

# SYSTEMATIC REVIEW OF THE NEMATODES PARASITIZING FRESHWATER FISHES IN AFRICA

## Phylum Nematoda Rudolphi, 1808

According to available data, the African freshwater fishes may be parasitized by 99 species of adult nematodes and at least 10 species that occur in fishes only as larvae; these represent 37 genera and 18 families, belonging to all the above mentioned orders and suborders.

For practical reasons, the nematode species parasitizing fishes as adults and those occurring in these hosts only as larvae are dealt with separately in the following review. Keys to higher taxonomic groups are common for both adult nematodes and larvae.

## ADULT NEMATODES

### Key to classes of Nematoda

- 1 Phasmids absent. Oesophagus cylindrical or with oesophageal glands free in pseudocoel and forming stichosome. Excretory system without lateral canals. Males with one spicule or spicule absent. Eggs usually unsegmented, with plug at either pole or hatching in utero . . . . . **Adenophorea**
- Phasmids present. Oesophagus never in form of stichosome. Excretory system with lateral canals. Males with two spicules, exceptionally spicules absent. Eggs without polar plugs, rarely operculate at one pole, or hatching in utero . . . . . **Secernentea**

## Class Adenophorea Linstow, 1905

Small, less often large nematodes. Deirids absent. Phasmids (situated on lateral sides of tail) absent. Excretory system usually represented by unicellular renette.

Most Adenophorea are free-living forms and plant parasites. Those species which have adapted to a parasitic life in animals are all representatives of the order Enoplida. Of the three superfamilies of Enoplida the species of which are parasitic

in vertebrates, only members of two, Trichinelloidea and Dioctophymatoidea, are fish parasites.

#### Key to superfamilies of Enoplida parasitic in fishes

- 1 Oesophagus cylindrical and well developed; stichosome absent. Male tail modified to form ventral sucker-like muscular bursa. Vulva near anus. Body thick, massive ..... **Dioctophymatoidea** (see p. 327)
- Stichosome present. Male tail without muscular bursa. Vulva anterior or near end of oesophagus. Body small, thin, mostly filiform, only in *Cystoopsis* posterior part of body globular ..... **Trichinelloidea**

#### Superfamily Trichinelloidea Ward, 1907 (1879)

Nematodes with narrowed anterior part of body, posterior part may be considerably expanded. Mouth small, surrounded by indefinite lips. Oesophagus divided into two portions: shorter anterior muscular part and longer posterior glandular part; latter surrounded by one, two or three longitudinal rows of unicellular oesophageal glands (stichocytes). Excretory system rudimentary or absent. Genital apparatus of males and females single. One spicule present or absent, spicular sheath present. Vulva anterior, near oesophagus. Eggs, if present, with a plug at each pole. Development direct or indirect.

Of the six families of this superfamily, a representative of only one is parasitic in African freshwater fishes.

#### Family Capillariidae Railliet, 1915

Thin, thread-like nematodes. Cuticle with longitudinal bacillary bands, usually two lateral, one dorsal and one ventral. In males, one more or less sclerotized spicule present, with smooth or spiny spicular sheath, able to invaginate or evaginate. Posterior end of male with small membranous bursa or without it. Vulva near distal end of oesophagus, sometimes with elevated lips. Eggs usually barrel-shaped, with polar plugs, and with smooth or variously sculptured surface. Parasitic in various organs of both cold-blooded and warm-blooded vertebrates. Life cycle direct or with intermediate host (usually annelids).

Only one genus of this family has a representative parasitizing freshwater fishes in Africa.

#### Genus *Capillostrongyloides* Freitas et Lent, 1935

Capillariidae. Stichosome consisting of single row of stichocytes. Lateral caudal alae in male absent. Membranous bursa well developed, usually exceeding

considerably posterior end of body, being supported by two short, wide lateral lobes, each of them bearing papilla at its base. Spicule without rough transverse grooves on surface, being often insufficiently sclerotized. Spicular sheath nonspiny. Vulval appendage absent. Parasites of digestive tract of fishes.

Type species: *C. sentinosa* (Travassos, 1927).

Only one species of this genus is known from fishes in Africa.

***Capillostrongyloides fritschi* (Travassos, 1914) Moravec, 1982**

Fig. 2

Syns.: *Trichosoma papillosum* Fritsch, 1886, nec Wedl 1856; *Capillaria fritschi* Travassos, 1914; *C. yamagutii* Tadros et Mahmoud, 1968.

**Description:** Small nematodes. Cephalic end narrow; mouth situated terminally on anterior end, being surrounded by minute oral papillae. Two lateral bacillary

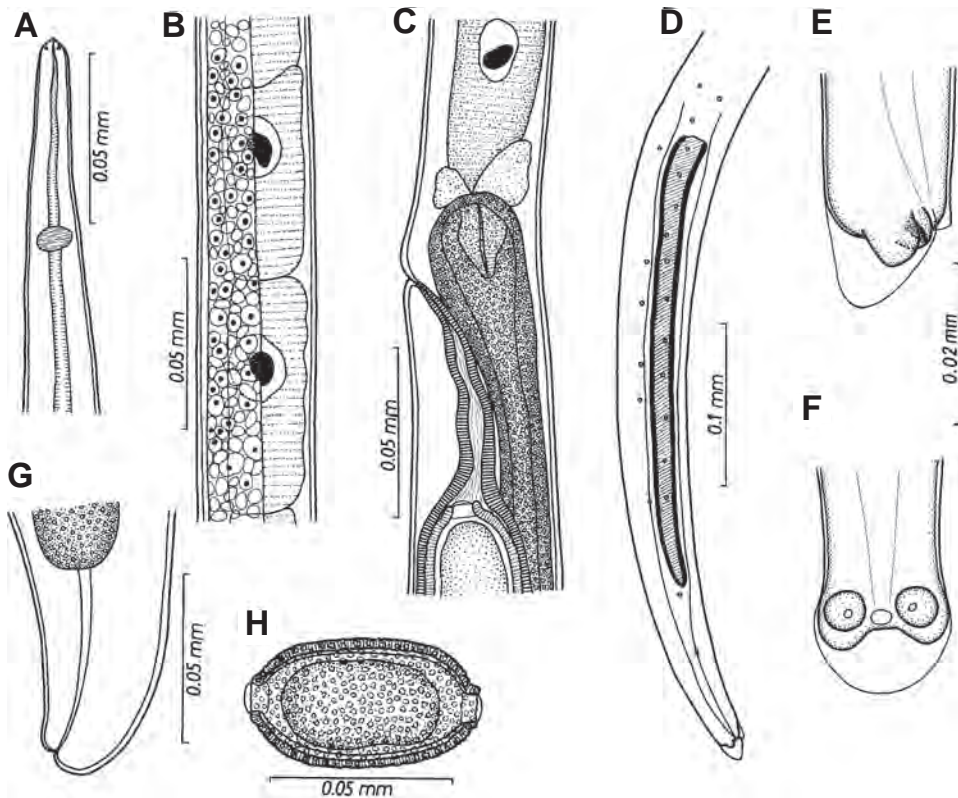


Fig. 2. *Capillostrongyloides fritschi* (Travassos, 1914). A – cephalic end; B – stichosome region with marked lateral bacillary band; C – region of vulva; D – posterior end of male; E, F – tail of male, lateral and ventral views; G – tail of female; H – egg. (After Moravec 1974a [A–D and G, H] and 1987 [E, F].)

bands, covered by tiny papilla-like formations, extending along almost whole body. Stichosome consisting of single row of 27–35 stichocytes subdivided into several transverse annuli; nuclei large, well visible. Two wing-like cells present at oesophago-intestinal junction.

**Male:** Length of body 3.86–4.42 mm, maximum width 41–54. Width of lateral bacillary bands at stichosome region 9. Length of entire oesophagus 1.80–1.84 mm (42–44% of body length), of muscular oesophagus 201–240, of stichosome 1.60 mm; number of stichocytes 34–35. Nerve ring 51–84 from anterior extremity. Spicule slightly sclerotized, 267–270 long. Spicular sheath nonspiny. Posterior end of body rounded, provided with well developed membranous bursa supported by two wide, rounded dorsolateral lobes elevating laterally on tail; one large, round adanal papilla present at base of each of them.

**Female:** Body length of gravid specimens 6.07–9.32 mm, maximum width 54–81. Width of lateral bacillary bands 21–30. Length of entire oesophagus 2.24–3.20 mm (34–36% of body length), of muscular oesophagus 189–330, of stichosome 2.05–2.87 mm; number of stichocytes 27–34. Distance of nerve ring from anterior end 72–90. Vulva situated 3–60 posterior to oesophagus end level, vulval lips not elevated or only anterior lip slightly elevated. Eggs oval, polar plugs mostly not protruding or only slightly protruding. Egg wall two-layered, inner layer hyaline, outer layer with distinct superficial sculpture; contents of eggs uncleaved. Size of eggs 51–66 × 27–36. Posterior end of body rounded, anus almost terminal.

**Hosts:** *Malapterurus electricus* (Malapteruridae) (type host), *Bagrus bajad*, *B. docmak* (Bagridae) (all Siluriformes).

**Site of infection:** Stomach and intestine.

**Distribution:** Egypt (River Nile and the Mediterranean Sea coast) (Fritsch 1886; Tadros and Mahmoud 1968; Moravec 1974a) and the Democratic Republic of the Congo (Campana-Rouget 1961).

**Biology:** Unknown. Moravec (1974a) recorded this species from about 50% of *Bagrus bajad* and *B. docmak* from the River Nile in Egypt, with the intensity 1–5 nematodes per fish.

### Capillariidae gen. sp. of Moravec and Scholz, 2017

**Host:** *Auchenoglanis* sp. (Claroteidae, Siluriformes).

**Site of infection:** Intestine.

**Distribution:** Sudan (the White Nile in Kosti) (Moravec and Scholz 2017).

**Remark:** Only a single gravid female was recorded, which, until also the conspecific male is found, cannot be identified to the genus.