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PARASITIC HELMINTHS OCCURRING IN ADRIATIC FISHES

Part III (Nematodes, Acanthocephala)

PARASITSKI HELMINTI U JADRANSKIM RIBAMA-III dio

OTTO SEY

SPLIT 1970

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Part III (Nematodes, Acanthocephala)

PARASITSKI HELMINTI U JADRANSKIM RIBAMA — III DIO

By

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The present paper is the finishing part of the helminthological examinations carried out in 1966, Split. It involves the recovered Nematodes and Acanthocephla. As a result of the investigations sixteen species of Nematodes occurred, one of them, *Collarinema triglae* gen. et sp. nov., a new nematode genus and species in science, and several others were found for the first time in the Adriatic fishes.

Five species of Acanthocephalous worms belonging to three families have also been dealt with in the paper.

Recovered Nematode Species

Anisakidae Skrjabin et Karokhin, 1945

Anisakis sp. (larvae)

Not only in the Adriatic but also in other Seas (of Japan, White, Bahrein and so on) this parasite is widly distributed (Nikolajeva-Najdenova, 1961). In the Adriatic it was previously mentioned by Janiszewska, 1949; Nikolajeva-Najdenova, 1961. In *Scomber japonicus, Serranus cabrilla, Uranoscopus scaber, Trachurus trachurus* and *Nyctophum punctatum.* This parasite was found during my investigations in several other fish species (Table II). Probably, its adult forms are parasitic in certain species of marine mammals.

Contracaecum (E.) aduncum (Rud., 1819) larvae

It is a very common parasite of fishes in the Adriatic and Mediterranean. Earlier investigators (Barbagallo-Drago, 1903; Janiszewska, 1937, 1938, 1949; Nikolajeva-Najdenova, 1961) disclosed it in more and more fishes. Descriptions of different larval stages can be found in Janiszewska's paper (1949).

Contracaecum (C.) fabri (Rud., 1819) larvae

It was the common nematode of the examined fishes. Twenty five fishes were infected by them. (Table I.)

Contracaecum (E.) clavatum (Rud., 1809) larvae

It was recovered in eight fish species. So far it has not occurred in *Citharus linguatula, Gobius niger* and *Solea variegata.* The detailed description and the main morphological characters of these larvae can be found in Janiszewska's work.

I agree with Janiszewska's opinion emphasizing that the common nematode larvae parasitic in the Adriatic fishes *[Contracaecum (E.) clavatum,* C. (C.)*fabri,* C. (C.) *auctum]* can be distinguished on the basis of their morphological features.

Contracaecum (C.) filiforme (Stossich, 1904)

It is a frequent parasite in the gall-bladder of Uranoscopus scaber. It was mentioned for the first time by Stossich in Triest, 1904.

Physalopteridae Leiper, 1908

Proleptus robustus (Beneden, 1871)

This parasite was found in the alimentary canal of *Raja miraletus*. For the first time it was mentioned in the Adriatic by Nikolajeva-Najdenova, 1961.

Proleptus obsturs Dujardin, 1845

It was found in the intestine of *Scyliorchinus caniculus* several times, sometimes in a great number. So far it has not been known in the Adriatic.

Dracunculidae Leiper, 1912

Philometra globiceps (Rud., 1819)

This nematode was recoverd in the gonads of *Uranoscopus scaber* three times. All of them were females.

Philometra sp.

Only one specimen was found in the ovary of *Scomber scombrus*. During the dissection it was damaged, so closer identification was not possible.

Cucullanidae Cobbold, 1864

Cucullanus longicollis (Stossich, 1899)

Three specimens occurred in the alimentary canal of *Mullus barbatus*. For the first time it was described by Stossich (1894) in the Adriatic. Later Janiszewska (1949) also found it in *Mullus barbatus*.

Cucullanus praecinctus (Duj. 1845)

Twelve specimens were found altogether in the intestine of *Ariosoma balearicum* and *A. mystax*.

Cucullanus micropapillatus Törnquist, 1932

Three females and four males were recovered in the intestine of *Crenilabrus cinereus* and *Labrus merula*. The characteristics of the species of the genus *Cucullanus* parasitic in the Adriatic fishes are given by Janiszewska (1949).

Camallanidae Railliet et Henry, 1915

Camallanus melanocephalus (Rud., 1819)

Only one female specimen was found in the intestine of *Auxis thazard*.

Rhabdochonide Skryabin, 1946

Collarinema triglae gen. et sp. nov. (Fig. 1. a-h)

Collarinema gen. nov.

DISCUSSION.

Rhabdochonidae, Metabronematinae. Small and slender worms. The cuticle in the head region is either reflected back forming a cap-shaped swelling, or directed forwards constituting a funnal-shaped cover. The cuticle is transversely striated. Mouth with two lateral, distinct lips on which there is some cuticular thickening. Vestibule present; oesophagus divides into two portions. Cervical papillae slightly behind the lips.

Male with distinct caudal alae; four pairs of precloacal papillae; spicule very unequal, the right spicule is always longer; gubernaculum absent.

Female: vulva at the middle of or behind the body; uterus didelphic, amphidelphic. Eggs with filaments at least in type species.

Type species: *Collarinema triglae*.

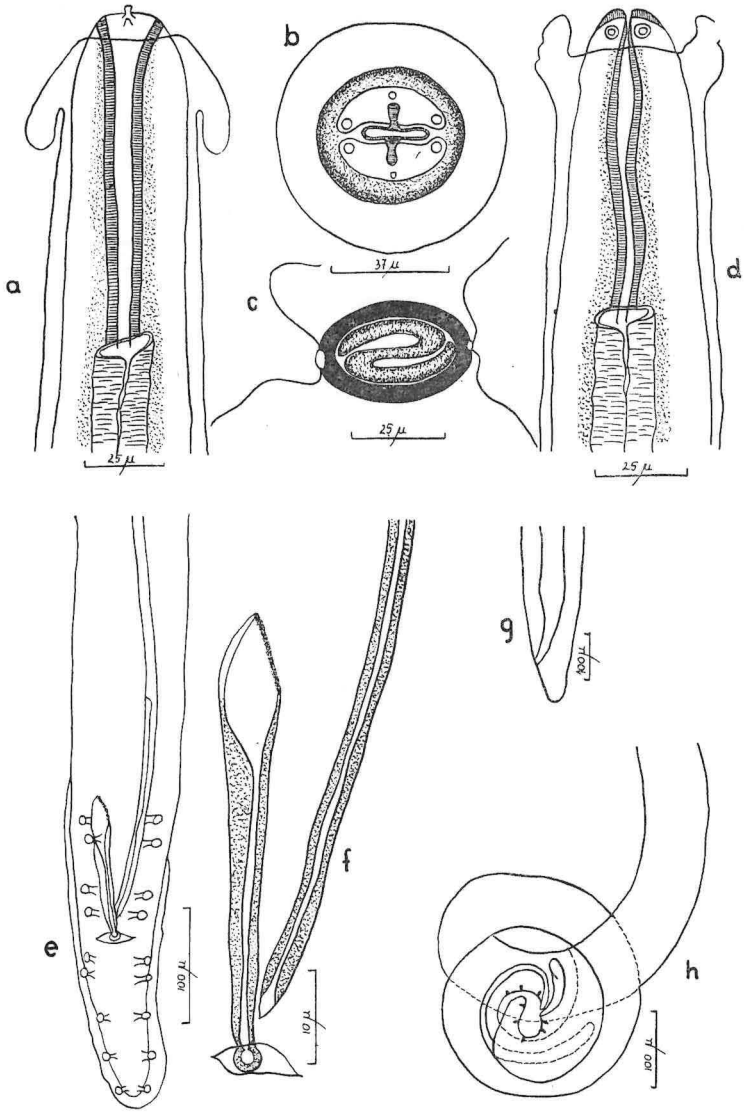

Figura 1. Collarinema triglae gen. et sp. nov. a—h.
a) female anterior end, lateral view, b) en face view, c) egg, d) male anterior end, ventral view, e) male caudal end, f) spicules, g) female caudal end, h) tail end, male.

Collarinema triglae sp. n.

Description.

The body before the vulva is slender, tapering towards the mouth while the post vulvar half is almost uniform in breadth. A cap-shaped cuticular swelling can be found at the anterior end of both sexes which can be reflected back forming a funnel-shaped cover. The cuticle is transversally striated beginning from the nerve ring to the posterior end.

The mouth is dorsoventrally elongated with a distinct opening surrounded by a cuticular rim. It is bordered by two developed lateral lips, each carrying a pair of submedian papillae on the outer surface at the anterior corners. The mouth leads into the vestibule with thick walls which are transversally striated. The cuticular lining of the vestibule continues anteriorly and at the middle of the inner margins of the lips it laps over the lips forming half--finger-biscuit-shaped thickenings in an end-on-view.

The oesophagus consists of an anterior muscular and a posterior glandular portion. The slightly developed cervical papillae are situated at a distance of 0,210 from the anterior extremity. The nerve-ring can be found at the level of the muscular oesophagus. The excretory pore opens immediatelly below the nerve-ring.

Male. The body measures 6,85 to 7,25, its breadth by the end of the glandular oesophagus is 0,105 to 0,130. The striation of the cuticle being 0,003 to 0,004. The nerve-ring is situated at a distance of 0,240 from the anterior end of the body. The pharynx maesures 0,114. Length of the muscular oesophagus is 0,240 to 0,256, the glandular one is 1,465 to 1,475. The caudal end is spirally coiled like a corkscrew. The lateral alae moderately developed. The tail measures 0,099 to 0,115. On the ventral surface there are four pairs of stalked preanal papillae and five pairs of stalked postanal caudal ones. Two pairs of the preanal papillae are situated a little before the anus and the other two pairs can be found at the level of the shorter spicule's foot. Two pairs of the postanal papillae are nearer the anus and the rest are situated at an equal distance on the further portion of the caudal end. There are two unequal, dissimilar spicules. The length of the right spicule is 0,120 to 0,144 the left one is 0,390 to 0,420 respectively. From the 1/5 of the right spicule two low margins rise which together with the body itself form an open-topped canal. It ends bluntly. The posterior part of the left spicule has also formed a canal. The left spicule ends pointed.

Female. It measures 10,92 to 12,38 in length and 0,154 in maximum breadth. The body, towards the anus, gradually becomes wider then it ends bluntly. The nerve-ring is situated at a distance of 0,252 from the cephalic extremity. The plarynx measures 0,280 to 0,350. The longer glandular part is 1,960 in length. The distance of the vulva from the anterior end varies between 5,14 to 6,12. Its lips are not prominent. Uterus didelphic, amphidelphic containing a large number of eggs. The eggs are covered with a thick egg-shell (0,004), a knob with two delicate filaments (0,35) is on either end. The eggs

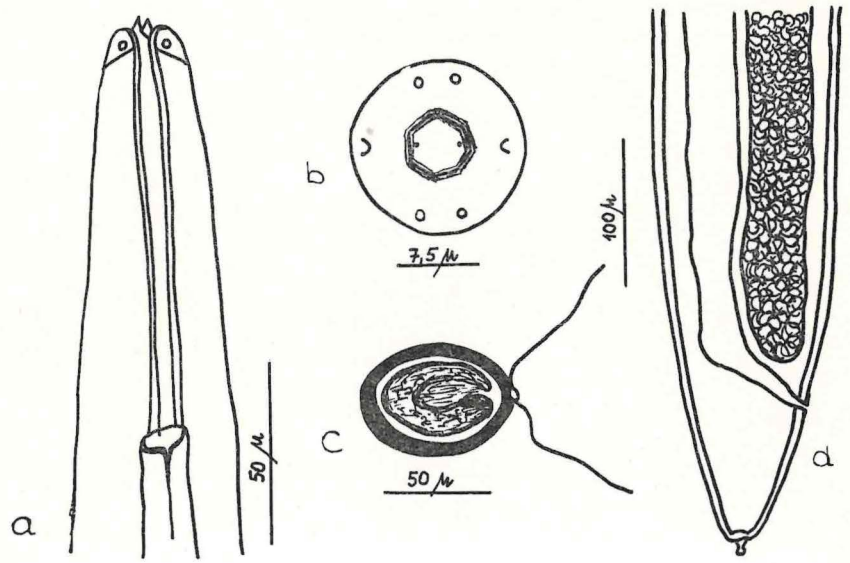

Figure 2. Ascarophis sp. a—d.
a) female anterior end, ventral view, b) en face view, c) egg, d) female posterior end.

are 0,035 to 0,045 long and 0,020 broad; they are embryonated. The length of the worm's tail is 0,045 to 0,09. Phasmids were not visible.

Host: *Trigla lyra* L.

Habitat: Stomach

Locality: Adriatic Sea

Type locality: Split, Yugoslavia

Type specimens: holotype female and allotype male, paratypes: Zoology Department, University College, Pécs, Hungary.

DISCUSSION.

Taking into account the characters of the alimentary canal, male caudal end and the structure of cephalic end, the parasite can be included in the family *Rhabdochonidae,* subfamily *Metabronematinae* Trofimenko, 1967. So far as the literature and the writer's knowledge are concerned, the head structure of the present worm is not represented in any of the known genera of the subfamily *Metabronematinae.* During the last decades several authors (Skinker, 1931; Dollfus and Campana-Rouget, 1956; Wierzbicki, 1962; Rasheed, 1965; Moravec, 1967; Trofimenko, 1967; Roytman, 1967) dealt with the taxonomic problems of the Spiruroid nematodes of fishes.

Trofimenko gives a comprehensive review of the subfamily Metabronematinae. According to his system the subfamily *Metabronematinae* consists of four genera: *Metabronema* Yorke et Maplestone, 1926; *Comephoronema* Layman, 1933; *Salvelinema* Trofimenko, 1962; *Sterliadochona* Skryabin, 1964.

Of the papers published in the last years Rasheed's work is of greatest importance because the examinations of some Spiruroid genera and species were carried out by using original materials. I agree with Rasheed's opinion emphasizing the importance of the cephalic structure in the determination of Spiruroid genera of fishes. In her paper she re-established the genus *Cystidicoloides* Skinker, 1931 and together with the genera *Metabronema* and *Ascarophis* she gives an amended generic diagnosis of them.

On the basis of the examinations of original materials Rasheed and Moravec consider the genus *Sterliadochona* Skryabin, 1946 a synonym of *Cystidicoloides* Skinker, 1931. Taking into consideration the establishments of the above mentioned authors, the subfamily *Metabronematinae* Trofimenko, 1967, includes the genera below:

Metabronema Yorke et Maplestone, 1926 emended Rasheed, 1965
Cystidicoloides Skinker, 1931 emended Rasheed, 1965
Comephoronema Layman, 1933
Salvelinema Trofimenko, 1962
Collarinema gen. nov.

The most characterizing features of *Collarinema* gen. nov. are the cuticular swelling of the cephalic end and the structure of the anterior extremity. In this respect it differs from the other genera of the subfamily *Metabronematinae*. *Collarinema* gen. nov. comes closer to the genera *Cystidicoloides* and *Metabronema* but it differs from the latter in the structure of the lips (genus *Metabronema* has also dorsoventral pseudolabia), a longer left spiculum and the presence of a distinct rim around the mouth opening. The main character by which *Collarinema* gen. nov. can be distinguished from *Cystidicoloides* is the presence of the cuticularized structure in the buccal region, on one hand, and the cuticular swelling of the anterior end, on the other.

Key to the Genera of the *Metabronematinae*

1. Lateral lips with cutilarized structure 2
   Lateral lips without cuticularized structure 5
2. Right spicule is always the longer . . . . . *Metabronema* Yorke et Maplestone, 1926
   Left spicule is always the longer 3
3. Anterior end with cuticular swelling . . . . . *Collarinema* gen. nov
   Anterior end without cuticular swelling 4
4. Preanal papillae more than four pairs . . . . . *Salvelinema* Trofimenko, 1962
5. Mouth is surrounded by two lips . . . . . *Cystidicoloides* Skinker, 1931
   More lips can be found around the mouth 6
6. Number of lips is four, two smaller and two bigger ones . . . . . *Comephoronema* Layman, 1933

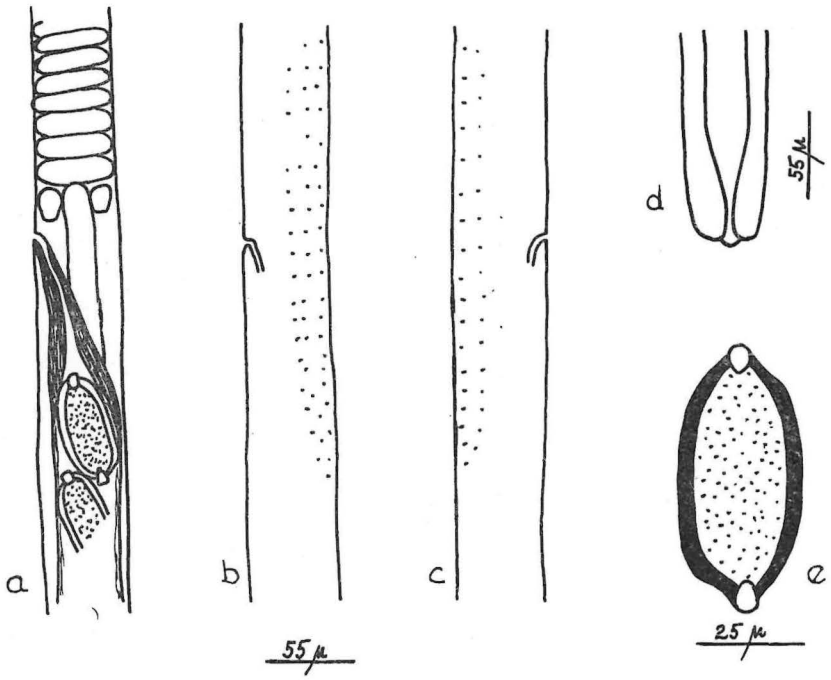

Figure 3. Capillariidae gen. et sp.
a) vulvar region, b—c) ornamentation of cuticle, d) caudal end, e) egg.

In 1951 Karve and Naik described the Spiruroid nematodes *Metabronema notopteri* Karve et Naik, 1951, from the fresh water fish *Notopterus notopterus* in India. Studying its morphological features this helminth is to be ranged in the genus *Collarinema* gen. nov. as *Collarinema notopteri* (Karve et Naik, 1951) comb. nov.

Collarinema triglae gen. nov. and *Collarinema notopteri* (Karve et Naik, 1951) are similar to each other mainly in the structure of their cephalic ends considering the presence of the cuticular swelling but there are slight differences in form and arrangement of their cuticularized thickenings.

Essential differences can be found in the structure of the male caudal end. *Collarinema notopteri* (Karve et Naik, 1951) has eight postanal papillae, *Collarinema triglae* has only five; the left longer spiculum of *Collarinema notopteri* (Karve et Naik, 1951) has two special processes at its tip, *Collarinema triglae* has no such elements; and finally there is a difference in the structure of the eggs: the eggs of *Collarinema notopteri* (Karve et Naik, 1951) are without filament and knobs.

Collarinema triglae gen. et sp. nov. has been the first record from the subfamily *Metabronematinae* occurring in the Adriatic fishes so far. During my investigation 81 different fish species had been examined but it has

occurred only in red gurnard (Sey, 1969). It seems probable that *Collarinema triglae* gen. et sp. nov. can develop in *Trigla lyra* L.

Ascarophis sp.

This helminth has been recovered in the intestine of *Scorpaena porcus*. All of them were females, due to lack of males closer identification was not possible. So far *Ascarophis* sp. has not been found in the above host. In comparison with the other species of the genus *Ascarophis* I have found some different features, that is why I give its description in short.

The body measures from 18 to 19 m/m in length and its maximum thickness is 0,14 m/m. To the naked eye the body divides into two portions, an anterior slender one tapering towards the cephalic end and a posterior broader one almost uniform in breadth. The demarcation between the two parts is where the vulva is situated. The mouth leads into a tubular pharynx. The pharynx measures 0,135 m/m in length. The oesophagus consists of two parts, an anterior muscular, measuring 0,450 m/m and a posterior glandular one measuring 2,730 m/m. There are two, laterally placed, slightly developed cervical papillae at a distance of 0,120 m/m from the anterior end. The prominent nerve-ring encircles the muscular oesophagus at a distance of 0,180 m/m from the anterior end. The small excretory pore is situated behind the nerve-ring and its distance from the cephalic extremity is 0,270 m/m. The cuticle is transversally striated beginning from the level of the excretory pore. The vulva is situated at a distance of 14 m/m from the anterior end. The tail measures 0,075 m/m. It has a small (5 μ) caudal appendage. The eggs are 40 to 45 μ long and 20 to 21 μ broad. They have a knob at one pole with two delicate, long filaments.

Capillariidae gen. et spec.

Three female worms occurred in the intestine of *Onos tricirratus*. It seems to be a new parasite for the host. So far two Capillarid species have been only described in the Adriatic fishes but the specimen found by me differs from them therefore I give a short description of it.

Length 6,4 to 6,8 m/m. The breadth by the vulva varies from 0,06 to 0,07 m/m. The distance from the vulva to the front end varies from 1,95 to 2,13 m/m. The vulva has no characteristic features, there are no vulvar appendices nor other prominent parts.

The bacillary band begins at the cephalic end. It gradually becomes wider, its widest part is at the level of the vulvar region. After this it gradually becomes narrower and not too far from the vulva it ends. The bacillary band covers a half of the body.

The eggs are elongated with a protruding plug. The length ranges from 0,050 to 0,060 m/m. Their breadths are from 0,029 to 0,031 m/m.

Recovered Acanthocephalous Species

Echinorhynchidae (Cobbold, 1879)

Acanthocephaloides incrassatus (Molin, 1858)

It was found in the intestine of *Gobius exanthematicus, G. geniporus* and *Ophidium barbatum*. It showed a low infection, only 1—3 specimens were in the hosts.

Echinorhynchus gadi Müller, 1776

Only one specimen was recovered in the food canal of *Anguilla anguilla*.

Acanthocephaloides propinguus (Dujardin, 1845)

Five specimens occurred in the intestine of *Maena smaris*. It is a new host for this parasite.

Telosentidae Petrocsenko, 1956

Telosentis molini Van Cleave, 1923

Four specimens were found in the digestive canal of *Oblata melanura* and *Diplodus annularis*. They are new hosts for this helminth.

Polymorphidae Meyer, 1931

Bolbosoma vasculosa (Rud., 1819) (larva)

One immature specimen was found in the posterior portion of the intestine of *Auxiz thazard*.

SUMMARY

Nematodes and Acanthocephala occurring during the helminthological examination of the Adriatic fishes, in general, are similar to those recovered by previous authors in the Adriatic or Mediterranean. The major part of the recovered worms are widely distributed parasites of the fishes of the Adriatic, the Mediterranean and other seas.

Collarinema triglae gen. et sp. n. represents a new genus and species for science. The occurrence of the helminth belonging to the subfamily *Metabronematinae* is the first record for the Adriatic fauna.

Proleptus obsturus, Ascarophis sp., *Capillariidae* gen. et sp. and *Camallanus megalocephalus* are new helminths occurring in the Adriatic fishes.

A relatively smaller number of the recovered proboscidean worms. Generally, they are common species in the Adriatic fishes.

Table I.

LIST OF THE NEMATODES AND THEIR HOSTS

Contracaecum clavatum larvae:	*Merluccius merluccius*
	Zeus faber
	Alosa fallax nilotica
	Citharus linguatula
	Gobius niger jozo
	Lophius piscatorius
	Mullus barbatus
Contracaecum fabri larvae:	*Serranus cabrilla*
	Serranus scriba
	Mullus barbatus
	Mullus surmuletus
	Gadus minutus capelanus
	Sardina piechardus sardina
	Citharus liguatula

	Crenilabrus cinereus
	Crenilabrus tinca
	Trachinus draco
	Lophius piscatorius
	Maena maena
	Maena cryselis
	Uranoscopus scaber
	Bothus podas
	Anguilla anguilla
	Echelus myrus
	Ophidion barbatum
	Gobius geniporus
	Gobius niger jozo
Contracaecum aduncum larvae:	*Boops boops*
	Belone belone
	Scomber scombrus
	Gobius cruentatus
	Maena maena
	Sardina pichardus sardina
	Maena smaris
	Trachinus draco
	Blennius ocellaris
	Onos tricirratus
	Sphyraena sphyraena
	Mugil capito
	Pagellus erythrinus
	Gobius exanthematicus
Contracaecum aduncum larvae:	*Diplodus annularis*
	Diplodus vulgaris
	Coris juris
	Zeus faber
Anisakis sp. larvae:	*Scomber japonicus colias*
	Trachurus mediterraneus
	Merluccius merluccius
Contracaecum filiforme:	*Uranoscopus scaber*
Proleptus robustus:	*Raja miraletus*
Proleptus obtusus:	*Scyliorhinus caniculus*
— Ascarophis sp.:	*Scorpaena notata*
— Collarinema triglae gen. et sp. nov.	*Trigla lyra*
Philometra globiceps:	*Uranoscopus scaber*
Philometra sp.:	*Scomber scombrus*
Cucullanus longicollis:	*Mullus barbatus*
Cucullanus praecinctus:	*Ariosoma mystax*
	Ariosoma balearicum
Cucullanus micropapillatus:	*Crenilabrus cinereus*
	Labrus merula
— Camallanus megalocephalus	*Auxis thazard*
— Capillariidae gen. et spec.:	*Onos tricirratus*

LIST OF THE ACANTHOCEPHALA AND THEIR HOSTS.

Acanthocephaloides incrassatus	*Gobius exanthematicus*
	Ophidion barbatum
	Gobius geniporus
Acanthocephaloides propinguus	*Maena smaris*
— *Echinorhynchus gadi*	*Anguilla anguilla*
Telosentis molini	*Oblata melanura*
	Diplodus annularis
Bolbosoma vasculosa (larva)	*Auxis thazard*

— indicate a new helminth for the Adriatic

Table II.

LIST OF THE INFECTED FISHES AND THEIR NEMATODES

Scyliorchinus caniculus	*Proleptus obtusus*
Raja miraletus	* *Proleptus robustus*
Sardina piechardus sardina	* *Contracaecum fabri*
	Contracaecum aduncum
Alosa fallax nilotica	* *Contracaecum aduncum*
Anguilla anguilla	*Contracaecum clavatum*
Ariosoma balearicum	* *Contracaecum fabri*
Ariosoma mystax	*Cucullanus praecinctus*
Echelus myrus	*Cucullanus praecinctus*
Gadus minutus capelanus	* *Contracaecum fabri*
Merluccius merluccius	* *Contracaecum fabri*
	* *Contracaecum clavatum*
Onos tricirratus	*Anisakis sp.*
	* *Capillariidae gen. et sp.*
Zeus faber	* *Contracaecum aduncum*
Sphyraena sphyraena	*Contracaecum clavatum*
Mugil capito	*Contracaecum aduncum*
Serranus scriba	* *Contracaecum fabri*
Serranus cabrilla	*Contracaecum fabri*
Pagellus erythrinus	*Contracaecum fabri*
Diplodus annularis	* *Contracaecum aduncum*
Diplodus vulgaris	*Contracaecum aduncum*
Boops boops	* *Contracaecum aduncum*
Maena maena	*Contracaecum aduncum*
	Contracaecum fabri
	Contracaecum aduncum
Maena cryselis	*Contracaecum fabri*
Maena smaris	*Contracaecum aduncum*
Mullus barbatus	*Contracaecum clavatum*
	Contracaecum fabri
	Cucullanus longicollis
Mullus surmuletus	*Contracaecum fabri*

Trachurus mediterraneus	*Anisakis sp.*
Crenilabrus cinereus	* *Contracaecum fabri*
	Cucullanus micropapillatus
Crenilabrus tinca	* *Contracaecum fabri*
Labrus merula	*Cucullanus micropapillatus*
Coris juris	* *Contracaecum aduncum*
Trachinus draco	* *Contracaecum aduncum*
	* *Contracaecum fabri*
Uranoscopus scaber	*Contracaecum fabri*
	Contracaecum filiforme
	Philometra globiceps
Scomber scombrus	*Contracaecum aduncum*
	Philometra sp.
Scomber japonicus colias	*Anisakis sp.*
Auxis thazard	*Camallanus megalocephalus*
Blennius ocellaris	* *Contracaecum aduncum*
Ophidion barbatum	*Contracaecum fabri*
Gobius geniporus	* *Contracaecum fabri*
Gobius niger jozo	* *Contracaecum fabri*
	* *Contracaecum clavatum*
Gobius cruentatus	* *Contracaecum aduncum*
Gobius exanthematicus	* *Contracaecum aduncum*
Scorpaena notata	* *Ascarophis sp.*
Balone belone	* *Contracaecum aduncum*
Trigla lyra	* *Collarinema triglae gen. et sp. n.*
Citharus linguatula	* *Contracaecum fabri*
	* *Contracaecum clavatum*
Bothus podas	* *Contracaecum fabri*
Lophius piscatorius	*Contracaecum clavatum*
	* *Contracaecum fabri*

LIST OF THE INFECTED FISHES AND THEIR ACANTHOCEPHALA

Anguilla anguilla	* *Echinorhynchus gadi*
Diplodus annularis	* *Telosentis molini*
Maena smaris	* *Acanthocephaloides propinguus*
Auxis thazard	* *Bolbosoma vasculosa (larva)*
Ophidion barbatum	* *Acanthocephaloides incrassatus*
Gobius geniporus	* *Acanthocephaloides incrassatus*
Gobius exanthematicus	* *Acanthocephaloides incrassatus*

* indicates a new parasite for the host

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PARASITSKI HELMINTI U JADRANSKIM RIBAMA

III DIO

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KRATAK SADRŽAJ

Općenito, nematode i acanthocephalni crvi nađeni za vrijeme ispitivanja helminta riba Jadrana slični su onim koje su raniji autori našli u Jadranskom i Sredozemnom moru. Većina njih su helminti riba koji su široko rasprostranjeni u Jadranskom i drugim morima.

Collarinema triglae gen. et sp. nov. je novi helmint zabilježen u nauci. *Proloptus obstusus, Ascarophis sp., Capillariidae* gen. et sp., *Camallanus megalocephala* su novi helminti otkriveni u ribama Jadranskog mora.

Broj nađenih acanthocephala je relativno mali. Obično oni su česti helminti u parazitskoj fauni Jadrana.