Acrobeles farzanae spec. nov. and *Seleborca complexa* (Thorne) from the West Coast National Park and Rocher Pan Nature Reserve (Nematoda: Cephalobidae)

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Acrobeles farzanae spec. nov. is described from two localities on the west coast of South Africa. The new species is characterised by body length of 0.7-0.8 mm; relatively slender, cylindroid body, abruptly ventrally bent in vulval region; vulva with protruding lips and situated in a sunken area; three incisures in lateral field; and cuticle with an intricate interlocked block-like pattern. Additional data is presented on the morphology of *Seleborca complexa* (Thorne, 1925) collected in the same area.

Key words: Nematoda, Acrobelinae, taxonomy, morphology, SEM, South Africa.

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Introduction

Soil samples taken in dune sands surrounding the Langebaan Lagoon in the West Coast National Park, as well as dune sands near the pan in Rocher Pan Nature Reserve, yielded specimens of several Cephalobidae species. This paper deals with two Acrobelinae species, one of which is new to science. Standard methods of extraction, fixing, processing and mounting were used. Fresh, unmounted specimens were available for SEM, and prepared as described by Swart & Heyns (1987). Slides are deposited in the collection of the Department of Zoology, Rand Afrikaans University, unless otherwise indicated.

Descriptions

Acrobeles farzanae spec. nov.

(Figs 1, 2 and 3A-D)

Morphometric data in Table 1

Body relatively slender; in female nearly straight except abruptly ventrally bent through about 30 degrees at the vulva; in male gently ventrally curved with stronger curvature posteriorly. Cuticle about 2 µm thick, annulated, the annules about 4.1 (3.7 - 4.4) µm wide at midbody, mostly slightly wider dorsally than ventrally. The annules are interrupted by longitudinal lines. These are, however, not continuous lines which divide the annules into regular rectangular blocks, but alternating discontinuous lines creating an intricate interlocking effect, as shown in Figure 1A and B, and also in the SEM micrographs, especially Figures 2B and H and 3B and D. Number of interlocking blocks in circumference of midbody about 42 to 48. Lateral field with three incisures. Part of cuticle adjoining lateral field, especially towards posterior end of female, somewhat modified, bulging, forming more regular rectangular blocks marked by irregular, minute, longitudinal lines. In this area the lateral field could be interpreted as consisting of four bands, or marked by five incisures (See Figures 1D and 2D). Six cephalic probolae with membranous fringes, six to seven on either side, and the third or fourth one on the

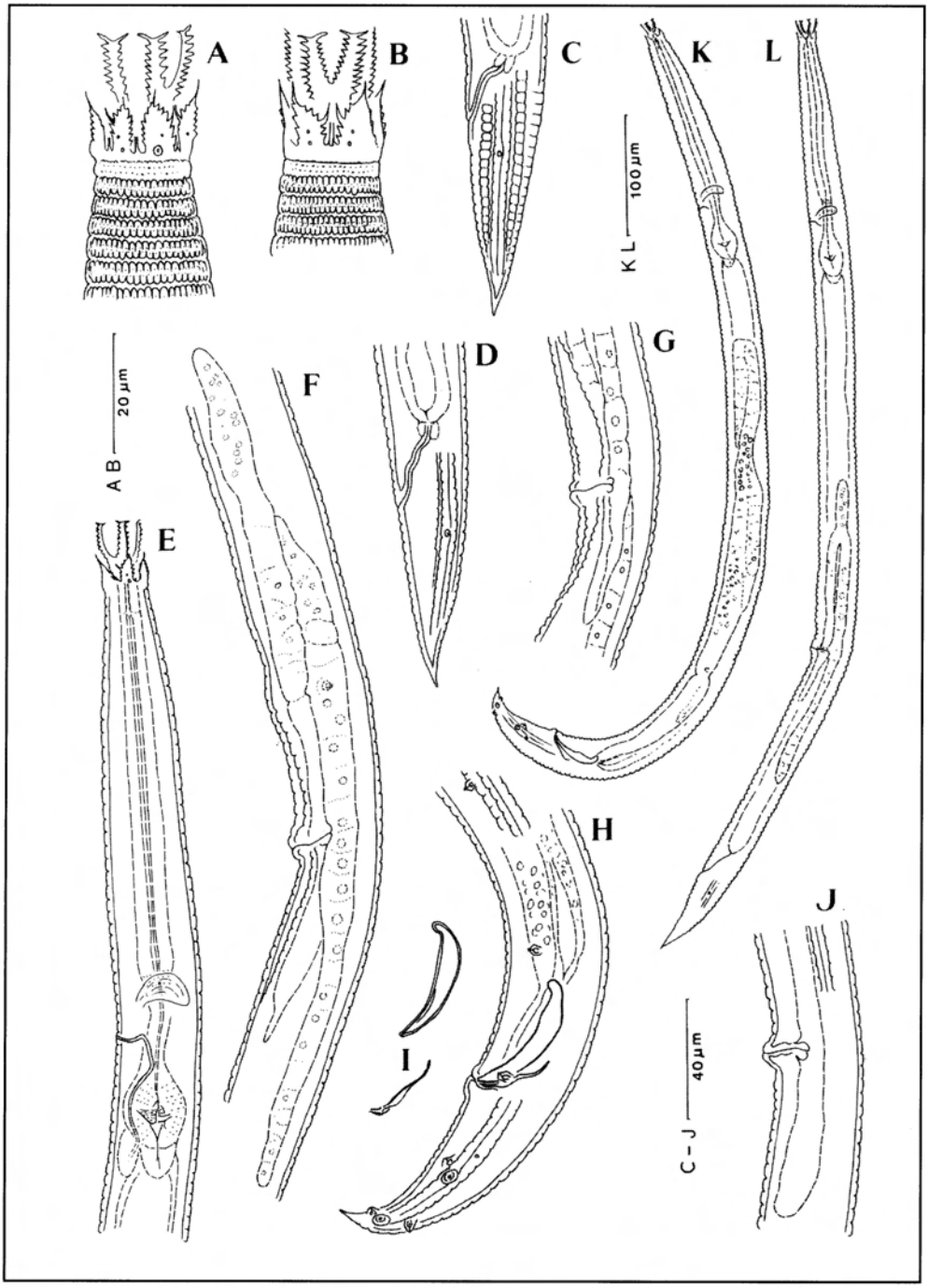

Fig. 1. *Acrobeles farzanae* spec. nov. A. Head end in sublateral view; B. Head end in lateroventral view; C and D. Tails of two different females; E. Anterior body region; F. Part of body showing female reproductive system; G and J. Vulval region and posterior uterine branch; H. Male tail; I. Spicule and gubernaculum; K and L. Male and female showing typical relaxed body posture. All specimens from Rocher Pan.

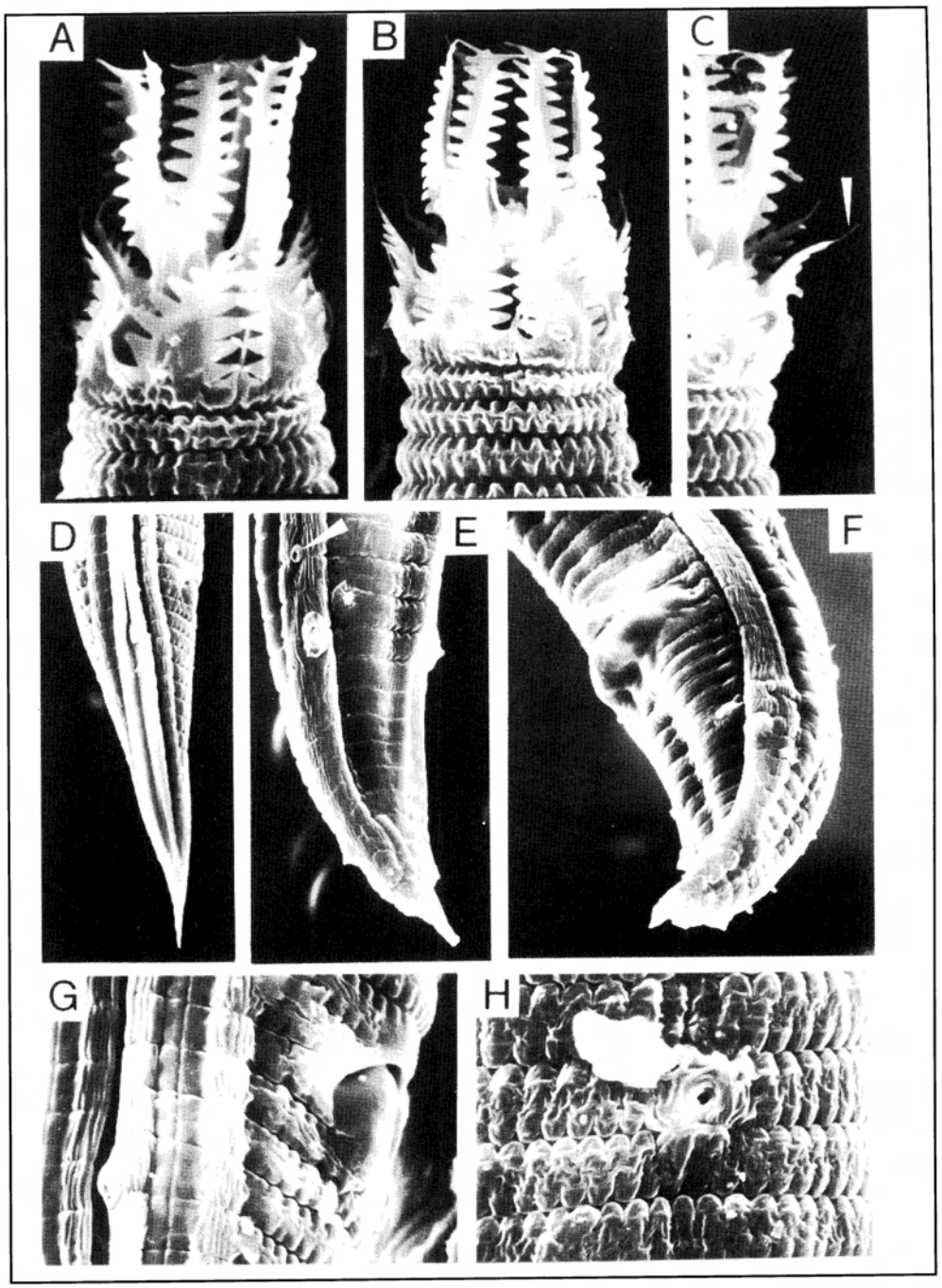

Fig. 2. *Acrobeles farzanae* spec. nov. A. Subdorsal view of head of male; B. Sublateral view of head of female; C. Sublateral view of head of male. Note the long thread-like terminus of the cephalic probolae (arrow); D. Female tail with phasmid in lateral field; E. Lateral view of posterior part of male tail; F. Oblique subventral view of male tail; G. Anal region of female; H. Excretory pore. All specimens from Rocher Pan. A-C and G = x about 2 000; D = x 825; E = x 1 400; F = x about 1200; H = x 2 700.

Table 1

Morphometric characters of Acrobeles farzanae *spec. nov. from two localities*

	Rocher Pan Nature Reserve			West Coast National Park	
	Holotype	Paratypes		Paratypes	
	female	female	male	female	male
n	1	7	10	4	5
L (mm)	0.81	0.76(0.70-0.81)	0.77(0.70-0.82)	0.79(0.78-0.83)	0.74(0.67-0.81)
a	24.9	23.9(21.0-25.7)	21.7(19.9-23.2)	23.7(21.6-26.0)	23.2(21.5-25.5)
b	3.7	3.8(3.5-4.3)	3.7(3.4-4.0)	3.7(3.5-3.8)	3.6(3.2-3.8)
c	12.5	11.5(10.5-12.9)	10.7(10.0-11.6)	11.3(10.7-12.0)	10.0(9.0-10.7)
c'	2.50	2.63(2.50-2.81)	2.35(2.10-2.58)	2.75(2.60-2.90)	2.54(2.36-2.86)
Tail length	65	66(60-73)	72.5(67-80)	70(65-73)	74(67-82)
V%	64.5	64.0(61.9-64.6)	-	63.4(62.8-64.1)	-
Number of annules:					
on neck	45	44(41-46)	43(38-46)	46(45-46)	44(42-47)
neck to vulva	69	71(68-75)	-	68(64-71)	-
vulva to anus	49	53(49-56)	-	54(51-58)	-
neck to cloaca	-	-	117(110-123)	-	124(116-128)
ventral on tail	15	16(16-17)	8(7-9)	16(15-17)	8(7-9)
total	178	183(177-188)	169(162-174)	184(175-188)	176(168-181)

oblique side of each probola, facing the secondary cephalic axils, are lengthened and anteriorly directed. Cephalic axils with long guarding processes. Apices of cephalic probolae with long, almost threadlike extensions (Fig. 2C, arrow). Each prong of the three labial probolae with about seven triangular membranous fringes on the inside, about nine on the outside, and each prong ending with two slender and slightly inward-directed apical tines. Width of head at base of cephalic probolae 16.8 (15.5 - 18.5) µm. Stoma and rhabdions typical. Pharynx typical, with nerve ring encircling base of metacorpus or beginning of isthmus. Excretory pore and duct conspicuous, the pore located 33(29 - 36) annules from base of lip region, or 76(71 - 81)% of the length of the pharynx, opposite the isthmus. Excretory gland situated ventrally, opposite base of terminal bulb. Hemizonid not observed. Deirid seen in some specimens only, more often so in male, and located in region of excretory pore, in lateral field on annule 35(31 - 37).

Female reproductive system cephaloboid, but the ovary seldom with a second reflex posterior to vulva. Post-uterine branch 46(41 - 62) µm long, or 1.7(1.4 - 2.2) times the corresponding body diameter. Vulva a transverse slit, with slightly protruding lips, the area anterior and posterior to the vulva mostly sunken to a variable extent, but not bordered by cuticular flaps. Female tail conoid, straight, the terminus acute and not annulated. Phasmid located at 15.2(9.2 - 20.6) % of tail length, between the middle and ventral incisures of the lateral field.

Male: Monorchic, with reflexed testis, the gonad displaying the same divisions and general morphology as that described by Thomas (1965) for *Seleborca complexa* (Thorne). Spicules typical, 43(42 - 47) µm long, measured along the curved median line. Gubernaculum sinuous, 22(20 - 24) µm long. Male tail dorso-ventrally flattened, ventrally arcuate, the terminus acute and not annulated. With three pairs of preanal lateroventral papillae, one pair adanal, another pair slightly anterior to proximal end

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Table 2

Morphometric characters of Seleborca complexa *(Thorne) from two localities*

	West Coast National Park		Rocher Pan Nature Reserve		Mean and range for both populations	
	Female	Male	Female	Male	Female	Male
n	8	3	6	6	14	9
L (mm)	0.55-0.72	0.51-0.55	0.51-0.68	0.48-0.61	0.62(0.51-0.72)	0.55(0.48-0.61)
a	18.5-27.2	19.9-20.5	18.8-24.2	15.3-21.8	21.3(18.8-27.2)	19.7(15.3-21.8)
b	3.3-4.1	3.3-3.8	3.5-4.2	3.2-4.0	3.8(3.3-4.2)	3.6(3.2-4.0)
c	8.1-10.5	13.5-14.7	9.1-10.0	11.6-14.1	9.5(8.1-10.5)	13.0(11.6-14.7)
c'	3.3-4.6	1.8-2.0	3.4-3.9	1.7-2.1	3.7(3.3-4.6)	1.9(1.7-2.1)
Tail length	60-83	37-40	55-69	38-45	66(55-83)	41(37-45)
V% /Spicule length	56.5-59.6	32-35	57.6-59.9	33-36	58.6(56.5-59.9)	34.3(32-36)
Post. ut. branch/Gubernaculum	15-22	17-19	14.5-16	18-20	17.3(15-22)	18.6(17-20)
Cephalic region width	13.5-15	13-13.5	13.5-15	12.5-14	14.2(13.5-15)	13.3(12.5-14)
Excr. pore: annules from front	36-43	40	41-44	42-43	40(36-44)	42(40-43)
Phasmid: % of tail length	19.7-25.4	30.8-32.5	15.0-25.9	23.2-32.2	22.4(15.0-25.9)	27.6(23.2-32.5)
Width of annules (midbody)	2.1-2.9	2.4	2.0-2.6	1.8-2.8	2.4(2.0-2.9)	2.3(1.8-2.8)
Number of annules:						
on neck	52-74	53-61	52-65	53-62	57(52-74)	57(53-62)
neck to vulva	76-95	-	72-92	-	83(72-95)	-
vulva to anus	74-83	-	72-87	-	79(72-87)	-
neck to cloaca	-	150-166	-	151-163	-	158(150-166)
ventral on tail	21-24	11-12	18-23	7-9	21(18-24)	9(7-12)
total	236-256	223-232	239-242	220-228	243(236-256)	226(220-232)

of spicules, and the third pair about four anal body diameters from the cloaca (113-118 µm). Five pairs of caudal papillae: three pairs close to the tail terminus, two pairs near middle of tail, one of which is subventral, the other in the lateral field between the middle and ventral incisures. Phasmid rather variable in position, at 34(28 - 40) % of the tail length, always located between the middle and dorsal incisures of the lateral field.

Diagnosis

Acrobeles farzanae spec. nov. is about 0.7-0.8 mm long, has a relatively slender cylindroid body, which is abruptly ventrally bent at the vulva, vulva with protruding lips and situated in a sunken area, three incisures in the lateral field and cuticle with an intricate interlocked block-like pattern.

Relationships

In its cuticular pattern *Acrobeles farzanae* spec. nov. most closely resembles that group of *Acrobeles* species in which the cuticle is divided into blocks by longitudinal lines, viz. three species from southern Africa, *Acrobeles thornei* Heyns, 1962, *Acrobeles sheasbyi* Heyns & Hogewind, 1969 and *Acrobeles seelyae* Rashid, Heyns & Coomans, 1990 and the Venezuelan species *Acrobeles undulatus* Loof, 1964. The new species was compared with the descriptions as well as type specimens of the three southern African species.

It differs from the holotype of *A. thornei* in shape and body posture of the female, viz. slender, cylindroid, abruptly bent at vulva *vs* thicker, spindle-shaped and slightly but evenly ventrally arcuate (compare Fig. 1L with Fig. 38 in Heyns 1969); difference in a-ratio, 20 - 26 *vs* 14.5*; vulva with protruding lips and situated in a sunken area *vs* vulva normal; cuticular pattern and width of annules, 3.7 - 4.4µm *vs* 6* µm. (The identity of the specimens described as *A. thornei* by Heyns (1969) and Rashid *et al.* (1990a) will be discussed in a paper now under preparation).

From *A. sheasbyi* the new species differs in body posture (compare Fig. 1L with Fig. 40 in Heyns 1969); structure of vulva which is surrounded by conspicuous cuticular flaps in *A. sheasbyi*; cuticular pattern, which consists of regular, oblong blocks in *A. sheasbyi*; presence of two long tines in the secondary axils of the cephalic probolae of *A. farzanae*; and in the male by the presence of two pairs of caudal papillae near the phasmids in the new species *vs* only one pair in *A. sheasbyi*.

The new species differs from *A. seelyae* in body length (0.67 - 0.83 mm *vs* 0.50 - 0.67 mm); absence of cuticular flaps at vulva, while present in *A. seelyae*; and the cuticular pattern which consists of rectangular blocks in *A. seelyae*. Lastly the new species can be distinguished from *A. undulatus* by body length (0.67 - 0.83 mm *vs* 0.49 - 0.65 mm); more slender body (a = 20-26 *vs* 14-17); structure of vulval area, which is not sunken in *A. undulatus*; presence of long tines on cephalic probolae; and cuticular pattern which in *A. undulatus* is similar to that of *A. thornei* (see Fig. 6B in Loof 1964).

* New measurements of holotype.

Type locality and habitat

Holotype and paratypes from dune sand under typical dune vegetation including shrubs, between the pan and the beach at Rocher Pan Nature Reserve, legit J. Heyns, 14 Oct. 1993. Other paratypes from dune sand east of the Langebaan lagoon at Seeberg, and in high stabilised dunes between the lagoon and the Atlantic Ocean, in the West Coast National Park, legit J. Heyns, 13 Oct. 1993.

Type specimens

Holotype plus two female and two juvenile paratypes on slide RAU 7195, further paratypes on slides RAU 7196 - 7213. Other paratypes deposited in the nematode collections of the Institute for Zoology, University of Ghent, Belgium, and the Swedish Museum of Natural History in Stockholm.

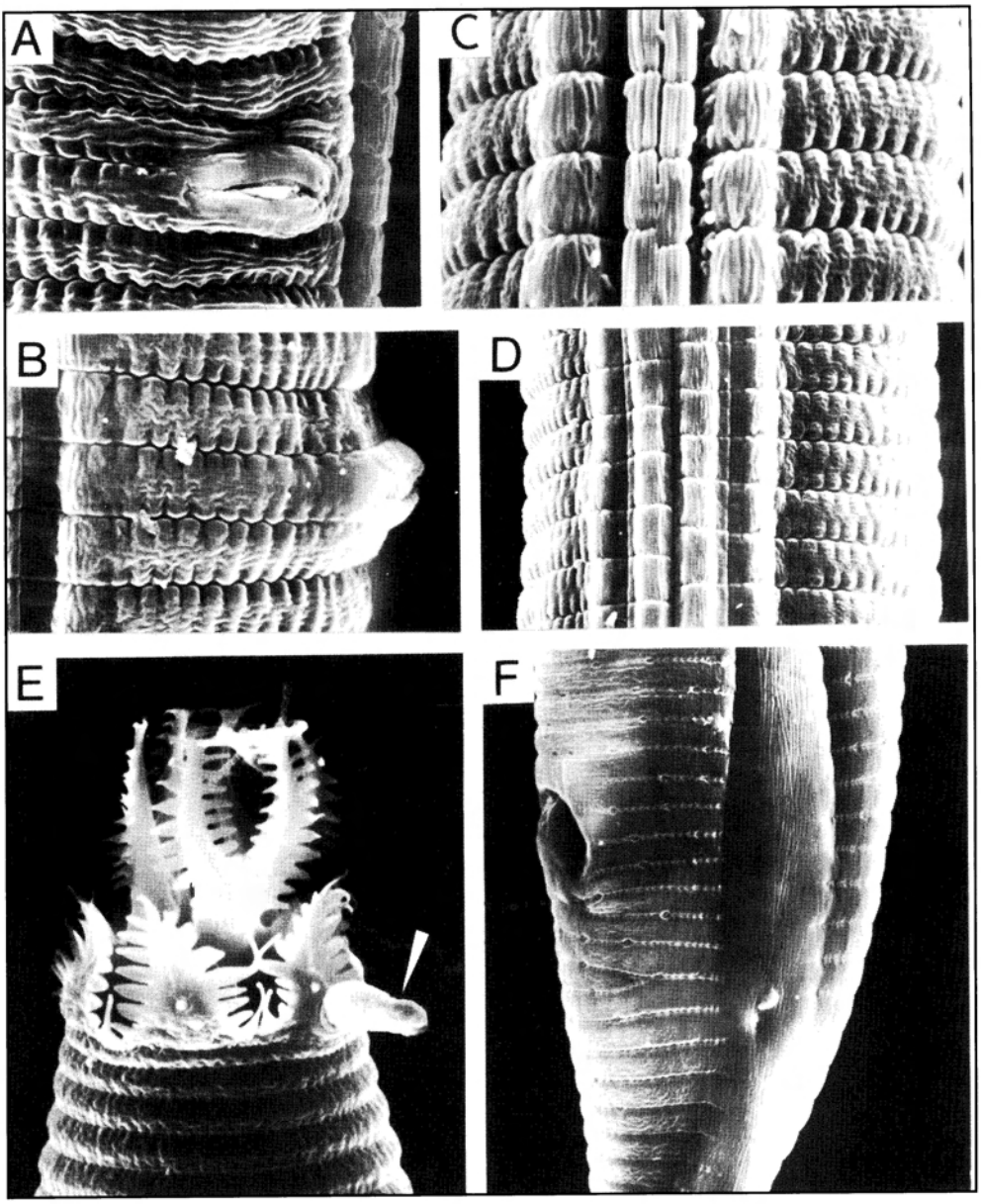

Fig. 3. A-D: *Acrobeles farzanae* spec. nov. A. Vulva in subventral view; B. Vulva of another specimen, lateral view; C and D. Lateral field in two specimens. All specimens from Rocher Pan. E and F: *Seleborca complexa* (Thorne, 1925). E. Ventrolateral view of head of male. Note exudate from amphid (arrow); F. Anal region of female, showing phasmid in lateral field. A and B = x 2 200; C = x 2 700; D and F = x 1 600; E = x 1 900.

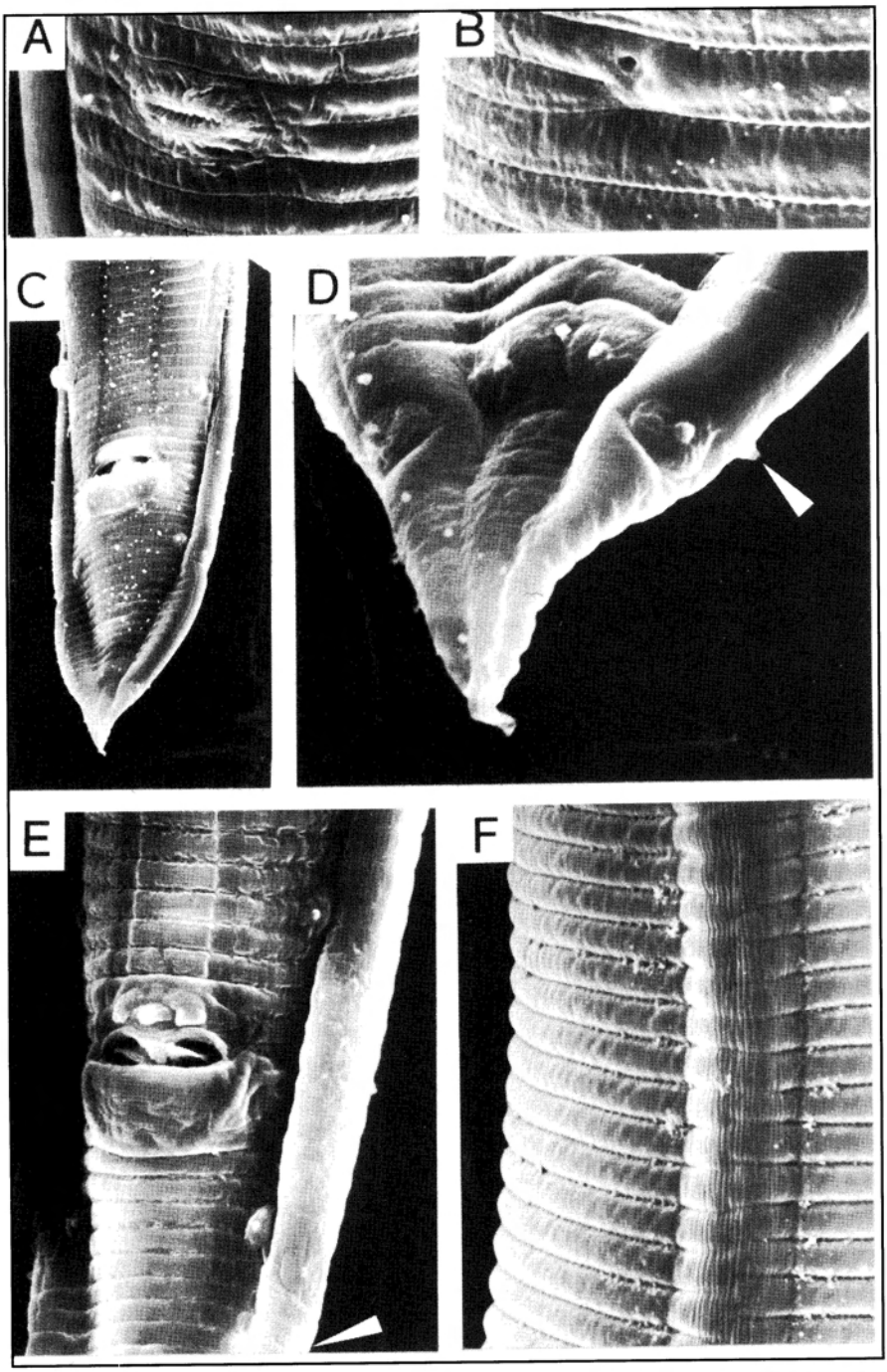

Fig. 4. *Seleborca complexa* (Thorne, 1925). A. Vulva; B. Excretory pore; C. Ventral view of male tail; D. Ventral view of tip of male tail. Arrow indicates subdorsal papilla; E. Anal region, male. Arrow indicates phasmid; F. Lateral field near midbody, female. A and F = x 2 250; B = x 4 000; C = x 1 000; D = x 5 000; E = x 1 600.

Dedication

The new species is named after Dr. Farzana Rashid in recognition of her work on Cephalobidae, especially from Namibia.

Seleborca complexa (Thorne, 1925) Andràssy, 1985

Synonym: *Acrobeles crossotus* Steiner, 1929

(Figs 3E and F, and 4A - F)

Morphometric data in Table 2

This near-cosmopolitan species was first recorded from southern Africa as *Acrobeles crossotus* by Heyns (1969), who reported it to be widespread in the Transvaal, Orange Free State and Cape Province. More recently it was also recorded from Namibia by Rashid *et al.* (1990b) and Botswana (De Bruin & Heyns 1993).

Numerous specimens of *S. complexa* were found together with *Acrobeles farzanae* spec. nov. in the localities mentioned here. These specimens agree with the descriptions by the abovementioned authors, as well as with the description by Thomas (1965) and the SEM micrographs of Sauer *et al.* (1979).

Remarks

It was found during the course of this study that the position of the excretory pore, when expressed as a percentage of pharynx length, or as absolute measurement from the front end of the body, can be much influenced by shrinking or distortion of either or both the specimen or the pharynx. A more reliable indication of its position, for comparison and diagnostic purposes, is to count the number of annules from the anterior body end. This is remarkably constant, even when the total number of body annules vary appreciably.

The width of annules on the dorsal and ventral sides may differ significantly, depending on the degree of compression or stretch due to curvation of the body. The figures cited in the present paper are the mean of measurements made both dorsally and ventrally. Finally, all counts of numbers of annules were made on the ventral side. It is not correct to assume that dorsal and ventral counts are in agreement, and indications are that the difference may be greater in some species than in others.

Acknowledgements

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