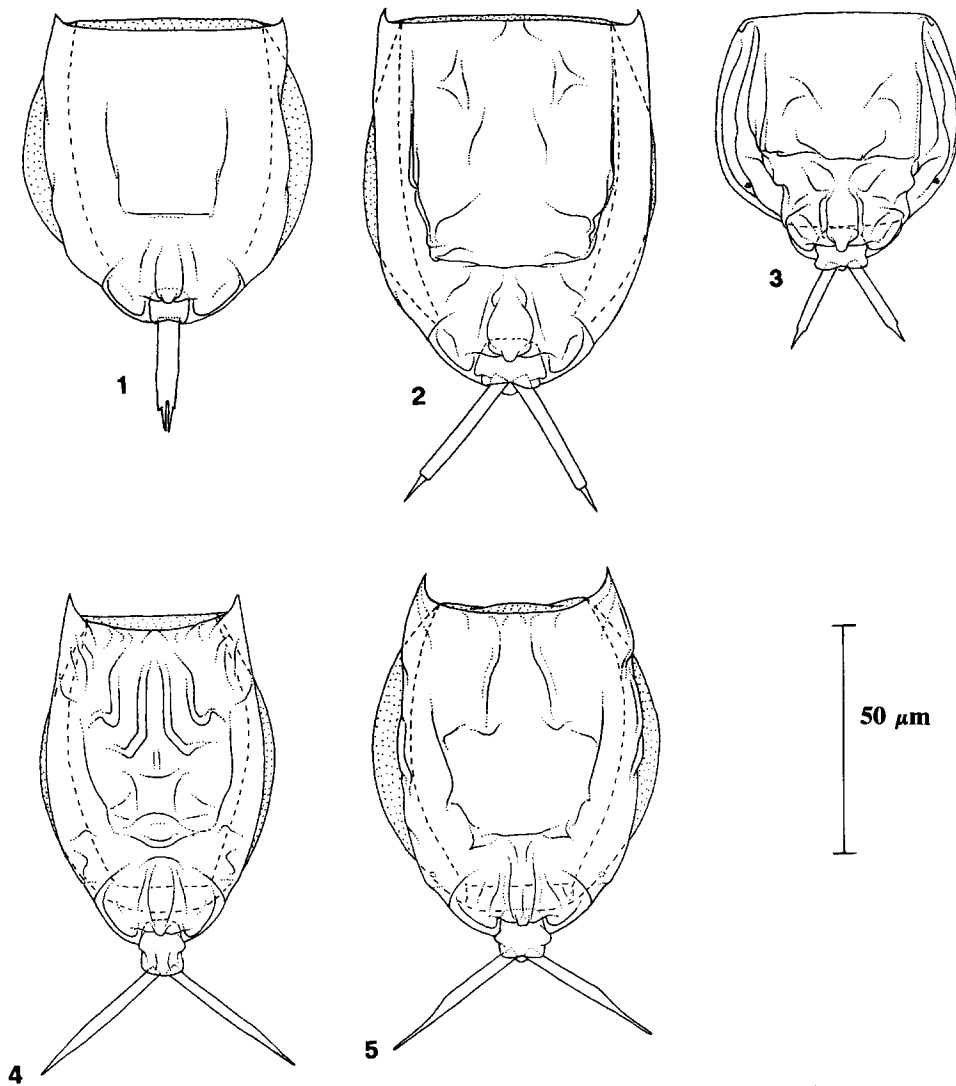
The species is relatively rare, but appears to be widely distributed. Illustrated records are from California (Myers, 1917; Haring & Myers, 1926), Sumatra (Hauer, 1937b; 1938) and Hungary (Varga, 1939). The Australian record by Bērziņš' (1982) may concern a misidentification of, presumably, *L. haliclysta* 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* Haring & 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.

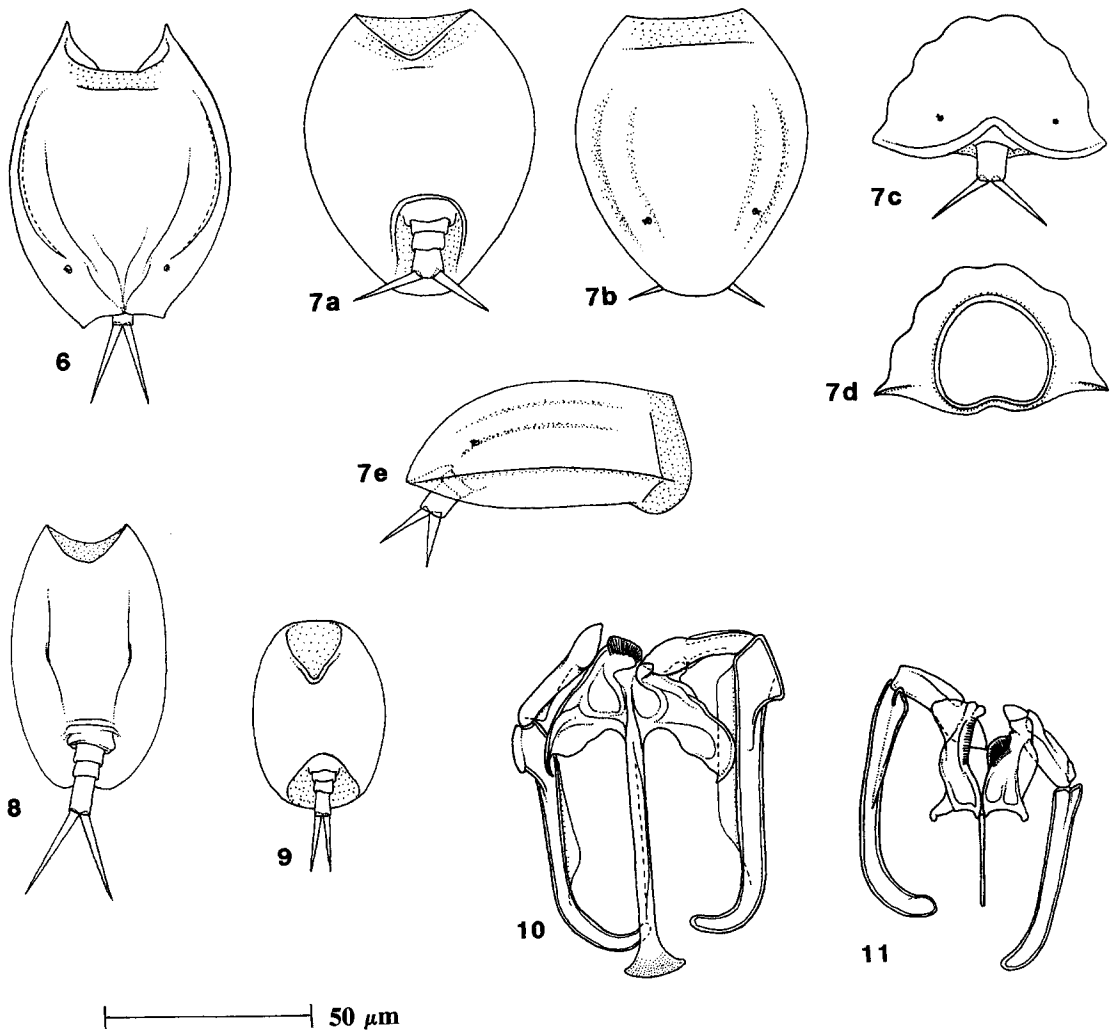
One of the Indian specimens (Fig. 6) had a slightly asymmetric posterior margin of the foot

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



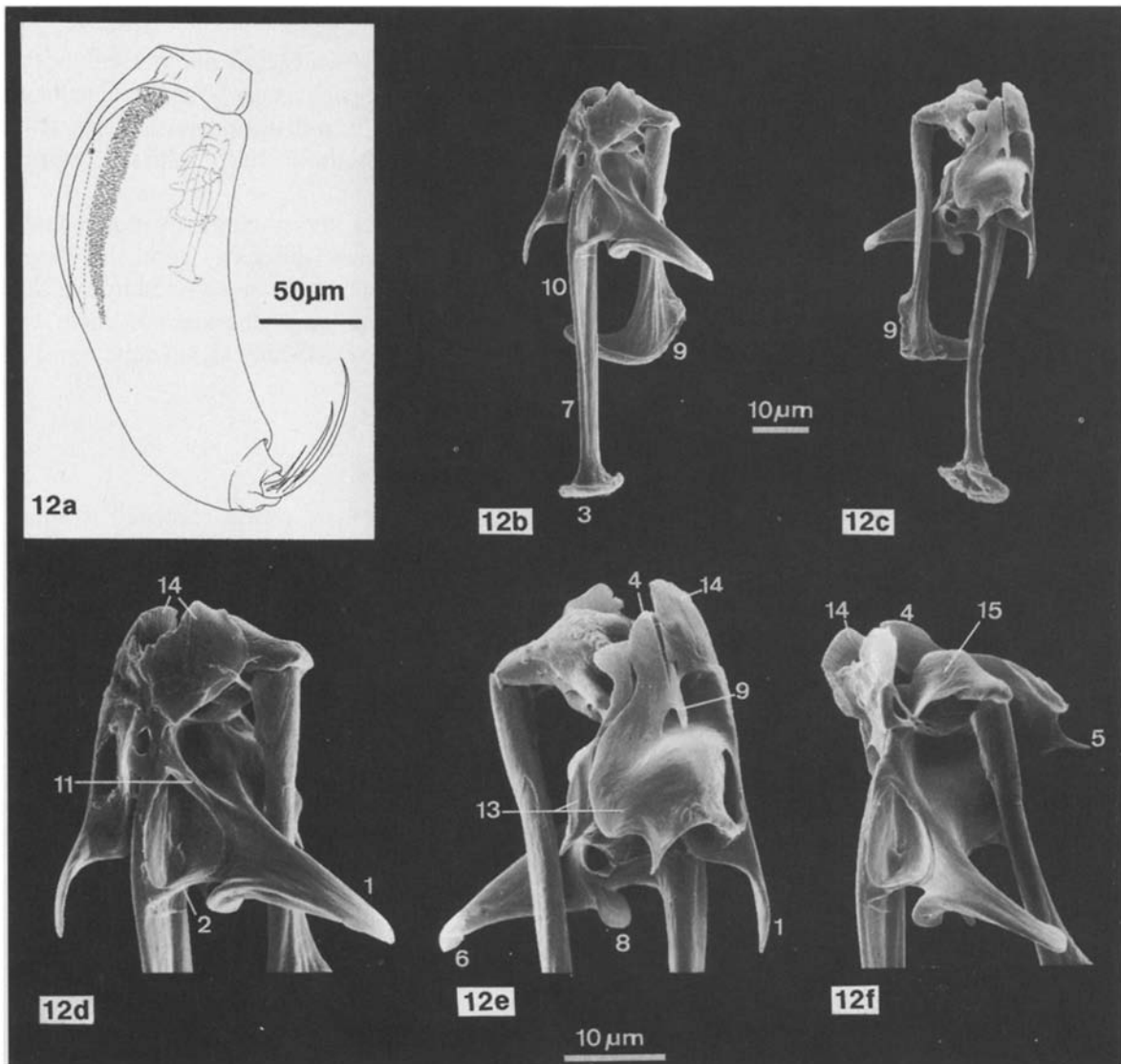
Figs 6–11. *Lepadella* spp. 6: *L. costatoides* Segers, 1992, dorsal view; 7a–e: *L. cf. favorita* Klement, 1962, a: ventral view, b: dorsal view, c: caudal view, d: frontal view, e: lateral view; 8: *L. triba* Myers, 1934; 9: *L. minuta* (Montet, 1918).

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.

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| 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 Irinjalkuda (Kerala, 9 September 1991).

T. kostei was described from Nigeria, but was also recorded from Australia (Segers, 1993). The present records extend 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. simonneae* and of *Lepadella* cf. *favorita* is insufficiently known.

After having abandoned the 'potential cosmopolitanism' (Jennings, 1900; Haring & Myers, 1928, Ruttner-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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