

# DESCRIPTION OF *NAMIBINEMA SCAPHOVULVA* N. GEN., N. SP. AND *ZELDIA PUNCTATA* (THORNE, 1925) FROM NAMIBIA (NEMATODA: CEPHALOBIDAE)

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## ABSTRACT

Key words: Cephalobidae, morphology, *Namibinema* n. gen., Namibia, SEM, taxonomy, *Zeldia*

*Namibinema scaphovulva* n. gen., n. sp., a new cephalobid nematode is described and figured from Namibia. The new genus is distinguished by having short triangular, flap-like, strongly cuticularized labial probolae, deeply bifurcate and the margins not bordered by membranous projections. Cephalic probolae also strongly cuticularized, bifurcate, bearing small, pointed, membranous projections, cephalic axils without guard processes. Vulva a sunken, large oval-shaped opening surrounded by a prominent cuticular flap, appearing boat-shaped in ventral view.

*Zeldia punctata* (Thorne, 1925) Thorne, 1937 which is reported from Namibia for the first time, is also described and figured.

## Uittreksel

### BESKRYWING VAN *NAMIBINEMA SCAPHOVULVA* N. GEN., N. SP. EN *ZELDIA PUNCTATA* (THORNE, 1925) UIT NAMIBIË (NEMATODA: CEPHALOBIDAE)

*Namibinema scaphovulva* n. gen., n. sp., word uit Namibië beskryf en afgebeeld. Die nuwe genus word gekenmerk deur kort, driehoekige, flapagtige, sterk gesklerotiseerde labiale probolae, wat diep gevurk is en sonder membraanagtige aanhangsels. Die sefaliese probolae is ook sterk gesklerotiseer, gevurk, en dra klein hoekige membraanagtige aanhangsels. Die vulva is versonke, met 'n groot ovaalvormige opening, omring deur 'n opvallende kutikulêre flap sodat dit bootvormig vertoon.

*Zeldia punctata* (Thorne, 1925) Thorne, 1937, wat vir die eerste keer uit Namibië aangemeld word, word ook beskryf en afgebeeld.

## INTRODUCTION

This paper is one of a series of articles on Cephalobidae from Namibia, dealing with the description of a new genus *Namibinema* and *Zeldia punctata*. For information on collection and preparation of material, see the first paper in this series (Rashid et al., 1990).

### *NAMIBINEMA* NEW GENUS

Cephalobidae. Labial probolae strongly cuticularized, short, triangular, flap-like, deeply bifurcate and the margins not bordered by membranous projections. Cephalic probolae also strongly cuticularized, bifurcate, bearing small, pointed, membranous projections. Female gonad single, only anterior branch is well developed, uterus anteriorly directed, spermatheca at anterior flexure, ovary posteriorly directed, straight. Postvulval uterine sac variable in length. Male monorchic, testis reflexed at anterior end. Spicules cephaloboid. Three pairs of preanal ventrolateral papillae and five pairs of caudal papillae present. Tail basically similar in both sexes, elongate, conoid, terminus smooth, pointed, but not set off.

### Differential diagnosis

The new genus *Namibinema* can be distinguished from all Cephalobidae genera by the shape of labial probolae and by the large oval-shaped vulval opening which is sunken and surrounded by a prominent cuticular flap, appearing boat-shaped in ventral view. The new genus shows some affinities with the genera *Nothacrobeles* Allen & Noffsinger, 1972 and *Zeldia* Thorne, 1937. It further differs from *Nothacrobeles* in having labial probolae without membranous projections, cephalic axils without guard processes, and the lateral field with three lines. The new genus differs from *Zeldia* by the shape of the labial probolae and by the cephalic axils not being dentate.

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Received 17 November 1989; accepted for publication 20 July 1990

## Type species

*Namibinema scaphovulva* n. sp.

## DESCRIPTIONS

*Namibinema scaphovulva* n. gen., n. sp. (Fig. 1 and 2)

### Measurements

Holotype female: L = 0,52 mm; a = 18,9; pharynx = 125 µm; b = 4,0; tail = 51 µm; c = 10,2; c' = 3,0; V = 63,8 %

Paratype females (n = 5): L = 0,50 mm (0,42-0,62); a = 17,9 (15,5-19,6); pharynx = 110,7 µm (90,5-124); b = 4,5 (4,3-5,0); tail = 46,7 µm (40-56); c = 10,8 (10,3-11,2); c' = 2,4 (2,1-2,6); V = 62,3 % (58-64).

Paratype males (n = 7): L = 0,46 mm (0,41-0,58); a = 20,7 (18,2-23,4); pharynx = 105 µm (84-122); b = 4,4 (4,1-5,0); tail = 42,9 µm (37,5-53,5); c = 12,3 (10,4-19,9); c' = 2,1 (1,9-2,3); T = 57,7 % (50,8-60).

**Female:** Body slightly ventrally curved when relaxed, tapering at both extremities. Cuticle 2,0 µm thick, distinctly annulated; annuli 2,0-2,5 µm wide. Subcuticle with punctations, three rows per annulus, over entire body. Longitudinal striae on cuticle observed only with SEM. Lateral field marked by three incisures, outer ones crenate, originating one to two annuli from lip region as a single line, soon dividing into two lines, a third line appearing opposite corpus-isthmus junction, all three extending up to tail terminus (Fig. 1B, G, H and Fig. 2G). Head slightly wider than adjoining body. Three labial probolae, short, flap-like, triangular shaped, deeply bifurcate, margins not bordered by membranous projections. Six cephalic probolae, bifurcate, bearing small pointed membranous projections. Labial and cephalic probolae strongly cuticularized. Cephalic axils without guard processes (Fig. 1A, B and Fig. 2A).

Subdorsal and subventral probolae bearing two papillae each (one labial and one cephalic), the lateral probolae bearing a labial papilla and a rounded amphid aperture (Fig. 1B and Fig. 2B). Stoma δ,7

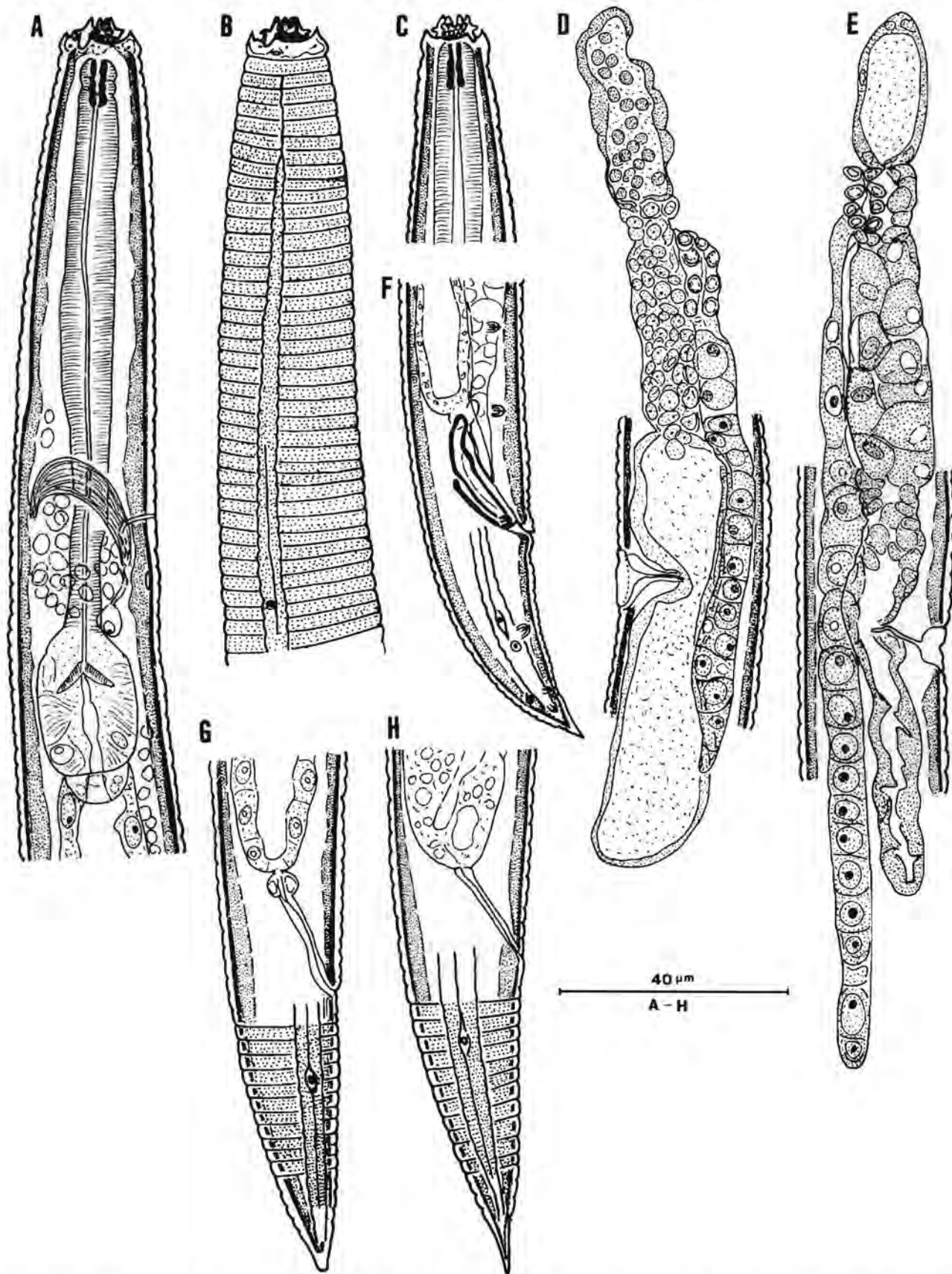


FIG. 1 *Namibinema scaphovulva* n. gen., n. sp. A: Female anterior region; B: Anterior region (surface view); C: Male head region; D and E: Female reproductive system; F: Male posterior region; G and H: Female tail region, showing variation.

μm (8,0-9,5) long, sclerotized. Cheilorhabdions small, rounded in optical section. Other rhabdions distinctly demarcated. Dorsal metarhabdial tooth not distinct. Pharynx cylindrical, separated by transverse marking. Basal bulb elongate, with well-

developed valve. Nerve ring 69,8 μm (69-81,5) from oral opening, position varying from opposite corpus-isthmus junction to opposite base of isthmus. Excretory pore 59 μm (55-85) from oral opening, opposite or posterior to nerve ring. Hemizonid distinct, two

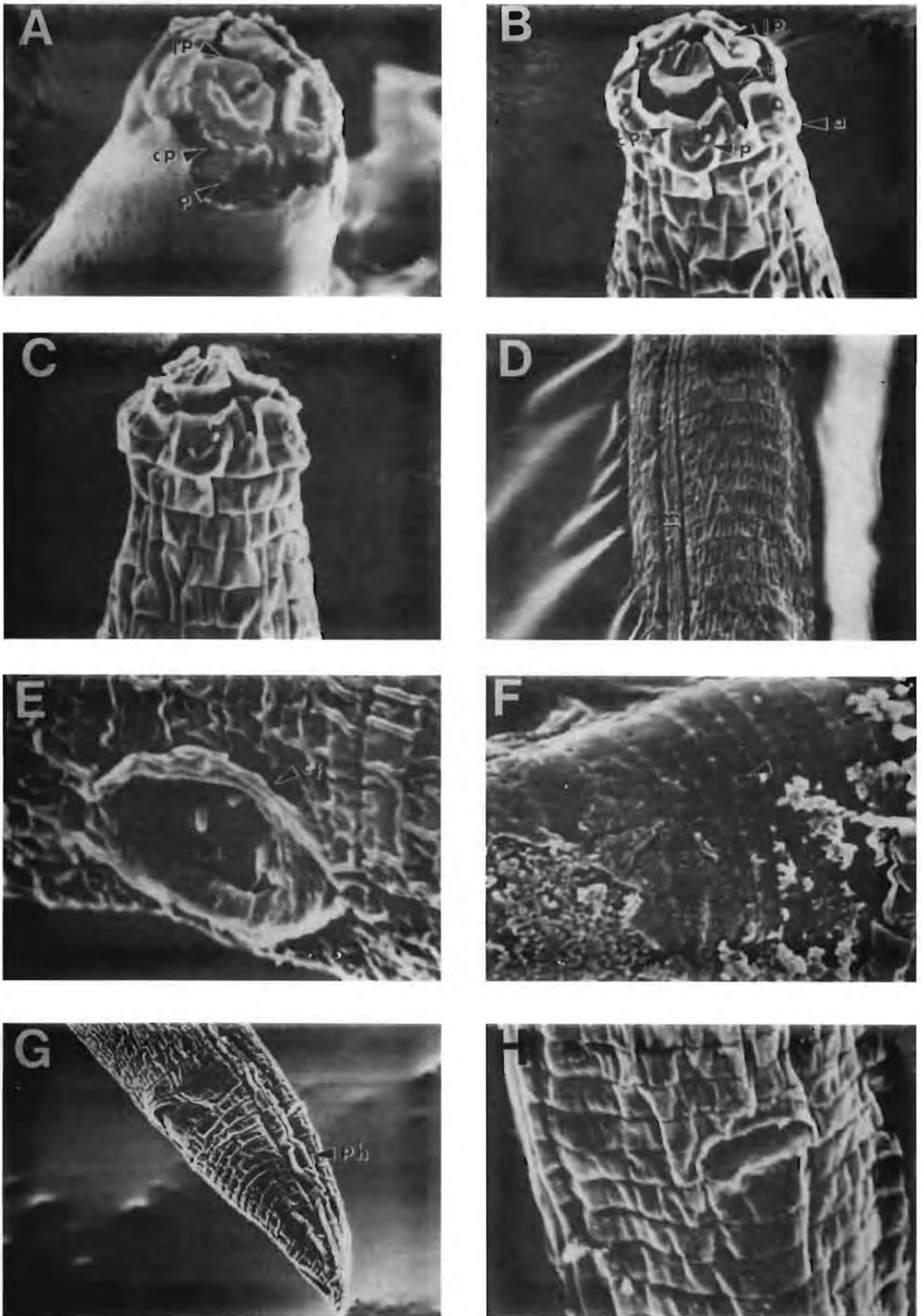


FIG. 2. *Namibinema scaphovulva* n. gen., n. sp. SEM. A: Male head (face view) (898 $\times$ ); B: Juvenile head (subdorsal) (10 000 $\times$ ); C: Juvenile head (lateral) (10 000 $\times$ ); D: Lateral field (4 200 $\times$ ); E: Vulvar region (9 100 $\times$ ); F: Inner cuticle showing punctation and pores (arrow head) (14 700 $\times$ ); G: Female tail (4 300 $\times$ ); H: Juvenile anus (3 100 $\times$ ). (lp = labial probolae; cp = cephalic probolae; p = papillae; a = amphid; t = tooth-like projections; cf = cuticular flap; ph = phasmid)



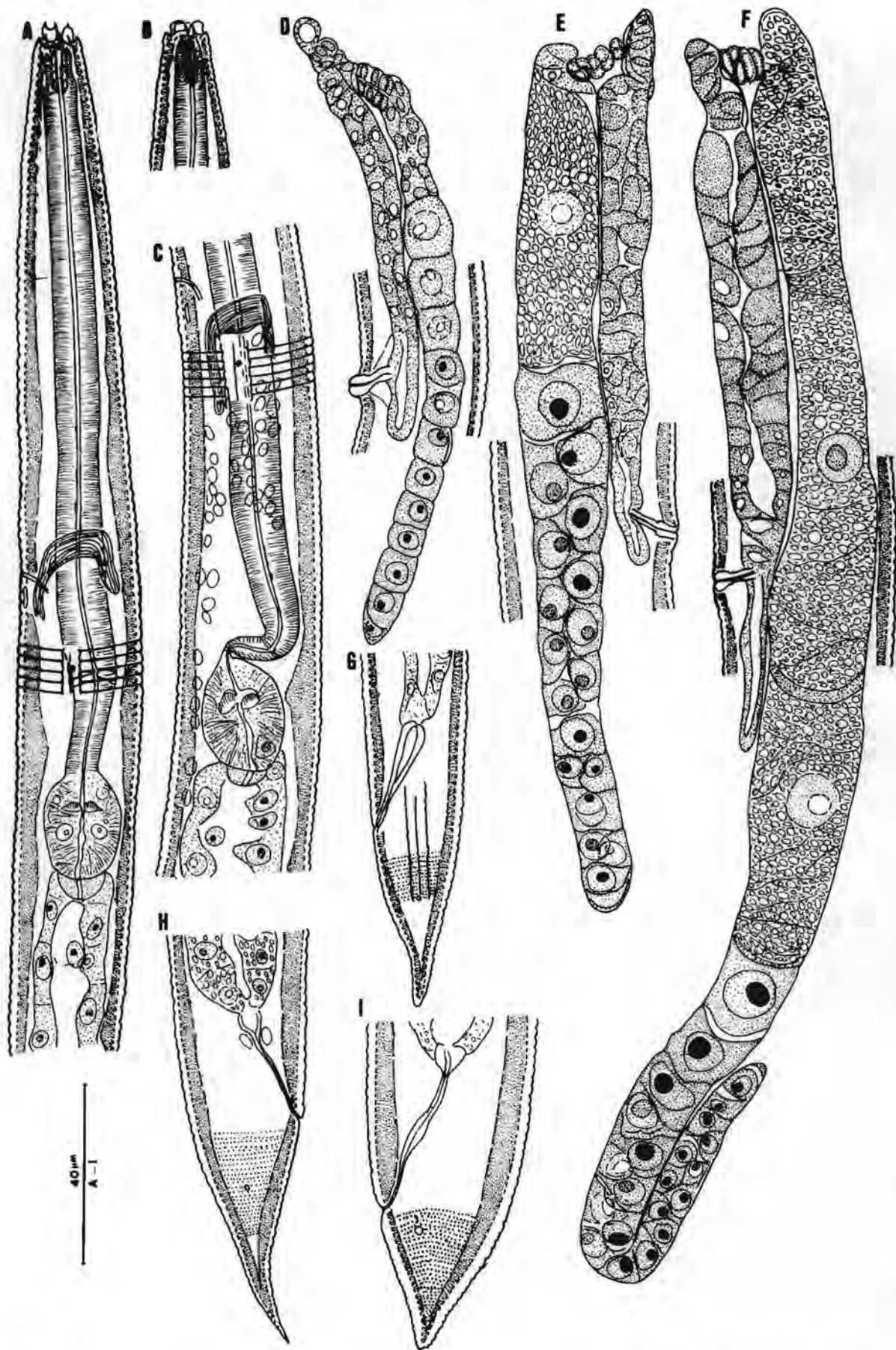


FIG. 3 *Zeldia punctata*. A: Female anterior region; B: Female head showing variation in labial and cephalic probolae; C: Pharyngeal region showing more anteriorly situated nerve ring excretory pore and deirid; D, E and F: Female reproductive system, showing variation; G, H and I: Female tail region, showing variation.

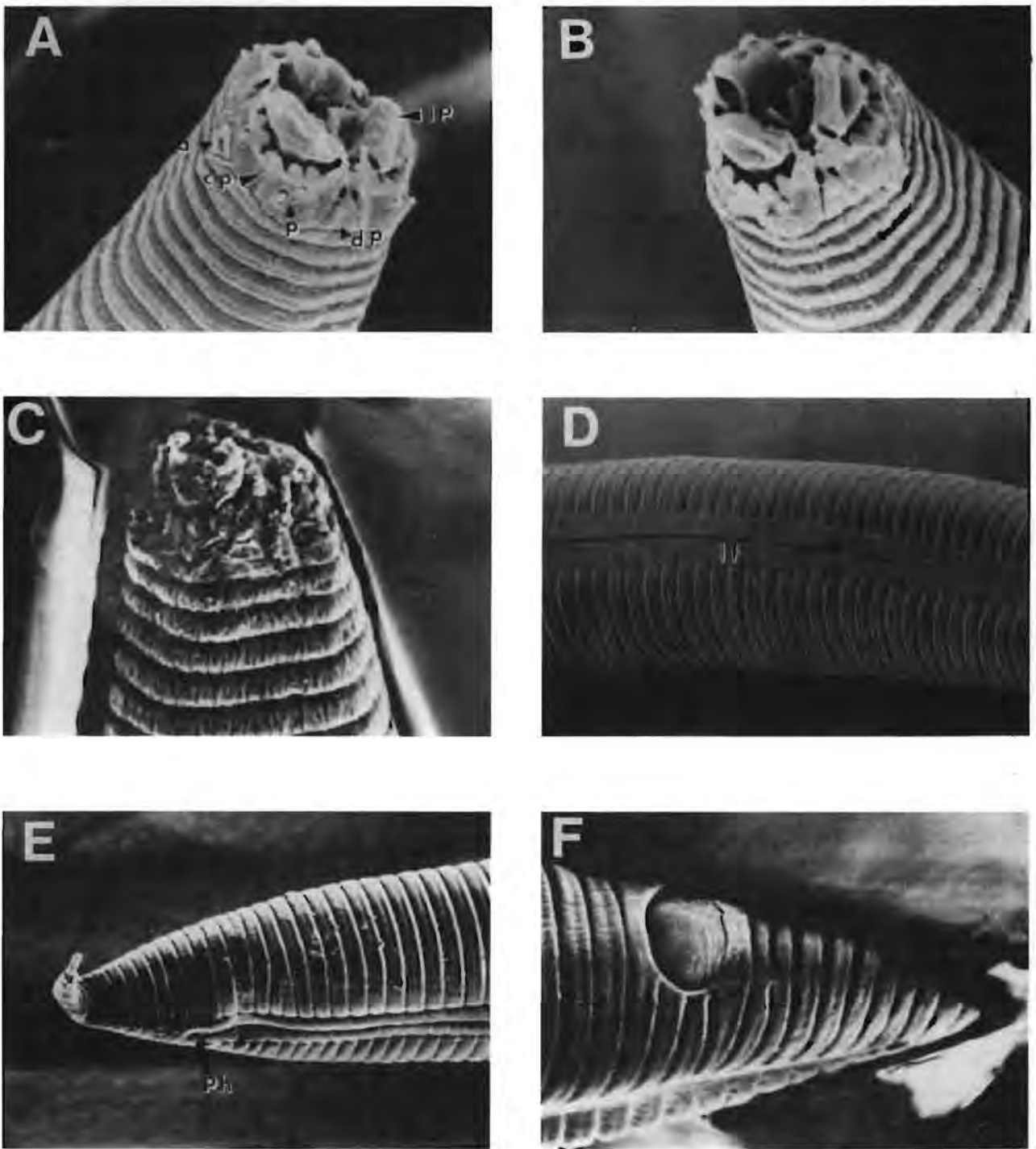


FIG. 4 *Zeldia punctata*. SEM. A, B and C: Female heads (subdorsal and lateral), showing variation in labial probolae (10 000× and 9 300×); D: Lateral field (3 340×); E: Female tail (4 200×); F: Female anus (9 500×). (lp = labial probolae; cp = cephalic probolae; p = papillae; a = amphid; dp = dentate point; lf = lateral field; ph = phasmid)

to four annuli posterior to excretory pore. Deirid observed at level of isthmus and basal bulb between lateral lines. Cardia hemispherical, 5,2  $\mu\text{m}$  (5,0-5,5) long. Intestinal cells distinct with small nuclei. Several cells of unknown nature observed over entire body length. Female reproductive system cephaloboid. Vagina about half body diameter long, straight or oblique, vulva sunken, a large oval-shaped opening, surrounded by a cuticular flap, appearing boat-shaped in ventral view (Fig. 2E). Uterus showing variation in number and arrangement of cells with several small cells or with five pairs of large cells (Fig. 1D and E). Oviduct with four to five pairs of cells. Ovary varying from short to long,

straight, without double flexure behind vulva. Spermatheca large, distinct, empty or filled with small rounded sperm cells. Post-vulval uterine sac variable in length, 55,3  $\mu\text{m}$  (48,5-62) long (Fig. 1D and E).

Tail elongate-conoid, straight on ventral side, terminus smooth, pointed or rounded (Fig. 1G, H and Fig. 2G). Phasmid at 29 % (26-32) of tail length. Rectum 18,5  $\mu\text{m}$  (14-23) long. Anus an arcuate slit (Fig. 2G).

**Juveniles:** Fourth stage juveniles similar to adults in general appearance except for some minor differences. Cephalic probolae not bordered by small membranous fringes; internal to cephalic probolae

there are two pointed tooth-like structures (Fig. 2B and C). Anus a transverse slit (Fig. 2H).

**Male:** Similar to female in general appearance. Monorchic, testis reflexed at anterior end. Spicules arcuate, 25,2  $\mu\text{m}$  (20,5–34) long, cephaloboid. Gubernaculum appearing rod-like, 14  $\mu\text{m}$  (11–19) long. Three pairs of preanal ventrolateral papillae, first pair just anterior to cloacal opening, second slightly anterior to proximal end of spicules and third pair about one anal body diameter anterior to second. Five pairs of caudal papillae: three pairs near terminus, one pair lateral, one pair subdorsal and one pair subventral; two pairs near phasmid, one lateral and one subventral (Fig. 1F). Lateral field with three incisures, same as in female, originating anteriorly with a single line and ending with three lines at the terminus.

Tail short, conoid, slightly ventrally curved, terminus smooth, pointed, not set off.

**Type locality and habitat:** Namib Desert: East of Homeb, next to the Kuiseb River under *Acacia al-bida* Del. collected July 1986 by J. Heyns and A. Coomans. A single male from Karibib, under a bougainvillea in the garden of Hotel Laszig, collected July 1983 by J. Heyns.

**Type specimens:** Holotype female and three paratype females on slide 4586 and five paratype males on slides 4578, 4585, 4601 and 4602, deposited in the nematode collection of the Rand Afrikaans University, South Africa. One paratype female and one paratype male deposited in the nematode collection of the Instituut voor Dierkunde, Rijksuniversiteit, Gent, Belgium.

### *Zeldia punctata* (Thorne, 1925) Thorne, 1937 (Fig. 3 and 4)

#### Measurements

Females ( $n = 40$ ):  $L = 0,70$  mm (0,50–0,92);  $a = 23,1$  (19,2–27,5); pharynx = 130  $\mu\text{m}$  (124–235,5);  $b = 3,6$  (2,8–4,9); tail = 40  $\mu\text{m}$  (32–51);  $c = 17,9$  (13,7–30,5);  $c' = 2,0$  (1,1–2,5);  $V = 64,4\%$  (58–67).

**Female:** Body slightly to strongly ventrally curved, in some females "c" shaped; tapering anteriorly. Cuticle 1,5 to 2,0  $\mu\text{m}$  thick, distinctly annulated, annuli 2,5 to 3,0  $\mu\text{m}$  wide. Subcuticle punctate. Lateral field marked by three incisures, outer two crenate, extending up to phasmid (Fig. 3G and Fig. 4E). Head continuous or slightly wider than adjoining body. Labial probolae with margins rounded to setose, bifurcate one third of their length or not bifurcate. Cephalic probolae flap-like, margins simple or with small membranous projections. Cephalic axils 1,5 to 2,0  $\mu\text{m}$  wide, dentate (Fig. 3A, B and Fig. 4A, B, C). Subdorsal and subventral cephalic probolae bearing two papillae (one labial and one cephalic) and lateral probolae bearing one labial papilla and an oval-shaped amphid aperture (Fig. 4A, B and C). Cheilorhabdions small, rounded in optical longitudinal section, without accessory teeth. Stoma 10,8  $\mu\text{m}$  (10–13,5) long, sclerotized, rhabdions distinctly demarcated, dorsal metarhabdion with tooth. Pharynx cylindrical, separated from isthmus by distinct transverse marking; isthmus short, Basal bulb ovate to spheroid, with well-developed valves. Nerve ring 115,6  $\mu\text{m}$  (87–143,5) from oral opening, encircling pharynx from middle of metacarpus to posterior of corpus. Excretory pore 118,2  $\mu\text{m}$  (87,5–146,5) from oral opening, variable in position, anterior or posterior to nerve ring.

Hemizonid distinct, just posterior to excretory pore. Deirid observed at level of metacarpus, from middle to base (Fig. 3A and C). Cardia 4,9  $\mu\text{m}$  (3,5–7,0) long, hemispheroid to conoid. Intestinal cells distinct with small nuclei. Several cells of unknown nature observed in pseudocoel within pharyngeal region.

Female reproductive system cephaloboid. Vagina one third of vulval body diameter long, straight or oblique, anteriorly directed. Vulval lips protruding in some females. Uterus variable in length, 14 to 20 pairs of uterine cells observed, not always distinct. Oviduct with four to five pairs of cells. Ovary short or long, usually straight or with one flexure posterior to vulva. Oogonia arranged in single or multiple rows. Spermatheca distinct, small, empty, rounded to elongate in shape. Postvulval uterine sac variable in length, 20,8  $\mu\text{m}$  (10–37) long (Fig. 3D, E and F).

Tail conoid, variable in length, terminus smooth, pointed or rounded, occasionally annulated truncate (Fig. 3G, H, I and Fig. 4E). Phasmid 35% (17,5–43,7) of tail length. Rectum 21,4  $\mu\text{m}$  (17–29) long. Anus an arcuate slit (Fig. 4E).

No males were found.

#### DISCUSSION

The specimens from Namibia correspond well with populations described by Allen & Noffsinger (1972) and Rashid *et al.* (1985). However, some differences occur in body length, in position of nerve ring and excretory pore, tail length and length of post-vulval uterine sac. These characters are more variable in our populations. A SEM study showed the structure of the head cuticle and anus to be similar to the illustrations given by Sauer (1985).

**Habitats and localities:** Namib Desert: (1) East of Homeb, next to the Kuiseb River under *Acacia al-bida* Del. tree and in moist sand about 40 km east of Gobabeb *en route* to the waterhole in the Kuiseb River, and under grass next to the Kuiseb River. (2) East of the Desert Research Station and north of the Kuiseb River, around *Welwitschia mirabilis* Hook. F. Collected July 1986 by J. Heyns and A. Coomans. (3) Sandvis Bay, next to water of estuary, collected July 1986 by J. Heyns and A. Coomans. Caprivi: (1) between Katima Mulilo and Sabinda under grass and *Strychnos decussata* (Pappe) Gilg. (Cape teak) at white gravel quarry. (2) In sandy soil under grasses, north of Sabinda, collected 27 July 1983 by J. Heyns.

#### ACKNOWLEDGEMENTS

The authors thank the Foundation for Research Development of the CSIR, South Africa for financial support, and Miss Chantelle Baker for assistance with the SEM.

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