



New and known Criconematoidea (Nemata) from forests in South Africa with a redescription of *Mesocriconema teres* (Raski, 1952) Loof & De Grisse, 1989

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Summary – *Mesocriconema neli* sp. n. females have 95 to 113 retrorse, smooth annuli, two lip annuli, labial plates, four submedian and four supplementary lobes, indented or cleft first lip annuli, a non-sigmoid vagina, open vulva and a 65 to 79 μm long stylet. *Ogma ornatum* sp. n. females have one lip annulus larger than first two body annuli, 50 to 52 retrorse annuli, each with sections of contiguous projections alternating with bare sections forming longitudinal rows, projections single or branched, longer on posterior end of body, all with minute protuberances, cuticula with small tubercles. Juveniles have one lip annulus with same diameter as first body annulus, four large submedian lobes, 57 to 66 retrorse body annuli with eight longitudinal rows of scales each bearing leaf-like filaments, cuticula with tubercles. *Trophotylenchus obscurus* (Colbran, 1961) Cohn & Kaplan, 1983 is reported and figured. Notes are given for *Criconema duplicivestitum* (Andrássy, 1963) Raski & Luc, 1985. *Criconemella jessiensis* Van den Berg, 1992 is transferred to *Mesocriconema jessiense* (Van den Berg, 1992) comb. n. A redescription of *Mesocriconema teres* (Raski, 1952) Loof & De Grisse, 1989 is given.

Résumé – *Criconematoidea (Nemata) nouveaux et déjà connus provenant de forêts d'Afrique du Sud, et redescription de Mesocriconema teres (Raski, 1952) Loof & de Grisse, 1989* – Les femelles de *Mesocriconema neli* sp. n. sont caractérisées par : 95 à 113 anneaux retorses, lisses; deux anneaux labiaux; présence de plaques labiales, de quatre lobes submédiens et de quatre lobes supplémentaires; premier anneau labial indenté ou fendu; vagin non sigmoïde; vulve « ouverte »; stylet long de 65 à 79 μm . *Ogma ornatum* sp. n. est caractérisé par (femelles) : un seul anneau labial de diamètre supérieur à celui des deux premiers anneaux du corps; 50 à 52 anneaux retorses ornés chacun de plages comportant des projections contiguës, alternant avec des plages nues, formant ainsi des rangées longitudinales, les projections étant simples ou divisées, plus longues à la partie postérieure du corps et comportant de petites protubérances; cuticule pourvue de petits tubercules; les juvéniles montrent un seul anneau labial de même diamètre que le premier anneau du corps, 57 à 66 anneaux retorses comportant huit rangées d'écailles pourvues de filaments foliacés, une cuticule pourvue de tubercules. *Trophotylenchulus obscurus* (Colbran, 1961) Cohn & Kaplan, 1983 est signalé et figuré. Des données sont fournies sur *Criconema duplicivestitum* (Andrássy, 1963) Luc & Raski, 1985. *Criconemella jessiensis* Van den Berg, 1992 est renommé *Mesocriconema jessiense* (Van den Berg, 1992) n. comb. *Mesocriconema teres* (Raski, 1952) Loof & de Grisse, 1989 est redécrit.

Key-words : *Criconema*, *Mesocriconema*, *Ogma*, South Africa, taxonomy, *Trophotylenchulus*, nematodes.

Early in 1992 a nematode survey was undertaken in the Nelspruit and Barberton districts in the eastern Transvaal which included two state forests namely the Berlin State Forest and the Nelshoogte State Forest. Species of Criconematoidea were abundant in the forests in commercial plantings and natural vegetation and amongst them specimens belonging to two new species were found which are described herein. To facilitate a better comparison of *Mesocriconema neli* sp. n. with *M. teres* (Raski, 1952) Loof & De Grisse, 1989 a redescription and drawings are given from topotypes of *M. teres* from Holland. For the first time specimens of *Trophoty-*

lenchulus were found in South Africa. They belong to the species *T. obscurus* (Colbran, 1961) Cohn & Kaplan, 1983 and are described and figured. A short note and SEM photographs are given for *Criconema duplicivestitum* (Andrássy, 1963) Raski & Luc, 1985, found in soil around natural vegetation on a farm in the Maggiesdal area south of Nelspruit. *Criconemella jessiensis* Van den Berg, 1992 is transferred to *Mesocriconema jessiense* (Van den Berg, 1992) comb. n. to conform to the diagnosis of the genus of Loof and De Grisse (1989).

All measurements and drawings were made from specimens killed in water by gradual application of heat,

preserved in TAF and mounted in anhydrous glycerine according to the slow method of Goodey (1957). SEM photographs were taken from specimens preserved in TAF, dehydrated in increasing concentrations of amyl acetate in pure alcohol and finally in pure amyl acetate. Critical -point drying and gold-palladium coating (25 nm) were carried out in the conventional way and the specimens viewed with a JEOL-35 stereoscan microscope at 15 kV. Soil classification was done according to the simplified particle - size analysis procedure of Van der Watt (1966).

***Criconema duplicivestitum* (Andrássy, 1963)
Raski & Luc, 1985
(Fig. 1)**

Several specimens of this species were found on section 34 of the farm "Maggiesdal" near Nelspruit (25° 32'S 30° 56'E) from natural vegetation from a loamy sand soil (0% clay, 13% silt, 87% sand) on the slope of a small hill. They correspond well with the specimens recently reported from the Wilderness National Park (Van den Berg, 1993) except that the female stylet is slightly longer (75-92 µm *vs* 62-78 µm). One female was found with an undetached deteriorated last stage juvenile cuticula which appear to have eleven longitudinal rows of scales. The scales on the posterior part of body each bear a mucro on the tip. SEM photographs of female specimens are given.

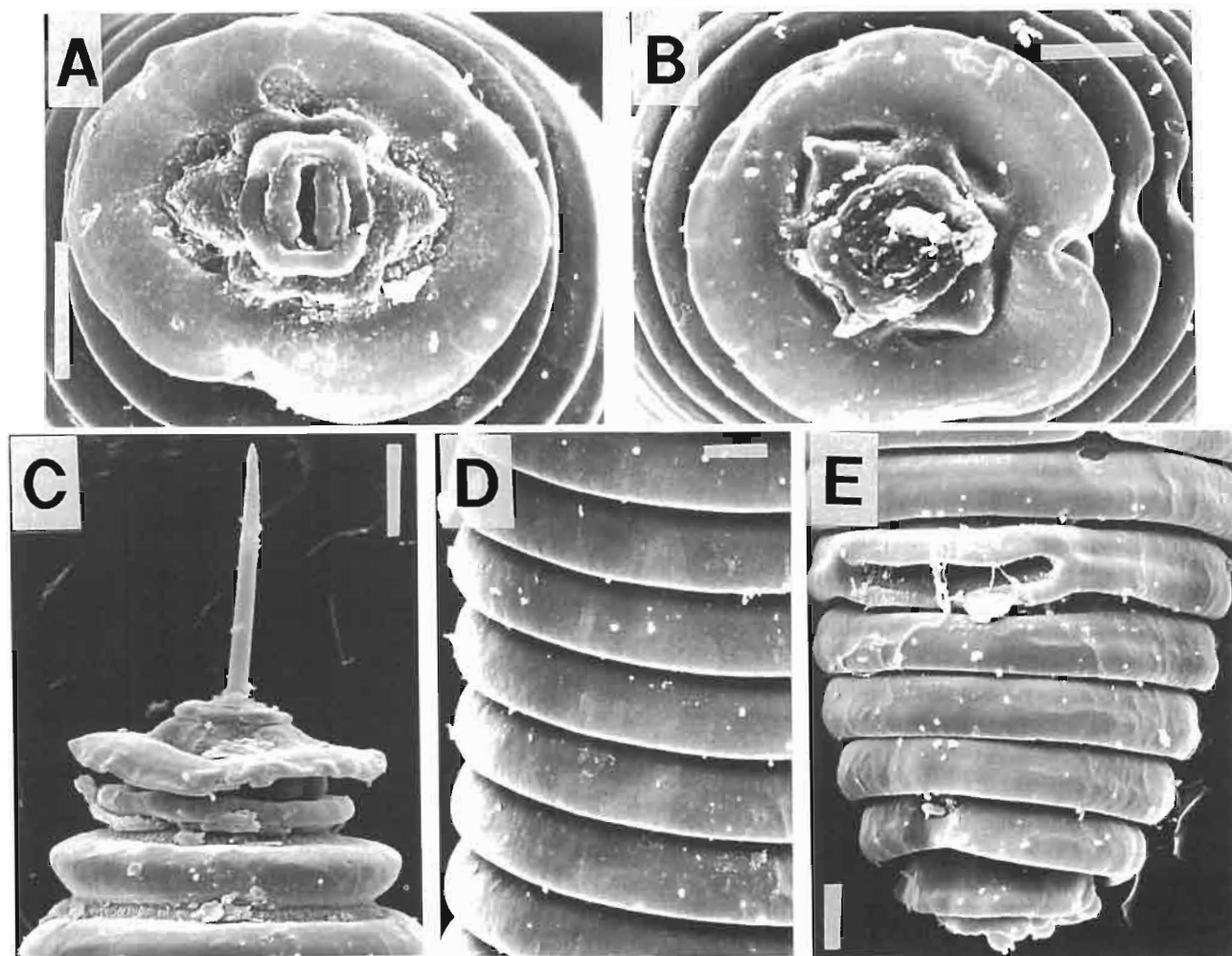


Fig. 1. *Criconema duplicivestitum* (Andrássy, 1963) Raski & Luc, 1985. Female. A, B : En face view of lip regions; C : Lateral view of lip region; D : Annuli at midbody; E : Posterior part of body. (Bars = 5 µm).

Mesocriconema neli * sp. n.
(Figs 2, 3)

MEASUREMENTS

Females (paratype pop.: n = 7): L = 389 ± 39.2 (328-451) μm; a = 9 ± 0.7 (8-10); b = 3 ± 0.2 (3-4); c = 24 ± 8.7 (16-45); o = 10 ± 0.9 (8-10); V = 93 ± 1.5 (89-94); OV1 = 44 ± 6.3 (32-48); stylet = 67 ± 1.6 (65-70) μm; R = 98-113; RSt = 18-21; ROes = 29-33; Rex = 29-32; RV = 8-13; RVan = 1-3; Ran = 5-9; VL/VB = 0.9 ± 0.2 (0.6-1.2); St % L = 18 ± 1.7 (15-20).

Holotype (female): L = 381 μm; a = 9; b = 3; c = 16; o = 8; V = 89; OV1 = 48; stylet = 67 μm; R = 103; RSt = 18; ROes = 31; Rhem = 28; Rex = 29; RV = 13; RVan = 3; Ran = 9; VL/VB = 1; St % L = 18.

Other population (Indigenous forest: n = 10): L = 357 ± 26.7 (314-394) μm; a = 9 ± 0.6 (8-10); b = 3; c = 25 ± 4.1 (16-30); o = 8 ± 1.8 (6-10); V = 92 ± 0.7 (90-93); OV1 = 46 ± 5.4 (38-54); stylet = 73 ± 3.7 (67-79) μm; R = 95-106; RSt = 19-26; ROes = 29-35; Rex = 27-32; RV = 9-11; RVan = 2-4; Ran = 5-7; VL/VB = 0.9 ± 0.1 (0.8-1); St % L = 21 ± 2 (18-23).

DESCRIPTION

Females: Body curved ventrad into a C shape. Lip region with two annuli, diameters 14 ± 1.5 (10-17) μm and 17 ± 1.2 (14-20) μm respectively; both annuli with smooth but wavy margins; labial area raised above first annulus with four distinct submedian lobes and four supplementary lobes, two each between the dorsal and ventral submedian lobes; labial disc appearing almost hexagonal in *en face* view with a thickened ridge extending from the labial disc around the large amphid openings, so that the whole area appears elliptical; development of labial plates ranging from non-existent to appearing as an additional annulus with deep clefts laterally in 65 % of specimens, one cleft only in 25 % of specimens and no cleft in 10 % of specimens; first lip annulus with a slight cleft or indentation on both sides in 61 % of specimens, one indentation in 13 % of specimens and no indentation in 26 % of specimens. First and second body annuli diameters 20 ± 1.3 (17-22) μm and 22 ± 1.6 (19-24) μm, respectively. All body annuli well retrorse, margins smooth, at most rough. Occasionally from one to six anastomoses present, sometimes post-vulvally. Stylet well developed with cupped basal knobs, the latter 9 ± 0.6 (7-10) μm wide and 3 ± 0.4 (3-4) μm high. Metenchium 57 ± 4.2 (52-64) μm long and telenchium 14 ± 0.9 (13-17) μm long. Opening of dorsal oesophageal gland 6 ± 1.2 (4-8) μm from base of stylet knobs. Hemizonid seen in one specimen only, one annulus long and situated directly anterior to excretory pore. Excretory pore situated opposite basal oesophageal bulb, 109 ± 11.7 (86-128) μm from anterior end of

* Named after the farmer on whose farm the State Forest was established.

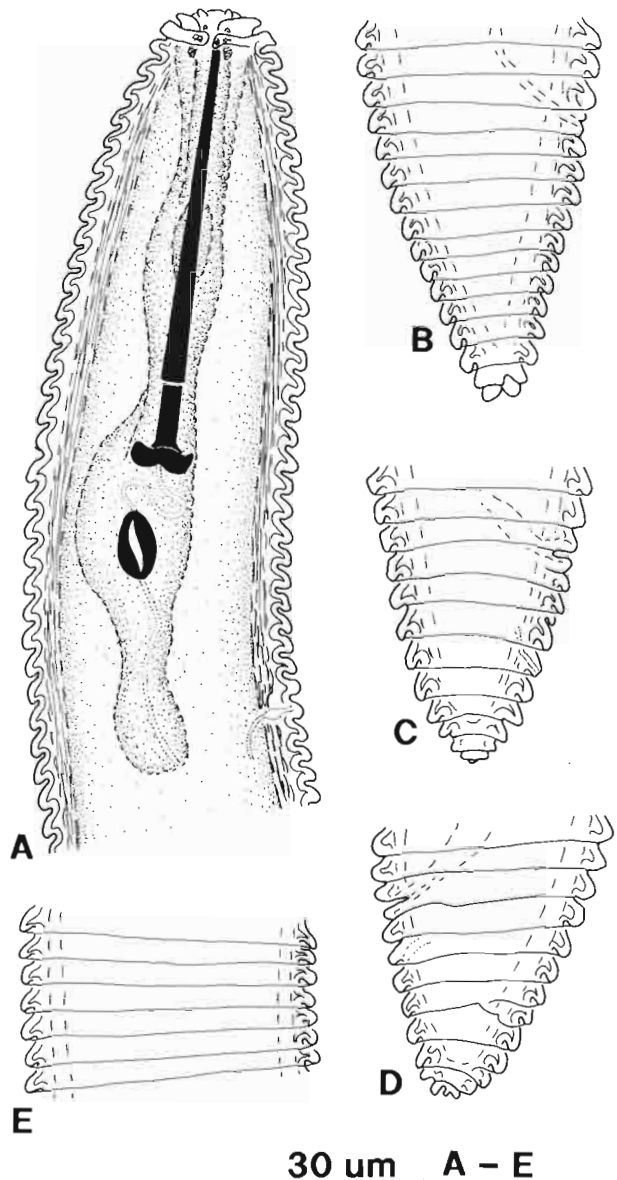


Fig. 2. *Mesocriconema neli* sp. n. Female. A: Anterior part (holotype); B: Posterior part (holotype); C, D: Posterior part of two other females; E: Midbody annuli (holotype).

body. Width at midbody 42 ± 2.2 (38-47) μm and at excretory pore 40 ± 1.4 (38-42) μm. Annuli 4 ± 0.2 (3-4) μm wide at midbody. Spermatheca round, filled with rounded sperm, two to four annuli long and situated seven to eleven annuli anterior to vulva. Vulva open. Tail conical to more rounded conical, 15 ± 3.8 (7-24) μm long.

Males and juveniles: Not found.

TYPE SPECIMENS

Holotype female (slide 27450), twelve *paratype* and twenty other females (slides 27450-27457) deposited in

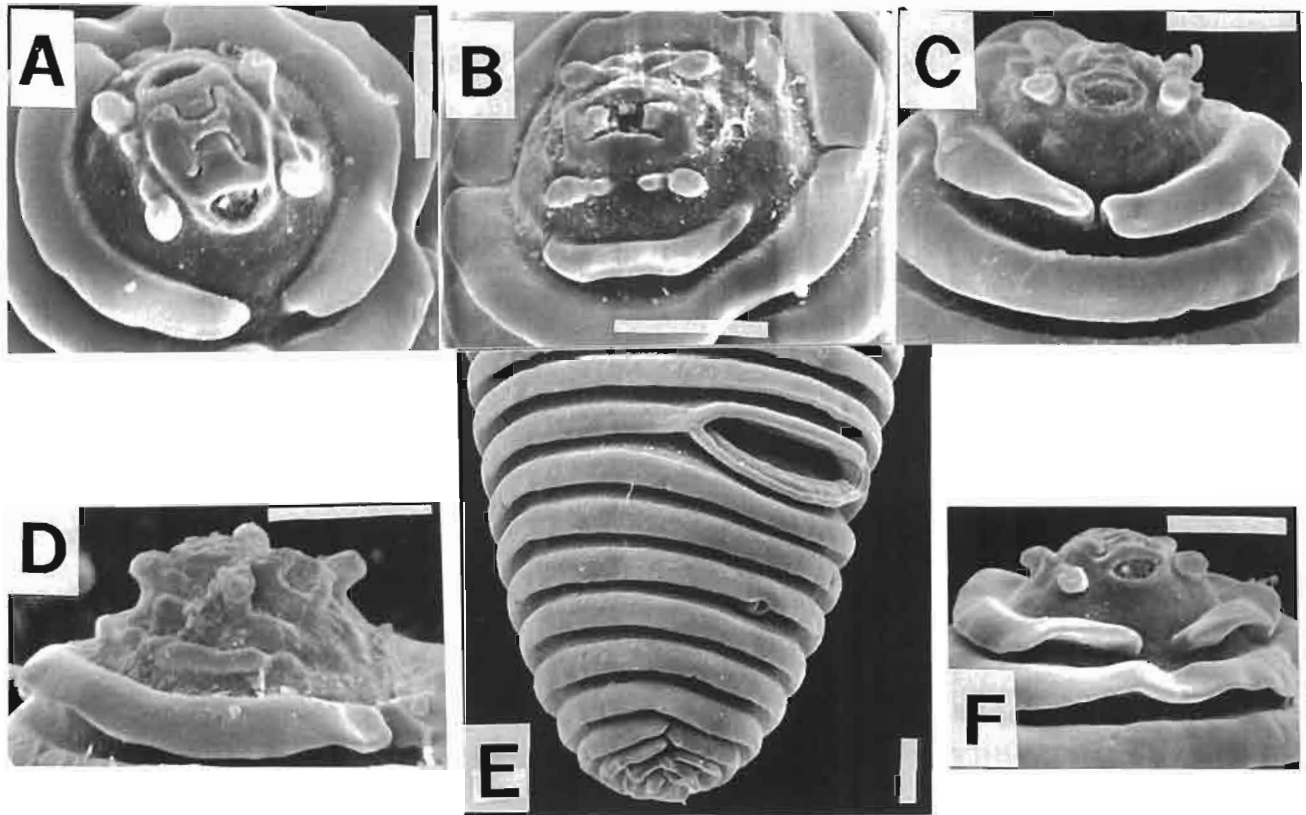


Fig. 3. *Mesocriconema neli* sp. n. Female. A, B : En face view of lip regions; C, D : Lateral view of lip regions; E : Posterior part of body; F : Lateral view of lip region. (Bar = 5 μ m in A, B, C, D, E, F).

the National Collection of Nematodes, Biosystematics Division, Plant Protection Research Institute, Pretoria, South Africa. Four *paratype* and four other females deposited in the collection of the Muséum National d'Histoire Naturelle, Paris, France. Eight females deposited in the collection of the Landbouwniversiteit Wageningen, Netherland.

TYPE LOCALITY

Transvaal : Barberton dist., 28. i. 1992, *leg.* M. Marais, N. H. Buckley and H. C. Coetzee. Specimens collected in the Nelshoogte State Forest (25° 49'S 30° 50'E) from kikuyu grass in a sandy loam soil (8 % clay, 17 % silt, 75 % sand). Height above sea-level 1500 m, annual rainfall 1100 mm.

OTHER LOCALITY

Transvaal : Barberton dist., 28. i. 1992, *leg.* M. Marais, N. H. Buckley and H. C. Coetzee. Specimens collected in the Nelshoogte State Forest in the Stolzenfelz 626 JT area, below the "Devils'Knuckles", just above the Drinkwater Dam (25° 48'S 30° 50'E) from a sandy loam soil (8 % clay, 25 % silt, 67 % sand) with pH 4.4

and soil temperature 19.9 °C. Height above sea-level 1520 m, annual rainfall 1100 m.

DIAGNOSIS AND RELATIONSHIPS

Mesocriconema neli sp. n. females are characterized by 95 to 113 well retrorse, smooth/rough body annuli, two lip annuli with varying degrees of developed labial plates, four submedian lobes and four supplementary lobes, first lip annulus mostly indented or cleft laterally, a 65 to 79 μ m long stylet, a conical to rounded-conical tail, an open vulva and a non-sigmoid vagina.

Mesocriconema neli sp. n. is very close to several species in the genus viz. *M. britsiense* (Heyns, 1970) Loof & De Grisse 1989, *M. caelatum* (Raski & Golden, 1966) Loof & De Grisse, 1989, *M. curvatum* (Raski, 1952) Loof & De Grisse, 1989, *M. incisum* (Raski & Golden, 1966) Loof & De Grisse, 1989, *M. obtusicaudatum* (Heyns, 1962) Loof & De Grisse, 1989, *M. oostenbrinki* (Loof, 1964) Loof & De Grisse, 1989, *M. teres* (Raski, 1952) Loof & De Grisse, 1989, *M. xenoplax* (Raski, 1952) Loof & De Grisse, 1989 and *Criconemella jessiensis* Van den Berg, 1992 which is transferred to *Mesocriconema jessiense* (Van den Berg, 1992) comb. n. to

Table 1. Main characters differentiating *Mesocriconema neli* sp. from closely related species.

	R	Submedian lobes	First lip annulus	Stylet length (μm)	Vagina
<i>M. neli</i> sp. n.	95-113	Four plus four supplementary lobes	Cleft	65-79	Straight
<i>M. britsiensis</i>	80-90	Four	Cleft	53-54	Straight
<i>M. caelatum</i>	91-103	Absent	Not cleft	61-75	Straight
<i>M. curvatum</i>	78-85 *	Four	Not cleft	50-85	Straight
	74-86 **				
<i>M. incisum</i>	90-93	Four plus four supplementary lobes	Not cleft	35-40	Straight
<i>M. jessense</i>	88-102	Four	Cleft	56-61	Straight
<i>M. obtusicaudatum</i>	59-86	Four plus four supplementary lobes	Cleft	41-57	Straight
<i>M. oostenbrinki</i>	85-94	Four	Not cleft	62-70	Sigmoid
<i>M. teres</i>	102-115	Four	Not cleft	70-81	Straight
<i>M. xenoplax</i>	77-114	Four	Cleft	48-101	Sigmoid

* from Loof (1974).

** from Van den Berg (1980, 1991).

conform to the generic diagnosis of Loof and De Grisse (1989).

The main distinguishing characters between *M. neli* sp. n. and the above species are given in Table 1. Apart from these characters this new species is separated from the above species in a combination of characters such as having larger RSt, ROes, Rex and RV values, smaller Ran and RV values, differently sculptured annuli margins, more or less anastomoses, a higher raised labial area with labial plates, a conical tail and smooth anterior vulva lip.

M. teres is known only from California. The original description by Raski (1952) and the note by De Grisse (1968) gives very little information. Topotypes of this species were obtained from Dr. P. A. A. Loof. To facilitate a better comparison between *M. teres* and *M. neli* sp. n. a redescription plus illustrations are given for *M. teres*.

***Mesocriconema teres* (Raski, 1952)
Loof & De Grisse, 1989**

(Fig. 4)

MEASUREMENTS

Females (n = 9): L = 466 ± 64.6 (357-550) μm ; a = 13 ± 1 (12-15); b = 4 ± 0.4 (3-4); c = 30 ± 5.2 (22-40); o = 8 ± 1 (8-9) (n = 3); V = 94 ± 0.6 (93-94); OV1 = 57 ± 5.2 (51-61); stylet = $74 - 3.7$ (70-81) μm ; R = 102-115; RSt = 16-22; ROes = 27-35; Rex = 28-34; Rhem = 27-31; RV = 7-9; RVan = 0-3; Ran = 4-7; St % L = 16 ± 2.5 (13-20); VL/VB = 1.

Juvenile (n = 1): L = 426 μm ; a = 13; stylet = 56 μm ; R = 116; RSt = 18; Ran = 6; St % L = 13.

DESCRIPTION

Females: Body curved ventrad into open C. Lip region with three annuli, diameters 11 ± 1.1 (10-13) μm , 15 ± 1.1 (14-16) μm and 17 ± 1 (16-19) μm respective-

ly, first annulus projecting anteriorly and last two posteriorly; labial area not markedly raised above first lip annulus with four submedian lobes; first lip annulus not divided into a dorsal and ventral sector by a cleft or indentation. First body annulus diameter 20 ± 1.1 (18-21) μm . All body annuli well retrorse with irregular margins, the latter becoming more distinct towards tail tip, in one specimen almost forming small lobes post-vulvally. No anastomoses observed. Stylet with cupped basal knobs, the latter 9 ± 0.5 (9-10) μm wide and 4 ± 0.6 (3-4) μm high. Metenchium 58 ± 3.5 (54-64) μm long and telenchium 16 ± 1 (14-17) μm long. Opening of dorsal oesophageal gland 6 ± 0.4 (6-7) μm from base of stylet knobs. Hemizonid seen in a few specimens, one annulus long and situated opposite or one annulus anterior to excretory pore. Excretory pore situated from five annuli anterior to four annuli posterior to base of oesophagus, 128 ± 15 (105-154) μm from anterior end of body. Width at midbody 34 ± 3.2 (30-39) μm and at excretory pore 34 ± 2.6 (29-37) μm . Annuli 4 ± 0.9 (3-5) μm wide at midbody. Spermatheca round to oblong, filled with roundish sperm, four to five annuli long and situated ten to eleven annuli anterior to vulva. Vulva open. Tail round, 17 ± 6.3 (10-23) μm long.

Juvenile: Similar to female except that the annuli margins bear small rounded lobes becoming slightly larger toward tail tip. Lip annuli diameters 10 μm , 12 μm and 14 μm respectively. First body annulus diameter 15 μm .

REMARK

Apart from the differentiating characters given in Table 1 *M. neli* sp. n. differs from *M. teres* in having two lip annuli (14 μm and 17 μm in diameter) vs three (11 μm , 15 μm and 17 μm in diameter), vulva situated slightly more anteriorly (RV = 8-13 vs 7-9) and from one to six anastomoses vs rare.

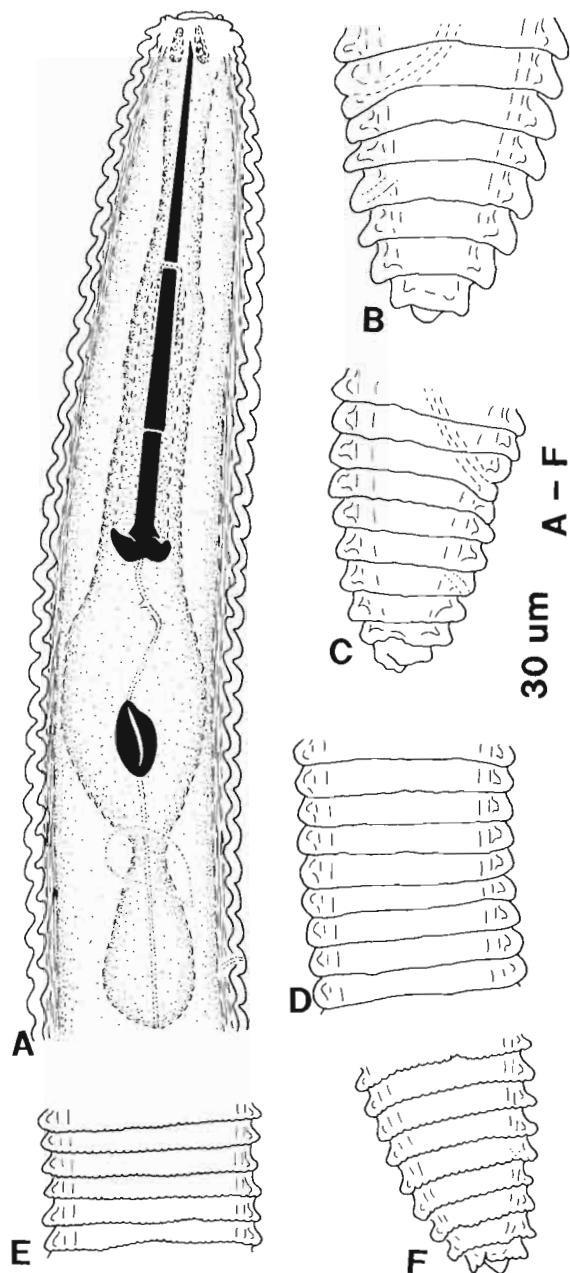


Fig. 4. *Mesocriconema teres* (Raski, 1952) Loof & De Grisse, 1989. Female. A: Anterior part of body; B, C: Tails; D: Midbody annuli. Juvenile. E: Midbody annuli; F: Tail region.

***Ogma ornatum* sp. n.**

(Figs 5, 6, 7)

MEASUREMENTS

Females (paratype, n = 7): L = 358 ± 21.3 (318-389) μm ; a = 6 ± 0.5 (5-6); b = 3; V = 95 ± 1.1 (93-96); stylet = 84 ± 6.5 (78-91) μm ; R = 50-52; RSt =

14-16; ROes = 20-23; Rex = 18-19; RV = 5-6; VL/VB = 0.5 ± 0.07 (0.4-0.6); St % L = 24 ± 3.2 (20-26).

Juveniles (paratype, n = 4): L = 304 ± 26.9 (268-333) μm ; a = 6 ± 1.1 (5-7); b = 3 (n = 1); stylet = 72 ± 4.3 (68-77) μm ; R = 57-66; RSt = 15-18; ROes = 21 (n = 1); Rex = 22-24; St % L = 24 ± 2.5 (22-28).

Holotype (female): L = 318 μm ; a = 5; b = 3; o = 7; V = 95; stylet = 83 μm ; R = 52; RSt = 14; ROes = 20; Rex = 19; RV = 5; VL/VB = 0.5; St % L = 26.

DESCRIPTION

Females: Body curved slightly ventrad. Lip region with one large disclike annulus, diameter 24 ± 1.2 (24-27) μm , separated from first body annulus by a smaller neck; labial area with six pseudolips, raised slightly above lip annulus; margin of lip annulus scalloped, wavy or with rounded tooth-like lobes. First and second body annuli smaller than lip annulus, diameters 18 ± 1.8 (16-21) μm and 22 ± 1.1 (21-23) μm respectively, projecting mostly outward, margins wavy, scalloped or with an occasional tooth-like lobe. Third body annulus retrorse, 39 ± 3.3 (35-43) μm in diameter, margin usually with a contiguous row of bluntly rounded projections. All other body annuli well retrorse, each bearing sections of contiguous finger-like projections alternated with sections with no projections; two sections of projections and two bare sections are the most common arrangement but one section with projections and one bare and three with projections and three bare are also found; all three arrangements can be found on the same female; length of each segment and number of projections vary considerably; segments appear to form longitudinal rows on body; a segment with projections is always followed by a bare one on the succeeding annulus and vice versa; projections differ considerably in form, they are mostly single on front part of body, but could also be bifurcate or trifurcate; from third body annulus they all bear fine rod- or hair-like protuberances on their posterior halves; posteriorly on body the projections become much longer and more branched where they are also longer on the ventral side; from neck area, except for projections and ridges they are attached to, to tail tip the cuticula is covered with small, rounded tubercles of varying sizes. Anus obscured by projections and debris. Vulva appears as two elongated lips in lateral view. Width of annuli at midbody 8 ± 1 (7-9) μm . Excretory pore difficult to see, but where seen it is situated opposite basal oesophageal bulb, 115 ± 13.2 (104-130) μm from anterior end of body. Width at midbody 63 ± 4.7 (56-70) μm and at excretory pore 63 ± 4.3 (60-68) μm . Hemizonid not seen. Stylet long and slender with cupped basal knobs, the latter 8 μm wide and 3 μm ; 4 μm (n = 2) high. Metenchium 71 ± 5.9 (67-75) μm long and telenchium 16 μm long (n = 2). Dorsal oesophageal gland opening 6 μm (n = 1) from base of stylet knobs. Spermatheca round or oval, three and five (n = 2) annuli long, filled

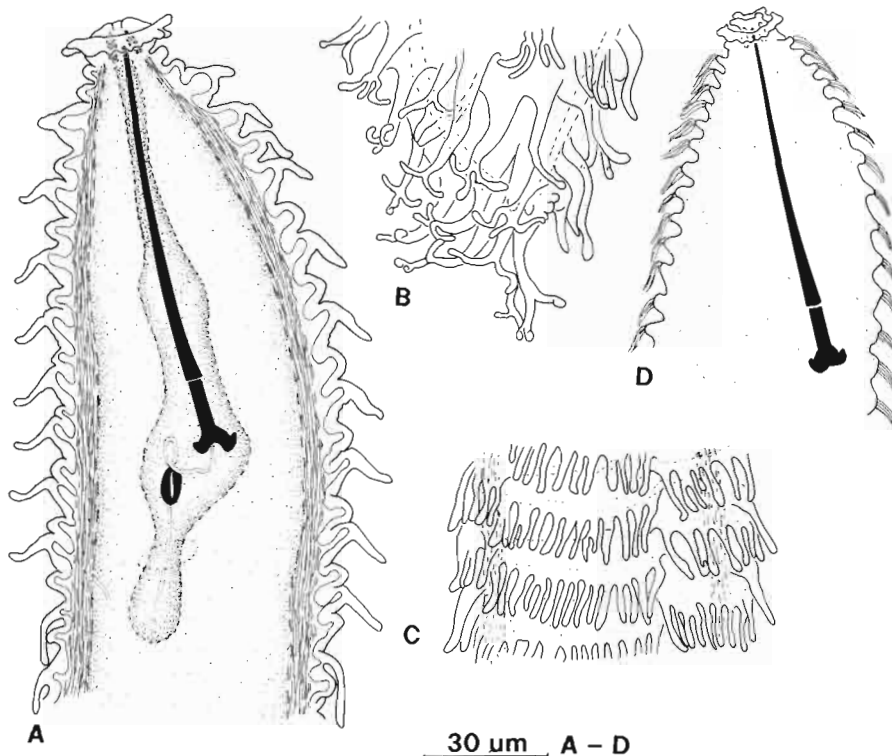


Fig. 5. *Ogma ornatum* sp. n. Female (holotype). A : Anterior part; B : Tail; C : Midbody annuli. Juvenile. D : Anterior part.

with roundish sperm and situated six and seven annuli anterior to vulva. Tail tip rounded with a few rounded lobes but indistinct amidst projections.

Males : Not found.

Juveniles : Body curved slightly ventrad. Lip region with one outward projecting annulus, diameter 13 ± 1.2 (11-14) μm ; margin wavy and scalloped; labial area raised with four distinct submedian lobes; labial area and lip annulus cuticula covered with small, rounded tubercles. First, second and third body annuli diameters 13 ± 1.1 (11-14) μm , 17 ± 0.8 (16-17) μm and 20 ± 1 (18-21) μm respectively; first body annulus usually projecting outward but all other annuli well retrorse; cuticula covered with small rounded tubercles; annuli with eight (one female with nine) longitudinal rows of scales at midbody each bearing about five leaf-like filaments not markedly becoming longer towards posterior end of body. Anus not observed. Excretory pore seen in two specimens, 114 μm ; 118 μm from anterior end of body. Width at midbody 52 ± 12.7 (40-68) μm and at excretory pore 43 μm ($n = 1$). Annuli 5 ± 0.6 (4-6) μm wide at midbody. Stylet long and slender with cupped basal knobs, the latter 7 ± 0.5 (7-8) μm wide and 3 ± 0.6 (3-4) μm high. Metenchium 59 ± 4.5 (55-65) μm long and telenchium 13 μm long.

TYPE SPECIMENS

Holotype female (slide 27458), thirteen *paratype* females and four juveniles, (slide 27458-27462) deposited in the National Collection of Nematodes, Biosystematics Division, Plant Protection Research Institute, Pretoria, South Africa. Four *paratype* females deposited in the collection of Muséum National d'Histoire Naturelle, Paris, France. Three *paratype* females and one juvenile deposited in the collection of the Landbouwniversiteit Wageningen, Netherland.

TYPE LOCALITY

Transvaal : Barbeton dist., 28.i.1992, *leg.* M. Marais, N. H. Buckley and H. C. Coetzee, collected from around roots of a herbaceous plant next to a marsh nearby pine trees in Block 101 in the Nelshoogte State Forest (25° 50'S 34° 07'E) from a loamy sand soil (5 % clay, 8 % silt, 87 % sand) with pH 5.1 and soil temperature 19.6 °C. Height above sea-level 1380 m; annual rainfall 1100 m.

DIAGNOSIS AND RELATIONSHIPS

Ogma ornatum sp. n. females are characterized by having one lip annulus which is larger than first two body annuli, 50 to 52 retrorse body annuli each with sections of contiguous fringes of projections alternated

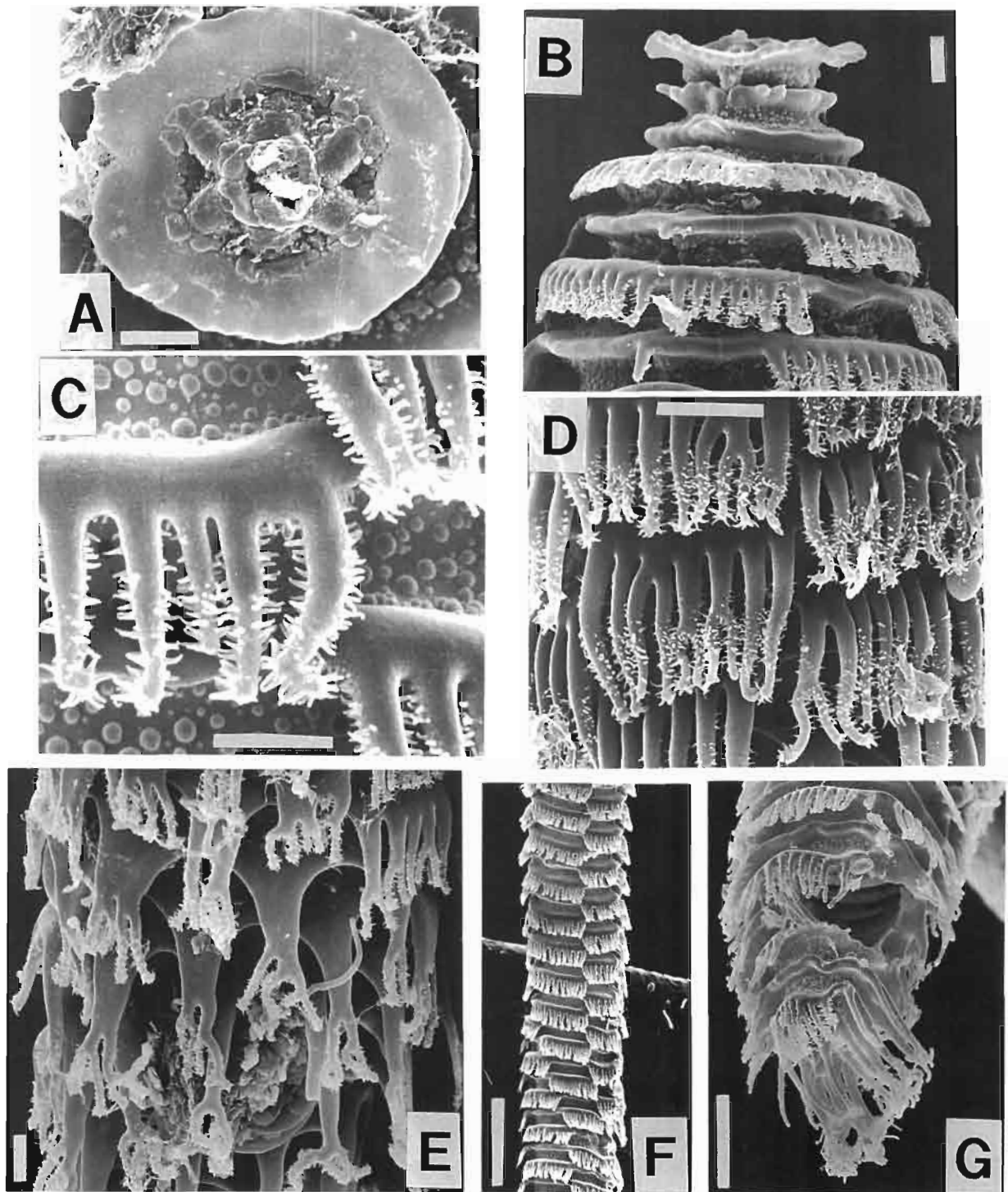


Fig. 6. *Ogma ornatum* sp. n. Female. A : En face view of lip region; B : Lateral view of lip region; C-E : Projections and cuticular structure on different part of body; F : Arrangement of projections on body; G : Posterior part of body. (Bar = 5 μ m in A, B, C, D, E; 10 μ m in G, 50 μ m in F).

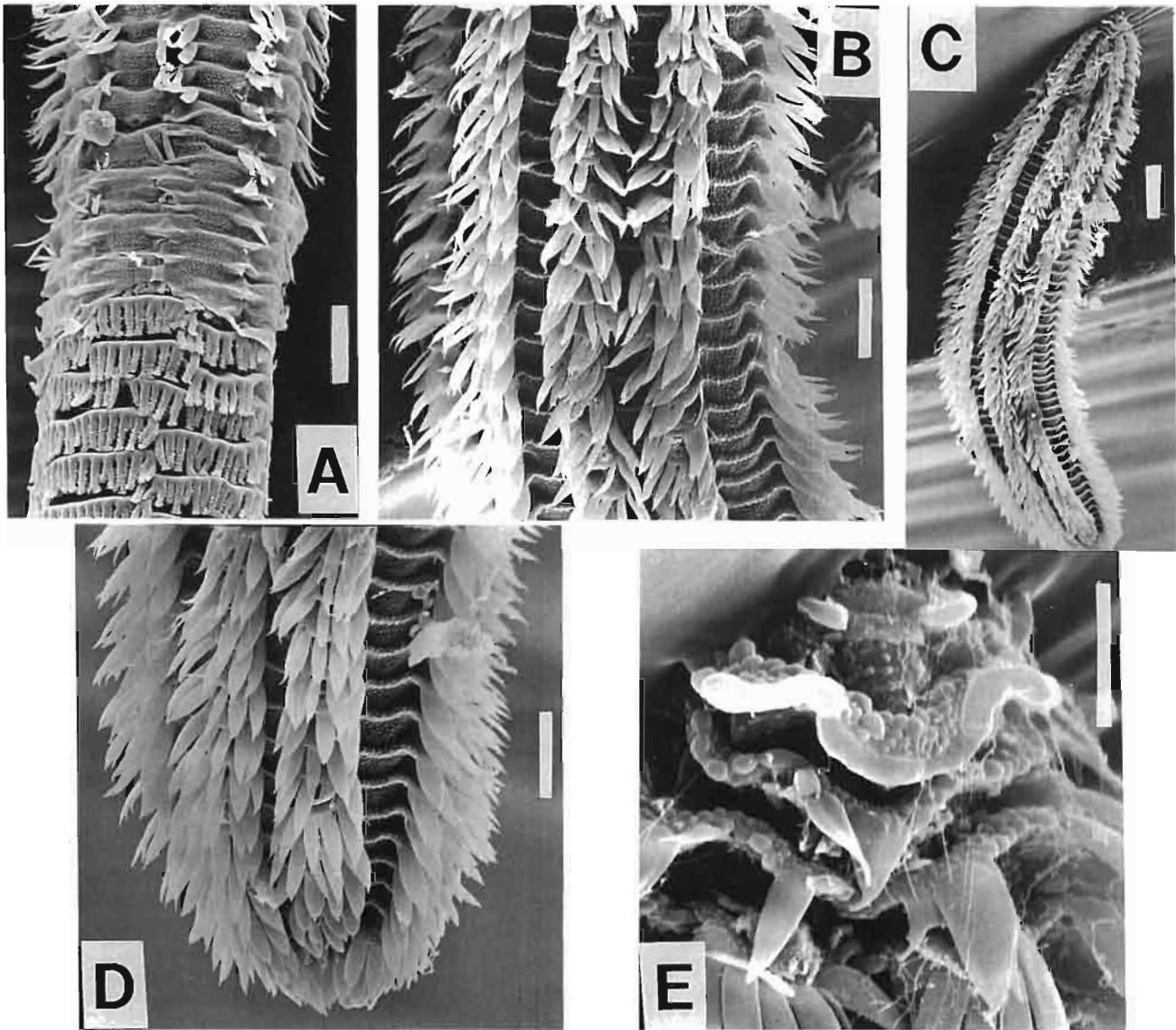


Fig. 7. *Ogma ornatum* sp. n. Juvenile. **A** : Midbody cuticle over female; **B** : Midbody close-up of scales and cuticular structure; **C** : Whole body; **D** : Posterior part of body; **E** : Lip region. (Bar = 5 µm in E; 10 µm in B, D; 20 µm in A, C).

by bare sections; fringed sections are followed by bare sections on succeeding body annuli and vice versa, the sections forming longitudinal rows over body; projections become longer and more branched toward tail with the ventral projections longer; all projections with rod- or hair-like protuberances on posterior halves; cuticula covered with small, rounded tubercles. Juveniles with one lip annulus with four large distinct submedian lobes; lip and first body annulus of almost equal diameter; body with 57 to 66 retrorse annuli, eight longitudinal rows of scales at midbody, each bearing about five leaf-like filaments; cuticula covered with small rounded tubercles.

With this unique arrangement of cuticular appendages this new species is separated from all other species in the genus. It does, however, show some resemblance to one South African species *O. nyalaziense* Van den Berg, 1991 from which it is immediately separated by the differences in the cuticular structure: one, two or three fringed sections alternated with one, two or three bare sections on the annuli *vs* one section with projections and one bare section always arranged on the dorsal or ventral half of the body thus accentuating the lateral field area and having more projections per section (30 *vs* 7-17) in *O. nyalaziense*; cuticula covered with small, rounded tubercles *vs* none and rod- or hair-like protu-

berances on projections *vs* none. Morphometric differences are: having a smaller body (318-389 μm *vs* 641 μm) and larger RSt, ROes and St % L values (14-16, 20-23 and 22-28 *vs* 12, 14 and 14) respectively.

***Trophotylenchulus obscurus* (Colbran, 1961)
Cohn & Kaplan, 1983**
(Figs 8, 9)

Specimens of this species were collected from soil around natural vegetation from two sites in the Berlin State Forest on 30.i.1992 (25° 34' and 25° 33'S 30° 45'E) from a silty loam soil (6 % clay, 30 % silt, 64 % sand) and a loamy sand soil (3 % clay, 10 % silt, 87 % sand) with pH of 4.4. Height above sea-level 1600 m; annual rainfall 900 mm.

MEASUREMENTS

Females (n = 10) : L = 276 \pm 14.5 (253-299) μm ; a = 8 \pm 1.3 (6-10); b = 3 \pm 0.3 (3-4); c = 10 \pm 0.9 (9-12); c' = 4 \pm 0.5 (3.5-4.5); o = 30; 31 (n = 2); V = 72 \pm 2.6 (68-76); stylet = 12.5 \pm 0.8 (12-14) μm ; excretory pore = 43 \pm 4.7 (39-52) %.

Males (n = 6) : L = 437 \pm 50.7 (371-478) μm ; a = 37 \pm 1.6 (35-39); b = 4; c = 7 \pm 0.8 (6-9); c¹ = 7 \pm 1.1 (5-8); stylet = 9 μm ; spicules = 15 \pm 0.8 (14-15) μm ; gubernaculum = 4 \pm 0.6 (4-6) μm ; excretory pore = 35 \pm 1.2 (34-37) %.

Second-stage juveniles (n = 7) : L = 272 \pm 34 (238-308) μm ; a = 22 \pm 2.8 (19-26); b = 3 \pm 0.3 (3-4); c = 8 \pm 0.7 (8-9); c¹ = 5 \pm 1.3 (4-7); o = 25; 26 (n = 2); stylet = 12.5 \pm 1 (11-14) μm ; excretory pore = 40 \pm 1.6 (39-42) %.

DESCRIPTION

Females : Body tightly coiled, markedly swollen at midbody. Lip region conoid, slightly set off with oral plate distinctly projecting as two protrusions on each side beyond lip region outline, 4 μm wide at base and 2 μm high (n = 2). Cephalic framework weak. Stylet well developed with anteriorly sloping stylet knobs, extreme tips pointing anteriorly thus appearing slightly cupped at outer margins, 3 \pm 0.2 (2-3) μm wide and 1 \pm 0.2 (1-2) μm high (n = 3). Dorsal oesophageal gland opening 4 μm (n = 2) from base of stylet knobs; oesophageal lumen distinct; median bulb large, mostly distorted by the body curvature and enlarged ovary, with large ovate valve; isthmus narrow; length of oesophagus 84 \pm 8.6 (74-93) μm from anterior end of body. Nerve ring not observed. Excretory pore situated 119 \pm 8.6 (110-131) μm from anterior end of body; excretory duct distinct, leading perpendicular inward from body wall, then directed posteriad disappearing between internal organs; excretory pore opening large, funnel-like. Annuli not distinct on swollen part of body, more distinct anteriorly and posteriorly, 1.5; 2 μm (n = 2) wide. Reproductive system greatly enlarged with a large irregular spermatheca filled with roundish or oval

sperm; post-uterine sac not present but in a few specimens enlarged parts of the quadricollumella are pressed posteriad past the vagina giving the impression of a post uterine sac; vulval lips bulging. Body narrows abruptly behind vulva, then gradually to a broadly rounded tail tip; tail length 29 \pm 1.9 (25-32) μm . Width at midbody 34 \pm 3.9 (28-40) μm and at excretory pore 29, 32 μm (n = 2). Length from excretory pore to vulva 82 \pm 9.9 (79-100) μm and from vulva to anus 50 \pm 6.3 (38-59) μm .

Males : Body almost straight, at most slightly curved. Lip region blunt anteriorly with no circumoral ridge, slightly set off, indistinct annulation, weak internal sclerotization, 4 \pm 0.4 (3-4) μm wide and 3 μm high. Stylet weak with stylet knobs slightly tapering posteriad, 1 μm high and 1.5 μm wide. Oesophagus degenerate. Hemizonid two to three annuli long situated posterior to oesophageal lobe. Excretory pore distinct, directed posteriad, situated 152 \pm 17.6 (125-169) μm from anterior end of body or six times body width at excretory pore posterior to the hemizonid. Body 12 \pm 1.3 (10-13) μm wide at midbody and 11 \pm 1.5 (10-13) μm at excretory pore. Annuli 1.5 μm wide at midbody. Lateral field seen as two faint lines on one specimen, 1.5 μm wide. Bursa absent. Spicular sheath prominent with anterior and posterior spine-like process on tip, posterior one longer. Tail 63 \pm 11.7 (43-73) μm long, tapering gradually to a rounded tip; annulation on tail distinct right up to tail tip, mostly wider than on rest of body.

Second-stage juvenile : Body slender, curved ventrad in the form of an open to normal C. Lip region conical, very slightly set off from body with distinct oral plate projecting as two protrusions beyond the lip region outline, no annulation observed. Cephalic framework weak. Stylet well developed with stylet knobs slightly cupped, 3 μm wide and 1 \pm 0.2 (1-2) μm high. Dorsal oesophageal gland opening 3 μm (n = 2) from base of stylet knobs. Oesophageal lumen distinct. Excretory pore directed posteriad, situated 114 \pm 16.9 (93-128) μm from anterior end. Width at midbody 13 \pm 0.4 (12-13) μm . Annuli 0.7 μm wide at midbody. Lateral field appearing as two faint lines, 2 μm wide (n = 2). Anus faintly seen, tail 36 \pm 5 (32-42) μm (n = 3) long. Genital primordium two-celled, situated at 65 \pm 1.8 (63-67) % of body length.

DISCUSSION

These specimens are regarded as belonging to the species *T. obscurus* (Colbran, 1961) Cohn & Kaplan, 1983 because they fit the distinguishing characters of the species as given by Colbran (1961) in his table of closely related species viz. female length 264-333 μm , spiral body shape, arcuate post-vulval region, hard capsule wall and an excretory pore situated at 46 % of body length; juvenile 250-300 μm long, circumoral ridge present, blunt tail terminus, posteriad directed excretory

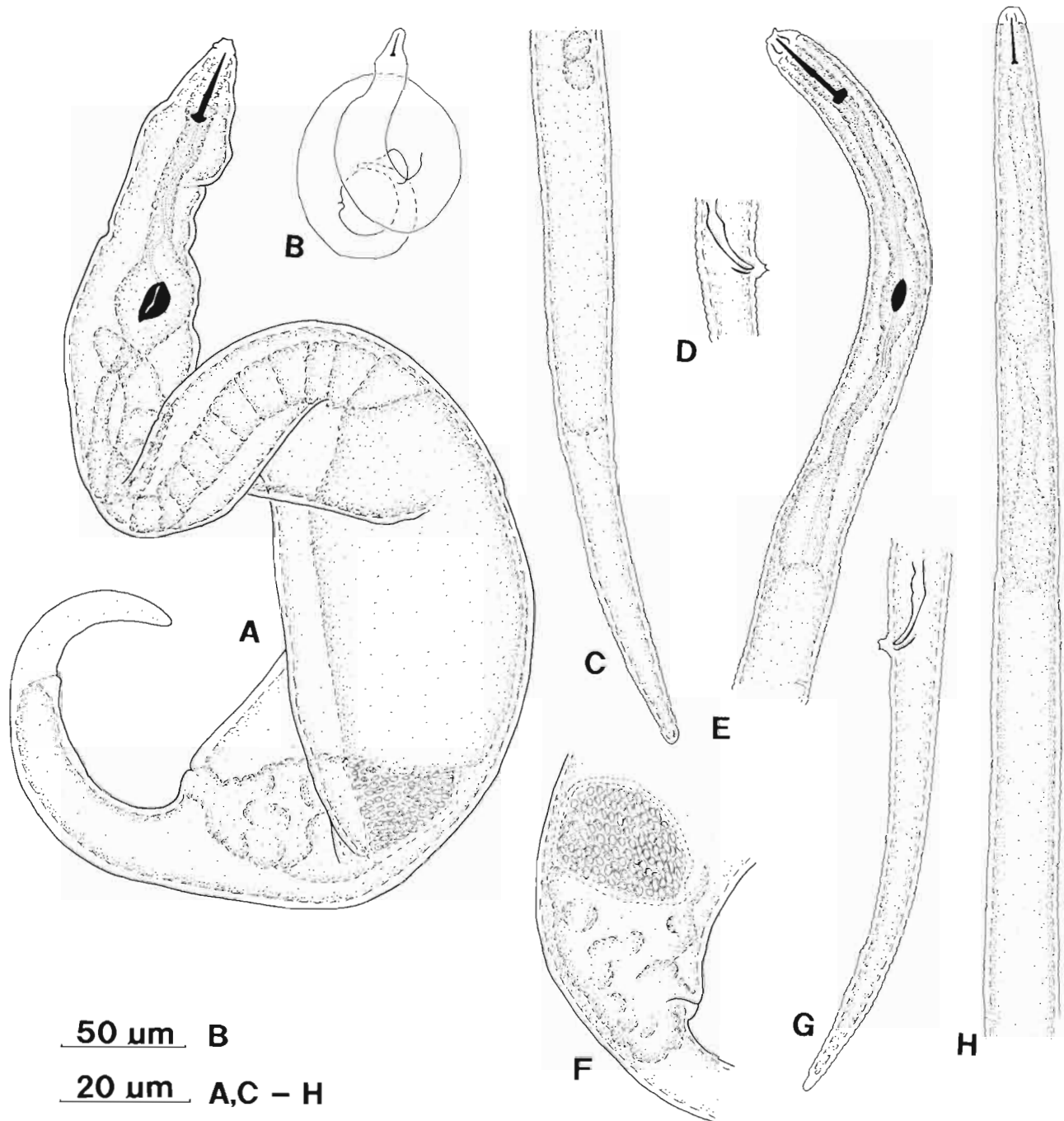


Fig. 8. *Trophotylenchus obscurus* (Colbran, 1961), Cohn & Kaplan, 1983. Female. A: Whole body; B: Body position of another specimen; F: Vulval area of another specimen; Male. D: Cloacal area; G: Posterior part of body; H: Anterior part of body. Juvenile. C: Posterior part of body; E: Anterior part of body.

canal and excretory pore situated at 39-45% of body length.

When following the key of Hashim (1984) the vulva percentage of the present specimens leads to *T. saltensis* Hashim, 1984. They can, however, be separated from

this species in the following: females and juveniles shorter (253-299 μm vs 440 μm and 238-308 μm vs 380-440 μm), female stylet longer (12-14 μm vs 11.5 μm), female excretory pore situated 110-130 μm from anterior end vs 182 μm , post-vulval region shorter

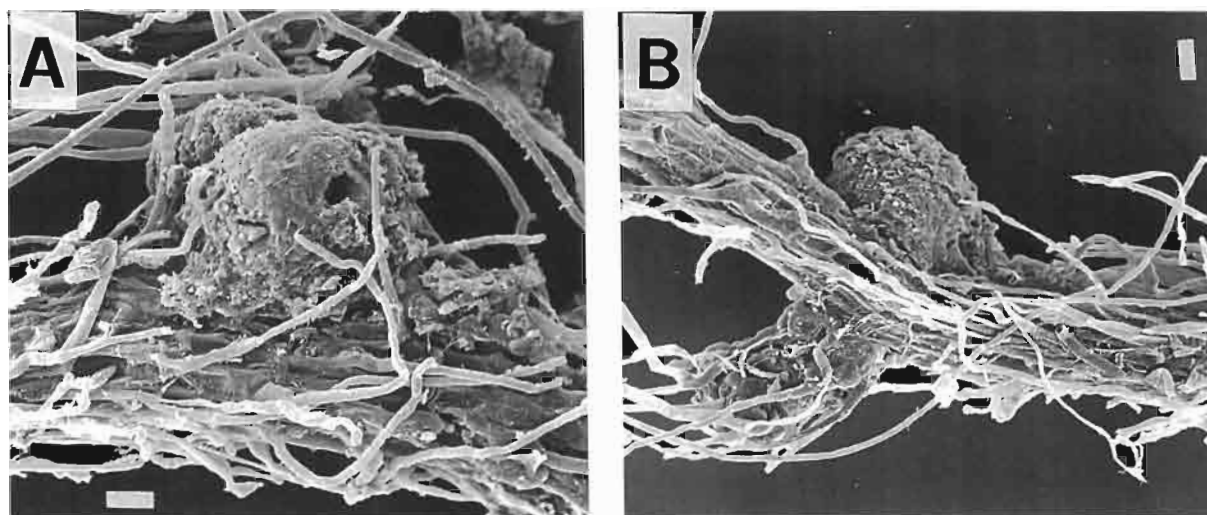


Fig. 9. *Trophotylenchulus obscurus* (Colbran, 1961) Cohn & Kaplan, 1983. Mature capsule. A, B: View of two specimens on root. (Bars = 200 μ m).

(63-91 μ m vs 93-122 μ m), spermatheca large, filled vs not seen, post-vulval sac absent vs 1/2-2/3 vulval body width long, juvenile excretory pore situated at 39-42 % of body length or 93-128 μ m from anterior end vs 37-39 % or 153-170 μ m, all tails rounded without projections vs pointed with sometimes a projection in male and bluntly rounded, pointed or with distinct projection in juvenile.

Females were found on small roots completely covered by a hard black capsule, usually one female per capsule; front part embedded in the root; front part of body usually breaks off when the female is removed. Females were either alone or with a few eggs and second stage juveniles. Males were only found in the soil. A few juveniles were also found in the soil. SEM photographs of capsules show some to have a hole, almost appearing as if it was specially made but no explanation can be given for their presence.

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References

COLBRAN, R. C. (1961). Studies of plant and soil nematodes 4. *Tylenchulus obscurus* n. sp. (Nematoda: Tylenchulidae). *Qd J. agric. Sci.*, 18: 203-207.

DE GRISSE, A. (1968). *Bijdrage tot de morfologie en de systematiek van Criconematidae* (Taylor, 1936) Thorne, 1949 (Nematoda). Deel 1. Doctoraatsthesis. Universiteit Gent. 150 p.

GOODEY, R. (1957). *Laboratory methods for work with plant and soil nematodes*. 3rd Ed., London, Ministry of Agriculture and Fisheries, 47 p.

HASHIM, Z. (1984). Description of *Trophotylenchulus saltensis* n. sp. with a comment on the status of *Trophotylenchulus* Raski, 1957 and a proposal for *Ivotylenchulus* n. gen. (Nematoda: Tylenchida). *Revue Nématol.*, 6: 179-186.

LOOF, P. A. A. (1974). *Macroposthonia curvata*. C.I.H. Description. *Plant-parasit. Nematodes*. Set 4, No 58: 3 p.

LOOF, P. A. A. & DE GRISSE, A. (1989). Taxonomic and nomenclatorial observations on the genus *Criconemella* De Grisse & Loof, 1965 *sensu* Luc & Raski, 1981 (Criconematidae). *Meded. Fac. LandbWet., Rijksuniv. Gent*, 54: 53-74.

RASKI, D. J. (1952). On the morphology of *Criconemoides* Taylor, 1936, with descriptions of six new species (Nematoda: Criconematidae). *Proc. helminth. Soc. Wash.*, 19: 85-99.

VAN DEN BERG, E. (1980). Studies on some Criconematoidea (Nematoda) from South Africa with a description of *Ogma rhombosquamatum* (Mehta & Raski, 1971) Andrassy, 1979. *Phytophylactica*, 12: 15-23.

VAN DEN BERG, E. (1991). New and known *Criconemella* and *Ogma* species from northern Natal coastal sandy soils (Criconematinae: Nematoda). *Phytophylactica*, 23: 157-165.

VAN DEN BERG, E. (1993). A first list of plant-parasitic nematodes from the Wilderness National Park with description of *Ogma sekgwaum* spec. nov. *Koedoe*, 36: 61-76.

VAN DER WATT, H. v. H. (1966). Improved tables and a simplified procedure for soil particle size analysis by the hydrometer. *S. Afr. J. agric. Sci.* 9: 911-916.