

## ***Myleusnema brasiliense* sp. n. (Nematoda: Kathlaniidae), a new intestinal parasite of the serrasalmid fish *Myleus* sp. in Brazil**

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**Abstract.** A new kathlaniid nematode, *Myleusnema brasiliense* sp. n., is described from the intestine of a characoid fish, *Myleus* sp. (Serrasalminae, Cypriniformes), from Brazil. It differs from the only other congeneric species *Myleusnema bicornis* Moravec et Thatcher, 1996 mainly in having an unseparated cephalic portion of the body, lips provided with flanges with numerous spike-like appendages, deirids situated more posteriorly, more numerous (8 pairs) subventral preanal papillae in the male, and distinctly longer spicules (1.58-1.70 mm). The species description is based on light microscopic and scanning electron microscopic (SEM) observations.

During a recent examination of some freshwater fishes from the Serra da Mesa, Tocantins River, Pará State, Brazil carried out by one of the authors of this paper (V.E. Thatcher), specimens of a previously undescribed species of *Myleusnema* Moravec et Thatcher, 1996 were recovered from the intestine of the serrasalmid fish, *Myleus* sp. The hitherto monotypic genus *Myleusnema* was erected only recently by Moravec and Thatcher (1996) to accommodate their newly described species *Myleusnema bicornis* Moravec et Thatcher, 1996 from the fish *Myleus ternetzi* (Norman) from French Guiana. In this study, another congeneric species is described from Brazil.

### **MATERIALS AND METHODS**

The specimens were fixed and preserved in 70% ethanol and cleared with glycerine for light microscopic examination. Drawings were made with the aid of a Zeiss microscope drawing attachment. For examination in SEM, the nematodes were postfixed in 1% OsO<sub>4</sub>, dehydrated through an ethanol and an acetone series and then subjected to critical point drying. The specimens were coated with gold and examined with a JSM-6300 scanning electron microscope at an accelerating voltage of 15 kV. All measurements are given in micrometres unless otherwise stated. Type specimens were deposited (in vials with 70% ethanol) in the Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil; paratypes also in the University of Nebraska State Museum, Lincoln, Nebraska, USA, and in the Institute of Parasitology, Academy of Sciences of the Czech Republic, České Budějovice, Czech Republic.

### **RESULTS**

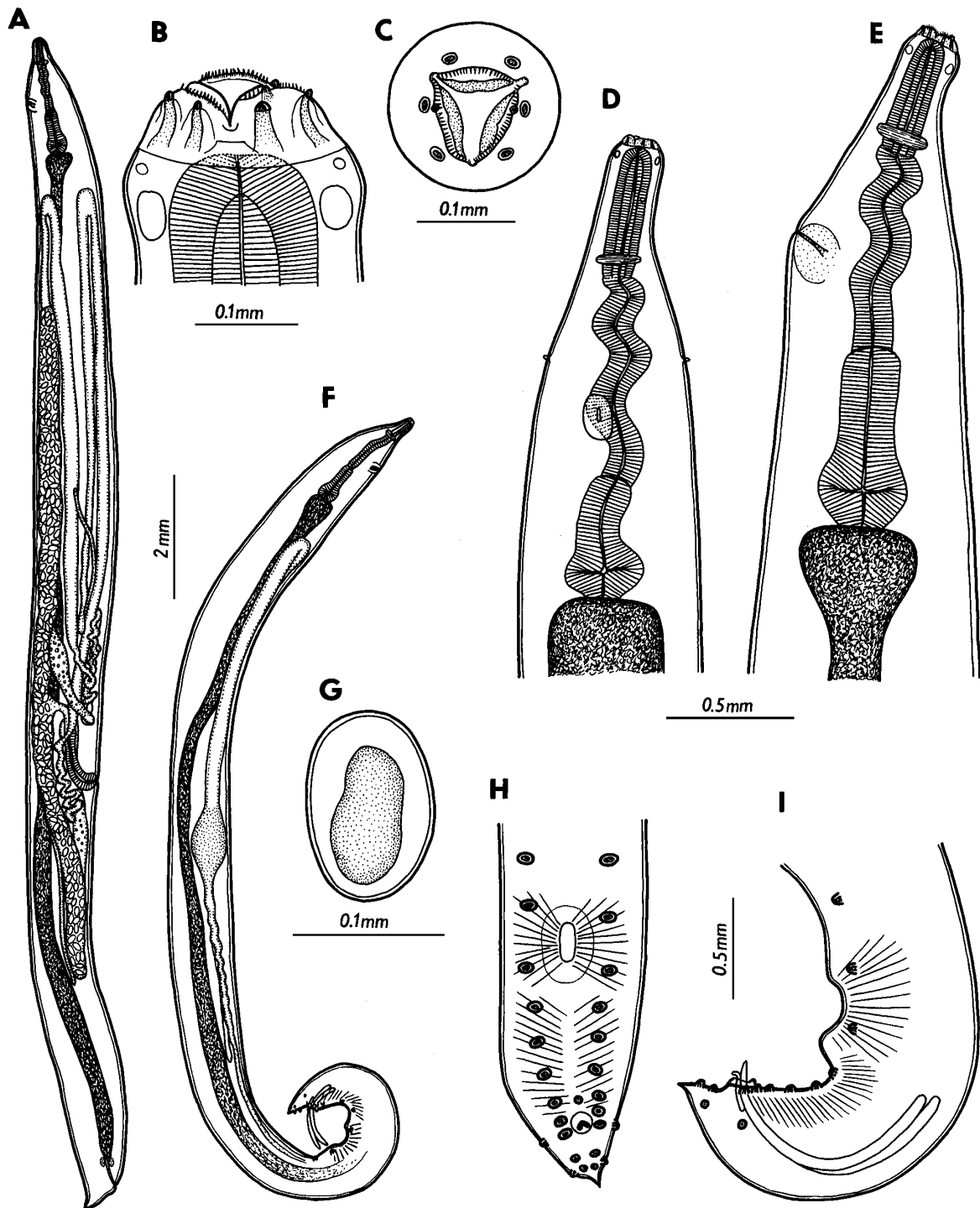
Superfamily: Cosmoceroidea Railliet, 1916

Family: Kathlaniidae Lane, 1914

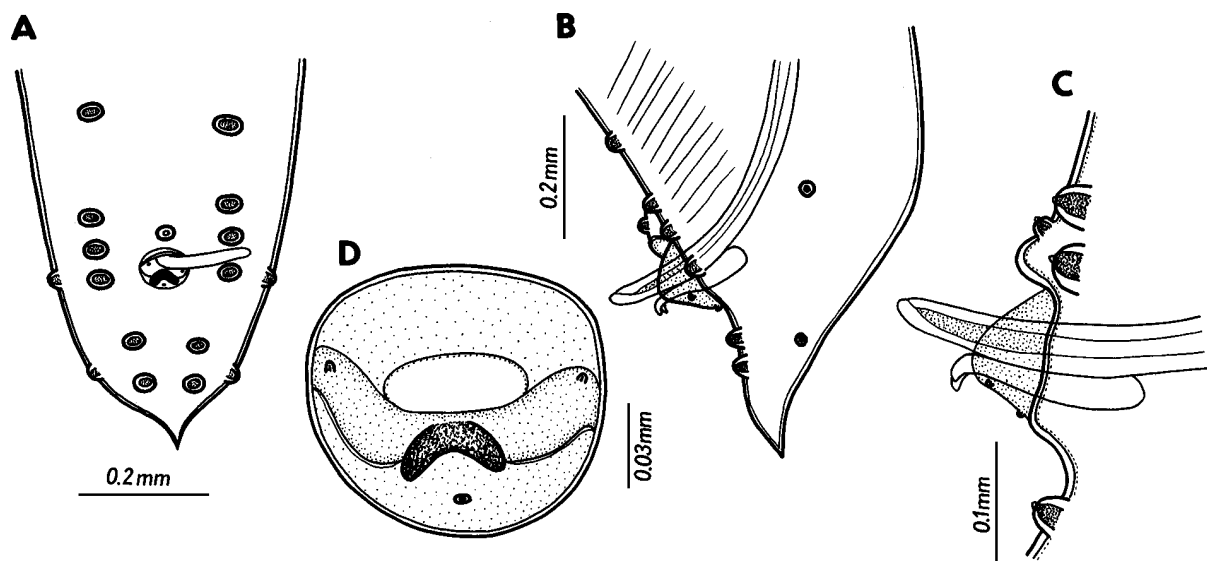
*Myleusnema brasiliense* sp. n. Figs. 1-3

**Description:** Large nematodes. Cuticle with irregular transverse striations. Lateral alae absent. Anterior end distinctly narrowed, continuous to remaining part of body (not separated by transverse cuticular fold). Cephalic end rounded, provided with three small lips; dorsal lip bearing two larger, elevated cephalic papillae, each ventrolateral lip with one larger, elevated subventral cephalic papilla, one lateral amphid and one smaller lateral cephalic papilla situated at inner base of amphid (Figs. 1 C, 3 A-C). Rim of each lip bearing narrow membranous flange with numerous thin and rather long spike-like appendages. Inner base of each lip provided with a cuticularised lamella-like formation protruding anteriorly and demarcating triangular mouth aperture; sometimes middle parts of these formations modified to form two distinct, forward directed lobes (Fig. 3 A-C). Buccal cavity poorly developed. Anterior extremity of oesophagus not distinctly differentiated into a pharyngeal portion. Oesophagus dark. Oesophageal corpus narrow, elongate, its part posterior to nerve ring usually S-shaped; approximately anterior third of corpus of somewhat different structure than more posterior part, being always straight; posterior part of oesophagus differentiated into isthmus and spherical bulb with sclerotised apparatus; isthmus elongate, somewhat

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**Fig. 1.** *Myleusnema brasiliense* sp. n. A – female, general view; B, C – cephalic end, lateral and apical views; D – anterior end of male, dorsoventral view; E – anterior end of largest female, lateral view; F – male, general view; G – egg; H, I – caudal end of male, ventral and lateral views.



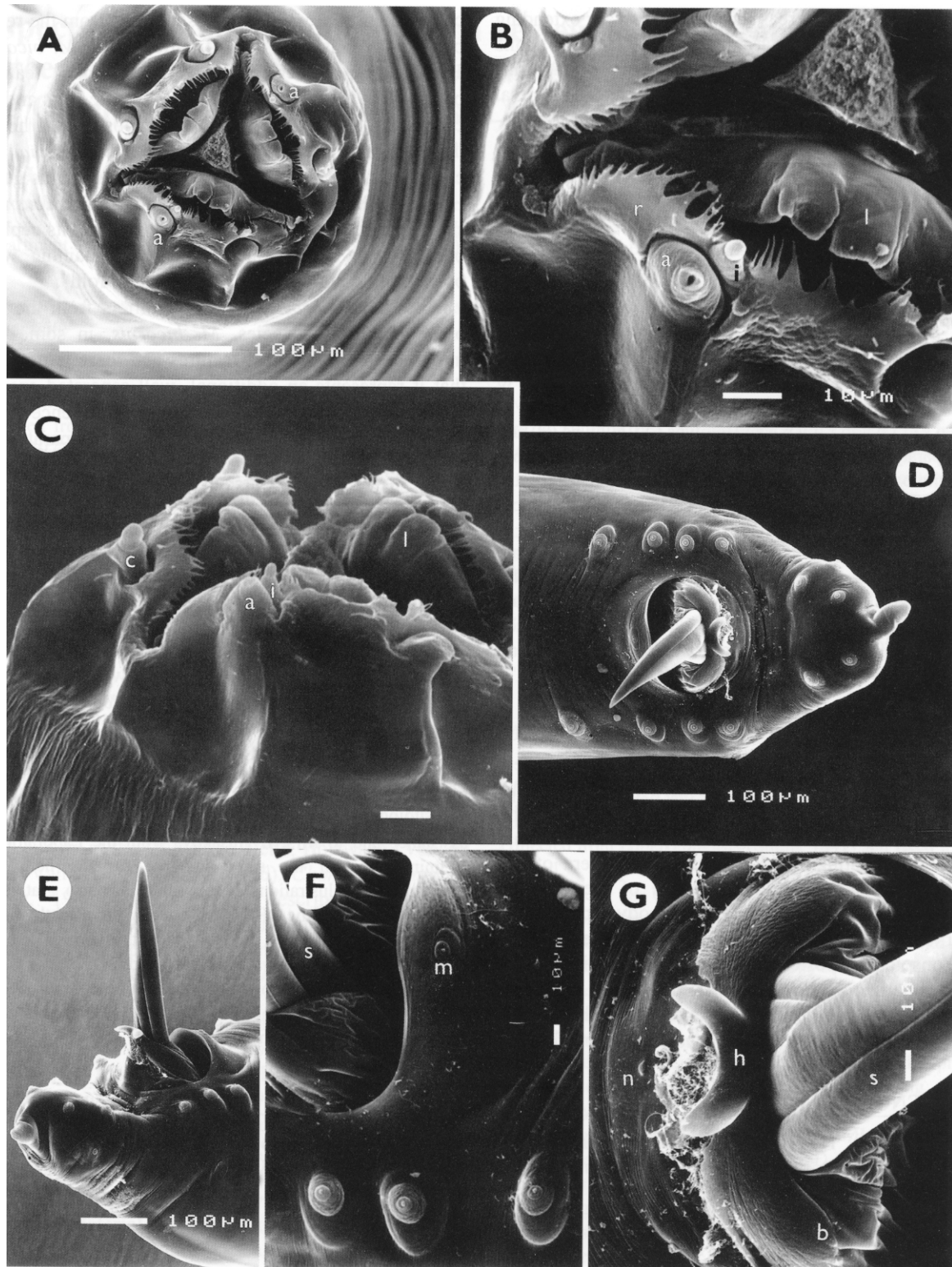
**Fig. 2.** *Myleusnema brasiliense* sp. n. **A, B** – tail of male, ventral and lateral views; **C, D** – region of cloaca, lateral and ventral views.

longer than bulb, distinctly broader than posterior end of corpus. Anterior end of oesophagus encircled by a ring formation appearing as hollow. Nerve ring encircling base of anterior portion of oesophageal corpus. Minute deirids situated well posterior to level of nerve ring. Excretory pore conspicuous, longitudinally elongate, situated somewhat posterior to level of deirids, at level of posterior half of oesophageal corpus. Intestine straight, narrow, only its anterior end bulbously inflated. Tail of both sexes short, conical, with terminal spike. Males usually somewhat smaller than gravid females.

**Male** (6 specimens; measurements of holotype in parentheses): Length of body 15.16–22.63 mm (21.300 mm), maximum width 1.02–1.31 mm (1.31 mm). Length of lips 54–68 (68). Length of entire oesophagus 2.08–2.43 mm (2.38 mm); corpus 1.52–1.95 mm (1.67 mm) long, length of its anterior portion 503–639 (612), width 136–163 (150), width of posterior portion of corpus 150–177 (163); isthmus 326–517 (517) long and 190–231 (231) wide, and bulb measuring 245–326 × 340–394 (326 × 394). Nerve ring, deirids and excretory pore 544–612 (612), 993–1.074 (1.006) and 1.16–1.52 mm (1.20 mm), respectively, from anterior extremity. Posterior end of body ventrally bent. Preanal ventral musculature forming numerous oblique bundles; small, longitudinally elongate precloacal ventral sucker present. Eleven pairs of subventral caudal papillae present of which 8 pairs being preanal, 1 pair adanal and 2 pairs postanal, situated on posterior half of tail; in addition to subventrals, 2 pairs of lateral papillae present, first at level of cloacal opening and second slightly posterior to level of first pair of postanals. One unpaired median papilla present in front of cloacal opening (Fig. 3 F).

Special lobe-like process armed with two conspicuous, posteriorly oriented horns protruding out of posterior part of cloacal opening; in addition to horns, this formation bears a pair of minute papillae at its anterior part and a small, transversely elongate median papilla situated posteriorly to horns. Spicules simple, 1.58–1.70 mm (1.70 mm) long and 54–95 (68) wide, with broad alae; proximal ends of spicules blunt, distal ends rounded. Gubernaculum well sclerotised, 204–245 (231) long, its distal end bifurcate, protruding out of body as postcloacal horns mentioned above. Testis narrow, reaching anteriorly almost to end of oesophagus; conspicuous oval seminal vesicle present. Length of tail 326–490 (490).

**Female** (6 gravid specimens; measurements of allotype in parentheses): Length of body 18.33–24.18 mm (23.58 mm), maximum width 1.14–1.56 mm (1.41 mm). Length of lips 54–82 (54). Length of entire oesophagus 2.15–2.80 mm (2.29 mm); corpus 1.32–1.99 mm (1.44 mm) long, length of its anterior portion 422–612 (530), width 136–163 (136), width of posterior portion of corpus 150–177 (163); isthmus 340–344 (544) long and 190–272 (272) wide, and bulb measuring 313–340 × 408–435 (340 × 408). Nerve ring, deirids and excretory pore 571–653 (612), 925–1.360 (1.006) and 1.09–1.66 mm (1.14 mm), respectively, from anterior extremity. Vulva in posterior half of body, 10.68–15.95 mm (15.40 mm) from anterior extremity (at 58–67% [65%] of body length); vulvar lips not elevated. Vagina directed anteriorly from vulva. Genital apparatus prodelphic; ovaries parallel, long forming reflected coils immediately posterior to anterior end of intestine; narrow end of one ovary reflected anteriorly in region anterior to vulva, whereas that of other ovary extending



**Fig. 3.** *Myliusnema brasiliense* sp. n., SEM micrographs. **A** – cephalic end, apical view; **B** – detail of region of amphid; **C** – cephalic end, sublateral view (scale bar = 10 μm); **D** – caudal end of male, ventral view; **E** – same, sublateral view; **F** – anterior region of cloacal opening; **G** – posterior region of cloacal opening. a – amphid; b – anterior postanal paired papilla on lobe-like cloacal process; c – cephalic papilla; h – postcloacal horns; i – inner lateral cephalic papilla; l – lamella-like formation; m – median preanal papilla; n – median postanal papilla on lobe-like cloacal process; r – rim of oral aperture provided with numerous spine-like appendages; s – spicule.

posteriorly in post-ovarian region. Uterine coils extending anteriorly to some distance below anterior ends of ovaries and posteriorly far posterior to vulva. Eggs oval, thin-walled, size 122-150 × 82-95 (136 × 82-95), containing moderately developed embryos. Length of tail 408-680 (598).

**Type host:** *Myleus* sp. (Serrasalminae, Characidae, Cypriniformes).

**Site of infection:** Intestine.

**Type locality:** Serra da Mesa, Tocantins River, Pará State, Brazil (25 September 1997).

**Prevalence and intensity:** 70 % (7 fishes infected / 10 fishes examined); 1-120 (mean 30) nematodes per fish.

**Etiology:** The specific name of this species relates to the country of its origin, i.e. Brazil.

**Deposition of types:** Holotype (♂), allotype (♀) and 32 paratypes (10 ♂♂ + 22 ♀♀) in Invertebrate Collection, Instituto Nacional de Pesquisas da Amazônia, Manaus, AM, Brazil (Cat. Nos.: holotype: INPA-014; allotype: INPA-015; paratypes: INPA-016a-t); paratypes (2 ♂♂ + 2 ♀♀) in Helminth Collection, University of Nebraska State Museum, Harold W. Manter Laboratory, Lincoln, Nebraska, USA (Cat. No. HWML 14796), and in Institute of Parasitology, Academy of Sciences of the Czech Republic, České Budějovice, Czech Republic (2 ♂♂ + 2 ♀♀; Cat. No. N-741).

## DISCUSSION

Moravec and Thatcher (1996) established a new kathlaniid genus *Myleusnema* for their new species, *M. bicornis*, based on specimens collected from the intestine of *Myleus ternetzi* (Norman) in French Guiana. The authors distinguished it from other genera of the Kathlaniidae mainly by the structure of the cephalic extremity, by the cephalic portion of body separated by a marked transverse fold of cuticle, and by the presence of a conspicuous postcloacal lobe-like formation armed with two horns.

The general morphology of nematodes of the present material corresponds to *Myleusnema* except for the

cephalic portion, which is not separated from the rest of body by a transverse fold of cuticle as in *M. bicornis*. However, in other important taxonomic features, particularly the structure of the cephalic end and the caudal end of the male (presence of postcloacal horns), they agree with the diagnosis of *Myleusnema* and, consequently, we consider them to belong to this genus. However, the original generic diagnosis of *Myleusnema* should be changed in that "the body is large, its cephalic portion may be separated from the remaining wider portion of body by a transverse cuticular fold".

*Myleusnema brasiliense* sp. n. differs from the only other congeneric species, *M. bicornis*, in some very important morphological features and there is no doubt that it represents an additional, well separated species. In addition to the already mentioned difference in the shape of the body (cephalic portion unseparated vs. separated), *M. brasiliense* differs from *M. bicornis* in having lips provided with flanges with numerous spike-like appendages (not present in *M. bicornis*), deirids well posterior to the level of the nerve ring (vs. at nerve ring level), more numerous pairs of subventral preanal papillae (8 vs. 7), a different situation of lateral pairs of caudal papillae, and in the length of spicules (1.578-1.700 mm vs. 0.694-0.721 mm); also the shape of postcloacal horns seems to be somewhat different in these two species (more pointed in *M. bicornis*).

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