

Redescriptions of *Dichelyne (Dichelyne) rasheedae* Petter, 1974 and *Spirocamallanus olsenii* Campana-Rouget & Razarihelissoa, 1965, recorded for the first time from fish in Lake St. Lucia, South Africa

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ABSTRACT

GIBBONS, L.M. & SAAYMAN, J.E. 1996. Redescriptions of *Dichelyne (Dichelyne) rasheedae* Petter, 1974 and *Spirocamallanus olsenii* Campana-Rouget & Razarihelissoa, 1965, recorded for the first time from fish in Lake St. Lucia, South Africa. *Onderstepoort Journal of Veterinary Research*, 63:39–46

During a survey of parasites of fish in Lake St. Lucia, KwaZulu-Natal, South Africa, *Dichelyne (Dichelyne) rasheedae* was recovered from the intestines of *Pomadasys commersonnii* and *Rhabdosargus sarba*, and *Spirocamallanus olsenii* from *Rhabdosargus sarba*. These are new host and geographical records. Both species of nematodes are redescribed and figured by use of light and scanning-electron-microscopical techniques, and additional morphological data are provided.

Keywords: *Dichelyne (Dichelyne) rasheedae* Petter, 1974, fish, Lake St. Lucia, *Spirocamallanus olsenii* Campana-Rouget & Razarihelissoa, 1965

INTRODUCTION

Spotted grunters, *Pomadasys commersonnii* (Lacepède, 1801) and Natal stumppnose, *Rhabdosargus sarba* (Forsskål, 1775) were collected during a continuing survey undertaken on Lake St. Lucia, KwaZulu-Natal, by the Department of Zoology, University of the North, Sovenga, South Africa. Nematodes recovered from the intestines of *P. commersonnii* and *R. sarba* were identified as *Dichelyne (Dichelyne) rasheedae* Petter, 1974 [= *Dichelyne (Dichelyne) fastigatus* of Rasheed, 1968 *nec* Chandler, 1935]. In addition, nematodes identified as *Spirocamallanus olsenii* Campana-Rouget & Razarihelissoa, 1965, were

also recovered from *R. sarba*. These findings represent new host and geographical records for both species of nematodes. Petter (1974) designated *Dichelyne (Dichelyne) fastigatus* of Rasheed (1968) as a new species which she named *Dichelyne (Dichelyne) rasheedae*, but she did not redescribe the species or designate a type specimen. *S. olsenii* has not been re-examined since its original description (Campana-Rouget & Razarihelissoa, 1965) from *Echeneis naucrates*, *Lutjanus duodecimlineatus* and *Lutjanus* sp. from Madagascar. Examination of the present specimens by light and scanning electron microscopy revealed details not previously observed, and the two species are redescribed here.

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MATERIALS AND METHODS

The fish were caught in nets, and the nematodes were immediately collected from them, washed in lake water and fixed in warm 70% alcohol. Some

specimens were cleared in lactoglycerol and some stained in Horen's trichrome and examined by interference microscopy. End-on-view preparations of the cephalic region were made, with glycerine jelly as the mounting medium. Spicules were examined in Berlese's fluid. Some specimens were prepared for scanning electron microscopy by means of the freezing dehydration method (Veltkamp, Chubb, Birch & Eaton 1994) and the critical-point drying technique, with liquid carbon dioxide as the drying medium. The dried specimens were coated with gold.

Specimens of *D. (D.) fastigatus*, collected by Rasheed from the intestine of *Pristipoma hasta*, Karachi, Pakistan, were borrowed from the Natural History Museum, United Kingdom (registration numbers 1969.667–668) and examined for comparison.

Measurements are in mm, unless otherwise stated.

Dichelyne (Dichelyne) rasheedae Petter, 1974

Material examined (Fig. 1–18)

1 ♂ and 1 ♀ from the material collected by Rasheed from the intestine of *P. hasta*, 4 ♂♂ and 10 ♀♀, 2 ♂♂ and 8 ♀♀ from the intestines of *P. commersonnii* and *R. sarba*, respectively, collected at Lake St. Lucia, South Africa. Measurements are based on those of 6 ♂♂ and 15 ♀♀.

Description

MALE

BODY. 3,1–6,02 long, maximum width 0,17–0,26 at level of proximal tip of fully withdrawn spicules.

HEAD. 0,12–0,17 wide, with a single circle of cephalic sensory organs, a pair of lateral amphids and four double submedian cephalic papillae.

MOUTH (Fig. 10). Laterally flattened, forming a dorso-ventral, oval opening, bordered internally by a band of small denticles.

OESOPHAGUS (Fig. 1). 0,61–0,73 long, swollen anteriorly, forming oesophagostome; ventriculus, 0,035–0,113 long; ventral caecum, 0,36–0,48 long.

NERVE RING, CERVICAL PAPILLAE AND EXCRETORY PORE (Fig. 11). 0,19–0,26, 0,64–0,98, 0,73–1,08 from anterior end, respectively. Cervical papillae project above body surface.

SPICULES (Fig. 6). 0,59–0,80 long, with single barb on each distal tip; gubernaculum narrow, 0,05–0,10 long.

TAIL (Fig. 18). 0,13–0,17 long, with distal tip covered in very small spines.

CAUDAL END (Fig. 16 and 17). With four pairs of latero-ventral and two pairs of ventral precloacal papillae; one pair of adcloacal papillae; two pairs of ventral, one pair of latero-ventral and one pair of lateral postcloacal papillae; single median papilla anterior to cloaca.

FEMALE

BODY. 5,83–11,53 long, 0,2–0,47 wide at level of vulva.

HEAD (Fig. 7). 0,15–0,26 wide, with cephalic sensory organs as in male; band of small denticles form an internal band around dorso-ventral, oval mouth opening, 88 denticles present in a single female.

OESOPHAGUS (Fig. 2). 0,76–1,35 long, swells anteriorly, forming an oesophagostome; ventriculus, 0,05–0,11 long; ventral caecum projects anteriorly, 0,47–0,72 long.

NERVE RING, CERVICAL PAPILLAE AND EXCRETORY PORE. 0,26–0,4, 0,7–1,27, 0,85–1,72 from anterior end, respectively.

VULVA (Fig. 5 and 13). Opens 2,23–5,37 from posterior end; eggs 0,049–0,073 x 0,026–0,05.

TAIL (Fig. 15). 0,2–0,45, with distal tip of tail covered in very small spines; (Fig. 4 and 14), pair of prominent caudal papillae 0,1–0,2 from tail tip. (Fig. 4 and 14).

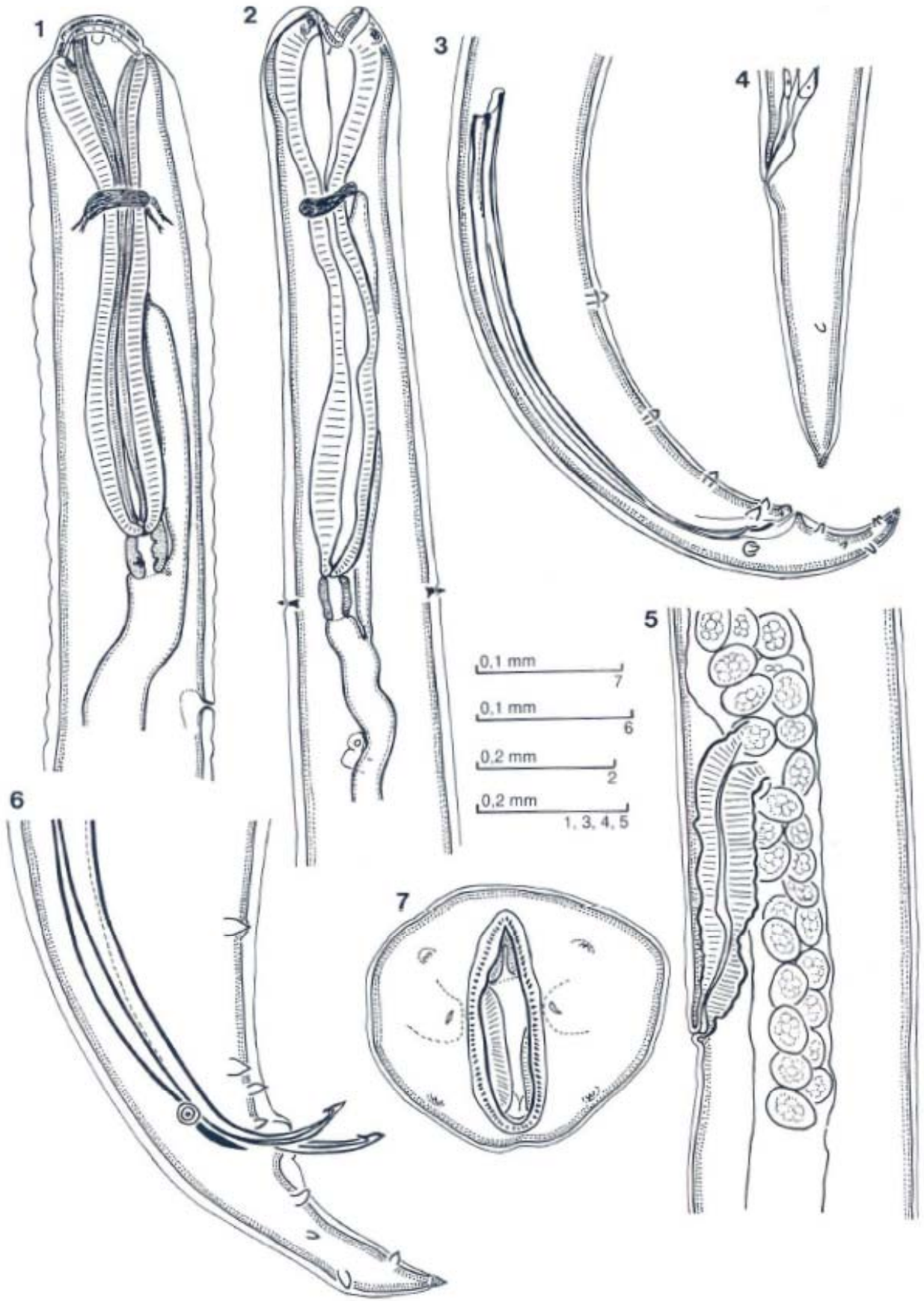
DISCUSSION

Chandler (1935) described *Dichelyne fastigatus* from the intestine of *Sciaenops ocellatus* from Galveston Bay, Texas, U.S.A. Rasheed (1968) identified specimens from the intestine of *P. hasta* near Karachi, West Pakistan and assigned them to Chandler's species, describing them and depositing her specimens in the Natural History Museum, London, United Kingdom. Stromberg & Crites (1972) established a new species, *Dichelyne bullocki*, from the intestine of *Fundulus heteroclitus* from Crommet Creek, Great Bay, Durham County, New Hampshire, USA. To establish

FIG. 1–7 *Dichelyne (Dichelyne) rasheedae* from *Pomadasy commersonnii* (light microscopy)

FIG. 1 Anterior end of male, lateral view
 FIG. 2 Anterior end of female, dorsal view
 FIG. 3 Posterior end of male, lateral view
 FIG. 4 Posterior end of female, lateral view

FIG. 5 Vulvar region of female, lateral view
 FIG. 6 Higher magnification of posterior end of male showing details of distal tips of spicules
 FIG. 7 *En face* view of female



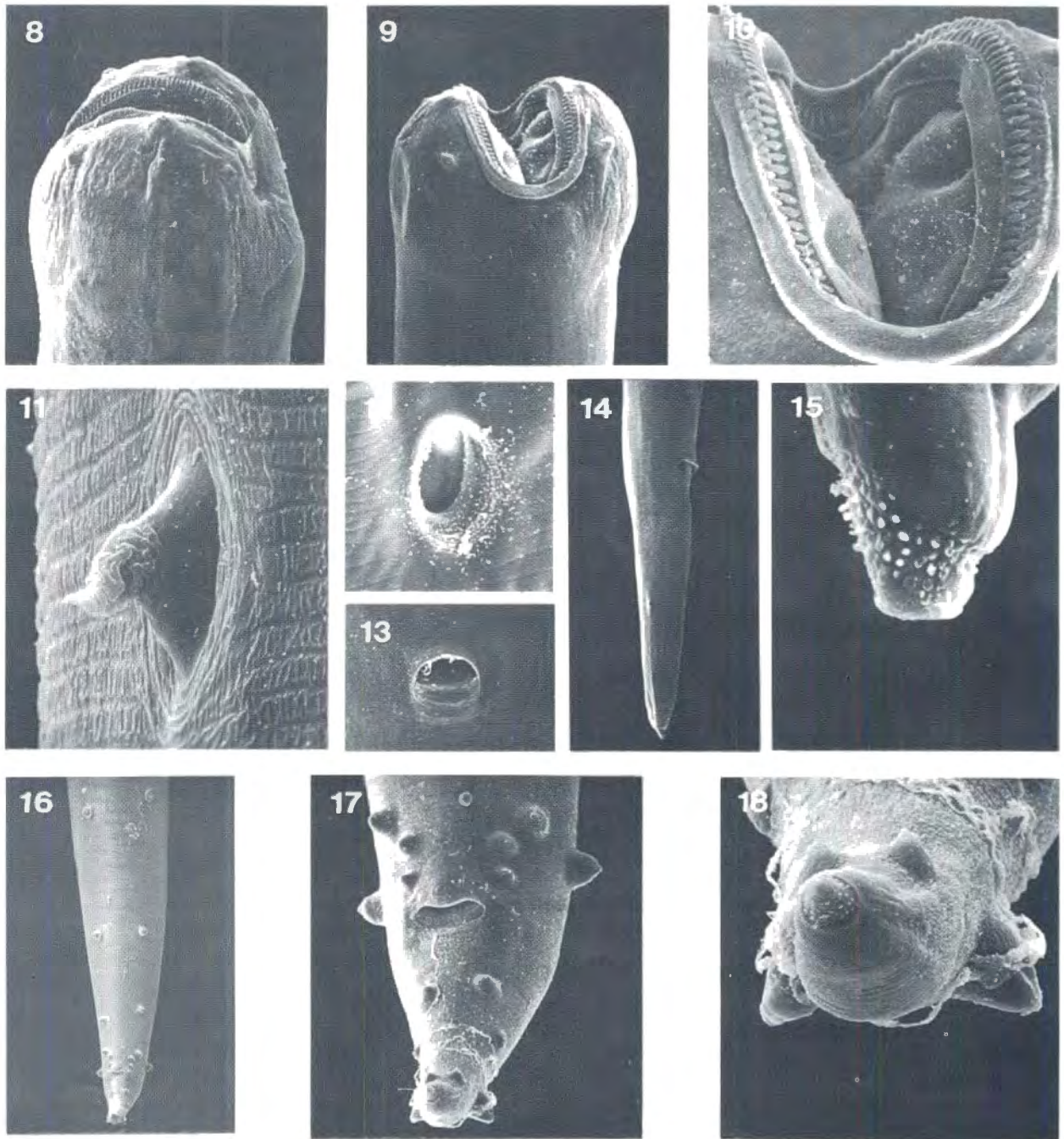


FIG. 8 *Dichelyne (Dichelyne) rasheedae* from *Pomadasy commersonii* (scanning electron microscopy). Anterior end, lateral view
Scale bar = 75 μ m

FIG. 9–18 *Dichelyne (Dichelyne) rasheedae* from *Rhabdosargus sarba* (scanning electron microscopy)

FIG. 9 Anterior end, dorso-ventral view

FIG. 10 Higher magnification of mouth opening showing bands of denticles and the beginning of the oesophagostome

FIG. 11 One of the two cervical papillae

FIG. 12 Excretory pore

FIG. 13 Vulvar opening

FIG. 14 Female tail, lateral view

FIG. 15 Distal tip of female tail showing the cone of spines

FIG. 16 Posterior end of male, ventral view

FIG. 17 Male tail, ventral view

FIG. 18 Higher magnification of distal tip of male tail showing the cone of spines

Scale bars = Fig. 9: 86 μ m

Fig. 10: 30 μ m

Fig. 11: 8 μ m

Fig. 12: 12 μ m

Fig. 13: 75 μ m

Fig. 14: 120 μ m

Fig. 15: 5 μ m

Fig. 16: 176 μ m

Fig. 17: 43 μ m

Fig. 18: 12 μ m

their new species, it was necessary to re-examine all the species identified from North American waters, including Chandler's species, *D. fastigatus*. Careful examination of the type specimens revealed a dorsal intestinal caecum and a smooth female tail which differed from the description given by Rasheed (1968) of her specimens. Stromberg & Crites (1972) therefore rejected the assignment of Rasheed's specimens to *D. fastigatus*. Petter (1974) revised the family Cucullanidae and, in view of the work by Stromberg & Crites (1972), proposed a new species for Rasheed's specimens, and named it *Dichelyne rasheedae*, but she did not redescribe the species or designate type specimens. She included this species with seven other species, including *D. fastigatus*, in the subgenus *Dichelyne*.

1 ♂ and 1 ♀ from Rasheed's material, described as *Cucullanus fastigatus* (Chandler, 1935) Campana-Rouget, 1957, were borrowed from the Natural History Museum, London, United Kingdom and compared with the present specimens from Lake St. Lucia. Studies revealed that the two were of the same species and this also supports the views of Stromberg & Crites (1972) and Petter (1974) that they both belong to a separate species. The validity of *D. (D.) rasheedae* is accepted here. Following the Rules of Zoological Nomenclature Article 74, the Natural History Museum specimen number 1969.667 DB Reg. No. 59697 is designated the lectotype, and specimen No. 1969.668 DB Reg. No. 59698, a paralectotype. Further paralectotypes have been deposited in the Natural History Museum, London, United Kingdom, collection numbers 1995.8.3.1–3 DB Reg. No. 62473 and the type collection of the International Institute of Parasitology, St. Albans, United Kingdom, collection numbers B. 1060–1062. The present study increases the range of measurements of Rasheed (1968), confirms the presence of a ventriculus, establishes the presence of a barb on the distal tip of the spicules and identifies eleven pairs of papillae on the posterior end of the male [only ten described by Rasheed (1968)].

***Spirocamallanus olsenii* Campana-Rouget & Razarihelissoa, 1965**

Material examined (Fig. 19–35)

9 ♂♂ and 3 ♀♀ from the intestine of *R. sarba* collected at Lake St. Lucia, South Africa. IIP Voucher Collection number 7757.

Measurements are based on those of 6 ♂♂ and 3 ♀♀.

Description

MALE

BODY. 15,97–18,37 long, 0,17–0,21 wide, just anterior to caudal alae.

HEAD (Fig. 20 and 30). 0,1–0,13 wide; inner circle of four small cephalic sensory organs present near mouth rim; outer circle of cephalic sensory organs include a pair of lateral amphids, four single submedian cephalic papillae; mouth opening, circular with simple circumoral membrane.

THICK-WALLED BUCCAL CAPSULE (Fig. 21, 31 and 32). Present, oval in lateral view, 0,08–0,12 long, 0,07–0,085 wide, 12–16 spiral grooves in its inner surface; eight muscle bands radiate from cephalic region.

OESOPHAGUS (Fig. 19). Clearly divided into two parts, anterior muscular oesophagus, 0,37–0,47 long, posterior glandular oesophagus, 0,75–0,94 long.

NERVE RING, CERVICAL PAPILLAE, AND EXCRETORY PORE. 0,23–0,29, 0,14–0,18 and 0,55–0,74 from anterior end, respectively.

CERVICAL PAPILLAE. Finely pointed, project above body surface.

SPICULES (Fig. 27); Unequal, right, 0,27–0,32 long, broad, with short, pointed tip; left, 0,19–0,25, narrow, tapering to sharp point.

GUBERNACULUM. Absent.

POSTERIOR END OF MALE (Fig. 33). Curves ventrally, caudal alae present, linking transversally on ventral surface anterior to cloaca, forming a central, elongate, sucker-like region.

OBLIQUE MUSCLE BANDS. Extend toward median line within caudal alae; three pairs of precloacal papillae, five pairs of postcloacal and two pairs of adcloacal papillae are present.

TAIL (Fig. 26). 0,2–0,25 long, two tiny projections or spines present on distal tip of tail.

FEMALE

BODY. 26,11–30,88 long, 0,58–0,8 wide at level of vulva.

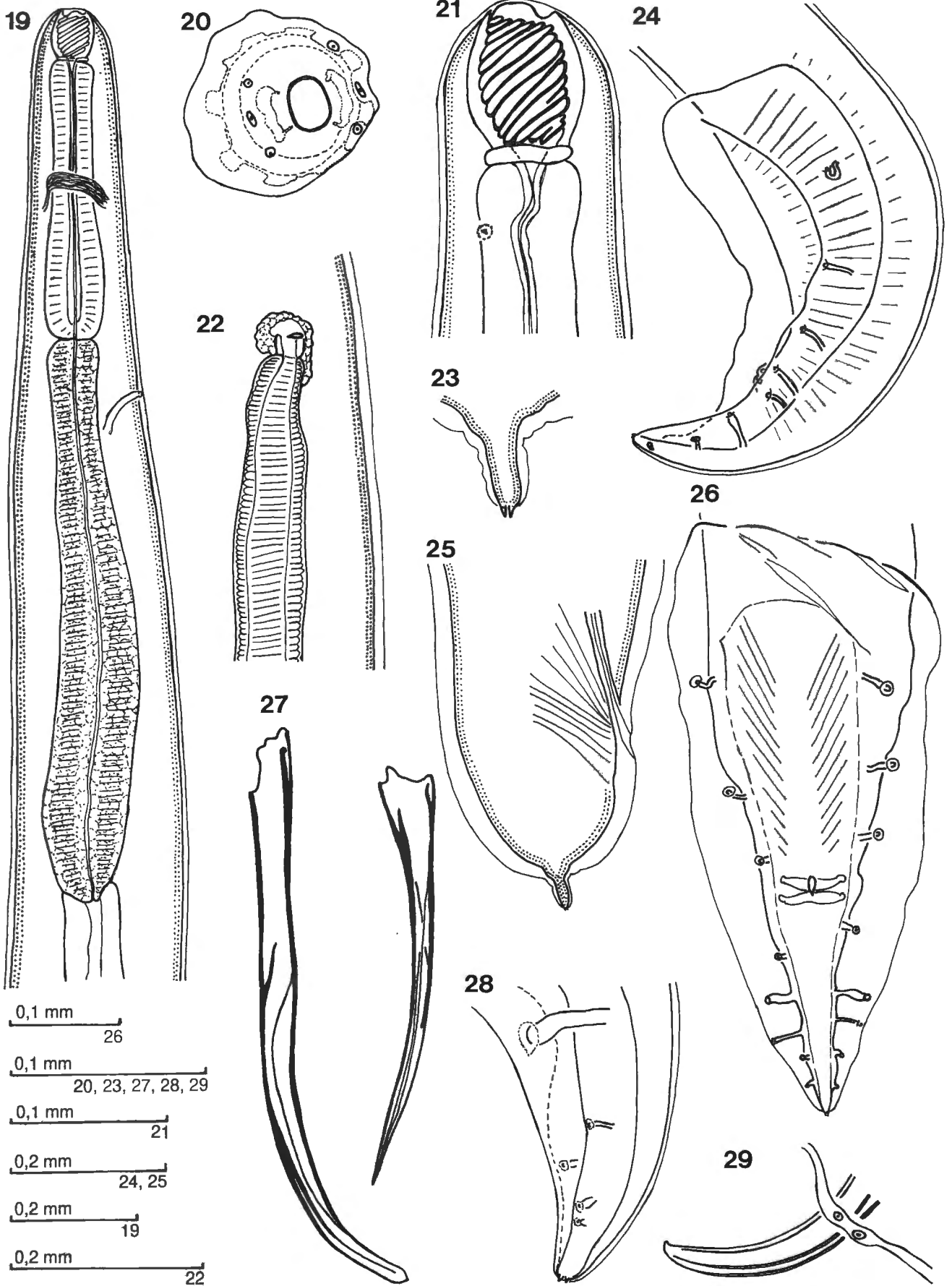
HEAD. 0,14–0,15 wide; insufficient number of specimens available to examine end-on-view of cephalic region.

THICK-WALLED BUCCAL CAPSULE. Oval in lateral view, 0,1–0,12 long, 0,1 wide; 12–15 spiral grooves in its inner surface.

OESOPHAGUS. Clearly divided into two parts, anterior muscular oesophagus, 0,5–0,56 long, posterior glandular oesophagus, 1,02–1,12 long.

NERVE RING, CERVICAL PAPILLAE AND EXCRETORY PORE. 0,28–0,3, 0,18–0,19, 0,68–0,93 from anterior end, respectively.

VULVA (Fig. 22). Small transverse slit, opens 12,51–16,73 from tail tip; viviparus, uterus filled with larvae.



TAIL (Fig. 23 and 25). 0,19–0,24 long, constricts 0,04–0,05 from distal tip to form a narrow elongation with two projections or spines on distal tip.

DISCUSSION

Spirocamallanus olseni was reported and described by Campana-Rouget & Razarihelissoa (1965) from specimens recovered from the stomach of *E. nautocrates*, *L. duodecimlineatus* and *Lutjanus* sp. from Madagascar. They distinguished their species from the three other species known from marine fish, namely *Spirocamallanus monotaxis* Olsen, 1952, *Spirocamallanus tornquisti* Campana-Rouget, 1961 and *Spirocamallanus* sp. (= *Procamallanus spiralis* of Yamaguti, 1954) by the number of spiral grooves in the buccal capsule, the length of the spicules and the number of (male) genital papillae.

Bashirulla (1973) described a new species from the intestine of *Channa (Ophiocephalus) striatus* Dacca, Bangladesh, and named it *Spirocamallanus olseni*, unaware of Campana-Rouget & Razarihelissoa's species. Later (1974), Bashirulla renamed his species *Spirocamallanus intestinecolas*. The specimens described by Bashirulla are distinctly different from *S. olseni* in the number of spiral grooves in the buccal capsule (22 in *S. intestinecolas*, 12–16 in *S. olseni*) and the measurements of the body and organs.

Gupta & Garg (1986) reviewed the genus *Spirocamallanus* Olsen, 1952, and gave a key to the species, distinguishing *S. olseni* from the remaining species of the genus, on the basis of the presence of two unequal spicules, dissimilar in shape, in the constriction of the female tail, the presence of two spines on the tail and the presence of eight caudal papillae on the male. The present specimens fit these criteria, but show some differences from the original description of the species. The number of spiral grooves in the buccal capsule wall are 12–16 in the present specimens (8–9 in Campana-Rouget & Razarihelissoa's); and the male caudal papillae show some differences in arrangement. However, Campana-Rouget & Razarihelissoa (1965) indicated that in the specimens they had studied, there was some variability in these papillae. Furthermore, some of the measurements in the present study extend beyond the published range for this species. These differences are considered insufficient for the separation

of the specimens in the present study into a different species, consequently they are assigned to *S. olseni* Campana-Rouget & Razarihelissoa, 1965.

The scanning electron micrographs show that the spiral "thickenings" of the buccal capsule are deeply rounded grooves on the wall, which probably assist in the filtering out of food particles.

Incidence

Dichelyne (Dichelyne) rasheedae were recovered from both *P. commersonnii* and *R. sarba*, and *S. olseni* only from *R. sarba*, in Lake St. Lucia, South Africa. Forty-five *P. commersonnii* were examined during the winter months over a 4-year period (1991–1994), 27 were infected, with a range of 1–51 specimens of *D. (D.) rasheedae*. Thirty-one *P. commersonnii* were examined during the summer months of the same period; of these only nine were infected, with a range of 1–30 specimens of the same nematode species. Similarly, 21 *R. sarba* were examined during the winter months (1991–1994), and only one fish was infected, with a range of 1–4 specimens of the two species, *D. (D.) rasheedae* and *S. olseni*. Forty *R. sarba* were examined during the summer months of the same period and seven fish were infected, with a range of 1–10 nematodes of the two species. It would appear that the incidence of nematode infection is higher in *P. commersonnii* in winter and lower in summer, while in *R. sarba*, the opposite occurs, and the incidence appears to be lower in winter and higher in summer.

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FIG. 19–29 *Spirocamallanus olseni* from *Rhabdosargus sarba* (light microscopy)

FIG. 19 Anterior end of male, lateral view

FIG. 20 *En face* view of male

FIG. 21 Higher magnification of anterior end of male, latero-ventral view

FIG. 22 Vulvar region, latero-ventral view

FIG. 23 High magnification of elongation of female tail, lateral view

FIG. 24 Posterior end of male, lateral view

FIG. 25 Posterior end of female, lateral view

FIG. 26 Posterior end of male, ventral view

FIG. 27 Spicules

FIG. 28 Higher magnification of distal end of male tail

FIG. 29 Higher magnification of cloacal region showing adcloacal papillae, lateral view

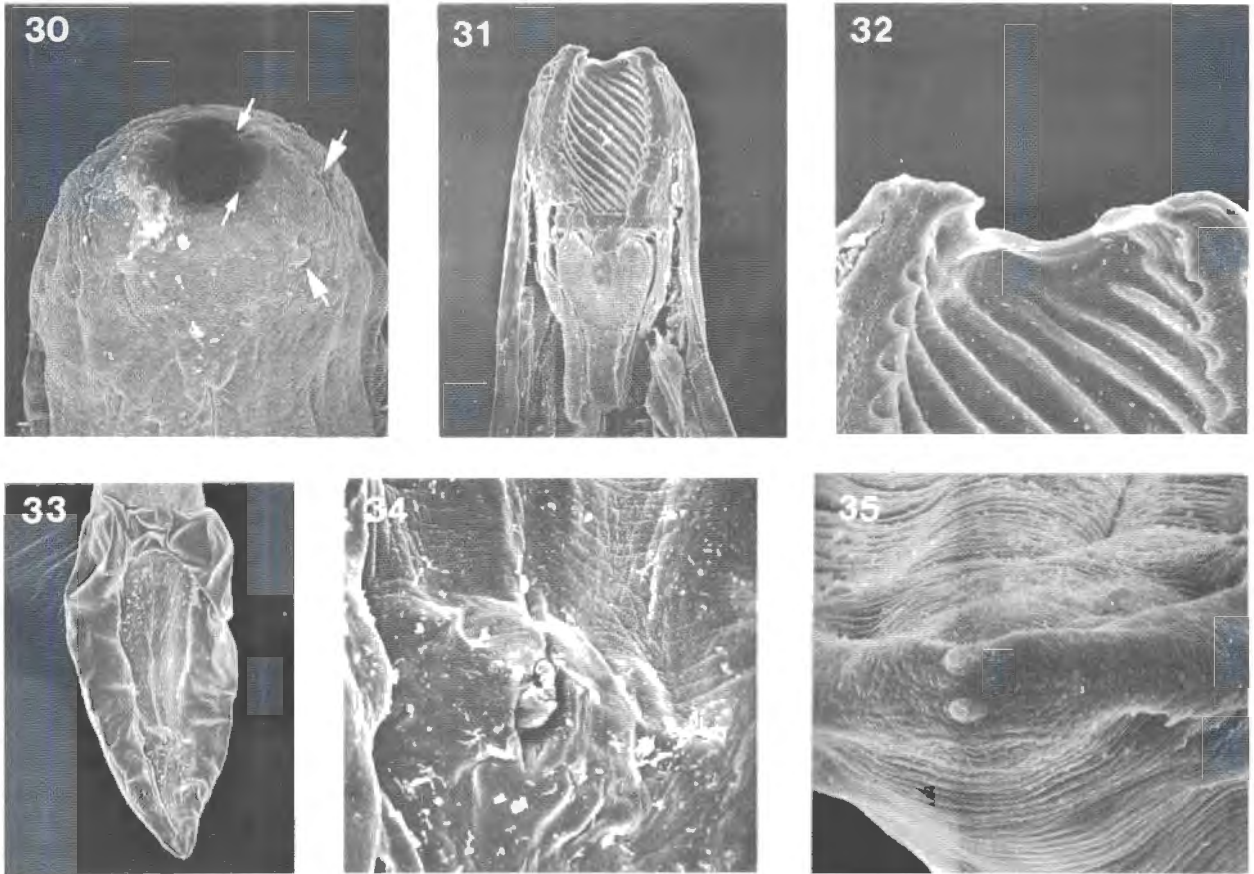


FIG. 30–35 *Pirocamallanus olseni* from *Rhabdosargus sarba* (scanning electron microscopy)

FIG. 30 Anterior end showing inner (small arrow) and outer (large arrow) circle of cephalic sensory organs

FIG. 31 Buccal capsule cut open to reveal spiral grooves in inner wall

FIG. 32 Higher magnification of anterior part of internal wall of buccal capsule

FIG. 33 Posterior end of male, ventral view

FIG. 34 Male cloacal region

FIG. 35 Distal tip of male tail

Scale bars = Fig. 30: 30 μ m

Fig. 31: 50 μ m

Fig. 32: 15 μ m

Fig. 33: 176 μ m

Fig. 34: 25 μ m

Fig. 35: 10 μ m

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