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Helminthoxys abrocomae n. sp. (Nematoda: Oxyurida) from *Abrocoma cinerea* in Bolivia

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Abstract

A new pinworm parasite is described from *Abrocoma cinerea*, a caviomorph rodent of the superfamily Octodontidae from the Andes of Bolivia. The new species, *Helminthoxys abrocomae* n. sp., possesses special secretory mamelons which we consider a synapomorphy of the genus *Helminthoxys*. Within *Helminthoxys*, the closest relatives are found in octodontoid rodents: *H. gigantea* occurs in *Octodon degus* in Chile and *O. bridgesi* in Argentina, and *H. freitasi* is a parasite of *Thrichomys aperioides* in Brazil. *H. abrocomae* n. sp. differs from both other species morphometrically in relation to different parts of the body in both sexes, particularly the size of the body, spicule, gubernaculum and eggs, by the presence of a rough cuticular area around the cephalic sensory papillae and by the possession of very well-developed cervical alae which are strongly curved dorsally. *H. abrocomae* n. sp. is the tenth nominal species described in *Helminthoxys*, all of them being parasites of caviomorph rodents.

Introduction

Herein we provide the description of a new species of nematode of the family Oxyuridae and genus *Helminthoxys* Freitas, Lent & Almeida, 1937 recovered from the caecum of individuals of *Abrocoma cinerea* (Thomas) (Rodentia: Caviomorpha) collected from the Andes of Bolivia.

Materials and methods

Mammals were collected in live-traps, killed with chloroform and examined for helminths within a few minutes of death. Pinworms were collected from the large intestine and caecum, and either placed directly in 10% formalin or plunged into glacial acetic acid for a few seconds prior to fixation in 10% formalin. Some specimens were preserved in either 95% ethanol or liquid nitrogen for future analyses of genetic material. Specimens were studied under the light microscope as temporary wet mounts, first in water and later in lactophenol. We

studied hand-cut cross-sections made using small pieces of razor-blade and a small brush. Drawings were made with the aid of a drawing tube.

Helminthoxys abrocomae n. sp.

Description

Holotype male. Width gradually increasing posterior to cephalic vesicle, reaching maximum at level of mid-body. Tail short, with slender tip (Figure 1A). Mouth surrounded by 3 prominent pseudolabia (*sensu* Hugot, 1988); on each dorso-lateral pseudolabia 2 labial papillae are closely grouped laterally with corresponding amphid, all of them being surrounded by rough cuticular area (Figure 1B, C, E); 3 strong conical oesophageal teeth are intercalated with cuticularised thickenings of inner part of pseudolabia (Figure 1B, D, F). Ventral pseudolabium cap-shaped (Figure 1E, F); dorso-lateral pseudolabia bowed dorsally, each being prolonged laterally by voluminous protuberance

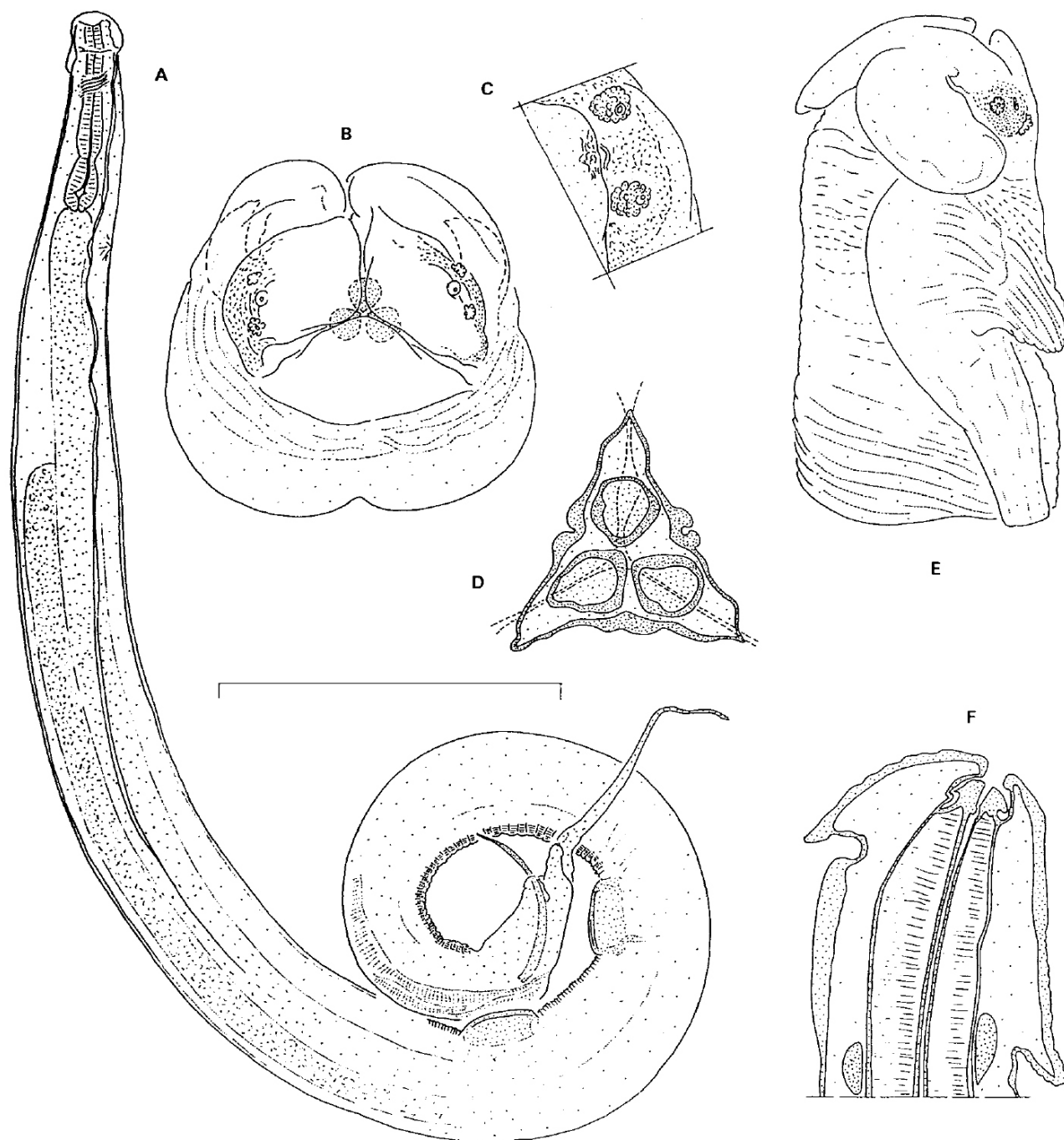


Figure 1. *Helminthoxys abrocomae* n. sp., holotype male. A, entire worm, right lateral view; B, head, apical view; C, *idem*, detail of the sensory organs of the left side; D, optical section of the oesophageal teeth in apical view; E, left lateral view of the anterior region of the body; F, *idem*, optical sagittal section. Scale-bar: A, 1,650 μ m; B,E,F, 250 μ m; C,D, 100 μ m.

gradually giving rise to strong cervical ala, triangular on a cross-section and curved dorsally (Figures 1B, E, 2A). Size of cervical alae decreases posteriorly as they progressively transform into small, sharp lateral alae, ending just anterior to cloaca (Figures 1A, 2B, 3F). Excretory pore close to posterior end of oesophagus. Monorchic, with testis reflexing at about twice length of oesophagus from anterior extremity (Figure 1A). Area rugosa composed of 2 ventro-medial mamelons, followed by regular ranks of small longitudinal crests corresponding with cuticular striae (Figure 1A). Each mamelon with 5 secretory slots corresponding with ventral cuticular striae of body (Figure 2D, E). Secretory slots communicating with gland formed by local differentiation of ventral hypodermis. At level of mamelons ventral myocytes appear transformed: they are hypertrophied and orientation of myofibrils is modified to allow conduction of secretions from gland during mating (Figure 2B, C, F). Ranks of crests extend from end of second mamelon to last cuticular striation before caudal bursa (Figures 1A, 3E); size of crests decreases from ventro-median line laterally; crests oriented toward right side of body; external and internal layers of cuticle supporting crests are separated and interstitial space filled with liquid (Figure 3F, G). Genital papillae: 3 pairs (Figure 3A), comprising 2 pairs lateral, adanal and sessile (Figure 3B, C) and one pair posterior and pedunculate, flanking base of tail-tip. Phasmids situated laterally and posterior to last pair of caudal papillae. Spicule curved ventrally, well cuticularised, with sharp tip (Figure 1A). Gubernaculum present, well developed (Figure 3D), with accessory hook (cuticularised posterior lip of cloaca) twisted toward right side of body, thick and covered with scale-shaped ornamentation (Figure 3B, C, D).

Allotype female. Long worm with inflated cephalic vesicle; body narrowing just posterior to vulva and terminating in short tail (Figure 4A). Buccal structures, cephalic vesicle and cervical alae as in males (Figure 4A, C). Excretory pore situated at about twice length of oesophagus from anterior extremity; vulva situated at limit of first and second thirds of body. Genital tract didelphic and symmetrical, with oviducts making loops around voluminous spermatheca (Figure 4E). Spermatheca with inner epithelium modified, its cells being tall and narrow, separated from lu-

men of oviduct by several larger cells which obstruct its opening (Figure 4F). Eggs lemon-shaped, thin-shelled and unembryonated (Figure 4D).

Measurements. See Table 1.

Diagnosis

General: Large worms with 3 prominent pseudolabia; labial papillae closely grouped laterally with corresponding amphid, surrounded by rough cuticular area; pseudolabia prolonged laterally by voluminous protuberances giving rise to well-developed cervical alae which are strongly curved dorsally. *Male.* Area rugosa composed of 2 ventral secretory mamelons followed by regular ranks of crests oriented toward right side of body. Three pairs of genital papillae. Spicule well-sclerotised, with sharp tip. Accessory hook of gubernaculum twisted toward right side of body, thick and covered with a scale-shaped ornamentation. *Female.* Eggs lemon-shaped, thin-shelled and unembryonated.

Symbiotype: *Abrocoma cinerea* (Thomas) adult male, Museum of Southwestern Biology (MSB) catalogue no. 70580; field collection no. SLG155-93; MSB Division of Biological Materials, New Mexico Kryovoucher no. NK30666. *Parasymbiotypes:* *Abrocoma cinerea* adult female no. NK30665, and lactating adult female no. NK30667. Site in host: Caecum and colon. *Type-locality and date of collection:* 11.5 km west of San Andrés de Machaca, Departamento de La Paz, Bolivia, 16°59'47"S, 69°03'31"W, elevation 3,850 m, 3 August 1993. *Holotype male and allotype female:* Harold W. Manter Laboratory of Parasitology Collection (HWML) no. NK30666 and MSB, New Mexico Kryovoucher no. NK22814 A, respectively. *Paratypes:* Muséum National d'Histoire Naturelle, Paris, (MNHN no. 79 KJ) 3 males and 3 females, and (MNHN no. 80 KJ) 3 males and 3 females.

Discussion

In addition to the new species described herein, the genus *Helminthoxys* includes seven species, all parasite of caviomorph rodents. The type-species, *H. caudatus* Freitas, Lent & Almeida, 1937, has been reported from the caviid *Microcavia australis* (I. Geoffroy & d'Orbigny) in Argentina. *H. velizy* Parra

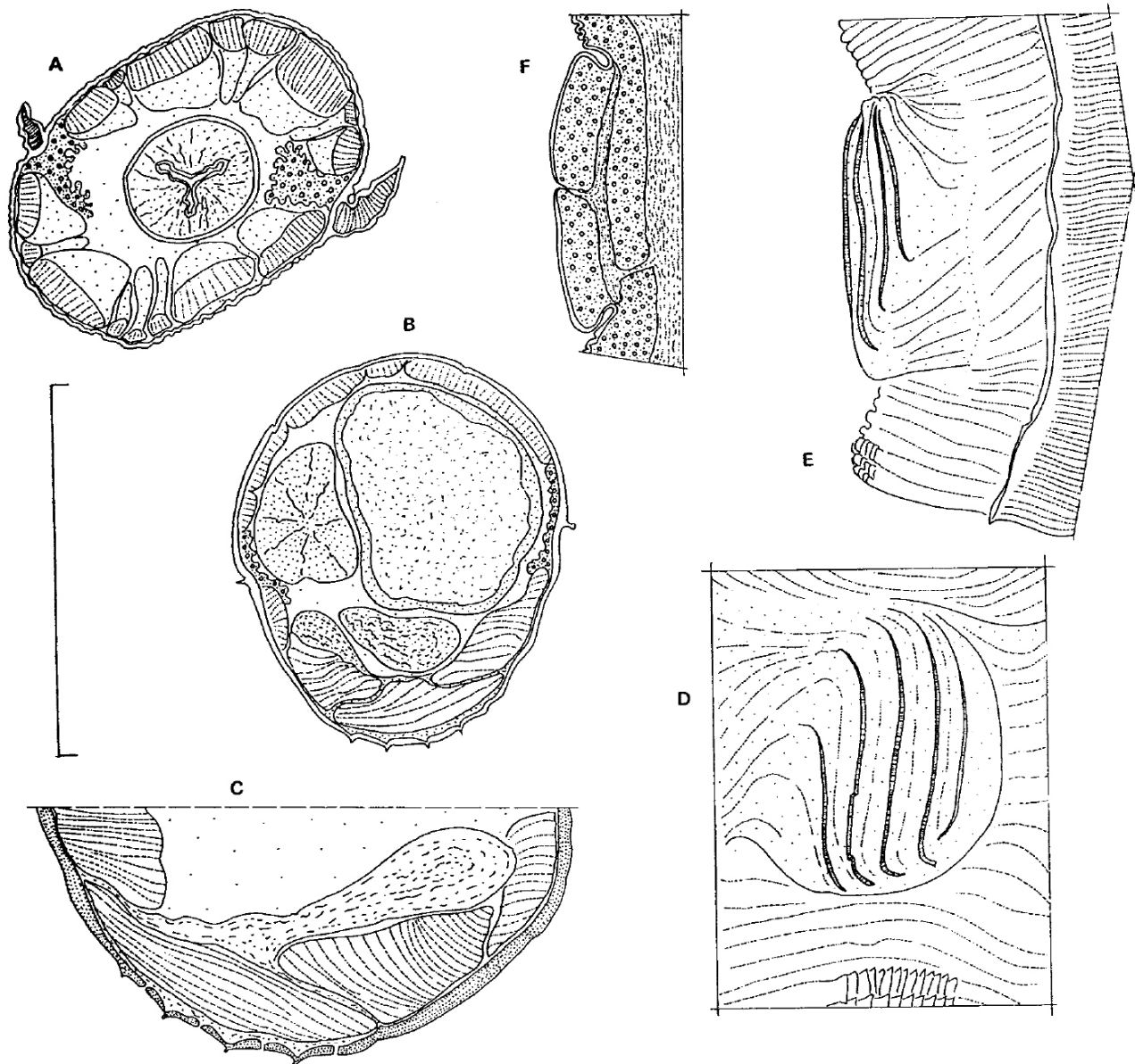


Figure 2. *Helminthoxys abrocomae* n. sp., holotype male. A, cross-section of the body at the level of the cervical alae, posterior view; B, cross-section of the body at level of the first mamelon; C, *idem*, detail; D, second mamelon ventral view; E, *idem*, left lateral view; F, *idem*, optical sagittal section. Scale-bar: A, B, 250 μ m; C-F, 50 μ m.

Ormeño, 1953 is specific to the chinchillid *Lagidium peruanum* Meyen in Bolivia and Peru. The other five, including *H. abrocomae* n. sp., are specific to members of the Octodontoidea, including *H. freitasi* Quentin, 1969 from *Trichomys aperoides* Lund in Brazil, *H. gigantea* (Quentin, Courtin & Fontecilla, 1975) from *Octodon degus* (Molina) in Chile and *O. bridgesi* Waterhouse in Argentina (Sutton & Hugot, 1993), *H. quentini* Barus, 1972 from *Capromys pilorides*

(Say) in Cuba and *H. tiflophila* (Vigueras, 1943) from *Mysateles prehensilis* Poeppig in Cuba. Lastly, *H. urichi* Cameron & Reesal, 1951 occurs thus far only in *Dasyprocta aguti* (L.), a member of the Dasyproctidae, in Trinidad and French Guyana (Hugot, 1986). Two additional species, *H. pujoli* Quentin, 1973, a parasite of the Bolivian caviid *Microcavia niata* (Thomas), and *H. effilatus* Schuurmans-Stekhoven, 1951, from *Lagidium viscacia boxi* Thomas

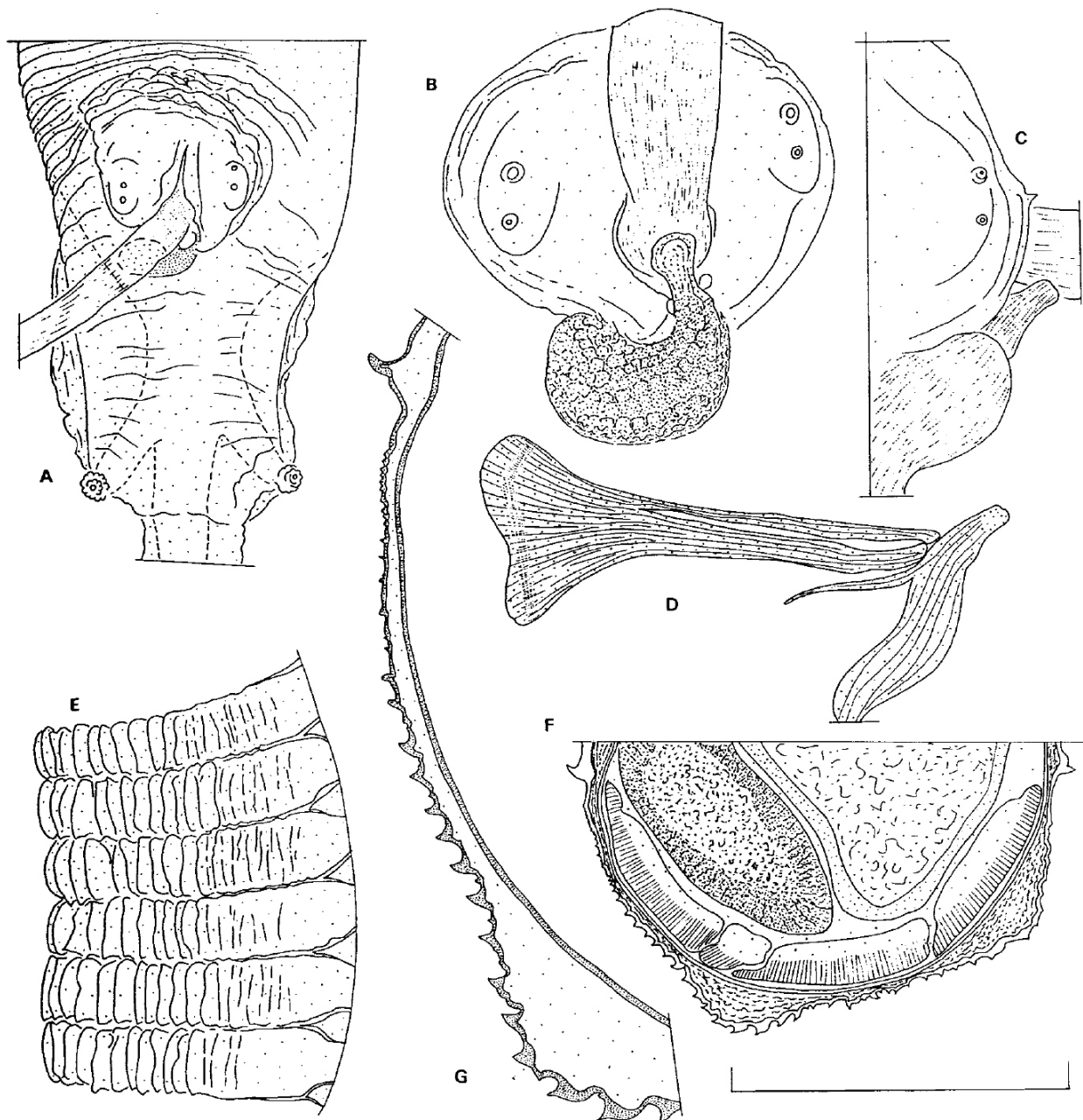


Figure 3. *Helminthoxys abrocomae* n. sp., holotype male. A, bursal cauda, ventral view; B, *idem*, detail of the cloacal opening; C, *idem*, detail on a right lateral view; D, gubernaculum, right lateral view; E, area rugosa posterior to second mamelon, left lateral view; F, *idem*, cross-section, partial view; G, detail of F. Scale-bar: A, E, F, 25 µm; B, C, D, G, 10 µm. *Helminthoxys abrocomae* n. sp.

in Argentina, were synonymised with *H. pujoli* and *H. velizi*, respectively (Hugot & Sutton, 1989). *Helminthoxys abrocomae* n. sp.

Our specimens possess the special secretory mamelons which we considered synapomorphies for *Helminthoxys* (see Hugot, 1983, 1988), thus justifying inclusion of these specimens in this genus.

Within *Helminthoxys*, only *H. gigantea* and *H. freitasi* exhibit a buccal structure similar to *H. abrocomae* n. sp., with dorso-lateral pseudolabia bowed dorsally and prolonged laterally by voluminous protuberances giving rise to the cervical alae. *H. abrocomae* n. sp. can be distinguished from *H. freitasi* by the following: having a larger body size in both male and female; an excretory pore situated relatively

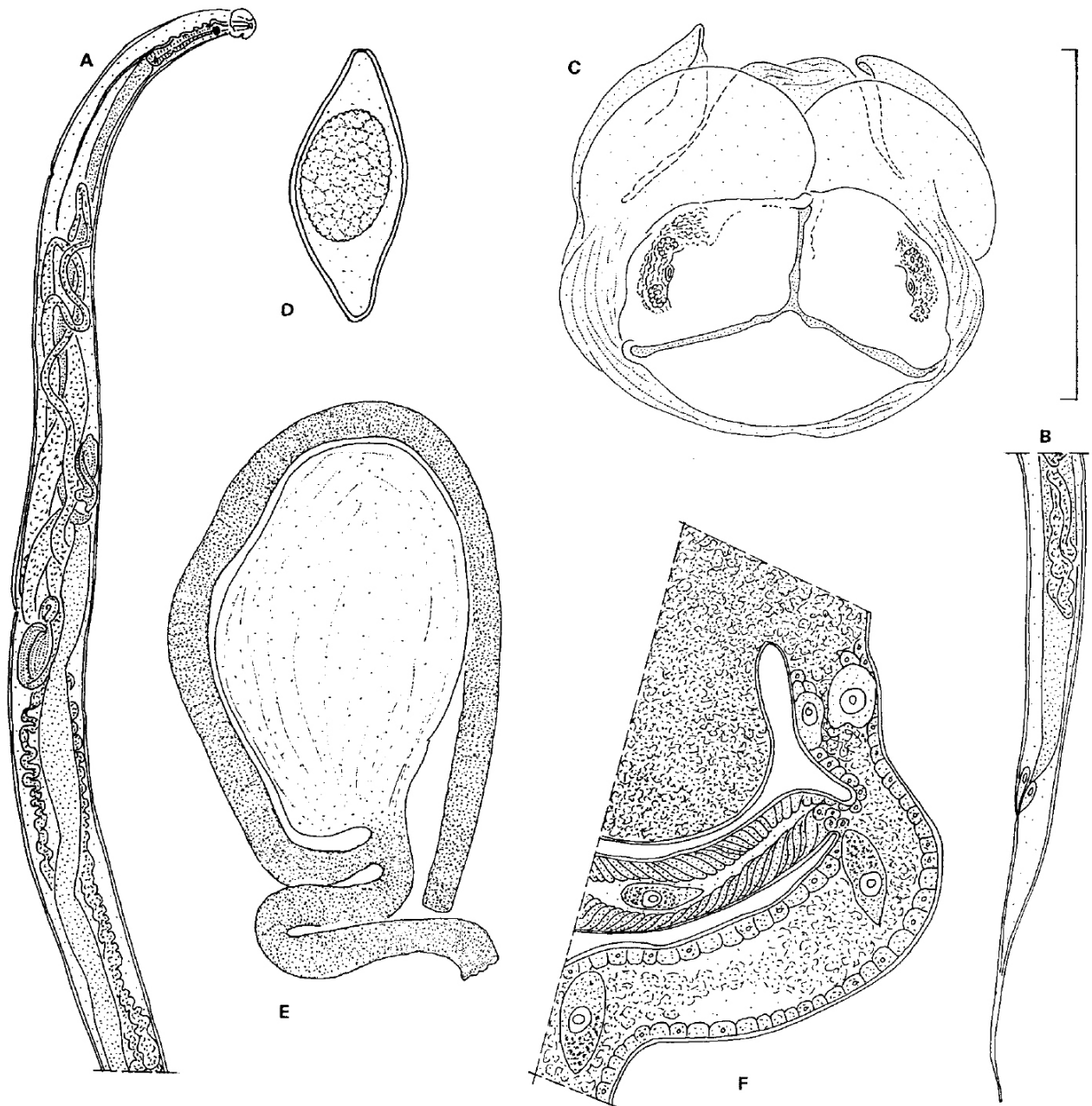


Figure 4. *Helminthoxys abrocoma* n. sp., allotype female. A, B, entire worm, left lateral view; C, head, apical view; D, egg; E, spermatheca after dissection. F, *idem*, detail. Scale-bar: A, B, 415 μ m; C, F, 25 μ m; D, 10 μ m; E, 50 μ m.

more anteriorly; a relatively longer oesophageal bulb; a relatively shorter spicule and relatively longer gubernaculum in males; and in females a vulva situated in the anterior half of the body (Table 1), the presence of a rough cuticular area around the cephalic sensory organs and a more rounded cephalic plate. The new species most closely resembles *H. gigantea* in the following: (i) lemon-shaped, thin-shelled eggs (in other species of the genus the

eggs generally are reniform and thick-shelled); (ii) a relatively weak development of the lateral adanal caudal papillae in males; (iii) the presence of a rough cuticular area around the cephalic sensory organs; and (iv) generally similar measurements of the different parts of the body, especially in the females (Table 1). However, *H. abrocoma* n. sp. can be distinguished from *H. gigantea* by the larger size of both sexes, a relatively more anteriorly sit-

Table 1. Measurements in micrometres of male and female of *Helminthoxys abrocomae* n. sp., plus *H. gigantea* (Quentin, Courtin & Fontecilla, 1975) and *H. freitasi* Quentin, 1969, from their original descriptions. Plain text represent measurements, italics indicate ratios and bold text represents values that provide good separation between *H. abrocomae* n. sp. and one or both of the other species.

	<i>H. abrocomae</i> holotype male	<i>H. gigantea</i> male	<i>H. freitasi</i> male		<i>H. abrocomae</i> allotype female	<i>H. gigantea</i> female	<i>H. freitasi</i> female
amphids (gap)	142	120	104	amphids (gap)	171	165	139
body L	11,672	6,320	4,910	body L	21,211	13,500	15,260
W (head)	282	168	157	W (head)	284	310	204
W (maximum)	367	250	241	W (maximum)	654	420	630
W (at nerve-ring)	234	140	161	W (at nerve-ring)	384	375	283
W (at bulb)	316	193	179	W (at bulb)	512	562	413
W (at excretory pore)	348	213	214	W (at excretory pore)	666	750	543
W (at anus)	219	93	107	W (at anus)	359	250	174
oesophagus L	957	700	520	oesophagus L	1,383	1,150	1,087
bulb W	153	115	116	bulb W	205	180	217
bulb L	285	200	161	bulb L	359	270	283
anterior extremity to:				anterior extremity to:			
– nerve-ring	306	180	170	– nerve-ring	512	270	261
– excretory pore	1,151	1,200	930	– excretory pore	3,023	1,830	2,065
– loop of testis	2,182	2,000	1,589	– vulva	8,146	5,000	9,522
– 1st mamelon	5,938	3,400	2,482				
– 2nd mamelon	7,099	3,900	2,857				
Tail L	1,365	900	500	Tail L	3,381	1,900	2,152
tip of tail L	1,243	850	384	egg L	77	92	?
spicule L	866	234	616	egg W	33	35	?
gubernaculum L	152	80	70				
<i>L/T</i>	8.55	7.02	9.82	<i>L/T</i>	6.27	7.11	7.09
<i>L-T/W maximum</i>	28.06	21.68	18.30	<i>L-T/W maximum</i>	27.25	27.62	20.81
<i>L-T/oesophagus L</i>	10.77	7.74	8.48	<i>L-T/oesophagus L</i>	12.89	10.09	12.06
<i>L-T/ex</i>	8.96	4.52	4.74	<i>L-T/ex</i>	5.90	6.34	6.35
<i>bulb L/bulb W</i>	1.87	1.74	1.39	<i>bulb L/bulb W</i>	1.75	1.50	1.30
<i>oesophagus L/nv</i>	3.13	3.89	3.06	<i>oesophagus L/nv</i>	2.70	4.26	4.16
<i>oesophagus L/bulb L</i>	3.36	3.50	3.23	<i>oesophagus L/bulb L</i>	3.86	4.26	3.84
<i>ex/oesophagus L</i>	1.20	1.71	1.79	<i>ex/oesophagus L</i>	2.19	1.59	1.90
<i>L-T/1st mamelon</i>	1.74	1.59	1.78	<i>L-T/vulva</i>	2.19	2.32	1.38
<i>L-T/2nd mamelon</i>	1.45	1.39	1.54	<i>L-T/egg L</i>	231.07	126.09	?
<i>L-T/spicule L</i>	11.91	23.16	7.16	<i>egg L/egg W</i>	2.31	2.63	?
<i>1st mamelon/2nd mamelon</i>	0.84	0.87	0.87				
<i>spicule L/gubernaculum L</i>	5.68	2.93	8.80				

Abbreviations: L, length; W, width; T, tail length; L-T, body length minus tail length; nv, ex, 1st mamelon, 2nd mamelon, vulva=distance from anterior extremity to nerve-ring; excretory pore, first and second mamelon, or vulva, respectively; ?, missing value.

uated excretory pore, a relatively longer spicule and a relatively shorter gubernaculum in the males, plus relatively smaller eggs (Table 1) and more developed cervical alae, which are strongly curved dorsally, in the females. We consider, therefore, that our specimens are new to science.

Acknowledgements

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