A new species of Lernanthropus De Blainville, 1822 (Copepoda: Lernanthropidae) from St. Lucia estuary, South Africa)

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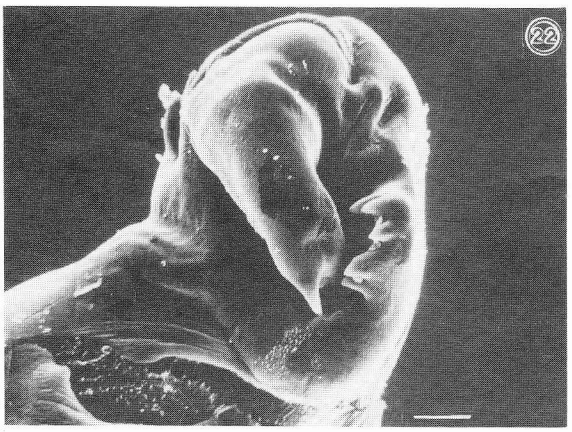

Fig. 22. Tip of maxilliped, male. Scale bar, 5 µm.

junction with subchela, with medial cavity housing base of subchela; myxal area armed with one relatively large rod-like seta; subchela (Fig. 14) with short spiniform seta on shaft, prominent claw and naked barb; adjacent to latter are three pairs and one unpaired (seven) denticles, all approximately equal-sized (Fig. 13).

Genital segment (Fig. 15) tapering posteriorly into papilla bearing two copulatory pores; genital orifices and anal slit as depicted in Fig. 15; egg sacs twice as long as trunk, eggs multiseriate.

Male (Figs 16–22).

Males were found attached to the cephalothorax (Fig. 16), trunk and genital segment of female. Body oval, slightly laterally compressed, no separation between cephalothorax and trunk. Dorsal shield conspicuous (Fig. 17). Appendages arrayed anteroventrally.

Male differs from female as follows: antennule (Fig. 18) as in female except for well-developed tubercle (2); endopod (Fig. 19) of antenna larger than exopod, spinules different from that of female; maxilla with large corpus (Fig. 17) and prominent distomedial sheath, subchela tapering into curved claw (tip fitting in distomedial sheath) and well-developed barb penetrating concavity in terminal margin of corpus (Fig. 20); maxilliped (Fig. 21) with robust corpus, subchela smaller with prominent barb closing into cavity with five prominent teeth on outer margin and smaller claw (Fig. 22); genital tubercle (Fig. 21) posterior to maxilliped.

Discussion

The general description of *A. pterobrachiata* by Kabata[5] does not allow sufficient comparison with the present material, but the shape of the aliform expansions differentiate it clearly from *A. gibbosa*. In comparing *A. gibbosa*, with the other species, prominent differences (sufficient justification to assign this specimen a new species) are found: the variable shape in the trunk of ovigerous females is unique in *A. gibbosa*; the shape of the aliform swellings lateral to the cephalothorax in *A. gibbosa* differ from all other species; apical armature of antennule of *A. gibbosa* with five setae and two tubercles, *A. pagelli* with four setae and one tubercle,[2] *A. macrotrachelus* with seven spines[6,7] and *A. detrimatis* with four setiform spines;[6] apical armature of endopod of antenna unique in *A. gibbosa* with reduced hook (1), lateral seta (2) and processes (4 and 5); *A. gibbosa* with seven mandibular teeth, similar to *A. detrimatis* but different in *A. pagelli* and *A. macrotrachelus* each with eight teeth; denticulation (number and arrangement) of the maxilliped in *A. gibbosa* is different from the other species.

We thank the Natal Parks Board for supporting the study at Lake St. Lucia, J.E. Saayman for making research funds available, the Department of Zoology and Biology for technical assistance and the EM Unit, University of the North for the use of SEM facilities. We are also grateful to Z. Kabata and G.A. Boxshall for their comments on the manuscript.

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A new species of Lernanthropus De Blainville, 1822 (Copepoda: Lernanthropidae) from St. Lucia estuary, South Africa

A detailed description of both sexes of a new species, Lernanthropus capistroides, *is given. Specimens were sampled from the host,* Otolithes ruber *(Schneider, 1801), collected from Lake St. Lucia, South Africa. Morphological detail was observed with the aid of scanning electron microscopy. This species was compared with its nearest congener,* L. gisleri *van Beneden, 1852.*

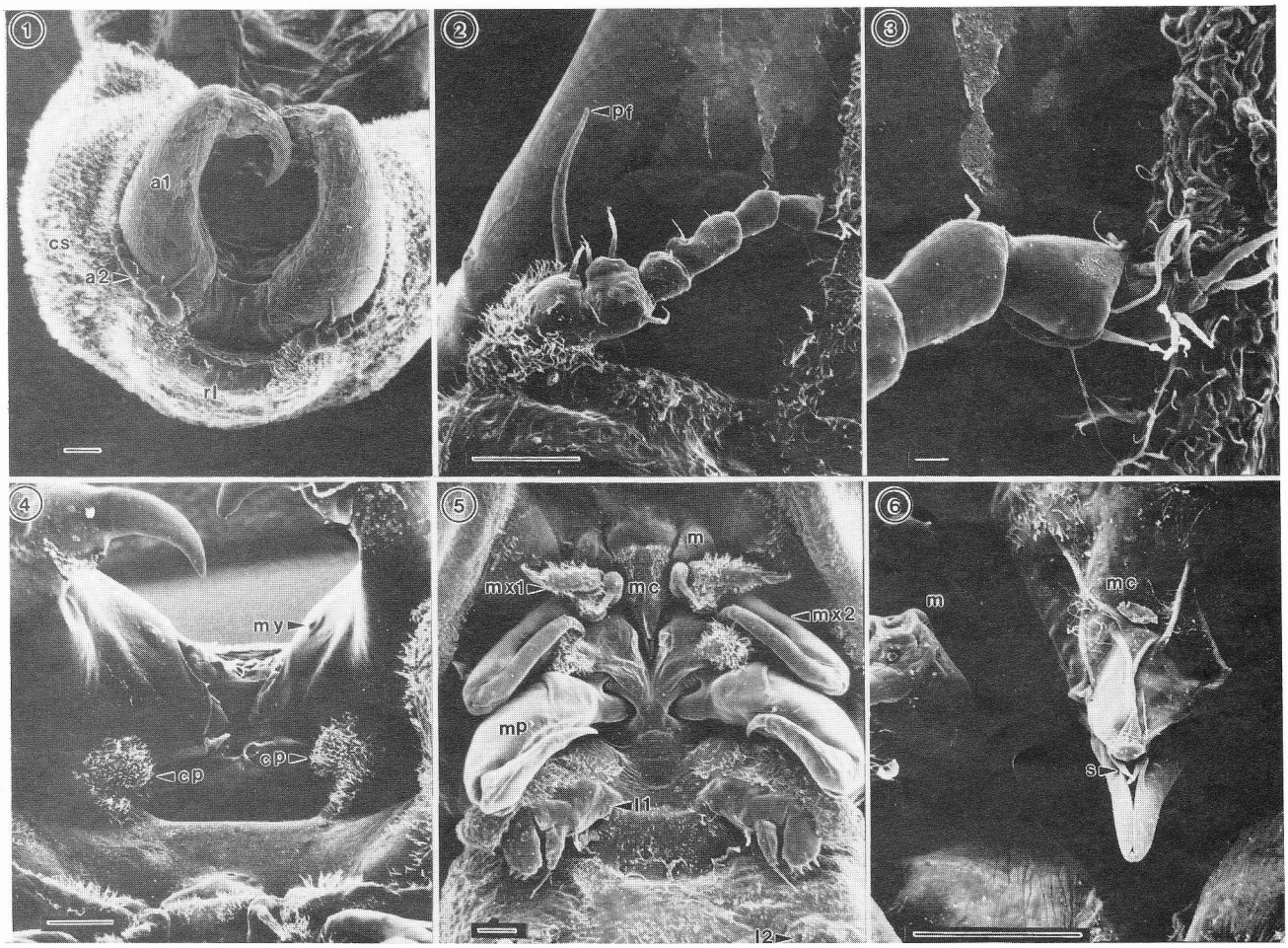
Lernanthropus (with 109 nominate species) is the largest genus of the family Lernanthropidae[1] and is considered a common genus of parasitic copepods. Nevertheless, it is virtually unknown from South Africa with the only references being *L. corniger, L. sarbae* (from Durban), *L. ecclesi* (from Table Bay, Cape Town)[2] and *L. paradoxus* from the Cape.[3] Other southern African species mentioned by Capart[4] include *L. barnardi, L. brevis, L. delamari, L. giganteus, L. gisleri, L. lichiae, L. nunesi, L. theodori, L. trachuri* and *L. villiersi* as well as *L. francai,*[5] all reported from Angola.

Specimens of *Lernanthropus* were collected from the St. Lucia estuarine system during surveys in 1992 and 1993. These were found attached to the gill filaments of four host species of fish. This paper deals with the description of a new species of *Lernanthropus*. The terminology of Kabata[4] and Huys and Boxshall[7] is adopted. Identification of host species was done according to Smith and Heemstra.[8]

Scanning electron microscopy was used in collaboration with conventional light microscopy for confirmation of certain structures. Specimens were fixed in 70% ethanol, cleaned in an ultrasonic bath and prepared for SEM using conventional methods.

Lernanthropus capistroides sp. nov. (Figs 1–28)

Material examined: Holotype female, 21 female paratypes in the type collection of the Department of Zoology, University of the North, registration numbers UNIN.SL.8/21, UNIN.SL.8/45, UNIN.SL.8/47 and UNIN.SL.8/48; 2 male paratypes (1 on SEM-stub) in the type collection of the Department of Zoology, University of the North, registration number UNIN.SL.8/45; 2



Figs 1–6. Fig. 1. Female, anterior view. al, antennule; a2, antenna; cs, cephalic shield; rl, rostral lobe. Fig. 2. Antennule, female. pf, parabasal flagellum. Fig. 3. Terminal segments of antennule, fe-male. Fig. 4. Antenna, posterior view, female. cp, capstan shape papilla; my, myxal area. Fig. 5. Female, ventral view. Ll, first leg; L2, second leg; m, base of mandible; mc, mouth cone; mp, maxilliped; mx1, maxillule; mx2, maxilla. Fig. 6. Ventral view of mouth cone and mandible, female. m, mandible; mc, mouth cone; s, stylet. Scale bars: single, 5 μm; double, 50 μm.

female paratypes in the collection of the British Museum (Natural History), registration numbers BMNH 1993. 702–703.

Host: *Otolithes ruber* (Schneider, 1801).

Locality: Collected during a parasitological survey at Fanie Island, Lake St. Lucia, South Africa (28°30′00″S, 32°30′00″E), 25-10-1992 to 1-11-1992.

Location on host: Attached to gill filaments.

Etymology: *capistrum* (L) = capstan, refers to capstan-shape papillae.

Female (Figs 1–19).

Body elongate, ventrally with patches covered with setules; length from anterior margin of cepalic shield to posterior margin of dorsal plate 7.2 mm (range = 6–8.3 mm); length including fourth legs 10.4 mm (range = 8.7–12.7 mm). Cephalic shield present to first pedigerous segment; slightly longer, 1.3 mm (range 1.1–1.4 mm) than broad, 1.1 mm (range = 1–1.3 mm); subcircular with narrower posterior margin and small rostral lobe (Fig. 1); lateral margins angled ventrally. Dorsal plate bell shape, covering uropods and most of fifth legs; lateral margins somewhat folded ventrally; length 3.2 mm (range = 2.8–3.5 mm).

Antennules close to antennae (Fig. 1), distinctly seven-segmented (Fig. 2); first segment with 1 seta; second segment with 3 setae; third segment with 1 small spine-like seta; fourth segment somewhat re-entrant at mid-length (probably signifying fusion of 2 segments), proximally with 1 short (obscured in Figure) and 1 long seta, distally with 1 short, spine-like seta; fifth segment with 1 seta; sixth segment with 1 long (possibly aesthete) and 2 shorter terminal setae; seventh segment (Fig. 3) with 9 terminal setae (2 obscured in Figure). Parabasal flagellum typical for genus (Fig. 2). Antenna (Fig. 4) sturdy, two-segmented; corpus large, curving inwards, tapering; with small myxal process on inner surface; subchela divided into shaft and strong uncinate claw with longitudinal striae.

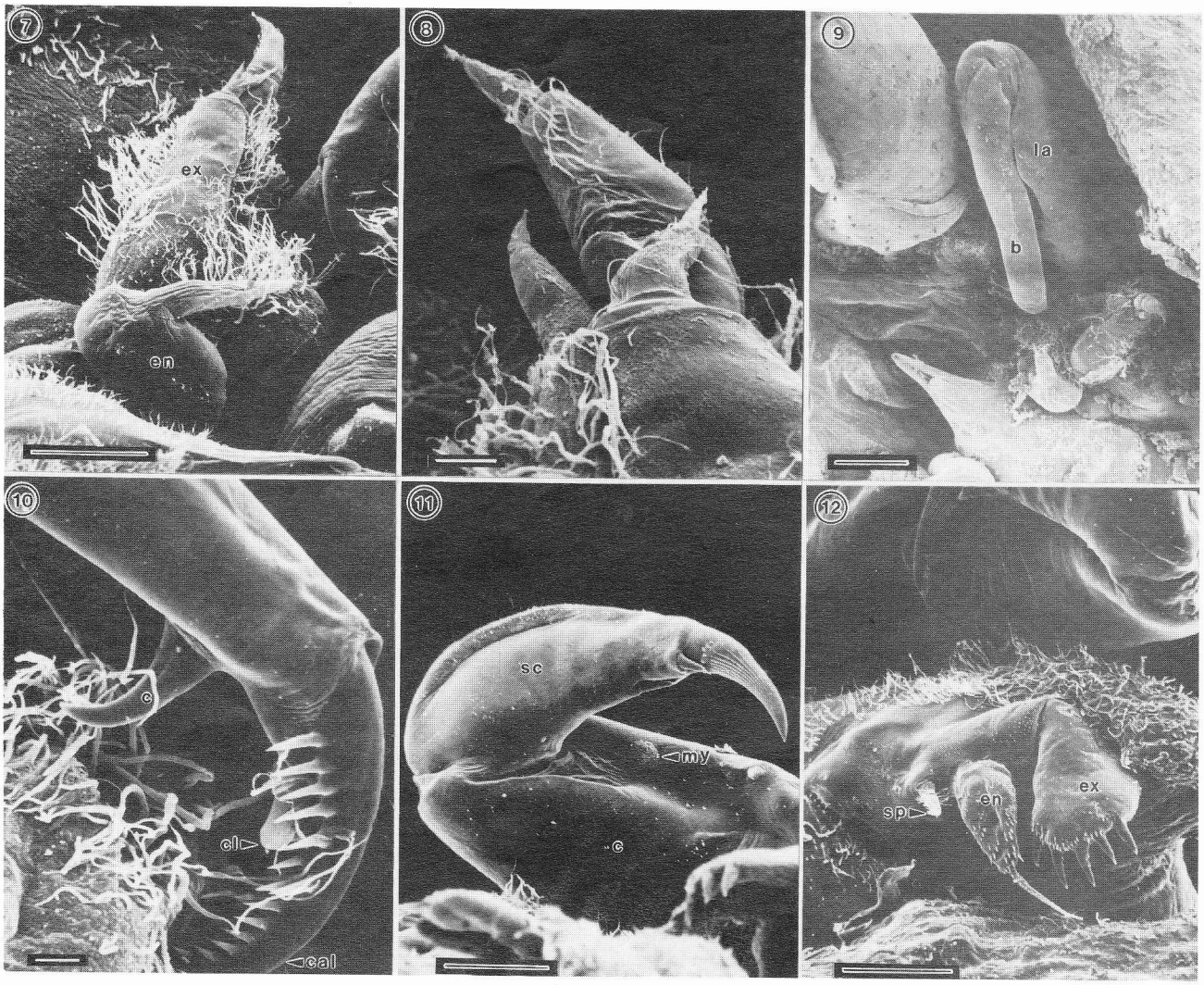
Immediately posterior to basis of antennae are two capstan-shape papillae (Fig. 4) covered with setules.

Mouth cone (Figs 5 and 6) conical with tip directed posteriorly, situated between the maxillules and maxillae; labrum shorter than labium, blunt ending with some integumental folds on frons. Labrum with two prominently bifid, tube-like buccal stylets (Fig. 6). Labium tapering towards tip, margins denticulated as in male (Fig. 23).

Mandible siphonostome; base conspicuously outside mouth cone (Figs 5 and 6), anterior to base of maxillule; tip curving to fit inner contour of labium; tip with flattened shaft, margined with 7 recurved teeth (Fig. 23).

Maxillule (Fig. 7) biramous with large sympod; endopod small, with inflated base and prominent subterminal horny spine, the latter angled to long axis of base, pointing posteriorly; exopod (Figs 7 and 8) setule covered; tip bearing a large spine (appearing three-jointed due to integumental folds) and two conspicuous setae. Maxilla uniramous, brachiform, two-segmented (Fig. 5); lacertus large, elongate with channeled inner margin (Fig. 9); brachium slender, with cubital articulation to fit into channel of lacertus, distally with one strong falcate canna, clavus and claw-like calamus; calamus with one incomplete and one complete row of spiniform denticles (Fig. 10).

Corpus of maxilliped robust (Fig. 5) myxal region papilliform, unarmed; shaft of subchela with two sub-terminal barbs and ter-



Figs 7–12. Fig. 7. Maxillule, female. en, endopod; ex, exo-pod. Fig. 8. Tip of exopod of maxillule, female. Fig. 9. Maxilla, female. b, brachium; la, lacertus. Fig. 10. Tip of maxilla, female. c, canna; cl, clavus; cal, calamus. Fig. 11. Maxilliped, female. c, corpus; my, myxal area; sc, subchela. Fig. 12. First leg, female. en, endopod; ex, exopod; sp, sympodial process. Scale bars: single, 5 μm; double, 50 μm.

minal claw with longitudinal striae (Fig. 11).

First leg (Figs 5 and 12) with large setule-covered sympod bearing one slightly curved, stout setose spine medial to endopod. Endopod conical (distal half with spicules) bearing one long spiculated apical seta. Exopod paw-shaped with five prominent spines on terminal margin, inner surface of spines denticulated; distal part of paw with a number of spicules; without flagelliform seta lateral to exopod. Second leg smaller than first (Figs 5 and 13); endopod cylindrical, tapering in short apical seta; exopod with four distal spines, spicules less conspicuous; sympodial process lateral to exopod, with filiform terminal seta. Third leg (Fig. 14) large, foliaceous, slightly folded along longitudinal axis. Fourth leg (Figs 14 and 15) originating anteroventrally to base of abdomen, bifurcate, lobes lanceolate, more than 75% protruding past posterior margin of dorsal plate. Fifth leg (Fig. 15) originating anterodorsally to abdomen, undivided, lanceolate, only tip reaching past posterior extremities of dorsal plate.

Abdomen (Fig. 15) with lateral papilliform copulatory pores (for attachment of spermatophores) and dorsolateral genital orifices (Fig. 16); uropods terminally, anal slit posterodorsally. Uropods (Fig. 15) tapering, with two terminal (Fig. 17) and two proximal setae dorsally (Fig. 18). Egg sacs long, cylindrical, with large numbers of uniseriate eggs (Fig. 19).

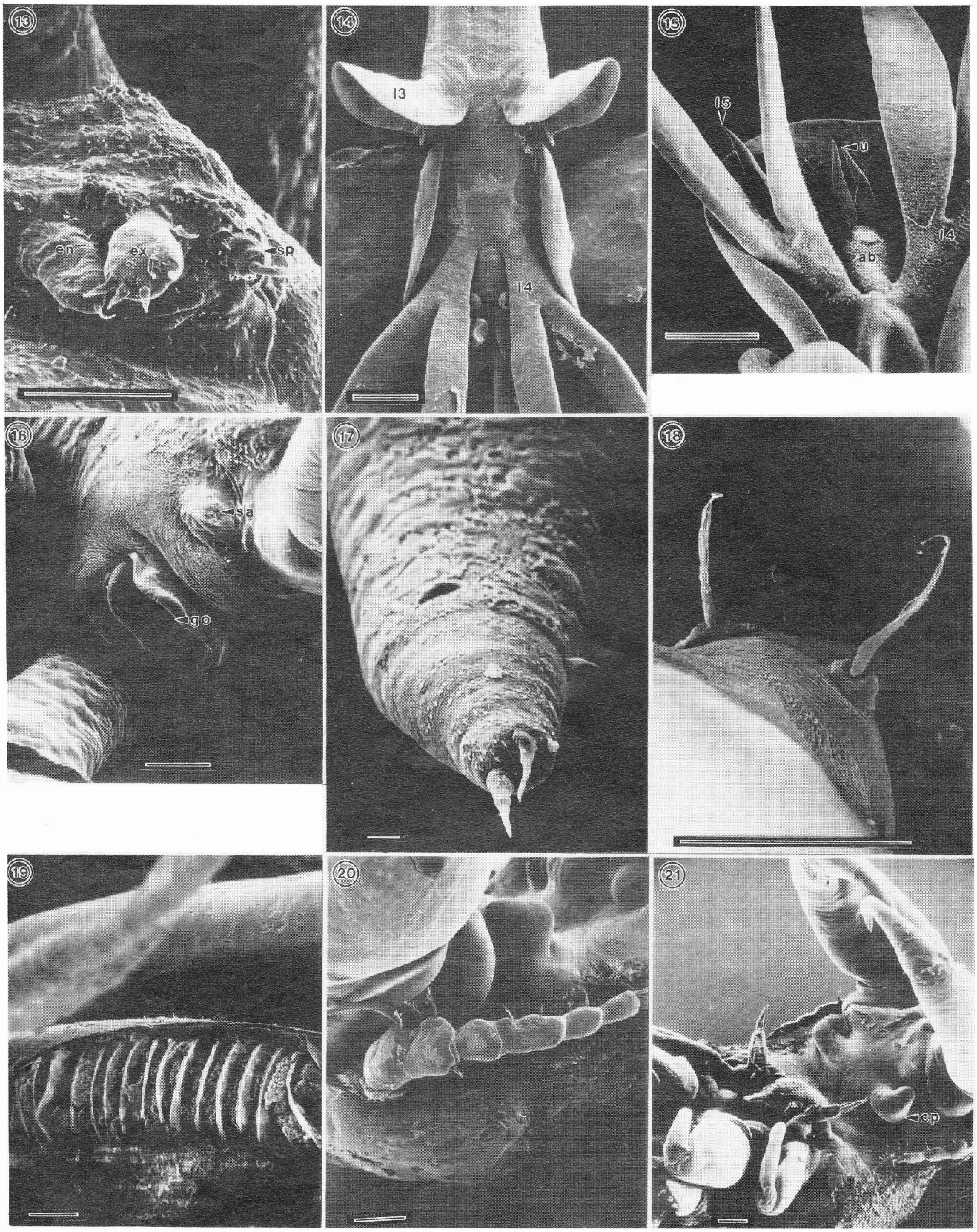
Male (Figs 20–28).

Smaller than female (2.5 mm; range 2.3–2.7 mm), lacking cephalic shield and dorsal plate. Third leg lateroventral, biramous, endopod smaller than exopod. Fifth leg absent. Dorsal surface of body and some appendages with small setae.

Antennule similar to female except for 1 and 2 feathered setae on first and second segments respectively (Fig. 20). Antenna larger in relation to body size and not as close to antennule as in female (compare Figs 1 and 20). Capstan-shape papillae without setules (Fig. 21). Labrum with a number of strong, curved spines on mid-ventral surface (Fig. 22). Mandible and buccal sylets as in female (Fig. 23). Base of maxillule with less conspicuous setules; first segment of exopod with 8 prominent spines on inner ventral surface; terminal spine and setae faintly setuled (Fig. 24). Corpus of maxilliped with small spines on ventral surface; myxal area well developed, armed (Fig. 25). Sympodial process of first leg armed with small spines at base; spicules of exopod longer than in female. Endopod of second leg (Fig. 26) with spines on medioventral surface and more prominent apical seta. Terminal area of exopod with three spines and array of spicules (Fig. 26); sympodial process with feathered terminal seta. Abdomen with prominent genital apertures and anal slit (Fig. 27), the latter margined with small spicules (Fig. 28).

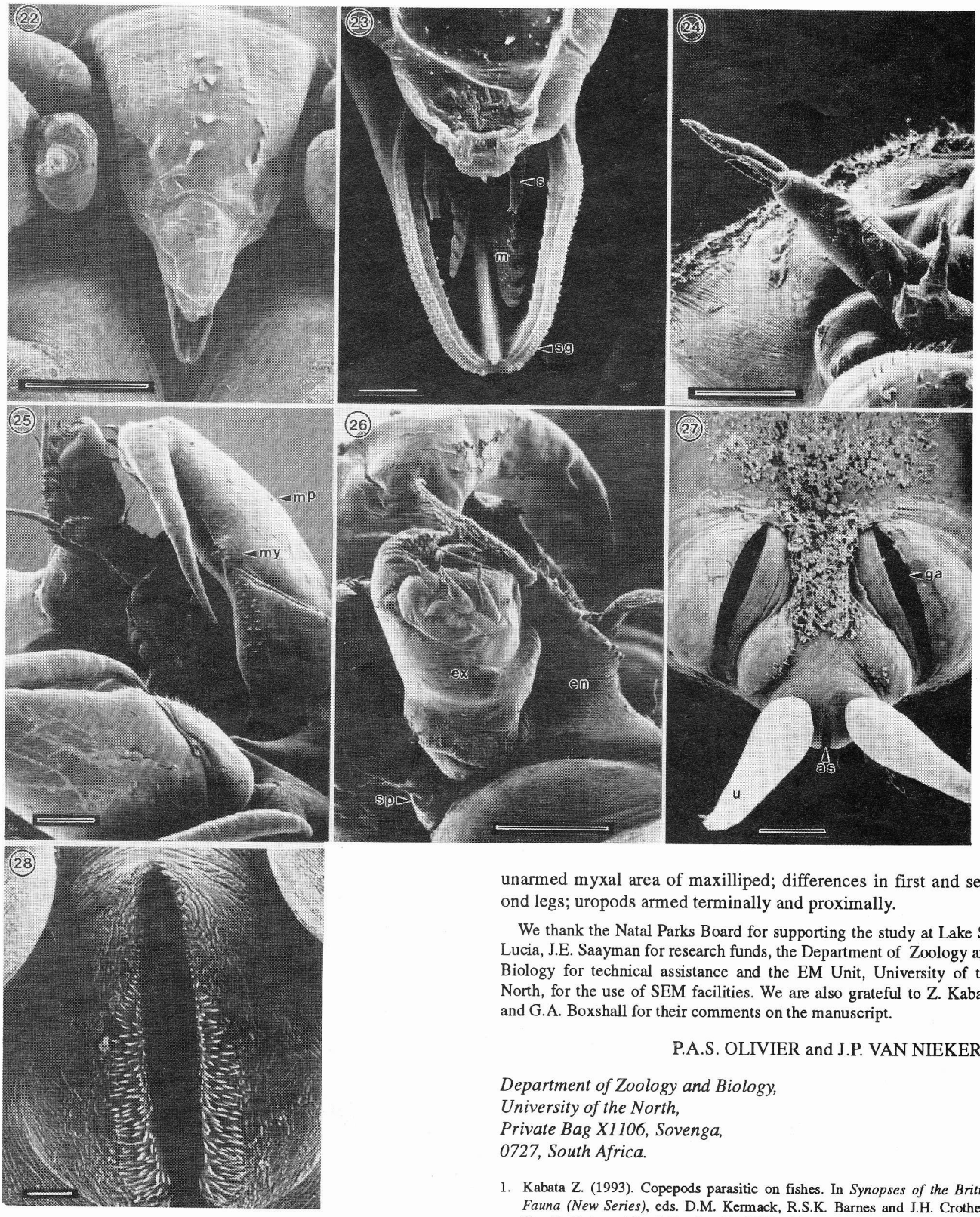
Discussion

The shape of the third leg of *L. capistroides* is a characteristic shared by a number of species. Amongst these are *L. ecclesi* Kensley and Grindley, *L. haumani* Luque and Farfán, *L. francai* Nunes-Ruivo, *L. grassei* Debouteville and Nunes-Ruivo, *L.*



Figs 13–21. Fig. 13. Second leg, female. en, endopod; ex, exopod; sp, sympodial process. Fig. 14. Posteroventral view, female. L3, third leg; L4, fourth leg. Fig. 15. Posteroventral view, female. ab, abdomen; L4, fourth leg; L5, fith leg; u, uropod. Fig. 16. Posterolateral view of abdomen, female. go, genital orifice; cop, copulatory pore. Fig. 17. Tip of uropod, female. Fig. 18. Proximal setae on uropod, female. Fig. 19. Ruptured egg sac, female. Fig. 20. Antenna, male. Fig. 21. Ventrolateral view, male. cp, capstan shape papilla. Scale bars: single, 5 μm; double, 50 μm; triple, 500 μm.

micropterygis Jägerskiöld, *L. gisleri* and *L. kroyeri* Van Beneden. Of these *L. capistroides* is most closely affiliated to *L. gisleri* (see Kabata[6] for redescription, paratypes of *L. gisleri*, BMNH 1984. 94–96, were compared by the authors during a visit to the British Museum), but there are several structural differences. In female *L. capistroides* the armarment of the antennule differs on the third and fourth segments; subchela of antenna divided into shaft and uncinate claw; the presence of capstan-shape papillae;



Figs 22–28. Fig. 22. Ventral view of mouth cone, male. Fig. 23. Tip of mouth cone, male. m, mandible; s, stylet; sg, denticulated margin of labium. Fig. 24. Maxilla, male. Fig. 25. Maxilliped, male. mp, maxilliped; my, myxal area. Fig. 26. Second leg, male. en, endopod; ex, exopod; sp, sympodial process. Fig. 27. Tip of abdomen, male. as, anal slit; ga, genital aperture; u, uropod. Fig. 28. Anal slit, male. Scale bars: single, 5 μm; double, 50 μm.

labrum with integumental folds on frons, lacking the sharp processes of *L. gisleri*; the presence of bifid buccal stylets; position and orientation of endopodal spine and detail of exopod armament of maxillule; channeled inner margin of maxilla's lacertus; unarmed myxal area of maxilliped; differences in first and second legs; uropods armed terminally and proximally.

We thank the Natal Parks Board for supporting the study at Lake St. Lucia, J.E. Saayman for research funds, the Department of Zoology and Biology for technical assistance and the EM Unit, University of the North, for the use of SEM facilities. We are also grateful to Z. Kabata and G.A. Boxshall for their comments on the manuscript.

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