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A NEW SPECIES OF *PTERYGODERMATITES* (NEMATODA: RICTULARIIDAE) FROM THE INCAN SHREW OPOSSUM, *LESTOROS INCA*

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ABSTRACT: *Pterygodermatites* (*Paucipectines*) *hymanae* n. sp. (Rictulariidae) collected from the Incan shrew opossum, *Lestoros inca*, from Peru is described herein. These nematodes show a subapical, slightly dorsal oral opening and a laterally compressed buccal capsule with 2 conspicuous lateral walls and a dorsal wall. Each lateroventral wall possesses 4 relatively large denticles, and the dorsal wall has 6 denticles. Females are characterized by a conspicuously large postvulvar 37th spine, which may reach 1 mm. This is the first record of endoparasites in the Incan shrew opossum and the fifth species of *Pterygodermatites* recorded in New World marsupials.

Pterygodermatites Wedl, 1861, is a cosmopolitan genus of spirurid nematodes that includes species with a prominent buccal capsule and conspicuous spines along the surface of the cuticle. These nematodes occur in the digestive tract of mammals and show a heteroxenous pattern of transmission (Quentin, 1969). In South America, there are 11 species of the genus included in 2 subgenera, *Pterygodermatites* (*Multipectines*) or *Pterygodermatites* (*Paucipectines*) (Beldomenico et al., 2005; Torres et al., 2007; Hoppe et al., 2010). Nine species of *Pterygodermatites* (*Paucipectines*) occur in South America, 4 in sigmodontine rodents (Quentin, 1967; Sutton, 1979, 1984); 1 in armadillos (Navone and Lombardero, 1980; Navone, 1987); 1 in bats (Travassos, 1928); and 1 in microbiotherid and 3 in didelphid marsupials (Chabaud and Bain, 1981; Navone, 1989; Navone and Suriano, 1992; Ramallo and Claps, 2007; Torres et al., 2007, 2009; Jiménez et al., 2008). *Pterygodermatites* (*Paucipectines*) *elegans* (Travassos, 1928) has been found in bats and didelphid marsupials. To our knowledge, no other member of *Pterygodermatites* has been reported in any of the 6 species of shrew opossums (Paucituberculata: Caenolestidae). The 3 genera of shrew opossums are all restricted to Andean South America, i.e., *Caenolestes* at middle to high altitudes in the northern Andes, *Lestoros* on the eastern Versant in southern Peru, and *Rhyncholestes* in the Valdivian Forest of southern Chile and Argentina. All forage on the ground and feed on invertebrates and fungi (Patterson, 2007). We herein present the first record for any helminth occurring in the Incan shrew opossum *Lestoros inca* (Thomas, 1917) and describe a new species of *Pterygodermatites* (*Paucipectines*).

MATERIALS AND METHODS

Incan shrew opossums were collected at the locality of La Esperanza, Paucartambo, Cuzco, Peru (13.17773°S, 71.60452°W, 2,880 m) from 25 October to 1 November 2001. Shrew opossums were collected using Museum Special and Victor snap traps baited with peanut butter, oats, and fish oil, and killed by means of thoracic compression (Sikes and Gannon, 2011). Specimens used in the present study were fixed in 4% buffered formaldehyde in the field and subsequently transferred to 70% ethanol for storage. Specimens are maintained in the fluid collection of the Division of Mammals, Field Museum of Natural History, Chicago, Illinois, accession numbers FMNH 174477, FMNH 174479, and FMNH 174481. Viscera were extracted through an inguinal incision and were examined for helminths. Parasites found were separated from the organs and stored in 70% ethanol. Nematodes were cleared in temporary mounts of lactophenol. All measurements are given in micrometers, with the exception of total length, esophagus, and distance to vulva; for each character, the range is given first, followed by mean, coefficient of variation (Sokal and Rohlf, 1995), and sample size. Drawings were made using an Olympus BX50 microscope equipped with a drawing tube.

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DESCRIPTION

Pterygodermatites hymanae n. sp.

(Figs. 1–9)

General: Nematodes with thick cuticle, body uniformly cylindrical, slightly tapering at both ends (Figs. 1, 2). Four pairs of papillae in anterior end; 2 external pairs, subterminal, 2 internal pairs, both flanking stoma (Fig. 3). Oral opening subapical, slightly dorsal with 4 pseudolabia and 1 ventral groove (Fig. 3). Buccal capsule asymmetric, dorsally elongated (Fig. 4), laterally flattened (Fig. 5). Three strongly developed walls; 4 denticles on margins of lateroventral walls (Figs. 3, 4), 6 minute denticles in dorsal margin (Fig. 3), and 3 internal denticles in bottom of capsule, 1 dorsal and 2 lateroventral (Fig. 4). Two subventral rows of cuticular projections run along the body. A single type of cuticular projection present in males (Fig. 1), 3 different types in females (Figs. 2, 6, 8). Esophagus filariform, with short muscular and long glandular portion (Figs. 1, 2).

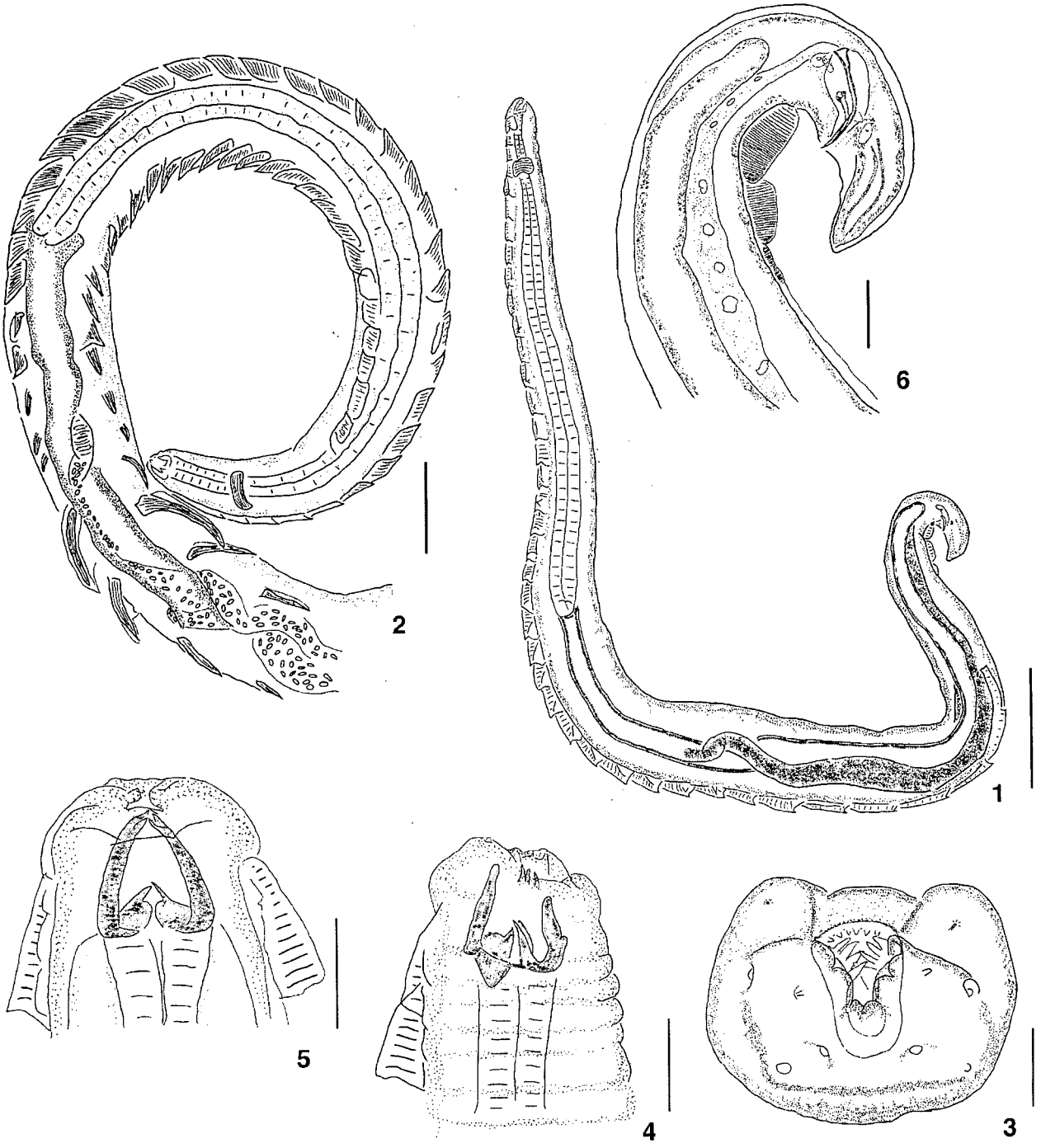
Males (based on 2 specimens): Total length, 2.66–3.33 mm, maximum width at midbody 122–198. Dorsal wall of buccal capsule 18 (0.3%) long; ventral wall 23–24 (3.3%) long, 23–25 (7%) wide at base. Total length of esophagus 1,057–1,224 (11.6%), length muscular portion 144–157 (5%), 20–33 (31%) wide at level of nerve ring; glandular portion 913–1,057 (12%) long, 36–59 (39%) wide. Nerve ring located 133–160 (14%) from anterior end (Fig. 1); excretory pore not observed. Forty-two pairs of subventral (n = 1) and 3 precloacal ventral projections (Figs. 1, 6). Eight pairs of caudal papillae. Spicules of different sizes, left 80–87 (6%) long, 9–10 (11%) wide at calomus; right 42–47 (9%) long, 5–6 (15%) wide at calomus (Fig. 6). Tail 98–108 (8%) long (Fig. 6).

Females (based on 8 gravid specimens): Total length, 16.22 by 26.37 mm (21.99, 17%), maximum width at midbody 448–881 (658, 24%). Dorsal wall of buccal capsule 69–123 (91, 24%) long; ventral wall 104–165 (127, 19%) long, 89–151 (114, 20%) wide at base. Total length of esophagus 4.21–5.11 mm (4.64, 7%), muscular portion 368–492 (426, 12%, n = 6) long, 59–81 (73, 15%, n = 6) wide at nerve ring level; glandular portion 3.72–4.51 mm (4.21, 7%, n = 6) long, 133–223 (170, 22%) wide (Fig. 2). Nerve ring and deirids located 360–443 (399, 9%, n = 7) and 586 (n = 1), respectively, from anterior end. Two subventral rows with 63 cuticular processes, 35 prevulvar (n = 6) (Fig. 2). Postvulvar processes 36–39 form hypertrophied spines (Fig. 2); processes 40 onward form smaller spines. Process 37 longer than rest, attached to body by 2 blunt roots, 561–901 (769, 15%, n = 8) long, 133–188 (161, 12%, n = 8) wide at base (Fig. 7). Vulva 4.49–5.93 mm (5.32, 6%) from anterior end. Amphidelphic opisthodelphic, with ova 39–47 (42, 4.7%, n = 48) by 22–29 (26, 6.8%, n = 48) (Fig. 9). Tail 300–364 (329, 7%) (Fig. 8).

Taxonomic summary

Type host: Incan shrew opossum, *Lestoros inca* (Thomas, 1917) (Paucituberculata: Caenolestidae). Symbiotype in FMNH 174481.

Type locality: Peru, Cuzco, La Esperanza, 13.177733°S, 71.604517°W, 2,880 m. Collected 1 November 2001.



FIGURES 1–6. *Pterygodermatites (Paucipectines) hymanae* n. sp. (**1**) Male, whole body; scale bar = 100 μm. (**2**) Anterior end of female; anterior end is lateral and body turns ventrally in the vulvar region where both rows of cuticular processes are parallel; scale bar = 200 μm. (**3**) En face view of a female, showing papillae, laterally compressed buccal capsule, and denticles in lateroventral and dorsal walls; scale bar = 50 μm. (**4**) Lateral view of anterior end, showing denticles in the bottom of buccal capsule; scale bar = 100 μm. (**5**) Dorsal view of anterior end; scale bar = 100 μm. (**6**) Tail of male, showing precloacal formations, spicules, and tail; scale bar = 50 μm.

Prevalence: Three of 3 shrew opossums (100%); mean intensity: 6.3; range: 2–9.

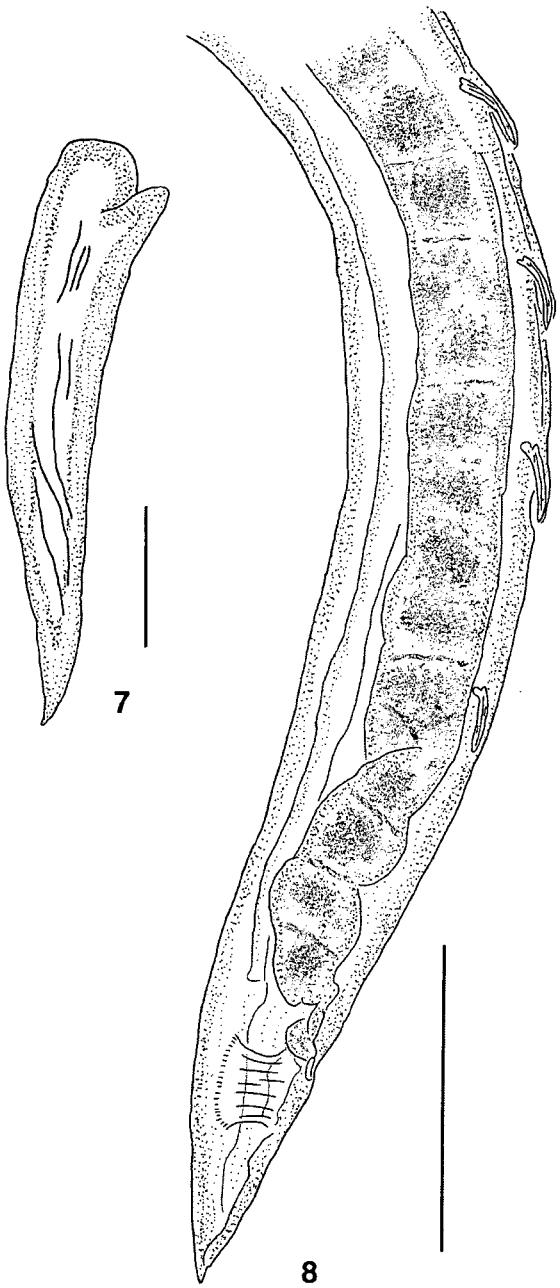
Site of infection: Small intestine.

Specimens deposited: Holotype in Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima [MUSM3057], allotype (FMNH-INV14014), and paratypes (MUSM3058 and 3059 and FMNH-INV14013, 14015-14017).

Etymology: The species is named after Dr. Libbie Henrietta Hyman, renowned invertebrate zoologist of the 20th century.

Remarks

Pterygodermatites (Paucipectines) hymanae is unique among all known species of the subgenus from the Neotropics in having a laterally



FIGURES 7, 8. *Pterygodermatites* (*Paucipectines*) *hymanae* n. sp. Female. (7) Thirty-seventh cuticular process; scale bar = 200 μm. (8) Tail; scale bar = 300 μm.

compressed buccal capsule, uniformly cylindrical body, and hypertrophied postvulvar spines. The body of the females of all other species in the subgenus is divided into a thin anterior end and wide posterior half. The posterior half contains the opisthodelphic uterus. The configuration of the buccal capsule of *P.* (*P.*) *hymanae* is unique in that there are 4 relatively large denticles in the lateroventral walls of the capsule, and 6 minute denticles in the dorsal wall. Relative to traits found in males, there are 3 unpaired ventral cuticular processes in the tail, of which the most anterior is smaller. Among the 9 described species of the subgenus in South America, only *P.* (*P.*) *zygodontomys* (Quentin, 1967) and *P.* (*P.*) *elegans* possess 3 caudal processes. *Pterygodermatites* (*Paucipectines*) *hymanae* can be distinguished from *P.* (*P.*) *zygodontomys* and *P.* (*P.*) *elegans* in the size

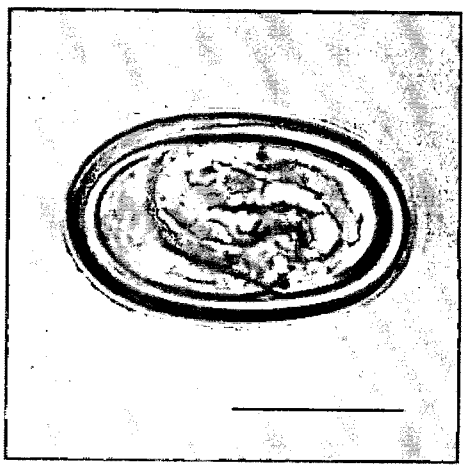


FIGURE 9. Embryonated egg of *Pterygodermatites* (*Paucipectines*) *hymanae* n. sp.; scale bar = 20 μm.

of the anterior ventral caudal process and shape of the body of females. Both *P.* (*P.*) *hymanae* and *P.* (*P.*) *elegans* show similar size and shape of spicules. All remaining species in *Pterygodermatites* (*Paucipectines*) show spine-like subventral processes near the vulva; however, none of them shows spines as long as 1 mm.

The configuration of the laterally compressed buccal capsule of *P.* (*P.*) *hymanae* is unique among all other species in the 5 subgenera. The nematode herein described possesses a buccal capsule that appears to be an inverted triangle in face view, with 2 ventral walls and 1 dorsal wall. Each ventral wall bears 4 well-developed denticles, whereas the dorsal wall has 6 smaller denticles. Known species of *Pterygodermatites* show an oblong buccal capsule in frontal view and bear a crown of minute denticles. Examples of this configuration include species in *Pterygodermatites* (*Paucipectines*) and *Pterygodermatites* (*Neopaucipectines*), which possess a similar number of homogeneous denticles. The latter subgenus is diagnosed by the dorsally directed stoma, a trait that is common with the species herein described. However, the different numbers and sizes of peribuccal denticles can be used to separate these taxa. In addition to the number of prevulvar cuticular processes, these structures are useful traits to separate these 2 taxa from *Pterygodermatites* (*Pterygodermatites*), in which peribuccal denticles are notoriously irregular in size. Finally, the peribuccal structures in *Pterygodermatites* (*Mesopectines*) and *Pterygodermatites* (*Multipectines*) form apophyses in the ventral side.

The configuration of the buccal capsule, the arrangement of the cephalic papillae, and the sessile caudal papillae in *P.* (*P.*) *hymanae* make us suspect it could belong to a unique subgenus. The structures surrounding the stoma are of key relevance in the definition of subgenera in *Pterygodermatites*. However, discrete and measurable characters used in the differentiation of subgenera and species frequently overlap, making species classification difficult (Tkach and Swiderski, 1996). More extensive sampling may reveal species showing similar traits. These could be used to reconstruct the phylogeny of the group, which may enable systematists to select characters that can be used reliably in the definition of the genus and subgenera.

The 5 species of *Pterygodermatites* known to infect marsupials in the New World include *P.* (*Paucipectines*) *elegans* in *Marmosa* sp. from Brazil, *P.* (*P.*) *hymanae* in *Lestoros inca* from Peru, *Pterygodermatites* (*P.*) *jagerskioldi* from *Caluromys philander*, *Gracilinanus agilis*, and *Gracilinanus microtarsus* from Brazil, *Pterygodermatites* (*P.*) *kozeki* from *Marmosa* sp. from Colombia, and from *Lestodelphys halli*, *Didelphis albiventris*, *Thylamis pusillus*, and *Thylamis pallidior* from Argentina, and *Pterygodermatites* (*P.*) *spinicaudatis* in *Dromiciops gliroides* from Argentina.

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