New species of marine nematodes from Qingdao, China

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Introduction

This paper is the first taxonomic report on freeliving marine nematodes from China. The three new oncholaimid species described here were extracted from intertidal sand samples taken from beaches adjacent to the city of Qingdao in summer, 1981.

Material and methods

The specimens came from two intertidal localities: mid-tide level on Qingdao bathing beach and mean low water level east of Qingdao pier. Cumulative curves of the sediment grain size analysis data are shown in Fig. 1. The pier beach is considered polluted by sewage whereas the bathing beach is relatively clean. Methods of microscopic study, abbreviations and style of description were as set out in Platt & Zhang (1982).

Systematic descriptions

Oncholaimus qingdaoensis sp. nov.
Fig. 2

MATERIAL STUDIED. Holotype: σ_1 BM(NH) 1982.1.2. Allotype: ♀ BM(NH) 1982.1.5. Paratypes: two males BM(NH) 1982.1.3–4.

LOCALITY. Qingdao bathing beach, Shandong, China.

DIMENSIONS

σ_1: $\frac{-\ 372\ M\ 2590}{20\ \ 25\ 27\ \ 20}$ 2640 μm; a = 98; b = 7; c = 53

σ_2: $\frac{-\ 384\ M\ 2370}{22\ \ 21\ 25\ \ 21}$ 2420 μm; a = 97; b = 6; c = 48

σ_3: $\frac{-\ 340\ M\ 2331}{20\ \ 21\ 26\ \ 20}$ 2380 μm; a = 92; b = 7; c = 49

♀: $\frac{-\ 365\ M\ 2300}{22\ \ 31\ 32\ \ 24}$ 2350 μm; a = 73; b = 6; c = 47

DESCRIPTION. Cuticle smooth. R_1 sensilla papilliform. $R_2 + R_3$ sensilla at the same level and equal in size: 8–9 μm, 40–45% h.d. Head constricted immediately posterior to cephalic setae. Amphid 9 μm wide, 40% c.d.: in some individuals the amphids are difficult to distinguish. Buccal cavity 25–27 μm deep. Large left subventral, small right subventral and small dorsal

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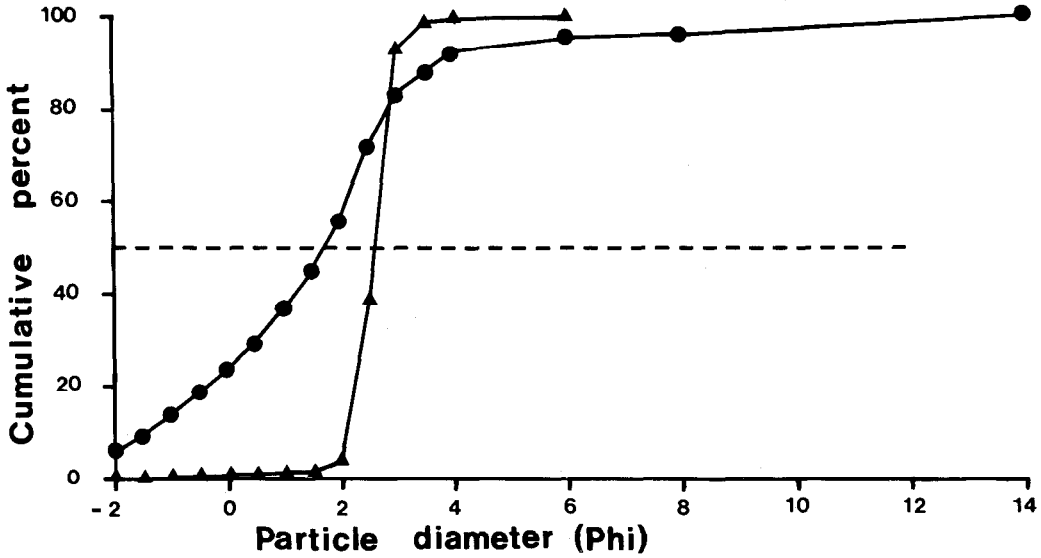

Fig. 1 Cumulative curves from the sediment analysis data for: (▲—▲) Qingdao bathing beach; (●—●) Qingdao pier beach sediments.

teeth. Oesophagus without bulb. Excretory pore situated 48–64 μm from the anterior, about 2–2·5 times the length of the buccal cavity (Fig. 2a, b). Nerve ring situated at 43–48% of oesophagus length. Tail conical, slightly curved ventrally; 2·0 a.b.d. in female, 2·5 a.b.d. in male.

Spicules equal, 34–36 μm (1·8 a.b.d.), proximally cephalate and pointed distally. Gubernaculum absent. Pairs of 3–7 μm special subventral stout spine-like setae: 4 pairs precloacal, 4 pairs adcloacal and 3 pairs on the tail. Two pairs of precloacal spines, not conspicuously situated on papillae. Conspicuous ventral papilla about 12 μm from the tail tip (Fig. 2c, d). Two opposed testes.

Vulva at 69% of total length. Single anterior ovary. A demanian system could not be distinguished in the only female available for study.

DIFFERENTIAL DIAGNOSIS. *Oncholaimus qingdaoensis* sp. nov. belongs to a group of species which have a conspicuous papilla near the male tail tip. Of these species, in terms of tail shape, the new species most closely resembles *O. cobbi* (Kreis, 1932), *O. domesticus* (Chitwood & Chitwood, 1938), *O. hyrcanus* Tchesunov, 1979 and *O. longus* (Wieser, 1953). Amongst several minor differences, *O. qingdaoensis* may be differentiated from *O. longus* by its less slender body (male a = 92–98 vs 130–150) and more anterior excretory pore (2–2·5 vs 4 buccal cavity lengths from anterior); from *O. cobbi* by the fewer number of adcloacal pairs of spines (4 vs 10–15), shape of the postcloacal papilla and the presence of precloacal spines; from *O. domesticus* by the lack of a well-developed demanian system with adanal or postanal openings; from *O. hyrcanus* by the lack of unequal spicules, lack of conspicuous precloacal papilla and different shape of the female tail. In addition, *O. qingdaoensis* appears to differ from all of these four species in having its larger left subventral tooth more conspicuously anterior to the dorsal and right subventral teeth.

ETYMOLOGY. The species name refers to the city near the type locality.

DISCUSSION. The genus *Oncholaimus* Dujardin, 1845 and the related genera are currently in some considerable state of confusion and badly need revising. Several sets of *Oncholaimus*-like species have been placed in separate genera, the bases of which appear to be breaking down in the light of more recent findings. Genera separated from *Oncholaimus* include *Metaparoncholaimus* De Coninck & Stekhoven, 1933 on the presence of two large

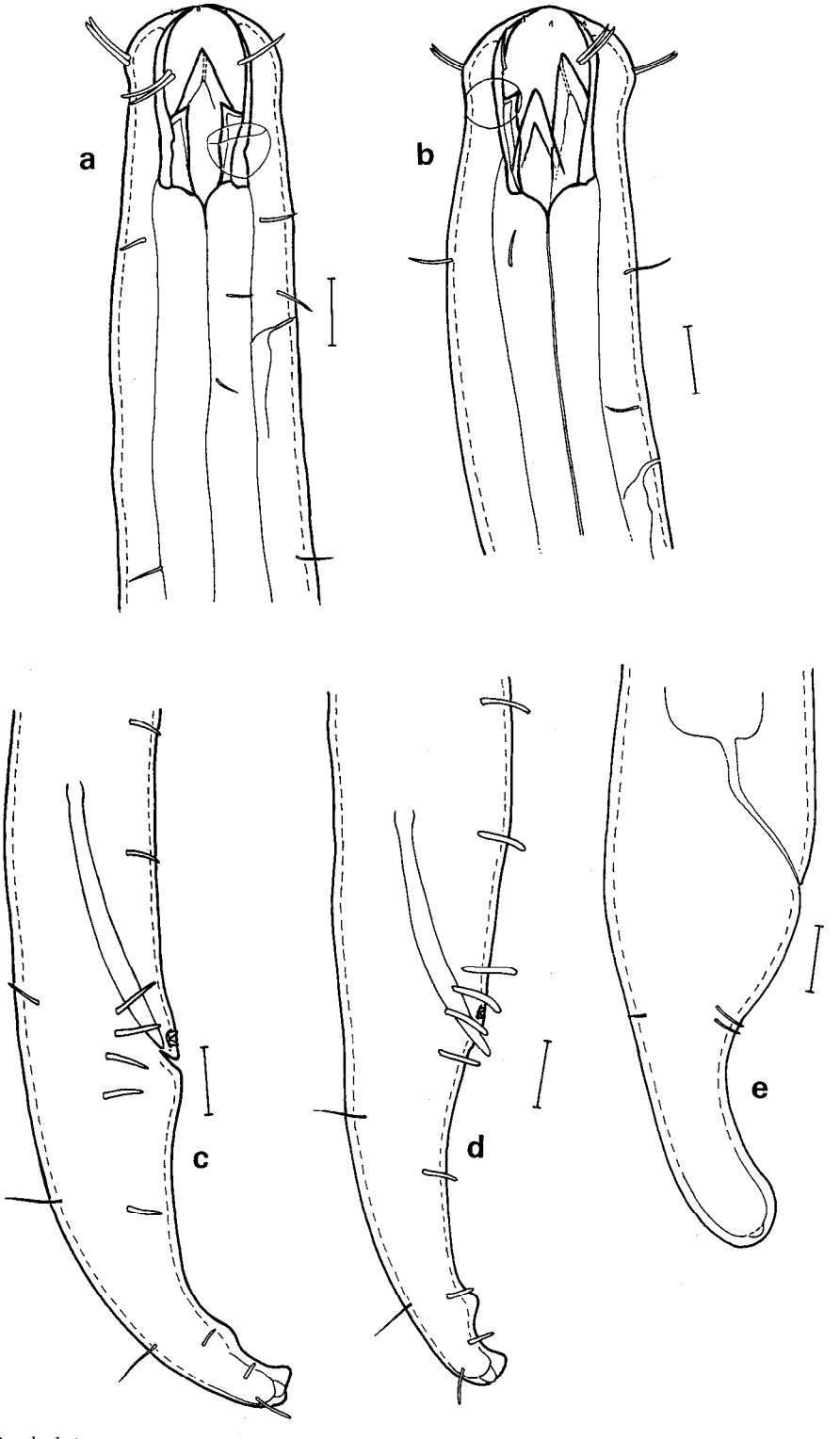

Fig. 2 *Oncholaimus qingdaoensis*: (a) δ_1 head; (b) δ_2 head; (c) δ_1 tail region; (d) δ_3 tail region: (e) ♀ tail region. Bar scales: 10 μm,

equal subventral teeth; *Oncholaimium* Cobb, 1930 on (originally) the presence of a precloacal papilla and a demanian system without exit pores; *Pseudoncholaimus* Kreis, 1932 on the absence of a demanian system. Rachor (1969) considered the last two to be synonymous with *Oncholaimus*. So, for the purposes of this analysis, species previously assigned to *Oncholaimium* and *Pseudoncholaimus* have been considered along with *Oncholaimus* sensu stricto. Altogether, this group includes 91 known species, of which 26 are considered to be dubious on the grounds of inadequate description.

Several *Oncholaimus* species have been reported as having teeth of equal or almost of equal length, e.g. *O. nigrocephalatus* Cobb, 1930, *O. opisthonchus* Filipjev, 1927 and *O. problematicus* Coles, 1977. Indeed, drawings of these species differ little from De Man's original (1876) drawing of *Metaparoncholaimus campylocercus*, the genotype. Therefore, any future revision of this group should carefully consider whether *Metparoncholaimus* should be maintained as a distinct genus or whether the relative tooth sizes should be considered a variable infrageneric character within *Oncholaimus*, albeit of great use in practical identification.

Oncholaimus sinensis sp. nov.

Fig. 3

MATERIAL STUDIED. Holotype: δ_1 BM(NH) 1982.1.6. Paratypes: δ_2 BM(NH) 1982.1.6, δ_3 in the collection of Z. N. Zhang and one juvenile BM(NH) 1982.1.7.

LOCALITY. East of Qingdao pier, Shandong, China.

DIMENSIONS

δ_1: $\frac{-\ 310\ M\ 1990}{19\ \ 38\ 40\ \ 22}$ 2080 µm: a = 52; b = 7; c = 23

δ_2: $\frac{-\ 325\ M\ 1930}{20\ \ 39\ 40\ \ 23}$ 2010 µm; a = 50; b = 6; c = 25

δ_3: $\frac{-\ 340\ M\ 2074}{22\ \ 40\ 42\ \ 23}$ 2160 µm; a = 51; b = 6; c = 25

Juvenile: $\frac{-\ 405\ M\ 2480}{21\ \ 35\ 35\ \ 23}$ 2570 µm; a = 73; b = 6; c = 29

DESCRIPTION. Cuticle smooth. R_1 sensilla papilliform. $R_2 + R_3$ sensilla at the same level and almost the same length: 5–6·5 µm, 25–33% h.d. Amphid 7 µm wide, 29% c.d., situated just anterior to dorsal tooth. Buccal cavity 24–26 µm deep, armed with large left subventral tooth and smaller right subventral and dorsal teeth. Excretory pore situated 80–93 µm from anterior, about 3 times the length of the buccal cavity (Fig. 3a). Nerve ring situated at 45–51% of oesophagus length. Tail conico-cylindrical, 3·5–4 a.b.d. with slightly swollen tip.

Spicules equal, 26–27 µm (1·2 a.b.d.), proximally slightly cephalate, distally pointed but with some striations on the ventral side. Gubernaculum absent. Relatively conspicuous 'fleshy' precloacal papilla present. There is also a ventral postcloacal papilla situated at about 60% of the tail length from the cloaca with two pairs of 3 µm setae. About 11 pairs of 4·5–7 µm adcloacal setae in addition to subdorsal caudal setae.

DIFFERENTIAL DIAGNOSIS. *Oncholaimus sinensis* sp. nov. most closely resembles *O. appendiculatus* (Cobb, 1930) and *O. campylocercoides* De Coninck & Stekhoven, 1933 in the presence of a prominent precloacal papilla and a conico-cylindrical tail. However, *O. campylocercoides* as originally described and as redescribed by Gerlach (1952) apparently lacks the postcloacal papilla, although Wieser (1959) mentions and figures the presence of *two* setose papillae in the middle of the tail. *O. appendiculatus* has a single ventral postcloacal papilla but the spicules are much longer than those of the new species. Three other species

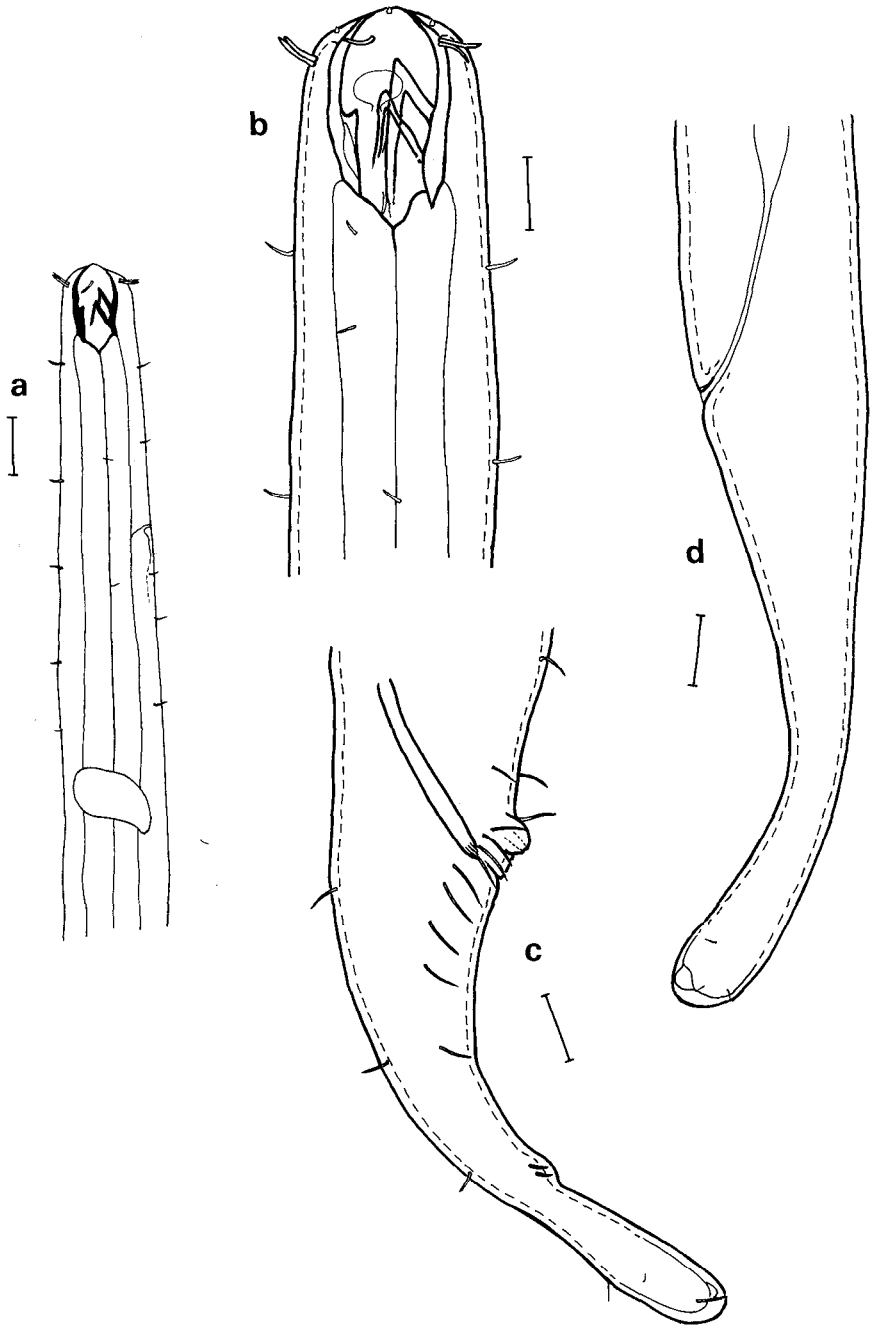

Fig. 3 *Oncholaimus sinensis*: (a) ♂1 anterior region; (b) ♂1 head; (c) ♂1 tail region; (d) juvenile tail region. Bar scales: a = 20 μm; b–d = 10 μm.

have been described with single postcloacal papillae and similarly shaped tails, *O. manilius* Gerlach, 1957, *O. martini* Wieser, 1959 and *O. olium* Belogurov, Belogurova & Pavluk, 1975: all lack the conspicuous precloacal supplement and have their amphids situated more posteriorly than in *O. sinensis*.

ETYMOLOGY. The species name refers to the country of the type locality.

DISCUSSION. It is hoped that an analysis of the female demanian system will be given in the near future when new material is available. In the meantime, the assessment of these Chinese specimens as belonging to a distinct species rests on the male characters alone. Judging from descriptions in the literature, and in view of the need for a revision of the genus as discussed above, it is considered that there are sufficient minor points of difference between *O. sinensis* males and those of species which most closely resemble them to support the Chinese species as being new. In any event, to place them in an already extant species would be to risk submerging what might be useful information. The striated nature of the tip of the spicule, for example, does not appear to have been reported hitherto, but may possibly have been overlooked in some other species.

Metoncholaimus moles sp. nov.

Fig. 4

MATERIAL STUDIED. Holotype: δ_1 BM(NH) 1982.1.8. Allotype: φ_1 BM(NH) 1982.1.9. Paratypes: two males BM(NH) 1982.1.8. and two females BM(NH) 1982.1.9.

LOCALITY. East of Qingdao pier, Shandong, China.

DIMENSIONS

δ_1: $\frac{- \quad 420 \quad M \quad 3172}{25 \quad 52 \quad 52 \quad 35}$ 3320 μm; a = 64; b = 8; c = 22

δ_2: $\frac{- \quad 420 \quad M \quad 3540}{25 \quad 54 \quad 55 \quad 39}$ 3700 μm; a = 67; b = 9; c = 23

δ_3: $\frac{- \quad 446 \quad M \quad 3292}{24 \quad 54 \quad 54 \quad 38}$ 3440 μm; a = 64; b = 8; c = 23

φ_1: $\frac{- \quad 440 \quad M \quad 2820}{24 \quad 53 \quad 53 \quad 36}$ 2950 μm; a = 56; b = 7; c = 23

φ_2: $\frac{- \quad 450 \quad M \quad 3685}{24 \quad 59 \quad 61 \quad 36}$ 3820 μm; a = 63; b = 9; c = 28

φ_3: $\frac{- \quad 440 \quad M \quad 3204}{27 \quad 57 \quad 58 \quad 36}$ 3340 μm; a = 58; b = 8; c = 25

DESCRIPTION. Cuticle smooth. Six papilliform R_1 sensilla. $R_2 + R_3$ sensilla at the same level: R_2 sensilla 7–8 μm, 28–32% h.d.; R_3 sensilla 5–7·5 μm, 20–30% h.d. Somatic setae 5–7 μm, most numerous in the anterior oesophageal region. Head somewhat attenuated. Amphid usually distinct, 10 μm wide (33% c.d.) and situated level with the dorsal tooth. Buccal cavity 26–30 μm deep. Large left subventral tooth and smaller right subventral and dorsal teeth. Oesophagus widens slightly towards the posterior, but no bulb. Excretory pore just posterior to the base of the buccal cavity, 29–36 μm from the anterior. Nerve ring at 44–49% of the oesophagus length. Tail conico-cylindrical, 3·6–4·2 a.b.d. with a characteristic ventral inflection of the tip in the male (Fig. 4d).

Spicules equal, 43–44 μm (chord), proximally cephalate and distally pointed (Fig. 4e). Gubernaculum present with a well-developed dorsally directed apophysis, 21–22 μm long. There are 9–11 pairs of stout adcloacal setae. Precloacally, there are an additional 4–6 thicker but shorter setae (Fig. 4e): a further 3 pairs of similar setae are found subventrally near the tail tip (Fig. 4f). Two testes.

Vulva situated posterior to the mid-body; V = 68–78%. Single anterior ovary. Demanian system appears to be relatively simple, typical of other *Metoncholaimus* species (Rachor, 1969). The terminal duct opens as a transverse slit about 65 μm anterior to the anus. The body is constricted immediately posterior to the pore (Fig. 4g), and in this region there are characteristic subdorsal and subventral pairs of setae.

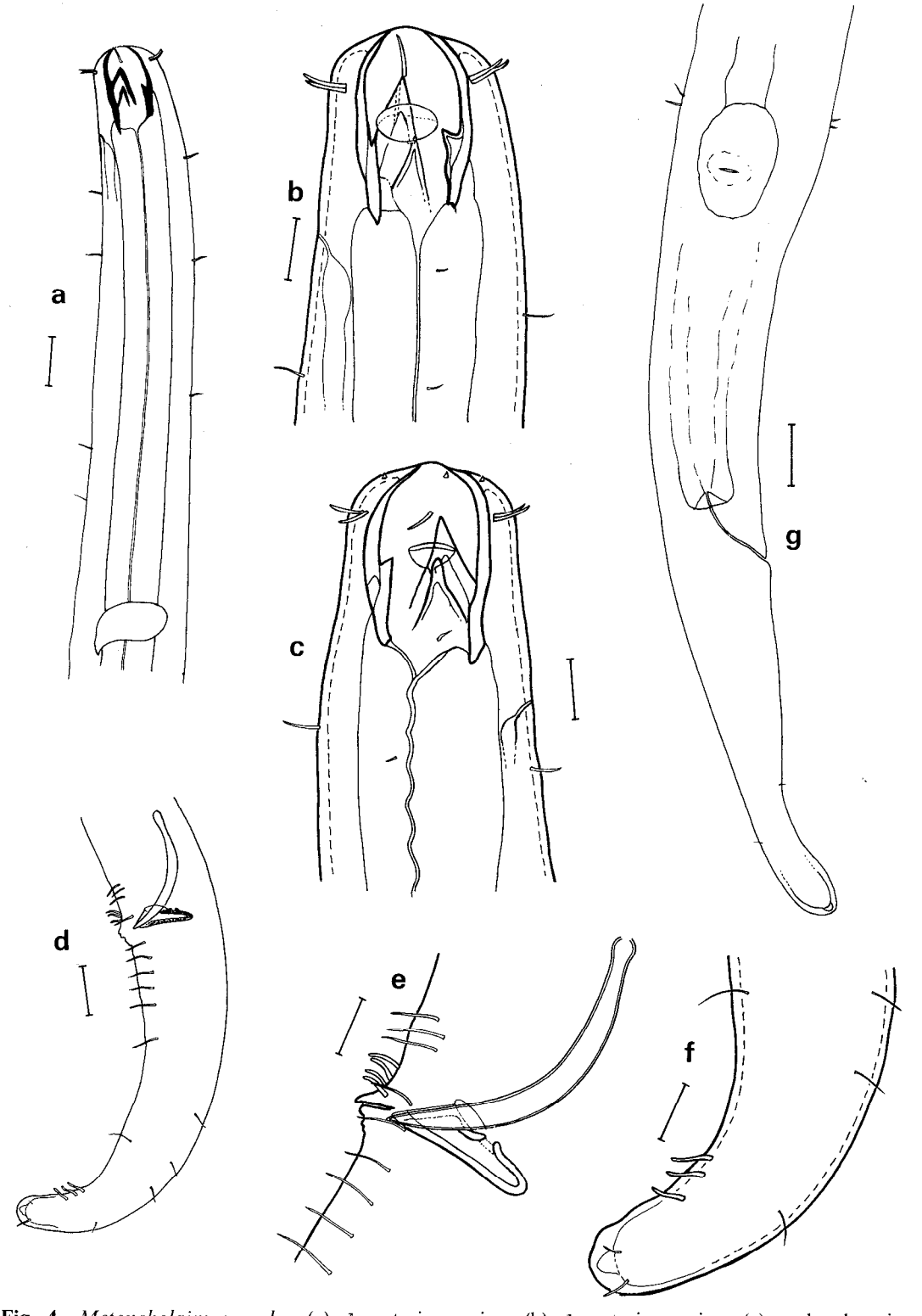

Fig. 4 *Metoncholaimus moles*: (a) δ_1 anterior region; (b) δ_1 anterior region; (c) φ_1 head region; (d) δ_1 tail region; (e) δ_1 copulatory apparatus; (f) δ_1 tail tip; (g) φ_1 posterior region. Bar scales: a, d, g = 20 μm; b, c, d, e = 10 μm.

DIFFERENTIAL DIAGNOSIS. *Metoncholaimus moles* sp. nov. is unique among the thirteen previously described species in having a well-developed dorsally directed gubernaculum.

ETYMOLOGY. The species name refers to the type locality being near a pier (moles, Latin = pier).

DISCUSSION. The traditional distinction between the genera *Oncholaimus* Dujardin, 1845 and *Metoncholaimus* Filipjev, 1918 is another that is beginning to break down. Characteristically, *Oncholaimus* species have short spicules and no gubernaculum whilst *Metoncholaimus* species have extremely long spicules and a small gubernaculum lying parallel with the distal end of the spicules, e.g. *M. demani* Zur Strassen. Already a number of *Oncholaimus* species have been described with simple gubernacula, e.g. *O. gladius* Gerlach, 1956, *O. longispiculosus* Gerlach, 1955 and *O. dujardini* sensu Wieser, 1953. *Metoncholaimus* species with long spicules but without a gubernaculum have also been reported, e.g. *M. intermedius* Wieser & Hopper, 1967 and *M. scissus* Wieser & Hopper, 1967. However, none of the *Oncholaimus* or *Metoncholaimus* species, nor any species belonging to other genera of the Oncholaiminae, have, to the best of our knowledge, been described as having a dorsally directed gubernaculum.

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