

Scutellonema sorghi n. sp., *S. dreyeri* n. sp. and *Rotylenchus mabelei* n. sp. (Nemata : Tylenchina) from sorghum in South Africa

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SUMMARY

Scutellonema sorghi n. sp. is characterized by a continuous to slightly off set lip region, basal head annule with up to sixteen longitudinal striae, posterior position of scutellum, lateral field not areolated at level of scutellum, long intestinal overlap over rectum and absence of males. *S. dreyeri* n. sp. can be distinguished from all other species of the genus by the male tail shape and the position of the scutellum situated between caudal alae and tail. *Rotylenchus mabelei* n. sp. is characterized by having long slender females, lateral field areolated anteriorly only, long tail, phasmid usually situated posterior to anus and absence of males.

RÉSUMÉ

Scutellonema sorghi n. sp., *S. dreyeri* n. sp. et *Rotylenchus mabelei* n. sp. (*Nemata : Tylenchina*) associés au sorgho en Afrique du Sud

Scutellonema sorghi n. sp. est caractérisé par une région labiale non ou peu séparée du reste du corps, la présence d'au maximum seize stries longitudinales sur l'anneau labial basal, la position postérieure du scutellum, l'absence d'aréolation au niveau du scutellum, et l'absence de mâles. *S. dreyeri* n. sp. se distingue de toutes les autres espèces du genre par la forme de la queue du mâle et le scutellum situé à la jonction postérieure des ailes caudales et de la queue. *Rotylenchus mabelei* n. sp. est caractérisé par la grande taille des femelles, le champ latéral aréolé seulement à la partie antérieure, la grande longueur de la queue, la phasmide située le plus souvent postérieurement à l'anus, et l'absence de mâles.

During a study of plant-parasitic nematodes in sorghum fields in South Africa, three undescribed spiral nematode species were found; two belong to the genus *Scutellonema* Andrassy, 1958 and one to the genus *Rotylenchus* Filip'ev, 1936; they are described and illustrated below.

The nematodes were extracted from the soil by the decanting and sieving method (Flegg, 1967), using 710 and 45 μm aperture sieves, followed by the sugar centrifugal-flotation method (Jenkins, 1964). The extracted nematodes were killed and fixed in hot 4 % formalin, transferred to anhydrous glycerin (De Grisse, 1969) and mounted on slides by means of the paraffin-ring method. Nematodes used for scanning electron microscopy (SEM) were transferred from formalin to TAF for two hours. Subsequently, they were dehydrated in increasing concentrations of alcohol, then transferred to increasing concentrations of amylacetate in pure alcohol and finally into pure amylacetate. Critical point drying and gold/palladium coating (250 Å) were carried out in the conventional way. Specimens were viewed in a JEOL JSM-35 scanning electron microscope.

Scutellonema sorghi n. sp. (Figs 1-2)

MEASUREMENTS

Females (paratypes, n = 12); L = 1.213 mm \pm 0.223 (0.877 - 1.566); a = 30.9 \pm 2.6 (27.4 - 34.3); b = 8 \pm 0.8 (6.9 - 9.3); b' = 9.2 \pm 0.8 (8.1 - 10.4); c = 47.1 \pm 8.3 (34.6 - 59.9); c' = 1 \pm 0.1 (0.8 - 1.2); o = 17.4 % \pm 2.3 (14.2 - 21.7); V = 61 % \pm 2.1 (59 - 64); stylet 28 μm \pm 2 (24.4 - 31.5).

Holotype (female) : L = 1.431 mm; a = 30.2; b = 9.4; b' = 11.2; c = 40.1; c' = 1.1; o = 17.8 %; V = 60 %; stylet = 31 μm .

DESCRIPTION

Females : Body arcuate ventrally to C-shaped. Lip region hemispherical, continuous to slightly set off from body contour, 9.1 \pm 1.3 (7 - 11) μm wide and 5.3 \pm 0.7 (4.4 - 6.6) μm high, with three indistinct annules.

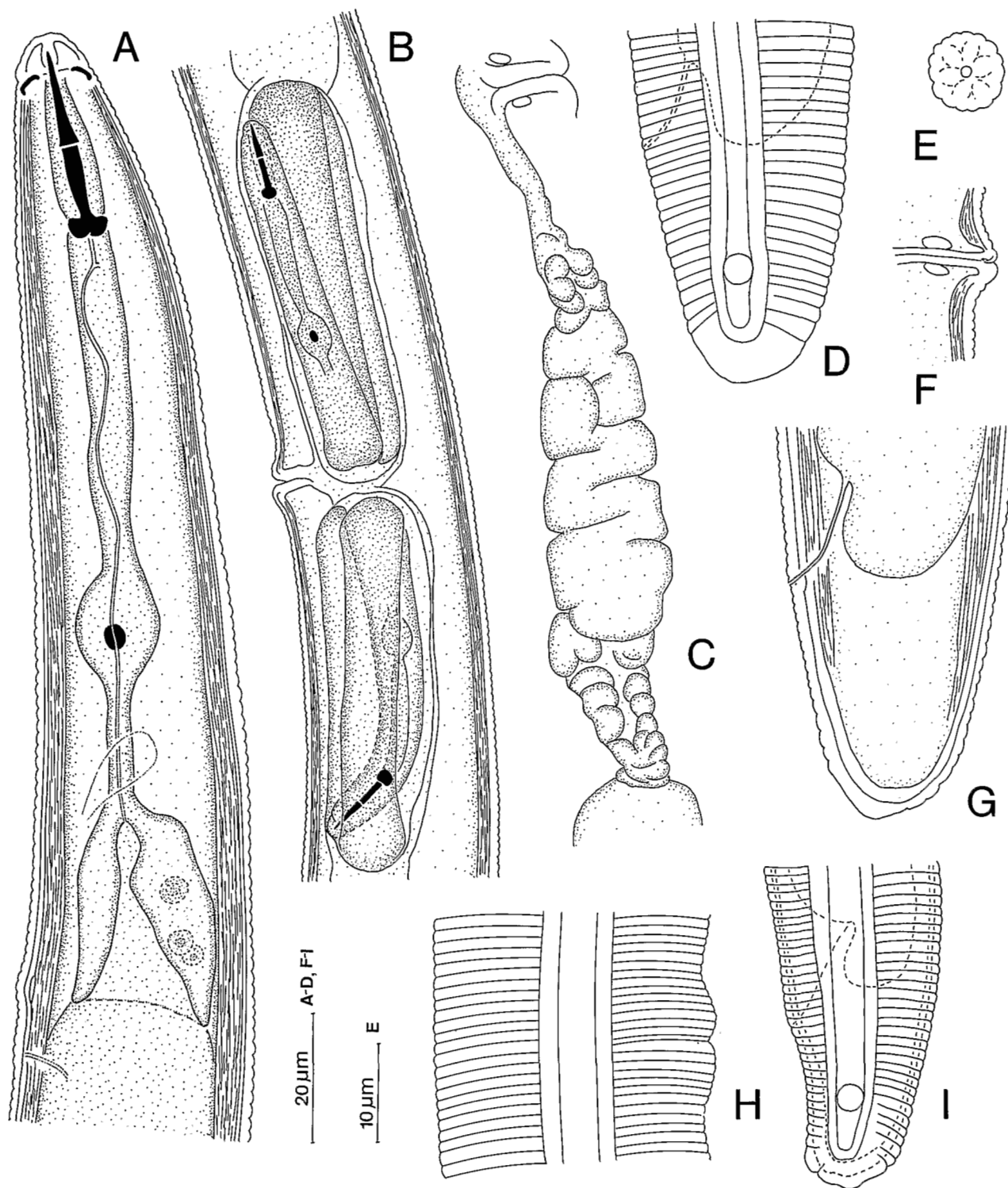


Fig. 1. *Scutellonema sorghi* n. sp. Female. A : Oesophageal region (holotype); B : Vulva region with eggs and larvae; C : Part of anterior genital branch (holotype); D : Posterior end, external view (holotype); E : *En face* view of basal lip annule; F : Vulva region; G : Posterior end, internal view (holotype); H : Lateral field at level of vulva; I : Posterior end.

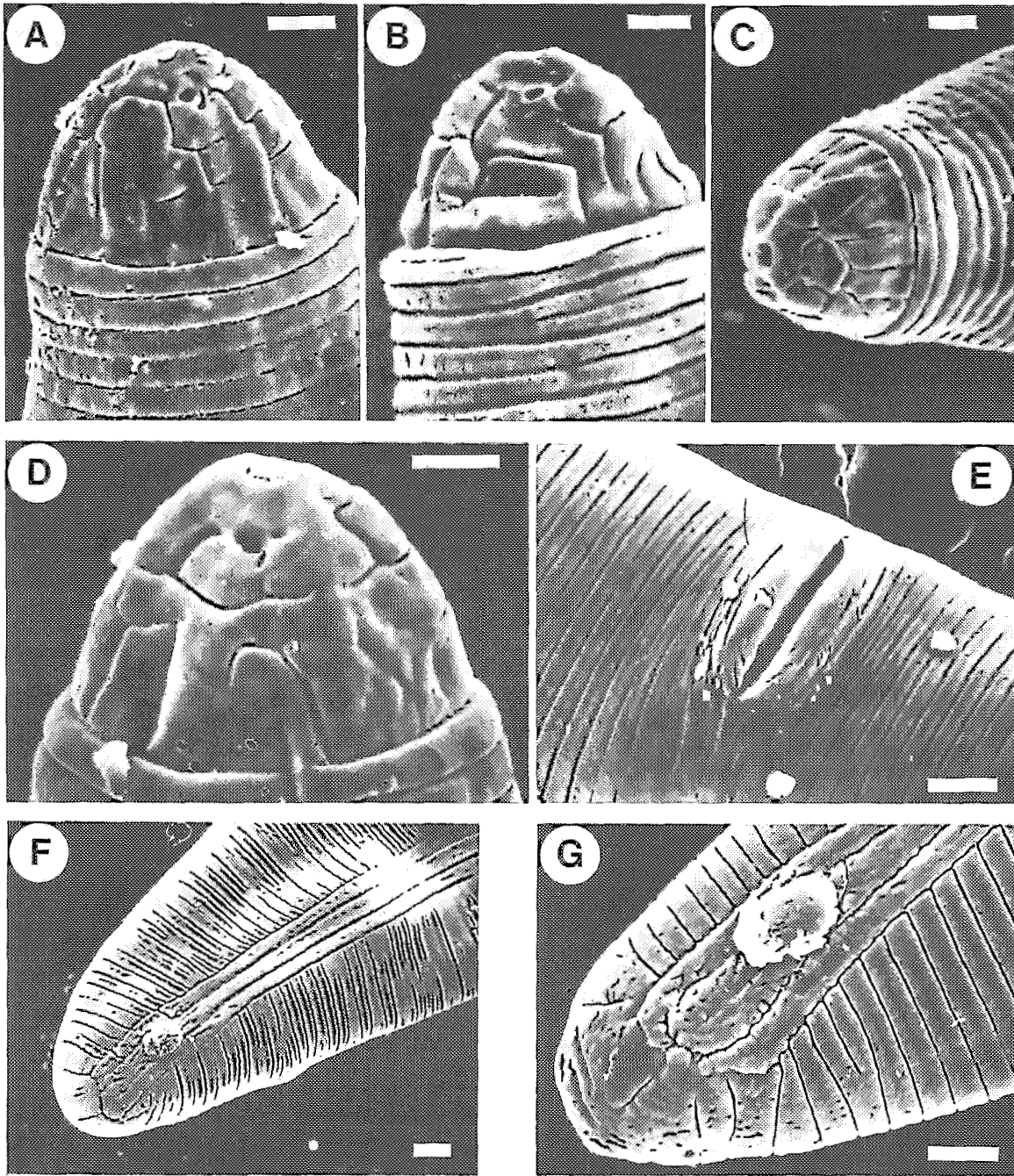


Fig. 2. *Scutellonema sorghi* n. sp. Female. A-D : Head regions; E : Vulva, ventral view; F-G : Tail regions, lateral view. (Bar = 2 μ m in A, B, C, D; 4 μ m in E, F, G, H.)

In SEM *en face* view, labial disc rounded, not set off from the first head annule, sometimes fused with some of the first annule lips. Lips of the first annule irregular but submedian ones not enlarged or thickened. In some specimens lateral and submedian lips of the first annule

partially fused with the labial disc or the second head annule. Second annule with discontinuous annulation, absent in some specimens. Basal head annule larger than first two annules with up to sixteen irregular longitudinal striae (five *en face* views). Labial framework well

developed, stretching one or two annules backwards from basal plate. Anterior and posterior cephalids situated three or four and ten to twelve annules, respectively, posterior to basal plate, visible in a few specimens only. Stylet robust. Stylet knobs flattened to slightly hollow anteriorly, 5.7 ± 0.7 (4.4 - 6.6) μm wide and 3.1 ± 0.5 (2.6 - 4.4) μm high. Metenchium shorter than slightly longer than telenchium ($m = 45\text{-}52\%$). Opening of dorsal oesophageal gland 5 ± 0.7 (3.7 - 5.9) μm from base of stylet knobs. Median bulb 15.3 ± 1.8 (12.1 - 18.4) μm long and 12.1 ± 1.8 (9.6-14.7) μm wide. Oesophageal lobes overlapping intestine 19.2 ± 4.5 (11.8-24.6) μm . Length of oesophagus 88 ± 9.3 (73-102) μm from anterior body end to valves of median bulb and 64 ± 10.6 (50 - 86) μm from valves of median bulb to base of oesophageal lobes. Excretory pore 150 ± 19.5 (126-186) μm from anterior end of body, usually situated posterior to base of oesophageal lobes. Hemizonid two or three annules long situated three to nine annules anterior to excretory pore. Hemizonion 1/2 annule long, visible in one specimen only, 22 annules posterior to hemizonid. Annules 1.3 ± 0.2 (1.1-1.5) μm at midbody. Spermathecae small and empty when visible. Vulval glands small and oval, adjacent to vaginal wall. Double epiptygma small, folded into the vagina when visible. Long intestinal overlap over rectum present in all specimens. Surface diameter of scutellum 4.2 ± 1.1 (2.6-5.9) μm wide. Anterior margin of scutellum situated two to eleven annules posterior to anus. Body width 39.1 ± 6 (31.3-37.4) μm at midbody and 32 ± 6 (22.4-40.8) μm at level of excretory pore. Lateral field with four incisures, 8 ± 2 (5.9-10.7) μm wide, middle band wider than outer two bands. Lateral fields faintly areolated at level of oesophagus and usually not areolated at level of scutellum except in a few specimens where one or two areolations were observed. Caudalids not visible. Tail 26.6 ± 5.6 (16.2-35.7) μm long, narrowly rounded, with twelve to nineteen irregular annules. Annules on tail tip larger than those on rest of body, non-existent in some specimens. In one specimen, one egg was present in each ovary. They were 93-104 μm long and 26-26.5 μm wide. Each egg contained a second stage larva (spear 18.5-19 μm), folded in three with the lip region directed away from the vulva.

Males : unknown.

TYPE SPECIMENS

Holotype female (slide 23495) and twenty *paratype* females (slides 23495-23505) deposited in the National Collection of Nematodes, Plant Protection Research Institute, Pretoria, Republic of South Africa. Four *paratype* females deposited in the collection of the Laboratoire des Vers, Muséum national d'Histoire naturelle, Paris, France.

TYPE HABITAT AND LOCALITY

Sandy loam soil (71 % sand, 11 % silt, 18 % clay)

around the roots of *Sorghum bicolor* (L.) Moench on the farm Vlensburg, Parys district, Orange Free State. Collected by D. De Waele and E. Jordaan.

OTHER LOCALITY

Sandy loam soil (62 % sand, 22 % silt, 16 % clay) around the roots of *Sorghum bicolor* (L.) Moench, Koppies district, Orange Free State. Collected by D. De Waele and E. Jordaan.

DIAGNOSIS AND RELATIONSHIPS

S. sorghi n. sp. can be separated from all species in the genus by the combination of the following characters : continuous to slightly off set lip region, basal head annule with more than six longitudinal lines, long intestinal overlap over rectum, lateral field usually not areolated at level of scutellum, long tail, posterior position of scutellum and absence of males.

S. sorghi n. sp. resembles *S. magniphasma* Sher, 1964 and *S. unum* Sher, 1964 in having a lip region continuous or nearly so with the body contour, basal head annule with more than six longitudinal striae and the absence of males. *S. sorghi* n. sp. differs from these two species by the absence of areolation at level of scutellum, tail length (16.2-35.8 μm vs 11.5-19 μm in *S. magniphasma* and 8-12.5 μm in *S. unum*) and number of tail annules (12-19 vs 6-11 in *S. magniphasma* and 5-11 in *S. unum*). From *S. magniphasma*, *S. sorghi* n. sp. is also distinct in having fewer longitudinal striae on the basal lip annule (up to 16 vs 20-26), finer body annulation (1.1-1.5 μm vs 2.3 μm), shorter stylet (25.5-31.5 μm vs 31-38 μm) long intestinal overlap over rectum (vs no overlap), more posterior position of scutellum (anterior margin two to eleven annules posterior to anus vs from four annules anterior to four annules posterior to anus) and smaller scutellum. From *S. unum*, *S. sorghi* n. sp. is also distinct in the more posterior position of the scutellum (anterior margin two to eleven annules posterior to anus vs from two annules posterior to three annules anterior to anus) and length of intestinal overlap over rectum (long vs short).

*Scutellonema dreyeri** n. sp.

(Figs 3-4)

MEASUREMENTS

Females (paratypes, $n = 7$) : L = 0.645 mm \pm 0.120 (0.803-1.132); a = 30.1 \pm 3.4 (25.7-34.8); b = 10.3 \pm 1.5 (7.8-12.4); b' = 8.3 \pm 1.3 (6.4-10.3); c = 57.4 \pm 7.5 (48.4-60.9); c' = 0.8 \pm 0.2 (0.7-1.2); o = 21.5 % \pm 3.2 (18.5-26.8); V = 57 % \pm 1.2 (55.6-59.5); stylet = 25 μm \pm 1.5 (23.5-27.5).

*Named after Dr J. Dreyer, Head of the Summer Grain Centre, Grain Crops Research Institute, Potchefstroom.

Males (paratypes, n = 11) : L = 0.940 mm \pm 0.156 (0.697-1.217); a = 34.3 \pm 5.4 (23.2-43.9); b = 9 \pm 1.5 (6.7-11); b' = 7.1 \pm 1.2 (5.4-8.6); c = 41.5 \pm 4.7 (32.4-48.8); c' = 1.4 \pm 0.1 (1.2-1.6); o = 22.3 % \pm 3.4 (16.2-26.5); stylet 24.5 μ m \pm 1.5 (22-26); spicules 27.5 μ m \pm 2.5 (25.5-33); gubernaculum 13 μ m \pm 1.5 (12-16).

Holotype (female) : L = 0.822 mm; a = 25.7; b = 7.8; b' = 6.4; c = 48.4; c' = 0.8; o = 25.1 %; V = 56.8 %; stylet = 23.5 μ m.

DESCRIPTION

Females : Body usually arcuate ventrally to C-shaped. Lip region hemispherical, continuous with body contour, 9.5 \pm 1 (8-11) μ m wide and 5 \pm 1.5 (4-8) μ m high, with three to four indistinct annules. Areolation of basal annule not distinctly seen. Labial framework well developed. Stylet robust. Stylet knobs rounded with slightly hollow anterior surface, 2.9 \pm 0.1 (2.7-3) μ m wide. Metenchium shorter than, to slightly longer than telenchium (m = 46-54 %). Opening of dorsal oesophageal gland 5.4 \pm 0.7 (4.7-6.7) μ m from base of stylet knobs. Median bulb 13.8 \pm 1.2 (11.5-15.5) μ m long and 9.9 \pm 0.8 (8.5-11) μ m wide. Oesophageal lobes overlapping intestine 22 \pm 3.2 (18-27) μ m. Length of oesophagus 73.4 \pm 5.2 (65-81) μ m from anterior body end to valves of median bulb and 41 \pm 5.3 (33.5-48) μ m from valves of median bulb to base of oesophageal lobes. Excretory pore 114.5 \pm 8.7 (103.5-129) μ m from anterior end of body, situated opposite or posterior to base of oesophageal lobes. Hemizonid three annules long, situated one to four annules anterior to or one or two annules posterior to excretory pore. Annules 1.6 \pm 0.2 (1.4-1.9) μ m at midbody. Spermatheca visible in two specimens, round, filled with sperm. Vulval glands small, oval, adjacent to vaginal wall. Epiptygma double, folded into vagina. Intestine not overlapping rectum. Surface diameter of scutellum 3.2 \pm 0.5 (2.5-3.8) μ m wide. Anterior margin of scutellum situated four to eight annules posterior to anus. Body width 31.5 \pm 2.7 (26.4-34) μ m at midbody. Lateral field with four incisures, 1/4th to 1/3rd of body width, middle band wider than outer two bands. Lateral field not areolated or with only a few areolations at level of scutellum. Tail 16.5 \pm 2.2 (14-20.5) μ m long, with nine to fourteen annules. Annules on tail tip irregular, sometimes indistinct.

Males : Similar to females except for reproductive structures. Labial disc rounded, not set off from the first head annule. Submedian lips of first head annule neither thickened nor enlarged. Second annule with discontinuous annulation. Basal head annule with up to sixteen irregular longitudinal striae. Tail 23 \pm 3.2 (17.5-28) μ m. Hyaline portion of tail tip 8.5 \pm 1.4 (7-10.5) μ m forming a terminal mucro in lateral view but broadly rounded in ventral view. Caudal alae extending over three quarters

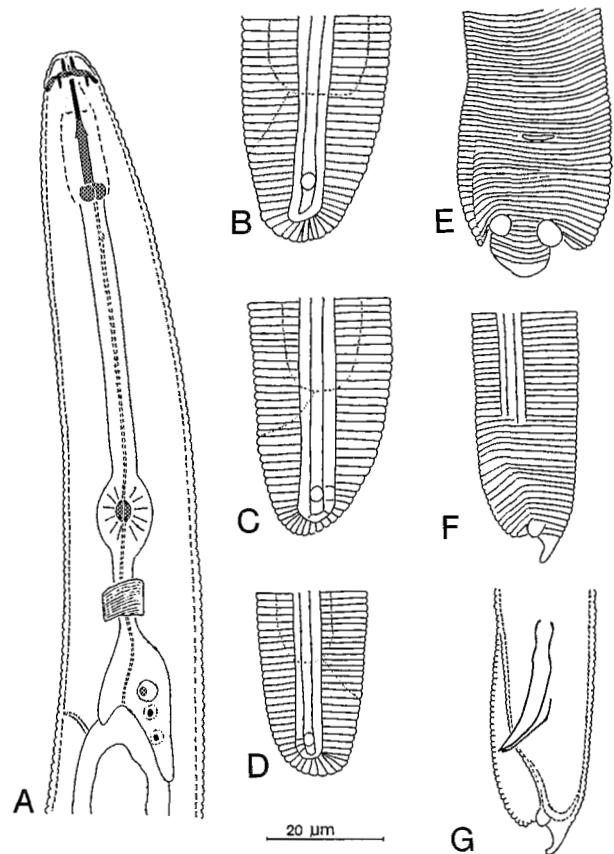


Fig. 3. *Scutellonema dreyeri* n. sp. Female. A : Oesophageal region (holotype); B : Posterior end (holotype); C, D : Posterior end. Male. E : Posterior end (ventral view); F : Posterior end (external view); G : Posterior end (internal view).

of tail length. Scutellum situated posterior to ending of caudal alae, between caudal alae and tail tip.

TYPE SPECIMENS

Holotype female (slide 23898), three *paratype* females and seven *paratype* males (slides 23898-23901) deposited in the National Collection of Nematodes, Plant Protection Research Institute, Pretoria, Republic of South Africa. Three *paratype* females and three *paratype* males deposited in the collection of the Laboratoire des Vers, Muséum national d'Histoire naturelle, Paris, France.

TYPE LOCALITY

Sandy loam soil (65 % sand, 23 % silt, 12 % clay) around the roots of *Sorghum bicolor* (L.) Moench on the farm Danspan, Potgietersrus district, Transvaal. Collected by D. De Waele and E. Jordaan.

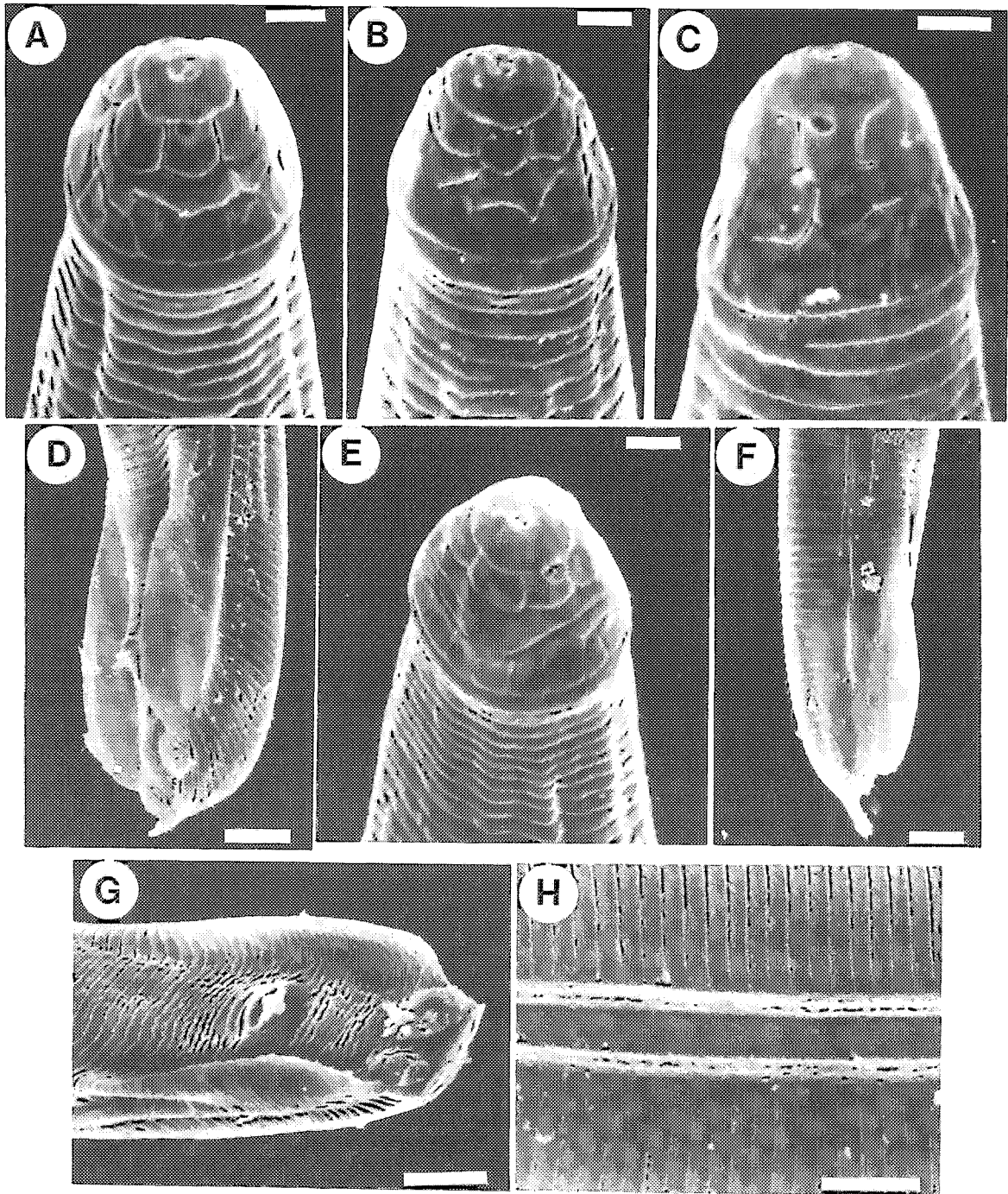


Fig. 4. *Scutellonema dreyeri* n. sp. Male. A-C : Head regions; D : Posterior end; E : Head region; F : Posterior end; G : Posterior end, ventral view; H : Lateral field. (Bar = 3 μ m in A, B, C, E; 10 μ m in D, F, G, H.)

DIAGNOSIS AND RELATIONSHIPS

S. dreyeri n. sp. can be separated from all species in

the genus by the combination of the following characters : continuous lip region, basal head annule with more than six longitudinal lines, lateral field not areolated or

with only a few areolations at level of scutellum, presence of males, male tail shape and unique position of scutellum between caudal alae and tail tip.

S. dreyeri n. sp. resembles *S. labiatum* Siddiqi, 1972 and *S. tsitsikamense* van den Berg, 1976 in having a lip region continuous with the body contour, basal head annule with more than six longitudinal striae and the presence of males. Females of *S. dreyeri* n. sp. differ from these two species by the more posterior position of the scutellum (anterior margin of scutellum situated four to eight annules posterior to anus *vs* from two annules posterior to two annules anterior to anus in *S. labiatum* and one to four annules posterior to anus in *S. tsitsikamense*). Males of *S. dreyeri* n. sp. differ from these two species by the unique position of scutellum. From *S. labiatum*, females of *S. dreyeri* n. sp. are also distinct in the absence of long, protruding epiptygma and longer tail length (14-20.5 μm *vs* 7.5-14.5 μm). From *S. tsitsikamense*, *S. dreyeri* n. sp. is also distinct in having a shorter stylet in both females and males (23.5-27.5 μm in females and 22-26 μm in males *vs* 31-40 μm in females and 31-36 μm in males) and shorter spicules (25.5-33 μm *vs* 33.4-41.9 μm).

*Rotylenchus mabelei** n. sp.

(Fig. 5)

MEASUREMENTS

Females (paratypes, n = 11) : L = 1.047 mm \pm 0.063 (0.915-1.119); a = 42 \pm 2.4 (35.5-44.2); b = 6.6 \pm 0.7 (5.6-7.8); b' = 7.6 \pm 0.7 (6.6-8.9); c = 43 \pm 4.2 (36.5-51.6); c' = 1.3 \pm 0.1 (1.1-1.5); o = 16.1 % \pm 3.7 (10.3-21); V = 53 % \pm 2.5 (48-57); stylet = 28 μm \pm 0.5 (27-29.5).

Holotype (female) : L = 1.031 mm; a = 40.1; b = 6.2; b' = 7.1; c = 39.5; c' = 1.4; o = 10.1; V = 54 %; stylet = 28.5 μm .

DESCRIPTION

Females : Body slender, slightly arcuate ventrally to C-shaped. Lip region hemispherical, slightly set off from body contour, 7.4 \pm 0.6 (6.6-8.1) μm wide and 4.2 \pm 0.5 (3.3-4.4) μm high, with four or five annules. Labial framework stretching backwards one or two annules from basal plate. Anterior and posterior cephalids situated four and eleven annules, respectively, from basal plate, visible in one specimen only. Stylet robust. Stylet knobs flattened or very slightly hollow anteriorly, 5.4 \pm 0.8 (4-6.3) μm wide and 2.9 \pm 0.4 (2.6-3.7) μm high. Metenchium shorter than telenchium (m = 43.5-49.5 %).

*The name of this new *Rotylenchus* species is derived from the Sotho word for sorghum, mabele.

Opening of dorsal oesophageal gland 4.6 \pm 1.1 (2.9-5.9) μm from base of stylet knobs. Median bulb oval, 15.2 \pm 1 (13.2-16.5) μm long and 10.7 \pm 0.6 (9.9-11.8) μm wide. Length of oesophagus 87 \pm 3.2 (91-93) μm from anterior end of body to valves of median bulb and 73 \pm 8.7 (56-82) μm from valves of median bulb to base of oesophageal lobes. Oesophageal lobes overlapping intestine 22.1 \pm 4.7 (12.1-30.5) μm . Excretory pore 136 \pm 6.1 (127-147) μm from anterior end of body, situated from opposite junction between isthmus and oesophageal lobes to opposite base of oesophageal lobes. Hemizonid 1/2 to two annules long, situated two to four annules anterior to excretory pore. Hemizonion one annule long, visible in a few specimens only, sixteen to nineteen annules posterior to hemizonid. Body width 24.9 \pm 1.1 (23.2-26.8) μm at midbody and 21.2 \pm 1 (19.5-23.2) μm at level of excretory pore. Annules 1.6 \pm 0.2 (1.5-1.8) μm at midbody. Lateral field with four incisures, 6 \pm 0.9 (4.8-7.4) μm wide, areolated faintly anteriorly opposite oesophagus but not areolated on tail. No longitudinal lines on cuticle outside lateral field. Spermatheca thick walled and empty when visible. Epiptygma double, folded into the vagina. Intestine not overlapping rectum. Phasmid situated from three annules anterior to five annules posterior to anus. Caudalids not visible. Tail rounded, 24.5 \pm 2.6 (20.6-29) μm long with fourteen to eighteen regular annules.

Males : unknown.

TYPE SPECIMENS

Holotype female (slide 23506) and 33 *paratype* females (slides 23499-23512) deposited in the National Collection of Nematodes, Plant Protection Research Institute, Pretoria, Republic of South Africa. Four *paratype* females deposited in the collection of the Laboratoire des Vers, Muséum National d'Histoire naturelle, Paris, France.

TYPE LOCALITY

Sandy loam soil (71 % sand, 11 % silt, 18 % clay) around the roots of *Sorghum bicolor* (L.) Moench on the farm Vlensburg, Parys district, Orange Free State. Collected by D. De Waele and E. Jordaan.

OTHER LOCALITIES

Sandy loam soil (62 % sand, 22 % silt, 16 % clay) around the roots of *S. bicolor*, Koppies district, Orange Free State and sandy loam soil (70 % sand, 16 % silt, 14 % clay) around the roots of *S. bicolor* on the farm Worthing, Warmbad district, Transvaal. Collected by D. De Waele and E. Jordaan.

DIAGNOSIS AND RELATIONSHIPS

R. mabelei n. sp. can be separated from all species in

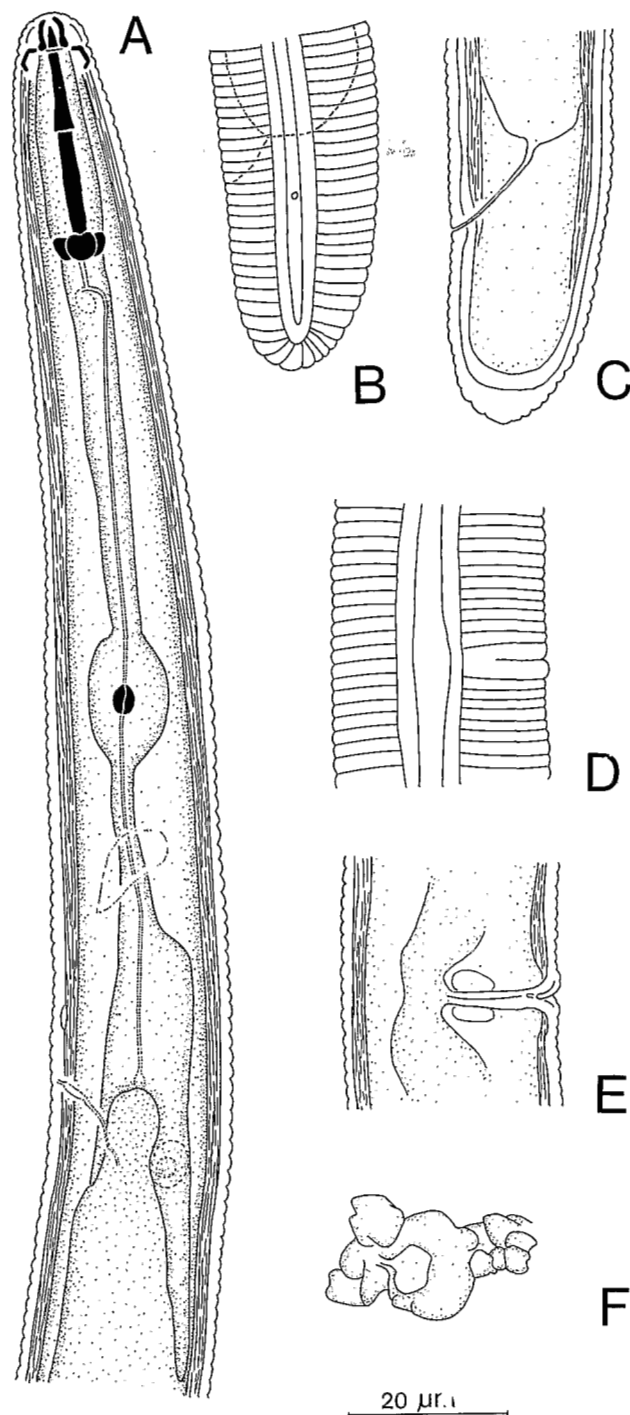


Fig. 5. *Rotylenchus mabelei* n. sp. Female (holotype). A : Oesophageal region; B : Posterior end, external view; C : Posterior end, internal view; D : Lateral field at level of vulva; E : Vulva region; F : Empty spermatheca.

the genus by the combination of the following characters : long and slender body, hemispherical lip region, absence of longitudinal striae on cuticle outside lateral field, lateral field areolated anteriorly only, oesophageal overlap longer than three body annules, equatorial position of vulva, long tail, striated tail terminus, phasmid usually situated posterior to anus and absence of males.

R. mabelei n. sp. resembles *R. unisexus* Sher, 1965 and *R. dalhousiensis* Sultan & Jairajpuri, 1979 in having no longitudinal striae on cuticle outside lateral field, an anteriorly areolated lateral field, a hemispherical lip region, an oesophageal overlap longer than three body annules, a striated tail terminus and the absence of males. *R. mabelei* n. sp. differs from these two species in being longer (0.915-1.119 mm vs 0.550-0.680 mm in *R. dalhousiensis* and 0.500-0.958 mm in South African *R. unisexus*). *R. mabelei* n. sp. is further separated from *R. dalhousiensis* in having a longer tail with a larger c' value (1.1-1.5 vs 0.9-1) smaller V value (48-57 vs 64-66) and position of phasmids (from three annules anterior to five annules posterior to anus vs two to seven annules anterior to anus). From *R. unisexus* (South African specimens) *R. mabelei* n. sp. is distinct in having a larger c value (35.5-44 vs 19-35), position of phasmids (from three annules anterior to five annules posterior to anus vs three to seventeen annules anterior to anus) and longer tail (20.6-29 μ m vs 6.6-23.5 μ m).

Because of the presence of the phasmids posterior to anus in most specimens this species is also very similar to *R. caudaphasmidius* Sher, 1965. *R. mabelei* n. sp. is, however, separated from this species by being longer (0.915-1.119 mm vs 0.620-0.883 mm), having a larger a value (35.5-44 vs 23.8-32), longer tail (20.6-29 μ m vs 14.3-19.1 μ m) with more annules (14-18 vs 8-15) resulting in a larger c' value (1.1-1.5 vs 0.8-1.2), vulva situated slightly more anteriorly (48-57 vs 55-63) and the absence of males (males present in *R. caudaphasmidius*).

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