Acta Adriat., 24 (1/2) : 179—191 (1983) YU ISSN: 0001—5113
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A CONTRIBUTION TO THE KNOWLEDGE OF THE HELMINTH FAUNA OF FISHES FROM THE COASTAL WATERS OF THE MID-DALMATIAN INSULAR AREA OF THE ADRIATIC SEA

PRILOG POZNAVANJU HELMINTOFAUNE RIBA U PRIOBALNIM VODAMA SREDNJODALMATINSKIH OTOKA JADRANSKOG MORA

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A total of 161 fish specimens representing 24 fish species and subspecies from the coastal area of the insular middle Dalmatia were examined and 10 parasite endohelminth species, belonging to Nematoda and Trematoda, recorded. Of the fish examined, 70.8%, that is 26.1% of individuals, carried endohelminths. The most common endohelminths were *Contracaecum fabri* and *C. aduncum* which occurred in the 45.2% of the infected fish.

INTRODUCTION

Helminith parasitofauna of the Adriatic fishes is little know (Babić, 1665, 1971, 1972 /1974/) despite the fact that a geat number of parasitological investigations of the Adriatic fishes have been carried out from different aspects ever since the beginning of the preceding century. These investigations, however, have mainly dealt with the parasitofauna of fishes of the Split, Trieste and south Adriatic areas thus that no work has been done in a large part of the Adriatic, including the area among the mid-Dalmatian islands. The present study, which brings out the preliminary investigations of helminith parasitofauna of fishes from the mid-Dalmatian insular area, has been undertaken to increase our knowledge of these problems in this area and the Adriatic as a whole.

BREEF LITERATURE REVIEW

The investigations of the helminith parasitofauna of the Adriatic fishes can be traced back to as early as the beginning of the preceding century (Rudolphi, 1819). They were intensified during the second half of that century and at the beginning of our century when a larger number of foregin and our workers dealt with this problem (Diesing, 1851; Molin, 1858, 1859,

1861; Schneider, 1866; Monticelli, 1892, 1905; Looss, 1894, 1901; Lühe, 1900 and some others). Particularly numerous were the papers by Stossich (1882, 1887, 1888, 1890, 1890a, 1896, 1898, 1899, 1901, 1904 and others).

However, all these papers approach the helminith parasitofauna of fishes from the biosystematic (taxonomic) point of view. Their bilogoy and developpmental cycle were, however, studied only to a certain extent. Not only that a large number of species were for the first time recorded from the Adriatic (Mediterranean) but also many of the species recorded had not been ever earlier rcorded and were for the first time described (Rudolphi, Stossich, Molin and others).

Törnquist (1931) made a significant contribution to the knowledge of the helminthfauna of the Adriatic fishes. He worked out the Cucullanidae and Camallanidae families. Later works by Janiszewska (1949, 1953), R. Mužinić, (1958), Nikolaeva and Najdenova (1963, 1964), Nikolaeva (1964, 1964a, 1964b, 1968, 1969, 1970), Najdenova and Nikolaeva (1968), Prost (1967), Sey, (1968, 1970,1970a, 1970b), Jardas (1972), Radujković (1980, 1982), Radujković and Petrović (1982) also increased our knowledge of helminth parasitofauna of the Adriatic fishes.

These papers dealt with the detailed descriptions and morphometric characteristics of individual endohelmint species, their developmental cycles, intensity and extent of infection, their hosts, some of the physiological changes of hosts (condition factor) due to the parasite burden etc. These aspects have been studied in the middle and southern Adriatic.

In addition to the records of several new helminth species in the Adriatic fishes (e. g. Trematoda: *Deropristis inflata, Hemiurus lühei, Mesometra orbicularis* (Rud.) *minutacualata, M. brachycoelia* (Lühe) *minimispina,* Nematoda: *Proleptus optusus, Ascaropsis* sp. *Capillariidae* gen. and sp.,*Camallanus megalocephala* and Acanthocephala *Echinorynchus gadi* and similar) (Sey, 1968, 1970), the record of *Collarinema triglae* from the stomach of *Trigla lyra* fish from the vicinty of Split was reported, as well. This was the new genus and species for science (Sey, 1968, 1970b). Large number of new hosts for many of the endohelminth species were also recorded.

MATERIAL AND METHODS

The investigations were carried out at eight locations in the coastal areas of the mid-Dalmatinan islands and at a travling ground between Čiovo and Šolta islands (Fig. 1). Material was collected during August 1982. In the coastal area, fish were caught by trammel nets at 2 to 25 m depths (mainly between 7 and 12 m) and between Šolta and Čiovo islands by bottom trawl at about 60 m depth.

A total of 161 fishes were analysed, which included 24 bottom and pelagic species. Eight individuals of eachs of the following species were analysed: *Serranus hepatus, Mullus barbatus, Spicara maena flexuosa* and *Citharus macrolepidotus* from trawl catches, then *Scorpaena porcus* (35 individuals), *Scorpaena scrofa* (21 individuals), *Symphodus tinca* (13 individuals), *Uranoscopus scaber* (12 individuals), *Sciaena umbra* (8 individuals), *Scorpaena notata* (7

individuals), *Diplodus annularis* and *D. vulgaris* (6 individuals each) *Symphodus mediterraneus* and *Blennius gattorugine* (3 individuals each), *Monochirus hispidus, Zeus faber, Serranus scriba, Labrus merula* and *Torpedo marmorata* (2 individuals each) and 1 individual of *Chromis chromis, Mullus surmuletus, Coris julis, Sparus aurata* and *Spicara maena maena* from trammel catches. The list of analysed fish species with basic morphometric characteristics (length, weight) and the number of analysed individuals by studied locations of the study area are given in Table 1.

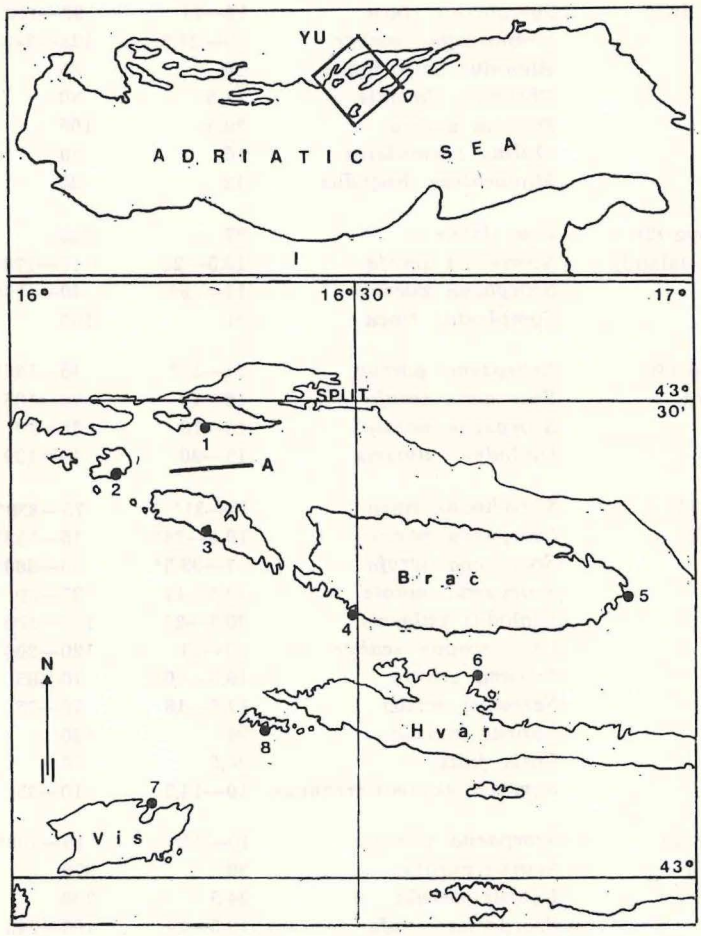

Fig. 1. The area of material collecting: 1. Movarštica Cove, 2. Solinska Cove, 3. Tatinja Cove, 4. Blaca Cove, 5. Cape Planik, 6. Cape Planirat, 7. Host Island, 8. St. Klement Island, A — trawl position

Conventional helminthological techniques were used in the examination of the fishes for endohelminth parasites. Intestines, gall-bladder and internal body cavity were separately examined. Separated helminths were first put into

Table 1. Review of examined fish species by location in the insular middle Dalmatia (August, 1982)

Location	Fish species	Biometric data		Number of examined fish
		Length (cm) from — to	Weight (g) from — to	
Movarštica Cove (1)	*Scorpaena scrofa*	26—28	270—440	2
(Čiovo Island)	*Symphodus tinca*	19—21	90—110	3
	Uranoscopus scaber	19—24,5	125—240	2
	Blennius gattorugine	20	95	1
	Chromis chromis	11,5	30	1
	Sciaena umbra	20,5	105	1
	Mullus surmuletus	16	50	1
	Monochirus hispidus	12	25	1
Solinska Cove (2)	*Zeus faber*	27	245	1
(V. Drvenik Island)	*Scorpaena scrofa*	19,5—22	115—170	3
	Scorpaena porcus	14—19*	40—155*	10
	Symphodus tinca	21	100	1
Tatinja Cove (3)	*Scorpaena porcus*	14—19*	45—135*	7
(Šolta Island)	*Scorpaena scrofa*	16—19	70—105	2
	Scorpaena notata	13—15	35—50	4
	Diplodus vulgaris	15—20	45—130	2
Blaca Cove (4)	*Symphodus tinca*	18—31*	75—330*	6
(Brač Island)	*Scorpaena porcus*	10,5—24*	15—255*	6
	Scorpaena scrofa	17—35,5*	80—660*	6
	Scorpaena notata	12,5—17	35—80	3
	Diplodus vulgaris	20,5—23	125—180	2
	Uranoscopus scaber	20—23	120—200	3
	Sciaena umbra	19,5—20,5	70—85	2
	Serranus scriba	17,5—18	70—75	2
	Labrus merula	24	180	1
	Coris julis	20,5	70	1
	Symphodus mediterraneus	10—14,5	10—35	3
Cape Planik (5)	*Scorpaena porcus*	10—22*	15—200*	6
(Brač Island)	*Sparus aurata*	39	970	1
	Labrus merula	24,5	200	1
	Scorpaena scrofa	18,5—24	100—245	3
	Uranoscopus scaber	12,5—22	20—165	5
	Spicera maena maena	19	75	1
	Blennius gattorugine	18,5	65	1
Cape Planirat (6)	*Sciaena umbra*	28—42,5	250—1.015	3
(Hvar Island)	*Uranoscopus scaber*	18—22	60—80	2
	Torpedo marmorata	18—24	120—295	2
	Zeus faber	19,5	100	1

Host Island (7)	*Scorpaena scrofa*	19—26,5	110—325	2
(near Vis Island)	*Symphodus tinca*	19—21	95—105	2
	Diplodus annularis	13,5—14,5	50—55	3
	Diplodus vulgaris	16,5	65	1
	Blennius gattorugine	20,5	125	1
	Monochirus hispidus	13,5	35	1
	Scorpaena porcus	13—23,5*	30—265*	1
Pod Lozje Cove (8)	*Sciaena umbra*	19,5—27,5	95—260	2
(St. Klement Island)	*Scorpaena scrofa*	20—26	115—285	3
	Diplodus annularis	13,5—15,5	35—55	3
	Diplodus vulgaris	18	80	1
	Symphodus tinca	21	125	1

* Length and weight range from whole cacth

the sea water and afterwards, when they died, preserved in 2% formol or Barbagall's solution for later determination (Skrjabin, 1955, 1955a, 1958; Skrjabin *et al.*, 1951; Ivaškin and Hromova, 1976 and some others).

A part of the collected material is kept in the Institute of Oceanography and Fisheries, Split collection and a part at the Museum in Bitola (Zavod za zaštitu spomenika kulture, prirodnih retkosti i muzej).

RESULTS AND DISCUSSION

A total of 10 endohelminth parasites belonging to Nematoda and Trematoda were recovered from the larger number of analysed fish species and subspecies.

The following endohelminths and their hosts were recorded:

Class NEMATODA Rudolphi, 1808

Fam. Anisakidae Skrjabin et Karokhin, 1945

Anisakis sp. (larvae)

Larval stage of this species was found in *Serranus hepatus* taken between Šolta and Čiovo. This fish is a new host of this nematode in the mid-Dalmatian area.

Larval stages of this species were earlier found in the Adriatic fishes by Janiszewska (1949), Nikolaeva and Najdenova (1964) and Sey (1970a).

Adults of this nematode are likely to be the parasites of some marine mammals (dolphins) which are definitive hosts (Sey, 1970a).

Contracaecum fabri (Rudolphi, 1819) Baylis, 1923 (larvae)

This nematode was present in six fish species from the coastal area: *Spicara maena flexuosa, Scorpaena porcus, S. scrofa, Symphodus tinca, S. medi-*

terraneus and *Chromis shromis*. All these fish species are new hosts of the larval stages of this nematode in the mid-Dalmatian area.

Some earlier workers also described this nemetode larval stages found in the Adriatic fishes (Stossich, 1882, 1896; Janiszewska, 1949; Nikolaeva, and Najdenova, 1964; Najdenova and Nikolaeva, 1968: Sey, 1970a).

This is very common parasite of the coastal area fish species not only in the Adriatic but in the Mediterranean as vell. Sey (1970a) found this nematode in as many as 25 fish species from the coastal area adjacent to Split.

Contracaecum aduncum (Rudolphi, 1802) Baylis, 1920 (larvae)

This nematode vas found in fishes *Citharus macrolepidotus, Zeus faber, Scorpaena porcus, Diplodus annularis* and *D. vulgaris*. Fishes *C. macrolepidotus* and *S. porcus* are new hosts of the larval stages of this nematode in the mid-Dalmatian area.

Larvae of this nematode, common and widely distributed in the Mediterranean (Sey, 1970a), were reported by earlier workers on the Adriatic fishes (Stossich, 1882; Nikolaeva and Najdenova, 1964; Najdenova and Nikolaeva, 1968; Janiszewska, 1949; Sey, 1970a).

Najdenova and Nikolaeva (1968) reported, for the Mediterranean in general, a significant difference in the intensity of infection between bottom fishes, in which it was insignificant, and pelagic fishes, where it was much higher and adult specimens were also recorded. This, after these authors, was a proof of the connexion between the developmental cycle of this nematode and plankton organisms.

Contracaecum filiforme (Stossich, 1904)

This nematode was recorded from the gall-bladder of *Uranoscopus scaber* fish. Earlier authors reported the same records.

This specific nematode was for the first time reported by Stossich (1904) in species *Uranoscopus scaber* from Trieste area. Sey (1970a) reported its frequent occurrence in the gall-bladder of *U. scaber* from Split area. Najdenova and Nikolaeva (1968) found it in the same fish from the Adriatic.

Contracaecum clavatum (Rudolphi, 1809) (larvae)

Larvae of this nematode were present in *Mullus barbatus* from the location between Čiovo and Šolta.

Sey (1970a) found this nematode larvae in eight species of fish from Split area. Stossich (1882); Looss (1901) and Janiszewska (1949) also reported its occurrence in the Adriatic.

Fam. Cucullanidae Cobbold, 1864

Cucullanus longicolis (Stossich, 1899)

Larval and adult stages of this species were found in *Mullus barbatus* from the insular mid-Dalmatian area.

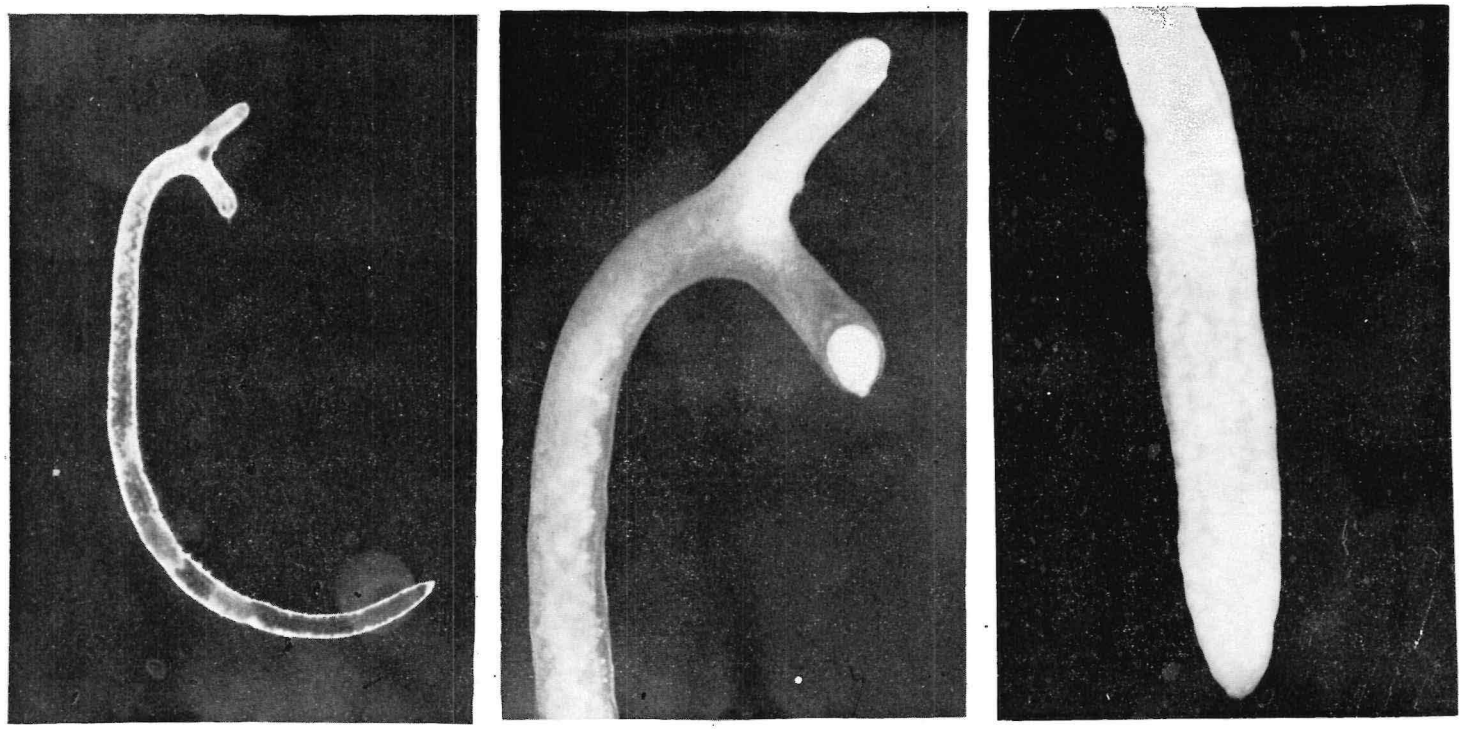

Fig. 2. *Opecoeloides furcatus* (Bremser, 1819) Odhner, 1928: habitus, anterior and posterior part

(Foto: M. Alajbeg)

It was earlier established in the Adriatic fishes by Stossich (1894), Janiszewska (1949), Nikolaeva and Najdenova (1964), Najdenova and Nikolaeva (1968) and Sey (1970a).

Cucullanus sp. (larvae)

Larvae of this nematode were discovered from several fisch species from the study area *(Sciaena umbra, Diplodus vulgaris, Coris julis).* Since larvae were too small they could not be determined at taxonomic level lower than genus. This larvae were very similar to the larvae of the preceding species, and possible belong to the some species, but to be sure we give it separately. All fish species in which this parasite was found are new hosts in the mid-Dalmatian area.

Class TREMATODA Rudolphi, 1808

Fam. Acanthostomatidae Poche, 1925

Anisocoelium capitellatum (Rudolphi, 1819)

This trematode species was found always in the gall-bladder of fishes *Uranoscopus scaber* and *Mullus surmuletus.* The latter fish is a new host in the mid-Dalmatian area.

Earlier authors also reported this species in the Adriatic fishes (Rudolphi, 1819; Lühe, 1900; Janiszewska, 1953; Sey, 1968).

Fam. Opecoelidae Ozaki, 1925

Opecoeloides furcatus (Bremser, 1919) Odhner, 1928 (Fig. 2)

This species was present in *Serranus hepatus* from the location between Šolta and Čiovo. This is a new host for science.

This trematode was first described by Bremser for the Mediterranean, and by Rudolphi (1819) and Lühe (1900) for the Adriatic. Janiszewska (1953) and Sey (1968) found it in the intestines of *Mullus barbatus* from the Split area.

Fam. Monorchidae Odher, 1911

Monorchis monorchis (Stossich, 1890)

One specimen of this species was found in the intestine of *Blennius gattorugine* from the area of Brač (Planik Cape).

Stossich (1890) described this trematode for the first time in the Adriatic. Its occurrence in the central intestine part of *Blennius gattorugine* and *Diplodus annularis* from the area of Split was later reported by Sey (1968).

The review of the found nematode and trematode species, their hosts and intensity and extent of infection on the basis of the number of analysed individuals by locations are shown in Table 2. The Table also shows that 17 fish species were infected by endohelminths (70.8%), predominantly by nematodes (14 species) and somewhat less by trematodes (4 species). Representatives of both endohelminth groups were recorded only from *Uranoscopus scaber* and *Serranus hepatus*. It is apparent that the number of endohelminths in individual infected host was low, ranging from 1 to maximum 5 specimens. Thus low intensity of infection may, on the one hand, be the result of the actual situation and, on the other, due to insufficiently studied problem. The latter explanation is more probable.

Of the total of 161 nalysed fish individuales, 42 were infected, what makes 26.1%.

The review of fish species and their parasites on the basis of our analyses are shown in Table 3.

Larval stages of Nematode were prevalent in infected fishes. They were predominantly found in the intestines and body cavity. *Contracaecum fabri* (larvae) and *C. aduncum* (larvae) were most frequently occurring Nematoda. Both this Nematoda were recorded from 45.2% of infected fish individuals, that is from 10 species (41.7%). This two nematode species, or in general *Contracaecum* genus, were reported as the most frequent parasites of the Adriatic fishes (and wider) by other authors, as well (Janiszewska and Najdenova, 1964; Najdenova and Nikolaeva, 1968; Sey, 1970a).

Trematoda were found in olny few fish species. The most infected host was *Uranoscopus scaber* species. Trematode *Anisocoelium capitellatum* was regularly found in the gall-bladder of this fish occurring in large numbers. Ecology of hosts affects the degree of parasitism.

Acanthocephala and Cestoda were not recorded from the analysed material. This, however, does not mean that they were absent but that too small number of hosts, in relation to the intensity of their infection, were studied.

Some of the fish species were established as new hosts of individual endohelminths in the middle Adriatic area, and the species *Serranus hepatus* is a new host of treamtode *Opecoeloides furcatus* for science.

CONCLUSION

Ten endohelminths of Nematoda and Trematoda classes were established in analysed fishes from the coastal area of insular middle Dalmatia. The following nematodes were found: *Anisakis* sp. (larvae), *Contracaecum fabri* (larvae), *C. aduncum* (larvae), *C. filiforme, C. clavatum* (larvae), *Cucullanus longicollis* and *C.* sp. (larvae). The following trematodes were recorded: *Anisocoelium capitellatum, Opecoeloides furcatus* and *Monorchis monorchis,*

Extent and intensity of infection of analysed fish species by endohelminths was relatively low. Endohelminths were found in 17 fish species (70.8%) of 42 nalysed species, or in 26.1% of analysed individuals. However, the number of individual endohelminths in individuals of fish did not exceed five. This shows low degree of infection.

Nematodes were the most common fish parasites in the study area, particularly *Contracaecum aduncum* (larvae) and *C. fabri* (larvae), which were found in 45.2% of infected fish individuals.

Table 2. Endohelminth species, their hosts and intensity and extent of infection

Helminth species	Hosts	Number of examined specimens	Number of infected specimens	Intensity	Location
NEMATODA					
Contracaecum fabri (larvae)	* *Spicara maena flexuosa*	8	3	1—3	Šolta—Čiovo
	* *Scorpaena scrofa*	2	1	1	Movarštica (1)
	* *Chromis chromis*	1	1	1	Movarštica (1)
	* *Ccorpaena scrofa*	3	1	1	Solinska Cove (2)
	* *Scorpaena porcus*	10	1	1	Solinska Cove (2)
	* *Symphodus mediterraneus*	3	1	1	Blaca Cove (4)
	* *Symphodus tinca*	3	2	2	Movarštica (1)
Contracaecum aduncum (larvae)	* *Citharus macrolepidotus*	8	4	1—2	Šolta—Čiovo
	Zeus faber	1	1	1	Solinska Cove (2)
	* *Scorpaena porcus*	7	1	1	Tatinja Cove (3)
	Zeus faber	1	1	1	Cape Planirat (6)
	Diplodus annularis	3	1	1	Host Island (7)
	Diplodus vulgaris	1	1	1	St. Klement Island (8)
Contracaecum clavatum (larvae)	*Mullus barbatus*	8	2	1	Šolta—Čiovo
Contraceacum filiforme	*Uranoscopus scaber*	2	1	1	Movarštica (1)
	Uranoscopus scaber	3	1	1	Blaca Cove (4)
	Uranoscopus scaber	2	1	1	Cape Planirat (6)
Anisakis sp. (larvae)	* *Serranus hepatus*	2	1	1	Movarštica (1)
Cucullanus longicollis (larvae + adult)	*Mullus barbatus*	8	2	1—2	Šolta—Čiovo
Cucullanus sp. (larvae)	* *Sciaena umbra*	1	1	1	Movarštica (1)
	* *Diplodus vulgaris*	1	1	1	Tatinja Cove (3)
	* *Coris julis*	1	1	1	Blaca Cove (4)
TREMATODA					
Opecoeloides furcatus	** *Serranus hepatus*	8	1	2	Šolta—Čiovo
Anisocoelium capitellatum	*Uranoscopus scaber*	2	2	2—5	Movarštica (1)
	Mullus surmuletus	1	1	1	Movarštica (1)
	Uranoscopus scaber	3	1	1	Blaca Cove (4)
	Uranoscopus scaber	5	5	1—4	Cape Planik (5)
	Uranoscopus scaber	2	1	1	Cape Planirat (6)
Monorchis monorchis	*Blennius gattorugine*	1	1	1	Cape Planik (5)

* New hosts for the area of middle Adriatic
** New host for science

Table 3. List of infected fish species and their parasites

Fish species	Endohelminths established
Scorpaena porcus	*Contracaecum fabri* (larvae)
	Contracaecum aduncum (larvae)
Scorpaena scrofa	*Contracaecum fabri* (larvae)
Symphodus tinca	*Contracaecum fabri* (larvae)
Symphodus mediterraneus	*Contracaecum fabri* (larvae)
Uranoscopus scaber	*Contracaecum filiforme*
	Anisocoelium capitellatum
Sciaena umbra	*Cucullanus* sp. (larvae)
Serranus hepatus	*Anisakis* sp. (larvae)
	Opecoeloides furcatus
Mullus barbatus	*Contracaecum clavatum* (larvae)
	Cucullanus longicollis (larvae + adult)
Mullus surmuletus	*Anisocoelium capitellatum*
Spicera maena flexuosa	*Contracaecum fabri* (larvae)
Citharus macrolepidotus	*Contracaecum aduncum* (larvae)
Diplodus annularis	*Contracaecum aduncum* (larvae)
Diplodus vulgaris	*Contracaecum aduncum* (larvae)
	Cucullanus sp. (larvae)
Blennius gattorugine	*Monorchis monorchis*
Zeus faber	*Contracaecum aduncum* (larvae)
Chromis chromis	*Contracaecum fabri* (larvae)
Coris julis	*Cucullanus* sp. (larvae)

REFERENCES

Babić, I. 1965. Pregled razvoja jugoslavenske medicinske (humano-medicinske i veterinarske) parazitologije do godine 1966. i njeni daljnji zadaci. JAZU, Zagreb, 814 p.

Babić, I. 1971. Pregled razvoja jugoslavenske medicinske (humano-medicinske i veterinarske) parazitologije od 1961. do 1965. godine. JAZU, Zagreb, 312 p.

Babić, I. 1972. (1974). Pregled jugoslavenske medicinske (humano-medicinske i veterinarske) parazitologije od 1966. do 1970. godine. JAZU, Zagreb, 384 p.

Diesing, C. M. 1851. Systema helminthum, 2. Vindobonea.

Ivaškin, V. M. i Hromova, L. A. 1976. Osnovi nematodologii, 27. Kukulanati i Gnatostomati životnih i čeloveka i vizivaemie imi zabolevanija. AN SSSR, Moskva, 436 p.

Janiszewska, J. 1949. Some Fish Nematodes from the Adriatic Sea. Zool. Polon., 5 (2): 7—30.

Janiszewska, J. 1953. Some Adriatic Sea Fish Trematodes. Zool. Polon., 6 (1): 20—48.

Jardas, I. 1972. Prilog poznavanju ekologije nekih jadranskih hrskavičnjača *(Chondrichthyes)* s posebnim osvrtom na ishranu. Acta Adriat., 14 (7): 60 p.

Jardas, I. 1979. Morfološke, biološke i ekološke karakteristike populacije mačke bljedice, *Scyliorhinus canicula* (Linnaeus, 1758), u Jadranskom moru. Izvješća-Reports Rib.-biol. eksp. »Hvar« 1948—1949, 4 (2—3): 104 p.

Looss, A. 1894. Die Distomen unserer Fische und Frösche. Bibl. Zool., Stuttgart, 16.

Looss, A. 1901. Über einige Distomen der Labriden des Triester Hafens. Centralbl. Bakt. Parasitenk. Infekt., Jena., 29: 437—439.

Lühe, M. 1900. Über Distomen aus der Gallenblase von Mittelmeerfische. Zool. Anz., 23: 504—509.

Molin, R. 1858. Prospectum helminthum quae in prodromo faunae helminthologicae venetiae continentur. Sitzunsber. Kais. Akad. Wiss., Math.-Natur. Kl., 30: 127—158.

Molin, R. 1859. Prospectum helminthum quae in parte seconda prodromi faunae helminthologicae venetiae continentur. Sitzungsber. Kais. Akad. Wiss., Math.-Natur. Kl., 33: 287—302.

Molin, R. 1861. Prodromus faunae helminthologicae venetiae etc. Denkschr. Kais. Akad. Wiss., Wien, 19.

Monticelli, F. S. 1892. Die Monostomum del *Box salpa*. Atti Acad. Sci. Torino, p. 271.

Monticelli, F. S. 1905. Sul ciclo biologico dell'*Ichtyonema globiceps* (Rud.). Comp. rend. 3 Congr. Inter. Zool., Berne, 1904.

Mužinić, R. 1958. Preliminarna opažanja o broju nematoda kod šnjura, *Trachurus trachurus* L. Bilješke-Notes Inst. oceanogr. rib., Split, (13).

Najdenova, N. N. i Nikolaeva, V. M. 1968. K faune nematod nekotorih donnih rib Sredizemnomorskogo bassejna. Biol. morja, Kiev, 14: 63—82.

Nikolaeva, V. M. 1964. *Didymozoon sphyraenae* Taschenberg, 1979 — parazit sfiren Adriatičeskogo morja. Tr. Sevast. biol. st., 15: 363—370.

Nikolaeva, V. M. 1964a. Metacerkarii trematod semejstva Didymozoidae (Monticelli, 1888) Poche, 1907 v ribah Sredizemnomorskogo bassejna. Probl. parazitol., Kiev, 3.

Nikolaeva, V. M. 1964b. Predvariteljnoe soobščenie o parazitofaune rib vastočnoj časti Sredizemnogo morja. Tr. Sevast. biol. st., 15: 348—368.

Nikolaeva, V. M. 1966. Trematodi podotrjada Hemiurata, invazirujuščie rib Sredizemnomorskogo bassejna. Gelmintofauna životnih južnih morej, »Naukova dumka«, Kiev, p. 52—66.

Nikolaeva, V. M. 1968. K obnaruženiju ličinok Accacoeliidae u rib i bespozvonočnih. Biol. morja, Kiev, 14: 83—89.

Nikolaeva, V. M. 1970. K helmintofaune rib Sredizemnogo morja. Eksp. isled. v Sredizemn. morja v avg.-sept. 1969. »Naukova dumka«, Kiev, p. 38—48.

Nikolaeva, V. M. i Najdenova, N. N. 1963. Nematodi pelagičeskih i pribrežnih rib Sredizemnomorskogo bassejna. Probl. parazitol., Kiev, p. 469—470.

Nikolaeva, V. M. i Najdenova, N. N. 1964. Nematodi pelagičeskih i pridonno-pelagičeskih rib morej Sredizemnomorskogo bassejna. Tr. Sevast. biol. st., 17: 125—158.

Prost, M. 1967. Comparison of Monogenoidea fauna of some species of fishes from the Mediterranean, Adriatic and Baltic seas. Acta Parasitol. Polon. 14 (32): 309—312.

Radujković, B. 1980. Helmintofauna cipola (Mugilidae, Pisces) sa područja Bokokotorskog zaliva. Kratki sadržaji referata Simp. »Aktualni problemi ihtiologije i ribarstva«, Plitvice.

Radujković, B. M. 1982. Uticaj parazita na kondicioni faktor cipola (Pisces: Mugilidae) iz Bokokotorskog zaliva. Izvodi saopštenja VI Kongr. biol. Jugoslavie, Novi Sad, A 1—13.

Radujković, B. i Petrović, Z. 1982. Problem nematoda — paratita riba južnog Jadrana. Sinopsisi radova Nauč. skupa »Crnogorsko primorje — mogućnosti, eksploatacija i zaštita«, Kotor.

Rudolphi, C. A. 1819. Entozoorum synopsis cui accedunt mantissa duplex et indices locupletissimi, 10. Berolini.

Schneider, A. 1866. Monographie der Nematoden. Berlin.

Sey, O. 1968. Parastic Helminths occurring in Adriatic fishes. 1. (Flukes). Acta Adriat., 13 (4): 15 p.

Sey, O. 1970. Parasitic Helminths occurring in Adriatic fishes. 2. (Flukes and Tapeworms). Acta Adriat., 13 (6): 16 p.

Sey, O. 1970a. Parasitic Helminths occurring in Adriatic fishes. 3. (Nematodes, Acanthocephala). Acta Adriat., 13 (7): 16 p.

Sey, O. 1970b. *Collarinema triglae* gen. et sp. nov. (Nematoda: Rhabdochonidae) from the Red Gurnard (*Trigla lyra* L.) in the Adriatic Sea, Yugoslavia. Acta Zool. Hung., 16 (1/2): 209—214.

Skrjabin, K. I. 1955. Trematodi životnih i čeloveka. 10. AN SSSR, Moskva.

Skrjabin, K. I. 1955a. Trematodi životnih i čeloveka. 11. AN SSSR, Moskva, 751 p.

Skrjabin, K. I. 1958. Trematodi životnih i čeloveka. 15. AN SSSR, Moskva, 820 p.

Skrjabin, K. I., Sihobalova, N. P. i Mozgovoi, A. A. 1951. Opredelitelj parazitičeskih nematod. 2 — Oksiurati i Askaridati. AN SSSR, Moskva.

Stossich, M. 1882. Prospetto della Fauna del mare Adriatico. 4. — Vermes. Boll. Soc. adriat. sci. nat. Trieste, 7 (1): 79—171.

Stossich, M. 1887. Brani di Elmintologia tergestina. Ser. 3, 4. Boll. Soc. adriat. sci. nat. Trieste, (9): 1—7.

Stossich, M. 1888. Appendice al mio lavoro »I Distomi dei pesci marini e d'acqua dolce«. Progr. Gin. comm. super. Trieste, 95—105.

Stossich, M. 1890. Brani di Elmintologia tergestina. Ser. 7. Boll. Soc. adriat. sci. nat. Trieste, (12): 39—47.

Stossich, M. 1890a. Elminti veneti raccolti dal Dr. Alessandro Conte de Ninni. Boll. Soc. adriat. sci. nat. Trieste, 62—73.

Stossich, M. 1896. I Distomi dei pesci marini e d'acqua dolce. Lavoro monografico. Progr. Gin. comm. super. Trieste 1885—1886, p. 1—66.

Stossich, M. 1896a. Elminti trovati in un *Orthagoriscus mola*. Boll. Soc. adriat. sci. nat. Trieste, (17): 189—191.

Stossich, M. 1898. Saggio di una Fauna elmintologica di Trieste e provincie contermini. Progr. Civ. Scuola R. Super. Trieste, 1898. p. 162.

Stossich, M. 1899. Appunti di Elmintologia. Boll. Soc. adriat. sci. nat. Trieste, (19): 1—6.

Stossich, M. 1901. Osservazioni elmintologiche. Boll. Soc. adriat. sci. nat. Trieste, 20: 86—104.

Stossich, M. 1904. Note distomologische. Boll. Soc. adriat. sci. nat. Trieste, 19 (6): p. 13.

Törnquist, N. 1931. Die Nematodenfamilien *Cucullanidae und Camallanidae*. Göteborgs Kungl. Vetenskaps-ach. Witterhets Vitt. Samh. Handl., Ser. B, 2 (3): 1—441.

Yamaguti, S. 1958. Systema Helminthum. I. The digenetic trematodes of Vertebrates Part I and II. nterscience, New York—London, 1575 p.

Yamaguti, S. 1961. Systema Helminthum. III. The nematodes of Vertebrates Part I and II. Interscience, London, 1261 p.

Received: June 28, 1983

PRILOG POZNAVANJU HELMINTOFAUNE RIBA U PRIOBALNIM VODAMA SREDNJODALMATINSKIH OTOKA JADRANSKOG MORA

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KRATKI SADRŽAJ

Iznose se rezultati jednokratnog istraživanja helmintofaune riba u priobalnom području otoka srednje Dalmacije. Materijal je sakupljen tokom kolovoza 1982. na 8 priobalnih lokaliteta i na jednoj kočarskoj postaji između otoka Šolte i Čiova (Sl. 1).

Analiziran je 161 primjerak od 24 vrste i podvrste riba (Tab. 1).

Tokom ovih istraživanja ustanovljeno je 10 vrsta endohelminata iz grupa Nematoda i Trematoda. Od Nematoda su ustanovljene vrste: *Aniskis* sp. (larve), *Contracaecum fabri* (larve), *C. aducum* (larve), *C. filiforme, C. clavatum* (larve), *Cucullanus longicollis* (larve i adultni) i *Cucullanus* sp. (larve), a od Trematoda: *Anisocoelium capitellatum, Opecoeloides furcatus i Monorchis monorchis* (Tab. 2 i 3).

Navedenim endohelmintima bilo je invadirano 70,8% analiziranih vrsta riba, odnosno 26,1% analiziranih primjeraka.

Najčešće nalaženi nematodi bili su: *Contracaecum fabri* i *C. aduncum*, koji su nađeni u 45,2% invadiranih primjeraka riba.

Neke vrste riba utvrđene su kao novi domaćini za neke nađene endohelminte za područje srednje Dalmacije, a vrsta *Serranus hpatus* je novi domaćin trematoda *Opecoeloides furcatus* i za nauku.