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A new leech species of *Semiscolex* (Arhynchobdellida: Semiscolecidae) from Lake Catemaco, Veracruz, Mexico

Especie nueva de sanguijuela del género *Semiscolex* (Arhynchobdellida: Semiscolecidae) del lago de Catemaco, Veracruz, México

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Abstract. *Semiscolex lamothei* sp. nov. from Catemaco lake, Veracruz, México, is described based on the examination of 18 specimens. The new species differs from other species of the genus by the presence of 1/2 + 5 + 1/2 annuli between gonopores. The new species has morphological features previously not described for any other member of the genus, such as well-developed ejaculatory bulbs and postcaeca in the posterior part of the crop. This is the first record of the genus and the family in the northern hemisphere of the Americas.

Key words: leech, *Semiscolex,* new species, Catemaco, Veracruz, Mexico.

Resumen. Se describe *Semiscolex lamothei* sp. nov. del lago de Catemaco, Veracruz, México con base en 18 ejemplares. Se diferencia del resto de las especies del género por presentar 1/2 + 5 + 1/2 anillos entre los gonoporos. Esta nueva especie del género *Semiscolex* presenta características morfológicas no descritas en otros miembros del grupo, como bulbos eyaculadores bien desarrollados y postciegos en la región terminal del buche. Es el primer registro del género y de la familia en el hemisferio norte del continente americano.

Palabras clave: sanguijuela, *Semiscolex*, especie nueva, Catemaco, Veracruz, México.

Introduction

The genus *Semiscolex* Kinberg 1866 includes species of predaceous agnathous leeches distributed in South America, and is diagnosed by the presence of a well developed vagina, one pair of testisacs per somite, complete somite XII separating gonopores, and the absence of jaws (Ringuelet, 1985; Sawyer, 1986). The number of species included in this genus is not clear. Sawyer (1986) considered only 3 species: *Semiscolex juvenilis* Kinberg, 1866, *Semiscolex intermedius* Ringuelet, 1942 and *Semiscolex similis* (Weyenbergh, 1879), whereas Ringuelet (1985) considered 2 additional taxa: *Semiscolex zonatus* Oka, 1930 and *Semiscolex notatus* Cordero, 1937. The inclusion of the genus *Semiscolex* into the macrophagous family Haemopidae proposed by Richardson (1969) is also controversial (Sawyer, 1986; Borda and Siddall, 2004). Recent phylogenetic studies (Borda and Siddall, 2004; Oceguera-Figueroa, 2005; Phillips and Siddall, 2005) demonstrated that the family is polyphyletic with North American + European Haemopidae and South American *Semiscolex* + *Patagoniobdella* forming independent lineages. The latter group, formed by *Semiscolex* and *Patagoniobdella* was earlier recognized by Scriban and Autrum in 1934 and emended by Ringuelet (1972) as Family Semiscolecidae.

During a survey study of leeches in Veracruz, Mexico, specimens of a previously undescribed species from the genus *Semiscolex* was found. The morphological description of the new species is presented.

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Materials and Methods

Leeches were found attached to submerged rocks in Catemaco Lake, Veracruz, Mexico. All the specimens were collected under the Scientific Collecting License FAUT0056, issued to Virginia León Règagnon, by

hand and transported to laboratory in plastic containers. Specimens were relaxed with the gradual addition of 70% ethanol and fixed either in 4% formalin or in 100% ethanol. Dissections and drawings were accomplished under a stereoscopic microscope Zeiss 475052-9901. Microphotographs of whole specimens were taken with a digital camera Canon EOS Digital Rebel. Specimens were deposited in the Colección Nacional de Helmintos (CNHE), Instituto de Biología, Universidad Nacional Autónoma de México and in the American Museum of Natural History, New York, USA (AMNH).

Description

Semiscolex lamothei Oceguera-Figueroa sp. nov. (Figures 1-6).

Based on the examination of 18 specimens (with 4 dissections).

External morphology. Body firm, muscular, size medium, body elongate, brownish, dorsal surface darker than venter, with longitudinal obscure stripes along all the length of the body alternating with lighter spots and stripes in metameric order. Largest specimen 87.2 mm long, 8 mm wide; smallest specimen 54.8 mm long and 5 mm wide (Fig. 1). Diameter uniform along the body with anterior part thinner than the rest of the body. Clitellum not obvious and weakly defined, from X b5 to XIII a2. Dorsum with 8-10 white papillae on each a2 forming well-defined transversal rows and small white papillae irregularly distributed in almost all annuli. Five pairs of eyespots arranged in parabolic arc on uniannulate somites II, III, IV and on first annulus of biannulate somites V and VI. Fourth and fifth pair of eyespots separated by one annulus (Fig. 2). Ventral surface with few small white papillae irregularly distributed in almost every annuli. One pair of nephridopores in each posterior margin of b2 of somites VIII-XXIV, 17 pairs in total. In some specimens, each nephridiopore surrounded by black pigments. Male gonopore on XI b6, in some specimens displaced to XI b5/b6 but never reaching interannular area. Female gonopore on XIII b1, in some specimens displaced to XII/XIII. 1/2 + 5 + 1/2 annuli between gonopores (Fig. 3). Somites I, II, III, IV uniannulate, somite V and VI biannulate, somite VII triannulate, VIII quadriannulate, somites of middle series, IX-XXIII, complete quinquannulate, XXIV and XXV quadriannulate, XVI triannulate and XXVII biannulate. Anus located on the dorsal surface at XXVI a2. Caudal sucker directed ventrally in relaxed specimens, thinner than the posterior part of the body.

Internal morphology. Male reproductive anatomy. Ten pairs of testisacs at interganglionic intervals from XIV/XV to XXIII/XXIV. Ascending male sperm ducts (i.e., "vasa

Figure 1. *Semiscolex lamothei* from Catemaco, Veracruz, Mexico. A, holotype dorsal view. B, holotype ventral view.

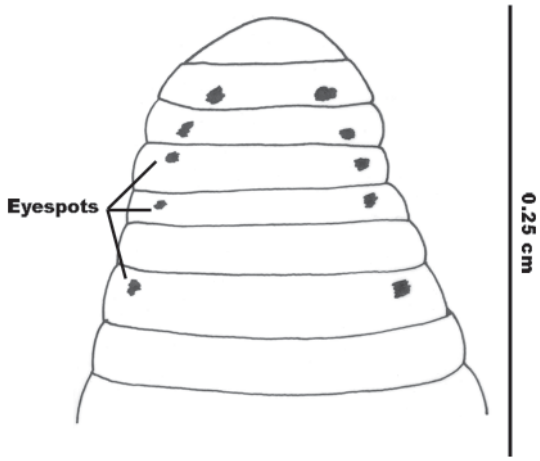

Figure 2. Dorsal view of cephalic somites. Eyespots arranged in parabolic arc.

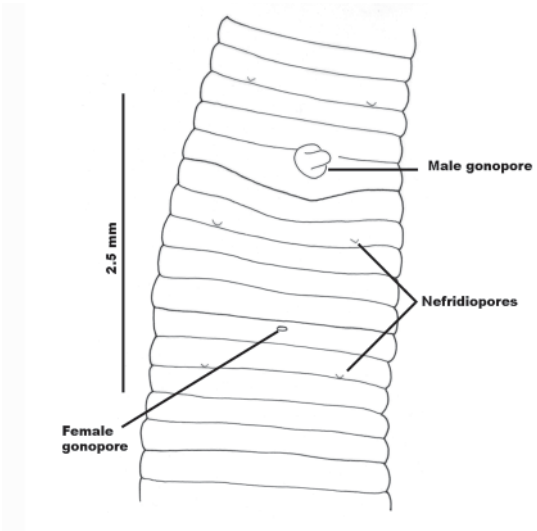

Figure 3. Ventral view of female and male gonopores.

deferentia") lateral to testisacs, surrounded by glands in the ascending portion, after somite XIII without glands. In somite XI each sperm duct forms an anteriorly directed loop, which descends to somite XIII and connects with tightly coiled sperm ducts or epididymes. Each epididymus forms a loop, and is followed by a muscular ejaculatory bulb; both ejaculatory bulbs fuse to form penis (Fig. 4). Female reproductive anatomy arranged principally on the left of midline. Globular ovaries between somites XII/XIII. Right oviduct crosses ventral to the nerve cord and both the right and left oviduct independently insert into the anterior portion of the vagina. Vagina forms posteriorly directed loop at XIII (Fig. 5).

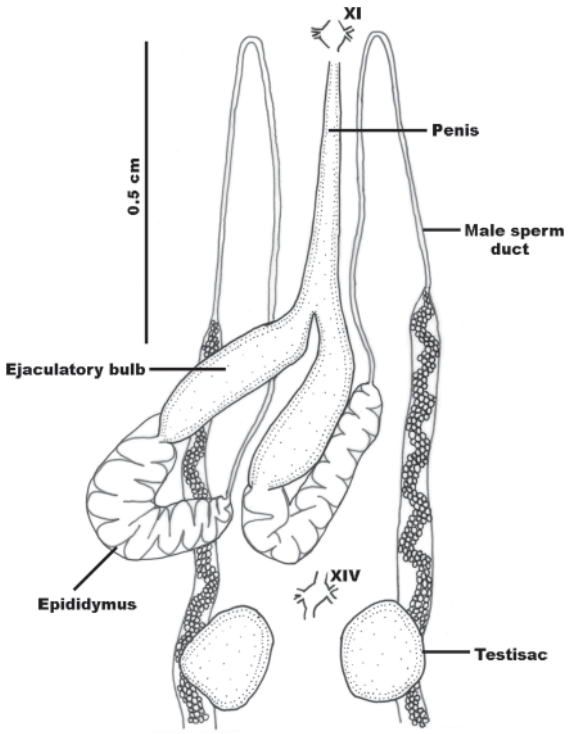

Figure 4. Dorsal view of the male reproductive system.

Digestive system. Pharynx euthylaematous, without jaws (agnathus), descendig to somite XII. Crop tubular with one pair of caeca on somite XVIII (Fig. 6). Crop/intestinal sphincter in XIX. Intestine tubular acaecate.

Taxonomic summary

Material examined: **Holotype**. (CNHE 5429) Fixed in 4% formalin and preserved in a mixture of ethanol, glycerine and formalin. Length 87.1 mm, width 7.6 mm, Mexico, Lake Catemaco, Veracruz, near Colonia La Victoria. 18° 22' 33.4''N, 95° 06' 34.4''W. Altitude 355 m. Coll. A. Oceguera-Figueroa, E. Martínez, L. Romero, R. Bautista, and A. Espinoza, September 9, 2005. **Paratypes** CNHE: 13 specimens 5430; AMNH 4 specimens 5325 Annelida, locality, collectors and date as for the holotype.
Etymology: Named after Rafael Lamothe Argumedo for his contributions to Mexican zoology.

Remarks

Previous diagnosis for members of the genus *Semiscolex* include one pair of testisacs per somite, complete somite

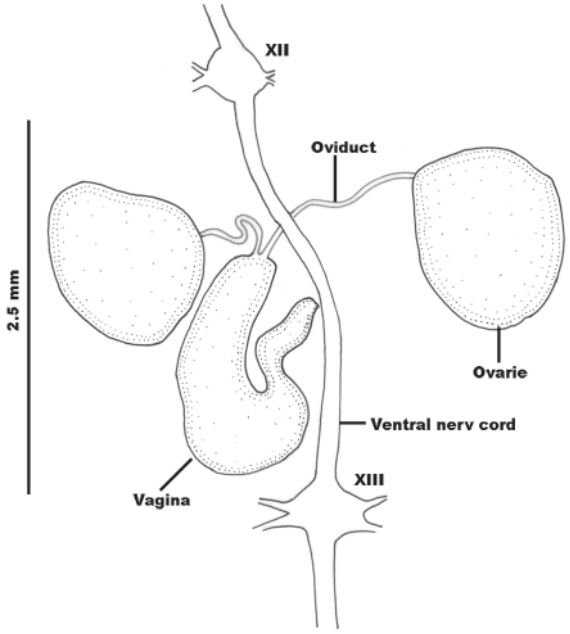

Figure 5. Dorsal view of the male reproductive system.

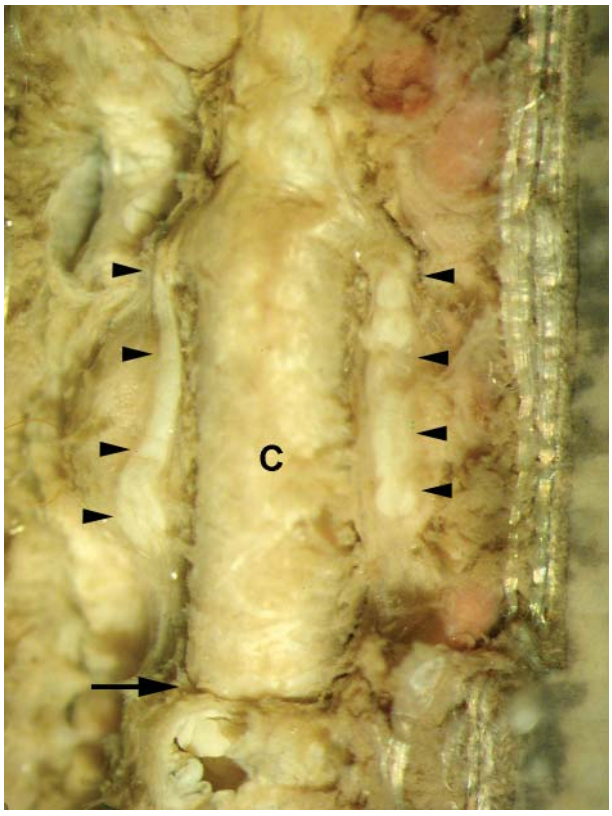

Figure 6. Dorsal view of crop caeca (triangles) and crop/intestine sphincter (arrow).

XII separating gonopores, well developed vagina and absence of jaws (Ringuelet,1985; Sawyer, 1986). These characteristics are consistent with the species described herein, and it is thus clear that this species belongs to *Semiscolex.*

Semiscolex lamothei can be easily distinguished from other species of *Semiscolex* based on the number of annuli between gonopores. *Semiscolex zonatus* has 1/2 + 4 + 1/2; *S. similis* 6; *S. juvenilis* 7; *S. notatus* 8; and *S. intermedus* 1/2 + 6 + 1/2 annuli between gonopores, whereas *Semiscolex lamothei* possesses 1/2 +5 +1/2.

Semiscolex lamothei has morphological features previously not described for any other member of the genus. Based on Ringuelet´s (1985) description, *Semiscolex* species have globular epidydymes followed by an ejaculatory duct that connects to the penis. However, *Semiscolex lamothei* lacks ejaculatory ducts, and instead has epidydymes that are directly followed by well-developed ejaculatory bulbs. Richardson (1969) suggested that members of the genus *Semiscolex* lack ejaculatory bulbs, apparently based on Ringuelet's descriptions. It is interesting to note that, in *S. lamothei*, the base of the penis, the ejaculatory bulbs, and the epididymes are surrounded by a membranous sheath, forming a sac, similar to that described by Ringuelet (1985). It would appear that Ringuelet did not dissect that sac, and did not observe the ejaculatory bulbs. Additionally, *Semiscolex lamothei* is the only known species of the genus with postcaeca in the posterior part of the crop. Wheather or not ejaculatory bulbs and postcaeca were overlooked by previous workers in their analyses of South American species, or if *Semiscolex lamothei* is the unique among *Semiscolex* species with this condition needs to be investigated in future studies. In the second case, the establishment of a new genus is strongly supported by the presence of paired ejaculatory bulbs in *S. lamothei* versus a single fused bulb in *Semiscolex* species, but until a detailed analysis of South American species is carried out, it is preferable to consider this species into the genus *Semiscolex.*

The description of a new species of the South American genus *Semiscolex* in the northern hemisphere suggests a more intensive faunal interchange after the formation of Panama Isthmus (1.2 MYA) than previously recognized for leeches (Ringuelet, 1978). This geographical distribution is similar to the pattern seen in blood-feeding leeches of the genus *Haementeria* (Ringuelet, 1985; Oceguera-Figueroa, 2006) and in leeches of the non blood-feeding genus *Helobdella* (Siddall et al., 2005).

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