Fundam. appl. Nematol., 1992, **15** (4), 355-366.

Criconema paradoxiger, *Ogma civellae* and *O. paracivellae* sp.n. from Papua New Guinea (Nemata : Tylenchida)[1]

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Accepted for publication 2 September 1991.

Summary — SEM studies of the unusual species *Criconema paradoxiger* (Orton Williams, 1982) Raski & Luc, 1985 revealed new aspects of the cuticular structure in juveniles. A new species *Ogma paracivellae* n. sp. is described; it differs from *O. civellae* (Steiner, 1949) Raski & Luc, 1987 by its larger number of body rings (R = 62-70 *vs* 40-55) and, in juveniles, by the presence of a higher number of scales per annulus (twelve to eighteen *vs* eight).

Résumé — Criconema paradoxiger, Ogma civellae *et* O. paracivellae *sp. n. provenant de Papouasie - Nouvelle-Guinée (Nemata : Tylenchida)* — Une étude au MEB d'une espèce inusuelle, *Criconema paradoxiger* (Orton Williams, 1982) Raski & Luc, 1985, a révélé de nouveaux détails sur la cuticule des juvéniles. Une nouvelle espèce, *Ogma paracivellae* n. sp., est décrite. Elle diffère de *O. civellae* (Steiner, 1949) Raski & Luc, 1987 par le plus grand nombre d'anneaux du corps (R = 62-70 *vs* 40-55) et, chez les juvéniles, par un nombre plus élevé d'écailles sur chaque anneau (douze à dix-huit contre huit).

Key-words : Nematodes, *Criconema*, *Ogma*.

During expedition of the Koninklijk Belgisch Instituut voor Natuurwetenschappen (Brussels) to Papua New Guinea in 1982 and 1987, samples were collected from different terrestrial habitats. A detailed description of the samples is given in Decraemer and Geraert (1991).

The samples containing material dealt with in this article are:

Sample 1156 : Awar Point, secondary rain forest, from moist heavy soil, collected on June 1, 1982.

Sample 7111 : Bogia Hills, along road from Masawara to Apringan, secondary rain forest, in rhizosphere of trees, upper 10 cm of soil, collected August 19, 1987.

Samples 7175 and 7177 : Tok Tok river, at cross with road towards Bunapas; rhizosphere of several trees, upper 10 cm from very dry soil, collected on September 3, 1987.

Nematodes were fixed in 4 % neutralized formalin and mounted on slides in anhydrous glycerin. The drawings were made with the aid of a camera lucida of a Reichert Polyvar.

For SEM, glycerin embedded nematodes were transferred to a drop of glycerin in a small embryo dish and then distilled water was added drop by drop until the nematodes were in pure distilled water. Specimens were exposed to ultrasound for 3 min to remove adhering particles and water was then pipetted off and replaced by a solution of osmium tetroxide. After 12 h immersion any debris adhering the specimens was removed by transference to distilled water and exposure to ultrasound for approximately 2 min. The nematodes were then dehydrated in a series of ethanol concentrations of 30, 50, 75, 95, and 100 % ethanol; the last concentration repeated twice at hourly intervals. The standard critical point drying procedure was used with CO_2 as a drying liquid. Finally, the nematodes were coated with gold and put on stubs for SEM examination.

Criconema paradoxiger (Orton Williams, 1982) Raski & Luc, 1985 = *Amphisbaenema paradoxiger* Orton Williams, 1982

(Figs 1-3)

MATERIAL

Sample 7111 : 1 female, 4 J4 male (moults); sample 7112 : 28 females, 1 male, 19 J4 male (moults), 3 J4, 1 J3 (moult to 4th stage); sample 7175 : 1 female, 4 J4 male (moults), 2 J4.

MEASUREMENTS

Females, male and juveniles : see Table 1.

DESCRIPTION

Females : Largely agreeing with original description. Body stout, slightly curved ventrally or straight, tapering to blunt extremities. Cuticle with 39-44 annuli (cephalic annuli not included). Outer cuticular layer (LM and SEM) visible as constructed by minute, more or less polygonal scales, well cemented on top surface of each annulus, but as coarse paving between annuli. In some SEM pictures, thin external cortical layer of the body cuticle broken and inner layer becoming visible. Longi-

(1) Leopold III Biological Station, Laing Island, Contribution No. 248.

Table 1. Morphometric data of *Criconema paradoxiger* specimens from Papua New Guinea (all measurements in µm).

	Females	Male	Fourth stage juveniles	
			juv. males moults	juv.
n	27	1	9	2
L	330-443 (379 ± 28.4)	360	275-340 (310 ± 19.4)	224-251
a	5.7-8.3 (6.6 ± 0.6)	14.4	7.6-8.4 (8 ± 0.4)	6.2-7.2
b	2.8-4.9 (3.7 ± 0.5)			
c		11.6	16-16.3 (16.3 ± 0)	10.8-12.2
c′		2.1		
Stylet (St)	67-77 (71.9 ± 2.6)			50-51
St cone	49-59 (54.3 ± 2.5)		35-38 (36.8 ± 0.9)	37
R	39-44 (41 ± 1.1)	89	47-48 (48 ± 0.4)	44
R St	7-11 (9 ± 0.9)			12
R pharynx	11-14 (12 ± 0.8)			16
R Ex	13-17 (15 ± 0.8)	35		
R V	32-40 (36 ± 1.4)			
R an		83		
L pharynx	79-146 (109 ± 18.4)			72-80
Ant. to Ex. P.	104-159 (124 ± 11.5)	118	82-108 (95 ± 8.6)	97
Ant. to gonad extr.	18-29 (25 ± 2.5)	175	128-210 (160 ± 26.1)	163-188
Ant. to vulva	302-403 (347 ± 26.4)			
Ant. to anus		329	261-308 (282 ± 19.3)	223
Max. b. diam. midbody	51-64 (59 ± 3.1)	25	26-41 (33 ± 6.2)	30-39
Max. b. diam. at vulva	31-54 (39 ± 4.6)			
Tail (+ spine)		31	27	28-29
L sclerotization head	8-10 (9 ± 0.7)	5	5-6.5 (5.9 ± 0.6)	5.5-5.7
Width lip region	3.6-7 (6.1 ± 0.7)		3.5-4.3 (3.8 ± 0.3)	3-3.5
Width ceph. ann. 1	12-16 (14.2 ± 1.1)		7.9-8.6 (8.1 ± 0.3)	7.1-7.2
Width ceph. ann. 2	14.5-25 (17.7 ± 3.0)		9-11 (9.9 ± 0.9)	8.5-8.9
Body ann. 1	18-29 (25 ± 2.5)		11.4-17 (12.9 ± 2.2)	10.7-11.4
Height St. knobs	2.9-5 (3.8 ± 0.5)			2.5-2.9
Width St. knobs	9.3 (10.1 ± 0.7)			7.1-7.2
Head width (male)		11.4	15	
Length vulva tip	23-42 (29.7 ± 4.7)			

tudinal optical sections in LM : body cuticle consisting of a thin external layer, a thicker internal layer, a median zone with a central lumen (usually with granules) at each annulus, but interrupted between the annuli. Inner cortical layer becoming very thin at mid ring in the anterior annuli or at the outer edge of the posterior border in the more posterior annuli (see broken cuticle at this level Fig. 2 D). In some specimens, cortical layers appearing interrupted and concretion and secretion material adhering to the outer ring surface from this level on and in between annuli : glandular outlets at this level (see Fig. 1 G, arrow). The cephalic region is more or less dome-shaped. It can consist of a single large dome-shaped annulus, as long as the cephalic sclerotization and offset from the first body annulus. Or the head region is formed by two annuli more or less amalgamated, with a dome-shaped first annulus and a wider second annulus (indicated by arrow, Fig. 1 B) with rounded outline. In some specimens, the second annulus becoming wider, more prominent, but the first annulus remaining short and dome-shaped; in still other specimens, the second annulus is almost as prominent and offset as a body annulus and the first dome-shaped annulus has become longer. The cephalic sclerotization however, extending up to the anterior half of the second annulus, the latter still being considered as a cephalic annulus. Female reproductive system can extend far anteriorly, up to the second body annulus.

Males : As described by Orton Williams (1982).

Juveniles : The fourth stage juveniles having 44-48 annuli. Each large annulus is subdivided in a large anterior and two smaller annuli. In longitudinal optical section, the larger anterior subannulus forming prominent tubercles as insertion of large spines, arranged in eight longitudinal rows up to the anal region, reducing in number in tail region. The retrorse spines, prominent in longitudinal optical sections, being sections of large imbricate scales, which are hardly visible in LM but obvious in SEM. The imbricate scales being unallied. Each scale having a trilobed anterior border with the middle lobe indented and fitting on a wartlike tubercle, possibly functioning as a double triangular lock. A first indication of scales appearing on the third cephalic annulus; becoming obvious from the following annulus

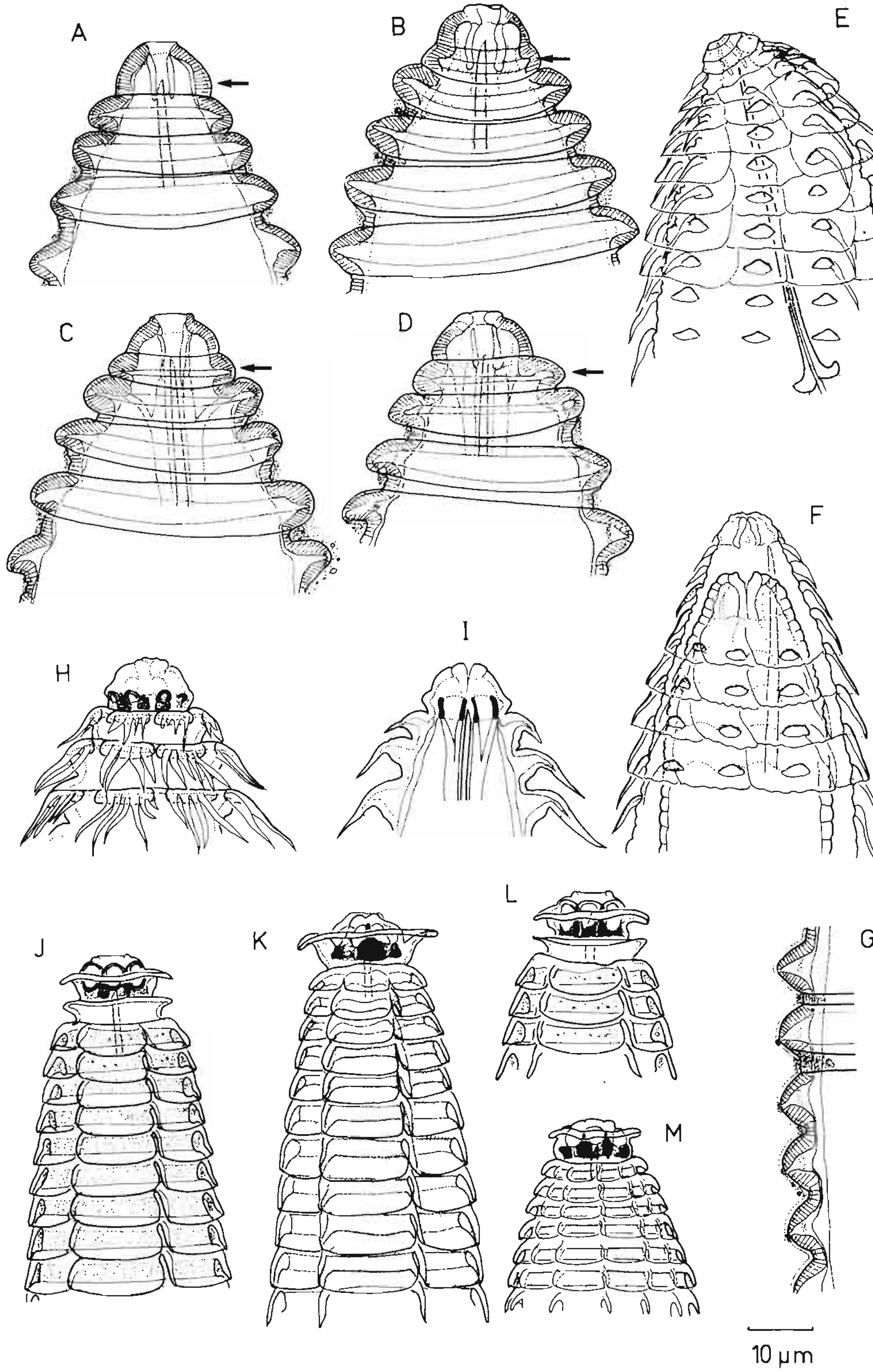

Fig. 1. *Criconema paradoxiger,* A-F : anterior body region in surface view. A-D : Females; E : Fourth stage juvenile; F : Fourth stage juvenile moulting to male; G : Detail of body wall (female). — *Blandicephalanema bossi,* anterior body in paratype female. H : Surface view; I : Longitudinal optical section. — *Pateracephalanema imbricatum.* J-L : Surface view of anterior body region (female). — *P. alticolum.* M : Surface view of anterior body region (female).

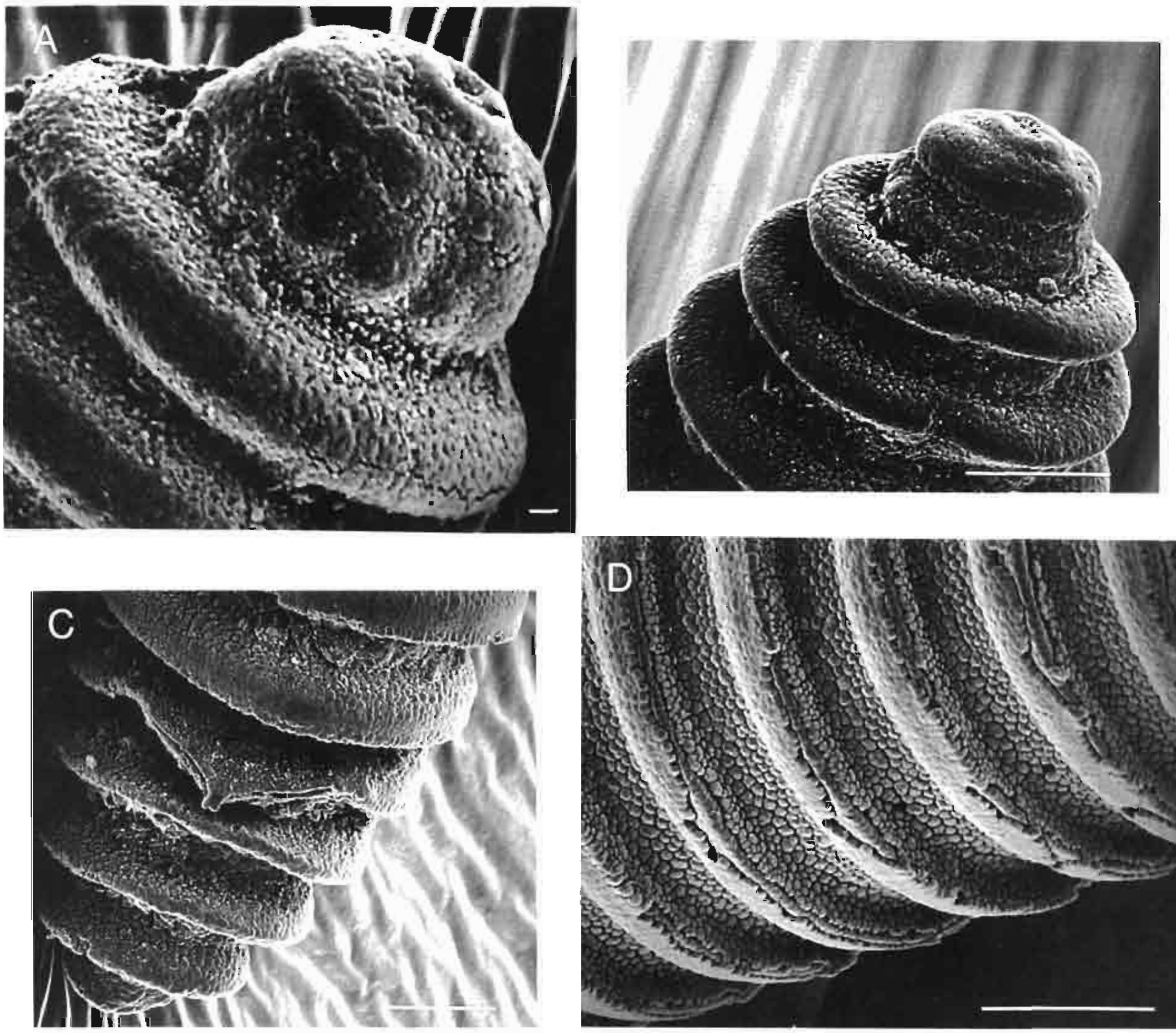

Fig. 2. *Criconema paradoxiger* SEM of females. A, B : Head region; C : Vulva (ventral view); D : Detail body cuticle of ventral side at midbody *(Bar equivalent : B-D = 10 μm; A = 1 μm).*

on. Head region with sclerotization extending up to halfway into the third annulus.

Discussion

Orton Williams (1982) described the cuticle in the genus *Amphisbaenema* Orton Williams, 1982 (= *Criconema* Hofmänner & Menzel, 1914) with the outer layer broken up, at least in part, into numerous platelets of different size and shape. In *C. paradoxiger*, the author considered the cuticle as covered with innumerable small dots and irregular patches which appear to be imbedded in an outer layer of cuticle.

A similar feature was observed by Jairajpuri and Southey (1984) in SEM studies of the body cuticle in *Criconema shepherdae*. These authors considered the outer cracked and fragmented layer with minute polygonal pieces as an extracuticular layer due to an extracuticular incrustation and they considered the platelets in *C. paradoxiger* similar in nature to those in *C. shepherdae* (their Figs 2 B, D & 3 A, D).

Mounport *et al.* (1991) compared the brush-like covering of the external cortical layer observed in ultrastructure studies of the cuticle in *Criconemella sphaerocephala* (Taylor, 1936) Luc & Raski, 1981 with the polygonal platelets in *C. shepherdae*.

Only TEM sections can clarify the real nature of the outer body cuticle in *C. paradoxiger*.

The dome-shaped cephalic region in *C. paradoxiger* remind us of the head of *Blandicephalanema bossi* Reay,

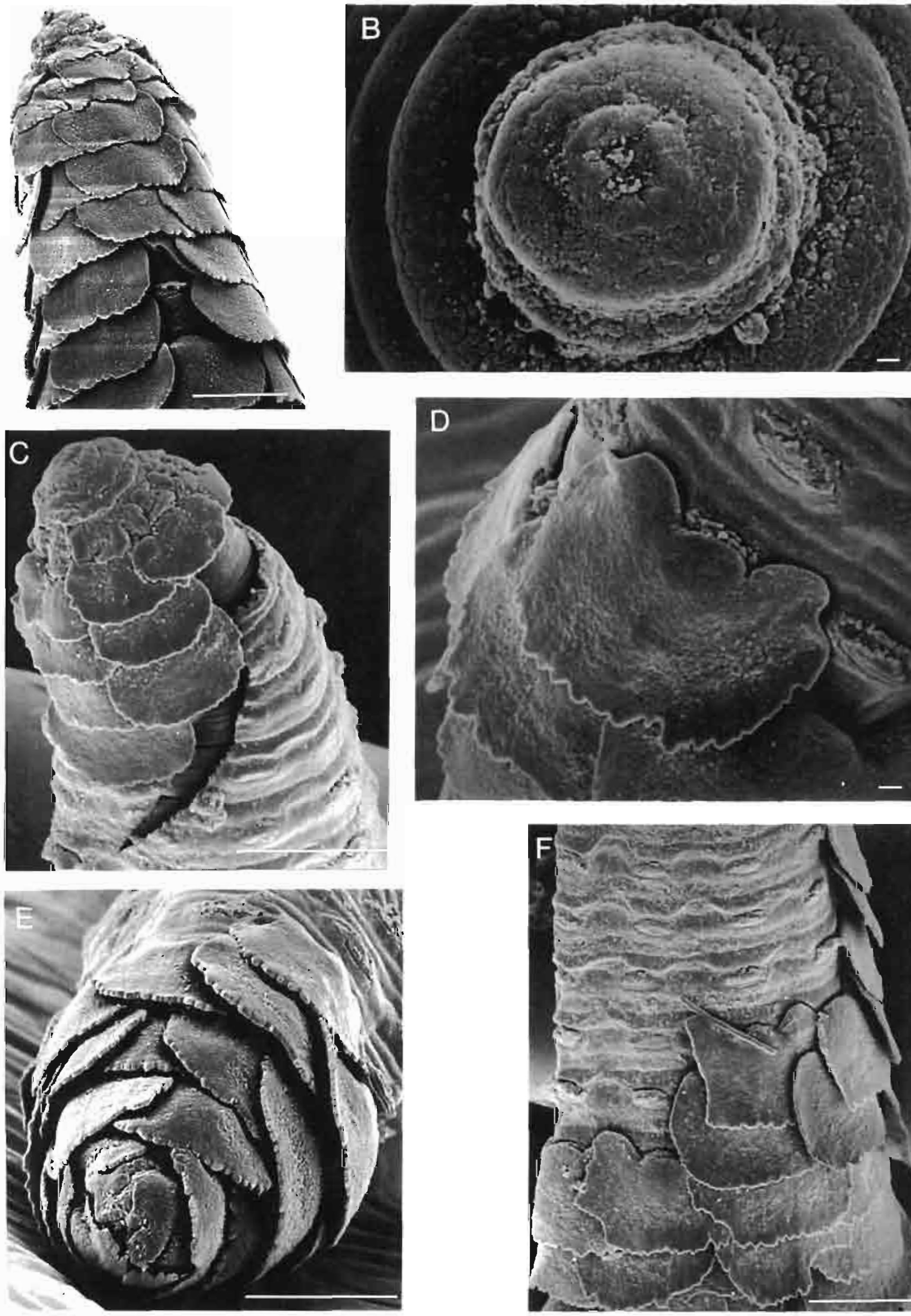

Fig. 3. *Criconema paradoxiger* SEM fourth stage juvenile moulting to male : A, C : Anterior body region, E : Tail region, top view; D, F : Detail of body cuticle; D : En face view of female *(Bar equivalent : B, C, E, F = 10 μm; A, D = 1 μm).*

1987 (Fig. 1 H, I). In *B. bossi*, the cephalic region consists also of a dome-shaped first annulus and a lower but wider second annulus. It differs from *C. paradoxiger* by the strong but low head sclerotization restricted to the second cephalic annulus and also by the different structure of head and body cuticle.

The occurrence of eight longitudinal rows of cuticular projections was one of the features used by Raski and Luc (1985) to synonymize *Amphisbaenema* with *Criconema*, although it was noticed that the incompletely defined layer of backwardly directed spines complicated that action. The presence of scales may reopen the discussion on the synonymization.

The scaled body cuticle in juveniles of *C. paradoxiger* resembles well the scaled body cuticle in the anterior body of *Pateracephalanema imbricatum* (Colbran, 1965) Mehta & Raski, 1971 (SEM picture Fig. 4 B in Reay, 1987) with more or less imbricated scales with irregular posterior border. Also in longitudinal optical section, the scales are in both species perceptible as fine spiny structures (*P. imbricatum* Fig. 1 J-L). At closer look, the scales in *P. imbricatum* are interconnected at their anterior border, similar for *P. alticolum* (Colbran, 1965) Mehta & Raski, 1971 (Fig. 2 M in Reay, 1987). In *C. paradoxiger*, the scales are independent and their relative loose fitting explains why these scales easily disconnect from the body.

Surprising, however, is the distinctness of the scales in SEM pictures compared with LM where they are hardly or not visible in mounted specimens. In *P. imbricatum*, the scales are clearly observable with LM, in *P. alticolum* the scales are smaller, more numerous and less obvious with LM.

Ogma civellae (Steiner, 1949) Raski & Luc, 1987

= *Criconema civellae* Steiner, 1949
= *Crossonema civellae* (Steiner, 1949) Mehta & Raski, 1971
= *Criconema celetum* Wu, 1960
= *Crossonema (Crossonema) celetum* (Wu, 1960) Siddiqi, 1986
= *Criconema eurysoma* Golden & Friedman, 1964
= *Criconema (Crossonema) eurysoma* (Golden & Friedman, 1964) Siddiqi, 1986
= *Criconema vishwanatum* Edward & Misra, 1966
= *Crossonema (Crossonema) vishwanatum* (Edward & Misra, 1966) Siddiqi, 1986

(Figs 4 C, H; 5 B-D).

MATERIAL

Sample 1156 : 10 females, 1 juv. moult to fourth stage.

MEASUREMENTS

Females (n = 10) : L = 416 ± 60.0 (320-505) µm; stylet = 74.3 ± 2.1 (72-79) µm; stylet cone = 61.9 ± 2.8 (60-69) µm; width labial disc = 6.2 ± 1.2 (3-7.2) µm; width cephalic annulus = 21.1 ± 1.1 (20-23) µm; width ceph. ann. 2 = 13.3 ± 0.8 (12-14) µm; width body ann. 1 = 19.5 ± 0.7 (18-20) µm; width body ann. 2 = 31.6 ± 2.0 (28-34) µm; L pharynx = 116.4 ± 8.4 (111-113) µm; ant. to excr. p. = 146.1 ± 14.2 (119-162) µm; ant. to gonad = 64.7 ± 35.5 (18-141) µm; ant. to vulva = 372 ± 55.4 (281-455) µm; max. body diam. = 63.2 ± 4.2 (58-71) µm; VB (diam. at vulva) = 38.6 ± 2.3 (35-41) µm; VL = 44.6 ± 5.7 (31-53) µm; VL/VB = 1.5 ± 0.8 (1-3.3); a = 6.5 ± 1.0 (5.2-8.7); b = 3.6 ± 0.3 (3.3-4.2); V = 89.2 ± 1.1 (87-91); R = 45.3 ± 2.3 (42-50); R st. = 10.4 ± 0.8 (9-12); R ph = 13.3 ± 0.7 (13-15); R Ex = 16.6 ± 1.2 (15-18); R gon. = 10 ± 3.5 (6-17); RV = 6.3 ± 0.5 (6-7); Position V in R = 39 ± 2.1 (36-43).

REMARKS

Ogma civellae is one of the most widely distributed criconematid species, showing great variability in cuticular ornamentation and a wide range in stylet length (70-114 µm).

The Papuan specimens were found in a soil sample from secondary rain forest at Awar Point. They completely agreed with previous data from literature, but showed no variability in the cuticular ornamentation formed by a continuous fringe of mainly single spines, and they also have a narrow range in number of body rings (R = 42-50) and in stylet length (72-79.5 µm).

The single juvenile specimen (a moult towards fourth stage) possessed an annulated body cuticle with 59 annuli (including two head annuli) in the third stage and provided with eight longitudinal rows of spiny scales (Fig. 5 C, D).

Ogma paracivellae sp. n.

(Figs 4 A, B, D, E-G, I, J; 5 A, E-H; 6 A-H).

DIMENSIONS

Females and juveniles : see Table 2.

DESCRIPTION

Female : Body short and plump, often ventrally curved upon fixation. Head consists of two annuli : a wide anterior annulus with a crown of 30 to 40 fingerlike projections (= spines) and a second narrower and smooth annulus. Slightly protruding oval labial disc, 5-6.5 µm long; amphidial apertures slit-like adjacent to labial disc. Well developed cephalic framework, 6 µm high in holotype. Body with 60-68 (excluding head annuli) retrorse annuli, increasing in width to level of stylet knobs, then equally wide and tapering in posterior body region. First body annulus is wider than second head annulus and provided with a short spiny ornamentation of 30-40 projections. All body annuli provided with a spiny ornamentation formed by a more or less continuous fringe of spines or the spines become more grouped resulting in a somewhat palmate arrangement. The palmate arrangement is dominant ventrally on the

Table 2. Morphometric data of *Ogma paracivellae* sp. n. females and juveniles (all measurements in µm).

	Holot.	Paratypes	Juv. females	Juv. males moults	Juveniles		
					J2 moulting	J3	J3 moulting
n	1	20	8	14	4	5	6
L	388	300-524 (413.7 ± 71.2)	238-302 (276.6 ± 22.1)	352-394 (371 ± 11.4)	168-241 (195 ± 27.5)	166-230 (210 ± 25)	245-256 (250.8 ± 4.7)
L (inside stage)				346-386 (361 ± 11.2)	154-236 (188.5 ± 29.7)		210-246 (234.2 ± 12.5)
a	7.1	5.3-10 (7.7 ± 1.5)	5.6-8.8 (7.2 ± 1.2)				
b	3.7	3.0-4.4 (3.7 ± 0.5)	2.5-3.9 (3.2 ± 0.4)				
V	86	86.8-92.0 (88.7 ± 1.5)					
Stylet (St)	81	74-90 (83.2 ± 4.0)	57-70 (63.3 ± 4.2)			48-55 (51.5 ± 2.5)	
Stylet (inside stage)					47-55 (51.5 ± 3.2)		54-67 (61.2 ± 4.9)
St cone	68.5	60-77 (70.4 ± 4.7)	48-59 (53.2 ± 3.7)	43-52 (47.7 ± 3.0)	31-34 (32.3 ± 1.2)	40-47 (43 ± 2.6)	35.5-45 (39.8 ± 3.0)
St cone (inside stage)					39-46 (43.3 ± 3.0)		45.5-57 (51.8 ± 4.7)
Width ceph. ann. 1	18	16-20 (18.5 ± 0.8)	9-12 (10.5 ± 0.9)			8-8.5 (8.3 ± 0.2)	
Width ceph. ann. 2	13	14-14.5 (14.5 ± 0)					
Width body ann. 1	17	13.5-17 (15.5 ± 1.3)					
Width body ann. 2	21.5	16.5-20 (18 ± 1.5)					
L pharynx	106	104-132 (112.8 ± 9.7)	74-97 (88.4 ± 8.7)			69-82 (77.5 ± 5.1)	
L pharynx (IV)							96-109 (102.2 ± 5.2)
Ant. to Ex. P.		99-174 (136.5 ± 37.5)		72-103 (87.1 ± 8.4)		72	
Anterior to Ex. P. (IV)							79-102 (90.5 ± 11.5)
Ant. to gonad	56	14.5-102 (54.5 ± 27.4)	148-198 (169.4 ± 17.0)	169-239 (208.6 ± 17.4)			
Ant. to gonad (IV)							126-173 (153.5 ± 17.7)
Ant. to vulva	333	269-465 (362.5 ± 64.6)					
Max. b. diam. midbody	55	44-59 (52.4 ± 3.5)	31.5-53 (39.5 ± 7.9)	27-30 (28.5 ± 0.9)	24-28 (26.3 ± 2.3)	26-36 (30 ± 4.2)	29-41 (34.5 ± 4.8)
Max. b. diam. (male)				18-22 (20.4 ± 1.1)			
Max. b. diam. at vulva	39	32-41 (36.1 ± 2.7)					
Spicules				33-37 (35.6 ± 1.0)			
Gubernaculum				4.5-7 (6.1 ± 0.7)			
Tail (male)				25-32 (27.5 ± 1.9)			
LV/LB	1.4	0.8-1.5 (1.3 ± 0.2)					
R	66	62-70 (66.2 ± 1.9)	70-81 (74.6 ± 3.6)	70-81 (77.5 ± 2.5)	79	74-79 (76.8 ± 1.8)	76-78 (77 ± 0.7)

	Holot.	Paratypes	Juv. females	Juv. males moults	Juveniles		
					J2 moulting	J3	J3 moulting
R (inside stage)				140-155 (150 ± 7.1)	76 (n = 1)		70-75 (73.3 ± 1.9)
R St	19	14-24 (18.6 ± 2.5)					
R pharynx	23	20-23 (21.5 ± 1.5)					
R Ex		18-24 (20.6 ± 2.1)					
R V	8						
R an	2						
V an (in R)	6	4-6 (5.2 ± 0.7)					
V (position in R)	58	55-61 (58.7 ± 1.5)					
Anus (position in R)	64	61-65 (63.7 ± 1.4)					
Length vulva tip	55	30-59 (46.5 ± 9.3)					

body and in the tail region. The spines are best developed and longest on the tail region. Due to the grouping of the spines, some specimens seem to possess a narrow " lateral field ". At midbody, annuli with 80 to 90 spines. A large amount of concretion particles can adhere between the annuli, captured by the spiny projections. Stylet, 74-90 µm long, slender with fine well developed anchor-shaped basal knobs 10.5 (8-12) µm wide, with anteriorly orientated distal ends, sites of insertion of protractor muscles. Excretory pore usually obscure, situated between annuli 19 and 24 (including head annuli). Vulva a closed transverse slit at border of a triangular flap in ventral view; vulval lips equally sized, distal end of vulva hardly or not protruding beyond profile formed by adjacent annular spines and situated at six to ten annuli from posterior end. No spines around the vulva. Reproductive system may extend for anteriorly up to 15 µm from anterior body end. Spermatheca with small globular sperm cells. The anus relative obscure, situated at four to six annuli from vulva and one to four annuli from tail tip.

Fourth stage juveniles (Fig. 5 E-H) : Apart from anterior two to three body annuli posterior to head, each annulus provided with scales with spiny projections : 4 to 6 (tail region). The scales are arranged in longitudinal rows from about 6th annulus on. Shortly posterior to pharynx, 16 to 18 scales per annulus (juvenile females) and 13 to 16 scales (juvenile males); numbers diminishing towards the extremities especially in tail region. Head with sclerotized framework extending to third annulus. Juvenile females have a 57-70 µm long stylet with a 48 to 59 µm cone and stylet knobs developed as in adult females. Stylet cone 44-52 µm in juveniles moulting into males. Excretory pore obscure, observed in one specimen at annulus 31 i.e. shortly posterior to the pharynx. Anus usually obscure, 4-5 annuli from the posterior end in juvenile males and females. Reproductive system well developed; in young females extending up to 56 % of body length from anterior end. In moulting juvenile males, reproductive system with single outstretched testis completely formed and extending up to 45 % of total body length from anterior end; digestive system reduced. Male cuticle with 140 to 155 annuli; lateral field with three incisures. Spicules 33-37 µm long, arcuate, slightly cephalated and corpus with pointed distal end; gubernaculum trough-shaped, 4.7-7.2 µm long.

Third stage juveniles moulting to fourth stage : Body cuticle with 74-79 annuli, ornamented with spiny scales as in fourth stage but not lying in clear longitudinal rows, scales of adjacent rows often alternating. Shortly posterior to pharynx, annuli with 12 to 16 scales per annulus. Head as in fourth stage. Stylet 48-55 µm, its cone 40-47 µm long, stylet knobs 6.8-8 µm wide. Reproductive system short, 14-21 µm long.

Second stage juveniles : Only specimens moulting to the third stage were observed. Body cuticle as in third stage; 79 annuli were counted in a specimen. Stylet cone 31-34 µm long.

TYPE MATERIAL

Holotype female slide RIT 368, Brussels. Paratypes on slide Nos. RIT 369-377; Paratype : 26 females, 72 juveniles (17 J4 moult to male; 24 J4 moult to female; 9 J4; third stage : 5 J3 moult to J4, 8 J3; 12 J2 moult to J3) from sample 7111 and 23 females, 13 juv. (2 J4 moult to male, 6 J4 moult to female 5 J) from sample 7177, State University of Ghen, Institute of Zoology, Ghent,

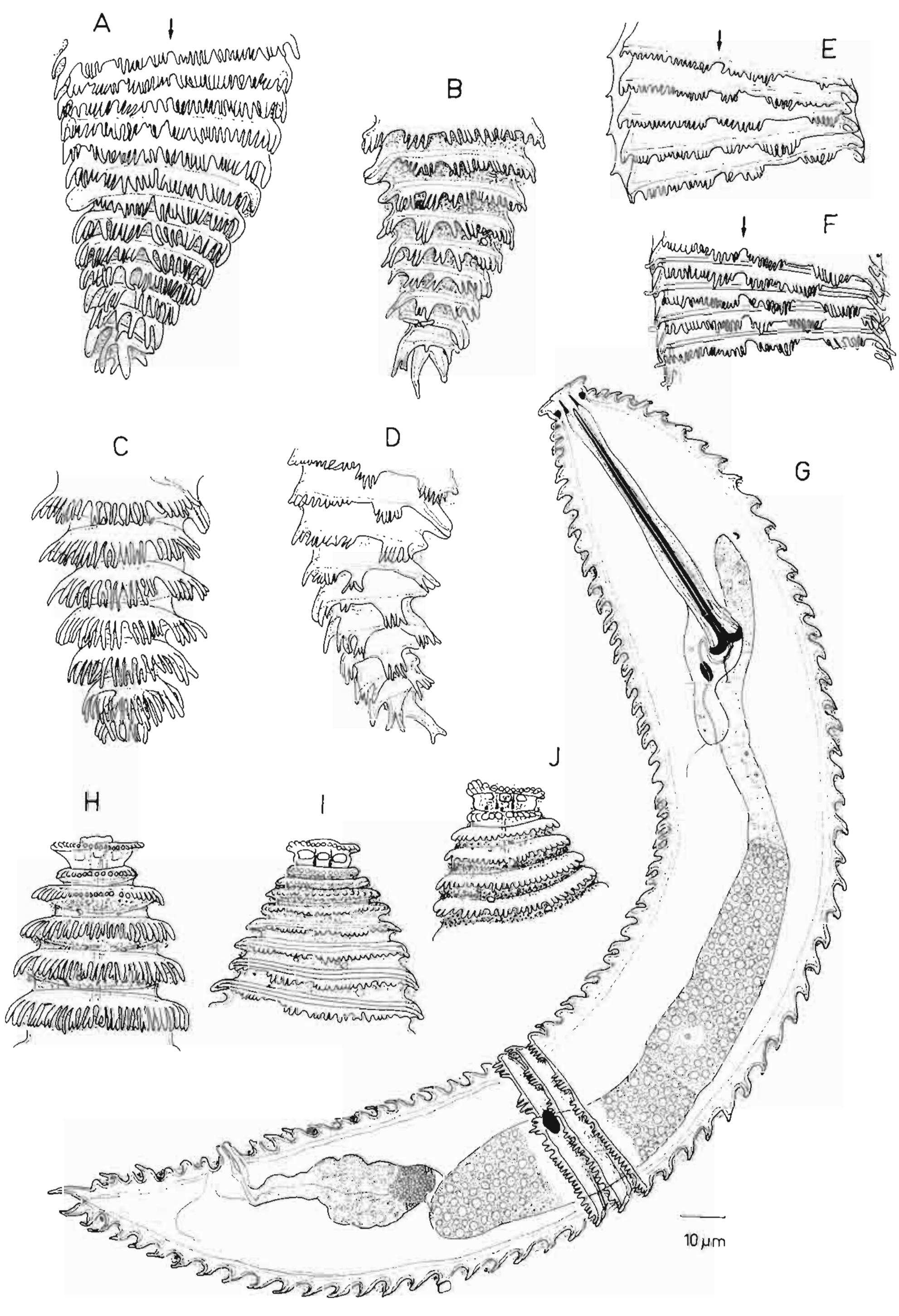

Fig. 4. *Ogma civellae,* female, surface view. C : Tail; Anterior body region. — *Ogma paracivellae* sp. n., females. A, D : Tail region (surface view, paratypes); B : Tail region (holotype); E-F : Detail of body cuticle at mid body and just anterior to vulva region; G : Total view of holotype (longitudinal optical section); I-J : Surface view of anterior body region (holotype and paratype, respectively).

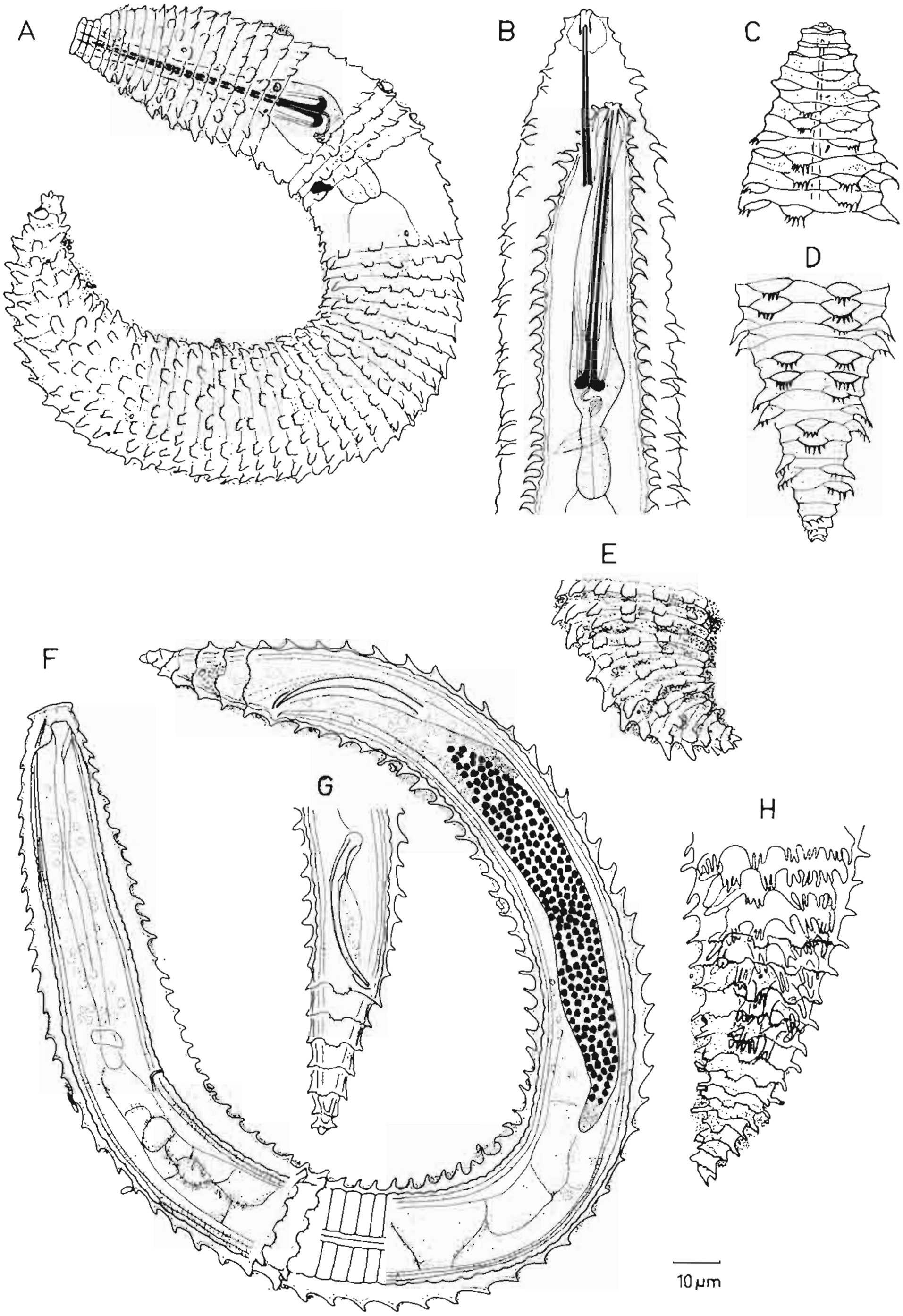

Fig. 5. *Ogma civellae*, third stage juvenile moulting to fourth stage. B-C : Anterior body region, D : Tail region (surface view). — *Ogma paracivellae* sp. n., paratype juveniles. A : total third stage juvenile in surface view except for level stylet knobs and base pharynx; E : Posterior body region of fourth stage (surface view); F : Total of fourth stage juvenile moulting to male (longitudinal optical section); G : Copulatory apparatus and tail in (surface view) young male.

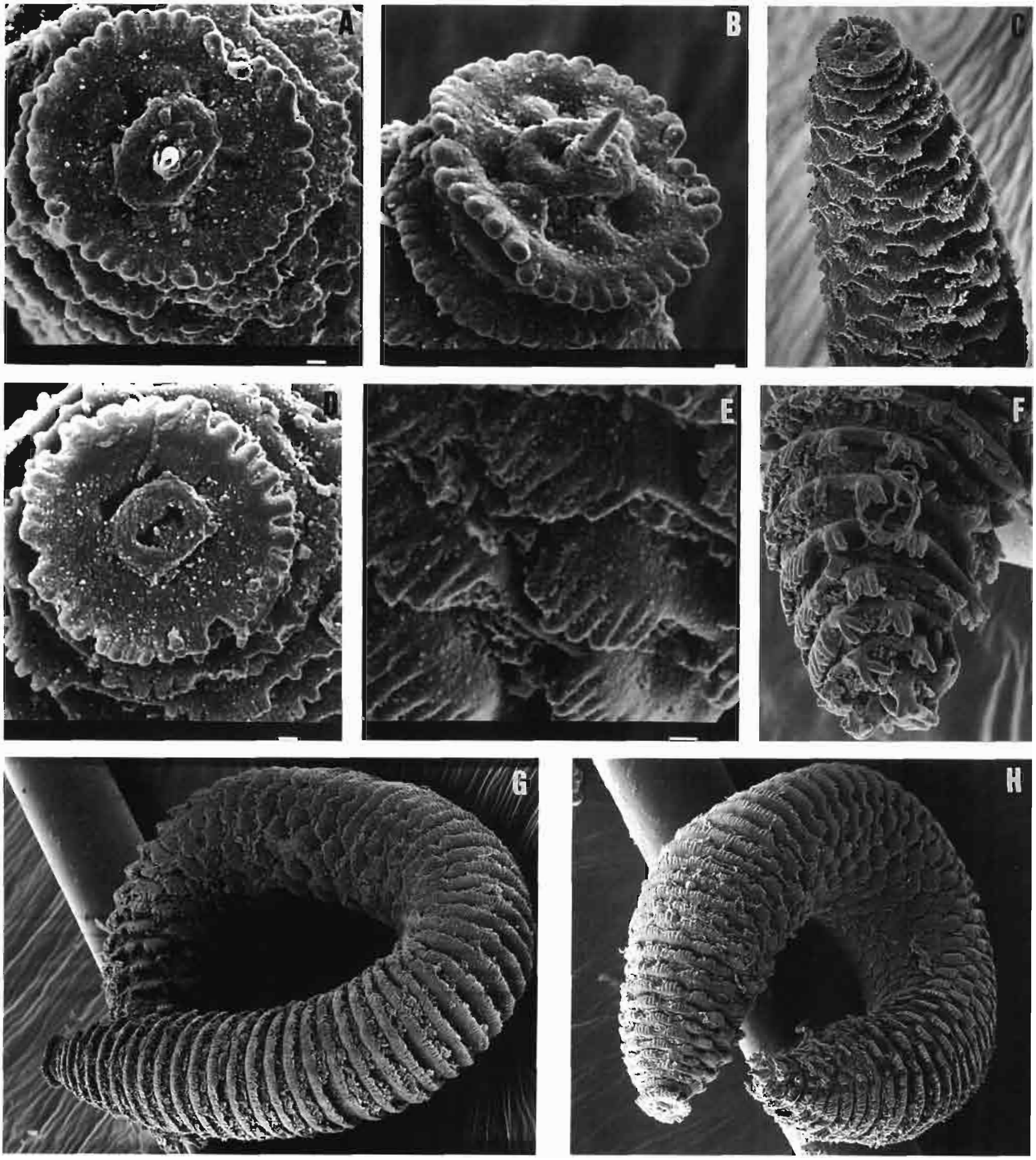

Fig. 6. *Ogma paracivellae* sp. n., females. A-C : Head and anterior region of the same female; D : En-face view of another female, without projecting stylet; E : Scale structure (mid-body); F : Posterior end, showing the vulval slit at the right upper side; G-H : Total view, showing *i)* the ventral scales and the dorsal fringe, *ii)* the lateral field (mid-body), indicated by interruptions in the fringes.

Belgium. A paratype slide with 5 females deposited to Muséum National d'Histoire Naturelle, Laboratoire des Vers, Paris, France, another with 1 female and 4 juv. moulting to female to the University of California, Davis, Nematode Collection, USA.

TYPE LOCALITY

Papua New Guinea, Bogia Hills, secondary rain forest, sample 7111 (see above).

OTHER LOCALITY

Papua New Guinea, near Tok Tok River, in rhizosphere of different trees, sample 7177 (see above).

DIAGNOSIS AND RELATIONSHIPS

Head with a wide anterior annulus with a crown of 30-40 spines and a second narrower and smooth annulus. All body annuli (60-68) with a spiny ornamentation showing a palmate arrangement ventrally and in the tail region but more or less continuous elsewhere (at mid-body 80-90 spines). Stylet 74-90 µm. RV = 6-10; Ran = 1-4; RVan = 4-6. Fourth-stage juveniles have the body annuli provided with scales in longitudinal rows from about the 6th annulus on. Posterior to pharynx there are 16 to 18 scales per annulus in juvenile females and 13 to 16 scales in juvenile males. In third-stage juveniles the scales are not in clear longitudinal rows, scales of adjacent rows often alternating; 12-16 scales per annulus at mid-body.

Ogma paracivellae sp. n. closely resembles *Ogma civellae* in most morphological and morphometrical features. It differs from it by its larger number of body rings : R = 66 (62-70) against 40-55 in *O. civellae* and in juveniles by the presence of a higher number of scales per annulus (12-16 in the third stage and 13-18 in the fourth stage posterior to the pharynx) against eight longitudinal rows of scales in *O. civellae*.

REMARKS

The number of body rings was considered a diagnostic feature to distinguish *O. paracivellae* sp. n. (two populations) from *O. civellae* (11 populations based on Heyns, 1970). Although Heyns (1970) found a large variability in stylet length with extreme values of 71 and 144 µm in six different populations of *Criconema celetum* (= syn. *O. civellae*) from different localities in South-Africa, the variability in number of body annuli was low : R = 41-46.

The variability within the cuticular ornamentation observed in the new species has also been described for *O. civellae*. The presence of a lateral differentiation of the body cuticle (= " lateral field ") was recently described for *Ogma sadabhari* Shahina & Maqbool, 1991 as marked by a single irregular line formed by anastomosing annuli. It was also observed in other genera as e.g. in *Criconema* with *C. aberrans* (Jairajpuri & Siddiqi, 1963) Raski & Luc, 1987 possessing irregular longitudinal breaks in the cuticle but on posterior-most annuli only.

Acknowledgments

We are very much obliged to Mrs. F. Reay for sending us type specimens and other material and to Dr. J. Bridge for information on criconematids in Papua New Guinea. We also thank Ir. C. Lauwens for the technical help and Mrs. R. Van Driessche for the SEM preparations and pictures.

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