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SOME CEPHALOBIDS FROM TURKEY (NEMATODA: RHABDITIDA)

by
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Summary. Three cephalobid species, found in soil samples from Turkey and not previously reported from that country, were studied by LM and SEM, which provided some additional information on their morphology. For *Acrobeloides tricornis*, ranges of measurements and ratios are extended. *Eucephalobus oxyuroides* specimens were found to possess six separate lips in agreement with the diagnosis of the genus. Specimens of some populations of *E. oxyuroides* and other species of the genus have duplex lips and labial probolae. This variability is an obstacle for identification and calls for a revision of the genus. The cephalic organisation of *Ypsylonellus devimucronatus* is described and is found to be similar to species presently placed in other genera, which calls for a revision of the genera *Cervidellus*, *Stegelletina* and *Ypsylonellus*.

To obtain material for studies of inter – and intraspecific variability within the family Cephalobidae, samples have been taken from various soil biotopes in different parts of the world.

The following species have not previously been reported from Turkey: *Acrobeloides tricornis* (Thorne, 1925) Thorne, 1937, *Eucephalobus oxyuroides* (de Man, 1876) Steiner, 1936 and *Ypsylonellus devimucronatus* (Sumenkova, 1964) Andrássy, 1984.

Descriptions of the species from observations by light and scanning electron microscopy were made and their identity and relationships are discussed below.

Materials and methods

Samples from Turkey were taken by Björn Sohlenius on the 15 June 1991 from Pamukule in the SW part of the country. The vegetation comprised various herbs and the soil was sandy with some organic material (roots).

Nematodes were extracted by a wet funnel method (Sohlenius, 1979), killed by heat, fixed in cold TAF and then transferred to anhydrous glycerine by a slow evaporation method (Hooper, 1970). For light microscopy (LM), nematodes were mounted on microscope slides as described by Boström and Gydemo (1983). Nematodes to be studied by scanning electron microscopy (SEM) were processed as described in Boström (1988). Identification of nematodes to species level was made using LM. Measurements and ratios are given as: mean ± S.E. (range).

ACROBELOIDES TRICORNIS (Thorne, 1925) Thorne, 1937 (Fig. 1A-B)

Measurements: 5 females; L = 360±4 (343-368) µm; width = 24±0.2 (24-25) µm; a = 15±0.2 (14-15); pharynx = 101±1 (100-105) µm; b = 3.5±0.04 (3.4-3.6); tail = 18±0.4 (16-18) µm; c = 20±0.7 (19-23); c' = 1.2±0.01 (1.2-1.25); V = 67±0.4 (66-68)%; V-A/T = 5.7±0.1 (5.5-6.2).

Description

Female body slightly arcuate ventrad when heat relaxed. Cuticle annulated, annules 1.75-1.9 µm wide. Lateral field with five incisures, posteriorly three and one extending from phasmid to tail extremity. Three pairs of lips with extensions along the primary cephalic axils. An anterior circlet of six labial papillae and a posterior circlet of four cephalic papillae and two oval amphids. Three conoid-setose labial probolae, joined basally by tangential ridges. Cheilorhabdions distinct, rounded; other stomatal elements obscure. Cheilostome wide, rest of stoma narrow; total stoma length 8-11 µm. Pharynx cephaloboid, metacorpus fusiform, isthmus narrow; c/i-ratio 2.85-3.15. Bulb oval with valves; 17-18 µm long, 13-14 µm wide. Cardia not prominent, enveloped by intestinal cells. Nerve ring surrounds isthmus. Excretory pore, just anterior to hemizonid, at 79-85 µm from anterior end. Deirid varying from level of posterior part of isthmus to anterior part of bulb, 88-94 µm from anterior end. Reproductive system cephaloboid, monodelphic, prodelphic; reflexed at oviduct, ovary usual-

ly with double flexure posterior to vulva (ovary straight or with four flexures also seen). Neither spermatheca, nor post-uterine branch (PUB) observed. Vulval lips protruding. Rectum 13-14 µm or about one anal body width (ABW) long. Anus a transverse slit with posterior lip protruding. Tail conoid with rounded terminus. Phasmids at 37-42% of tail length.

Male not found.

Discussion

As discussed earlier by Boström (1988), there are several species of *Acrobeloides* with setose labial probolae and five incisures in the lateral field. Most of the measurements and ratios of the specimens described here, fall within the ranges established for some of these species, i.e. *A. setosus* Brzeski, 1962, *A. syrtisus* Yeates, 1967 and *A. tricornis*. Specimens of this population are smaller than those originally described as *A. tricornis* by Thorne (1925) and later found on Spitzbergen by Loof (1971) and Boström (1988). Specimens of a population of *A. tricornis*, recorded by Nesterov (1979), were 310-410 µm long, but they had only two incisures in the lateral field, so that their identity is uncertain. The short tail, giving a c'-ratio of 1.2-1.25, points to a closer affinity to *A. tricornis* than to any of the other species. The distinction between all-female populations of these species is, however, far from unequivocal and they may be conspecific as pointed out by Boström (1988).

***EUCEPHALOBUS OXYUROIDES* (De Man, 1876) Steiner, 1936** (Fig. 1C-F)

Measurements: 1 female; L = 609 µm; width = 27 µm; a = 23; pharynx = 154 µm; b = 4.0; tail = 70 µm; c = 8.7; c' = 4.4; V = 63%; V-A/T = 2.2.

1 male; L = 525 µm; width = 19 µm; a = 28; pharynx = 133 µm; b = 3.9; tail = 32 µm; c = 16.4; c' = 1.9; T = 61%; spicules = 17 µm; gubernaculum = 10 µm.

Description

Adult body slightly arcuate ventrad when relaxed by heat. Cuticle annulated, annules about 2 µm wide at mid-body. Lateral field with three incisures, extending to phasmid in female, two extending to tail terminus in male. Six lips with seta-like projections; lateral lips with a basal amphid and a labial papilla at half of its length; subventral and subdorsal lips with basal cephalic papilla and a labial papilla. Cheilorhabdions conspicuous, bar-shaped, extending to the stoma opening; other stomatal elements less discernible. Cheilostome wide; second stoma section intermediate in width between cheilostome and third section. Stoma length 11-12 µm. Pharynx cephaloboid, corpus fusiform, isthmus narrow; c/i-ratio 3.5 in female, 3.1 in male. Bulb ovoid, 19x15 µm in female, 18x12 µm in male. Cardia not prominent, enveloped by intestinal cells. Nerve ring at 102 µm and 90 µm from anterior end and excretory pore at 104 µm and 94 µm from anterior end in female and male, respectively. Deirid at level of mid-isthmus, 121 µm from anterior end, in female; not observed in male.

Female reproductive system cephaloboid, monodelphic, prodelphic; reflexed at oviduct, with two flexures posterior to vulva. Vulval lips slightly protruding. Spermatheca 34x15 µm. PUB in two sections, together 32 µm or about 1.2 body widths (BW) long. Rectum 19 µm or about 1.2 ABW long. Tail ventrally arcuate, conoid-elongate, about 40 annules on the ventral side, pointed terminus with a short (1 µm long) mucro. Phasmids at 28% of tail length.

Male reproductive system monorchic, testis reflexed anteriorly. Spicules cephaloboid, arcuate ventrad; gubernaculum wedge-shaped. Papillae: two pairs preanal subventral, one pair adanal subventral; one pair caudal lateral, one pair caudal subventral, one pair caudal subdorsal. Tail arcuate ventrad, conoid with a short (about 1.5 µm long) mucro. Phasmids at 58% of tail length.

Discussion

The specimens agree with the original description of *E. oxyuroides* and correspond with descriptions by Andrássy (1967, 1984) and Rashid *et al.* (1985). However, they differ somewhat from those described by Boström (1985), which had lips in pairs. This was also shown by Anderson and Hooper (1971) and Boström (1985) for *E. striatus* (Bastian, 1865) Thorne, 1937, and for *E. mucronatus* (Kozlowska *et* Roguska-Wasilewska, 1963) Andrássy, 1967, *E. arcticus* Loof, 1971 and *E. hooperi* Marinari-Palmisano, 1967 by Boström (1985, 1988, 1990). However, some specimens of the last mentioned species showed a lip region more similar to that found in the specimens described here (Boström, 1990).

The genus *Eucephalobus* was erected by Steiner (1936a) with *E. oxyuroides* as type species and diagnosed as having only three lips. It was subsequently rediagnosed by Steiner (1936b) as having six separate lips. Anderson and Hooper (1971) showed a vast intraspecific variability in cephalic structures and the presence of labial probolae in *E. striatus*. They pointed to the difficulties in using presence or absence of probolae and number of lips to clarify identity and relationships of species. Boström (1985, 1988, 1990) also showed by SEM that several species of *Eucephalobus* possess duplex lips and probolae. The specimens

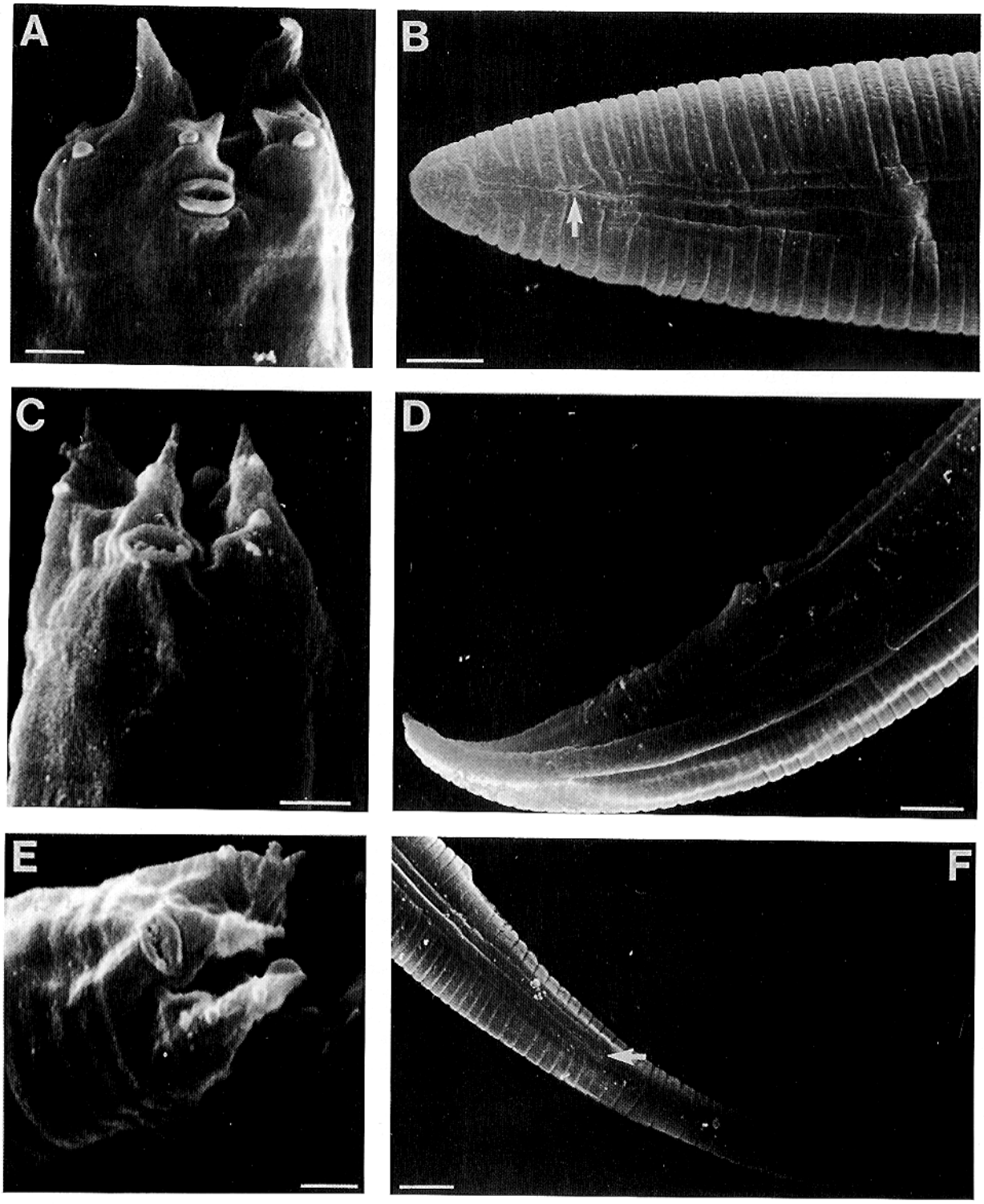

Fig. 1 - SEM-micrographs of *Acrobeloides tricornis*: A, lateral view of head; B, lateral view of female tail. SEM-micrographs of *Eucephalobus oxyuroides*: C, lateral view of head; D, lateral view of male tail; E, slightly tilted lateral view of head; F, lateral view of female tail (terminus less discernible). Arrow points to phasmid. Scale bars: on A, C, E = 1 µm; on B, D, F = 4 µm.

of *E. striatus* and *E. oxyuroides* described by Rashid *et al.* (1985) and those described here belong to six-lipped forms without probolae. This variability, an obstacle for identification, calls for a revision of the genus *Eucephalobus* such as that performed on *Pseudacrobeles* Steiner, 1938 by De Ley *et al.* (1993a, b).

YPSYLONELLUS DEVIMUCRONATUS (Sumenkova, 1964) Andrássy, 1984 (Fig. 2)

Measurements: 9 females; L = 430±6 (414-463) µm; width = 20±0.2 (19-21) µm; a = 22±0.4 (20-24); pharynx = 104±1 (100-109) µm; b = 4.1±0.1 (4.0-4.5); tail = 28±1 (25-32) µm; c = 15.6±0.2 (14.5-16.6); c' = 2.2±0.1 (1.9-2.5); V = 65±0.2 (64-66)%; V-A/T = 4.4±0.1 (3.9-4.7).

8 males; L = 403±9 (360-431) µm; width = 17±0.3 (16-18) µm; a = 23±0.6 (21-26); pharynx = 96±2 (85-102) µm; b = 4.2±0.1 (3.9-4.5); tail = 25±0.6 (22-27) µm; c = 16.1±0.2 (15.3-16.7) µm; c' = 1.7±0.05 (1.5-1.8); T = 61±1 (58-63) %; spicules = 18±0.4 (16-19) µm; gubernaculum = 9±0.3 (8-10) µm.

Description

Females body posture, when heat relaxed, more or less straight, somewhat arcuate ventrad posterior to vulva. Cuticle annulated, annules 1.8-2.1 µm wide. A longitudinal striation of annuli seen in SEM. Lateral field with three incisures, all three extending posterior to phasmid and at least two to tail terminus. Six leaf-like lips; subventral and subdorsal lips with one labial and one cephalic papilla, lateral lips with one labial papilla and a small round amphid. Each lip divided longitudinally by an incisure extending to the labial papilla, the larger part rounded with a pointed extension along the primary cephalic axils, the smaller part with a pointed extension along the secondary cephalic axils; a single triangular-pointed guarding piece in the broadly based primary cephalic axils. Three slender labial probolae, bifurcate about one third of their length, prongs very fine. Radial ridges connect the labial probolae basally. Tangential ridges extend from the stoma opening to the bases of the cephalic probolae. Cheilorhabdions refractive, small and round; other stomatal elements faintly discernible. Cheilostome wide, rest of stoma narrow; total stoma length 7-8 µm. Pharynx cephaloboid, metacorpus fusiform, isthmus narrow; c/i-ratio 2.0-2.1. Bulb oval with valves; 15-16 µm long, 11-12 µm wide. Cardia prominent, enveloped by intestinal cells. Nerve ring surrounds isthmus, 72-86 µm from anterior end. Excretory pore at 79-91 µm from anterior end. Deirid at level of posterior part of isthmus to anterior part of bulb, 89-99 µm from anterior end. Reproductive system cephaloboid, monodelphic, prodelphic; reflexed at oviduct, ovary straight or with double flexure posterior to vulva. Spermatheca 20-36 µm long, 7-13 µm wide. PUB 16-20 µm long, corresponding to about one BW. Vulval lips protruding. Rectum 12-15 µm or about one ABW long. Anus a transverse slit with posterior lip protruding. Tail conoid with rounded terminus bearing a multispiked mucro. Phasmids at 36-43% of tail length.

Males somewhat smaller than females, but similar to them in most characters except being more arcuate ventrad posteriorly. Cuticle annules 1.7-2.1 µm wide. Stoma 6-7 µm long. Corpus/isthmus-ratio 2.0-2.3. Nerve ring 74-78 µm, excretory pore 77-83 µm and deirid 91-98 µm from anterior body extremity. Reproductive system monorchic; testis reflexed anteriorly. Spicules cephaloboid, ventrally arcuate, narrow proximally; gubernaculum wedge-shaped. Lateral field with three incisures, two extending from the anterior-most lateral papilla to tail tip. Papillae: two pairs of preanal and one pair of adanal subventral papillae; a single median papilla on the anterior cloacal lip; two pairs of caudal lateral, one pair of caudal subventral and one pair of caudal subdorsal papillae; a single median caudal papilla close to tail terminus. Tail ventrally arcuate, conoid with rounded terminus and a multispiked mucro. Cloaca with protruding posterior lip. Phasmids at 45-54% of tail length.

Discussion

The specimens of this population agree in many respects with the description of *Cervidellus devimucronatus* Sumenkova, 1964, which was transferred to *Ypsylonellus* by Andrássy (1984). Apart from some morphometric discrepancies, one of the main differences is the number of incisures in the lateral field. Sumenkova's (1964: Fig. 2a-b) description shows four incisures (three on the female tail), but there were found to be only three throughout most of the body in this population.

Another (all-female) population of *Y. devimucronatus* recently described by Boström (1991) from the Greek island of Samos, also agrees well with the population described here. The description of the specimens from Samos was partially based on a single specimen studied by SEM. Subsequent studies have, however, shown that this specimen belongs to a species of *Cervidellus* and was erroneously referred to *Y. devimucronatus*. Thus, the detail organisation of the cephalic region of the Samos population was unfortunately misinterpreted (Boström, 1991: Fig. 3) and should be as described here. Hence the proposal to transfer the species back to *Cervidellus* Thorne, 1937 was also wrong.

A cephalic organisation similar to that found in *Y. devimucronatus* has also been recorded for *Y. similis* (Thorne, 1925) Andrássy, 1984 with its junior synonyms *Stegelletina*

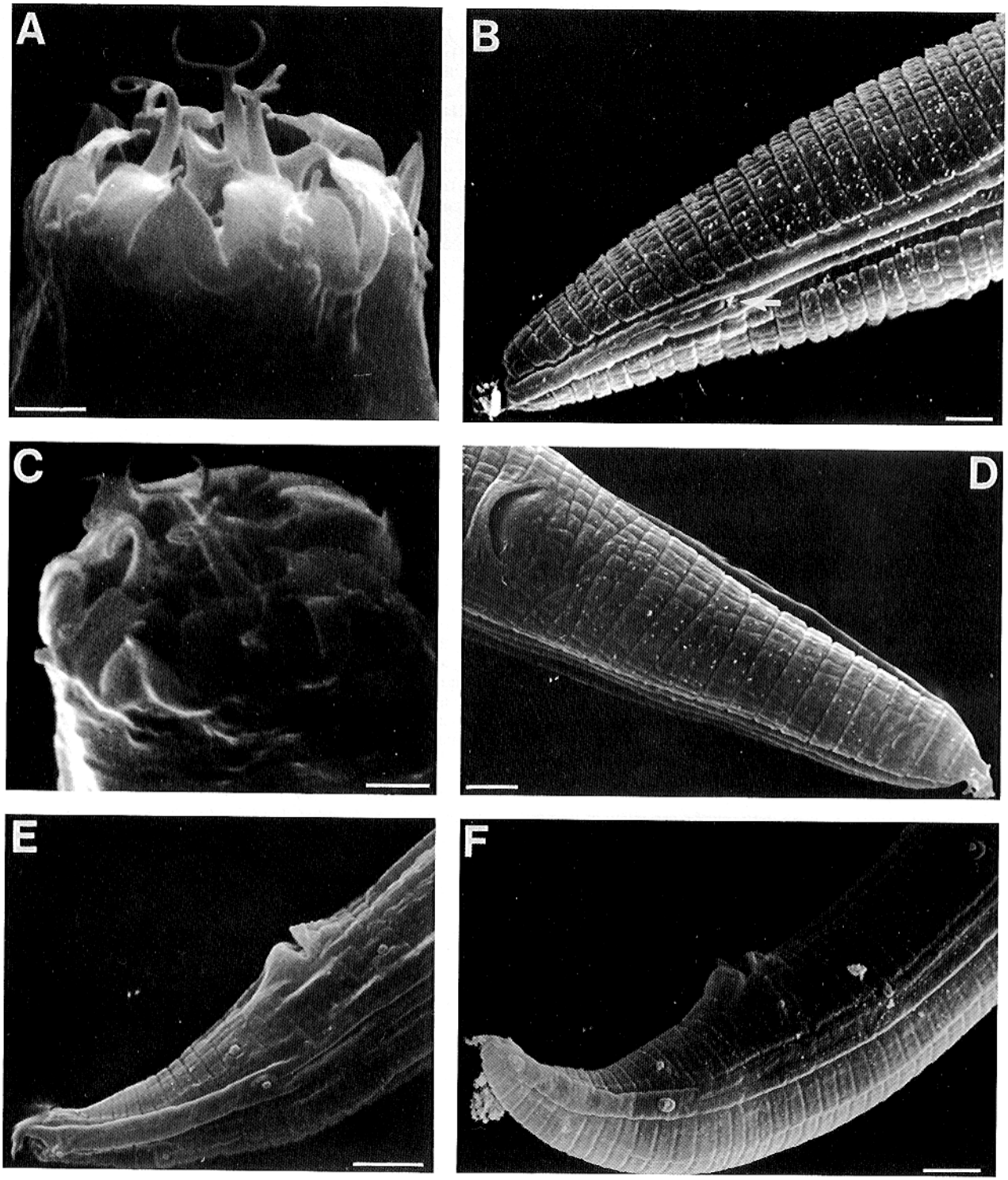

Fig. 2 - SEM-micrographs of *Ypsylonellus devimucronatus*: A, ventral view of head; B, lateral view of female tail; C, slightly tilted ventral view of head; D, ventral view of female tail; E, lateral view of male tail; F, sublateral view of male tail. Arrow points to phasmid. Scale bars: on A, C = 1 µm; on B, D = 2 µm; on E-F = 4 µm.

lineata (Thrne, 1925) Andrássy, 1984 and *S. mucronata* (Loof, 1971) Andrássy, 1984 by De Ley *et al.* (1994). In the light of these findings and the recent descriptions of several new species of *Stegelletina* with a diverse range of cephalic organisations (De Clerk and De Ley, 1990; De Ley and Vandebroek, 1992; De Ley *et al.*, 1990), a revision of the genera *Cervidellus*, *Stegelletina* and *Ypsylonellus* is much needed.

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