Rhigonema critesi sp. n. (Nematoda: Rhigonematidae), A Parasite of the Millipede, Orthoporus typotopyge (Brölemann, 1905) from Costa Rica

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Abstract: Rhigonema critesi sp. n. (Nematoda: Rhigonematidae) from the millipede, Orthoporus typotopyge (Brölemann, 1905), is described. This is the first rhigonematid nematode to be described from Costa Rica. It differs from other Rhigonema species in that the female has a large, blunt, prevulvar spine and in the number and arrangement of caudal papillae in the male: Five pairs precloacal, one median, unpaired precloacal and four pairs postcloacal. Also it lacks cuticular pilosities.

The nematodes studied for this description came from the hindgut of the millipede, Orthoporus typotopyge (Brölemann, 1905). Twenty-three millipedes were collected in farmland just west of Juan Santamaría International Airport, Alajuela Province, Costa Rica. Twenty of them were infected with Rhigonema critesi. Each millipede contained four to 35 adults (41% males) and four to 30 larvae of R. critesi.

Specimens were fixed in AFA according to Crites’ (1965) method. They were cleared by glycerine–alcohol dehydration and mounted in glycerine, the cover glass being supported by glass wool. Although preliminary sketches of living worms were made, all drawings were made from preserved specimens with the aid of a camera lucida and a phase microscope. Unless otherwise stated, all measurements are in microns; those in parentheses are averages of 5 males and 10 females. Measurements of curved regions of the body were made near the middle of the specimens.

Rhigonema critesi sp. n. (Figs. 1–9)

Description: Rhigonematidae Chitwood, 1935. Rhigonema Cobb, 1898. Small nematodes with short tails, particularly in males. Cuticle translucent, very faintly striated and devoid of ornamentation. Oral opening surrounded by three lips, which bear four papillae, two on dorsal lip and one on each subventral lip. Amphids not observed. Lips have very fine cuticular lines and bear denticular projections (Fig. 2). Glands (amphidial?) on each side of anterior portion of esophageal corpus. Six longitudinal rods line most of corpus lumen. Rods divided into anterior and posterior portions: anterior one weakly striated and shorter than posterior, nonstriated portion. Just posterior to end of striations on longitudinal rods, nerve ring surrounds corpus. Excretory pore opens ventrally at corpus–bulb junction or slightly anterior to it. Esophageal bulb contains corrugated valve; intestine straight. Rectal walls cuticularized and thick. Rectal glands present.

Male (5 Specimens): Total length 2.19 to 4.46 mm (3.32); maximum width 126 to 213 (172). Distance from anterior end to end of cardia 332 to 446 (387); distance from anterior end to end of corpus 242 to 320 (279). Length of bulb (excluding cardia) 72 to 101 (89); length of cardia 17 to 25 (20); distance from anterior end to end of striated portion of rods lining corpus 120 to 170 (144). Nerve ring 122 to 177 (154) from anterior end; excretory pore (distance from anterior end) 210 to 293 (254). Cloacal opening to tip of tail 77 to 135 (110). Testis single, reflexed, and extends to 642 to 1,392 (1,091) from anterior end. Two spicules, one slightly longer than other. Longer spicule 417 to 614 (517); shorter spicule 403 to 600 (503). Spicules not reticulated and have retractor muscles attached to their anterior ends. No gubernaculum present. One medio-ventral precloacal papilla and nine pairs of caudal papillae present: five pairs precloacal, four pairs postcloacal. Small caudal alae extend from short distance anterior to cloacal opening to tip of tail. Rectal glands present. Tail short, tapers sharply and ends abruptly.

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Figures 1–9. Camera lucida drawings of *Rhigonema critesi* sp. n. from *Orthoporus typotopyge*. Scales in μm. 1. Female anterior end, lateral view. 2. Female, en face view. 3. Entire male, lateral view. 4. Vulvar
Female (10 Specimens): Total length 2.52 to 5.85 mm (4.37); maximum width (just anterior to prevulvar spine) 163 to 259 (198). Distance from anterior end to end of cardia 308 to 570 (485); distance from anterior end to end of corpus 228 to 421 (376). Bulb length (excluding cardia) 76 to 115 (98); cardia 19 to 34 (25); distance from anterior end to end of striated portion of rods lining corpus 117 to 178 (156). Nerve ring 122 to 192 (168) from anterior end; excretory pore 201 to 313 (284) from anterior end. Vulva 1.30 to 3.12 mm (2.34) from anterior end; anus to tip of tail 155 to 242 (214). Eggs 96 to 103 (101) long by 68 wide. Strong, blunt spine just anterior to vulva, projects slightly posteriorly and outwardly (Fig. 4). Thick-walled vagina vera directed anteriorly, opening into thinner-walled vagina uterina and into large, blind sac. Vagina uterina extends posteriorly, connecting with amphidelphic uteri (Fig. 4). Ovaries reflexed and anterior ovary extends to within 521 to 1,451 (1,124) of anterior end. Oviducts become enlarged just before opening into uteri. Tail tapers to sharp point.

Host: Orthoporus typotopyge (Brölemann, 1905).

Location: Anterior hindgut, just posterior to valve separating mid- from hindgut.

Type Locality: Area just west of Juan Santamaria International Airport, Alajuela Province, Costa Rica.

Holotype: Female, USNM Helm. Coll. No. 71808.


Discussion

Cobb (1898) established the genus Rhigonema with a very brief description of R. brevicolle composed of a few drawings and measurements given as a formula. Christie and Cobb (1927) redescribed the genus and established R. brevicolle as the type species. Artigas (1930) divided Rhigonema into two genera: Rhigonema for the species in which the female has a large, blind sac or diverticulum between the vagina vera and the vagina uterina, and Dudekemia Artigas, 1930, for the species in which the female does not have such a diverticulum. Dollfus (1952), reviewing the genus Rhigonema, felt that this difference might merit a new subgenus, but not a new genus. Subsequently (1964) he recognized the two genera as valid.

Of the four characteristics listed by Travassos and Kloss (1960) as differentiating the two genera, the only one that is conclusive and without known exceptions is the presence of a diverticulum connected with the vagina in Rhigonema and the absence of such a sac in Dudekemia. The species presently assigned to the genus Rhigonema are: R. infectum (Leidy, 1849), R. brevicolle Cobb, 1898, R. truncatum Artigas, 1926, R. nigella Thomas, 1931, R. longicaudatum Dollfus, 1952, R. alvarengai Travassos and Kloss, 1950, R. africana Dollfus, 1964 (female only), R. thysonophora Crites, 1965, and R. ornata Majumdar, 1967.

R. critesi is the only species in the genus in which the female has a thick, blunt spine just anterior to the vulva (Fig. 4). R. critesi, R. africana, and R. ornata are the only species in the genus without cuticular pilosites. In R. africana only the female is known and it does not have the prevulvar spine characteristic of R. critesi. The rods lining the corpus in R. africana, R. nigella, and R. thysonophora have an anterior striated portion that is longer than the posterior nonstriated portion, while in R. critesi the opposite is true. A diverticulum associated with the vagina "was not observed" by Majumdar (1967) for R. ornata. In the absence of this diverticulum R. ornata cannot possibly be placed in the genus Rhigonema. The only males in the genus that have caudal alae are R. critesi, R. infecta, and R. thysonophora. All known Rhigonema males have a different number and arrangement of caudal papillae than R. critesi. The spicules of opening, vagina vera, diverticulum, vagina uterina, and beginning of amphidelphic uteri. 5. Entire female, lateral view. 6. Male tail, lateral view. 7. Male tail, ventral view. 8. Female tail, ventral view. 9. Female tail, lateral view.
R. truncatum and R. alevarengai males have lateral extensions ("alae") which are absent in R. critesi spicules. Furthermore, the tail of R. critesi males is very different than that of R. longicaudatum or R. thysanophora males.

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Literature Cited

Catenotaenia utahensis sp. n. (Cestoda: Catenotaeniidae) from the Merriam Kangaroo Rat, Dipodomys merriami vulcani, in Utah

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Abstract: A new species of Catenotaenia is described and compared with other members of the genus in North America. The new species differs in having fewer and larger testes and symmetrically bilobed ovaries located in the median line toward the center of the proglottid. Catenotaenia californica, the species most closely allied, has an asymmetrical ovary located more anteriorly in the proglottid.

A study of the parasitism in the Merriam kangaroo rat, Dipodomys merriami vulcani Benson, conducted at Dixie State Park, Washington County, Utah, produced a relatively high incidence of infections with helminths, especially cestodes. Examinations of 84 hosts from trapsites in the park during 1971 produced 12 specimens of tapeworms, 10 belonging to the genera Mathevotaenia and 2 to Schizorchodes, the latter described as new (Bieneck and Grundmann, 1973). During 1972, 84 cestodes were recovered from 26 of 107 hosts examined. The generic composition of the cestodes recovered varied from the previous year, and in addition to Mathevotaenia being present, 18 specimens of an apparently new species of Catenotaenia were recovered representing a 4% infection rate.

Although identical trapsites and seasonal col-