

## Six new species of the genus *Laimydorus* Siddiqi, 1969 (Nematoda : Dorylaimoidea)

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**Summary** – Six new species of *Laimydorus* are described. *L. coroniceps* n. sp. from Brazil is characterized mainly by very strongly offset, separate lips and odontostyle 40-44 mm long. *L. vacillans* n. sp. from Venezuela is characterized by the irregular shape of the male tail, ranging from conoid to spicate; the odontostyle is 31-34 mm long. *L. uterinus* n. sp. from Nigeria is characterized by the very short oviduct and the presence of a well developed *pars musculosa uteri*; the odontostyle is 25-30 mm long. The three other species were found in the Netherlands. *L. bongersi* n. sp. is extremely slender ( $a = 66-90$ ), with lip region continuous and odontostyle 19-23 mm long. *L. flevensis* n. sp. is also very slender ( $a = 60-80$ ); it differs from *L. bongersi* by shorter body, shorter odontostyle (15-17 mm), longer female tail, and offset lip region. *L. constrictus* n. sp. is characterized by a constriction between the two parts of the female tail; the odontostyle is 20-24 mm long. *Dorylaimus filiformis* Bastian, 1865 and *D. polyblastus* Bastian, 1865 are considered *species inquirendae* and also *incertae sedis*.

**Résumé** – Six nouvelles espèces du genre *Laimydorus* Siddiqi, 1969 (Nematoda : Dorylaimoidea) – Six nouvelles espèces du genre *Laimydorus* sont décrites. *L. coroniceps* n. sp. provenant du Brésil est caractérisé principalement par la capsule céphalique très nettement en relief avec des lèvres séparées, et un odontostyle long de 40-44 mm. *L. vacillans* n. sp. provenant du Vénézuéla est caractérisé par la forme irrégulière de la queue du mâle – de conoïde à spiciforme – et un odontostyle long de 31-34 mm. *L. uterinus* n. sp. provenant du Nigeria est caractérisé par un oviducte très court, la présence d'une *pars musculosa uteri* bien développée et un odontostyle long de 25-30 mm. Les trois autres espèces proviennent des Pays-Bas. *L. bongersi* n. sp. a un corps très effilé ( $a = 66-90$ ), une région céphalique continue, un odontostyle long de 19-23 mm. *L. flevensis* n. sp. a également un corps très effilé ( $a = 60-80$ ), mais diffère de *L. bongersi* n. sp. par la plus faible longueur du corps et de l'odontostyle (15-17 mm), une queue plus longue chez la femelle et une région céphalique en relief. *L. constrictus* n. sp. est caractérisé par la présence d'une constriction sur la queue et un odontostyle long de 20-24 mm. *Dorylaimus filiformis* Bastian, 1865 et *D. polyblastus* Bastian, 1865 sont considérés comme *species inquirendae* et *incertae sedis*.

**Key-words** : systematics, new species, *Laimydorus*.

In the course of the last twenty years I collected or received a large number of nematodes of the genus *Laimydorus* Siddiqi, 1969. This material contained several undescribed species. Six are described below, for the others the material was deemed insufficient. All specimens were killed and fixed in hot formalin and processed to glycerin by the Seinhorst method. The SEM photos were made with a JEOL JSM 35. C at the TFDL, Wageningen. The type slides marked WT are in the collection of the Department of Nematology, Agricultural University, Wageningen.

### *Laimydorus coroniceps* n. sp. (Figs 1, 2, 10)

#### MEASUREMENTS

See Table 1.

#### DESCRIPTION

**Adults** : Body curved ventrad in both sexes, posterior part of male more strongly curved. Cuticle with thin, sharply demarcated outer layer and fine but distinct transverse striae; 3 mm wide at mid-body, 4 mm at neck, 6 mm at base of female tail. Lateral chord one-fifth to

one-seventh of the body width. Amphid aperture equal to half the corresponding body diameter. Lip region 22-26 mm wide, offset by a very deep constriction; lips separate, strongly developed, with protruding sensilla (6 + 10) giving the lips angular contours. Inner lip flaps present. Odontostyle length equal to 1.6-2.0 width of lip region; odontostyle straight, 6 mm wide, ventral wall very thick anteriorly; aperture occupying 25-33 % of its length. Odontophore simple, linear. Guiding ring double. Nerve ring surrounding the pharynx at 171-201 mm (28-32 % of pharynx length) from head end. Cardia 33-46 mm long. In the holotype, an oblong body of unknown nature present on the dorsal side of the pharyngo-intestinal junction (Fig. 1B). Pharyngeal characters (two males, four females) : pharynx beginning to widen at 47-48 % and attaining its full width at 50-52 % of its length from head end. DO lying slightly anterior to the point where the pharynx attains its full width; distance DO-DN : 11-19 mm;  $S_1N$  lying some distance apart, the anterior one smaller. DN measuring 9-12 × 3-4 mm, nucleolus 2-3 mm;  $S_1N_1$  3 × 2 mm, nucleolus 1 mm;  $S_1N_2$  7 × 7 mm, nucleolus 2-2.5 mm;  $S_2N$  5-6 × 6-9 mm, nucleolus 2 mm. Locations :

**Table 1.** Dimensions of *Laimydrus coroniceps* n. sp. (all measurements in mm, except L, in mm).

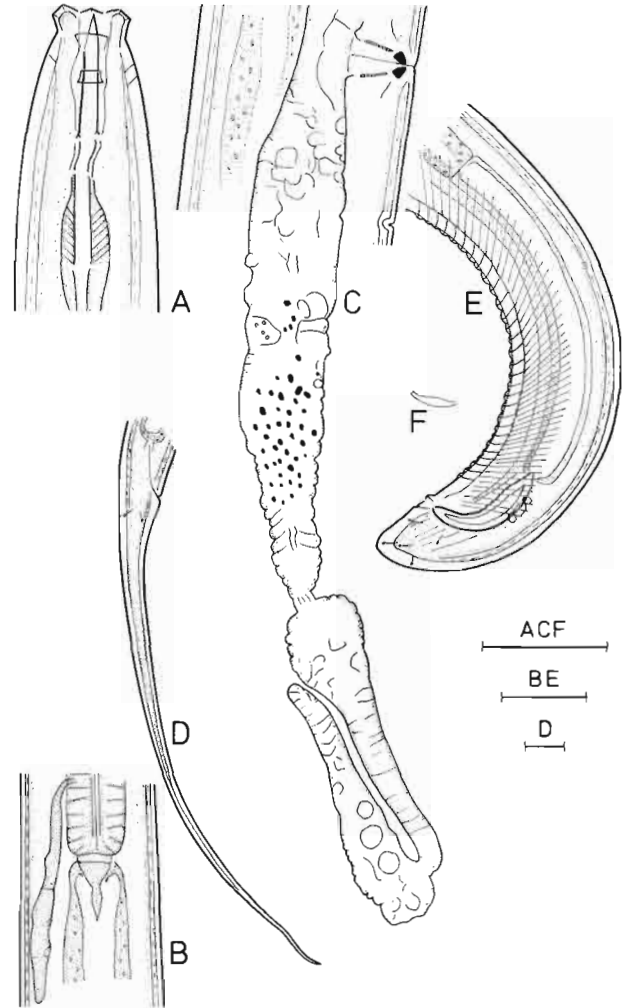
	Holotype (female)	Female	Males	J4	J2
n		10	6	9	1
L (mm)	3.39	2.66-3.41	2.32-2.96	1.79-2.39	1.00
a	40	33-46	34-48	36-48	38
b	4.9	4.4-5.2	4.1-4.7	4.0-4.9	3.8
c* (n = 9)	6.3	5.7-7.6	76-111	5.2-6.2	4.4
c' * (n = 9)	13	10-16	0.7-0.9	12-15	10
Tail (n = 9)	539	388-563	21-35	322-444	228
VVD	44	44-47	43-48		
G <sub>1</sub>	11	8-14	11-17		
G <sub>2</sub>	11	9-16	8-15		
LRW	25	23-26	22-26	17-20	11
Odst.	42	40-44	41-44	32-34	19
Odph.	47	43-51	43-48	37-41	21
Spear	89	85-95	85-92	69-74	40
Repl. odst.				40-44	24
ABW	41	34-42	38-44	26-34	23
MBW	85	62-88	52-78	37-65	26
PR		92-189	209-293		
Neck	693	563-716	541-682	429-526	264
h (n = 9)	88	55-88			
h% (n = 9)	16	10-19			

DO 48-50 % S<sub>1</sub>N<sub>1</sub> 67-69 %; S<sub>2</sub>N 81-83 %; K = 76-78;

DN 51-52 %; S<sub>1</sub>N<sub>2</sub> 73 %; S<sub>2</sub>O 82-84 %; K' = 77-78;  
DO-DN 1.6-2.9 %; S<sub>1</sub>N<sub>1</sub>-S<sub>1</sub>N<sub>2</sub> 4.4-5.2 %.

**Female:** Vulva transverse. Vagina: *pars proximalis* (De Ley et al., 1993) with parallel walls, 18-20 mm deep, 14-15 mm wide. *Pars refringens* 11-12 mm wide, 5-6 mm long, with two trapezoid "sclerotized pieces". *Pars distalis* nearly absent (0-2 mm). Two genital tubes, opposed, reflexed; uteri elongate, crowded with sperm, the advulvar parts strongly cellular, with a strong sphincter between uterus and oviduct. Zero to one prevulvar and zero to two postvulvar ventral pores. One female with five eggs (size 78-107 × 45-49 mm). Tail tapering first, then attenuated, distal part filiform, terminus finely rounded. One subdorsal and one sublateral pore on each side of the tail.

**Male:** Testes two, dorylaimid. Spicules dorylaimid, 73-82 mm long; lateral guiding pieces 20-22 mm long.

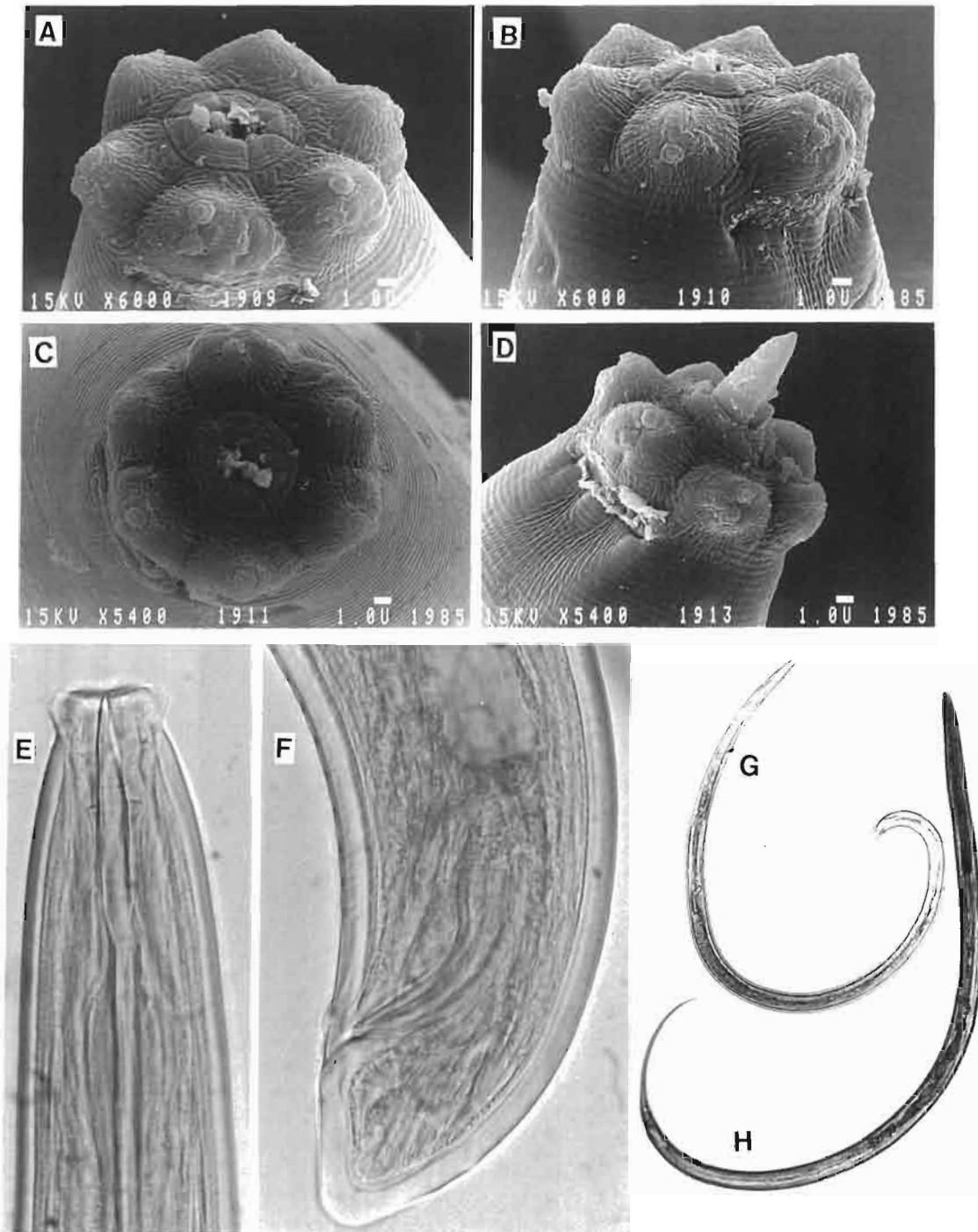


**Fig. 1.** *Laimydrus coroniceps* n. sp. A: Anterior end; B: Cardiac region of holotype; C: Female genital branch; D: Female tail; E: Male, posterior portion; F: Lateral guiding piece.

Apart from the adanal pair, series of 26-30 contiguous ventromedian supplements, the posterior one lying 27-38 mm anterior to the cloacal aperture, well posterior to the head of the spicules. Prerectum joining the intestine proper from 16 mm anterior to 60 mm posterior to the anterior supplement. Number of copulatory muscles about 40-50. No accessory muscles. Rectal and ejaculatory glands indistinct (in the material available). No "Kopulationshöcker". Tail convex-conoid, broadly rounded, with five pairs of pores.

**TYPE HABITAT AND LOCALITY**

Soil around roots of bean, Poços, Bahia, Brazil. Paratypes from soil around roots of oil palm and banana, Santo Amaro; soil around banana roots, Ilheus; soil near coconut palm, Ferradas. All localities in Bahia State, Brazil.



**Fig. 2.** *Laimydoorus coroniceps* n. sp. A-D : SEM photos of anterior end from various angles; E : Anterior end; F : Male tail; G : Male, entire; H : Female entire.

## TYPE SPECIMENS

Holotype: Female on slide WT 2948. Paratypes: four males and seven females on slides WT 2949-2956; one male and one female at the Instituut voor Dierkunde, Rijksuniversiteit Gent, Belgium, and at the USDA, Beltsville, MD, USA.

## DIAGNOSIS AND RELATIONSHIPS

The very strongly offset lip region, separate lips, in combination with the long odontostyle and position of the posterior ventromedian supplements immediately distinguish this species from all other species in the genus. In most *Laimyodoros* species the vulva is longitudinal, but a transverse vulva is known in several other species (*L. merogaster* (Steiner, 1916)\* (?), *L. tenuistriatus* (Schneider, 1935) Loof & Coomans, 1986, *L. kherai* Baqri, 1985, *L. stenopygus* (Andrássy, 1968) Siddiqi, 1969, *L. multialaeus* (Khera, 1970) Baqri, 1985, *L. reversus* Thorne, 1974 and *L. parabastiani* (Paetzold, 1958) Siddiqi, 1969.

***Laimyodoros vacillans* n. sp.**

(Figs 3, 10)

## MEASUREMENTS

See Table 2.

## DESCRIPTION

*Adults*: Body of female almost straight, posterior part of male bent at a 60-120° angle. Cuticle with very fine transverse striae, 3.5-4.0 mm thick at mid-body, 4 mm at anterior part of neck, 5.5 mm at base of female tail; with thin, sharply demarcated outer layer. Two dorsal and two ventral pores at level of guiding ring. Lateral chord one-fourth to one-sixth of body diameter. Lip region truncate, offset by depression; lips partly amalgamated, sensilla protruding distinctly. Amphid aperture about 10 mm. Odontostyle slightly sinuate, the aperture occupying about one-third of its length. Odontophore simple, linear. Guiding ring double. Nerve ring surrounding the pharynx at 34-35% of neck length. Cardia conoid, 42 × 14 mm. Pharyngeal characters: pharynx beginning to widen at 54-56% and attaining its full width at 59-61% of neck length. DO lying between these two levels; distance DO DN: 14-17 mm. The two S<sub>1</sub>N lying a small distance apart, the anterior one very small. DN measuring 11-15 × 5-8 mm, nucleolus 3-4 mm; S<sub>1</sub>N<sub>2</sub> 8-13 × 5-7 mm, nucleolus 3 mm; S<sub>2</sub>N 7-8 × 7 mm, nucleolus 3 mm. Locations:

DO 56-59%; S<sub>1</sub>N<sub>1</sub> 72-74%; S<sub>2</sub>N 88-89%; K = 64-71;

\* This transfer will be substantiated in another publication (Loof, 1996 a).

**Table 2.** Dimensions of *Laimyodoros vacillans* n. sp. (all measurements in mm, except L, in mm).

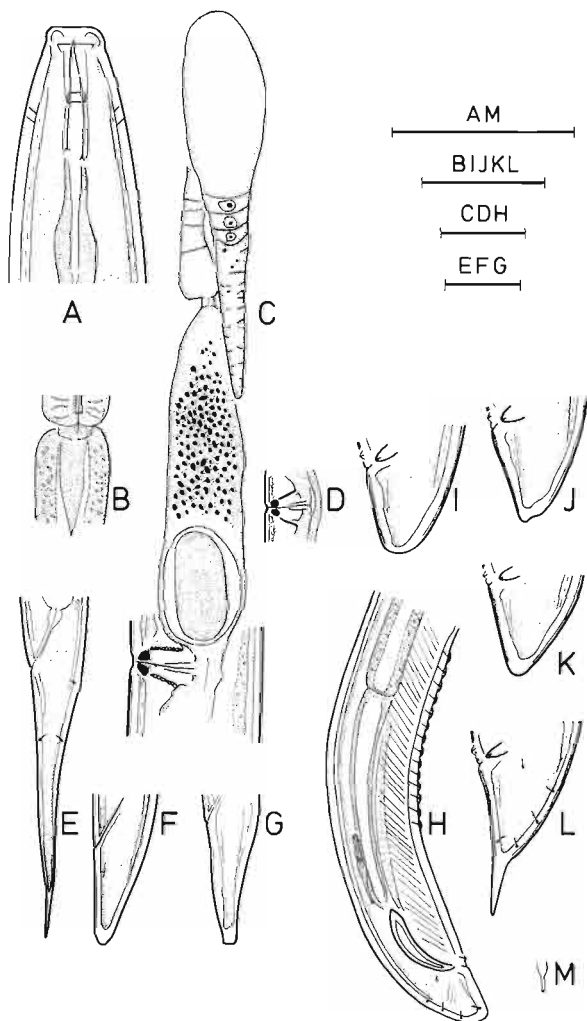
	Holotype (female)	Females	Males
n		18	20
L (mm)	1.99	1.71-2.33	1.67-2.29
a	38	28-39	30-38
b	4.3	3.9-5.0	3.8-4.6
c	14.2	11.7-15.9	26-69
c'	4.7	4.1-5.9	0.74-1.76
Tail	141	108-196	28-64
V/VD	53	50-54	41-44
G <sub>1</sub>	14	13-19	13-19
G <sub>2</sub>	16	14-20	11-16
LRW	15	15-16	14-16
Odst.	32	31-34	31-36
Odph.	34	32-38	33-41
Spear	66	64-70	66-74
ABW	30	30-36	34-41
MBW	53	44-74	48-69
PR	92	74-94	94-149
PR-S <sub>1</sub>			20-97
Neck	462	396-495	426-492
h	30	29-32	
h %	21	15-21	

DN 60-62%; S<sub>1</sub>N<sub>2</sub> 78-80%; S<sub>2</sub>O 89-90%; K' = 71-78;

DO-DN 3.0-3.7%; S<sub>1</sub>N<sub>1</sub>-S<sub>1</sub>N<sub>2</sub> 5.2-6.3%.

*Female*: Vulva longitudinal. Vagina: *pars proximalis* 15-19 mm wide, 22-26 mm long; *pars refringens* trapezoid, with rounded sides, 14-19 mm wide, 7-8 mm deep; inner surfaces jagged; *pars distalis* very short, about 2 mm. Uteri without special differentiations, packed with sperm. Ovaries sometimes longer than oviducts. Dimensions of three eggs: 73-81 × 40-47 mm. Tail conoid first, passing gradually into attenuated distal part which in many specimens appears malformed. Two subdorsal pairs of caudal pores and one subventral pair. Rectum 37-52 mm long = 1.2-1.6 anal body widths.

*Male*: Testes two, dorylaimid. Spicules curved, dorylaimid, 56-73 mm long. Lateral guiding pieces 9-10 mm long. Apart from the adcloacal pair, row of 12-14 slightly spaced ventromedian supplements present, the most posterior one lying 92-100 mm anterior to the cloaca. Junction between prerectum and intestine typically 20-97 mm behind anterior supplement but occasionally slightly anterior to it. 38-42 copulatory muscles. Ejacu-



**Fig. 3.** *Laimyodoros vacillans* n. sp. A: Anterior end; B: Cardiac region; C: Female genital branch; D: Vulva and vagina; E: Normal female tail; F-G: Abnormal female tails; H: Male, posterior portion; I-L: Various shapes of male tail; M: Lateral guiding piece.

latory glands far anterior to supplement series. The thin outer cuticle layer is often absent on the tail terminus. Tail shape varying, but never hemispheroid; typically irregularly conical but conoid with long cuticular extension in one specimen. Three subdorsal pairs of caudal pores: one adcloacal, one closer to terminus, one sub-terminal. One adcloacal lateral pore and one subventral pair.

#### TYPE HABITAT AND LOCALITY

Moss, Rancho Grande, Venezuela.

#### TYPE SPECIMENS

Holotype: Female on slide WT 2957. Paratypes: fourteen females and eighteen males on slides WT 2957-2971; one male and one female at the Instituut voor Dierkunde, Rijksuniversiteit Gent, Belgium, and at the USDA, Beltsville, MD, USA.

#### DIAGNOSIS AND RELATIONSHIPS

*L. vacillans* n. sp. is characterized by the irregular shape of the male tail, body length 1.7-2.3 mm, odontostyle length 31-36 mm, short female tail (108-196 mm,  $c = 12-16$ ,  $c' = 4-6$ ) and supplement number 12-14. Most males have a short tail, but one tail bears a cuticular extension. Even in the short-tailed males the tail is not hemispheroid but rather conoid, resembling the shape of the proximal part of the female tail. This might indicate that the transition from long to short tail can occur easily as suggested by Coomans and Carbonell (1988) and makes one hesitate (*vacillans* = hesitating) about the validity of the separation between *Prodorylaimus* and *Laimyodoros*.

Odontostyle length is similar to that of three other *Laimyodoros* species: i) *L. octo* (Andrássy, 1969)\*: single guiding ring, L = 3.0-3.6 mm, V = 36-37 and  $c = 5-6$ ; ii) *L. pseudostagnalis* (Micoletzky, 1927) Siddiqi, 1969: L = 3.4-4.6 mm, V = 36-45 and tail length = over 280 mm; iii) *L. minimus* Baqri, 1991: L = 1.3-1.5 mm, single guiding ring and males unknown.

#### *Laimyodoros uterinus* n. sp.

(Figs 4, 5 A-D, 10)

#### MEASUREMENTS

See Table 3.

#### DESCRIPTION

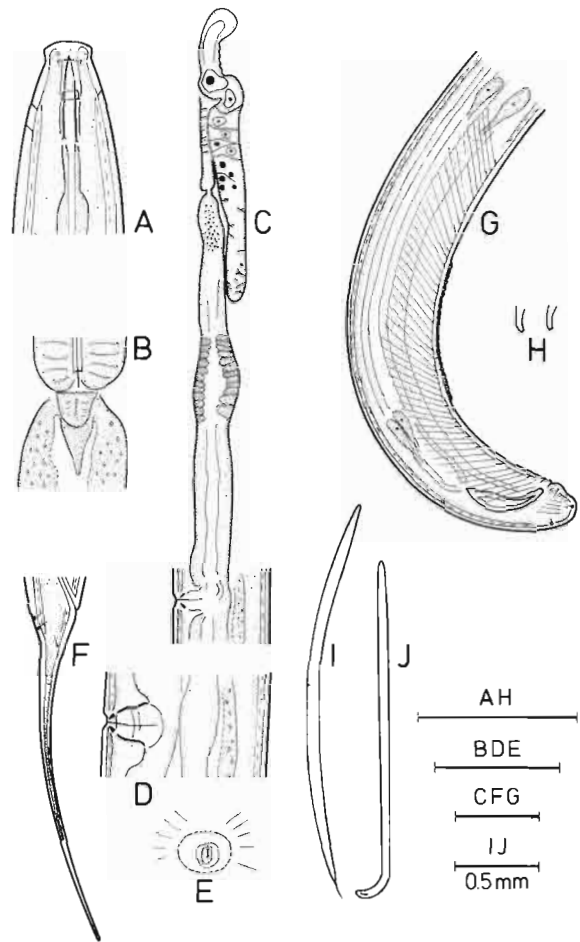
**Adults:** Body almost straight except for posterior part of male. Cuticle 2 mm at mid-body, 3 mm at anterior part of neck, 5 mm at base of female tail; with thin, sharply demarcated outer layer and very fine transverse striae. Lateral chord one-quarter of body width. Cervical pores: two ventral, one dorsal, often difficult to see. Lip region offset by constriction, lips partly fused, sensilla not protruding. Amphid aperture about half of the corresponding body width. Odontostyle straight to slightly sinuate, aperture about 35%. Odontophore simple, linear. Guiding ring double. Nerve ring surrounding the pharynx at 28-30% of neck length from head end. Cardia about 30 mm long, triangular, though the cardia proper appearing rounded and much smaller (cf. *L. bongersi*). Pharyngeal characters (four females, two males): pharynx beginning to widen at 49-52%, and attaining

\* This transfer will be substantiated in another publication (Loof, 1996 b).

**Table 3.** Dimensions of *Laimyrdorus uterinus* n. sp., type population (all measurements in mm, except L, in µm).

	Holotype (female)	Females	Males
n		60	20
L (mm)	2.16	2.32 ± 0.202 (2.00-2.82)	2.09 ± 0.135 (1.78-2.31)
a	33	35.5 ± 2.9 (30-43)	36.8 ± 5.2 (28-48)
b	4.3	4.60 ± 0.38 (4.0-5.6)	4.27 ± 0.28 (3.7-4.8)
c	15.1	13.6 ± 1.6 (11.0-16.7)	104 ± 12.4 (81-123)
c'	5.2	6.3 ± 0.8 (5.0-8.1)	0.68 ± 0.1 (0.6-0.8)
Tail	143	174 ± 26 (129-234)	20.2 ± 2.0 (18-25)
V/VD	45	45.3 ± 1.5 (41-49)	50.5 ± 1.8 (47-55)
G <sub>1</sub>	16	16.8 ± 2.0 (11-21)	13.3 ± 2.2 (10-18)
G <sub>2</sub>	20	20.0 ± 1.9 (16-24)	12.5 ± 2.4 (6-17)
LRW	13	13-15	13-14
Odst.	27	27.1 ± 1.2 (25-30)	26.8 ± 1.2 (24-28)
Odph.	33	32.0 ± 1.0 (30-34)	31.6 ± 1.2 (29-34)
Spear	60	59.2 ± 1.3 (57-63)	58.4 ± 1.2 (56-61)
ABW	27.5	27.1 ± 1.4 (24-31)	29.6 ± 1.4 (28-32)
MBW	66	65.6 ± 8.2 (52-87)	57.4 ± 6.3 (45-68)
PR	141	151 ± 18 (118-185)	309 ± 31.6 (254-363)
PR-S <sub>1</sub>			141 ± 34.0 (77-211)
Neck	501	506 ± 24 (462-561)	488 ± 18 (469-529)
h	22	45.6 ± 9.9 (22-68)	
h %	15	25.0 ± 3.4 (15-35)	

its full width at 53-56 %, of neck length from head end. DO lying near the point where the pharynx attains its full width; distance DO-DN : 3-12 mm; S<sub>1</sub>N lying distinctly behind the middle of the distance DN-S<sub>2</sub>N, the



**Fig. 4.** *Laimyrdorus uterinus* n. sp. A : Anterior end; B : Cardiac region; C : Female genital branch; D : Vulva, lateral view; E : Vulva, ventral view; F : Female tail; G : Male, posterior portion; H : Lateral guiding piece; I : Female, entire; J : Male, entire.

anterior one slightly smaller than the posterior. DN measuring 11 × 3-4 mm, nucleolus 4 mm; S<sub>1</sub>N<sub>2</sub> 9 × 3 mm, nucleolus 2 mm, S<sub>2</sub>N 5-6 mm, nucleolus 2 mm. Locations :

DO 51-54 %; S<sub>1</sub>N<sub>1</sub> 69-74 %; S<sub>2</sub>N 86-89 %; K = 63-84;

DN 54-56 %; S<sub>1</sub>N<sub>2</sub> 75-78 %; S<sub>2</sub>O 88-89 %; K' = 78-86;

DO-DN 0.7-2.4 %; S<sub>1</sub>N<sub>1</sub>-S<sub>1</sub>N<sub>2</sub> 3.4-8.5 %.

**Female :** Vulva longitudinal, 3-4 mm, with about thirteen muscles. Vagina : *pars proximalis* 17 × 11 mm, widened proximally; *pars refringens* oblique-trapezoid, total width 8 mm, length 5 mm; *pars distalis* absent. Uteri very long, filled with sperm, with well-developed *pars muscosa* (Coomans, 1965). Oviduct very short, junction with uterus lying about the middle of the ovaries. Up to eight eggs per specimen; dimensions 73-91 × 33-45 mm

(n = 47). Tail first convex-conoid, then tapering. Caudal pores : two subdorsal pairs, one subventral one.

**Male :** Spicules 55-61 mm long, lateral guiding pieces 8-10 mm. Prerectum joining the intestine proper far anterior to the first supplement. 21-26 supplements. 45-50 copulatory muscles. Ejaculatory glands at level of anterior copulatory muscles, rectal glands near the posterior ventromedian supplements. Tail with peculiar ventral contour. Three pairs of caudal pores.

#### TYPE HABITAT AND LOCALITY

Rice field, Adiopodoumé, Ivory Coast.

#### TYPE SPECIMENS

Holotype : Female on slide WT 3020. Paratypes : fifteen males and 34 females on slides WT 3020-3038; one male and one female at the Instituut voor Dierkunde, Rijksuniversiteit Gent, Belgium, and at the USDA, Beltsville, MD, USA.

#### DIAGNOSIS AND RELATIONSHIPS

*L. uterinus* n. sp. is characterized by a well developed *pars musculosa uteri*, a body 1.8-2.8 mm long, an odontostyle 24-30 mm long, and 21-26 ventromedian supplements.

In body length, vulva position, female tail length, lip region offset by constriction, and very short oviducts, this species is close to *L. cryptosperma* (Loof, 1969) Baqri & Coomans, 1973. It differs from it by : longer odontostyle (26-30 vs 20-22 mm); longer distance from intestine-prerectum junction to anterior supplement (100-211 vs 30-85 mm); more anterior location of DO and DN (51-54 and 54-56 vs 60-63 and 62-65 %); relatively shorter male tail (c = 90-123 vs 64-84), and in the presence of a distinct *pars musculosa uteri*. In the last mentioned character, it resembles *L. luetichau* (Meyl, 1957 a), Siddiqi, 1969, but this species is longer (3.0-3.5 mm), much more slender (a = 67-86), and has a continuous lip region.

The species was found also on Aldabra Atoll; these specimens have slightly longer odontostyle (29-33 mm), odontophore (33-35 mm), and spear (62-66 mm); the hyaline distal part of the tail is shorter (25-36 mm) and it occupies 9-21 % of the tail.

#### *Laimydorus bongersi* n. sp.

= *L. filiformis* apud Loof & Coomans, 1986

(Figs 5 E-H, 6, 10)

#### MEASUREMENTS

See Table 4 and 5.

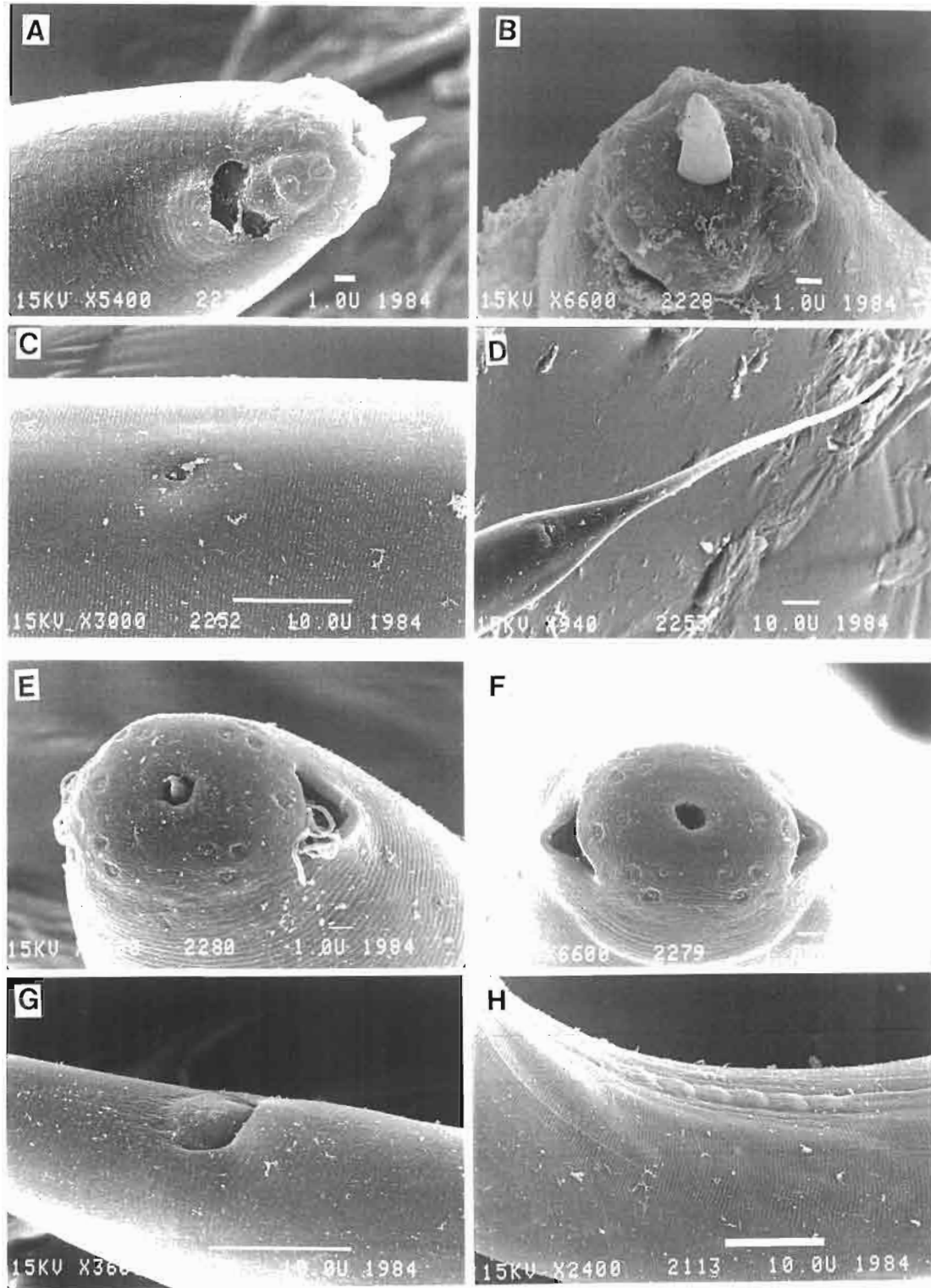
#### DESCRIPTION

**Adults :** Body very slender, cylindrical over the greater part of its length; straight or irregular in females, in males posterior end strongly curved ventrad. Cuticle 2.5-3.0 mm thick, not thickened on female tail; with thin, sharply demarcated outer layer; very fine transverse

**Table 4.** Dimensions of *Laimydorus bongersi* n. sp. (all measurements in mm, except L, in mm).

	Holotype (female)	Females	Males
n		24	26
L (mm)	3.39	3.57 ± 0.228 (3.00-3.93)	3.45 ± 0.246 (2.97-3.90)
a	83	73.3 ± 5.3 (66-84)	79.9 ± 5.7 (72-90)
b	7.0	7.0 ± 0.41 (6.1-8.0)	6.6 ± 0.52 (5.6-7.5)
c	31	33.2 ± 3.4 (28-44)	116 ± 10.4 (91-132)
c'	4.3	4.0 ± 0.39 (3.1-5.0)	0.86 ± 0.07 (0.8-1.0)
Tail	109	109 ± 9.1 (88-128)	30 ± 1.6 (28-33)
V/VD	47	47.7 ± 1.1 (46-50)	51 ± 3.7 (44-57)
G <sub>1</sub>	14	16.0 ± 4.0 (8-27)	16.4 ± 3.7 (11-23)
G <sub>2</sub>	13	16.5 ± 2.3 (12-20)	17.4 ± 4.1 (10-25)
Odst.	20	21.1 ± 0.8 (20-22)	21.1 ± 0.9 (19-23)
Odph.	28	27.4 ± 1.5 (25-31)	26.8 ± 1.5 (25-30)
Spear	48	48.4 ± 1.7 (46-52)	47.9 ± 1.8 (45-51)
ABW	25	26.5 ± 1.7 (23-30)	33.9 ± 2.4 (29-40)
MBW	41	47.9 ± 4.2 (41-57)	43.1 ± 4.0 (37-51)
PR	154	141 ± 9.6 (101-168)	261 ± 53.8 (178-358)
PR-S <sub>1</sub> (n=15)			143 ± 45 (63-202)
Neck	485	515 ± 23.4 (462-552)	515 ± 26.1 (462-589)
h	14	14.3 ± 3.1 (8-20)	
h %	13	13.8 ± 2.8 (7-19)	

striae visible in the neck region. Lateral chord about one-third of body width. There are no cuticular pores in the odontostyle region. Amphid aperture 50-60 % of corresponding body diameter. Lip region continuous with flat anterior margin and rounded edges, 13-15 mm wide, lips completely amalgamated, sensilla not protrud-



**Fig. 5.** SEM photos, A-D : *Laimyrdorus uterinus* n. sp. A : Anterior end, lateral view; B : End-on view of anterior end; C : Vulva; D : Female tail. – E-H : *L. bongersi* n. sp. E, F : End-on view of anterior end; G : Female, anal opening; H : Male, supplement region.



**Table 5.** Dimensions of juveniles of *Laimydorus bongersi* n. sp. (all measurements in mm, except L, in mm).

	J1	J2	J3	J4
N	6	2	8	10
L (mm)	0.65-0.96	1.05-1.11	1.59-1.92	2.26-3.01
a	41-53	53-56	58-67	66-74
b	3.6-4.6	4.2-4.5	4.5-5.5	5.2-6.9
c	9.9-12.5	13.8-14.0	19-24	23-28
c'	4.5-6.0	5.1-5.8	3.5-5.1	3.6-4.8
Tail	62-77	76-79	74-100	89-107
LRW	7-8	8-9	11	12-13
Odst	8-9	11	12-14	15-19
Repl odst.	10-11	13	15-17	18-21
Neck	165-219	245-251	334-359	371-449
ABW	11-16	13-14	17-21	21-27
MBW	13-20	20	24-32	32-41

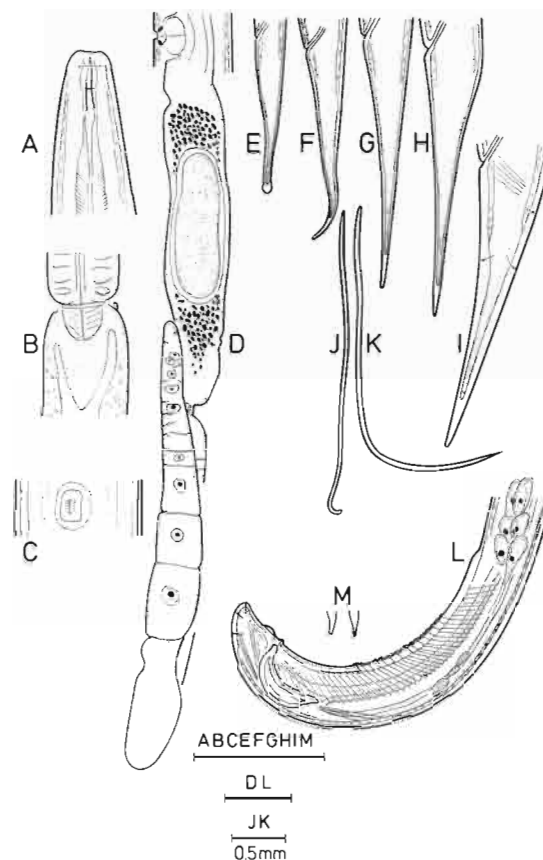
ing, arranged 6 + 4 + 6. Odontostyle usually slightly sinuate, the aperture occupying about 35-40 % of its length. Guiding ring single. Nerve ring surrounding the pharynx at about one-third of neck length. Cardia dome-shaped, 13-16 mm long, 15-17 mm wide, embedded in intestinal tissue. Pharyngeal characters : pharynx beginning to widen at 49-53 % and attaining its full width at 56-61 % of neck length from head end. DO lying near the point where the pharynx attains its full width; distance DO-DN : 10-13 mm. The two  $S_1N$  lying a small distance from one another, posterior to the middle of the distance DN- $S_2N$ ; anterior one smaller.  $S_2N$  lying rather far anterior. Dimensions : DN 11 × 11 mm, nucleolus 4 mm;  $S_1N_1$  5 × 3 mm, nucleolus 1 mm;  $S_1N_2$  10 × 3 mm, nucleolus 2 mm;  $S_2N$  7 × 7 mm, nucleolus 3 mm. Locations :

DO 56-59 %;  $S_1N_1$  75-78 %;  $S_2N$  86-88 %; K = 78-88 %;

DN 59-62 %;  $S_1N_2$  78-81 %;  $S_2O$  88-89 %; K' = 80-89 %;

DO-DN 2.0-2.5 %;  $S_1N_1$  - $S_1N_2$  2.6-4.4 %.

**Female :** Vulva a longitudinal slit 6-7 mm long. Vagina : *pars proximalis* much wider than long (15-18 × 26-29 mm), its walls diverging proximally. *Pars refringens* : 14 mm wide, 5 mm long, with two oval, obliquely orientated sclerotized "pieces". *Pars distalis* : very short, about 4 mm. Uteri very long, packed with sperm. Oviducts and ovaries also very long. No ventral advulvar pores. Dimensions of three intra-uterine eggs : 100-117 × 35-38 mm. Tail elongate-conoid; tail core fragmented near tip. Two subdorsal pairs of caudal pores, one sub-



**Fig. 6.** *Laimydorus bongersi* n. sp. A : Anterior end; B : Cardiac region; C : Vulva, ventral view; D : Female genital branch; E : Tail of J1; F : Tail of J2; G : Tail of J3; H : Tail of J4; I : Female tail; J : Male, entire; K : Female, entire; L : Male, posterior portion; M : Lateral guiding piece.

ventral pair as illustrated. Length of preectum 3.5-6.5 anal body diameters.

**Male :** Testes two, dorylaimid. Spicules 66-77 mm, lateral guiding pieces 9-11 mm long. 13-19 ventromedian supplements, contiguous. Preectum beginning far anterior to the anteriormost supplement. About 40-45 copulatory muscles. A weak "Kopulationshöcker" present. Ejaculatory glands lying anterior to the copulatory muscles, rectal glands opposite the supplement series. Ventral contour of tail concave. Two subterminal pairs of caudal pores.

**Juveniles :** Similar to females in general structure, except for a clavate tip at tail terminus of the J1.

#### TYPE HABITAT AND LOCALITY

In crusts of the freshwater sponge *Ephydatia fluvialilis* (L.), on the bank of the Rhine near Lexkesveer, close to Wageningen. Collected by Dr. A.M.T. Bongers in October 11, 1978, and named in his honour.

## TYPE SPECIMENS

Holotype: Female on slide WT 2972. Paratypes: 21 females, 26 males and 34 juveniles on slides WT 2973-3000; one female and one male deposited at the Instituut voor Dierkunde, Rijksuniversiteit Gent, Belgium, and at the USDA, Beltsville, MD, USA.

## DIAGNOSIS AND RELATIONSHIPS

*L. bongersi* n. sp. is characterized by its very slender body about 3.0-3.7 mm long, relatively short female tail ( $c = 28$  or more), continuous lip region, odontostyle slightly sinuate, 20-22 mm long, longitudinal vulva, and males with spicules 66-77 mm long and with 13-19 (usually 14-16) ventromedian supplements. The very long and slender body at first suggested identity with *Dorylaimus filiformis* Bastian, 1865 and actually the species was mentioned under that name by Loof and Coomans (1986). The dimensions fit reasonably well with those given by de Man (1880, 1884) but his females had longer tails and de Man illustrated a strongly offset lip region. Bastian's description is insufficient to recognize the species: "Female length = 2.54 mm;  $a = 59$ ;  $b = 6$ ;  $c = 13.3$ ;  $V = 50$ ; spear = 43 mm, neck = 423 mm, tail = 191 mm. Head truncate, no papillae. Pharynx enlarged in posterior third. Male unknown". There are numerous redescrptions from other countries but these may refer to other species. In this connection another species must be mentioned, *D. polyblastus* Bastian, 1865, synonymized with *D. filiformis* by Zschokke (1900): only the males are known:  $L = 1.95$  mm;  $a = 39$ ; spear = 25 mm, supplement number = 16-20. This is evidently a different species, but it cannot be identified. Both species must be regarded *species inquirendae* and also *incertae sedis* until topotypes shed more light on their morphology.

In its slender body and relatively short female tail *L. bongersi* is similar to: *i*) *L. luettichau* (Meyl, 1957 *a*) Siddiqi, 1969: in this species the vulva is more anterior ( $V = 32-40$ ), the uteri have a distinct *pars muscosa*, the guiding ring is double, the female prerectum much longer (250-300 vs 101-168 mm), the males have shorter spicules (40-44 mm) and possess more ventromedian supplements (20-22); *ii*) *L. oryzae* Dey & Baqri, 1986: in this species the odontostyle is longer (24-25 vs 20-22 mm), the vulva is transverse, the guiding ring is double, the female tail is longer (150-177 vs 88-128 mm), the spicules are shorter (55-59 mm) and the number of ventromedian supplements is slightly higher (18-22); *iii*) *L. lordelloi* (Meyl, 1957 *b*) Loof\*: in this species the vulva is transverse, the guiding ring is double, the odontostyle is shorter (15-16 vs 20-22 mm), the males have only 7-9 supplements vs 13-19, and the spicules are

shorter (about 46 vs 66-77 mm); *iv*) *L. dhanachandi* Jai-rajpuri & Ahmad, 1983: in this species the female tail is longer (150-167 vs 88-128 mm;  $c = 17-20$  vs 28-44;  $c' = 6.5-7.4$  vs 3.1-5.0); the lip region is wider (20 vs 13-15 mm) and the spicules are much shorter (<50 vs 66-77 mm); *v*) *L. flevensis* n. sp. (see below).

***Laimydorus flevensis* n. sp.**

(Figs 7, 8 A-D, 10)

## MEASUREMENTS

See Table 6.

## DESCRIPTION

Body cylindrical, very slender, almost straight except for the curved strongly ventrad posterior part of the male. Cuticle with strongly demarcated outer layer, striae almost invisible; 1.5-2.0 mm thick over the whole body. Lateral chord about one-third body width. Lip region angular, oral disc depressed, offset by a distinct depression. Amphid aperture 6-8 mm or 50-60 % of corresponding body diameter. Guiding ring "single". Aperture of odontostyle about 40 %. Four linear refractive longitudinal stripes opposite the stylet (also found in *Laimydorus* sp. [see Baqri and Coomans, 1973] and in *Afractinolaimus zairensis* [see Baqri et al., 1975]. Coomans [*in litt.* April 14, 1994] suggested that these are the narrow basal parts of the stylet protractors). Nerve ring surrounding the pharynx at about one-third of neck length from head end. Cardia conoid, about 20-25 mm long. Pharyngeal characters (three males, three females): pharynx beginning to widen at 51-55 % and attaining its full width at 59-61 % of its length from head end. DO lying near the point where the pharynx attains its full width; distance DO-DN: 8-10 mm. The two  $S_1N$  lying a small distance apart, behind the middle of the distance DN- $S_2N$ ; the anterior one small and indistinct. DN measuring 8-9 × 5-6 mm, nucleolus 3-4 mm;  $S_1N_2$  8-10 × 3-4 mm, nucleolus 3 mm;  $S_2N$  6-7 mm, nucleolus 2-2.5 mm. Locations:

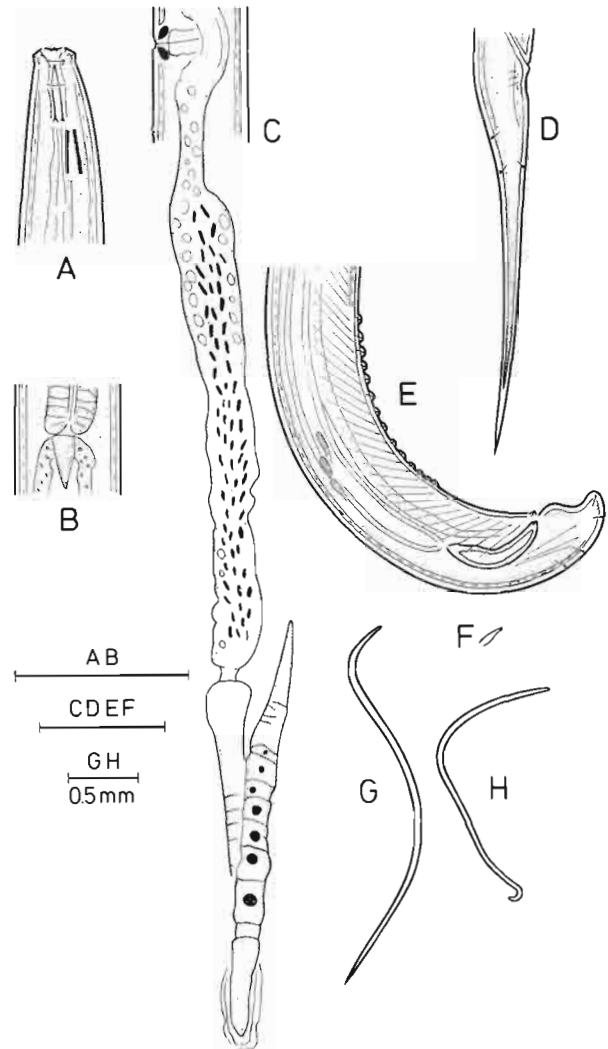
DO 57-60 %;  $S_1N_1$  74-78 %;  $S_2N$  90-91 %;  $K = 73-81$ ;DN 59-62 %;  $S_1N_2$  80-82 %;  $S_2O$  92-93 %;  $K' = 75-83$ ;DO-DN = 1.8-2.2 %;  $S_1N_1-S_1N_2$  3.7-6.7 %.

*Female*: Vulva longitudinal. Vagina: *pars proximalis* 15 × 10 mm; *pars refringens* 12 × 6 mm, with triangular sclerotizations; *pars distalis* virtually absent. Uteri extremely long, filled with sperm. Ovaries also extremely long. Ventral contour of tail base somewhat irregular. Large advulvar ventral pores resembling invaginations: prevulval 0.45 (0-2), 27-30 mm from vulva; postvulvar 1.3 (1-2), 45-52 mm from vulva. Tail elongate. Caudal

\* This transfer will be substantiated in another publication (Loof, 1996 *b*).

**Table 6.** Dimensions of *Laimydorus flevensis* n. sp. (all measurements in mm, except L, in mm).

	Holotype (female)	Females	Males
n		34	29
L (mm)	2.95	2.81 ± 0.284 (2.30-3.32)	2.62 ± 0.190 (2.04-2.97)
a	77	70.6 ± 4.3 (60-80)	72.6 ± 4.6 (62-80)
b	6.7	6.8 ± 0.64 (5.4-8.4)	6.1 ± 0.36 (4.9-6.6)
c	18.5	18.4 ± 1.4 (15.9-20.7)	100 ± 12.1 (77-135)
c'	6.9	6.9 ± 0.46 (5.9-7.8)	1.00 ± 0.1 (0.9-1.2)
Tail	160	153 ± 9.6 (130-173)	26.5 ± 2.4 (22-31)
V/VD	46	46.7 ± 1.4 (44-49)	47.4 ± 1.9 (43-50)
G <sub>1</sub>	17	15.3 ± 1.7 (12-20)	15.7 ± 3.5 (11-24)
G <sub>2</sub>	18	15.4 ± 2.1 (12-21)	13.9 ± 3.1 (10-22)
LRW	13	11.8 ± 0.5 (11-13)	12.0 ± 0.5 (11-13)
Odst.	16	16.0 ± 0.67 (15-17)	15.8 ± 0.63 (15-17)
Odph.	25	25.8 ± 1.8 (23-30)	25.8 ± 1.6 (24-31)
Spear	41	41.8 ± 1.6 (39-45)	41.7 ± 1.5 (40-46)
ABW	23	22.2 ± 1.5 (20-26)	26.2 ± 1.7 (23-31)
MBW	38	39.6 ± 4.9 (32-54)	36.1 ± 3.0 (30-42)
PR	112	121 ± 14.7 (89-146)	232.2 ± 32.3 (184-308)
PR-S <sub>1</sub>			110 ± 28 (64-188)
Neck	428	422 ± 19 (385-484)	430 ± 19 (397-466)
h	26	27 (22-34)	
h %	16	17 (13-23)	

**Fig. 7.** *Laimydorus flevensis* n. sp. A: Anterior end; B: Cardiac region; C: Female genital branch; D: Female tail; E: Male, posterior portion; F: Lateral guiding piece; G: Female, entire; H: Male, entire.

pores: two subdorsal pairs, one subventral pair as illustrated.

**Male:** Testes two, dorylaimid. Spicules dorylaimid, 43-48 mm long; lateral guiding pieces 13-14 mm long, widened proximally. Ventromedian supplements 13-16. Copulatory muscles about 35; no accessory muscles and no constriction. "Kopulationshöcker" absent. Junction of intestine and prerectum far anterior to anteriormost supplement. Four ejaculatory glands on each side, located anterior to copulatory muscles. Rectal glands opposite posterior half of supplement series. Tail with concave ventral contour, with a pair of ventrosubterminal pores and three pairs of subdorsal ones.

## TYPE HABITAT AND LOCALITY

Canal bottom, Lelystad (Southern Flevoland), The Netherlands.

## TYPE SPECIMENS

Holotype : Female on slide WT 3039. Paratypes : 21 males and 24 females on slides WT 3040-3052; one male and one female deposited at the Instituut voor Dierkunde, Rijksuniversiteit, Gent, Belgium, and at the USDA, Beltsville, MD, USA.

## DIAGNOSIS AND RELATIONSHIPS

*L. flevensis* n. sp. is characterized by very slender body, narrow angular lip region, odontostyle 15-17 mm long, and males with 13-16 ventromedian supplements.

Through the very slender body, this species resembles *L. bongersi* n. sp., from which it differs by : shorter odontostyle (15-17 vs 18-21 mm); offset angular lip region vs rounded, continuous; presence vs absence of advulvar pores; shorter spicules (< 50 vs > 60 mm); longer tail (130-168 vs 88-128 mm); lower "c" (17-20 vs 28-44); higher "c'" (6.2-7.4 vs 3.1-5.0); narrower lip region (11-13 vs 13-15 mm).

From *L. dhanachandi*, it differs mainly by much narrower (11-13 vs 20 mm) and more offset lip region and shorter odontostyle (15-17 vs 22-25 mm); from *L. lordelloi*, by longitudinal vulva and supplement number (13-16 vs 7-9); from *L. luettichau* and *L. oryzae*, by single guiding ring and lower number of supplements, from *L. oryzae* also by the longitudinal vulva.

It is possible that this is the species described by de Man (1880, 1884) from fresh water near Leiden, the Netherlands, under the name of *Dorylaimus filiformis* Bastian; the dimensions fit well, only the lip region is not so strongly offset but it is known that de Man sometimes exaggerated the distinctness of this portion, e.g., in *Dorylaimus attenuatus* (Loof, 1994).

***Laimydorus constrictus* n. sp.**

(Figs 8 E-H, 9, 10)

## MEASUREMENTS

See Table 7.

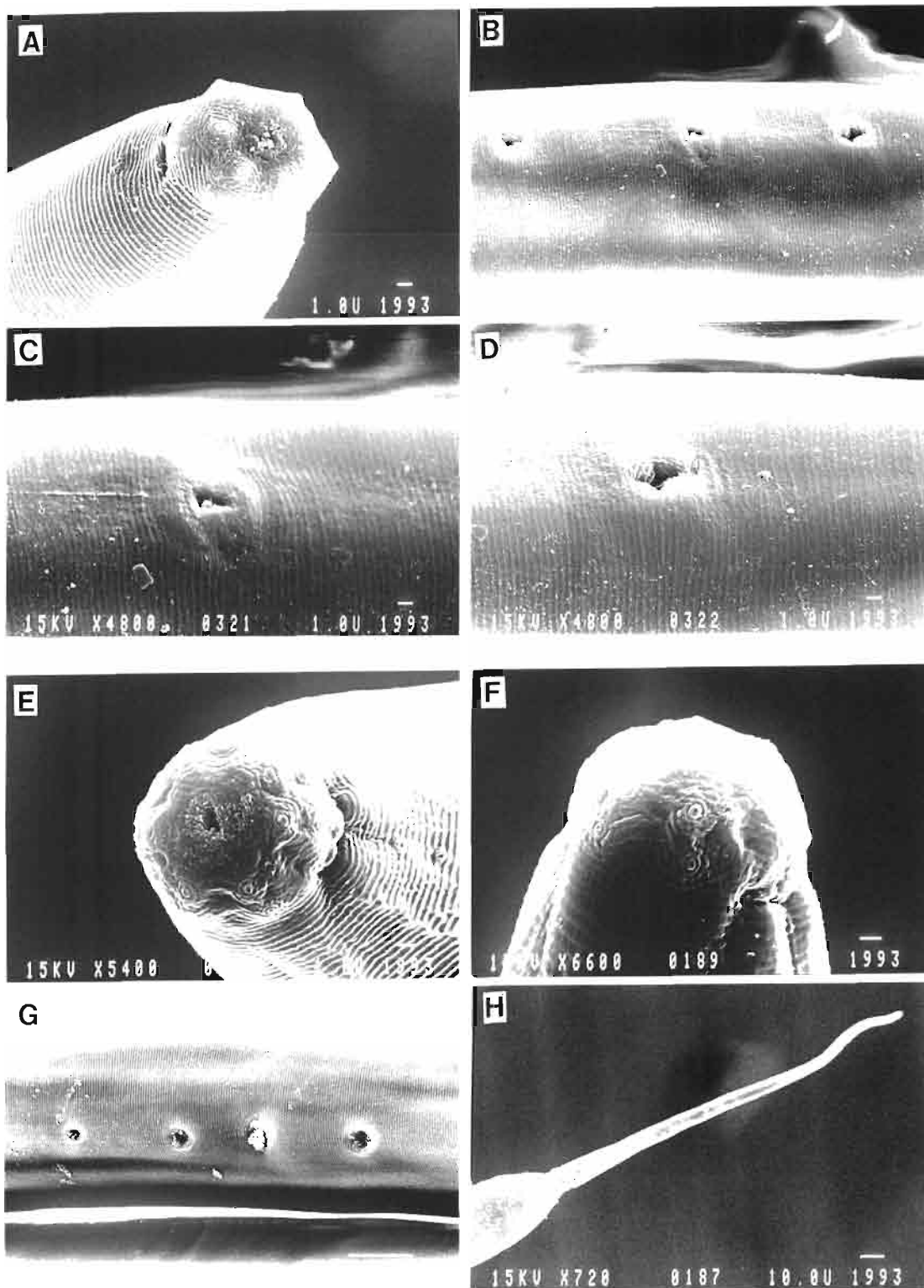
## DESCRIPTION

*Adults* : Body straight in female, posterior part strongly curved ventrad in male. Cuticle 2 mm thick, increasing to 3 mm at neck region and 6 mm at base of female tail; with thin, sharply demarcated outer layer; transverse striae imperceptible. Lateral chord one-fourth to one-fifth of body diameter. Lip region offset by a deep depression, only one-fourth to one-fifth as wide as the body at base of pharynx; flattened anteriorly, sides rounded, sensilla slightly protruding, arranged into an anterior circle of ten and a posterior one of six sensilla. Lips fused. Amphid aperture about 10 mm (two-thirds of corresponding body width). Odontostyle straight, the aperture occupying about one-third of its length. Odon-

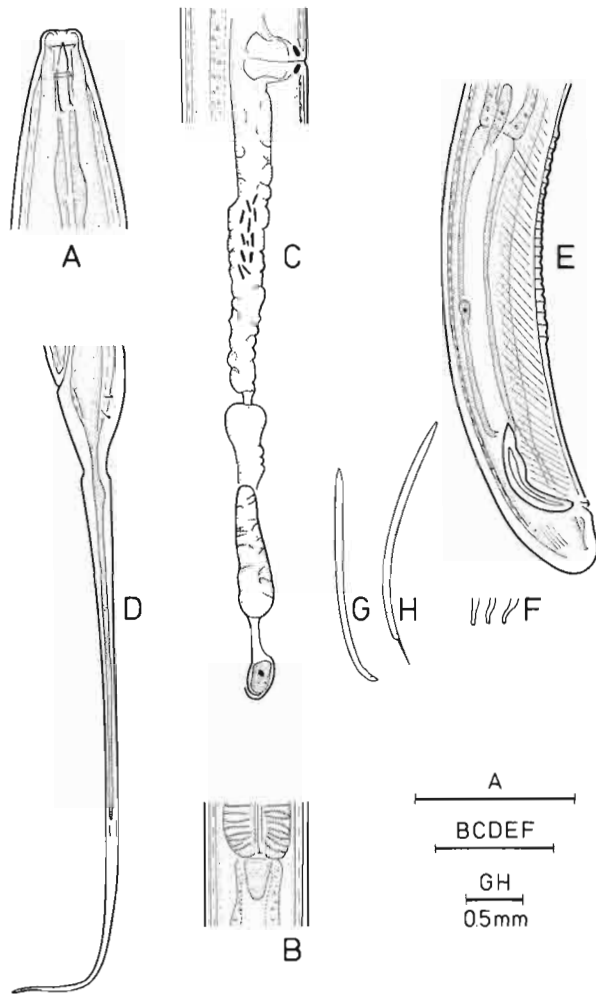
**Table 7.** Dimensions of *Laimydorus constrictus* n. sp. (all measurements in mm, except L, in mm).

	Holotype (female)	Females	Males
n		15 (32)	27
L (mm)	2.28	2.34 ± 0.11 (2.16-2.58)	1.94 ± 0.11 (1.70-2.16)
a	46	42.5 ± 3.1 (38-50)	37.8 ± 3.0 (35-45, n=14)
b	5.2	5.3 ± 0.24 (4.7-5.7)	4.6 ± 0.32 (3.9-5.3)
c	7.3	7.1 ± 0.39 (6.0-7.4)	7.9 ± 6.7 (66-89)
c'	9.3	9.8 ± 0.86 (8.6-11.7)	0.70 ± 0.1 (0.63-0.92)
Tail	311	334 ± 21.7 (308-380)	24.6 ± 1.8 (21-27)
V/VD	48	47.8 ± 2.0 (45-52)	44.3 ± 3.3 (35-52)
G <sub>1</sub>	15	14.3 ± 1.0 (13-16)	
G <sub>2</sub>	14	14.0 ± 2.1 (11-20)	
LRW	13	13.2 ± 0.5 (12-14)	13.0 ± 0.5 (12-14)
Odst.	22	21.7 ± 0.8 (20-24)	22.1 ± 0.7 (21-24)
Odph.	30	31.2 ± 1.2 (29-33)	31.3 ± 1.5 (29-34)
Spear	52	52.8 ± 1.0 (51-55)	53.4 ± 1.6 (50-57)
ABW	33	34 ± 1.6 (30-37)	34 ± 2.3 (29-37, n=14)
MBW	50	54 ± 4.9 (41-62)	52 ± 7.3 (40-59, n=14)
PR	127	87.5 ± 20 (69-163)	180 ± 28 (139-248)
Neck	438	442 ± 22 (404-495)	427 ± 27 (350-490)
h (n=8)	89	89-138	
h % (n=8)	29	29-38	

tophore simple, linear. Guiding ring double. Nerve ring surrounding the pharynx at 33-37 % of neck length from head end. Cardia conoid, 20-23 mm long. Pharyngeal characters : pharynx beginning to widen at 47-51 % and attaining its full width at 53-57 % of neck length from head end. DO lying near the point where the pharynx attains its full width; distance DO-DN : 8-10 mm. The two S<sub>1</sub>N lying a small distance apart behind the middle



**Fig. 8.** SEM photos. A-D : *Laimydoros flevensis* n. sp. A : End-on view of anterior end; B-D : Vulva (B with advulvar pores). – E-H : *L. constrictus* n. sp. E : End-on view of anterior end; F : Medial view of anterior end; G : Vulva and advulvar pores; H : Female tail.



**Fig. 9.** *Laimydorax constrictus* n. sp. A: Anterior end; B: Cardiac region; C: Female genital branch; D: Female tail; E: Male, posterior portion; F: Lateral guiding piece; G: Male entire; H: Female entire.

of the distance DN- $S_2N$ , the anterior one smaller. DN measuring 7-8 × 7-8 mm, nucleolus 3-4 mm;  $S_2N$  4 × 4 mm, nucleolus 2 mm; contours of  $S_1N_1$  and  $S_1N_2$  indistinct. Locations:

DO 53-56%;  $S_1N_1$  72-77%;  $S_2N$  87-90%; K = 84-92;

DN 55-58%  $S_1N_2$  75-80%;  $S_2O$  89-91%; K' = 86-93;

DO-DN 1.8-2.4%;  $S_1N_1$ - $S_1N_2$  1.7-3.6%.

**Female:** Vulva a longitudinal slit 4 mm long. Vagina: *pars proximalis* with walls diverging proximally, 20 mm wide, wider than deep; *pars refringens* with two oblique, drop-shaped to sickle-shaped "sclerotized pieces", 11 mm wide, 4 mm deep; *pars distalis* very short,

2-4 mm. Uteri filled with sperm. Several females show cuticular invaginations near the vulva: one to three prevulval, one or two postvulval. Tail constricted both dorsally and ventrally, then attenuated to finely rounded tip. Cuticle mostly thickened, on the anterior part of the tail. Two subdorsal pairs of caudal pores. Rectum as long as ABW, prerectum 69-163 mm long = 2.0-4.7 ABW.

**Male:** Teste two, dorylaimid. Spicules dorylaimid, 53-62 mm long; lateral guiding pieces 13-14 mm long, narrowed distally. Ventromedian supplements 19-24, contiguous. Copulatory muscles 45-50. Junction between prerectum and intestine proper from 64 mm anterior to 30 mm posterior to anterior supplement. Tail regularly convex-conoid with five pairs of pores.

#### TYPE HABITAT AND LOCALITY

Bank of Voetakker pond, Meteren, The Netherlands. Paratypes also from river bank at Beesd, some miles west of Meteren.

#### TYPE SPECIMENS

Holotype: Female on slide WT 3001. Paratypes: 27 females and 24 males on slides WT 3001-3019; one male and two females at the Instituut voor Dierkunde, Rijksuniversiteit, Gent, Belgium; one male and one female at the USDA, Beltsville, MD, USA.

#### DIAGNOSIS AND RELATIONSHIPS

*L. constrictus* is characterized by shape of female tail, narrow, rounded lip region, body length 1.7-2.6 mm, odontostyle length - 12-14 mm and supplement number of 19-24. It differs from all species in the genus by its female tail being constricted on all sides.

#### Acknowledgment

I thank Mrs H. van Megen for her skilful assistance in making the SEM photos.

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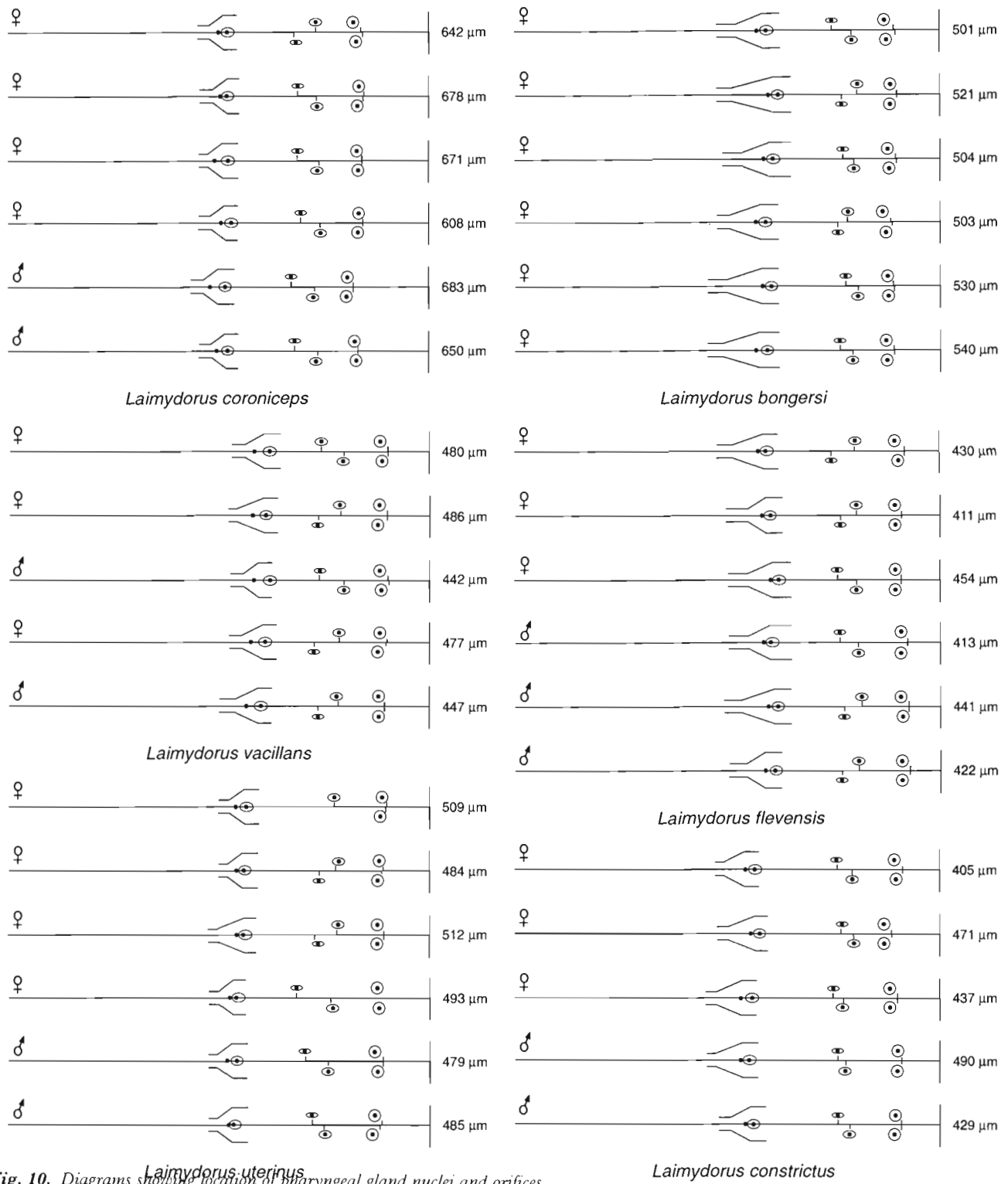


Fig. 10. Diagrams showing location of pharyngeal gland nuclei and orifices.

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