

Some Marine Rotifera from Réunion Island, with a Description of a New Species of *Lindia* Haring and Myers, 1924 and one of *Synchaeta* Ehrenberg, 1832

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Willem H. De Smet (2006) Some marine Rotifera from Réunion Island, with a description of a new species of *Lindia* Haring and Myers, 1924 and one of *Synchaeta* Ehrenberg, 1832. *Zoological Studies* 45(1): 81-92. The rotifer fauna of 2 samples from the marine littoral zone of Réunion I. (Indian Ocean) was studied. In total 12 taxa were identified, of which the monogononts *Lindia elsae* sp. nov. (Lindiidae) and *Synchaeta squamadigitata* sp. nov. (Synchaetidae) are described herein. *Lindia elsae* sp. nov. is characterized by conical toes, a long fulcrum, short anterior manubrial branches running parallel to the main branches, and a complex, single epipharyngeal element with 2 serrate semicircular parts. *Synchaeta squamadigitata* sp. nov. is diagnosed by the short cylindrical toes terminating in a short, rounded squamose part, with subterminal and ventrolateral tubuli. Concise comments are provided on the other species found. <http://zoolstud.sinica.edu.tw/Journals/45.1/81.pdf>

Key words: Rotifera, Marine, *Lindia elsae*, *Synchaeta squamadigitata*, New species.

To the present, the marine rotifer fauna of the Southern Hemisphere has largely been neglected, with scarce information being mostly restricted to occasional samplings. For the Ethiopian region Brownell (1988) described *Synchaeta hutchingsi* from the S.E. Atlantic off Cape Town, South Africa. Information on the Australian region concerns 9 taxa: Whitelegge (1889) reported *Synchaeta* sp., and Evans (1951) identified *S. baltica* Ehrenberg, 1834 from Australia, whereas for New Zealand Morris (1913) recorded *S. triophthalma* Lauterborn, 1894, Cassie (1960 in De Ridder and Segers 1997) mentioned ?*S. stylata* Wierzejski, 1893, and Russell (1953 1962) listed *Keratella crassa* Ahlstrom, 1943, *S. cecila* Rousselet, 1902, ? *S. curvata* Lie-Pettersen, 1906, *S. fennica* Rousselet, 1909, *S. monopus* Plate, 1889 and *Trichocerca marina* (von Daday, 1890). Some 15 taxa of marine rotifers have been

reported from the subantarctic-Antarctic region. Zelinka (1927) described *Rattulus artmanni* (syn. *Trichocerca marina*?) and *S. triophthalma* from the Kerguelen Is. (Subantarctica), and *S. rousseleti* from the not further localized Gauss Station (Kerguelen Is. or winter anchorage (67°S, 98°E) of the German South Polar Expedition?). Leung and Mohr (1966) reported *Seison* sp. from McMurdo Sound (Ross I., Antarctic continent) and Magellanic Chile. Dartnall (1997) described *Ecentrum salinum*, and mentioned *E. spatium* and *Proales reinhardti* from Ellis Fjord in the region of the Vestfold Hills, East Antarctica. De Smet (2002a) described *Ecentrum frenoti* and recorded Bdelloidea indet., *Colurella salina* Althaus, 1957, *C. cf. colurus* (Ehrenberg, 1830), *Ecentrum algente* (Haring, 1921), *E. marinum* (Dujardin, 1841), *Proales halophila* Remane, 1929, *P. reinhardti* (Ehrenberg, 1834) and *Lindia*

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torulosa (Dujardin, 1841) from the littoral zone of the subantarctic Crozet and Kerguelen Is. In the present paper, the rotifers of 2 samples from the marine littoral zone of Réunion I. are reported, and a new species of *Lindia* and one of *Synchaeta* are described.

MATERIALS AND METHODS

Réunion (21°S, 55.30°E) is one of the Mascarene Is. lying in the Indian Ocean, ~800 km east of Madagascar (Fig. 1). It is a volcanic island, with a surface area of ~2510 km². The climate is tropical and oceanic, with 2 main seasons: the

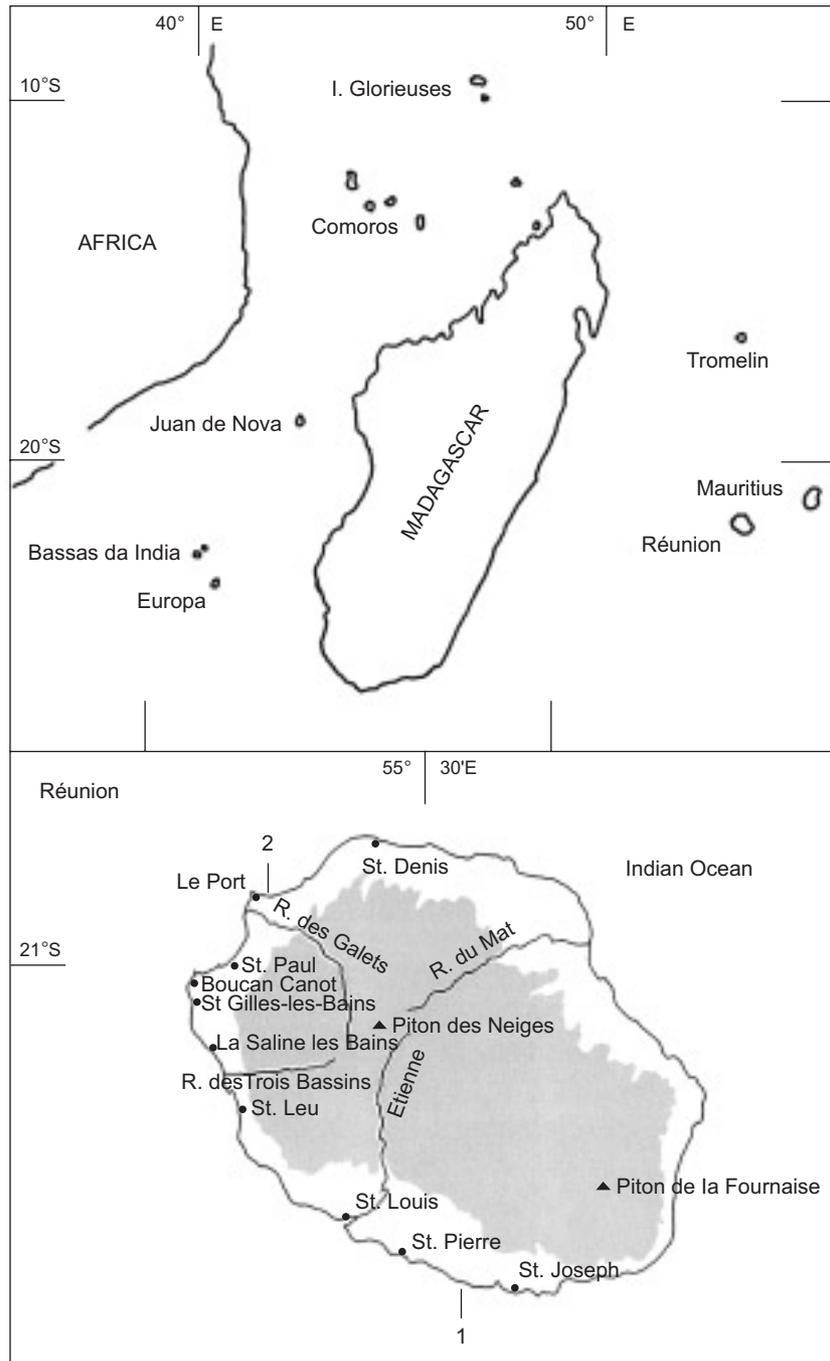


Fig. 1. Map showing Réunion I. in relation to Madagascar, and location of sampling localities.

austral summer from Dec. to Mar., and the winter from June to Oct. The summer months tend to be hot, rainy and prone to cyclonic disturbances. In the coastal belt, air temperature varies from 25 to 32°C in summer, and 18 to 25°C in winter, with water temperatures averaging about 26°C and 23°C respectively.

The island was visited on the occasion of expeditions to the Subantarctic, organized by the “Institut Polaire Français, Paul Emile Victor”, and 2 marine samples were taken.

Sample 1. Aufwuchs collected among a stand of the brown alga *Padina pavonia* (L.) Gaillon, from the infralittoral fringe of Grande Anse at Grand Bois, S. Réunion on 24 Dec. 1998. Fixation was done on the spot with formalin.

Sample 2. A vertical plankton haul of 5 m, equaling about 265 L, 30 m off shore; the mesh width was 40 µm. Port Est, N. Réunion on 4 Jan. 2002. Part of the sample was fixed immediately with formalin, and part was fixed after anesthetization with Nupercaine®.

Animals were examined and drawn with a Leitz Orthoplan microscope equipped with a camera lucida. Trophi were isolated by dissolving the soft body parts in dilute NaOCl, and were prepared for light and scanning electron microscopy (SEM) following the procedure of De Smet (1998). SEM was performed using a Philips SEM 515 microscope operated at 20 kV.

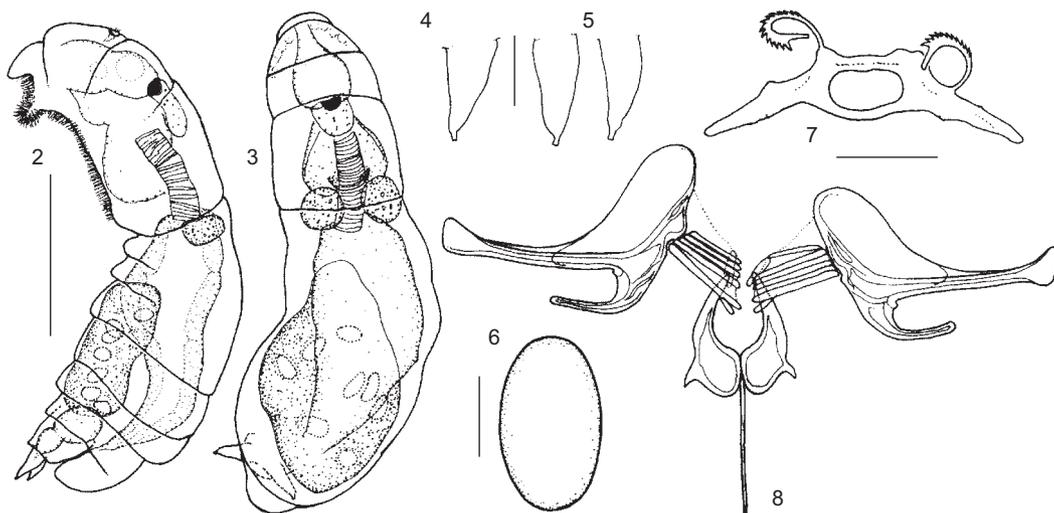
RESULTS

In total 12 taxa were identified (Table 1). Both samples contained bdelloids (deformed beyond identification due to contraction) and monogononts. Monogononts dominated by the number of individuals in the Aufwuchs sample, whereas bdelloids were dominant in the plankton sample. The 7 monogononts found in the Aufwuchs sample were represented by the Lepadellidae, Dicranophoridae, Lindiidae and Proalidae, with

Table 1. Rotifera found in Aufwuchs (1) and plankton (2) samples

Sample	1	2
Bdelloidea indet	1 ^a	31
<i>Cephalodella</i> sp.	-	1
<i>Colurella adriatica</i> Ehrenberg, 1831	13	-
<i>C. colurus</i> Ehrenberg, 1830	-	1
<i>Encentrum marinum</i> (Dujardin, 1841)	1	-
<i>Encentrum</i> sp. 1	1	-
<i>Encentrum</i> sp. 2	2	-
<i>Lindia elsae</i> sp. nov.	22	-
<i>Proales similis</i> de Beauchamp, 1907	1	-
<i>Proales</i> sp.	8	-
<i>Synchaeta squamadigitata</i> sp. nov.	-	20
<i>Synchaeta</i> sp.	-	2

^aNumber of specimens.



Figs. 2-8. *Lindia elsae* sp. nov. 2. Lateral view; 3. dorsal view; 4. toe, dorsal view; 5. toes, lateral view; 6. subitaneous egg; 7. epipharynx, frontal view; 8. trophi, ventral view. Scale bars: 2, 3, 6: 50 µm; 4, 5, 7, 8: 10 µm.

Lindia elsae sp. nov. dominant and *Colurella adriatica* codominant. The plankton sample showed 4 monogonont species only, belonging to the Notommatidae, Lepadellidae and Synchaetidae, with an absolute dominance of *Synchaeta squamadigitata* sp. nov.

Seven of the monogonont species found are hitherto undescribed, but 2 of them only, 1 species each of *Lindia* and *Synchaeta*, occurred in sufficient numbers to warrant description. The description of the new species and comments on the other taxa are given here.

***Lindia elsae* sp. nov.**

Differential diagnosis: *Lindia elsae* sp. nov. is diagnosed by the epipharynx consisting of a single element with a large central opening, showing 2 lateral extensions and 2 serrate semicircular parts. As such, it is easily separated from all other known *Lindia*-species.

Material examined: Holotype a parthenogenetic female on a permanent, glycerin glass slide mount deposited in the Koninklijk Belgisch Instituut voor Natuurwetenschappen (KBIN), Brussels, Belgium, Reg. no. IG 30.103.

Paratypes: 1 slide with parthenogenetic female and light microscopic trophi preparation in KBIN; slides with parthenogenetic females and trophi, 6 stubs each with 1 trophi prepared for SEM, and 6 specimens in glycerin in the Department of Biology, University of Antwerp. In total 22 specimens were found.

Type locality: Infralittoral fringe of Grande Anse, Grand Bois, Réunion I., Indian Ocean. 24 Dec. 1998.

Etymology: The species is dedicated to Dr. Els Van Rompu, in recognition of a long and much-appreciated collaboration.

Description: Parthenogenetic female (Figs. 2-5). Body of slightly contracted specimens elongate, spindle-shaped (Figs. 2, 3). Head large, with 2 or 3 transversal folds dorsally, rostrum broadly rounded. Dorsal antenna in distal 1/3. Auricles short-stalked. Corona ~1/3 total length, with 2 small anterolateral depressions. Tail a conspicuous lobe, covering foot. Foot short, a single pseudosegment. Toes (Figs. 4, 5) offset indistinctly from foot, short, stout almost conical in ventral/dorsal view with short and abruptly offset tubules; in lateral view with curved dorsal margin and almost straight ventral margin. Eyespot large, dark red, at posterior of saccate brain. Retrocerebral sac fairly large, hemispherical in dorsal view, flattened in la-

teral view, with few minute pigment granules. Esophagus with transversal thickenings, with wide diameter. Very weak constriction between stomach and intestine. Gastric glands rounded-oval. Pedal glands large, club-shaped with distal reservoir. Vitellarium with 8 nuclei. Oviparous. Subitaneous egg (Fig. 6) elliptical.

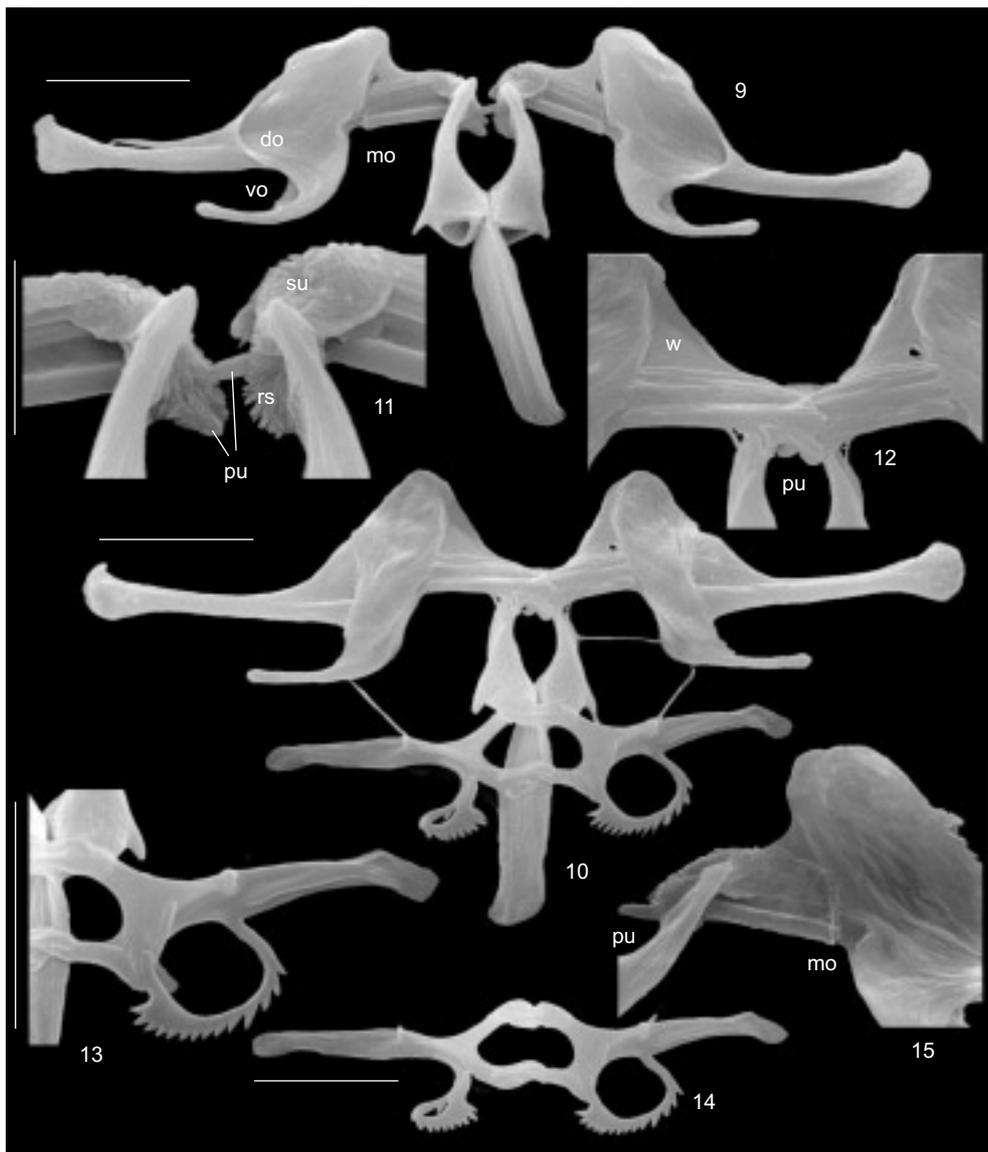
Trophi (Figs. 7-15). Rami lyrate with distinct alulae; basifenestrae large; inner margin of ramitips with scleropili (Fig. 11; rs); no distinct external lamellae. Fulcrum fairly long, ~1.5x ramus length, in lateral view almost parallel-sided and slightly rounded distally. Unci with 4 (right) and 5 (left) rod-shaped and webbed teeth, gradually decreasing in size, ventral teeth longest; dorsal teeth joined distally to a large triangular web connected to the manubrium (Fig. 12; w); subunci a mass of short and small scleropili (Fig. 11; su); outer side of ventral margin of major teeth with preuncinal teeth, composed of a small irregular sclerite element and a larger, rod-shaped, moveable element (Figs. 11, 12, 15; pu). Ventral branch of manubria slender, short, less than 1/2 length of shaft and nearly parallel to it; inner side of head with small opening at base of the major tooth (Fig. 15; mo), a larger ventral opening at turn between shaft and ventral branch (Fig. 9; vo), and a large, funnel-shaped dorsal opening leading to a thin rib, running along greatest part of shaft (Fig. 9; do). Epipharynx (Figs. 7, 10, 13, 14) a single piece consisting of a central more or less flattened O-shaped part, bearing 2 long lateral extensions and 2 serrate (~14 teeth) semicircular dorsal extensions terminating in a smooth-margined and free projection. It is shown in a latero-lateral plane in the figures, but is actually oriented dorsoventrally in the body, the lateral extensions pointing laterocaudally and the serrate elements pointing rostrally. Semicircular elements showing asymmetry: right one inserted near base of O-shaped part, and left one inserted at base of lateral extension; both elements curving to right side. Apparently, the epipharynx situated around buccal tube.

Measurements: Total length ($n = 10$) 175-205 (mean, 212) μm , toe 13-21 (mean, 16) μm ; trophi ($n = 8$): ramus 8.7-12 (mean, 11.0) μm , fulcrum 13.3-16.4 (mean, 15.2) μm , uncus 8.0-9.6 (mean, 8.8) μm , manubrium 22.4-25.2 (mean, 24.1) μm , epipharynx (h x w) 32.4-37.4 x 8.4-12.7 (mean, 34.5 x 10.2) μm .

Comments: The Lindiidae is a small family actually comprising 14 valid morphospecies according to a recent revision by Segers (2002). It is characterized by the unique cardate trophi which

are modified for pumping. The body is illoricate with weakly differentiated external morphology, and as such the species are very similar. External characters of *Lindia elsa* sp. nov. that may aid in differentiating it from some of the other *Lindia* spp. are the single foot pseudosegment and the shape of the toes. Descriptors of the internal organization allowing for some discrimination are the hyaline retrocerebral sac with few red-pigmented granules, the club-shaped pedal glands with reservoirs, and particularly the wide, transversally striated esophagus. Apparently, an annulated esophagus is only shared with *L. torulosa* Dujardin, 1841.

However, all species can be recognized unequivocally by their complicated trophi, in particular the characteristic epipharynx. Among the *Lindia* spp. known to date (see Segers 2002), the new species shows the relatively longest fulcrum. *Lindia elsa* sp. nov. and *L. tecusa* Harring and Myers, 1922 are the only species displaying a straight anterior manubrial branch which is almost parallel to the shaft, while the others have a crescent-shaped or irregular (*L. candida* Harring and Myers, 1922) branch. The new species, however, is easily distinguished from *L. tecusa* by its different epipharynx (a broad plate without a central hole and with-



Figs. 9-15. *Lindia elsa* sp. nov., SEM photographs of trophi. **9.** Dorsal view; **10.** ventral view; **11.** detail of rami and unci tips; **12.** unci, outer view; **13.** epipharynx, detail; **14.** epipharynx; **15.** unci, inner view. do, dorsal opening; mo, opening at base of major tooth; pu, preuncinal tooth; rs, rami scleropili; su, subuncus; vo, ventral opening; w, web. Scale bars: 9, 10, 12-15: 10 μ m; 11: 5 μ m.

out serrate elements in *L. tecusa*), the conical toes (toes very short, broadly conical and slightly compressed laterally in *L. tecusa*), the normal auricles (absent from *L. tecusa*), and its ovoviviparity (viviparity in *L. tecusa*). Serrate epipharynx elements have also been demonstrated in *L. torulosa* (see De Smet 2002a: 420, figure 29, 2002b: 390, figure 40). The epipharynx of *L. torulosa* consists of 2 symmetrical sets of 4 sclerite elements (a pseuduncus, pseudintramalleus, pseudomanubrium, and oral lamella) connected by ligaments. The serrate elements of *L. elsae* might be homologous with the serrate oral lamellae of *L. torulosa*; the lateral extensions and the ventral arc of the central O-shaped part might be homologous with the pseudomanubria; and the dorsal arc probably corresponds to the pseudintramallei. No counterpart could be demonstrated for the pseudunci.

Distribution and ecology: The new species is known from the type locality only. It was the dominant rotifer on Aufwuchs among a stand of the brown alga *Padina pavonia* from the infralittoral fringe. Examination of the gut contents revealed that *L. elsae* sp. nov. feeds on filamentous cyanobacteria, such as *Oscillatoria* sp. The new species was accompanied by a rich fauna, consisting of foraminiferans, nematodes, polychaete annelids, arthrotardigrades, kinorhynch, copepods, ostracods, amphipods, molluscan larvae, and other rotifers (Table 1). To date, only 2 *Lindia* species have been reported from thalassic environments: *L. tecusa* is an inhabitant of marine and brackish waters (Segers 2002), and *L. torulosa*, although primarily a freshwater species, has been

mentioned occasionally from thalassic waters as well (Remane 1929, Schwarz 1955/56 1962, Saunders-Davies 1995 1998, De Smet 2002a).

Synchaeta squamadigitata sp. nov.

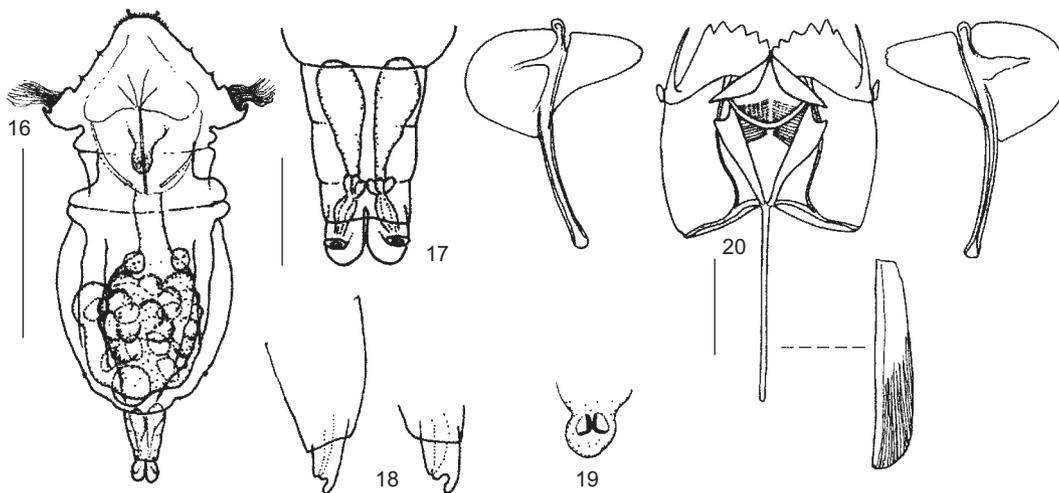
Differential diagnosis: *Synchaeta squamadigitata* sp. nov. is diagnosed by its distally broadly rounded and squamate toes, with proximally displaced ventrolateral tubuli. It cannot be mistaken for any of the other known species of the genus.

Material examined: Holotype a parthenogenetic female on a permanent, glycerin glass slide mount deposited in the KBIN, Brussels, Belgium, Reg. no. IG 30.194. Paratypes: 1 slide with parthenogenetic female in KBIN; slides with females and trophi preparation for light microscopy (LM), and 7 stubs each with 1 trophi preparation for SEM in the Department of Biology, University of Antwerp.

Type locality. Port Est, Réunion I., Indian Ocean. 4 Jan. 2002.

Etymology: The specific name *squamadigitata* (Latin *squama* meaning scale, *digitata* meaning provided with toes) refers to the characteristic shape of the toes.

Description: Parthenogenetic female (Figs. 16-19). Body more or less vasiform, neck region narrower with 2 small transversal folds distally, and 2 dorsolateral humps proximally; head almost 1/2 total length; trunk with a few weak dorsal longitudinal striae. Lateral antennae in posterior 1/3 of trunk. Apical field strongly convex, with 2 small frontal antennae, and 2 small dorsal and lateral



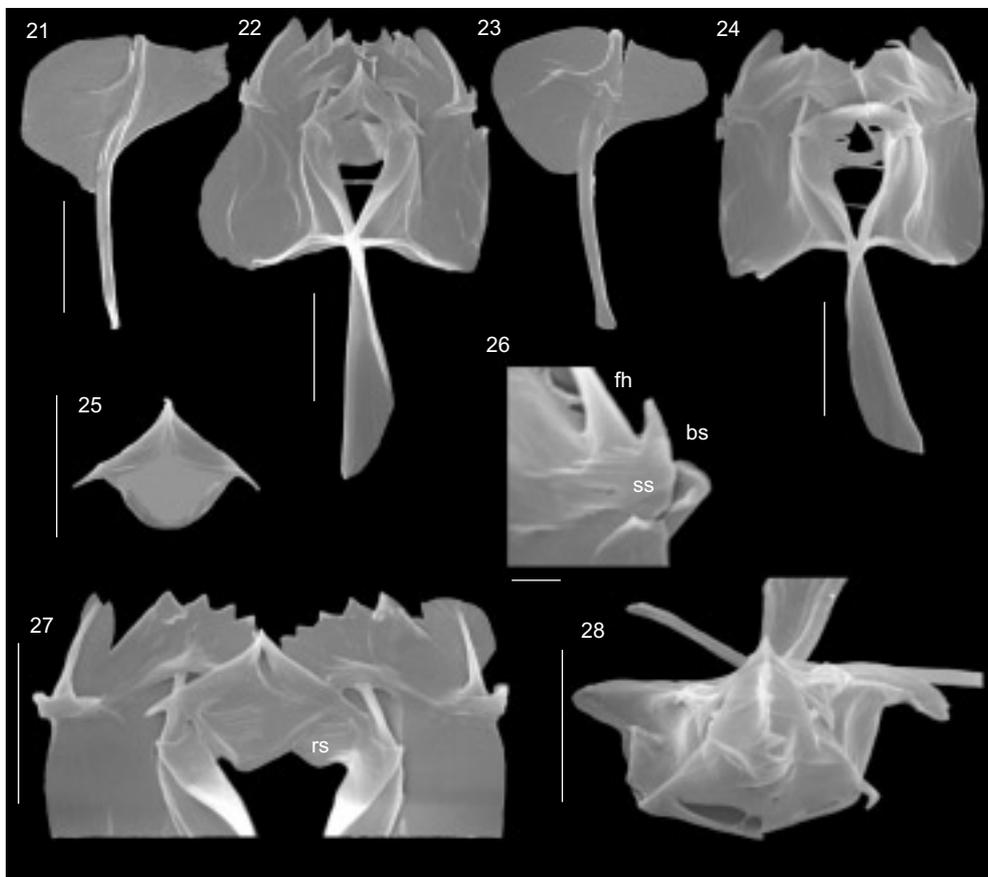
Figs. 16-20. *Synchaeta squamadigitata* sp. nov. 16. Dorsal view; 17. foot, ventral view; 18. toes, lateral view; 19. cerebral eyes; 20. trophi. Scale bars: 16: 50 μ m; 17-20: 10 μ m.

coronal antennae bearing small styli. Auricles medium large, triangular, with pronounced lateral tips recurved apically. Dorsal antenna in neck region, on shallow prominence. Two fused, red cerebral eyes of equal size (Fig. 19); apparently no frontal eyespots or granules. Foot medium long, conical, 4 pseudosegments. Toes double (Figs. 17, 18), of equal length, short, basal part conical, distal part squamate with broadly rounded margin; tubuli ventrolateral and subterminal. Pedal glands double, as long as foot, with reservoirs in the toes.

Trophi (Figs. 20-28) weakly sclerotized. Unci composed of a rather small frontal hook, and a toothplate bearing 5-6/6-7 blunt teeth gradually decreasing in size; sulci between teeth shallow; gap between frontal hook and toothplate fairly small, with membranous web composed of tiny scleropili; basal spine relatively small, basally with a small triangular and inwardly projecting platelet composed of ~6 scleropili (Fig. 26; ss). Rami lamellar, composed of an elongate, more-heavily

sclerotized triangular inner lamella, and a weakly sclerotized outer lamellar part; outer part composed of narrow median part, and large, rounded outer part separated by a weakly reinforced ridge connected to toothplate; proximal margin of rami with reinforced ridge; distal margin of elongate triangular plate concave; inner margin of rami distally with row of scleropili increasing in length distally. Epipharynx (Fig. 25) a single element, consisting of 2 elongate semilunate parts, pointed acutely on both ends, and a semicircular band connected to the semilunate parts by a thin web. Fulcrum long, plate-shaped, in lateral view slightly widening distally; distal margin oblique. Manubria long, shaft very weakly curved, almost straight, anterior 1/3 with large, blunt triangular dorsal lamella; anterior 1/2 with large semilunate ventral lamella; at anterodorsal margin of dorsal lamella a series of scleropili forming a small triangular lamella (Fig. 21).

Measurements: Total length ($n = 10$) 98-138



Figs. 21-28. *Synchaeta squamadigitata* sp. nov., SEM photographs of trophi. **21.** Right manubrium, inner view; **22.** incus, ventral view; **23.** left manubrium, outer view; **24.** incus, dorsal view; **25.** epipharynx; **26.** detail of basal spine and platelet; **27.** unci, epipharynx, detail; **28.** frontal view. Scale bars: 21-25, 27, 28: 10 μm ; 26: 1 μm . bs, basal spine; fh, frontal hook; rs, rami scleropili; ss, platelet at basal spine.

(mean, 118) μm , toe 6-8 (mean, 7) μm ; ($n = 5$) trophi 38-43 μm : ramus ~14-17 μm , fulcrum 19-22 μm , uncus ~8-9 $\mu\text{m} \times 12-13 \mu\text{m}$, manubrium 24-29 μm , epipharynx (h x w) 9-10 $\mu\text{m} \times 14-18 \mu\text{m}$.

Comments: *Synchaeta squamadigitata* sp. nov. is one of the smallest members of the genus. Applying the key in Hollowday (2002), the new species keys out near *S. glacialis* Smirnov, 1932 and *S. hyperborea* Smirnov, 1932, both of which are known from Arctic seas, with which it only shares small coronal styles and a large head. The other external features of *S. squamadigitata* greatly differ, and its trophi also show little resemblance (Friedrich and De Smet 2000). It is difficult to relate *S. squamadigitata* to any other *Synchaeta* on the basis of the trophi morphology, since most of the available data are unreliable and incomplete.

Of the genus *Synchaeta*, family Synchaetidae, some 34 species are recognized as being valid (Hollowday 2002). Diagnosis and identification traditionally rely on the shape of the body and apical field; the position of the lateral antennae; the shape of the foot and the number and shape of the toes; the presence, type and number of eyespots; and to a lesser extent on the trophi, especially the unci. Many of these external distinguishing features appear variable or at least difficult to ascertain. The trophi are delicate and often fairly hard to see with LM, and little attention was paid to their detailed structures in the past. However, it is my experience that LM in combination with SEM can reveal major taxonomically useful characters. Of special interest are the unci, epipharynx, manubria (shaft straight or kinked; the shape of the inner and

outer lamella, their extent and the position of their greatest width in relation to the shaft; and the shape of the accessory lamella), and the rami triangular lamellae (concave or convex anteriorly).

Identification of this illoricate genus is considered virtually impossible in the preserved state (e.g. Ruttner-Kolisko 1974, Rougier et al. 2000). However, they easily can be prepared and preserved fully extended, using cocaine or eucaine (Rousselet 1902), procaine hydrochloride (May 1988), or some local anesthetic (pers. observ.). Nogrady and Rowe (1993) obtained very well anesthetized specimens with the addition of 20% (v/v) carbonated water to the samples.

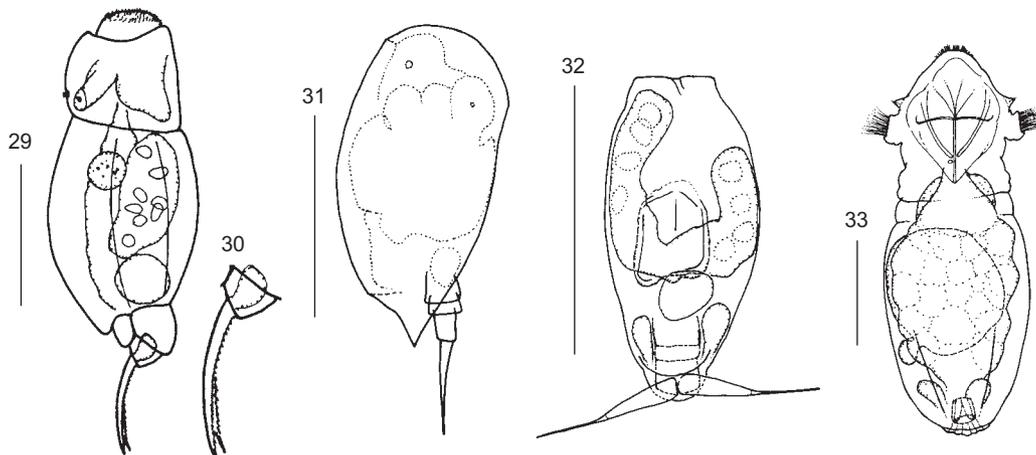
Distribution and ecology: Known from the type locality only. It occurred in the plankton of the littoral zone consisting, among others, of tintinnids; dinoflagellates; copepods; podonid cladocerans; larvaceans; polychaete, molluscan, and echinoderm larvae; and other rotifers (Table 1).

COMMENTS ON OTHER SPECIES

Cephalodella sp.

A single specimen (Figs. 29, 30, 41) of an unknown *Cephalodella* was found in the plankton sample. The species is characterized by the finely denticulate (~22 spinules) ventral margin of the slender, ventrally curved medium long toes. The trophi (Fig. 41) show a long fulcrum and slightly asymmetrical manubria (with the left one larger) with axe-shaped cauda.

The only other *Cephalodella* bearing spinulets at the ventral margin of the toes, is the Tasmanian



Figs. 29-33. Habitus of rotifer species. 29. *Cephalodella* sp.; 30. same as 29, detail toes; 31. *Colurella adriatica*; 32. *Proales* sp.; 33. *Synchaeta* sp. Scale bars: 10 μm .

endemic *C. lindamaya* Koste and Shiel, 1986 described from acidic freshwater. It is easily distinguished from the species of Réunion by the simply incurved manubrial cauda.

Colurella spp.

A single specimen of *C. colurus* was found in the plankton; *C. adriatica* was relatively numerous in the Aufwuchs. Both species are euryhaline and eurytopic, and considered cosmopolitan. Several records exist from the Southern Hemisphere (e.g. de Beauchamp 1913, Russell 1956, De Ridder and Segers 1997), but it was not previously reported from marine habitats.

In *C. adriatica* different forms have been described, with increased lorica size and toe length correlated with increasing salinity (Hauer 1925), or with animals inhabiting running water showing a wider lorica than those from stagnant biotopes (Donner 1964). However, these presumed relationships between external morphology and environmental parameters remain to be proven by thorough morphometric analyses. The

specimens encountered in the marine littoral of Réunion I. (Fig. 31) are morphologically similar to those found in stagnant freshwaters in Flanders, Belgium (De Smet unpubl. data) for example. Comparison of the trophi of the marine specimens (Figs. 34-37) with freshwater specimens from Belgium, revealed no significant differences. Unci with 5 or 6 teeth, major teeth with a small accessory toothlet; fulcrum short, basal plate well-developed and slightly asymmetrical with the left arm more or less strongly curved ventrally, which appears characteristic for the species.

Encentrum spp.

The genus *Encentrum* was represented by *E. marinum* and 2 undescribed species. *Encentrum marinum* (trophi in Fig. 38) is a widespread species (De Ridder and Segers 1997, De Smet 1997), mainly known from thalassic and athalassic waters, but also recorded from alkaline fresh waters. Southern Hemisphere records exist from saline ponds in New Zealand (Russell 1962), and the marine littoral of the subantarctic Île de la



Figs. 34-37. *Colurella adriatica*, SEM photographs of trophi. 34. Frontal view; 35. incus, frontal view; 36. caudal view; 37. lateral view. Scale bar: 10 μ m.

Possession (Crozet Is.) and Îles Kerguelen (De Smet 2002a).

The undescribed *Encentrum* sp. 1 (trophi shown in Fig. 39) is characterized by trophi bearing a shallow, broad tooth at the inner margin of both rami, and a short, truncate-triangular fulcrum.

Encentrum sp. 2 (trophi shown in Fig. 40) has an elongate hexagonal rami outline, with the right ramus showing a pronounced, distally pointing ventral extension. The species was also found in interstitial sand of Peter the Great Bay and Ussuri Bay, Sea of Japan, Russia (De Smet and Chernyshev unpubl. data), and thus is probably widespread.

Proales spp.

A single specimen of *P. similis* (trophi shown in Fig. 44) was found in Aufwuchs. The species is known from thalassic and athalassic waters from most parts of the world (De Smet 1996, De Ridder and Segers 1997). In the Southern Hemisphere, it is recorded from inland saline waters in W. Australia (Bērziņš 1953), Tasmania (Koste and Shiel 1986), and Namibia (Brain and Koste 1993).

The Aufwuchs sample contained another and yet undescribed *Proales* sp. (Fig. 32), characterized by the toes with long, needle-shaped points, reminiscent of the much larger *P. syltensis*



Figs. 38-48. SEM photographs of trophi. **38.** *Encentrum marinum*, dorsal view; **39.** *Encentrum* sp. 1, ventral view; **40.** *Encentrum* sp. 2, ventral view; **41.** *Cephalodella* sp., lateral view; **42,43** *Proales* sp. **42.** frontal view; **43.** same as 42, detail of incus; **44.** *Proales similis*, ventral view; **45-48** *Synchaeta* sp. **45.** epipharynx; **46.** incus; **47.** unci, frontal view; **48.** right manubrium, outer view. Scale bars: 10 μ m.

Tzschaschel, 1978. It is distinctly differentiated from the latter by the trophi (Figs. 42, 43): the smaller manubrial lamellae, the large basal apophyses, and the absence of large frontal rami plates.

***Synchaeta* sp.**

Two specimens (Fig. 33) of this undescribed species were found in the plankton sample. The apical field is strongly convex, with 2 weak coronal styles; the body is cylindrical and slender; the foot is short, with 2 equal toes; there is a single eyespot, located cerebrally. Trophi (Figs. 45-48) strongly sclerotized. The uncus plate has 2 or 3 fairly strong teeth and 3 shallow smaller teeth, without a gap; the lamella in front of the teeth is strongly sclerotized; the triangular lamella is concave distally; for the manubria, the shaft is slightly curved, the anterior 1/2 has a large semilunate ventral lamella, and rounded-triangular dorsal lamella; the greatest widths of the lamellae are at ~1/4 and 1/7 from the proximal end respectively; an accessory lamella is apparently absent; the epipharynx is composed of 2 elongate semilunate elements connected by a semicircular element, and the semilunate elements have openings proximally.

CONCLUDING REMARKS

Twelve rotifer taxa (1 Bdelloidea undetermined and 11 Monogononta) are registered from Aufwuchs and plankton of the marine littoral of tropical Réunion I. Both species richness and abundance were low, which agrees with the very few observations from the different climatic belts of the Northern and Southern Hemispheres. Although these are results of a very limited sampling effort, the find of 7 undescribed species, two of which are described in the present paper, and the 1st record of 2 cosmopolitan eurytopic species (*Colurella adriatica* and *C. colurus*) from marine habitats in the Southern Hemisphere, once more demonstrates the knowledge gap in marine rotifers. The presence of Bdelloidea likewise shows that, although this group is considered primarily limnic and limno-terrestrial, a yet-unexplored marine bdelloid fauna does exist. It is also clear that, even though the marine rotifer fauna may be considered impoverished relative to its freshwater counterpart, marine rotifer diversity is obviously underestimated, and will ultimately turn out to be much richer considering the high diversity

of marine ecosystems. This lack of knowledge must be ascribed to difficulties in obtaining well-preserved specimens, the low densities at which most of the species occur, the lack of taxonomic expertise, and identifications to higher taxonomic levels only by ecologists, and the few taxonomists working on rotifers, especially marine ones.

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