

Terrestrial Nematodes from the Galápagos Archipelago IV : The genus *Plectus* BASTIAN, 1865, with description of three new species (Leptolaimina : Plectidae)

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Abstract

Eight species of the genus *Plectus* are described from the Galápagos Islands. *P. (Plectus) cryptoptychus* sp.n. is characterized by radially striated lips, slender cephalic setae that reach the anterior lip margin, a vagina with inconspicuous epiptygmata, and 50-73 somatic setae. *P. (P.) lamproptychus* sp.n. has sublateral epidermal glands (19-25 on each side of the body between vulva and anus, with one aberration), distinctly refringent epiptygmata in the vagina, and 12-16 somatic setae. *P. (P.) galapagensis* sp.n. is slender and small (L = 370-464 µm; a = 22-42) with smooth lips, fairly slender tail (c' = 6.9-9.6) and 8-10 somatic setae. Other species were identified as *P. (Ceratopectus) armatus*, *P. (Plectus) minimus*, *P. (P.) patagonicus*, *P. (P.) tropicus* and *P. (P.)* sp. cf. *longicaudatus*. Identification of *Plectus* species is shown to be facilitated by the study of seta distribution, vagina structure, tail tip and observation with SEM of lip region and lateral field.

Key-words : *Plectus*, new species, Nematoda, taxonomy, morphology, SEM, Galápagos

Résumé

Huit espèces du genre *Plectus* sont décrites des Iles Galápagos. *P. (Plectus) cryptoptychus* sp.n. se caractérise par des lèvres avec stries radiales, des soies céphaliques fines qui atteignent le bord antérieur des lèvres, un vagin avec épiptygmata peu apparents et 50-73 soies somatiques. *P. (P.) lamproptychus* sp.n. possède des glandes épidermiques sublatales (19-25 de chaque côté du corps entre la vulve et l'anus, avec une aberration), des épiptygmata distinctement réfringents dans le vagin et 12-16 soies somatiques. *P. (P.) galapagensis* sp.n. est fin et petit (L = 370-464 µm; a = 22-42) avec des lèvres lisses, une queue assez fine (c' = 6,9-9,6) et 8-10 soies somatiques. D'autres espèces ont été identifiées comme *P. (Ceratopectus) armatus*, *P. (Plectus) minimus*, *P. (P.) patagonicus*, *P. (P.) tropicus* et *P. (P.)* sp. cf. *longicaudatus*. Il est montré que l'identification des espèces de *Plectus* est facilitée par l'analyse de la distribution des soies, de la structure du vagin, de l'extrémité de la queue, et par l'observation à l'aide du MEB de la région labiale et du champ latéral.
Mots-clefs : *Plectus*, nouvelles espèces, Nematoda, taxinomie, morphologie, MEB, Galápagos.

Introduction

The family Plectidae ÖRLEY, 1880 is a diverse, wide-spread group of bacterivorous species, representatives of which can be found in nearly every type of soil and

freshwater sediment. They also occur in brackish sediments (ZELL, 1993; VERMEULEN, unpubl.), albeit very rarely. The main bulk of known species belong to the genus *Plectus* BASTIAN, 1865, which has received substantial taxonomic attention in the last decade (ANDRÁSSY, 1984 & 1985; EBSARY, 1985; MAGGENTI *et al.*, 1990; KITO *et al.*, 1991; TAHSEEN *et al.*, 1992; ABDEL-RAHMAN, 1993; ZELL, 1993), and for which two markedly different compositions have been proposed. While ANDRÁSSY (1984) split the genus in three with his proposal of the new genera *Ceratopectus* and *Chiloplectus*, ZELL (1993) by contrast used phylogenetic arguments to relegate not only *Ceratopectus*, but also all genera of the subfamily Wilsonematinae CHITWOOD, 1951 to subgenus level within *Plectus*. In total, ZELL (1993) lists forty-nine valid species in the subgenus *Plectus* (= genus *Plectus sensu* ANDRÁSSY, 1984), five valid species in the subgenus *Ceratopectus*, and eighteen valid species in the subgenus *Wilsonema* COBB, 1913 (= *Wilsonematinae sensu* ANDRÁSSY, 1984). In this paper, we follow ZELL (1993) in referring *Ceratopectus* to subgeneric level, but we do not accept the synonymy and subgeneric status of all *Wilsonematinae*, i.a. because of grave reservations about the phylogenetic method of WOAS (1981) as used by ZELL (1993). One species of *Ceratopectus* and seven species of *Plectus* are described from the Galápagos, including three new species. SEM photographs of seven species are shown, and the diagnostic value of the distribution pattern of somatic setae along the body is illustrated.

Material and methods

We refer to DE LEY *et al.* (1993) for data on the examined soil samples and on abbreviations used. For two reasons, we have measured stoma length from the mouth opening to the anterior end of the pharyngeal radial tubuli, unlike ZELL (1993) and MAGGENTI (1961b) who measured it to the point where the stoma lumen constricts to a closed condition (cf. Abb. 2 in ZELL, 1993).

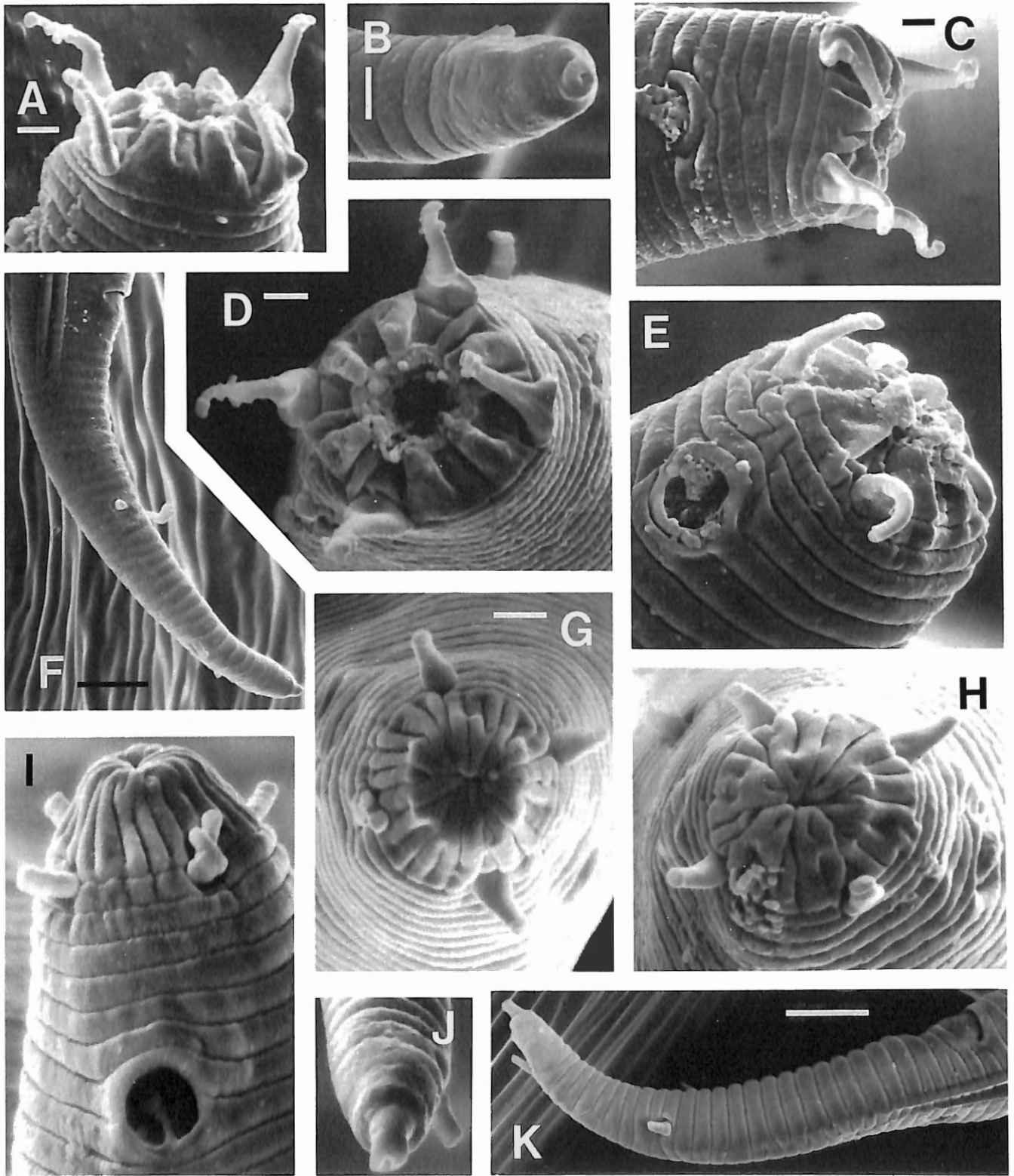


Fig. 1. – *Plectus (Ceratoplectus) armatus* (BÜTSCHLI, 1873) ANDRÁSSY, 1984 (females only) – A, C-E. lip region (ventral view in A, lateral view in C and E, en face with dorsal side up in D). – B. tail tip. – F. tail. *Plectus (Plectus) tropicus* ZELL, 1993 (females only) – G-I. lip region (G,H in en face view with dorsal side up, I in lateral view). – J. tail tip. – K. tail. Scale bars equal 4 μm in F,K and 1 μm in rest; E is at scale of D and 10 mm = 1 μm in H-J.

Firstly, delineation of stoma from pharynx along the lines of ZELL (1993) and MAGGENTI (1961b) poses definite problems under the light microscope, particularly for species of Plectidae with a narrow, tapering stoma in lateral view (e.g. Fig. 4J; 7D, G), or with a stoma that narrows irregularly (e.g. Fig. 4A, C; 9A, E). In such cases, the "posterior end" of the stoma cannot be located objectively, resulting in great variation in measurements and loss of information. By contrast, the point of origin of the radial tubuli is usually quite distinct (cf. all our drawings of anterior ends), and much less variable in position. In those cases where the tubuli are not distinct, they can still be located on the basis of the transverse discontinuity in the musculature that seems to accompany them (probably cell walls; Fig. 7F, G).

Secondly, anatomical considerations suggest that the tubuli demarcate the anterior end of the corpus. We adhere to a general definition of the stoma as that part of the digestive tract which extends from the mouth opening to the point where the pharyngeal lumen assumes its characteristic shape. However, this does not clarify matters in Plectidae: their anterior digestive tract first has a cylindroid shape just posterior to the mouth opening, then develops larger and larger radii without tubuli, and finally exhibits well-developed radial tubuli (Fig. 1B-F in MAGGENTI, 1961a). In isthmus and bulbus, the lumen is again Y-shaped without tubuli (Fig. 1F-G; 2A, B; 4B in MAGGENTI, 1961a). Thus, it is not obvious which lumen shape should be considered characteristic

for the pharynx — Y-shaped or Y-shaped with tubuli?

The structure and terminology of the stoma in Rhabditida is currently being reviewed and revised (VAN DE VELDE *et al.*, in press), and this work has illustrated the importance of the arrangement of the cells surrounding the cuticle of the stoma in comparative studies. In particular, it was found that the dorsal pharyngeal gland opens slightly anterior to the junction of stoma and pharyngeal corpus (and not just posterior to it, as hitherto assumed), and that the corpus itself is characterized by the presence of radial tubuli. Contrary to MAGGENTI (1963), we do not consider it unlikely that Plectidae and Rhabditida are relatively closely related (cf. LORENZEN, 1983), and we therefore suspect that the point of origin of the radial tubuli in Plectidae is homologous with the stoma-corporum junction in Rhabditida. This is also suggested by the fact that the pharyngeal tissue around the stoma usually keeps thickening posteriorly, at least until the radial tubuli are reached (Fig. 2B, D; 4A, J; 7A, D, G, F).

We have also mapped the positions of all setae in our specimens (Table 1), which was done by drawing consecutive parts of each side of the body with *camera lucida*, and marking the positions of the setae relative to the pharynx, the vulva and the anus. This was very labour-intensive for species with many setae; in these we mapped just a few entire specimens, and restricted ourselves to mapping only the neck region of other individuals. Observation of all setae required specimens that had an optically clean cuticle without ruptures or deep

Table 1 :

Distribution of somatic setae* on the body of several *Plectus* spp. (species from the Galápagos ordered according to descending total count).

Species	BODY TOTAL	Neck region	Cardia- vulva	Vulva- anus	n neck	n total
From the Galápagos :						
<i>P. (P.) cryptoptychus</i> sp.n.	50-73	16-21	12-20	22-34	8	4
<i>P. (P.) patagonicus</i>	39-59	16-23	8-17	13-20	10	5
<i>P. (C.) armatus</i>	26-35	10-13	4-7	12-17	18	10
<i>P. (P.) tropicus</i>	20-23	7-10	2-5	8-11	5	5
<i>Plectus (P.)</i> sp. cf. <i>longicaudatus</i>	20	6	4	10	1	1
<i>P. (P.) lamproptychus</i> sp.n.	12-16	6-8	2-6	3-7	6	6
<i>P. (P.) galapagensis</i> sp.n.	8-10	2-3	2-3	4	6	6
<i>P. (P.) minimus</i>	5-6	2	1-2	2	5	5
From other localities:						
<i>P. (P.) parvus</i> (cf. MULK & COOMANS, 1978)	10-15	3-6	0-3	4-8	8	7
<i>P. (P.) sambesii</i> (cf. DE CONINCK, 1935)	17-23	10-12	2-8	14-15	3	3

* : not including cephalic setae, deirids and caudal setae.

folds, that were not too strongly curved or contorted, and which were mounted in double-coverslip slides.

In our drawings, setae filled in in black are located on that side of the body facing the viewer, while open setae are located on the other side. Thus, the posterior end in Fig. 2F has four setae on the right side of the body, and three on the left side. In the descriptions, the following distinctions are made between setae :

- caudal setae : all setae located posterior to the level of the anus;
- cephalic setae : the four setae located nearest to the lips, anterior to the amphids;
- deirids : the two midlateral setae located resp. on the left and right side of the body in the lateral field at the level of the isthmus;
- somatic setae : all other setae.

We were not able to examine any relevant type material to confirm our species identifications, although we did re-examine some relevant specimens described by DE CONINCK (1935) and MULK & COOMANS (1978), which are kept at the Instituut voor Dierkunde, Universiteit Gent, Belgium. Also, Dr. H. ZELL kindly allowed us to consult the manuscript of his recent monograph (ZELL, 1993), which will undoubtedly constitute the reference work on *Plectus* for years to come. As Dr. ZELL has examined an enormous number of specimens, including the types of many species, we have tended to rely on his identifications.

Descriptions

Plectus (Ceratoplectus) armatus (BÜTSCHLI, 1873) ANDRÁSSY, 1984 (Fig. 1A-F; 2H-M)

LOCALITIES

Isla Fernandina : Samples 17 (4 ♀♀), 18 (32 ♀♀, 26 JJ) and 19 (4 ♀♀, 1 J); Isla Isabela : Samples F1 (3 ♀♀, 2 JJ) and F2 (1 ♀); Isla Santa Cruz : Samples 1 (1 ♀), 2 (1 ♀), 3 (1 ♀), 5 (3 ♀♀, 1 J) and 7 (1 ♀); Isla Floreana : Samples 13 (6 ♀♀, 4 JJ), 14 (1 ♀), 15 (2 ♀♀, 3 JJ) and F4 (1 ♀). Six females from sample 18 were studied with SEM.

MEASUREMENTS

Table 2.

DESCRIPTION

Females :

Body weakly to strongly ventrally curved upon fixation. Cuticle less than 1 µm thick, finely divided into 0.5-0.8 µm wide annuli. Lateral field consisting of two separate, inconspicuous wings that are 1.5-3 µm apart along most

of the body and which fade anteriorly at the level of the corpus and posteriorly on the tail (just posterior to the anus : Fig. 1F). Neck region with 10-13 setae (n = 18) distributed as follows : a quartet just posterior to the stoma, one pair ventrosublaterally next to the lateral field near the base of the corpus (one female also with a subdorsal seta on the left side slightly anterior to these), a pair or a single seta dorsally of the nerve ring, a pair or a single seta ventrally just posterior to the excretory pore, and a dorsosublateral pair next to the lateral field at the bulb.

Amphids 3-8.5 µm from anterior end, circular, the rim of each amphid forming a refringent single coil that is interrupted by a narrow dorso-posterior break. Anterior end with four cephalic setae that are 3-5 µm long, generally extending well anterior to the lips (exceptionally recurved sideways : Fig. 1E), with clearly flattened bases implanted between lip region and first body annule. Lip region 6-9 µm wide, not offset, variously fixed with open or closed oral aperture. Lips weakly offset from one another under light microscope, each with an inner labial sensillum that is pressed against the other lips when the oral aperture is closed (Fig. 2H, I), and an outer labial sensillum that faces outwards irrespective of lip posture. Under SEM, the subdorsal and subventral lips of a female with open mouth appear as smooth ridges separated by less elevated cuticle, while the lateral lips are wider and carry two radial striae each (Fig. 1D).

Stoma 3-4 µm wide anteriorly, not or hardly narrowing posteriorly, 1.8-2.8 times as long as LRW. Corpus cylindrical, plump, 1.1-1.6 times as long as isthmus, with a faint transverse break in its walls at 6-9 µm from the base of the stoma. Isthmus plump, surrounded by nerve ring at its anterior end and by secretory-excretory gland cells at its posterior end. Bulb with simple valves, its base at 0-3 µm from anterior end of intestine. Cardia embedded in intestine, but usually only physically connected to intestinal cells at its posterior end. Excretory pore slightly posterior to nerve ring, at 56-71 annuli from anterior end (n = 11). Excretory canal fading rapidly proximally. Deirids setiform, nearly always placed in lateral field (left deirid dorsally adjacent to lateral field in one female) at 60-77 annuli from anterior end or at 3-9 annuli from excretory pore (n = 11).

Vulva inconspicuous, at mid-body. Vagina straight, extending over about one third of VBW. Reproductive system amphidelphic, with anterior branch on right side of body and posterior branch on left side in all females. Ovaries reflexed, posterior ovary sometimes extending anterior to vagina. No gravid females. Rectum 0.6-1.6 times as long as ABW. Tail subcylindrical, with four to six setae of which the terminal one is implanted at 3.5-6.5 µm from its posterior end, and with a small spinneret at its tip.

Male : not found.

Table 2 :
Measurements in μm of *Plectus (Ceratoplectus) armatus* BÜTSCHLI, 1873

Character	Island :			Santa Cruz				Floreana			Fernandina		
	Sample :	1	2	5	7	13	14	F4	17	18	19		
		1♀	1♀	2♀♀	1♀	1♀	1♀	1♀	3♀♀	10♀♀	3♀♀		
Length		292	308	296-324	288	306	292	308	218-312	339 \pm 17 (317-367)	322-378		
Body width		21	24	19-22	19	21-22	22	23	19-25	21 \pm 3 (16-25)	17-24		
Pharynx		89	92	88-93	86	85-88	84	90	83-90	91 \pm 3 (87-95)	94-104		
Tail length		35	38	32-36	34	32-37	32	35	35-36	37 \pm 4 (30-44)	33-43		
Anal body width		10	9	8-9	9	8.5	8	9	8.5-11	7-10	10-11		
a		14	13	15-16	15	14-15	13	13	12-15	17 \pm 2 (14-20)	15-18		
b		3.3	3.3	3.4-3.5	3.3	3.5-3.6	3.5	3.4	3.3-4.2	3.7 \pm 0.1 (3.6-4.0)	3.1-4.3		
c		8.4	8.1	9.0-9.3	8.5	8.3-9.6	9.1	8.8	7.9-8.7	9.2 \pm 0.9 (7.9-11)	9.8-11		
c'		3.5	4.2	3.6-4.5	3.8	3.8-4.4	4.0	3.9	3.3-4.2	4.2 \pm 0.6 (3.0-5.1)	3.1-4.3		
stoma		15	15	13-18	14	14	16	16	14-16	14-17	17-19		
corpus		31	32	32-33	29.5	32	28.5	32.5	30-32	34 \pm 2 (31-37)	32-38		
isthmus		27	32	24-27	27	25	23	25	22-28	24 \pm 3 (20-28)	27-32		
bulbus		15	15	16	12.5	12-17	17	16	13-15	17 \pm 2 (13-19)	15-17		
cardia		5	5	9-10	9	7-9	10	6	5-8	7 \pm 2 (4-9)	7-8		
nerve ring		48	48.5	48-50	49	48-49	45	50	46-51	52 \pm 3 (48-61)	54-60		
excretory pore		53	55	53-56	49	52-55	50	50	51-57	57 \pm 4 (52-66)	60-67		
deirid		58	59	53-60	58	57-60	54	53	58-64	62 \pm 4 (56-71)	64-75		
nerve ring (% neck)		54	53	52-57	57	55-57	53	55	53-57	57 \pm 3 (51-64)	53-58		
excretory pore (% neck)		60	60	57-63	57	59-65	59	55	61-64	63 \pm 4 (55-70)	62-65		
deirid (% neck)		65	64	61-65	67	65-71	64	59	68-71	67 \pm 4 (61-75)	65-73		
V (%)		49	48	49-50	50	49-50	49	47	49-53	49 \pm 1 (48-51)	51		
G ₁ (%)		11	9	7-9	8	9-11	7	7	7-15	10 \pm 2 (6-13)	8-15		
G ₂ (%)		7	11	5-7	8.5	7-11	9	9	8-15	9 \pm 3 (6-13)	10-13		
rectum		11	11	13	10	10-12	13	13	8.5-11	10 \pm 1 (7-11)	12-14		
vagina		6.5	6.5	6-6.5	6	6	6	6	6-7	5-6	7		

DISCUSSION

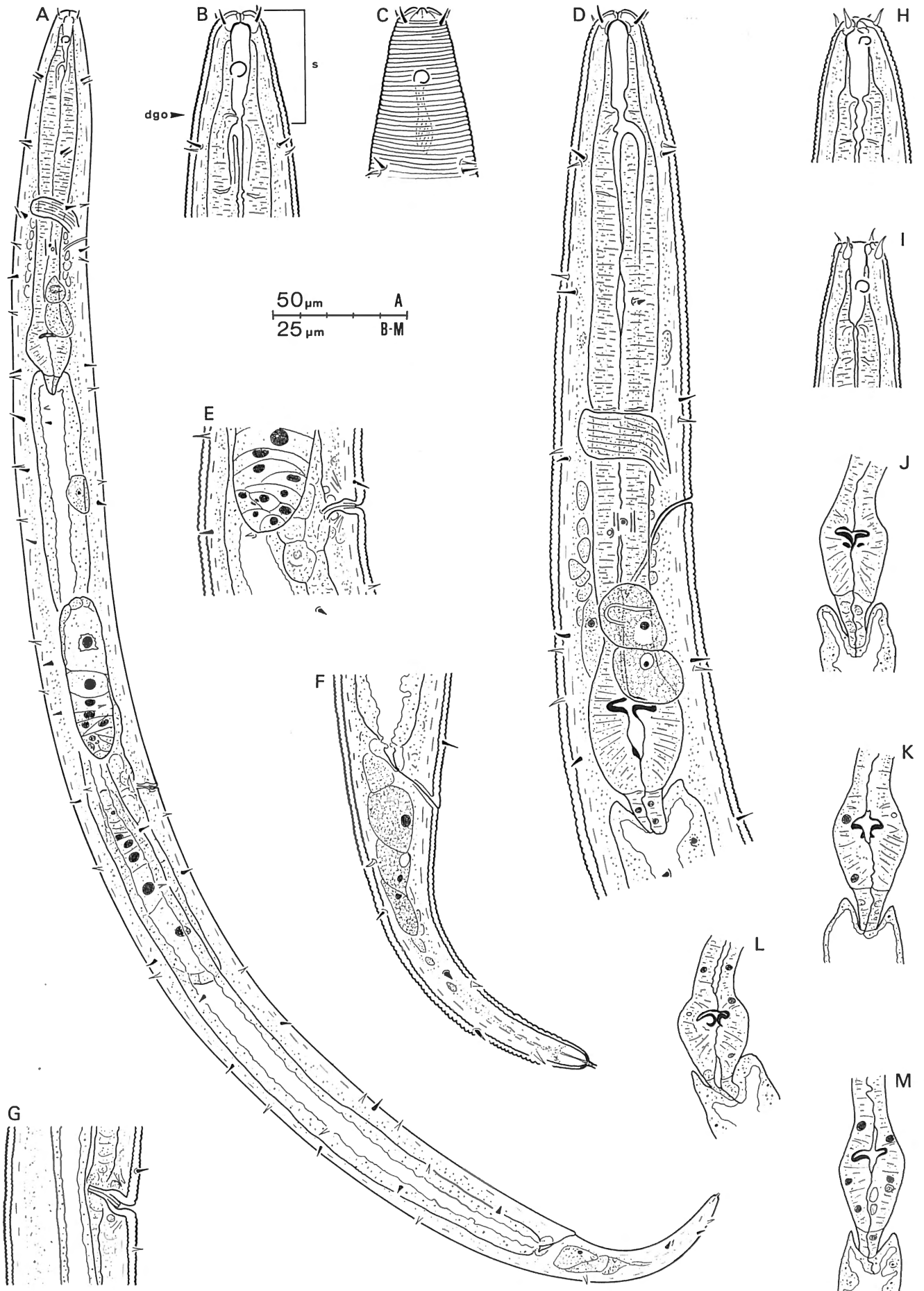
Justification of identification :

Although BÜTSCHLI (1873) originally described and depicted *P. armatus* as having six cephalic setae, MAGGENTI (1961b) and all other later publications considered it to have only four. Our specimens agree fairly well with the descriptions of *P. armatus* in MAGGENTI (1961b), MULK & COOMANS (1978), ANDRÁSSY (1985) and ZELL (1993), differing only in a smaller average body size, and a wider range for a few characters.

Other similar nominal species :

Contrary to ANDRÁSSY (1985), ZELL (1993) considered *P. (C.) arctus* (TRUSKOVA, 1976) ZELL, 1993 to be a valid species, distinguishable from *P. armatus* by the

combined length of bulbus and cardia, which is reported by him to be 25-30 μm in *P. arctus* and 16.5-24 μm in *P. armatus*. In our material, the combined length of bulbus and cardia was 19-26 μm . However, there is ample opportunity for confusion in measurements of bulbus and isthmus. Firstly, it is difficult to pinpoint the anterior end of the bulbus, because the point of expansion of the pharyngeal wall at the base of the isthmus rarely coincides precisely with the posterior end of the isthmus muscle cells (Fig. 2K, M). As a result, measurements of the bulbus length on the basis of its outline usually yield values that are a slightly higher than those based on changes within the pharyngeal tissues. Secondly, the tip of the cardia was always covered by intestinal tissue in our material. This tissue is easily mistaken for a part of the cardia, yielding higher values for cardia length.



Cumulating both errors of measurement, our material would have 20-30 μm as combined length of bulbus and cardia. ZELL (1993 : Taf. 15-17) draws the cardia tip without intestinal extension for both *P. armatus* and *P. arctus*, and it is therefore possible that he included the extension in his measurements of the cardia. He also noted himself that cardia length alone does not allow distinction of the two species. Furthermore, the illustrations of *P. arctus* by TRUSKOVA (1976) do not depict a very long bulbus-and-cardia, as we measure this to be 25 μm on her Fig. 2.1.

All these points suggest to us that *P. arctus* cannot be properly diagnosed on the grounds proposed by ZELL (1993), and that ANDRÁSSY's synonymisation of *P. arctus* with *P. armatus* is probably correct. However, a further complication arises through *Ceratoplectus amoenus* ANDRÁSSY, 1989, which was synonymised with *P. arctus* by ZELL (1993). Extending our line of reasoning, we think *C. amoenus* is another synonym of *P. armatus*, also because this fits in with the idea that *P. armatus* is both cosmopolitan (ANDRÁSSY, 1984) and morphologically variable (ZELL, 1993; our data).

***Plectus (Plectus) cryptoptychus* sp.n.**
(Fig. 2A-G; 3)

TYPE LOCALITY AND HABITAT

Sampling locality 4 (13 ♀♀, 14 JJ) : at 630 m altitude on N slope of Los Gemelos, Isla Santa Cruz, Galápagos, Ecuador. Clearing in *Scalesia*-forest with grasses and sedges. Three females from this locality were studied with SEM.

OTHER LOCALITIES

Isla Fernandina : Sample 19 (1 ♀, 1 J); Isla Santa Cruz : Samples 5 (1 J) and 8 (2 JJ); Isla Floreana : Sample 15 (2 ♀♀, 1 J).

TYPE SPECIMENS

Holotype and three paratype ♀♀ deposited as slide RIT 443 in the collection of the KBIN, Brussels, Belgium; ten paratype ♀♀ kept in the Nematode Collection of the Instituut voor Dierkunde, Universiteit Gent, Belgium (slides 3781-3788); three paratype ♀♀ deposited in the USDA Nematode Collection, Beltsville, Maryland, USA.

ETYMOLOGY

The specific epithet is a latinised contraction of the greek adjective "κρυπτός" (= "hidden") with the greek noun "πτυχή" (= "fold") and refers to the inconspicuous cuticular folds in the vagina of this species.

MEASUREMENTS

Table 1 & 3.

Table 3 :
Measurements in μm of *Plectus (Plectus) cryptoptychus* sp. n.

Character	Island :	Santa Cruz	Floreana
	Sample :	4	19
	Holotype ♀	Paratypes (10 ♀♀)	1 ♀
Length	611	620 ± 20 (581-641)	575
Body width	34	32 ± 2 (29-34)	25
Pharynx	139	145 ± 8 (130-155)	150
Tail length	69	73 ± 4 (67-80)	70
Anal body width	17	15-19	21
a	18	18-21	23.0
b	4.4	4.3 ± 0.2 (3.9-4.6)	3.8
c	8.9	8.5 ± 0.4 (8.0-9.0)	8.2
c'	4.1	4.3 ± 0.2 (3.9-4.7)	5.0
stoma	22	22 ± 1 (19-25)	21
corpus	48	50 ± 4 (44-57)	54
isthmus	47	49 ± 3 (43-54)	52
bulbus	20	20-23	23
cardia	8	7.5 ± 1 (5-9)	10
nerve ring	75	76 ± 3 (70-81)	79
excretory pore	85	88 ± 5 (80-97)	95
deirid	90	91 ± 6 (83-101)	90
nerve ring (% neck)	54	52 ± 2 (48-55)	53
excretory pore (% neck)	61	61 ± 2 (58-64)	63
deirid (% neck)	65	63 ± 2 (60-66)	60
V (%)	50	48 ± 1 (46-50)	49
G ₁ (%)	13	13 ± 1 (11-15)	7.5
G ₂ (%)	13	13 ± 1 (9-14)	9
rectum	15	14 ± 1 (12-16)	16
vagina	9	7-10	9

◁ Fig. 2. – *Plectus (Plectus) cryptoptychus* sp.n. (females only) – A. holotype. – B. anterior end of holotype in median view (*s* = extent of stoma; *dgo* = dorsal gland orifice). – C. anterior end in surface view of paratype. – D. neck region in median view of same paratype. – E, G. vagina region. – F. tail. *Plectus (Ceratoplectus) armatus* (BÜTSCHLI, 1873) ANDRÁSSY, 1984 – H, I. anterior end with resp. closed and open mouth. – J-M. bulbus, cardia and intestinal extension of cardia.

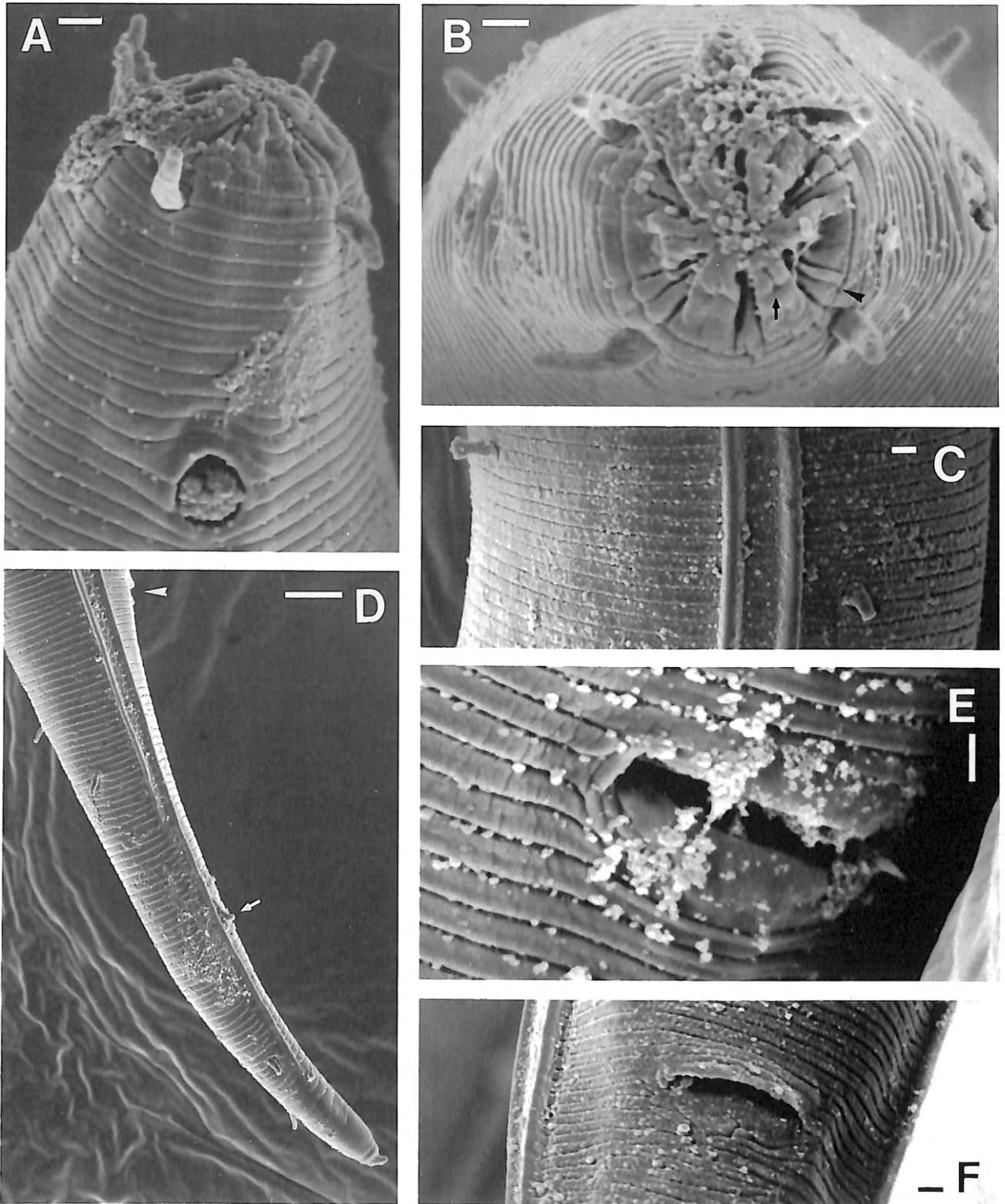
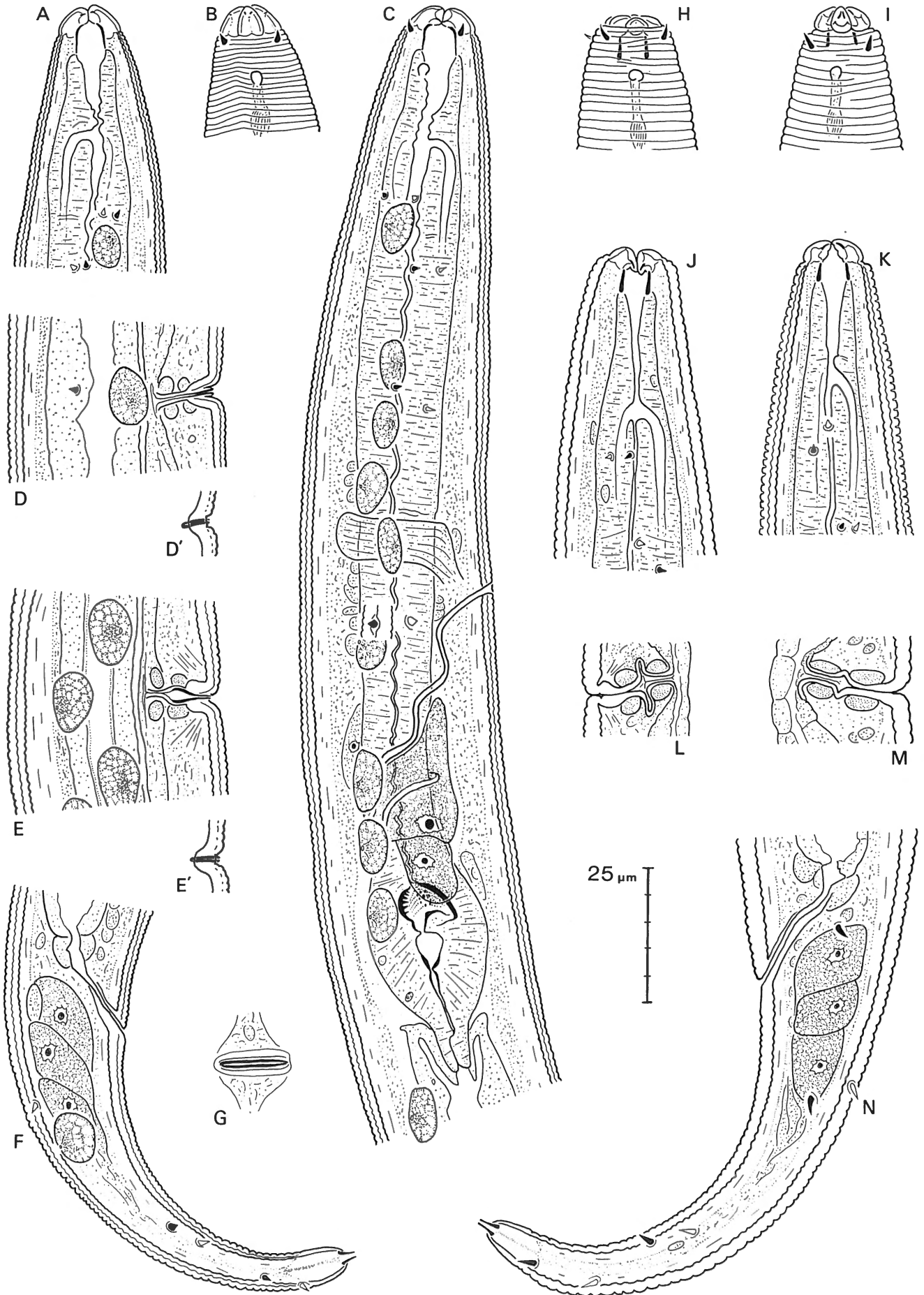


Fig. 3. – *Plectus (Plectus) cryptoptychus* sp.n. (females only) – A. anterior end. – B. lip region (arrowhead points at radial striae, arrow at outer labial sensilla). – C. lateral field and somatic setae. – D. tail (arrowhead points at anus, small arrow at an indistinct caudal seta). – E. vulva. – F. anus. Scale bar equals 5 μm in D and 1 μm in rest.

Fig. 4. – *Plectus (Plectus) lamproptychus* sp.n. (females only) – A, B. anterior end of holotype in median and surface view. – C. neck region. – D, E. vagina region (D is of holotype). – D', E'. vulva and epiptygmata in submedian view (D' is of holotype). – F. tail. – G. vulva and epiptygmata in ventral view. *Plectus (Plectus) patagonicus* DE MAN, 1904 (females only) – H-K anterior end in surface or median view (lips retracted in H, J; cuticle distinctly "two-layered" in K). – L, M. vagina with variously developed transverse folds. – N. tail.



DESCRIPTION

Females :

Body variously curved to straight upon fixation, tail usually ventrally arcuate but straight in two females. Cuticle 1 μm thick, divided into 0.8-1.0 μm wide annuli. Lateral field consisting of two separate, conspicuous wings that are 4-6 μm apart along most of the body and which fade anteriorly at the level of the corpus. On the tail, the ventral wing almost reaches the tail tip while the dorsal wing does not (Fig. 3D). Neck region with 16-21 somatic setae ($n = 8$) distributed as follows: three or four at the anterior end of the corpus, four at two-thirds of the corpus, two to four near the junction of corpus and isthmus, and six to nine scattered along isthmus and bulb.

Amphids 10-14 μm from anterior end, 2.5-3.5 μm wide, circular to ovoid, each a single coil interrupted by a narrow break. Anterior end with four slender cephalic setae inclined at angles of 30-90° to the body axis, 3-4 μm long and usually reaching the anterior end of the lips. Lip region not offset, 8-10 μm wide, separated from cephalic setae by two annuli, always fixed with lips reclined and oral aperture closed. Lips weakly offset from one another, with radial striae (Fig. 3A, B) that can have a weakly refringent appearance under certain angles and thus accentuate the separation of the lips.

Stoma 3-4 μm wide anteriorly, narrowing abruptly near its posterior end, 2.2-2.8 times as long as LRW. Corpus cylindrical, stout, 0.9-1.2 times as long as isthmus, with a more or less clear transverse break in its walls at 13-16 μm from the base of the stoma. Isthmus stout, surrounded by nerve ring at its anterior end and by secretory-excretory gland cells at its posterior end. Bulb with plectid valves, its base at 0-3 μm from anterior end of intestine. Excretory pore slightly posterior to nerve ring, at 88-99 annuli from anterior end ($n = 11$). Excretory canal distinct down to the gland cells. Deirids setiform, placed in lateral field at 90-105 annuli from anterior end or at 1-7 annuli from excretory pore ($n = 11$).

Vulva fairly conspicuous, at mid-body. Vagina straight or slightly arcuate, occupying less than one third of VBW, with two cuticular flaps extending 2-3 μm outwards from about halfway its length. These flaps probably occur in all females, but are only distinct when the vulval lips are well apart and have not been seen with SEM (Fig. 3E). Reproductive system amphidelphic, with anterior branch on right side of body and posterior branch on left side in eleven females. Ovaries very variable in size and quality of preservation. No female gravid. Rectum 0.7-1.0 times as long as ABW. Tail slender, conical, with four to seven setae of which the terminal one is implanted at 9.5-12.5 μm from its posterior end, and with a distinct, tubular spinneret at its tip.

Male : not found.

DISCUSSION

Differential diagnosis :

Our specimens resemble a large number of known species, but do not agree satisfactorily with any of these. Most relevant are :

a) *Plectus (P.) parvus* BASTIAN, 1865 cannot be distinguished clearly from our specimens on the basis of its original description, which only contains a slightly lower value for L (540 μm versus 575-641 μm) and a slightly higher one for c (10.6 versus 8.0-9.0). Likewise, the descriptions of *P. parvus* by MAGGENTI (1961b), MULK & COOMANS (1978) and ANDRÁSSY (1985) all give a slightly smaller body size and depict a relatively slender stoma, but do not contain any clear difference. We have re-examined some of the animals from Kenya examined by MULK & COOMANS (1978) however, and found that these have far fewer somatic setae (Table 1), a narrower stoma (maximum width 2 μm versus 3-4 μm) and no hint of vaginal flaps. ZELL (1993) also identified the animals from Kenya as *P. parvus*, and on the basis of specimens from 47 localities he described this species with lip region 6-7 μm wide (versus 8-10 μm in the new species) and tail 40-60 μm long (versus 67-80 μm).

b) *Plectus (Ceratoplectus) assimilis* (BÜTSCHLI, 1873) ANDRÁSSY, 1984 as originally described is larger than our new species (L = 0.9 mm versus 575-641 μm) with proportionately shorter pharynx ($b = 6$ versus 3.8-4.6) and tail ($c = 11$ versus 8.0-9.0). However, subsequent descriptions give intermediate values (L = 0.72-0.84 mm, $b = 4-5$, $c = 10.4-13.4$ in MAGGENTI, 1961b; L = 0.67-0.75 mm, $b = 4.4-4.7$, $c = 9.8-10.5$ in ANDRÁSSY, 1985; L = 614-825 μm , $b = 4.1-5.0$, $c = 8.6-13.1$ in ZELL, 1993). Nevertheless, all three authors agree in describing *P. assimilis* with more anterior amphid (between 4 and 10 μm from anterior end, i.e. at the level of the "prostom") than in our species (10-14 μm from anterior end, always well posterior to "prostom") and in depicting the cephalic setae with swollen base (compare Fig. 6D in MAGGENTI, 1961 with Fig. 18A in ANDRÁSSY, 1985, Taf. 13 in ZELL, 1993 and our Fig. 2A-D; 3A, B). Also, the rectum is clearly longer according to MAGGENTI (1961 : 24-28 μm) and ZELL (1993 : 20-30 μm) than in our species (12-16 μm).

c) As originally described, *Plectus (P.) geophilus* DE MAN, 1880 is clearly more slender ($a = 30-35$ versus 18-23) with slightly shorter tail ($c = 10-12$ versus 8-9), while Fig. 71a in DE MAN (1884) furthermore shows that the stoma is more slender in his species. As described by ZELL (1993), *P. geophilus* has a much narrower lip region (4.5-5.5 μm versus 8-10 μm) and shorter tail (29-47 μm versus 67-80 μm).

d) In its original description, *Plectus (P.) sambesii* MICOLETZKY, 1916 is quite similar to our specimens, being only slightly smaller (L = 505-520 μm versus 575-641 μm) and having a more slender stoma (Fig. 4b in MICOLETZKY, 1916). However, we have examined three

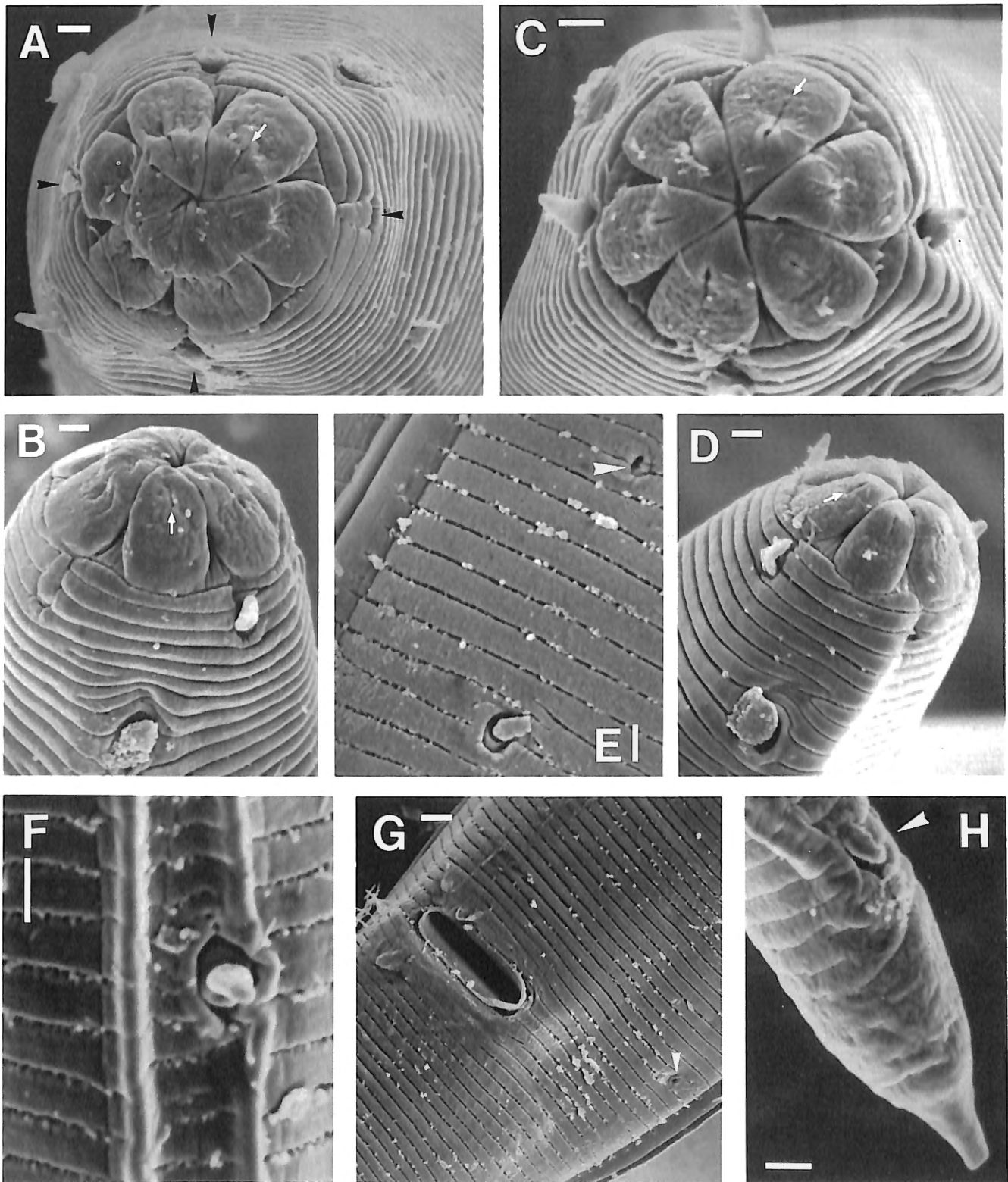


Fig. 5. – *Plectus (Plectus) lamproptychus* sp.n. – A-D. lip region (A, B is of female, C, D of juvenile; arrowheads in A point at cephalic setae, arrows point at slits with outer labial sensilla). – E. lateral field, somatic seta and sublateral gland orifice (arrowhead). – F. lateral field and deirid. – G. vulva. – H. tail tip, end of lateral field and terminal seta (arrowhead). Scale bar equals 2 μ m in G and 1 μ m in rest.

of the specimens described as *P. sambesii* in DE CONINCK (1935), and these have fewer somatic setae (Table 1), more posterior cephalic setae, a proportionately shorter and thicker spinneret (cf. Fig. 9, 10 in DE CONINCK, 1935) and no trace of vaginal folds. ZELL (1993) also identified these animals as *P. sambesii*; while the tail depicted in his Taf. 56 has a long spinneret, he did draw a lip region with setae not reaching anterior lip margins (versus level with anterior margins in our species).

e) *Plectus (P.) opisthocirculus* ANDRÁSSY, 1952 as originally described is more slender ($a = 23-33$ versus $18-23$) with tapering, narrower stoma ($2 \mu\text{m}$ versus $3-4 \mu\text{m}$) and has the amphids opposite the posterior end of the stoma. ANDRÁSSY (1985) gives measurements of less slender specimens ($a = 21-25$), but these have lips with a small protuberance (our specimens have a mediolabial ridge), and a clearly more slender stoma than our animals.

f) While the original description of *Plectus (P.) magadani* KUZ'MIN, 1979 does not reveal very clear differences with our material, the description of ZELL (1993) allows us to distinguish between the new species and *P. magadani*: bulb with valves simple versus *parietinus*-like; lip region very low and setae level with anterior margin of lips, versus lips higher and extending well anterior to setae (cf. Taf. 48 in ZELL, 1993).

g) *Plectus (P.) zelli* TAHSEEN *et al.*, 1992 agrees well with our animals in measurements, but differs i.a. in having a much more slender stoma, cephalic setae not reaching the anterior lip margins, and lips without radial striae (Fig. 1B, C; 2A-C in TAHSEEN *et al.*, 1992. Also, the rectum is $17.5-20.5 \mu\text{m}$ long according to ZELL (1993), versus $12-16 \mu\text{m}$ in our animals.

h) As originally described, *Plectus (P.) pulcher* ZELL, 1993 has a proportionately longer tail than our species ($c' = 6.5-8.6$ versus $3.9-5.0$), a "free" cardia (versus wholly embedded in intestine or nearly so), and cephalic setae not reaching the anterior lip margins (versus level with margins).

i) *Plectus (P.) similis* ZELL, 1993 has the stoma clearly narrower than the amphid at the level of this organ, cephalic setae not reaching the anterior lip margins and fewer somatic setae in the neck region (five on right side in Taf. 60 of ZELL, 1993). Our animals have a stoma as wide as the amphid, cephalic setae reaching the lip margins and eight to ten setae on each side of the neck.

***Plectus (Plectus) lamproptychus* sp.n.**
(Fig. 4A-G; 5)

TYPE LOCALITY AND HABITAT

Sample locality F3 (6 ♀♀, 2 JJ): at 1530 m altitude near caldera on Cerro Azul, Isla Isabela, Galápagos, Ecuador. Soil from dry scrubs above inversion zone. One female and two juveniles studied with SEM.

TYPE SPECIMENS

Holotype and one paratype ♀ deposited as slide RIT 444 in the collection of the KBIN, Brussels, Belgium; two paratype ♀♀ kept in the Nematode Collection of the Instituut voor Dierkunde, Universiteit Gent, Belgium (slide 3780); one paratype ♀ deposited in the USDA Nematode Collection, Beltsville, Maryland, USA.

ETYMOLOGY

The specific epithet is a latinised contraction of the greek adjective "λαμπρός" (= "bright, clear") with the greek noun "πτυχή" (= "fold") and refers to the refringent cuticular folds in the vagina of this species.

MEASUREMENTS

Table 1 & 4.

Table 4 :
Measurements in μm of *Plectus lamproptychus* sp. n. (sample F3)

Character	Holotype ♀	Holotype and paratypes (6 ♀♀)
Length	889	805 ± 54 (721-889)
Body width	40	42 ± 5 (35-40)
Pharynx	190	184 ± 5 (174-190)
Tail length	93	79 ± 8 (71-93)
Anal body width	23	22 ± 2 (18-24)
a	22	19 ± 2 (17-22)
b	4.7	4.4 ± 0.2 (4.1-4.7)
c	9.6	10.3 ± 0.9 (9.4-11.9)
c'	4.1	3.7 ± 0.4 (3.0-4.1)
stoma	24	24-26
corpus	67	67 ± 2 (64-70)
isthmus	64	61 ± 4 (55-65)
bulbus	27	27 ± 2 (25-30)
cardia	13	10.5 ± 2 (7-13)
nerve ring	98	97 ± 3 (93-100)
excretory pore	107	107 ± 3 (103-110)
deirid	113	113 ± 2 (110-116)
nerve ring (% neck)	52	52-54
excretory pore (% neck)	56	56-53
deirid (% neck)	59	61 ± 1 (59-63)
V (%)	46	49 ± 2 (46-51)
G ₁ (%)	11	10-13
G ₂ (%)	11	9-12
rectum	23	22 ± 1 (20-24)
vagina	13	10-13

DESCRIPTION

Body moderately to strongly ventrally curved upon fixation, with tail curvature strongest. Cuticle 2-3 μm thick, consisting of two distinct layers, divided into 1.1-1.5 μm wide annuli. Lateral field consisting of contiguous, areolated wings, 4-5 μm wide along most of the body and fading anteriorly at the level of the corpus and posteriorly on the tail (both wings almost reaching tail tip). Lateral chord with numerous well-developed epidermal glands lying in an irregular zig-zag line. On each side of the body, there are 8-10 such glands in the neck region, 12-21 from cardia to vulva, 19-25 from vulva to anus (except in the smallest female, where there are 21 glands on the left but only 9 on the right), and 0-2 in the tail. In total the smallest female has 62 glands while the others have 83-106 glands. Neck region usually with only six somatic setae ($n = 5$): one dorsosublateral pair and two ventrosublateral pairs at the level of the corpus. However, one female has an additional pair of subventral setae opposite the bulb. Amphids 10-13 μm from anterior end, 2 μm wide, circular with a posterior break. Anterior end with four squat cephalic setae that are 2-3 μm long, point anterior and fit into four cuticular depressions (Fig. 5A-D). Lip region contiguous or offset by a slight constriction, 11-12 μm wide, separated from cephalic setae by two annuli, fixed with lips reclined and oral aperture closed. Lips strongly offset from one another, with inner labial sensilla that touch the other lips over the closed oral aperture and with outer labial sensilla located in a radial slit on each lip (Fig. 5A-C). Stoma 4.5-5.5 μm wide anteriorly, narrowing abruptly near its posterior end, 2.1-2.3 times as long as LRW. Corpus cylindrical, fairly squat, 1.0-1.3 times as long as isthmus, without a clear transverse break in its walls. Isthmus fairly squat, surrounded by nerve ring at its anterior end and by secretory-excretory gland cells at its posterior end. Bulb with ornate valves carrying rows of fine denticles, its base at 0-2 μm from anterior end of intestine. Cardia embedded. Excretory pore slightly posterior to nerve ring, at 86-91 annuli from anterior end. Excretory canal clear down to the gland cells. Deirids setiform, placed in lateral field at 90-95 annuli from anterior end, or at three to six annuli from excretory pore. Vulva conspicuous, at mid-body. Vagina straight, occupying about one-fourth to one-third of VBW, with the distal walls extending into two cuticular folds that are at least 1.5 μm long and were seen with SEM (Fig. 5G). The rims of these folds are refringent in such a way that two refringent lines appear in submedian view of the vagina (Fig. 4D', E'). Reproductive system amphidelphic, always with anterior branch on right side of body and posterior branch on left side. No females with eggs or sperm. Rectum 1.0-1.2 times as long as ABW. Tail conical, with five or six setae of which the terminal one is implanted at 7-11 μm from its posterior

end, and with a distinct, tubular spinneret at its tip.

Male : not found.

DISCUSSION

Differential diagnosis :

To our knowledge, presence of a clearly "two-layered" cuticle and a vagina with epiptygmata and refringent margins have not been specified in any previous description of a *Plectus* species. In other respects, our animals resemble two described species :

a) Following MAGGENTI (1961b) and ANDRÁSSY (1985), our species keys out as *P. (P.) parietinus* BASTIAN, 1865. However, ZELL (1993) re-examined the neotype established by MAGGENTI (1961b) for *P. parietinus*, and concluded from this and other material that it is characterized by 6-13 epidermal glands on each side of the body between vulva and anus (versus 19-25, with an exceptional 9 at one side of the body, in our animals). Also, he describes it with longer body ($L = 933$ - $1522 \mu\text{m}$ versus 712 - $889 \mu\text{m}$) and pharynx (230 - $360 \mu\text{m}$ versus 174 - $190 \mu\text{m}$) and depicts it with more somatic setae in the neck region (eight on left side in his Taf. 36, versus only three or four in our animals).

b) ZELL (1993) groups the *Plectus* species with distinct epidermal glands around *P. parietinus*, and according to his key our species would be identified as *P. (P.) australis* COBB, 1898. The original description by COBB (1898) specifies that in this species "the cephalic setae ... grow at right angles to the cuticle and have a length about equal to the diameter of the lips" and that "the cardia is more than half as long as the bulb". Neither agrees with our animals. Also, ZELL (1993) describes *P. australis* with longer body ($L = 1284$ - $1826 \mu\text{m}$ versus 712 - $889 \mu\text{m}$ in our population), pharynx (248 - $366 \mu\text{m}$ versus 174 - $190 \mu\text{m}$), rectum (28 - $37 \mu\text{m}$ versus 20 - $24 \mu\text{m}$) and tail (97 - $146 \mu\text{m}$ versus 71 - $93 \mu\text{m}$). In comparison with Taf. 31; 32 in ZELL (1993) our animals further have a "prostom" that is wider and longer in proportion to the "meso-metastom", as well as a different distribution of the somatic setae on the neck region (two opposite corpus and two opposite isthmus on right side of body in Taf. 32 in ZELL, 1993, versus three opposite corpus on each side of the body in our specimens).

***Plectus (P.) galapagensis* sp.n.**

(Fig. 7E-I; 8A-F)

TYPE LOCALITY AND HABITAT

Sampling locality D5 (5 ♀♀, 2 juv), taken at 5 m alt. in littoral zone of Isla Santa Fé, Galápagos, Ecuador. Light sand around roots of *Cryptocarpus*. Three females and one juvenile from sample D5 were studied with SEM.

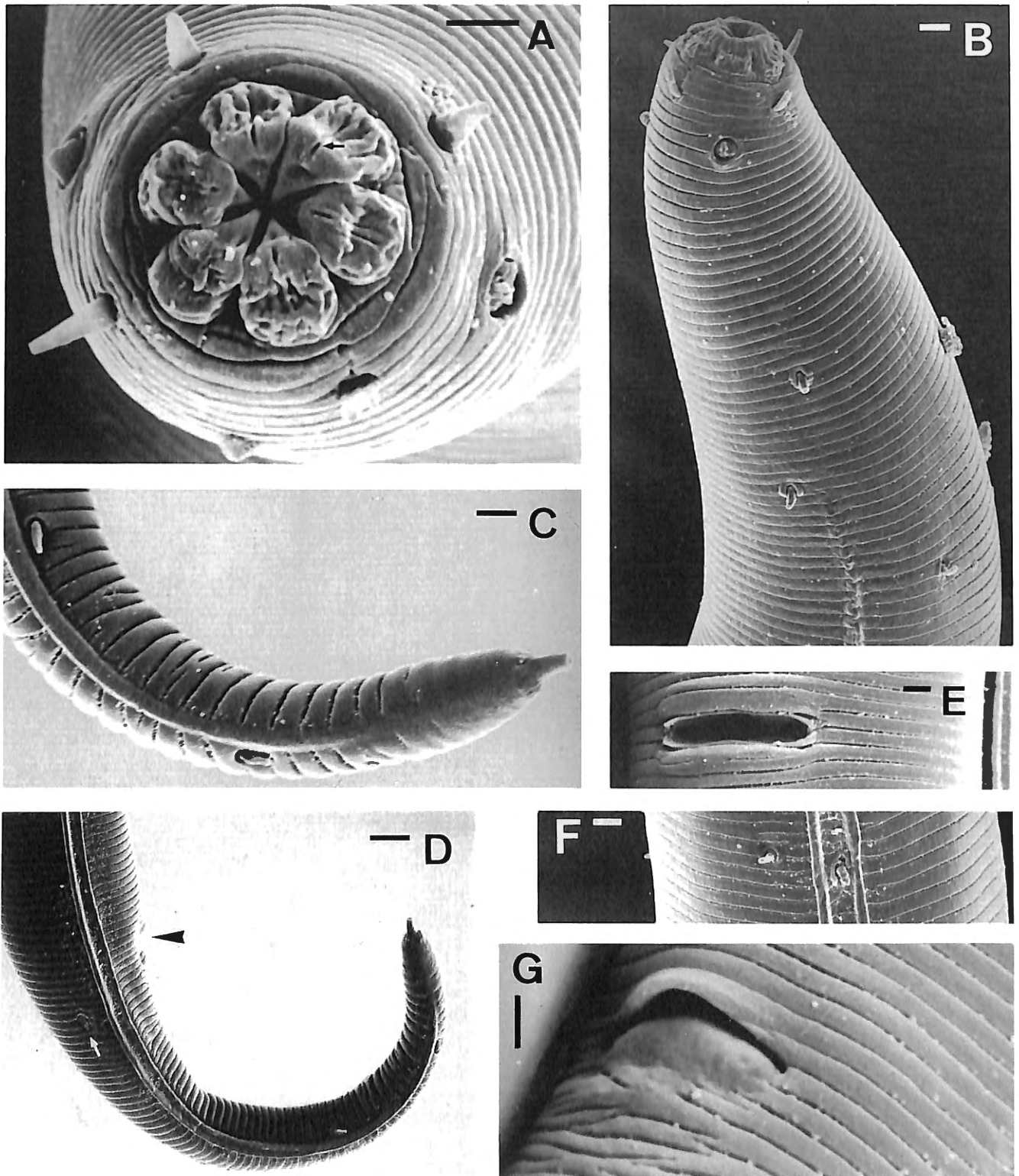
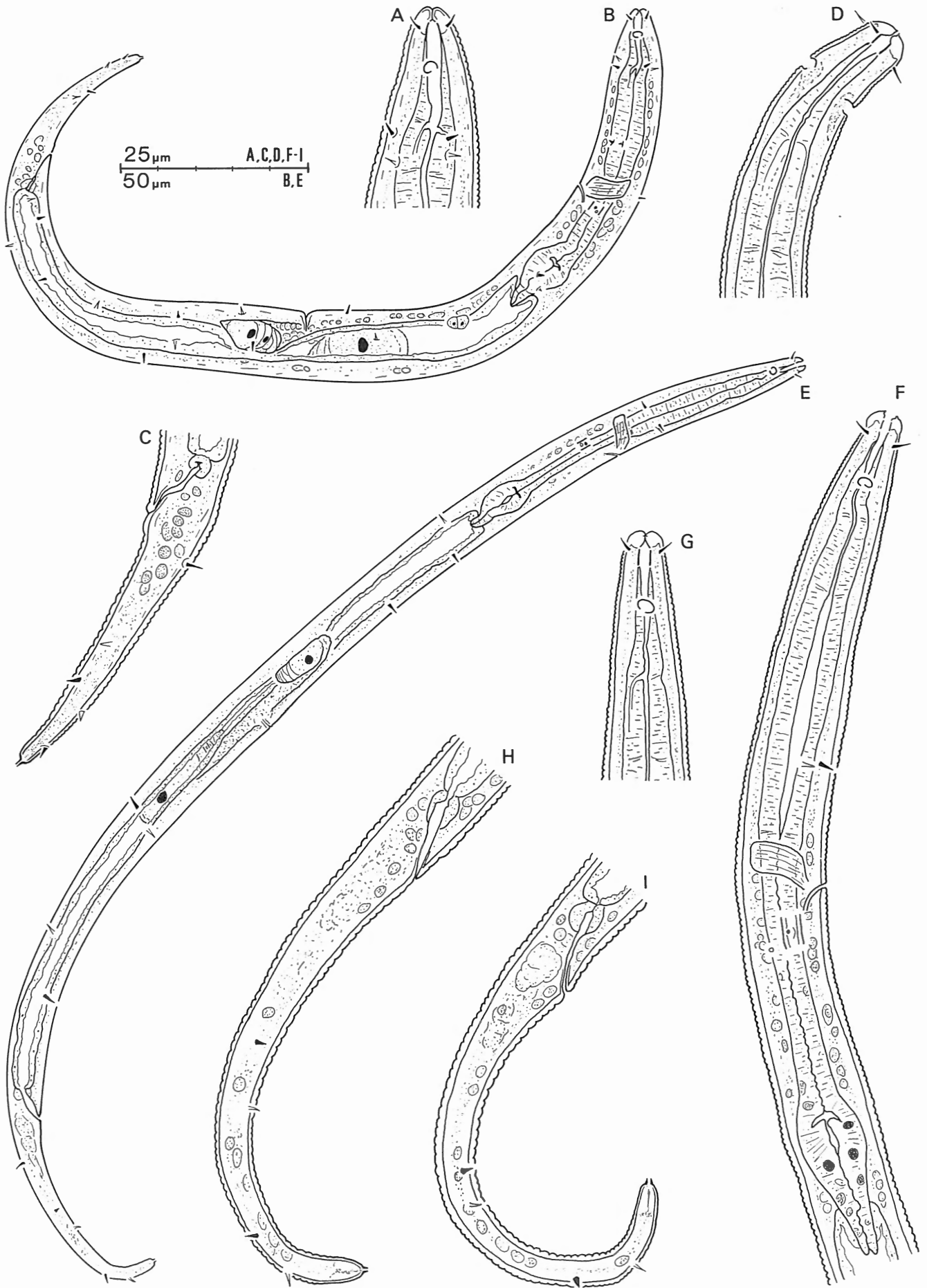


Fig. 6. – *Plectus (Plectus) patagonicus* DE MAN, 1904 (females only) – A. lip region. – B. anterior neck region, with setae of the first three somatic pairs and beginning of lateral field. – C. tail terminus. – D. tail (arrowhead points at anus, arrow at an indistinct caudal seta). – E. vulva. – F. lateral field with deirid and an accompanying somatic seta. – G. anus. Scale bar equals 5 μm in D and 2 μm in rest.

Fig. 7. – *Plectus (Plectus) tropicus* ZELL, 1993 (females only) – A. anterior end in median view. – B. entire female. – C. tail. \triangleright
Plectus (Plectus) sp. cf. longicaudatus BÜTSCHLI, 1873 – D. anterior end in ventral view. *Plectus (Plectus) galapagensis* sp.n. (females only) – E. entire female. – F. neck region of holotype. – G. anterior end in median view. – H, I. tail (I is of holotype).



OTHER LOCALITIES

Isla Fernandina : Sample D3 (1 J); Isla Santa Cruz : Samples 1 (1 ♀), 3 (1 ♀, 1 J), 4 (2 ♀♀), D2 (1 ♀); Isla Floreana : Sample F4 (1 ♀); Isla Santa Fé : Sample D4 (1 ♀).

TYPE SPECIMENS

Holotype and one paratype ♀ deposited as slides RIT 445 and RIT 446 in the collection of the KBIN, Brussels, Belgium; five paratype ♀♀ kept in the Nematode

Collection of the Instituut voor Dierkunde, Universiteit Gent, Belgium (slides 3789-3793); two paratype ♀♀ deposited in the USDA Nematode Collection, Beltsville, Maryland, USA.

ETYMOLOGY

The specific epithet is a latinised toponym.

MEASUREMENTS

Table 1 & 5.

Table 5 :

Measurements in μm of *Plectus (Plectus) galapagensis* sp.n. and *Plectus (Plectus) sp. cf. longicaudatus* BÜTSCHLI, 1873

Island :	<i>Plectus galapagensis</i>							<i>Plectus sp.</i>	
	Santa Cruz				Floreana	Santa Fé		Santa Cruz	
	Sample :	1	3	4	D2	F4	D4	D5	
Character	1 ♀	1 ♀	2 ♀♀	1 ♀	1 ♀	1 ♀	Holotype	4 ♀♀	1 ♀
Length	413	415	419-454	445	458	456	448	370-464	535
Body width	12	16	19-20	17	14	16	12	11-16	14
Pharynx	109	105	103-110	115	119	120	116	104-126	138
Tail length	71	62	68-72	65	69	70	73	62-74	61
Anal body width	9	8	9	9	10	8	8	7-8	12
a	33	26	22-23	26	32	30	37	27-42	38
b	3.8	3.9	4.1	3.9	3.9	3.8	3.9	3.6-3.9	3.9
c	5.8	6.7	6.2-6.3	6.8	6.6	6.5	6.1	6.0-6.4	8.8
c'	7.9	7.7	7.6-7.8	7.2	6.9	8.8	9.2	7.7-9.6	5.1
stoma	12	13	16-19	16	19	15	18	16-20	21
corpus	44	41	38-40	43	42	46	42	35-45	51
isthmus	36	33	34-35	36	39	40	38	33-41	44
bulbus	11	10	10-11	13	12	12	12	12-15	19
cardia	12	11	7-9	10	11	11	7	7-13	7
nerve ring	59	56	58-60	63	65	64	67	54-67	74
excretory pore	63	59	61-67	71	72	72	70	58-74	85
deirid	70	70	70-75	77	82	81	81	64-81	87
nerve ring (% neck)	54	53	54-56	55	55	53	58	51-58	54
excretory pore (% neck)	58	56	59-61	62	61	60	60	56-60	62
deirid (% neck)	64	66	68	67	69	67	70	62-70	63
V (%)	47	49	47-48	48	49	47	51	47-51	53
G ₁ (%)	9	8	9-13	5	7	7	6	6-11	5
G ₂ (%)	6.5	11	7-12	8	7	10	6	3-11	6.5
rectum	12	12	12-15	11	11	11	12	10-14	12
vagina	4	5	?	5	4	?	5	4-5	5

DESCRIPTION

Females :

Body usually weakly ventrally curved upon fixation, with curvature increasing towards the posterior end. Cuticle less than 1 μm thick, finely divided into 0.6-0.8 μm wide annuli that may carry secondary striae. Lateral field consisting of two separate, inconspicuous wings that are 2-3 μm apart along most of the body and which fade anteriorly at the level of the corpus and posteriorly on the tail (ventral wing approaching tail tip). Neck region with only two or three somatic setae, located at the level of the corpus.

Amphids 7-10 μm from anterior end, circular to kidney-shaped, the rim of each amphid forming a refringent single coil that is interrupted by a narrow dorso-posterior break. Anterior end with four cephalic setae that are 2-3 μm long and are inclined at an angle of up to 60° to the body axis. Lip region 4-5 μm wide, separated from cephalic setae by two annuli, usually fixed with lips raised and oral aperture open, occasionally fixed with lips reclined and oral aperture closed. Lips minute but deeply offset from one another, each with a small, pointed, non-refringent apical projection near its tip (inner labial papilla ?) and a minute (outer ?) labial sensillum on an otherwise smooth lip surface (Fig. 8A, B).

Stoma 1-1.5 μm wide anteriorly, narrowing posteriorly, 2.6-3.9 times as long as LRW. Corpus cylindrical, relatively slender, 1.0-1.3 times as long as isthmus, with a faint transverse break in its walls at 7-12 μm from the base of the stoma. Isthmus slender, surrounded by nerve ring at its anterior end and by secretory-excretory gland cells at its posterior end. Bulb with plectid valves, its base at 5-8 μm from anterior end of intestine. Excretory pore slightly posterior to nerve ring, at 87-89 annuli from anterior end ($n = 4$: annuli near lip region usually too fine to count). Excretory canal fading rapidly proximally. Deirids setiform, placed in lateral field at 97-99 annuli from anterior end ($n = 4$) or at 7-12 annuli from excretory pore ($n = 8$).

Vulva inconspicuous, at mid-body. Vagina straight, extending over about one third of VBW. Reproductive system amphidelphic, with anterior branch on right side of body and posterior branch on left side in ten females, but with both branches on right side of body in one female. Ovaries very variable in size and quality of preservation. One female gravid: its single egg measuring 48 by 15 μm . Rectum 1.0-1.7 times as long as ABW. Tail slender, subcylindrical, with five setae of which the terminal one is implanted at 8-12 μm from its posterior end, and with a small, tubular spinneret at its tip.

Male : not found.

DISCUSSION

Differential diagnosis :

a) In most measurements, the new species is identical with *Plectus (P.) longicaudatus* BÜTSCHLI, 1873 as redescribed by MAGGENTI (1961b), except for being slightly smaller ($L = 370\text{-}464 \mu\text{m}$ versus 450-650 μm) with a slightly shorter rectum (10-15 μm versus 15-20 μm). However, *P. longicaudatus* has a wider lip region with broader stoma (respectively 8 μm and 2 μm in Fig. 8A in MAGGENTI, 1961b, versus 4-5 μm and 1-1.5 μm in our animals), longer cephalic setae (4-5 μm versus 2-3 μm) that are more anteriorly directed, and a narrower tail tip (less than one fourth anal width in Fig. 8B in MAGGENTI, 1961b versus one third anal width in our species). These differences also appear from comparison with the description of *P. longicaudatus* in ANDRÁSSY (1985) and ZELL (1993).

b) Compared to the original description of *Plectus (P.) geophilus* DE MAN, 1880 our species is slightly smaller ($L = 370\text{-}464 \mu\text{m}$ versus 530 μm) with proportionately longer tail ($c = 5.8\text{-}6.8$ versus 10-12). According to ZELL (1993), *P. geophilus* has $L = 345\text{-}473 \mu\text{m}$, $c = 8.2\text{-}12.9$, $c' = 3.9\text{-}6.4$, and tail length 29-47 μm (versus $c = 5.8\text{-}6.8$, $c' = 6.9\text{-}9.6$, tail = 62-74 μm in *Plectus galapagensis* sp. n.).

c) As first described, *Plectus (P.) opisthocirculus* ANDRÁSSY, 1952 can be differentiated from our species by the proportionately shorter tail ($c = 5.8\text{-}6.8$ versus 8.2-10.3 and $c' = 4.5\text{-}5.3$ versus 6.9-9.6). Comparing with the description of *P. opisthocirculus* in ANDRÁSSY (1985), the new species also has a narrower lip region (4-5 μm versus 6.5-7 μm). According to ZELL (1993), *P. opisthocirculus* has a lip region 7-8 μm wide, $c = 7.3\text{-}9.5$ and $c' = 4.3\text{-}6.1$, while the amphids lie at 12.5-17 μm from the anterior end (versus 7-10 μm in our species) and the cardia is embedded in the intestine (versus "free").

d) Our specimens are similar to *Plectus (P.) inquirendus* as originally described by ANDRÁSSY (1958), but differ in their smaller size ($L = 370\text{-}464 \mu\text{m}$ versus 624-803 μm), relatively longer tail ($c = 5.8\text{-}6.8$ versus 8.8-9.1) that is proportionately less slender ($c' = 7\text{-}10$ versus 10-12), more anterior amphids (7-11 μm from anterior end versus 15-19 μm ; cf. Abb. 19A,B in ANDRÁSSY, 1958) and far fewer somatic setae in the neck region (two or three versus at least eleven - cf. Abb. 19B in ANDRÁSSY, 1958). While the differences in measurements alone might be due to variability, we think the difference in setation proves that our specimens are not *P. inquirendus*. In support of this, ZELL (1993) described *P. inquirendus* with $L = 543\text{-}739 \mu\text{m}$, lip region 7-8 μm wide (versus 4-5 μm), amphids 12-16.5 μm from anterior end (versus 7-10 μm), pharynx 151-186 μm long (versus 103-126 μm), tail 101-123 μm long (versus 62-74 μm) and terminal seta at 17-24.5 μm from posterior end (versus 8-12 μm).

e) Another species similar to our animals is *P. exinocaudatus* TRUSKOVA, 1976, which differs slightly in a number of measurements according to its original description (L = 340 μm versus 370-464 μm ; b = 3.0 versus 3.6-4.1; c = 5.6 versus 5.8-6.8; V = 44 % versus 47-51 %) and clearly in having a shorter rectum (6.5 μm versus 10-15 μm) as well as seven pairs of caudal setae (five caudal setae in our specimens). Fig. 1.10 in TRUSKOVA (1976) also suggests that *P. exinocaudatus* has an embedded cardia (versus "free"), and a very low corpus/isthmus-ratio (we measure it as 0.5, versus 1.0-1.3 in our specimens), which would be extremely unusual if correct. ANDRÁSSY (1985) described *P. exinocaudatus* on the basis of specimens from Hungary, and his material could well be conspecific with ours, or with that of ZELL (1993) discussed below. We re-examined the specimen from the Solomon Islands identified as *P. exinocaudatus* by COOMANS *et al.* (1985), and found that it has five caudal setae and only two somatic setae in the neck region. Other somatic setae were not clear, but we suspect this female to be the same species as our animals. We also examined one of the females (the one from Virelles, Belgium) described as *P. exinocaudatus* by ZELL (1993). This specimen agrees with our animals in many respects, but appears to have an embedded cardia (versus "free") and a different arrangement of the neck setae: in our specimens, there are just two or three setae posterior to the stoma, but in the Belgian female there is a quartet posterior to the stoma, a ventrosublateral pair just below the lateral field near the posterior end of the corpus, and a dorsosublateral pair within (!) the lateral field at 5 μm anterior to the deirids. The body cuticle posterior to the cardia was not preserved well enough to count setae reliably.

We do not think the descriptions of ANDRÁSSY (1985), COOMANS *et al.* (1985) and ZELL (1993) really deal with *P. exinocaudatus*, because of the explicit reference to seven pairs of elongate caudal setae in TRUSKOVA (1976), a feature never mentioned elsewhere. Furthermore, even if ZELL (1993) did identify his material correctly, our specimens must be considered to represent a different species.

f) A close relative appears to be *P. minutus* MAGGENTI *et al.*, 1990. This species is slightly larger (L = 499-642 μm versus 370-464 μm), has a slightly wider and differently structured lip region (7-9 μm versus 4-5 μm ; compare Fig. 2A-C in MAGGENTI *et al.*, 1990 with our Fig. 8A, B), a proportionately broader stoma (compare Fig. 1A in MAGGENTI *et al.*, 1990 with our Fig. 7G, F), and its deirids are apparently situated dorsally of the lateral field instead of within it. ZELL (1993) considered *P. minutus* to be synonymous with *P. longicaudatus*.

g) Finally, *Plectus (P.) fragilis* ZELL, 1993 differs from our material in the wider lip region (6.5-7 μm versus 4-5 μm), the wider stoma and pharynx (compare Tab. 24 in ZELL, 1993 with our Figs 6G, F), the cephalic setae reaching the anterior lip margins (not so in our species),

the more numerous somatic setae in the neck region (four on right side in Taf. 24 in ZELL, 1993, versus only one or two on each side) and the terminal seta implanted at 12-17 μm from the posterior end (versus 8-12 μm).

***Plectus (P.)* sp. cf. *longicaudatus* BÜTSCHLI, 1873**
(Fig. 7D)

LOCALITY

Isla Santa Cruz : Sample 11 (1 ♀).

MEASUREMENTS

Table 1 & 5.

DESCRIPTION

Female :

Body ventrally arcuate near lip region and between vulva and anus, straight between lip region and vulva. Cuticle less than 1 μm thick, finely divided into 0.7 μm wide annuli. Lateral field 2 μm wide, consisting of two adjacent, conspicuous wings which fade anteriorly at the level of the corpus and posteriorly on the tail. Neck region with six somatic setae located as follows: two dorsosublaterally near the anterior end of the corpus, two sublaterally near the base of the corpus (position relative to lateral field uncertain), and two (one ventral, one dorsal) near the base of the isthmus.

Amphids 11 μm from anterior end, width and shape not certain (seen in ventral view). Anterior end with four cephalic setae that are 2 μm long and are inclined at straight angles to the body axis. Lip region not offset, 7 μm wide, fixed with lips reclined and oral aperture closed. Lips weakly offset from one another, each with a non-refracting apical projection (sensillum?).

Stoma 2 μm wide anteriorly, very slender and tapering posteriorly, 3.0 times as long as LRW. Corpus cylindrical, slender, 1.2 times as long as isthmus, with a faint transverse break in its walls at 15 μm from the base of the stoma. Isthmus slender, surrounded by nerve ring at its anterior end and by secretory-excretory gland cells at its posterior end. Bulb with plectid valves, its base at 5 μm from anterior end of intestine. Excretory pore slightly posterior to nerve ring, excretory canal fading rapidly proximally. Deirids setiform, placed in lateral field at 2 annuli from excretory pore. Annuli near lip region too narrow to allow counting of their number down to excretory pore and deirid.

Vulva inconspicuous, at mid-body. Vagina straight, extending over about one third of VBW. Reproductive system amphidelphic, with anterior branch on right side of body and posterior branch on left side. Female not gravid. Rectum as long as ABW, but this may be an artefact of preservation as the anal lips appear to be raised

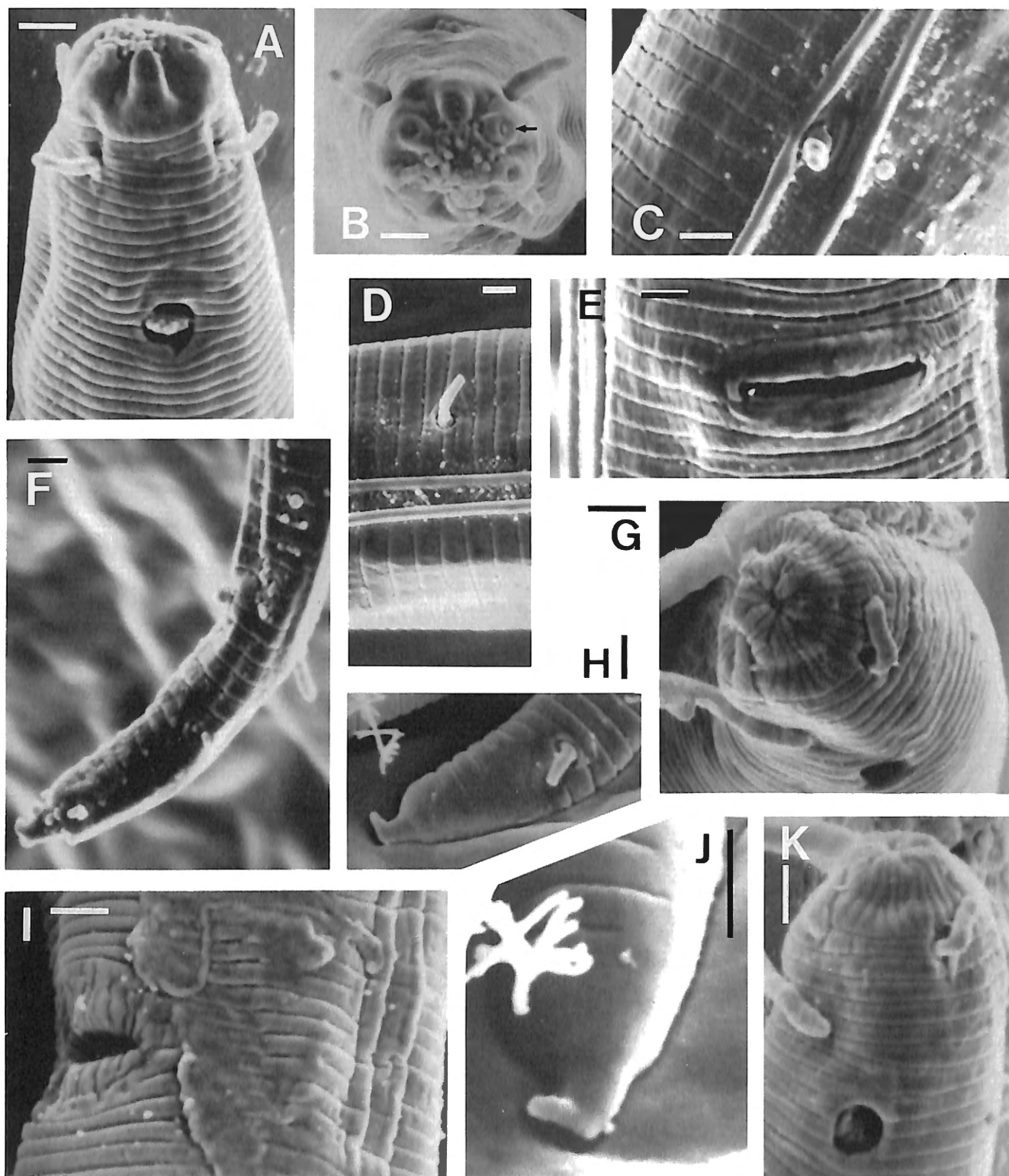


Fig. 8. – *Plectus (Plectus) galapagensis* sp.n. (females only) – A, B. lip region. – C. deirid and lateral field. – D. somatic seta and lateral field. – E. vulva. – F. tail terminus. *Plectus (Plectus) minimus* COBB, 1893 (one female) – G, K. lip region. – H, J. tail tip. – I. vulva and lateral field. Scale bars equal 1 μ m.

unnaturally. Tail subcylindrical, straight, with five setae of which the terminal one is set at 7 μm from the posterior end, and with a small, straight spinneret at the tip.

Male : not found.

DISCUSSION

This single female cannot be identified adequately, as it resembles several known species without agreeing completely with their descriptions :

a) *Plectus (P.) tenuis* BASTIAN, 1865 was originally described with larger body ($L = 770 \mu\text{m}$ versus $535 \mu\text{m}$), longer stoma ($34 \mu\text{m}$ versus $21 \mu\text{m}$) and slightly less slender body ($a = 33$ versus 38). Since DE MAN (1880), however, much larger animals with body sizes of 1 mm or more have always been identified as *P. tenuis* (various authors in ANDRÁSSY, 1985; ZELL, 1993).

b) According to the descriptions in ZELL (1993), *Plectus (P.) longicaudatus* BÜTSCHLI, 1873 and the very similar *P. fragilis* ZELL, 1993 differ from our female in their plumper body ($a = 19.2\text{-}34.9$, resp. $19.5\text{-}33.2$ versus 38), longer tail ($82\text{-}97 \mu\text{m}$, resp. $65\text{-}97 \mu\text{m}$ versus $61 \mu\text{m}$; $c = 5.3\text{-}8.4$, resp. $4.9\text{-}8.1$ versus 8.8 , $c' = 5.9\text{-}10.7$, resp. $5.9\text{-}11.9$ versus 5.1), less slender stoma (cf. Taf. 24-26 in ZELL, 1993) and more anterior terminal seta (at $11\text{-}17$, resp. $12\text{-}17 \mu\text{m}$ versus $7 \mu\text{m}$ from the posterior end). ZELL (1993) apparently proposed *P. fragilis* as a species separate from *P. longicaudatus* only on the basis of a supposedly narrower lip region ($6.5\text{-}7 \mu\text{m}$ versus $7.5\text{-}8.5 \mu\text{m}$), although Taf. 24 in ZELL (1993) also depicts cephalic setae reaching the level of the anterior lip margins in *P. fragilis*, while his Taf. 25 & 26 do not show this condition for *P. longicaudatus*. In our female, it is not clear what occurs exactly, as the setae point sideways and the lips are closed.

c) *Plectus (P.) opisthocirculus* ANDRÁSSY, 1952 was originally described with less slender body ($a = 23\text{-}33$ versus 38) and proportionately somewhat more posterior amphid (cf. Abb. 13a in ANDRÁSSY, 1952) than in our specimen. ANDRÁSSY (1985) describes other specimens that are even plumper ($a = 21\text{-}25$), have the amphids at $12\text{-}14 \mu\text{m}$ from the anterior end ($11 \mu\text{m}$ in our female), and have protruberances on the lip that may be identical to the non-refracting denticles we observed. According to ZELL (1993), *P. opisthocirculus* has an embedded cardia ("free" in our animal) and $a = 20.1\text{-}28.2$ (versus $a = 38$).

d) Compared to the original description of *Plectus (P.) inquirendus* ANDRÁSSY, 1958, our specimen is slightly smaller ($L = 535 \mu\text{m}$ versus $624\text{-}803 \mu\text{m}$) with somewhat more slender body ($a = 38$ versus $33\text{-}34$), shorter tail ($c = 8.8$ versus $5.5\text{-}6.3$, $c' = 5.1$ versus $10\text{-}12$) and with fewer somatic setae in the neck region (6 versus 11 in Abb. 19B in ANDRÁSSY, 1958). In comparison with ZELL (1993), *P. inquirendus* has a longer pharynx ($151\text{-}186 \mu\text{m}$ versus $138 \mu\text{m}$), a longer tail ($101\text{-}123 \mu\text{m}$

versus $61 \mu\text{m}$, $c = 5.3\text{-}6.2$ versus 8.8 , $c' = 7.5\text{-}11.2$ versus 5.1) and a more anterior terminal seta (at $17\text{-}24.5 \mu\text{m}$ from end versus at $7 \mu\text{m}$).

e) The original description of *Plectus (P.) exinocaudatus* TRUSKOVA, 1976 gives many measurements that differ from those of our animal ($L = 340 \mu\text{m}$ versus $535 \mu\text{m}$, $a = 28$ versus 38 , $b = 3.0$ versus 3.9 , $c = 5.6$ versus 8.8 , $c' = 9$ versus 5 , $V = 44\%$ versus 53%). *P. exinocaudatus* also has seven pairs of caudal setae, versus five caudal setae in our specimen. ZELL (1993) describes *P. exinocaudatus* with a narrower lip region ($4\text{-}5 \mu\text{m}$ versus $7 \mu\text{m}$) and an embedded cardia (versus "free").

f) Finally, *P. galapagensis* sp.n. as described above differs from the single female from Santa Cruz in numerous measurements (Table 5) as well as in the number and distribution of somatic setae (Table 1).

In the absence of additional specimens and more detailed information on known species, we identify our specimen as *Plectus* sp.cf. *longicaudatus*.

Plectus (P.) minimus COBB, 1893 (Fig. 8G-K; 9)

LOCALITIES

Isla Santa Cruz : Samples 2 (1 ♀) and 7 (1 ♀); Isla Floreana : Sample 14 (3 ♀♀, 1 J); Isla Fernandina : Samples 17 (1 ♀) and D3 (5 ♀♀, 3 JJ); Isla Santa Fé : Sample D4 (1 ♀).

MEASUREMENTS

Table 6.

DESCRIPTION

Females :

Body strongly ventrally curved upon fixation. Cuticle less than $1 \mu\text{m}$ thick, finely divided into $0.5\text{-}0.8 \mu\text{m}$ wide annuli. Lateral field not discernible with light microscope, found to be reduced in extent under SEM, with two inconspicuous wings that probably originate at the level of the bulbus and which do not reach the level of the anus. Only two somatic setae in neck region, located ventrosublaterally near the base of the corpus ($n = 5$).

Amphids $4\text{-}6 \mu\text{m}$ from anterior end, circular to kidney-shaped, $2 \mu\text{m}$ wide, a single coil interrupted by a narrow break. Anterior end with four cephalic setae that are $2 \mu\text{m}$ long and are usually inclined at an angle of about 60° to the body axis, but occasionally point more forward. Lip region not offset, $4\text{-}5 \mu\text{m}$ wide, always fixed with lips reclined and oral aperture closed. Lips weakly offset from one another, each internally with a small refracting rib (inner labial sensilla?), externally finely radially striated (Fig. 8G, K).

Table 6 :
Measurements in μm of *Plectus (Plectus) minimus* COBB, 1893

Island :	Santa Cruz			Floreana	Fernandina
	Sample :	2	7	D2	14
Character	1 ♀	1 ♀	1 ♀	2 ♀ ♀	2 ♀ ♀
Length	258	253	296	275-328	288-371
Body width	9	12	11	11-12	11
Pharynx	78	78	91	80-99	91-110
Tail length	31	34	35	36-37	34
Anal body width	5	6	7	6-7	7-8
a	29	21	28	24-28	25-31
b	3.3	3.5	3.3	3.3-3.4	3.2-3.4
c	8.2	7.4	8.5	7.5-9.1	8.5-9.7
c'	5.7	5.2	5.0	5.0-5.2	4.5-5.1
stoma	8	10	9	10-12	11-16
corpus	31	28	44	31-36	33-43
isthmus	26	29	30	28-36	32-38
bulbus	9	9	12	9-12	11
cardia	?	8	7	7-9	7-8
nerve ring	43	43	46	41-50	47-57
excretory pore	?	46	46	45-56	49-69
deirid	54	51	56	50-63	56-74
nerve ring (% neck)	55	59	51	51	51-52
excretory pore (% neck)	?	63	59	56-57	54-63
deirid (% neck)	70	70	62	62-64	62-68
V (%)	51	51	51	49-52	52
G ₁ (%)	10.5	7	?	9-10	9
G ₂ (%)	10.5	10	?	6-9	8
rectum	8	9	9	8-11	8-9
vagina	4	4	4.5	3-4.5	4-4.5

Stoma up to 2 μm wide anteriorly, narrowing posterior to the amphids, 2.0-3.4 times as long as LRW. Corpus cylindrical, fairly slender, 1.0-1.5 times as long as isthmus, with a very faint transverse break in its walls at 6-9 μm from the base of the stoma. Isthmus slender, surrounded by nerve ring at its anterior end and by secretory-excretory gland cells at its posterior end. Bulb with plectid valves, its base at 2-4 μm from anterior end of intestine. Excretory pore slightly posterior to nerve ring, at 80-85 annuli from anterior end ($n = 3$: annuli near lip region usually too fine for counting). Excretory canal fading rapidly proximally. Deirids setiform, placed anterior to commencement of lateral field, at 91-95 annuli from anterior end ($n = 3$) or at 8-11 annuli from excretory pore ($n = 4$).

Vulva at mid-body, inconspicuous, usually with lips 1 μm apart, finely striated under SEM (Fig. 8I). Vagina straight, extending over about one third of VBW. Reproductive system amphidelphic, with anterior branch on right side of body and posterior branch on left side in seven females. Ovaries very variable in size and quality of preservation. No eggs. Rectum 1.1-1.7 times as long as ABW. Tail subcylindrical, with four or five setae of which the terminal one lies at 4-7 μm from its posterior end, and with a minute, ventrally curved, probably dysfunctional spinneret at its tip.

Male : not found.

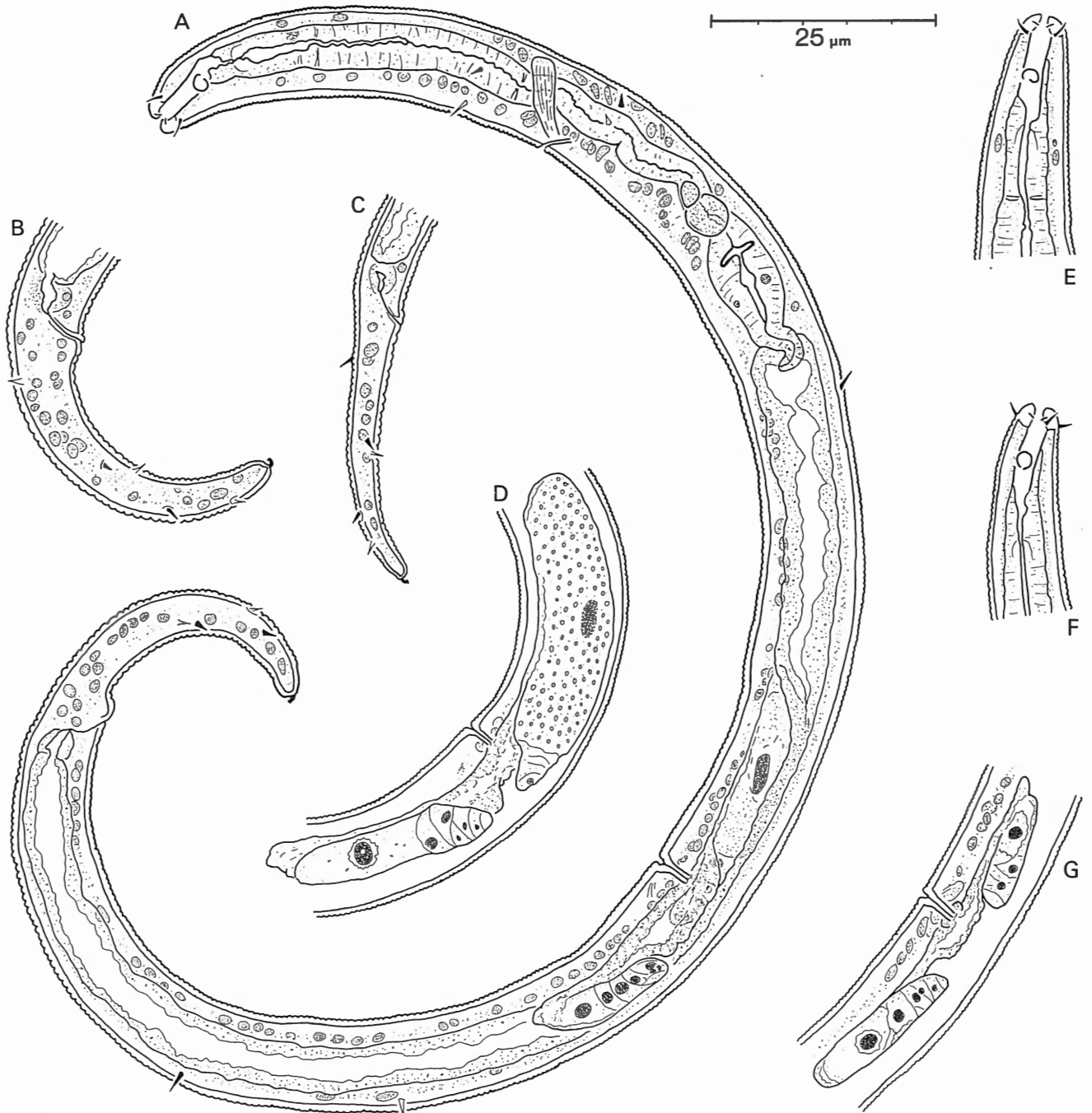


Fig. 9. – *Plectus (Plectus) minimus* COBB, 1893 (females only) – A. entire female. – B, C. tail. – D, G. reproductive system. – E, F. anterior end.

DISCUSSION

Our specimens resemble a number of species first described in the previous century :

a) As originally described, *Plectus (P.) parvus* BASTIAN, 1865 is larger ($L = 540 \mu\text{m}$ versus $253\text{--}371 \mu\text{m}$) with proportionately shorter pharynx ($b = 4$ versus $3.2\text{--}3.5$) and other DE MAN's ratios at the edge of those found in our material ($a = 21$ versus $21\text{--}31$, $c = 11$ versus $7\text{--}10$). More recent and more extensive descriptions (MAGGENTI, 1961b; MULK & COOMANS, 1978; ANDRÁSSY, 1985; ZELL, 1993) are not in complete agreement with one another in all points (e.g. position of the amphid), but do all show the spinneret to be straight. We have seen specimens of *P. parvus* of MULK & COOMANS (1978), and these at least are clearly different from ours, having e.g. more somatic setae (Table 1). Also, according to ZELL (1993) *P. parvus* has a lip region $6\text{--}7 \mu\text{m}$ wide ($4\text{--}5 \mu\text{m}$ in our material), an embedded cardia (versus "free"), a tail $40\text{--}60 \mu\text{m}$ long (versus $31\text{--}37 \mu\text{m}$) and a normal spinneret (versus crooked).

b) Our specimens are close to *Plectus (P.) geophilus* DE MAN, 1880, but in comparison with the data in DE MAN (1880) they are smaller ($L = 253\text{--}371 \mu\text{m}$ versus $530 \mu\text{m}$), slightly less slender ($a = 21\text{--}31$ versus $30\text{--}35$) with proportionately slightly longer tail ($c = 7\text{--}10$ versus $10\text{--}12$). In comparison with Fig. 71-71d of *P. geophilus* in DE MAN (1884) more differences are found : our animals have a stoma 2.0-3.4 times as long as LRW, while *P. geophilus* is depicted with one 4.0 times the LRW; the new species has a "prostom" that is not or hardly distinguishable from the posterior buccal cavity while *P. geophilus* is drawn with prominently offset "prostom"; *P. geophilus* has a proportionately smaller amphid, more posterior vulva ($V = 56\%$ versus $49\text{--}52\%$) and a straight spinneret.

Specimens from Iceland and Spitzbergen identified as *P. geophilus* by DE CONINCK (1944), respectively LOOF (1971), are intermediate between our material and the original description of *P. geophilus* in their main measurements, but do have a more slender stoma and a straight spinneret (Fig. 50, 51 in DE CONINCK, 1944; Fig. 15C, D in LOOF, 1971). In the description of *P. geophilus* in ZELL (1993), the stoma is less slender, the lateral field is $2\text{--}3 \mu\text{m}$ wide (not visible in our specimens) and there are at least three somatic setae on the right side of the neck (Taf. 18 in ZELL, 1993; only one seta on each side of the neck in our material).

c) Upon examination of one female and two juveniles from Zaire from the population described in GERAERT (1962) as *Plectus (P.) minimus* COBB, 1893, we found these to be most probably conspecific with our material. The original description of *P. minimus* gives few details and largely agrees with both our and GERAERT's specimens, but differs in one important respect : the more posterior vulva, with $V = 59\%$ versus $52\text{--}54.5\%$ in GERAERT, 1962 and $49\text{--}52\%$ in our animals). ZELL

(1993), who also studied GERAERT's material, describes *P. minimus* with $V = 50\text{--}53\%$ and lateral field $2 \mu\text{m}$ wide (not discernible in our specimens, but faintly visible and $2 \mu\text{m}$ wide in those of GERAERT, 1962). Taf. 19 in ZELL (1993) does not depict any somatic setae in the neck region, but the tail spinneret does appear to be functional. There is some conflict between the various descriptions, and it is impossible to draw a definite conclusion regarding the identity of our specimens and those of COBB (1893), GERAERT (1962) and ZELL (1993) without collection of topotypes of *P. minimus*. For the moment, we prefer to identify our species as *P. minimus*.

d) As originally described, *Plectus (P.) pusillus* COBB, 1893 is slightly larger ($L = 430 \mu\text{m}$ versus $253\text{--}371 \mu\text{m}$) but not otherwise distinguishable from our specimens. COBB (1893) did not present an illustration of his species. WU & HOEPLI (1929) give $L = 470\text{--}660 \mu\text{m}$ for a population identified as *P. pusillus*, and draw it with slightly swollen lip region, straight spinneret and amphid forming one and a half of a coil. ZELL (1993) describes it with lateral field $2.5\text{--}3.5 \mu\text{m}$ wide (not discernible in our material), $c' = 3.1\text{--}3.9$ (versus $4.5\text{--}5.7$), lip region $6.5\text{--}7.5 \mu\text{m}$ wide (versus $4\text{--}5 \mu\text{m}$), amphids $7.5\text{--}13.5 \mu\text{m}$ from anterior end (versus $4\text{--}6 \mu\text{m}$), cardia embedded (versus "free") and terminal seta $7\text{--}11 \mu\text{m}$ from posterior end (versus $4\text{--}7 \mu\text{m}$). Taf. 59 in ZELL (1993) depicts a normal, straight spinneret (versus crooked).

e) *Plectus (P.) sambesii* MICOLETZKY, 1916 was originally described with larger body ($L = 503\text{--}520 \mu\text{m}$ versus $253\text{--}371 \mu\text{m}$) and longer stoma ($20\text{--}22 \mu\text{m}$ versus $8\text{--}16 \mu\text{m}$) than our specimens, and was also drawn with straight spinneret (Fig. 4a in MICOLETZKY, 1916). These differences are also apparent in the description of *P. sambesii* in DE CONINCK (1935). DE CONINCK's specimens are clearly not conspecific with ours, having e.g. many more somatic setae (Table 1). As described in ZELL (1993), *P. sambesii* has, among other differences, a larger body ($L = 460\text{--}566 \mu\text{m}$ versus $253\text{--}371 \mu\text{m}$), a wider lip region ($7\text{--}8.5 \mu\text{m}$ versus $4\text{--}5 \mu\text{m}$), an embedded cardia (versus "free"), and a longer tail ($54\text{--}75 \mu\text{m}$ versus $31\text{--}37 \mu\text{m}$).

***Plectus (P.) patagonicus* DE MAN, 1904**
(Fig. 4H-N; 6)

LOCALITIES

Isla Fernandina : Samples 17 (1 ♀) and 18 (51 ♀♀, 43 JJ); Isla Isabela : Sample F2 (2 JJ); Isla Santa Cruz : Samples 4 (2 ♀♀, 3 JJ) and 8 (1 J); Isla Floreana : Sample 13 (1 J).

MEASUREMENTS

Table 1 & 7.

Table 7 :
Measurements in μm of *Plectus (Plectus) patagonicus*
DE MAN, 1904

Island :	Santa Cruz		Fernandina	
	Sample :	4	17	18
Character	2 ♀ ♀	1 ♀	15 ♀ ♀	
Length	853-980	980	819 \pm 61 (725-913)	
Body width	41-44	53	43 \pm 7 (33-61)	
Pharynx	201-233	236	198 \pm 8 (187-216)	
Tail length	98-109	112	100 \pm 7 (89-116)	
Anal body width	21-25	27	22 \pm 2 (20-28)	
a	21-22	18	19 \pm 2 (15-23)	
b	4.2	4.2	4.1 \pm 0.2 (3.8-4.5)	
c	8.7-9.0	8.7	8.2 \pm 0.4 (7.4-9.1)	
c'	4.4-4.7	4.1	4.5 \pm 0.4 (3.8-5.2)	
stoma	25-28	28.5	25 \pm 2 (22-28)	
corpus	89-94	91	80 \pm 4 (73-89)	
isthmus	69-77	78	69 \pm 4 (62-74)	
bulbus	29-30	33	32 \pm 4 (26-42)	
cardia	12-13	16	13 \pm 1 (12-16)	
nerve ring	108-130	125	104 \pm 6 (92-117)	
excretory pore	114-152	137	113 \pm 6 (103-131)	
deirid	118-157	139	118 \pm 7 (108-136)	
nerve ring (% neck)	54-56	53	52 \pm 2 (49-55)	
excretory pore (% neck)	57-65	58	57 \pm 2 (53-61)	
deirid (% neck)	59-67	59	59 \pm 2 (55-63)	
V (%)	49-52	51	49 \pm 1 (46-52)	
G ₁ (%)	8-9	13	9 \pm 1 (8-13)	
G ₂ (%)	8-10	11.5	9 \pm 1 (7-13)	
rectum	24-30	27	27 \pm 2 (24-30)	
vagina	14-17	20	15 \pm 2 (12-18)	

DESCRIPTION

Females :

Body weakly to strongly ventrally curved upon fixation, curvature strongest on tail. Cuticle less 2.5-4 μm thick, sometimes with two distinct layers, divided into 1.2-2.1 μm wide annuli. Lateral field 4-6.5 μm wide along most of the body, consisting of two separate wings which fade anteriorly at the level of the corpus and posteriorly on the tail (both approaching tail tip). Neck region with 16-23 somatic setae ($n = 10$): the anteriormost always lie in a pair dorsosublaterally just posterior to the stoma, and are always followed by two dorsosubventral pairs respectively lying at one third and two thirds of the corpus length. More setae are usually present at the

level of the corpus, but there is no clear pattern to their distribution or to that of all subsequent ones.

Amphids 9-13 μm from anterior end, 2-3 μm wide, circular to ovoid, the rim of each amphid forming a refringent single coil with a narrow break. Anterior end with four cephalic setae that are 2.5-3.5 μm long and are inclined at an angle of about 30-60° to the body axis. Lip region well offset, separated from cephalic setae by two or three annuli, 10-12 μm wide, fixed with lips always more or less shutting off oral aperture, reclined or protruding to various degrees. Lips strongly offset from one another, each with a conical tip containing two refringent rods (corresponding with inner labial papilla) and with an outer labial sensillum in a short subapical slit just anterior to a heavily wrinkled lip base (Fig. 6A). Stoma well-sclerotized and 4-5 μm wide anteriorly, narrowing more or less gradually posteriorly, 2.0-2.9 times as long as LRW. Corpus cylindrical, fairly slender, 1.0-1.3 times as long as isthmus, often with a clear transverse break in its walls at 19-32 μm from the base of the stoma. Isthmus fairly slender, surrounded by nerve ring at its anterior end and by secretory-excretory gland cells at its posterior end. Bulb with ornate valves carrying rows of fine denticles, its base at 0-3 μm from anterior end of intestine. Excretory pore slightly posterior to nerve ring, at 76-91 annuli from anterior end ($n = 14$). Excretory canal clearly traceable along the isthmus and in the gland cells. Deirids setiform, placed in lateral field at 78-93 annuli from anterior end or at 1-5 annuli from excretory pore ($n = 14$).

Vulva conspicuous, at mid-body. Vagina straight, extending over about one third to two fifths of VBW, without cuticular flaps but with more or less well-developed transverse extensions inserting between the two sphincters. Reproductive system amphidelphic, with anterior branch on right side of body and posterior branch on left side in all females studied. No females gravid or with sperm. Rectum 1.0-1.4 times as long as ABW. Tail subcylindrical, with five to seven setae of which the terminal one lies at 10-14 μm from its end, and with a straight spinneret.

Male : not found.

DISCUSSION

According to the key and descriptions of ZELL (1993), who examined some of our material from sample 18, this particular species is distinguished by the peculiar transverse processes of the vagina. ZELL (1993) found it throughout the tropics and assumes that it is *Plectus patagonicus* DE MAN, 1904, which was originally described on the basis of only one specimen. While there are differences with the original description (which gives a stoma length of 30 μm , and depicts a triangular bulbus and a tail with annulations down to the spinneret), these can be explained as artefacts (ZELL,

1993). *P. patagonicus* was originally found in dung of an extinct ground sloth (!) in Eberhard Cave near Ultima Esperanza, Chile (DE MAN, 1904); in the absence of any information on *Plectus* species from similar environments, we follow ZELL's interpretation.

***Plectus* (*P.*) *tropicus* ZELL, 1993**
(Fig. 1G-K; 7A-C)

LOCALITIES

Isla Fernandina : Sample 18 (1 J); Isla Santa Cruz : Samples 1 (1 ♀, 1 J), 3 (4 JJ), 5 (15 ♀♀, 9 JJ) and 7 (1 J); Isla Floreana : Samples 13 (7 ♀♀, 10 JJ), 15 (1 ♀) and F4 (2 ♀♀, 1 J). Five females from sample 5 were studied with SEM.

MEASUREMENTS

Table 8.

DESCRIPTION

Females :

Body strongly ventrally curved upon fixation. Cuticle less than 1 µm thick, finely divided into 0.7-0.8 µm wide annuli. Lateral field consisting of two separate, conspicuous wings that are 3-4 µm apart along most of the body and which fade anteriorly at the level of the corpus and posteriorly on the tail (just posterior to anus : Fig. 1K). Neck region with 7-10 somatic setae (n = 5), distributed as follows : four sublaterally near the junction of stoma and corpus, two ventrosublaterally near the base of the corpus, sometimes one dorsally opposite the nerve ring, and two dorsosublaterally near the base of the bulb. In one female with only seven somatic setae in the neck, the dorsosublateral pair lies opposite the tip of the cardia.

Amphids 5-8 µm from anterior end, 2 µm wide, circular to kidney-shaped, the rim of each amphid forming a refringent single coil that is interrupted by a narrow dorso-posterior break. Anterior end with four cephalic setae that are 2 µm long, implanted between the lip region and the first body annule, and inclined at an angle of about 60° to the body axis. Lip region not offset, 4-6 µm wide, fixed with lips reclined and oral aperture closed. Lips weakly offset from one another under light microscope, covered by radial striae under SEM.

Stoma 2-3 µm wide anteriorly, narrowing more or less gradually posteriorly, 2.9-3.4 times as long as LRW. Corpus cylindrical, stout, 1.1-1.3 times as long as isthmus, usually with a clear transverse break in its walls at 4-8 µm from the base of the stoma. Isthmus stout, surrounded by nerve ring at its anterior end and by secretory-excretory gland cells at its posterior end.

Table 8 :
Measurements in µm of *Plectus* (*Plectus*) *tropicus* ZELL, 1993

Island :	Santa Cruz		Floreana
Sample :	5	F4	13
Character	8 ♀♀	1 ♀	3 ♀♀
Length	320 ± 21 (294-362)	289	288-318
Body width	18-21	18	18-22
Pharynx	92 ± 4 (85-98)	93	73-94
Tail length	40 ± 3 (36-45)	37	29-38
Anal body width	7-9	8	7-8
a	16-18	16	14-16
b	3.5 ± 0.1 (3.3-3.7)	3.1	3.2-3.9
c	8.1 ± 0.7 (7.2-9.3)	7.8	8.4-9.9
c'	4.7 ± 0.5 (4.1-5.9)	4.6	4.1-4.8
stoma	15-18	16	14-17
corpus	32 ± 2 (30-35)	32	31-34
isthmus	28 ± 2 (23-31)	26	24-26
bulbus	11-14	12	11-15
cardia	6-9	7	7-11
nerve ring	51 ± 2 (49-55)	47	49-50
excretory pore	58 ± 4 (52-64)	53	55-57
deirid	62 ± 5 (55-69)	56	61-66
nerve ring (% neck)	56 ± 2 (52-58)	51	53-67
excretory pore (% neck)	63 ± 2 (60-66)	57	61-75
deirid (% neck)	67 ± 4 (63-72)	61	68-84
V (%)	49-52	49	48-53
G ₁ (%)	9 ± 2 (6-10)	6	7-12
G ₂ (%)	9 ± 1 (6-10)	8	7-12
rectum	10-13	11	9-13
vagina	5-7	5	5-7

Bulb with plectid valves, its base at 0-2 µm from anterior end of intestine. Excretory pore slightly posterior to nerve ring, at 60-65 annuli from anterior end (n = 12). Excretory canal fading rapidly proximally. Deirids setiform, placed in lateral field at 63-71 annuli from anterior end (n = 12) or at 0-7 annuli from excretory pore (n = 12).

Vulva inconspicuous, at mid-body. Vagina straight, extending over about one third of VBW. Reproductive system amphidelphic, with anterior branch on right side of body and posterior branch on left side in twelve females. No females gravid. Rectum 1.2-1.6 times as long as ABW. Tail slender, conical, with five setae of

which the terminal one lies at 3-5.5 μm from its end, and with a small, straight spinneret.

No males.

DISCUSSION

Because of their small size, these animals resemble the same species discussed above in connection with our specimens of *P. minimus*:

a) Based on BASTIAN (1865), *Plectus (P.) parvus* BASTIAN, 1865 is larger ($L = 540 \mu\text{m}$ versus 288-362 μm) and differs slightly in DE MAN's ratios ($a = 21$ versus 14-18, $b = 4$ versus 3.1-3.9, $c = 11$ versus 7-10). In comparison with specimens described as *P. parvus* by MULK & COOMANS (1978), our animals have more somatic setae (Table 1). In comparison with ZELL (1993), his *P. parvus* have the terminal seta at 7.5-13.5 μm from the posterior end (versus 3-5.5 μm) and have ranges touching those of our animals for a number of measurements ($L = 339$ -546 μm versus 288-362 μm , lip region 6-7 μm versus 4-6 μm , pharynx 98-143 μm versus 73-98, tail 40-60 μm versus 29-45 μm). Taf. 61 in ZELL (1993) shows three somatic setae on the right side of the neck, while our specimens have four setae on each side plus one mid-dorsally. In all, we do not identify our specimens as *P. parvus*, mainly on the basis of the specimens of MULK & COOMANS (1978).

b) Comparing the data in DE MAN (1880 & 1884) with ours, *P. geophilus* DE MAN, 1880 is larger ($L = 530 \mu\text{m}$ versus 288-362 μm) and much more slender ($a = 30$ -35 versus 14-18), with less tapering tail and anterior end (cf. Fig. 71a,d in DE MAN, 1884). According to ZELL (1993), *P. geophilus* has a "free" cardia (versus embedded) and terminal seta at 6.5-9 μm from posterior end (versus 3-5.5 μm), as well as being more slender ($a = 19.2$ -36.9 versus 14.4-17.7).

c) The original description of *P. minimus* COBB, 1893 yields a higher a -ratio than our specimens ($a = 29$ versus 14-18) as well as a more posterior vulva ($V = 59\%$ versus 48-54). In ZELL (1993), *P. minimus* has $a = 24.4$ -32.4 (versus 14.4-17.7) and a "free" cardia (versus embedded). If our identification of the species from the Galápagos treated previously in this paper is correct, there is also a clear difference between *P. minimus* and the specimens discussed here in body setation (5-6 versus 20-23) and spinneret (crooked versus normal: compare Fig. 8H,J with Fig. 1 J).

d) *P. pusillus* COBB, 1893 as originally described is slightly larger and more slender than our specimens ($L = 430 \mu\text{m}$ versus 288-362 μm , $a = 21$ versus 14-18). Similar quantitative differences are found in comparison with the description of *P. pusillus* in WU & HOEPLI (1929), who give $L = 470$ -660 μm and $a = 23$ -33. The lip region and stoma as drawn in Fig. 29 in WU & HOEPLI (1929) appear different too, but this may well be due to fixation of the mouth in open condition.

According to ZELL (1993), *P. pusillus* has a slightly wider lip region (6.5-7.5 μm versus 4-6 μm), a slightly longer pharynx (101-118 μm versus 73-98 μm) and a more anterior terminal seta (at 7-11 μm from end versus 3-5.5 μm).

e) *P. sambesii* MICOLETZKY, 1916 was originally reported to be 505-520 μm long with $a = 22$ (versus $L = 288$ -362 μm and $a = 14$ -18 in our specimens). The specimens described as *P. sambesii* by DE CONINCK (1935) also proved to have more somatic setae (Table 1) and a thicker spinneret. ZELL (1993) describes *P. sambesii* with $L = 460$ -566 μm , lip region 7-8.5 μm wide (versus 4-6 μm), pharynx 118-148 μm long (versus 73-98 μm), tail 54-75 μm long (versus 29-45 μm) and terminal seta at 8.5-14 μm from posterior end (versus 3-5.5 μm).

f) The original description of *P. tropicus* ZELL, 1993 tallies with our specimens in all respects, except for being on average less slender ($a = 17.4$ -25.3 versus 14.4-17.7) with slightly more anterior terminal seta (at 5-7 μm from end versus at 3-5.5 μm). We therefore identify our specimens as *P. tropicus*, but with the understanding that the biometric differences with *P. pusillus* are also quite small.

General discussion

IDENTIFICATION OF PLECTUS SPECIES

While there are several recent and comprehensive keys available for the genus *Plectus* (ANDRÁSSY, 1984 & 1985; EBSARY, 1985; ZELL, 1993), subsequent confirmation of identifications made with these keys is often quite difficult to achieve. Many original descriptions of species described in the previous century (e.g. by BASTIAN, 1865; DE MAN, 1880 or COBB, 1893) lack the detail needed to characterize these species unequivocally to present-day standards, and reference specimens are often lost. More recent and more detailed descriptions of such species are not completely reliable, because they deal with animals resembling several of the earliest known species, and every complication is further exacerbated by the large number of similar species that is usually involved (see discussions above). On the basis of our material, we found several characters of relevance to species identification that are usually ignored, and which bear considerable promise in improving the diagnostic resolution of *Plectus* species.

The distribution of setae on the body is commonly used as a major character in many groups of marine nematodes, but has obviously little use in most terrestrial groups, which simply have no somatic setae. However, Plectidae are exceptions to this rule, and we have therefore tried to expand on the limited attempts of ZELL (1985) at seta mapping in this group. Although the number and position of somatic setae prove to be quite variable in species with many setae, they become more

constant and characteristic as the total number of setae decreases (Table 1). We therefore think seta mapping is very useful in the identification of *Plectus* species, especially of the smaller ones, which are often very poorly characterized in the literature. Drawbacks of seta mapping are the requirements of clean specimens and very careful observation, and also the high workload involved in species with many setae. However, these can be partly overcome by focusing on the distribution of somatic setae in the neck region, which offers numerous points of reference and exhibits lower variation in seta locations.

Another character meriting more attention is the vagina: three of our species exhibit a vagina structure that appears to be characteristic, either because of the presence of epiptygmata or because of a modified lumen shape. For the moment, it is not clear to us whether these structures are generally useful for identification, i.a. because they can be very hard to see, and because they may occur only exceptionally. Nevertheless, their presence or absence should at least be recorded until more is known about their taxonomic value. Other distinctive characters can be found with SEM by examining the spinneret (cf. EBSARY, 1985), lateral field and lip region. The obvious drawback of this tool is its relatively limited availability, but it must clearly be applied more generally in *Plectus*, as the lip ornamentation shows as much hidden diversity in this genus as in e.g. genera of Tylenchida.

CONFLICTING CONCEPTS OF *PLECTUS* AND ITS RELATIVES

We agree with ZELL (1993) in treating *Ceratoplectus* as a subgenus of *Plectus*, but for diagnostic reasons rather than phylogenetic considerations. Thus, it is not unambiguous to differentiate *Ceratoplectus* by the presence of cephalic setae that reach anterior to the lips, as appears from *P. (P.) cryptoptychus* n.sp. and *P. (C.) assimilis* (cf. Taf. 13b in ZELL, 1993). Also, ZELL (1993) is incorrect in diagnosing *Ceratoplectus* as having cephalic setae located on the lips (cf. Fig. 1A, C-E), and furthermore *P. (P.) tropicus* proves to have these setae in exactly the same position as *P. (C.) armatus* (Fig. 1I-H). It is particularly interesting (and confusing) that both our *P. cryptoptychus* and *P. tropicus* show affinities with *P. armatus*, but in different respects: the former resembles *P. armatus* in stoma shape, cephalic seta length and lip structure, while the latter resembles it in cephalic seta position and lateral field ending. It is therefore likely that only one of both species is truly related to *Ceratoplectus*, and we suspect this to be *P. cryptoptychus*.

Whatever the case, it is at least clear that the differences between *Ceratoplectus* and *Plectus* are very small. The only consistent difference appears to be the shape of the cephalic seta base, and we feel that this does not justify retention of *Ceratoplectus* as a valid genus.

We do not follow ZELL (1993) in relegating wilsonematiids to a subgenus of *Plectus* as well. From a cladistic point of view, far too few synapomorphies have so far been identified for a sound cladistic classification of plectids, and we feel there still is insufficient substantial evidence for all the reorganisations proposed by ZELL (1993). On the basis of the various useful characters found in our specimens, we also have the impression that the distinctness of *Plectus* species is underestimated in current literature, and that ANDRÁSSY (1984 & 1985) was justified in his attempts to isolate species into new taxa. The genus currently appears to contain a greater morphological diversity of forms than many other large nematode genera, in which differences between accepted species are often restricted to small quantitative and qualitative discrepancies. It could therefore be justified to erect more subgenera, but this would evidently require (re-)examination of many more species with respect to morphology under SEM, seta arrangement and vagina structure.

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