Two new species of **Creptotrema** (Digenea: Allocreadiidae) from South America

Dos especies nuevas de **Creptotrema** (Digenea: Allocreadiidae) de America del Sur

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**Abstract.** Two new digenean species belonging in *Creptotrema* Travassos, Artigas and Pereira, 1928 are described from specimens stored in the invertebrate collection at the Museum of Natural History, Geneva, Switzerland. *Creptotrema lamothei* n. sp. is described from *Ageneiosus brevifilis* Valenciennes in Cuvier and Valenciennes, 1840 (Siluriformes: Ageneiosidae), *Auchenipterus nuchalis* (Spix and Agassiz, 1829) (Siluriformes: Auchenipteridae), and *Bryconops melanurus* (Bloch, 1794) (Characiformes: Characidae) in the Paraguay River, Paraguay. *Creptotrema sucumbiosa* n. sp. is described from *Tetragonopterus argenteus* Cuvier, 1816 (Characiformes: Characidae) in the Río Aquarico, Ecuador. *Creptotrema lamothei* differs from its congeners by having testes with irregular rather than entire outlines. *Creptotrema sucumbiosa* differs from its congeners by having a bilobed rather than entire ovary. Both *C. lamothei* and *C. sucumbiosa* differ from their other congeners by having relatively longer posttesticular spaces in their bodies, representing 25-30% and 24-28% of body length respectively, compared with approximately 6-19% in other species.

**Key words:** *Creptotrema lamothei* n. sp., *Creptotrema sucumbiosa* n. sp., Paraguay, Ecuador.

**Introduction**

*Creptotrema* Travassos, Artigas and Pereira, 1928 contains allocreadiids that have 1 pair of muscular ventrolateral papillae associated with the oral sucker and a uterus that does not descend posteriorly beyond the testes (Caira and Bogéa, 2005). Six named species were recognized from the genus prior to the present study. Preserved lots of South American trematode specimens borrowed from the Museum of Natural History, Geneva, Switzerland (MHNG), contained 2 undescribed species of *Creptotrema*. The species are herein described.

**Materials and methods**

Digenean specimens collected from freshwater fishes from Ecuador, Brazil, and Paraguay and stored in 70% ethanol were borrowed from MHNG. Various specimens were hydrated and stained in aqueous Van Cleave’s hematoxylin. Stained specimens were subsequently partially dehydrated in a graded ethanol series. Drops of lithium carbonate saturated in 80% ethanol, plus a small amount of butylamine, were added to make the specimens basic. They were then fully dehydrated through a graded ethanol series and cleared in clove oil and mounted in Canada balsam on glass slides under cover slips. Drawings were made with the aid of a drawing tube. Measurements presented in the descriptions are ranges in micrometers. The type-material for *C. funduli* Mueller, 1934 was...
borrowed for comparison from the United States National Parasite Collection, Beltsville, Maryland, USA (USNPC No. 032543: 1 slide containing 10 syntypes).

**Descriptions**

*Creptotrema lamothei* n. sp. (Figs. 1-2)


Testes oblique, entire in smaller individuals, with irregular outline in larger individuals, intercecal, contiguous or nearly so, with anterior most testis on left or right side. Left testis 91-153 long, 97-159 wide. Right testis 108-142 long, 85-156 wide. Post-testicular space measuring 318-362 long, representing 25-30% of body length. Cirrus sac arcuate, extending to posterior margin of ventral sucker, containing elongated looping seminal vesicle, pars prostatica, and unspined looping cirrus. Cirrus opening into flask-shaped genital atrium. Genital pore opening medially on forebody, at level of intestinal bifurcation.

Ovary subspherical, pretesticular, submedian, amphitopic, contiguous with ventral sucker margin or nearly so, 72-99 long, 79-102 wide. Seminal receptacle immediately post-ovarian, subspherical, 71-85 long, 42-56 wide. Mehlis’ gland opposite ovary. Laurer’s canal lying ventral to seminal receptacle, extending laterally toward ceca and vitelline field, distal end not observed. Vitellaria follicular; follicles clustering from level of pharynx to posterior extremity, largely extracecal but also encroaching in intercecal space. Uterus occupying pre-testicular intercecal region of body; distal portion connecting to genital atrium ventrally relative to cirrus sac. Eggs operculate, thin-shelled, 51-62 long, 31-34 wide.

Excretory vesicle I-shaped, extending to anterior margin of testicular field. Pore terminal.

Figure 1. *Creptotrema lamothei* n. sp. Ventral view of holotype. Scale bar=500 μm.
Creptotrema lamothei n. sp. is unique among species in the genus because the testes have an irregular outline. Further, the postesticular space in *C. lamothei* measures 25-30% of overall body length and is therefore relatively longer than in any other previously described species from the genus (Table 1). In addition, the oral sucker and ventral sucker are nearly equal in size (width ratio=1:0.9-1.1), whereas the oral sucker is always smaller than the ventral sucker in *C. creptotrema* Travassos, Artigas and Pereira, 1928, *C. funduli*, *C. lynchi* Brooks, 1976, *C. pati* Lunaschi, 1985, and *C. agonostomi* Salgado-Maldonado, Cabanas-Carranza, and Caspeta-Mandujano, 1998, and always larger than the ventral sucker in *C. paraensis* Vicente, dos Santos, and de Souza, 1978. *Creptotrema lamothei* differs further from *C. funduli* by having oblique rather than tandem testes, the genital pore at the same level as the intestinal bifurcation rather than posterior to it, and smaller eggs compared with 63 long by 35 μm wide. *Creptotrema lamothei* differs further from *C. lynchi* by having a relatively shorter cirrus sac that does not extend posterior to the posterior margin of the ventral sucker and by having the genital pore at the level of the intestinal bifurcation rather than anterior to it. *Creptotrema lamothei* differs further from *C. pati* by having intercecal testes rather than extracecal testes, the cirrus sac dorsal to the ventral sucker rather than lateral to it, and by having the genital pore at the level of the intestinal bifurcation rather than posterior to it. It should be noted that *C. pati* was described based on 4 compressed specimens and thus the configuration of the gonads and location of the cirrus sac may be due to the compression used at fixation. *Creptotrema lamothei* differs further from *C. paraensis* by having oblique rather than tandem testes and the genital pore opening at the level of the intestinal bifurcation rather than posterior to it. *Creptotrema lamothei* differs further from *C. agonostomi* because the cirrus sac extends further posteriorly (to the posterior margin of the ventral sucker rather than the middle or posterior

**Taxonomic summary**

**Type-host:** *Ageneiosus brevifilis* Valenciennes in Cuvier and Valenciennes, 1840 (Siluriformes: Ageneiosidae).

**Site of infection:** Intestine.

**Type-locality:** Paraguay River near San Antonio, Paraguay (23° 54’ 02” S, 57° 11’ 04” W).

**Other hosts and localities:** *Auchenipterus nuchalis* (Spix and Agassiz, 1829) (Siluriformes: Auchenipteridae) from Paraguay River near Paso Correa, Paraguay. *Bryconops melanurus* (Bloch, 1794) (Characiformes: Characidae) from Paraguay River, arroyo Tagatia-Guaza at 4 Km south of l’estancia Santa María at Isla Real, Paraguay.

**Specimens deposited:** Holotype MHNG INVE 60889; 8 paratypes MHNG INVE 60890-60897.

**Etymology:** The specific name *lamothei* is given to honor the eminent Professor Rafael Lamothe-Argumedo.

**Remarks**

*Creptotrema lamothei* n. sp. is unique among species in the genus because the testes have an irregular outline. Further, the postesticular space in *C. lamothei* measures 25-30% of overall body length and is therefore relatively longer than in any other previously described species from the genus (Table 1). In addition, the oral sucker and ventral sucker are nearly equal in size (width ratio=1:0.9-1.1), whereas the oral sucker is always smaller than the ventral sucker in *C. creptotrema* Travassos, Artigas and Pereira, 1928, *C. funduli*, *C. lynchi* Brooks, 1976, *C. pati* Lunaschi, 1985, and *C. agonostomi* Salgado-Maldonado, Cabanas-Carranza, and Caspeta-Mandujano, 1998, and always larger than the ventral sucker in *C. paraensis* Vicente, dos Santos, and de Souza, 1978. *Creptotrema lamothei* differs further from *C. funduli* by having a body nearly twice as large, measuring 1 150-1 405 long by 359-457 μm wide compared with 466-622 long by 240-390 μm wide, and by having slightly smaller eggs, measuring 51-62 long by 31-34 μm wide compared with 60-78 long by 38-50 μm wide (Travassos et al., 1928; Kohn, 1984). The cirrus sac is arcuate in both *C. lamothei* and *C. creptotrema* but extends only to the posterior margin of the ventral sucker in the former and slightly posterior to the ventral sucker in the latter. *Creptotrema lamothei* differs further from *C. funduli* by having oblique rather than tandem testes, the genital pore at the same level as the intestinal bifurcation rather than posterior to it, and smaller eggs compared with 63 long by 35 μm wide. *Creptotrema lamothei* differs further from *C. lynchi* by having a relatively shorter cirrus sac that does not extend posterior to the posterior margin of the ventral sucker and by having the genital pore at the level of the intestinal bifurcation rather than anterior to it. *Creptotrema lamothei* differs further from *C. paraensis* by having oblique rather than tandem testes and the genital pore opening at the level of the intestinal bifurcation rather than posterior to it. *Creptotrema lamothei* differs further from *C. pati* by having intercecal testes rather than extracecal testes, the cirrus sac dorsal to the ventral sucker rather than lateral to it, and by having the genital pore at the level of the intestinal bifurcation rather than posterior to it. It should be noted that *C. pati* was described based on 4 compressed specimens and thus the configuration of the gonads and location of the cirrus sac may be due to the compression used at fixation. *Creptotrema lamothei* differs further from *C. paraensis* by having oblique rather than tandem testes and the genital pore opening at the level of the intestinal bifurcation rather than posterior to it. *Creptotrema lamothei* differs further from *C. agonostomi* because the cirrus sac extends further posteriorly (to the posterior margin of the ventral sucker rather than the middle or posterior
Table 1. Comparison of Creptotrema spp.

<table>
<thead>
<tr>
<th>Digenean species</th>
<th>Teste shape</th>
<th>Teste position</th>
<th>Post-testicular space</th>
<th>Cirrus sac posterior extent</th>
<th>Genital pore position</th>
<th>Relative sucker size</th>
<th>Egg size (μm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. creptotrema</td>
<td>Entire, subspherical</td>
<td>Symmetrical or oblique</td>
<td>9-18% of body length</td>
<td>Slightly below VS posterior margin</td>
<td>Anterior to intestinal bifurcation</td>
<td>Oral smaller than ventral</td>
<td>60-78 long, 38-50 wide</td>
</tr>
<tr>
<td>C. funduli</td>
<td>Entire, subspherical</td>
<td>Tandem</td>
<td>≈ 12% of body length</td>
<td>Slightly below VS posterior margin</td>
<td>At or slightly posterior to bifurcation</td>
<td>Oral smaller than ventral</td>
<td>63 long, 35 wide</td>
</tr>
<tr>
<td>C. lynchii</td>
<td>Entire, elongated</td>
<td>Oblique</td>
<td>15-19% of body length</td>
<td>Posterior to VS posterior margin</td>
<td>Posterior to intestinal bifurcation</td>
<td>Oral smaller than ventral</td>
<td>54-67 long, 33-38 wide</td>
</tr>
<tr>
<td>C. paraensis</td>
<td>Entire, subspherical</td>
<td>Tandem</td>
<td>≈ 9% of body length</td>
<td>Posterior to VS posterior margin</td>
<td>Posterior to intestinal bifurcation</td>
<td>Oral larger than ventral</td>
<td>56 long, 42 wide</td>
</tr>
<tr>
<td>C. pati</td>
<td>Entire, elongated</td>
<td>Symmetrical, extracecal</td>
<td>NA</td>
<td>Posterior to VS posterior margin</td>
<td>Posterior to intestinal bifurcation</td>
<td>Oral smaller than ventral</td>
<td>54-67 long, 30-35 wide</td>
</tr>
<tr>
<td>C. agonostomi</td>
<td>Entire, subspherical to elongated</td>
<td>Oblique</td>
<td>≈ 6% of body length</td>
<td>Not extending to VS posterior margin</td>
<td>Anterior to intestinal bifurcation</td>
<td>Oral smaller than ventral</td>
<td>41-57 long, 30-35 wide</td>
</tr>
<tr>
<td>C. lamothei n. sp.</td>
<td>Irregular</td>
<td>Oblique</td>
<td>25-30% of body length</td>
<td>VS posterior margin</td>
<td>At intestinal bifurcation</td>
<td>Nearly equal</td>
<td>51-62 long, 31-34 wide</td>
</tr>
<tr>
<td>C. sucumbiosa n. sp.</td>
<td>Entire, elongated</td>
<td>Oblique</td>
<td>24-28% of body length</td>
<td>Posterior to VS posterior margin</td>
<td>At intestinal bifurcation</td>
<td>Oral slightly smaller than ventral</td>
<td>54-59 long, 28-37 wide</td>
</tr>
</tbody>
</table>

VS= ventral sucker; NA= not applicable

half of the ventral sucker).

Creptotrema sucumbiosa n. sp. (Figs. 3-4)

Figure 3. *Creptotrema sucumbiosa* n. sp. Ventral view of holotype. Scale bar=500 μm.

Elongated, looping seminal vesicle, relatively short pars prostatica, and unarmed cirrus. Cirrus opening into genital atrium. Genital pore opening medially at the level of the intestinal bifurcation.


Excretory vesicle I-shaped, extending to mid-testicular field. Pore terminal or slightly dorso-subterminal.

Figure 4. Terminal genitalia from holotype of *C. sucumbiosa* n. sp. ga=genital atrium, gp=genital pore, c=cirrus, ou=opening of uterus, du=distal uterus, pp=pars prostatica, sv=seminal vesicle. Scale bar=250 μm.
Taxonomic summary

Type-host: Tetragonopterus argenteus Cuvier, 1816 (Characiformes: Characidae).
Site of infection: Intestine.
Type-locality: Río Aquarico, near San Pablo de Kantesiya, Provincia de Sucumbíos, Ecuador (0º 15’ 15” S, 76º 25’ 26” W).
Specimens deposited: Holotype MHNG INVE 60898; 3 paratypes MHNG INVE 60899-60901.
Etymology: The species name sucumbiosa is given for the region from which it was collected, Sucumbíos Province in Ecuador’s Amazon Drainage.

Remarks

Creptotrema sucumbiosa n. sp. is unique among species in the genus because the ovary is bilobed rather than entire and subspherical. Creptotrema sucumbiosa has a relatively long post-testicular space in the hindbody measuring 24-28% of overall body length, a feature shared only with C. lamothei among its congeners (Table 1). Creptotrema sucumbiosa differs further from C. creptotrema by possessing a more elongated body, elongated rather than subspherical testes, a relatively longer cirrus sac, and slightly smaller eggs, measuring 54-59 long by 28-37 μm wide and slightly smaller eggs compared with 60-78 long by 38-50 μm wide. Creptotrema sucumbiosa differs further from C. funduli by possessing a more elongated body, elongated oblique rather than subspherical tandem testes, a relatively longer cirrus sac, nearly equal sucker sizes rather than having the oral sucker being much smaller than the ventral sucker, and slightly smaller eggs compared with 63 by 35 μm wide. Creptotrema sucumbiosa differs further from C. funduli by having an elongated rather than pyriform body and nearly equal sucker sizes rather than having the oral sucker being much smaller than the ventral sucker. Creptotrema sucumbiosa differs further from C. pati by having intercecal rather than extracecal testes and by having a much longer cirrus sac that does not lie lateral to the ventral sucker, and by having the genital pore at the level of the intestinal bifurcation rather than posterior to it. It should be again noted that these features might have been influenced by the compression during fixation of C. pati. Creptotrema sucumbiosa differs further from C. paraensis by having elongated oblique rather than subspherical tandem testes, by having the genital pore opening at the level of the intestinal bifurcation rather than posterior to it, and by not having the oral sucker larger than the ventral sucker. Creptotrema sucumbiosa differs further from C. agonostomi by having the cirrus sac extend well past the ventral sucker to the ovarian level rather than not extending to the posterior margin of the ventral sucker. Creptotrema sucumbiosa differs further from C. lamothei by having elongated rather than irregular testes and a conical rather than a broadly flattened posterior end.

Discussion

With the addition of 2 new species Creptotrema presently contains 8 named species: 1 from northern North America, 1 from Mexico, and now 6 from South America. No species have been reported from Central America and nothing has been reported concerning larval stages of Creptotrema. Creptotrema funduli occurs in Fundulus diaphanus menona Jordan and Copeland, 1877 (Cyprinodontiformes: Fundulidae) from New York, USA and immature adult specimens were reported from Cottus bairdii Girard, 1850 (Scorpaeniformes: Cottidae) in Wyoming, USA (Mueller, 1934; Bangham, 1951). Manter (1962) examined the type material for C. funduli and concluded that the presence of oral papillae was doubtful and suggested that the species was allied to Opecoelidae related to Plagioporus Stafford, 1904. I observed the type material for C. funduli, and confirmed the presence of ventrolateral oral papillae; furthermore, the distal uterus lies ventral to the cirrus sac and joins with the genital atrium ventrally relative to where the cirrus sac joins. These features combined with the presence of diffuse eyespots and a uterus largely confined to the pre-testicular hindbody, confirm that the species is an allocreadiid belonging in Creptotrema and not an opecoelid. Creptotrema agonostomi occurs in Agonostomus monticola (Bancroft, 1834) (Perciformes: Mugilidae) and Ictalurus balsanus (Jordan and Snyder, 1899) (Siluriformes: Ictaluridae) in Mexico (Salgado-Maldonado et al., 1998). Creptotrema creptotrema occurs in Leporinus elongatus Valenciennes, 1850 (Characiformes: Anostomidae) in São Paulo, Brazil (Travassos et al., 1928), and in L. obtusidens (Valenciennes, 1837) and Trachelyopterus galeatus (Linnaeus, 1766) (Siluriformes: Auchenipteridae) in northern Argentina (Hamann, 1988; Lunaschi and Sutton, 1995). Creptotrema paraensis occurs in Pimelodus sp. (Siluriformes: Pimelodidae) in the Brazilian Amazon (Vicente et al., 1978). Creptotrema lynchii was originally described from Buno marinus (Linnaeus, 1758) (Anura: Bufonidae) in Colombia (Brooks, 1976). Kohn et al. (1985) reported C. lynchii from Leporinus copelandii Steindachner, 1875 (Characiformes: Anostomidae) and L. octofasciatus Steindachner, 1915 in São Paulo, Brazil, and Lunaschi and Sutton (1995) reported C. lynchii from L. obtusidens in Argentina. I collected C. lynchii from Aequidens tetramerus
(Heckel, 1840) (Perciformes: Cichlidae) in the Peruvian Amazon. Absence of subsequent reports of *C. lynchii* from anurans suggests the cane toad may have been an accidental host for the species. Lunaschi (1985) described *C. pati* from *Luciopimelodus pati* (Valenciennes, 1835) (Siluriformes: Pimelodidae) in northern Argentina.

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Literature cited


