

**PHILOMETRA KARUNENSIS SP. N. (NEMATODA:
PHILOMETRIDAE) FROM *BARBUS SHARPEYI* (PISCES)
IN FRESHWATERS OF SOUTHWEST IRAN**

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During a study on some *Barbus* species (Pisces: Cyprinidae) of the Mesopotamian fauna region (the south-western part of Iran) a new nematode species, *Philometra karunensis* sp. n., was found in the swimbladder (under the serosa cover) and abdominal cavity of *Barbus sharpeyi* (Günther). Males distinctly differ from the known species in the length of the spicules and gubernaculum, while subgravid females are very similar to those of *Philometra* spp. known from the abdominal cavity of cyprinid fishes.

Key words: Nematoda, *Philometra*, *Barbus sharpeyi*, Iran

During a survey on the nematode fauna of Iranian fishes, large numbers of worm species were collected and identified. Among the nematodes recovered, a new *Philometra* species was studied in detail.

Papers on the occurrence of philometrid nematodes in Iran were first published by Ebrahimzadeh and Nabawi (1975) and Moghainemi and Abasi (1992). These authors identified the *Philometra* specimens found in freshwater fishes only to the genus level, but gave no data on their morphology and seasonality. Molnár and Pazooki (1995), who studied *Philometra* infection in Iranian barbels (*Barbus* spp.) from the Mesopotamian region, found these parasites in *Barbus sharpeyi* (Günther, 1874) and *B. luteus* (Heckel, 1843). They could not specifically identify the specimens but supposed that these worms represented a new species. However, having obtained the male and subgravid female specimens from different species of fish, they abstained from formally establishing one.

More data are available on the occurrence of philometrid nematodes from the Iraqi side of the Tigris River system. Herzog (1969) was the first to find female specimens of a *Philometra* sp. in the abdominal cavity of *Barbus luteus*, then Ali et al. (1987) reported the occurrence of a *Philometra* sp. in the abdomi-

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nal cavity of *Barbus grypus* (Heckel, 1843), which they identified as *P. abdominalis* Nybelin, 1928.

Philometrid nematodes are common parasites of freshwater and marine fishes. Their systematics is mainly based on the morphological characteristics of female worms, because only gravid females have been described for most of the known species. On this basis, Moravec and Shaharom-Harrison (1989) distinguished 11 genera in the family Philometridae, of which species of the genus *Philometra* are the most numerous and widespread.

The purpose of this paper, partly based on data by Molnár and Pazooki (1995), is to describe a new *Philometra* species from *Barbus sharpeyi*.

Materials and methods

Philometra specimens were collected during parasitological surveys involving fish species of the Karun River, Shadegan Marsh and Hoor-Elazim Marsh (Tigris River region, Persian Gulf system) between 1993 and 1996. A total of 62 *Barbus sharpeyi* (Günther, 1874), 2–4 years old, were dissected for parasites. A general parasitological dissection was performed. In order to detect *Philometra* specimens, the abdominal cavity and the swimbladder were checked with meticulous care. Organs of the abdominal cavity were examined in 0.65% saline and the cavity was rinsed with this solution. The occurrence of *Philometra* stages in this washing fluid was checked in a Petri dish. Males and retarded females were looked for in the serous membrane of the second sac of the swimbladder, which was peeled off the sac wall.

Nematodes found were placed into 4% formalin in physiological saline and preserved until their detailed study. The isolated *Philometra* specimens were cleared in lactophenol to examine their surface and inner structure. The structure of the cephalic papillae and the buccal region was studied in *en face* view after decapitating the subgravid females with a sharp blade (Moravec, 1994). Measurements and drawings were taken using an Olympus microscope.

Results

During the survey conducted between 1993 and 1996, 13 out of 62 *B. sharpeyi* specimens (21%) proved to be infected by different *Philometra* stages. Three of the infected *B. sharpeyi* harboured 5 subgravid females in the abdominal cavity and 10 of them were infected by 9 males and 13 mature non-gravid females under the serosa of the swimbladder. The males and the non-gravid females were found in *B. sharpeyi* from July to mid-September. Subgravid females occurred from the

end of November till March. By its characteristic morphological features this species proved to be new for science and is described as follows.

***Philometra karunensis* sp. n. (Fig. 1)**

Type host: *Barbus sharpeyi* (Günther, 1874) (Cyprinidae, Cypriniformes)

Type locality: Karun River, Shadegan and Hoor-Elazim Marsh in South-west Iran.

Site of infection: Females in the abdominal cavity, males under the serosa of the swimbladder.

Type material: Holotype and allotype deposited in the helminthological collection of the Zoological Department, Hungarian Natural History Museum, Budapest. Paratypes are in the collection of the senior author.

Etymology: The name of the species was given after the Karun River

Males (7 specimens; measurements of holotype in parentheses): Body thread-like, whitish, with smooth cuticle. Head end rounded. Papillae and amphids not seen by light microscope. Body length 2.6 to 3.2 (2.64) mm, maximum width 0.072–0.090 (0.084) mm. Oesophagus narrow, 0.540–0.570 (0.570) mm long, cylindrical, muscular, with a bulb-shaped inflation at anterior end. Posterior portion of oesophagus with oesophageal gland 0.316–0.340 (0.340) mm in length. Posterior end of the body distinctly lobed, showing two papilla-like protrusions laterally. Spicules sclerotized, slender, equal in size, measuring 0.068–0.077 (0.075) mm in length. Their width 0.004–0.005 (0.005) mm at base and 0.002–0.003 (0.003) mm at middle. Gubernaculum 0.043–0.046 (0.045) mm long, bent sclerotized plate with lancet-shaped posterior end (Figs 1D–F).

Subgravid females (4 specimens; measurements of allotype in parentheses): Body of live female red in colour, cylindrical, 65–105 (82) mm long and 0.72–1.5 (1.2) mm wide tapering slightly to both ends; cuticle smooth; body ends rounded. Oral opening circular, with three flat oesophageal lobes, surrounded by small lateral amphids and cephalic papillae arranged in two circles. Four slightly elevated lobes, each bearing 2 submedian papillae, arranged in outer circle and 4 small submedian papillae located in inner circle. Oesophagus relatively narrow, somewhat expanded at anterior end and provided with dorsal oesophageal gland with a giant cell nucleus at its mid-length. Length of oesophagus 1.42–1.85 (1.75) mm. Nerve ring encircling oesophagus at 0.24–0.33 (0.32) mm distance from anterior extremity. Intestine straight, displaced laterally; its posterior end forming ligament attached ventrally to body wall. Posterior end of body rounded with two small lateral papilla-like projections. Vagina and vulva absent. Uterus occupying almost the whole space of body, being filled with eggs 0.025–0.029 mm in diameter (Figs 1A–C).

Mature females (4 specimens): White in colour, cuticle smooth. Length of body 2.8–13 mm, width 0.10–0.54 mm. Body nearly uniform in diameter throughout, narrowing slightly toward both ends. Posterior end terminates in two distinct

lobe-like projections. Mouth very small, circular, papillae or amphids not seen by light microscope. Oesophagus narrow, inflated at anterior end. Ratio of oesophagus to body length 1 to 11. Ratio of oesophageal gland length to total length of oesophagus 76%. Vulvar opening lies in posterior third of body. It is circular in shape, continuing anteriorly in a 0.063 to 0.071 mm long sclerotized vagina 0.01 mm in diameter. Uterus uniformly thick sac, filled up with eggs 0.009 mm in diameter; it continues in tubular ovaries in both directions. Anterior ovary starts from uterus near centre of oesophagus, returns and ends close to mouth of the intestine. The posterior ovary forms loops at rectum and, returning, ends bluntly near uterus (Figs 1G–I).

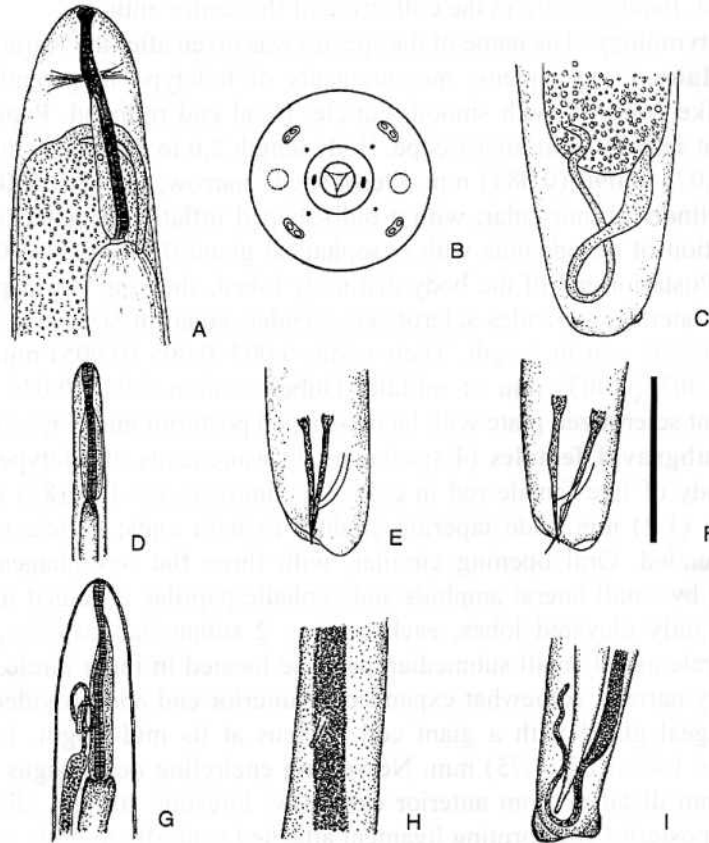


Fig. 1. Schematic drawing of *Philometra karunensis*. **A** – cephalic end of a subgravid female, lateral view. Bar = 1.2 mm; **B** – cephalic end of a subgravid female, apical view. Bar = 1 mm; **C** – caudal end of a subgravid female. Bar = 1.2 mm; **D** – cephalic end of a male. Bar = 0.4 mm; **E** – caudal end of a male (holotype) with spicules and gubernaculum. Bar = 0.1 mm; **F** – caudal end of a male (paratype) with spicules and gubernaculum. Bar = 0.1 mm; **G** – cephalic end of a mature (retarded) female. Bar = 0.5 mm; **H** – region of vulva. Bar = 0.5 mm; **I** – caudal end of a matured female. Bar = 0.5 mm

Discussion

During the present investigation, nematodes of different developmental stages characteristic of the genus *Philometra* were found in *Barbus sharpeyi*. Subgravid females of this *Philometra* resemble females of *P. abdominalis* Nybelin, *P. ovata* Zeder and *P. kotlani* Molnár, the three species common in the abdominal cavity of cyprinids, and they practically do not differ from the latter. However, the differences in their host preference seem to be more important. *P. kotlani* is a specific parasite of *Aspius aspius*. *P. ovata* occurs mainly in *Abramis* spp. and *Rutilus* spp.. *P. abdominalis* can complete its developmental cycle only in *Phoxinus phoxinus* and in *Gobio* spp. In other fish species including *Barbus meridionalis petenyi* only retarded forms of *P. abdominalis* were found in Hungary (Molnár, 1967, 1969). No *Philometra* spp. have been reported from *Barbus barbus*, a well-studied fish of European rivers (Vismanis et al., 1987; Moravec, 1994). While the females of philometrids from cyprinids show only slight morphological differences, the males of the known species differ significantly in the length of the spicules and gubernaculum. The spicules of specimens found in *Barbus sharpeyi* are equal and significantly shorter than those of *P. ovata*, *P. abdominalis* and *P. kotlani*, but resemble *P. rischta*, a non-abdominal parasite of the bleak and *P. cylindracea* and *P. kobuleji*, the parasites of the North American yellow perch and white sucker, respectively (Molnár and Fernando, 1975a, 1975b).

Data presented by Iraqi and Iranian authors (Herzog, 1969; Ebrahimzadeh and Nabawi, 1975; Ali et al., 1987; Moghainemi and Abasi, 1992; Molnár and Pazooki, 1995) indicate that *Philometra* spp. are common inhabitants in different fishes of the genus *Barbus* in the rivers of the Mesopotamian region. It is remarkable that in other parts of the world with a better-known parasite fauna relatively few philometrid nematodes have been recorded from *Barbus* spp. As concerns European *Barbus* spp. there have been only two reports on the occurrence of a *Philometra* species. Molnár (1967, 1969) reported retarded females and males of *Philometra abdominalis* in the swimbladder serosa of *Barbus meridionalis petenyi* in Hungary.

Before the present investigations Herzog (1969) and Ali et al. (1987) mentioned the occurrence of *Philometra* species in barbels in Iraq. Ali et al. (1987) recorded female specimens. Identification of the specimens found by them as *P. abdominalis* seems to be a mistake, as no gravid female of this species has been detected in European barbels. Although *Philometra* spp. have less strict host specificity in cyprinids, they usually show a distinct host selection.

In Europe *Philometra abdominalis* Nybelin, 1928 is common in fishes of the genera *Gobio* and *Phoxinus*, while *P. ovata* Zeder, 1803 infects *Abramis* and *Rutilus* spp. On the other hand, *P. kotlani* Molnár, 1969, *Philometroides cyprini*

Ishii, 1931 and *P. sanguinea* Rudophi, 1819 infect only members of the genera *Aspius*, *Cyprinus* and *Carassius*, respectively.

The development of nematodes belonging to the Philometridae family markedly differs from that of other nematodes. Significant diversity can be observed in the size of males and females. In contrast to gravid females which are several centimetres long and filled with larvae, the males measure only a few millimetres in length (Molnár, 1967, 1969; Moravec, 1994). As during the one-year period of synchronous development the size of females, but not that of the males, continuously increases, in species description a distinction should be made among mature, subgravid and retarded females. As interpreted by Moravec (1994), the category of mature worms includes females having the same size as males, and possessing a well-developed vulva and vagina. If these remain unfertilised and get stuck in the swimbladder, they can be described by the adjective 'retarded'. Females representing different stages of development, filled with eggs but having an atrophied vagina and vulva can be described as 'subgravid', whereas fully developed females filled with larvae as 'gravid'. In addition to male worms, mature (presumably retarded) females and subgravid females representing different developmental stages were studied during this survey; however, no gravid specimens were collected.

Identification of *Philometra* species is often based on the morphology of gravid females. However, females of some species are practically indistinguishable and, therefore, differences in the morphological characters of males are more significant. The extraordinarily small males, however, are known only from a minor fraction of the species described.

Prior to this study, Molnár and Pazooki (1995) also found *Philometra* infection in Iranian barbels, and their collection comprised both males and females. As, however, subgravid females and males originated from two different fish species (*Barbus sharpeyi*, *B. luteus*), the authors did not describe a new species.

The collected material indicates that the specimens found in *Barbus sharpeyi* are not identical with the known *Philometra* species and we regard them as a new species. On the other hand, the present material does not allow us to speculate whether or not *Philometra* specimens found in *B. grypus* and *B. luteus* from the same habitat by Iraqi and Iranian authors could be classified as *P. karunensis*, too. In our opinion, this question could be answered either by collecting males and gravid females from the barbels in question or by experimental infection of these fish species.

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