

Guyanema longispiculum sp. n. (Nematoda: Dracunculoidea) from *Loricariichthys brunneus* (Pisces) in Venezuela

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Abstract. A new nematode species, *Guyanema longispiculum* sp. n. is described from the abdominal cavity of the freshwater armoured catfish, *Loricariichthys brunneus* (Hancock), from two localities in western Venezuela. It differs from all hitherto known members of the genus in having unusually long spicules (0.480–0.609 mm) and from individual species also by other morphological and biometrical features. It is characterized by the presence of eight cephalic papillae arranged in two circlets, localization of deirids anterior to the nerve ring, a conical, undivided tip of the tail in both sexes, four pairs of preanal and six pairs of postanal papillae in the male, and a markedly elevated vulva in the female. A key to species of *Guyanema* is presented.

During a zoological expedition of the Moravian Museum (Brno, Czech Republic) to Venezuela in 1992, the second author of this paper (A. Prouza) examined a number of fish and other aquatic vertebrates for the presence of metazoan parasites. In the collected material, a new, previously undescribed dracunculoid nematode species referable to the genus *Guyanema* Petter, 1974 was present, originating from the abdominal cavity of the armoured catfish, *Loricariichthys brunneus* (Hancock, 1828), from two localities in western Venezuela. The species is described below.

MATERIALS AND METHODS

The nematodes were recovered from the abdominal cavity of fish. After washing in physiological saline, the specimens were fixed in a hot mixture of 40% formaldehyde and physiological saline (1:9). Later they were stored in vials with 4% formaldehyde and cleared with glycerine for examination. *En face* views were prepared according to Anderson's (1958) method. Drawings were made with the aid of a Zeiss microscope drawing attachment. For scanning electron microscopy (SEM), nematodes from 4% formaldehyde were postfixed in 1% OsO₄, dehydrated through an ethanol series to acetone and subjected to critical point drying. 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 millimetres unless otherwise stated.

RESULTS

Guyanema longispiculum sp. n. Figs. 1,2

Description: Medium sized, whitish nematodes with almost smooth cuticle. Head end rounded, not expanded. Oral opening small, oval, surrounded by eight small cephalic papillae arranged in two circlets and pair of lateral amphids; one small papilla-like protuberance present on either lateral side of oral opening (Figs. 1C, 2B, C). In some specimens, cephalic cuticle forming four slit-like submedian depressions in region between outer and inner papillae (Fig. 2C, D). Oesophagus composed of narrow anterior muscular part and wide, much longer glandular part; anterior end of muscular oesophagus not distended. Oesophagus opening into intestine through small valve. Nerve ring encircling oesophagus approximately at border of its second and third thirds; excretory pore slightly posterior to level of nerve ring. Deirids small, spike-like, situated slightly anterior to nerve ring. Intestine straight, light coloured. Tail of both sexes conical, with sharply pointed tip.

Male (5 specimens; measurements of holotype in parentheses): Length of body 6.83–9.29 (8.64), maximum width 0.068–0.082 (0.068). Length of muscular oesophagus 0.272–0.354 (0.340), width 0.015–0.018 (0.018), length of glandular oesophagus 0.680–0.789 (0.789), maximum width 0.036–0.045 (0.036); their length ratio

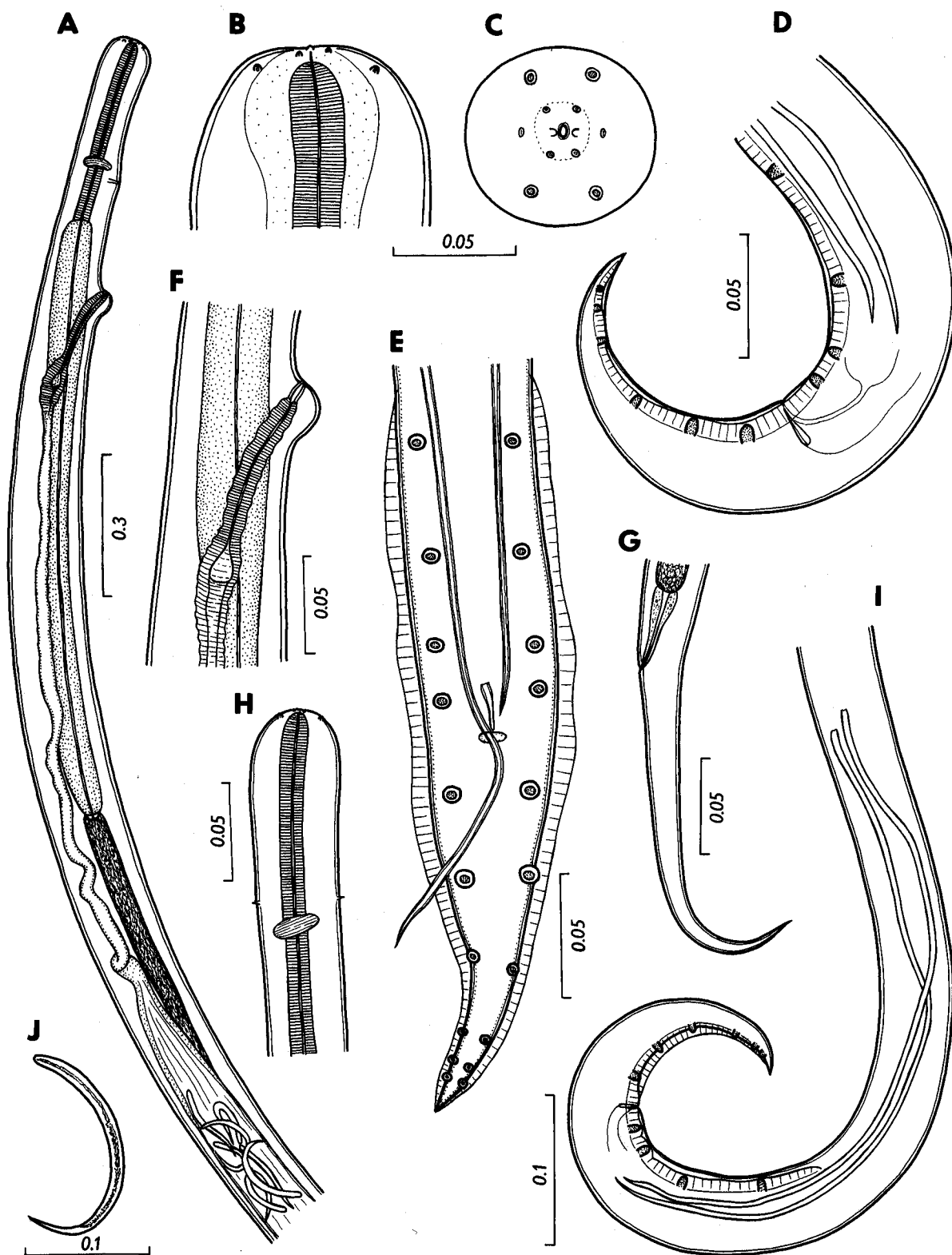


Fig. 1. *Guyanema longispiculum* sp. n. A – anterior part of body of gravid female; B, C – cephalic end of female, lateral and apical views; D, E – caudal end of male, lateral and ventral views; F – region of vulva; G – tail of female; H – anterior end of female, dorsoventral view; I – posterior end of male; J – larva from uterus.

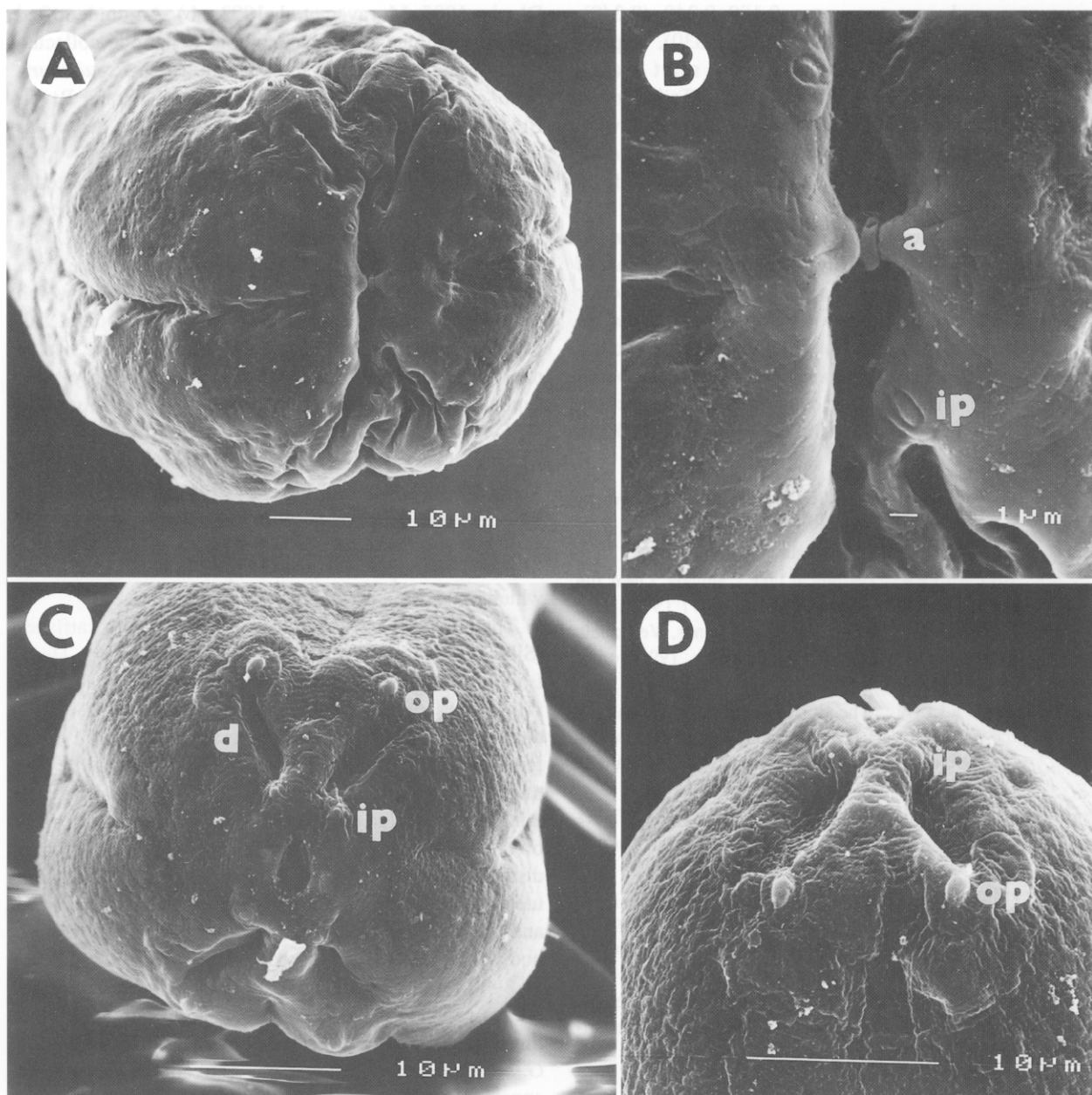


Fig. 2. SEM micrographs of cephalic end of *Guyanema longispiculum* sp. n. female. **A** – apical view; **B** – apical view of region of oral opening (enlarged from **A**); **C**, **D** – apical and dorsal views of another specimen. a – papilla-like protuberance, d – cuticular depression, ip – inner cephalic papilla, op – outer cephalic papilla.

1 : 2.2–2.5 (1:2.3). Distance of deirids, nerve ring and excretory pore 0.147–0.162 (0.156), 0.180–0.219 (0.201) and 0.195–0.255 (0.240), respectively, from anterior extremity. Posterior end of body ventrally bent, provided with narrow caudal alae supported by relatively short papillae. Spicules slender, simple, well sclerotized, 0.480–0.609 (0.543) long; proximal ends blunt, distal ends sharply pointed. Posterior wall of cloaca forming short, simple, weakly sclerotized gubernaculum 0.027–0.030 (0.027) long. Caudal papillae: 4 pairs

preanal and 6 pairs postanal; last two pairs of postanals near to each other. Tail elongate, 0.150–0.180 (0.150) long.

Female (6 specimens; measurements of allotype in parentheses): Length of body 16.80–30.72 (30.72), maximum width 0.136–0.231 (0.177). Length of muscular oesophagus 0.367–0.462 (0.449), width 0.027–0.033 (0.033), length of glandular oesophagus 1.29–1.97 (1.37), maximum width 0.060–0.082 (0.082); their length ratio 1 : 2.8–4.7 (1:3.1). Distance of deirids,

nerve ring and excretory pore 0.180–0.240 (0.240), 0.231–0.299 (0.299) and 0.225–0.330 (0.330), respectively, from anterior extremity. Rectum a short hyaline tube; small elongate rectal glands present. Tail slender, elongate, 0.315–0.584 (0.584) long. Vulva somewhat elevated, situated at short distance posterior to anterior end of glandular oesophagus, 0.422–0.694 (0.584) from anterior extremity (at 2–4 [2]% of body length). Posterior vulvar lip markedly elevated. Short muscular vagina directed posteriorly. Monodelphic. Anterior part of uterus passing along glandular oesophagus and anterior end of intestine forming narrow tube without larvae inside. More posterior part of uterus in posterior direction containing gradually fully developed larvae, developing embryos and eggs. Tubular ovary anterior to rectum. Larvae 0.219–0.225 (0.219–0.225) long and 0.009 to 0.012 (0.009–0.012) wide.

Type host: Armoured catfish, *Loricariichthys brunneus* (Hancock) (Loricariidae, Siluriformes).

Site of infection: Abdominal cavity.

Type locality: Periodical lake ("aguada") near the ranch Hato las Mercedes (8°20'N, 71°15'W) (the Orinoco River basin), State of Barinas, Venezuela (holotype collected on 17 February 1992; other specimens on 20 February 1992).

Other locality: The Corrosal Brook (a tributary of the Suripá River) near the ranch Hato Santa Marta (the Orinoco River basin), Boca de Anaro, State of Barinas, Venezuela (13 February 1992).

Prevalence, intensity: Type locality – 5 fishes infected/6 fishes examined, 2–15 (mean 6) nematodes per fish; Corrosal Brook – 1/3, 1.

Deposition of types: Holotype, allotype and paratypes in the Institute of Parasitology, Academy of Sciences of the Czech Republic, in České Budějovice (Helm. Coll. No. N – 669).

Etymology: The specific name "*longispiculum*" relates to the characteristic feature of this species, i.e. unusually long spicules.

DISCUSSION

The genus *Guyanema* Petter, 1974 (Guyanemidae, Dracunculoidea) includes four species (one represented by two subspecies), all described from the body cavity and intestine (?) of South-American freshwater fishes: *G. seriei seriei* Petter, 1974 from *Hoplerythrinus unitaeniatus* (Spix) from French Guyana, *G. seriei paraguayensis* Petter et Dlouhy, 1985 from the same host species from Paraguay, *G. baudii* Petter et Dlouhy, 1985 from *Hoplias malabaricus* (Bloch) from Paraguay, *G. ancistri* Petter, 1987 from *Ancistrus* sp. from Ecuador, and *G. raphiodoni* Moravec, Kohn et Fernandes, 1993 from *Raphiodon vulpinus* Agassiz from the Paraná River basin in Brazil (Petter 1974, 1987, Petter and

Dlouhy 1985, Moravec et al. 1993a, b). An unidentified female specimen of a dracunculoid nematode collected from the intestine (?) of the curimatid fish *Pseudocurimata gilberti* (Quoy et Gaimard) in the Paraná River, Brazil, was tentatively assigned to this genus as *Guyanema* sp. by Moravec et al. (1993a).

Guyanema longispiculum sp. n. differs markedly from all above mentioned species, except *G. ancistri* for which males are unknown, in having unusually long spicules which are at least three-times longer than those in other congeners. Except for *G. raphiodoni* in which only eight cephalic papillae have been reported, all other *Guyanema* species were described to have twelve papillae arranged in three circlets. However, only eight cephalic papillae arranged in two circlets were found in *G. longispiculum*, which was confirmed by SEM (Fig. 2). But it is necessary to remark that *G. longispiculum* is so far the only species in which the cephalic end has been studied by SEM. A unique feature of *G. longispiculum* is the presence of a weakly sclerotized gubernaculum, not reported for other species of *Guyanema* in which males are known.

The only *Guyanema* species described from catfishes (Siluriformes) is *G. ancistri* from *Ancistrus* sp. (fam. Loricariidae) in Ecuador, all others are parasites of Cypriniformes of the families Erythrinidae and Characidae. Although *G. ancistri* was described only from females and it has not been recorded since, it can be distinguished from *G. longispiculum* by the situation of a non-elevated vulva (at level of the junction of both parts of the oesophagus), a different shape of the vagina, a distinctly shorter female tail, and the broad part of the uterus (containing larvae) extending anteriorly to the anterior half of the glandular oesophagus; the female body of *G. ancistri* is markedly shorter (6.8–9.8 mm vs. 16.8–30.7 mm) and this species was described to have twelve cephalic papillae instead of eight papillae found in *G. longispiculum* as stated above. Features by which *G. longispiculum* differs from congeneric species are apparent from the key at the end of this paper.

Although most *Guyanema* species were found in the abdominal cavity of their hosts, the site of infection of *G. raphiodoni* and *Guyanema* sp. from *P. gilberti* was reported to be the intestine (Moravec et al. 1993a,b). It is highly probable that, in these cases, the nematodes were not found in the intestinal lumen, but on the external intestinal surface; also *G. longispiculum* specimens were often found on the intestinal surface. Apparently, the abdominal cavity is the typical site of infection of all nematodes of this genus. However, it is known in some nematodes of the related family Skrjabinellidae, parasites of the peritoneal cavity of fish in Europe, that they may exceptionally be found in the intestinal lumen (Moravec 1994). The same might occur as well in *Guyanema* nematodes.

KEY TO SPECIES AND SUBSPECIES OF *GUYANEMA*:

- 1 Broad part of uterus (containing larvae) extending anteriorly to anterior half of glandular oesophagus. Vulva non-elevated. Length of female tail 0.180–0.190 mm. Male unknown. Parasitic in *Ancistrus* sp. (Loricariidae) in Ecuador *G. ancistri* Petter, 1987
- Broad part of uterus (containing larvae) in anterior direction not reaching posterior end of oesophagus. Vulva elevated or non-elevated. Length of female tail less than 0.130 mm or exceeding 0.250 mm. Parasitic in Characidae, Erythrinidae and Loricariidae 2
- 2 Tail tip of male bifurcated. Five pairs of postanal papillae present. Vulva elevated. Parasites of *Hoplerythrinus unitaeniatus* (Erythrinidae) 3
- Tail tip of male conical. Six pairs of postanal papillae present. Vulva non-elevated or elevated. Parasites of other fishes 4
- 3 Deirids situated anterior to nerve ring, near to anterior extremity. Caudal processes oriented posteriorly. Length of spicules 0.100 mm. French Guiana *G. seriei seriei* Petter, 1974
- Deirids situated posterior to nerve ring. Caudal processes oriented anteriorly. Length of spicules 0.080 mm. Paraguay *G. seriei paraguayensis* Petter et Dlouhy, 1985
- 4 Length of spicules 0.070–0.150 mm. Gubernaculum absent. Body length of male less than 4 mm, that of female less than 6 mm. Deirids posterior to nerve ring or not observed. Vulva non-elevated. Length of female tail not exceeding 0.250 mm. Parasitic in Characidae and Erythrinidae 5
- Length of spicules 0.480–0.609 mm. Gubernaculum present. Body length of male 6.8–9.3 mm, that of female 16.8–30.7 mm. Deirids anterior to nerve ring. Vulva elevated. Length of female tail 0.363–0.584 mm. Parasitic in *Loricariichthys brunneus* (Loricariidae) in Venezuela *G. longispiculum* sp. n.
- 5 Spicules 0.070 mm long. Anterior lip of cloaca with ornamentation. Cephalic end of male not inflated. Length of female tail 0.250 mm. Parasitic in *Hoplias malabaricus* (Erythrinidae) in Paraguay *G. baudii* Petter et Dlouhy, 1985
- Spicules 0.150 mm long. Anterior lip of cloaca without ornamentation. Length of female tail 0.126 mm. Cephalic end of male somewhat inflated. Parasitic in *Raphiodon vulpinus* (Characidae) in Brazil *G. raphiodoni* Moravec, Kohn et Fernandes, 1993

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REFERENCES

- ANDERSON R. C. 1958: Méthode pour l'examen des nématodes en vue apicale. *Ann. Parasitol. Hum. Comp.* 33: 171–172.
- PETTER A. J. 1974: Deux nouvelles espèces de Nématodes Camallanina parasites de *Hoplerythrinus unitaeniatus* (Characidae, Cypriniformes) en Guyane; création d'une nouvelle famille: les Guyanemidae (Dracunculoidea). *Bull. Mus. natn. Hist. nat., Paris*, 3^e sér., n° 232, Zool., 156: 803–812.
- PETTER A. J. 1987: Nématodes de Poissons de l'Équateur. *Rev. suisse Zool.* 94: 61–76.
- PETTER A. J., DLOUHY C. 1985: Nématodes de Poissons du Paraguay. III. Camallanina. Description d'une espèce et d'une sous-espèce nouvelles de la famille des Guyanemidae. *Rev. suisse Zool.* 92: 165–177.
- MORAVEC F. 1994: Parasitic Nematodes of Freshwater Fishes of Europe. Academia and Kluwer Acad. Publishers, Prague and Dordrecht, Boston, London, 473 pp.
- MORAVEC F., KOHN A., FERNANDES B. M. M. 1993a: Nematode parasites of fishes of the Paraná River, Brazil. Part 3. Camallanoidea and Dracunculioidea. *Folia Parasitol.* 40: 211–229.
- MORAVEC F., KOHN A., FERNANDES B. M. M. 1993b: *Travassosnema travassosi paranaensis* subsp. n. and first description of the female of *Guyanema raphiodoni* Moravec, Kohn et Fernandes, 1993 (Nematoda: Guyanemidae), dracunculoid parasites of characid fishes in Brazil. *Ann. Parasitol. Hum. Comp.* 68: 229–233.