Systematic Parasitology **38:** 147–151, 1997.

Skrjabillanus cyprini n. sp. (Nematoda: Dracunculoidea) from the scales of common carp *Cyprinus carpio* (Pisces) from Hungary

K. Molnár[1] and F. Moravec[2]

[1] *Veterinary Medical Research Institute, Hungarian Academy of Sciences, H-1581 Budapest, POB 18, Hungary*

[2] *Institute of Parasitology, Academy of Sciences of the Czech Republic, Branišovská 31, 370 05 České Budějovice, Czech Republic*

Accepted for publication 1st April, 1997

Abstract

A new species of the histozoic nematode, *Skrjabillanus cyprini* n. sp., is described from the subsquamal part of the scales of common carp *Cyprinus carpio* L. from Lake Balaton, Hungary. It differs from the other three congeneric species mainly in possessing an extremely small, oval-shaped buccal capsule with a large tooth at the bottom, in the shape of the cephalic end (somewhat bulbously inflated, truncated anteriorly), the extent of the oesophageal glands and body size (body length of male and female 1,800–3,000 μm and 3,200–4,100 μm, respectively). A key to the identification of *Skrjabillanus* spp. is provided.

Introduction

The genus *Skrjabillanus* Shigin & Shigina, 1958 includes very slender dracunculoid nematodes which are tissue parasites of freshwater fishes. The most frequent location of these parasites in the host is the serosal cover of various organs, such as the swimbladder, kidneys or gonads, but they are often found in the abdominal cavity, kidneys, urinary bladder, orbits and in the humour of the eye (Moravec, 1994). At present, the genus includes three species, all parasitising European cyprinids: *S. tincae* Shigin & Shigina, 1958 from tench *Tinca tinca* (L.), *S. scardinii* Molnár, 1966 from rudd *Scardinius erythrophthalmus* (L.) and *S. schigini* Tikhomirova & Rudometova, 1975 from grasscarp *Ctenopharyngodon idella* (Valenciennes).

Thorough examination of common carp *Cyprinus carpio* L. from Lake Balaton, Hungary, carried out recently by the first author of this paper, has revealed the presence of another, hitherto undescribed species of *Skrjabillanus*. In contrast to the known species of the genus, the nematodes belonging to the new species are much smaller and their site of infection is the host's scales. This new species is described below.

Materials and methods

Fourteen common carp of 3–6 years old and 30–60 cm in length were collected using of an electric device or seined by fishermen from Lake Balaton, Hungary, between May and November 1996. The fish were transported alive to the laboratory of the Veterinary Medical Research Institute in Budapest, where they were subsequently examined within a few days. The fish were de-scaled and the scales were placed into 0.65% saline in a Petri dish. The skin covering part of the inner surface of the scales was carefully removed and scrapings were checked for the presence of nematodes. After removing the scales, the fish were skinned and the skin was placed into a jar containing saline. In addition, the serous membranes were peeled off the abdominal organs and swimbladder, and were checked for the presence of moving nematodes. Skrjabillanids were collected from the scrapings of the scales under a dissecting microscope. The nematodes were first washed in physiological saline, then placed in a drop of saline on a microscope slide. A coverslip was placed over the drop of saline and its corners were fixed with Noyer's lacquer. A small drop of lactophenol was then added to the edge of the coverslip. The specimens, mounted in lactophenol in this way, were examined using an NFPK Zeiss microscope and drawings were made

with the help of a drawing attachment. The specimens have been deposited in the helminthological collection of the Institute of Parasitology, Academy of Sciences of the Czech Republic, in České Budějovice. All measurements are given in micrometres unless otherwise stated.

In addition to these examinations, fish lice *Argulus foliaceus* (L.) infecting the examined common carp specimens were collected and examined for nematode infection at a magnification of × 100–400 in a compound microscope.

Results

Ten of the 14 common carp specimens proved to be infected with skrjabillanid nematodes. Infection was found during different seasons, from May to November. The intensity of infection ranged from 1 to 122 (mean 25.5). In most cases, nematodes were found in subsquamal locations between the cartilaginous plate of the scales and the epithelium covering them on the inside. In one case a single parasite was found in the saline solution used for soaking the skin. No infection was recorded in the abdominal cavity or under the serous membrane of the swimbladder; neither was infection found in a single mirror carp examined. Twenty-four specimens of the 29 fish lice *Argulus foliaceus* collected from the fins of common carp were found to be infected by second- and third-stage larvae of a skrjabillanid species.

***Skrjabillanus cyprini* n. sp.** (Figure 1)

Description

Very fine, long, thread-like nematodes with smooth cuticle. Head end distinctly distended, truncated anteriorly. Mouth opening very small, slightly depressed. Small, simple buccal capsule present, its width being equal to or slightly greater than its length. Base of buccal capsule provided with large conical tooth, its length representing about 2/3 that of capsule. Four small cephalic papillae present, situated well posterior to level of buccal capsule. Lateral amphids large, oval, situated approximately at mid-distance between posterior end of buccal capsule and level of cephalic papillae. Oesophagus muscular throughout, provided with well-developed external oesophageal glands. Anterior oesophageal gland broad, with rounded end, extending anteriorly to about mid-distance between nerve-ring and posterior end of oesophagus; posterior oesophageal gland narrow, extending posteriorly to about 2/3 of distance between end of oesophagus and vulva. Intestine straight, little distinct.

Male (4 specimens; measurements of holotype in parentheses). Length of body 1,800–3,000 (2,040), maximum width 11–12 (12). Width at level of cephalic inflation 12 (12), at narrowed part posterior to inflation 9 (9). Buccal capsule 1–2 (1) in diameter. Length of oesophagus, including its posterior part which is overlapped by oesophageal gland, 84 (90). Nerve-ring encircling oesophagus, 51 (45) from anterior extremity. Posterior end of body conical, provided with broad, membranous caudal alae starting somewhat anterior to cloaca and interconnecting at posterior end to form copulatory bursa. Caudal papillae: 5 pairs; 3rd pair formed by indistinct ventral sessile papillae; remaining pairs formed by pedunculate subventral papillae; pedunculate subventral papillae of first 3 pairs rather long, those of last pair short; 1st pair of papillae adanal, remaining postanal; all postanal papillae situated approximately in anterior half of tail. Copulatory plate markedly sclerotised, being bent in lateral view, – (6) long and – (1) wide. Length of tail 14–19 (14).

Female (10 specimens; measurements of allotype in parentheses. Length of body of gravid females 3,200–4,100 (3,310), maximum width 24–27 (27). Width at level of cephalic inflation 21–27 (27), at narrowed part posterior to inflation 18–21 (21). Buccal capsule 1–3 (1) long and 2–3 (2) wide. Length of oesophagus, including its posterior part which is overlapped by oesophageal gland, 210–402 (285); length of anterior oesophageal gland 99–192 (99), that of posterior gland c. 60–114 (60) from anterior extremity. Vulva situated somewhat posterior to oesophagus, 357–465 (426) from anterior end of body; vulval lips slightly elevated. Vagina short, narrow, directed posteriorly. Monodelphic. Uterus oriented anteriorly, contains eggs and developing larvae; ovary extends posteriorly almost to end of intestine. Fully-developed larvae in uterus numerous, usually with straight bodies aligned longitudinally; length of larvae not established, their width 6 (6). Rectum thin hyaline tube; small unicellular rectal glands present. Tail almost cylindrical, 33–39 (33) long, with 3 large rounded processes at tip; length of caudal processes 2–3 (3).

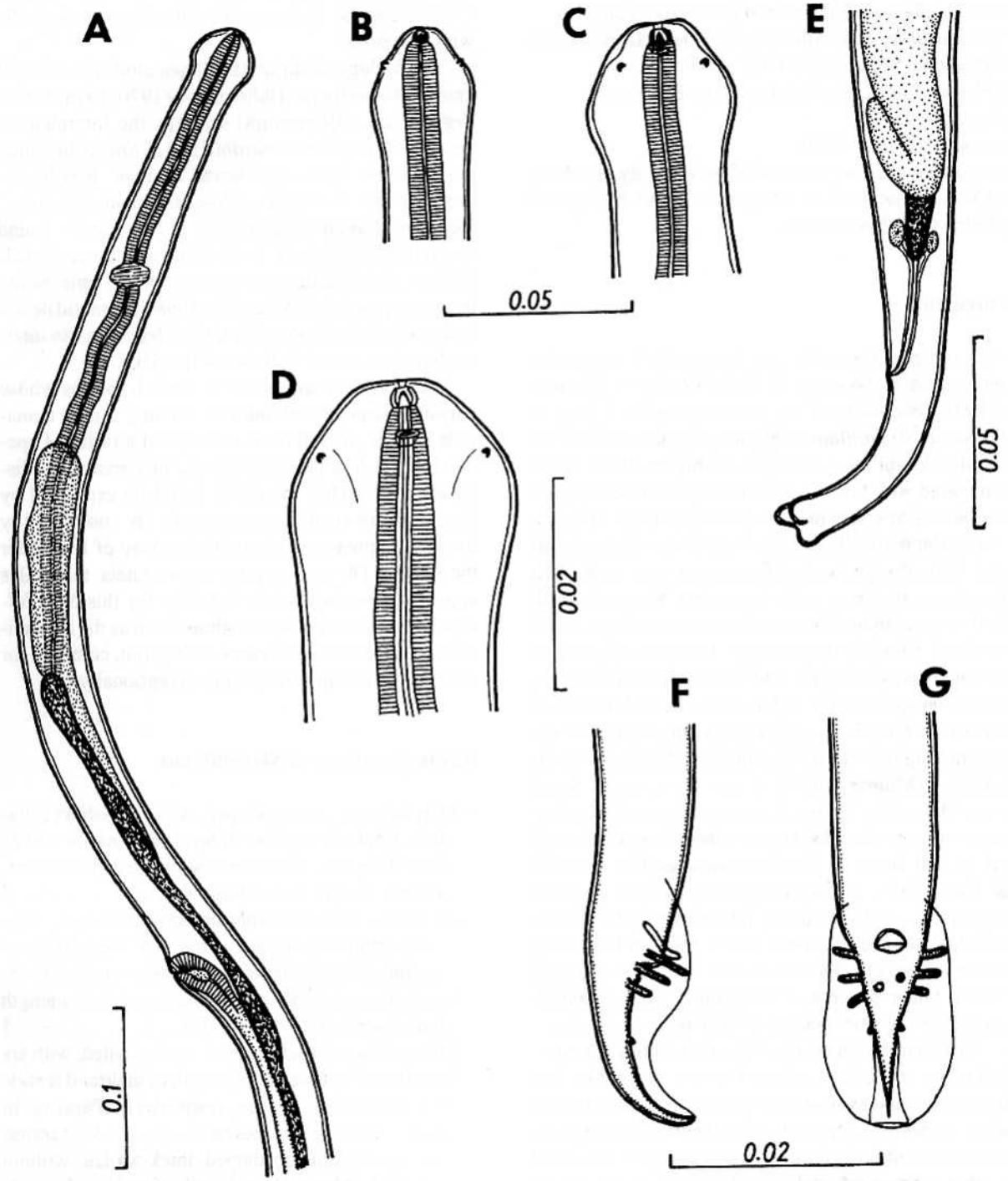

Figure 1. *Skrjabillanus cyprini* n. sp. from under the scales of the common carp. A, anterior end of female; B,C, cephalic end of male and female; D, cephalic end of female, greater magnification; E, tail of female; F,G, tail of male, lateral and ventral views. *Scale-bars*: in mm.

Type-host: Common carp *Cyprinus carpio* L. (body length 45 cm) (Cyprinidae, Cypriniformes).
Site of infection: Subsquamal part of the scales.
Type-locality: Lake Balaton, Hungary (all types collected on 5 September 1996).
Other localities: Kis-Balaton Water Reservoir.
Prevalence: 71%.
Intensity: 25.5 (1–120).
Deposition of types: Institute of Parasitology, Academy of Sciences of the Czech Republic, České Budějovice (Helm. Coll. No. N-687).

Discussion

According to the system of dracunculoid nematodes recognised by Moravec & Køie (1987) and Moravec (1994), specimens of the present material belong to the genus *Skrjabillanus* Shigin & Shigina, 1958 of the family Skrjabillanidae Shigin & Shigina, 1958. When compared with the three previously described species, *S. tincae* (type-species), *S. scardinii* and *S. schigini*, they differ markedly in their small body measurements and some morphological features as well as in their location in the host (under the scales). Morphologically they seem to be closest to the last named species (*S. schigini*) parasitic in grasscarp; however, in addition to some morphological and biometrical differences, these two species also differ in the site of infection in the host: while *S. schigini* occurs only in the mesentery linking both portions of the swimbladder with the intestine (Molnár, 1989), *S. cyprini* n. sp. is found under the scales. In fact, *S. cyprini* is the first *Skrjabillanus* species recorded from the host's skin, although adults and larvae of *Daniconema anguillae* Moravec & Køie, 1987, a histozoic parasite of eels *Anguilla anguilla* (L.), of the closely related family Daniconematidae Moravec & Køie, 1987, are also frequently found in the skin (Molnár & Moravec, 1994; Molnár, 1997). Other differences between *S. cyprini* and its congeners are elucidated in the key presented below.

The distribution of skrjabillanid nematodes is poorly known at present, mainly because of the fact that these very delicate histozoic parasites, which are sensitive to osmotic pressure, pass unnoticed during routine examinations of fish. Consequently, it may well be that subsequent studies will show *S. cyprini* to be a common and widespread parasite of common carp in Europe and elsewhere. In his MSc thesis submitted in 1984, Scholz reported a juvenile, unidentified *Skrjabillanus* specimen (body length 2.2 mm, width 0.014 mm) from the humour of the eye of a common carp from the Hostivař water reservoir near Prague, Czech Republic. It may well be that it was conspecific with *S. cyprini*.

The biology of skrjabillanid nematodes is not well known. According to Tikhomirova (1970, 1975, 1980), *Argulus* spp. (Branchiura) serve as the intermediate hosts of *Skrjabillanus scardinii* and *S. tincae*, in which the parasites' third-stage larvae develop. It is highly probable that *S. cyprini* utilises the same intermediate hosts. Larval skrjabillanids are frequently found in *Argulus foliaceus* in Lake Balaton; however, their species identification is uncertain for the time being, because several skrjabillanid and daniconematid nematodes, all of which probably utilise *Argulus* as an intermediate host, occur in fishes of that lake.

The common carp is one of the fish species whose parasite fauna is well studied. Finding a new nematode species, therefore, is considered a rarity of special interest. The fact that the parasite remained undiscovered for such a long time could be explained by its extremely small measurements, its susceptibility to osmotic pressure and its hidden way of life under the scales. The subsquamal region under the scales appears to be the specific location for this *Skrjabillanus* species, and other locations, such as the abdominal cavity, serous membranes or the orbit, common for other skrjabillanids, occur only exceptionally.

Key to the species of *Skrjabillanus*

1 Cephalic end dome-shaped, without distinct inflation. Cephalic papillae at level of posterior end of buccal capsule. Posterior oesophageal gland several times longer than anterior one 2
– Cephalic end somewhat bulbously inflated, truncated anteriorly. Cephalic papillae well posterior to end of buccal capsule. Anterior and posterior oesophageal glands approximately equal in length (not described for *S. schigini*) 3
2 Buccal capsule oval-shaped, thick-walled, with six small teeth at base. Body length of male and female 3–6 mm and 8–17 mm, respectively. Parasitic in *Scardinius erythrophthalmus* ..... *S. scardinii*
– Buccal capsule cup-shaped, thick-walled, without any teeth at base. Body length of male and female 6–8 mm and 7–22 mm, respectively. Parasitic in *Tinca tinca* ..... *S. tincae*
3 Buccal capsule relatively large, 3–5 × 5–7 μm in size, cup-shaped, markedly wider than long, with-

out any teeth at base. Body of male and female 4–5 mm and 11–15 mm, respectively. Parasitic in *Ctenopharyngodon idella* ..... *S. schigini*

– Buccal capsule very small, 1–3 × 1–3 μm in size, oval-shaped, approximately as long as wide, with a large tooth at base. Body length of male and female 1.8–3.0 mm and 3.2–4.1 mm, respectively. Parasitic in *Cyprinus carpio* ..... *S. cyprini* n. sp.

Acknowledgements

This study was supported by a grant given by the government commissioner of Lake Balaton and by grant no. T020044 received from the National Research Fund (OTKA) of Hungary. The authors are grateful to Dr Csaba Székely for his help in the collection of fishes and parasites.

References

Molnár, K. (1989) Occurrence of two skrjabillanid nematodes, *Sinoichthyonema amuri* and *Skrjabillanus schigini* in grasscarp (*Ctenopharyngodon idella*) in Hungary. *Parasitologia Hungarica*, **22**, 63–66.

Molnár, K. (1997) New data on the location of *Daniconema anguillae* (Nematoda: Dracunculoidea) adult stages in eels. *Bulletin of the European Association of Fish Pathologists* (in press).

Molnár, K. & Moravec, F. (1994) Third-stage larvae of *Daniconema anguillae* (Nematoda: Dracunculoidea) in the subcutaneous tissue of eel *Anguilla anguilla*. *Folia Parasitologica*, **41**, 215–219.

Moravec, F. (1994) *Parasitic nematodes of freshwater fishes of Europe*. Academia and Kluwer Academic Publishers: Prague and Dordrecht, Boston, London, 473 pp.

Moravec, F. & Køie, M. (1987) *Daniconema anguillae* gen. et sp. n., a new nematode of a new family Daniconematidae fam. n. parasitic in European eels. *Folia Parasitologica*, **22**, 279–281.

Scholz, T. (1984) *Helmintofauna ryb Břehyňského potoka a Botiče*. MSc Thesis, Faculty of Sciences, Charles University, Prague, 225 pp.

Tikhomirova, V.A. (1970) [Elucidation of the developmental cycle of the nematode *Skrjabillanus scardinii* Molnár, 1965.] *Doklady Akademii Nauk SSSR*, **195**, 510–511 (In Russian).

Tikhomirova, V.A. (1975) [Life cycles of nematodes of the family Skrjabillanidae.] *Sbornik "Voprosy ekologii zhivotnykh"*, Kaliningrad: Gosudarstvennyi Universitet, Part 2, pp. 118–122 (In Russian).

Tikhomirova, V.A. (1980) [On nematodes of the family Skrjabillanidae (Nematoda: Camallanata)]. *Parazitologiya*, **14**, 258–262 (In Russian).