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A NEW SPECIES OF *VEXILLATA* (NEMATA: ORNITHOSTRONGYLIDAE) FROM THE COARSE-HAIRED POCKET MOUSE *CHAETODIPUS HISPIDUS* IN NEW MEXICO

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ABSTRACT: Individuals of a new species of trichostrongyloid nematode of the genus *Vexillata* were collected from the intestines of the coarse-haired pocket mouse *Chaetodipus hispidus* from eastern New Mexico. This new species possesses general features of the genus *Vexillata* but may be recognized as distinct from all other species by unique features of the dorsal ray of the caudal bursa and the synlophe.

Nematodes of the genus *Vexillata* Travassos, 1937, inhabit the small intestines of rodents of the superfamily Geomyoidea in the southern Nearctic and northern Neotropical regions (Durette-Desset, 1971; Guerrero, 1984). Up to the present time 8 species of *Vexillata* have been described from rodents of the families Geomyidae and Heteromyidae (Table I) (Denke, 1977; Guerrero, 1984). Nematodes of the genus *Vexillata* have been reported as parasites of *Heteromys* from Mexico, Colombia, and Venezuela, and from pocket gophers of the genera *Thomomys* from Colorado and *Crateogeomys* from Mexico (see host and distribution list in Table I).

In the present paper, we describe a new species of *Vexillata* from the coarse-haired pocket mouse *Chaetodipus hispidus* Baird from eastern New Mexico (Portales). Rodents of the genus *Chaetodipus* occur in suitable habitat throughout western North America with a distribution extending from a northern limit of about 46°N latitude in southern North Dakota, south to about 20°N latitude in Hidalgo state in central Mexico (Nowak, 1991).

MATERIALS AND METHODS

The specimens of *Vexillata* used in this description were collected intermittently from 1981 through 1985. After capture, hosts were killed and frozen, specimens were later thawed, and nematodes were recovered from small intestines by dissecting and searching with the aid of a binocular dissecting microscope. All nematodes recovered were stored in 70% ethanol. Specimens were cleared for study by evaporation of a solution of 70% ethanol, 5% glycerol, and 2% lactic acid.

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The following descriptions are based on 10 male and 10 female nematodes. Measurements are given in μm unless otherwise indicated. For each character, range is given first followed by mean; standard deviation is in parentheses. For all measurements, n = 10 except where noted.

DESCRIPTION

Vexillata armandae n. sp.

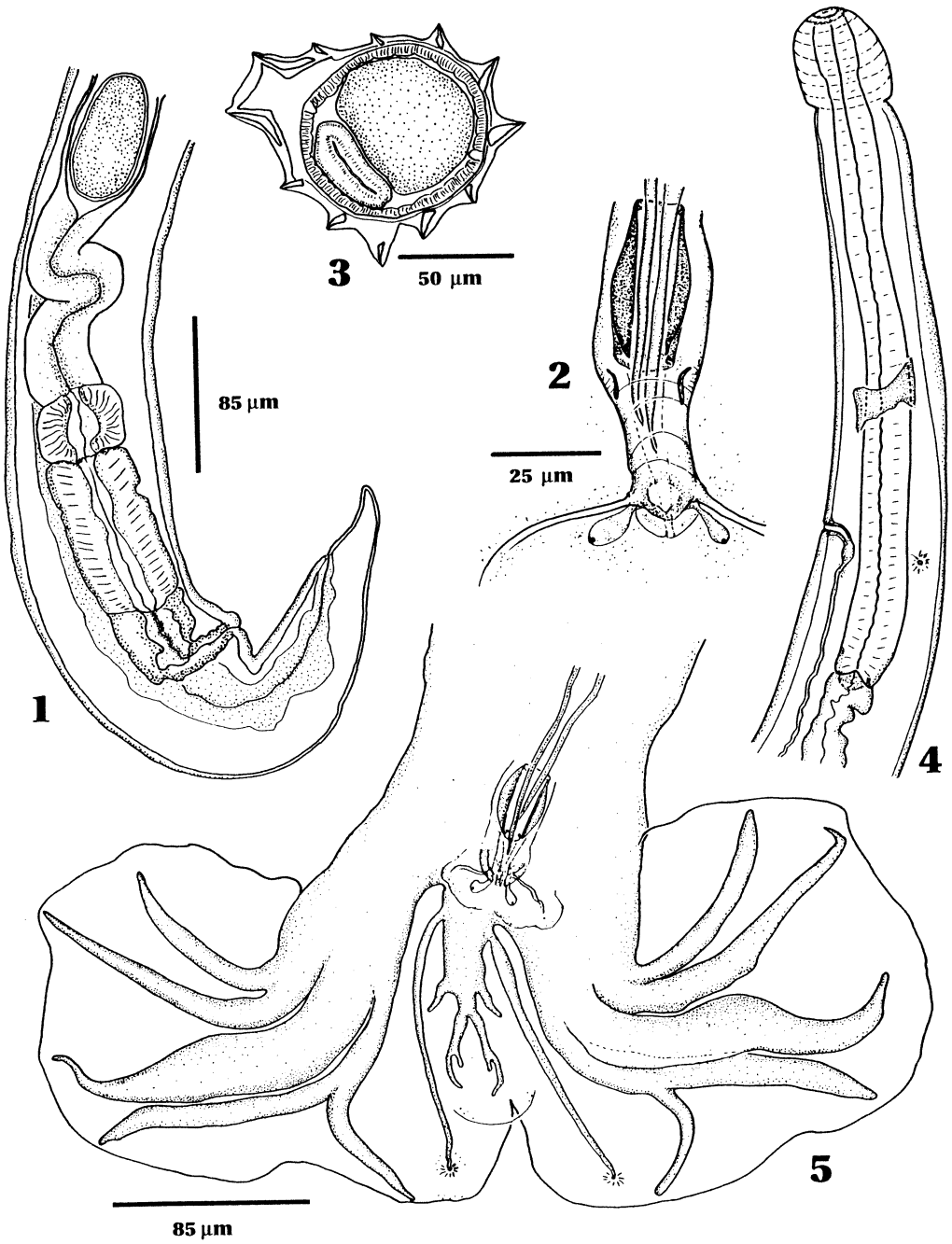
(Figs. 1–5)

General: Nematodes of medium size and coiled loosely. Excretory pore and deirids (Fig. 4) equal distance from anterior end. Females larger than males; males with well developed copulatory bursa. Females with straight tail but with body bent anteriorly just posterior to vulva.

Both males and females of this species possess 12 cuticular aretes in the middle of the body (Fig. 3). Two left-lateral aretes robust and forming a pronounced carene. Single right-lateral arete distinctly small pointing ventrally. Five dorsal and 4 ventral aretes pointing left. Dorsal aretes becoming smaller from right to left (Fig. 3).

Males: Length 4.67–6.55 mm, 5.65 mm (0.58). Maximum diameter 86–122, 102 (12). Cephalic inflation length 47–63, 56 (5.3) long by 41–55, 51 (4.1) wide. Anterior end to nerve ring 178–253, 209 (22.5) and to excretory pore 304–363, 324 (19.8). Width of body at excretory pore n = 8, 62–86, 73 (7.4). Esophagus length 347–397, 372 (15). Gubernaculum (Figs. 2, 5) well developed and cuticularized, located dorsal to spicules, just anterior to genital cone. Spicules subequal in length, right spicule 424–554, 498 (38.1), left spicule 434–566, 497 (38.9). Spicules simple in structure, gubernaculum not observed. Genital cone (Fig. 2) with 2 small rays connecting to velum-like structure dorsally and 2 small dorsal papillae (Fig. 2).

Arrangement of rays of bursa typical of nematodes of the genus *Vexillata*, 2-1-2 with a lateral pair, a mediolateral ray, and a posterolateral pair (Fig. 5). Rays 3 and 4 of similar size. Externodorsal rays long and slender. Dorsal ray (Fig. 5) with 2 small branches from main trunk starting about ½ length of dorsal ray and each branch ending in a single terminus. Continuing posteriad, dorsal ray splits into 2 symmetrical branches, each branch splitting into a fork with terminal por-



FIGURES 1–5. *Vexillata armandae* n. sp. **1.** Posterior end, female. **2.** Genital cone showing 1 pair of small dorsally originating rays with associated velum and 1 pair of papillae attached dorsally to the posterior part of the cone. Also illustrated is the well developed gubernaculum and the distal tips of the spicules. **3.** Synlophe, transverse section taken at midbody of female. For orientation, top is dorsal, bottom is ventral, toward the left of the page is left and toward the right side of the page is the right. The section was drawn and viewed from the posterior region looking anteriad. **4.** Anterior end showing esophagus, nerve ring, excretory pore, and deirid of female. For size, use scale bar from Figure 1. **5.** Caudal bursa, male. Note typical "*Vexillata*" arrangement of the rays in a 2-1-2 pattern.

TABLE I. Known geographic distribution and list of hosts of nematodes of the Genus *Vexillata.*

Species of *Vexillata**	Host	Geographic locality
V. armandae n. sp.	*Chaetodipus hispidus* Baird	Eastern New Mexico
V. chabaudi Yoyotte-Vado, 1972†	*Heteromys australis* Thomas	Dept. Valle de Cauca (Colombia)
V. convoluta Caballero y Cerecero, 1943‡	*Crateogeomys merriami* (Thomas)	Michoacán (Mexico)
V. dessetae Denke, 1977§	*Heteromys lepturus merriam*	Les Tuxtlas (Mexico)
V. legallae Denke, 1977§	*Heteromys lepturus*	Les Tuxtlas (Mexico)
V. petteri Durette-Desset, 1970‖	*Heteromys* sp. Desmarest	North America
V. scorzai Guerrero, 1984#	*Heteromys anomalus* Thompson	La Azulita, Edo Mérida (Venezuela)
V. tejerai Guerrero, 1984#	*Heteromys anomalus*	Los Canales, Naiguatá (Venezuela)
V. vexillata Hall, 1916¶	*Thomomys talpoides* (Richardson)	Colorado, New Mexico

* Data taken from the following: † Yoyotte-Vado (1972); ‡ Caballero and Cerecero, 1943; § Denke, 1977; ‖ Durette-Desset, 1970; # Guerrero, 1984; ¶ Hall, 1979.

tions of fork of unequal lengths and internal ray of each pair always shorter than external ray (Fig. 5).

Females: Monodelphic. Length 6.16–10.7 mm, 7.97 mm (1.82). Maximum width 95–140, 113 (17.4). Cephalic inflation length 53–66, 59 (3.8) long by 46–60, 53.8 (4.5) wide. Distance from anterior extremity to nerve ring n = 7, 222–250, 242 (8.7) and to excretory pore 307–402, 351 (32.4). Esophagus length (Fig. 4) n = 9, 361–452, 413 (27.4). Vulva to tip of tail n = 7, 172–220, 191 (15). Tail length 37–48, 43 (2.8). Width of body at nerve ring n = 5, 51–75, 61 (7.9); at base of esophagus n = 9, 51–84, 75 (13); at vulva n = 9, 94–118, 102 (10.3); at anus 23–31, 27 (2.2). Sphincter length n = 8, 43–47, 44 (3.6) and length of infundibulum n = 3, 85–102, 94 (6.9). Egg number 27–87 (52). Egg width 33–35, 38 (1.4) by 43–62, 50 (5.2). Vulva located just anterior to ventral bend of tail. Proceeding anteriad, the vulva is followed by a vagina vera, vestibule, and sphincter, respectively (Fig. 1). The infundibulum curves just before connection to the uterus.

Taxonomic summary

Symbiotype (see Frey et al., 1992): *Chaetodipus hispidus* Baird. Eastern New Mexico University Natural History Museum 9922.

Type locality: New Mexico, Roosevelt Co., 4.7 mi E, 4.3 mi South of Portales (latitude 34°10′N; longitude 103°21′W).

Specimens deposited: Holotype male: University of California Davis Nematode Collection (UCDNC) no. 3240. Allotype female: UCDNC 3241. Paratypes: 5 males UCDNC 3242–3246, 5 females UCDNC 3247–3251. Prevalence: 74% (148/200) from 1981 to 1985, from anterior portion of duodenum.

Etymology: This species was named after Dr. Armand Maggenti, Nematode Systematist and Professor Emeritus, University of California, Davis.

Diagnosis

Vexillata armandae n. sp. can be recognized as distinct from all known species of the genus in that the forks of the distal portion of the dorsal ray are not equal in length (Fig. 5). Except for the dorsal ray of *V. dessetae* Denke, 1977, the dorsal ray of all known species splits distally into forked branches of equal length. In *V. dessetae,* the distal part of the dorsal ray splits into 2 forks with each inside ray of the fork ending in a blunt bifurcation (compare fig. 3e, of Denke [1977] with Figs. 2 and 5 herein). In addition, the synlophe of *V. armandae* is different from all other species of *Vexillata* that have been described; in general form and shape of the carene and the cuticular aretes, the synlophe of *V. armandae* appears most similar to that of *V. dessetae*; however, it differs in having a carene that is more symmetrical with shorter aretes supporting the carene.

DISCUSSION

Nematodes of the genus *Vexillata* are known only from rodents of the superfamily Geomyoidea. Even though this is the first report of *Vexillata* from coarse-haired pocket mice, these nematodes are probably widely distributed throughout the range of rodents of the genus *Chaetodipus.* Little is known of the biological–ecological relationships among geomyoid rodents and their helminth parasites and except for a few preliminary studies (see Gardner, 1984; Gardner and Schmidt, 1988) few complete parasitological surveys of these rodents have been conducted. Rodents of the superfamily Geomyoidea have a certain monophyletic origin in the Nearctic region and have since diversified into 2 primary lineages represented by extant species included in the families Heteromyidae and Geomyidae (Simpson, 1945; Russell, 1968; Anderson and Jones, 1984). Geomyoid rodents have a diverse helminth fauna (Gardner, 1984; Gardner and Schmidt, 1988), and in many species of these mammals their parasites occur in relatively high prevalence (Gardner, 1984). The *Vexillata* group of ornithostrongylid nematodes is particularly well defined and the descriptions are very complete. The host-group in this case is also well defined thus providing a readily ac-

cessible host–parasite system that would be a good candidate for a study of host–parasite coevolution (Brooks and McLennan, 1991). Additional material in the form of helminths and protozoa from both geomyids and heteromyids from the northern Neotropics needs to be collected to provide a more complete knowledge of host–parasite diversity in this region.

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