A C T A A D R I A T I C A

INSTITUT ZA OCEANOGRAFIJU I RIBARSTVO — SPLIT
SFR JUGOSLAVIJA

Vol. XIII. No. 4

PARASITIC HELMINTHS OCCURRING IN ADRIATIC FISHES

PARASITSKI HELMINTI U JADRANSKIM RIBAMA

OTTO SEY

SPLIT 1968.

PARASITIC HELMINTHS OCCURRING IN ADRIATIC FISHES

Part I (Flukes)

PARASITSKI HELMINTI U JADRANSKIM RIBAMA

By

Ottó Sey

Zoological Department, the Teachers' Training College, Pécs Hungary

In 1966, I spent three months (April, May, and June) at the Institute of Oceanography and Fisheries of Split, Yugoslavia, studying the internal parasitic worms occurring in fishes caught in the waters around Split. While most of the material required for those investigations was purchased on the local fish market, the rest came from local fishermen.

In the course of my investigations, 824 specimens, belonging to 82 different species, were carefully examined (Table I.). By applying the usual method, the recovered helminths were fixed, prepared, stained, and cut for microscopical sections.

RECOVERED FLUKE SPECIES

Mesometridae Poche, 1925

Mesometra orbicularis (Rud., 1819), Lühe, 1901.

This is a typical helminth occurring in the intenstine of Boops boops. It was found in the host's digestive tract, from its middle third downwards. The species was examined from the morphological point of view in the same way as done by other investigators before. Some of the *Mesometra orbicularis* specimens belonged to the subspecies *Mesometra orbicularis minutacualata,* described by Dollfus in 1947.

Mesometra brachycoelia, Lühe, 1901

This species was found in the intestine of Boops salpa only, together wity the fluke mentioned above. Ist subspecies, *Mesometra brachycoelium minispinus* Dollfus, 1947, was also present among the *Mesometra brachycoelia* specimens. The subspecies, characterized by spines covering the ventral surface of the front part of the body, varied in length from 0.008 to 0.011 millimetres.

Table I

Name of fishes[1]	Number of fishes	Number of infected fishes				Percentage of incidence			
		T.[2]	C.	N.	A.	T.	C.	N.	A.
Scyliorhinidae									
Scyliorhinus caniculus (L.)	8	—	—	4	—	—	—	—	—
Squalidae									
Squalus acanthias (L.)	1	—	—	—	—	—	—	—	—
Torpedinidae									
Torpedo marmorata (Risso)	1	—	1	—	—	—	—	—	—
Rajidae									
Raja miraletus L.	3	—	2	—	—	—	—	—	—
Clupeidae	61	10	—	4	—	16	—	7	—
Sardina pilchardus sardina (Risso)									
Alosa fallax nilotica (Geoffr.)	2	1	—	1	—	—	—	—	—
Anguillidae									
Anguilla anguilla (L.)	10	1	—	1	1	10	—	10	10
Muraenidae									
Muraena helena L.	1	1	—	—	—	—	—	—	—
Congeridae									
Ariosoma balearicum (De la R.)	20	4	—	1	—	20	—	5	—
Ariosoma mystax (De la R.)	3	1	—	1	—	—	—	—	—
Ophichthidae									
Echelus myrus (L.)	2	—	—	1	—	—	—	—	—
Gadidae									
Gadus (Trisopterus) minutus capelanus (Risso)	14	1	—	2	—	8	—	14	—
Merlucius merlucius (L.)	16	1	2	7	—	6	13	49	—
Micromesistius poutassou (Risso)	1	—	—	—	—	—	—	—	—
Onos tricirratus (Brünn.)	2	1	—	1	—	—	—	—	—
Onos mediterraneus (L.)	1	—	—	—	—	—	—	—	—
Syngnathidae									
Syngnathus (Siphostoma) typhle L.	7	—	—	—	—	—	—	—	—
Nerophis maculatus (Raf.)	1	—	—	—	—	—	—	—	—
Zeidae									
Zeus faber L.	11	1	—	4	—	9	—	36	—
Sphyraenidae									
Sphyraena sphyraena (L.)	1	—	—	1	—	—	—	—	—
Mugilidae									
Mugil (Liza) capito Cuv.	5	3	—	1	—	—	—	—	—
Mugil (Oedacheilus) labeo Cuv.	4	2	—	—	—	—	—	—	—
Serranidae									
Serranus (Paracentropristis) hepatus (L.)	1	—	—	—	—	—	—	—	—
Serranus scriba (L.)	11	6	—	4	—	54	—	36	—
Serranus cabrilla (L.)	3	1	—	1	—	—	—	—	—

Name of fishes[1]	Number of fishes	Number of infected fishes				Percentage of incidence			
		T.[2]	C.	N.	A.	T.	C.	N.	A.
Sparidae									
Pagellus erythrinus (L.)	18	3	—	3	—	23	—	23	—
Diplodus annularis (L.)	46	13	—	2	1	28	—	4	2
Diplodus vulgaris (Geoffr.)	10	6	—	1	—	60	—	10	—
Diplodus sargus (L.)	4	1	—	—	—	—	—	—	—
Boops salpa (L.)	12	6	—	—	—	50	—	—	—
Boops boops (L.)	32	5	—	1	—	16	—	3	—
Oblata melanura (L.)	11	1	—	—	—	9	—	—	—
Spondyliosoma cantharus (L.)	2	1	—	—	—	—	—	—	—
Pagellus bogaraveo (Brünn.)	2	—	—	—	—	—	—	—	—
Lithognathus mormyrus (L.)	2	—	—	—	—	—	—	—	—
Puntazzo puntazzo (Cetti)	2	—	—	—	—	—	—	—	—
Centracanthidae									
Maena maena (L.)	8	—	—	3	—	—	—	—	—
Maena chryselis Val.	20	3	—	1	—	15	—	5	—
Maena smaris (L.)	16	6	—	4	—	38	—	25	—
Mullidae									
Mullus barbatus L.	13	3	—	3	—	23	—	23	—
Mullus surmuletus L.	1	1	—	1	—	—	—	—	—
Sciaenidae									
Sciaena umbra L.	1	1	—	—	—	—	—	—	—
Carangidae									
Trachurus mediterraneus Stdr.	1	—	—	1	—	—	—	—	—
Trachurus trachurus (L.)	21	3	—	2	—	—	—	—	—
Cepolidae									
Cepola rubescens L.	2	1	—	1	—	—	—	—	—
Pomacentridae									
Chromis chromis (L.)	43	—	—	—	—	—	—	—	—
Labridae									
Crenilabrus mediterraneus (L.)	4	1	—	—	—	—	—	—	—
Crenilabrus cinereus (Bonn.)	74	6	—	4	—	8	—	5	—
Crenilabrus ocellatus (Forsk)	3	—	—	1	—	—	—	—	—
Crenilabrus tinca (L.)	11	3	—	2	—	27	—	18	—
Crenilabrus quinquemaculatus (B. Schn.)	4	1	—	—	—	—	—	—	—
Labrus bimaculatus L.	2	1	—	—	—	—	—	—	—
Labrus bergylta Asc.	1	1	—	—	—	—	—	—	—
Labrus merula L.	1	1	—	1	—	—	—	—	—
Coris julis (L.)	6	1	—	1	—	—	—	—	—
Trachinidae									
Trachinus draco L.	6	2	—	5	—	—	—	—	—
Trachinus radiatus Cuv.	1	—	—	—	—	—	—	—	—

Name of fishes[1]	Number of fishes	Number of infected fishes				Percentage of incidence			
		T.[2]	C.	N.	A.	T.	C.	N.	A.
Uranoscopidae									
Uranoscopus scaber L.	43	11	—	10	—	23	—	23	—
Scombridae									
Scomber scombrus L.	41	19	—	10	—	46	—	24	—
Scomber (Pneumatophorus) japonicus colias Gm.	1	1	—	1	—	—	—	—	—
Thunnidae									
Auxis thazard (Lac.)	8	1	—	1	1	—	—	—	—
Blenniidae									
Blennius ocellaris L.	13	7	—	1	—	53	—	8	—
Elennius gattorugine L.	7	2	—	—	—	—	—	—	—
Blennius tentacularis Brünn.	2	1	—	—	—	—	—	—	—
Blennius sanguinolentus Pall.	1	1	—	—	—	—	—	—	—
Ophidiidae									
Ophidion barbatus L.	1	1	—	1	1	—	—	—	—
Gobiidae									
Gobius geniporus Val.	3	1	—	1	1	—	—	—	—
Gobius niger jozo L.	3	2	—	2	—	—	—	—	—
Gobius cruentatus Gm.	2	1	—	1	—	—	—	—	—
Gobius exanthematicus Pall.	2	2	—	1	1	—	—	—	—
Scorpaenidae									
Scorpaena notata Raf.	17	2	—	2	—	12	—	12	—
Scorpaena porcus L.	8	—	—	—	—	—	—	—	—
Belonidae									
Belone belone (L.)	2	1	1	1	—	—	—	—	—
Triglidae									
Trigla lyra L.	26	1	—	2	—	4	—	7	—
Trigloporus lastoviza (Brünn.)	2	—	—	—	—	—	—	—	—
Citharidae									
Citharus linguatula (L.)	31	5	5	6	—	16	16	19	—
Bothidae									
Bothus podas (De la R.)	2	1	—	1	—	—	—	—	—
Soleidae									
Solea variegata Don.	24	9	—	—	—	38	—	—	—
Solea ocellata (L.)	1	—	—	—	—	—	—	—	—
Monochirus hispidus (Raf.)	3	1	—	—	—	—	—	—	—
Lophiidae									
Lophius piscatorius L.	4	1	—	2	—	—	—	—	—

[1] The names of fishes are given according to E. Tortenese: Elenco riveduto dei Leptocardi, Ciclostomi, Pesci, Cartilaginei e Ossei del Mare Mediterraneo. — Estratto Dagli Annali Del Museo Civico Di Storia Naturale Di Genova, vol., LXXIV, 1963.

[2] T = *Trematoda*, C = *Cestoda*, N = *Nematoda*, A = *Acanthocephala*

Acanthostomatidae Poche, 1925

Anisocoelium capitellatum (Rad., 1819)

This was the most common parasite found in *Uranoscopus scaber*. It occurred also in the gall-bladder, as had been earlier observed by other investigators (Lühe, 1900, Dawes, 1947; Janiszewska, 1951).

It resulted from the examination of specimens belonging to my collection that the length of the oesophagus was always smaller than that of the pharynx. Here are the body measures (in millimetres) of the *Anisocoelium capitellatum* species:

body length	2,5 —4,5	oesophagus	0,023—0,168
body width	0,36 —0,81	acetabulum	0,168—0,393
oral sucker	0,196—0,505	testis I	0,168—0,337
	0,190—0,393[x]		0,056—0,112[x]
pharynx	0,140—0,252	testis II	0,170—0,505
	0,090—0,196[x]		0,056—0,140[x]
ovary	0,140—0,252	egg	0,017—0,065

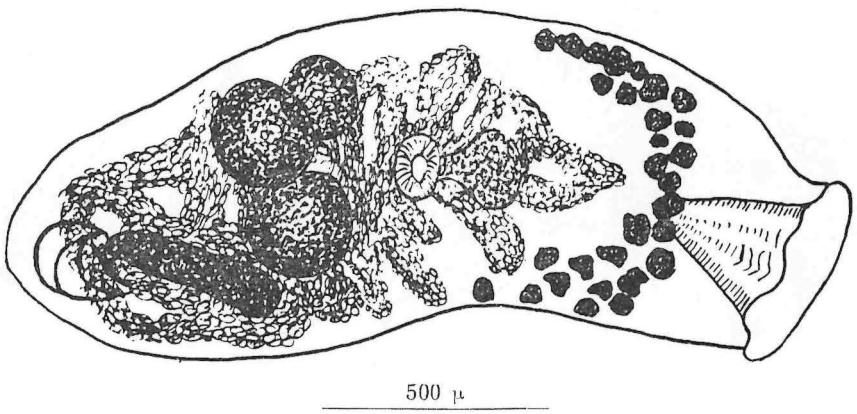


Fig. 1. *Prosorhynchus crucibulus* (Rud., 1819) Odhner, 1905

Distances of the right and left branches of the caeca, measured from the posterior end of the body, ranged from 0.5 to 0.84 millimetres and from 0.84 to 1.28 millimetres.

Anisocladium fallax (Rud., 1819).

The body length varied considerably as a consequence of movement of specimens in the course of fixation. The number of spines round the mouth ranged between 22 and 25. The position of the praepharynx depended on the fixation circumstances. The number of vitalline rosettes varied from 7 to 8, and the branches of the uterus did not penetrate the posterior end of the body. These helminths occurred in the intestine of *Uranoscopus scaber*.

Lepocreadiinae Nicoll, 1935

Opechona bacillaris (Molin, 1859) Looss, 1907

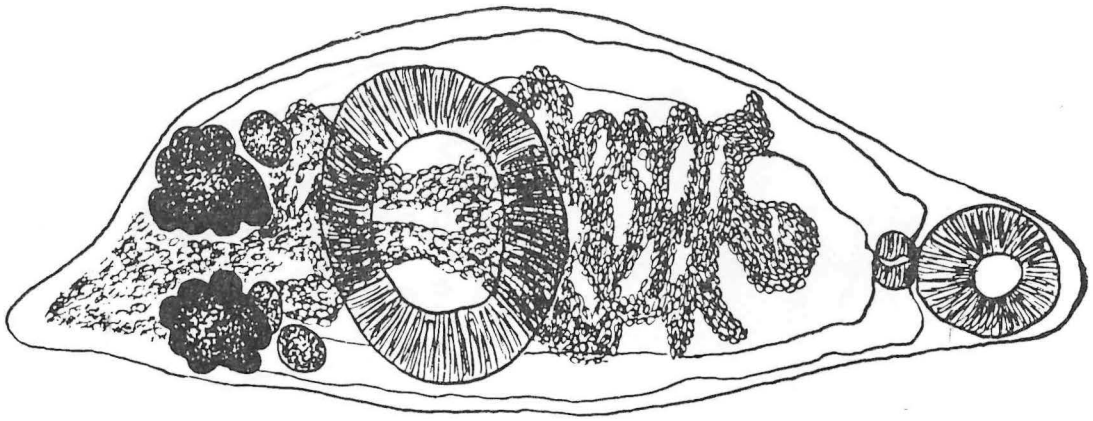
This species, described for the first time by Molin in 1959, was found in the digestive tract of *Centrolophus pompillus*. It was also observed by Stossich in the digestive tract of *Scomber scombrus* caught in the Adriatic.

Numerous descriptions of this parasite, published by various investigators, are available. There are different opinions as to presence or absence of the praepharinx. It was present in some, but not all, specimens of my collection. The length of the praepharinx exceeded sometimes the length of the pharinx. This parasite was found in the duodenum of *Scomber scomber*.

Opecoelidae Ozaki, 1925

Opecoeloides furcatus (Bremser) Odhner, 1928

This fluke, observed in the intestine of *Mullus barbatus*, was characterized by the digitiform papillae at the end of the acetabulum and by an accessory sucker.



1000 μ

Fig. 2. *Derogenes ruber* Lühe, 1900

Deripristidae Skrjabin, 1958

Deropristis inflata (Molin, 1859)

Only one specimen of this species was found in the fore part of the intestine of Anguilla anguilla.

Fellodistomatidae Nicoll, 1913

Tergestia laticollis (Rud. 1819) Stossich, 1899

A description of this parasite, termed *Distomum laticollis*, was given by Rudolphi in 1819. A number of investigators have subsequently studied its

morphological features. The body measure of the species differ in the descriptions published by various investigators. It is important to note that this parasite occurred, during my investigations, in some species (*Crenilabrus tinca, C. cinerea, Diplodus annularis*) that had never before been recorded as hosts. The flukes in my collection reveal some differences as regards their body measures and arrangement of genital organs.

The body measures of *Tergestia laticollis* are the following (in millimetres):

body length	0,843—1,18	testis I	0,168
body width	0,252—0,281		0,112[x]
orar sucker	5,505	testis II	0,168
	0,112—0,140[x]		0,112[x]
pharynx	0,112—0,168	ovary	0,08 —0,129
	0,083—0,084[x]		0,069—0,101[x]
oesophagus	0,046—0,080	egg	0,021—0,023
acetabulum	0,168—0,224		0,012—0,013[x]
	0,140—0,196[x]		

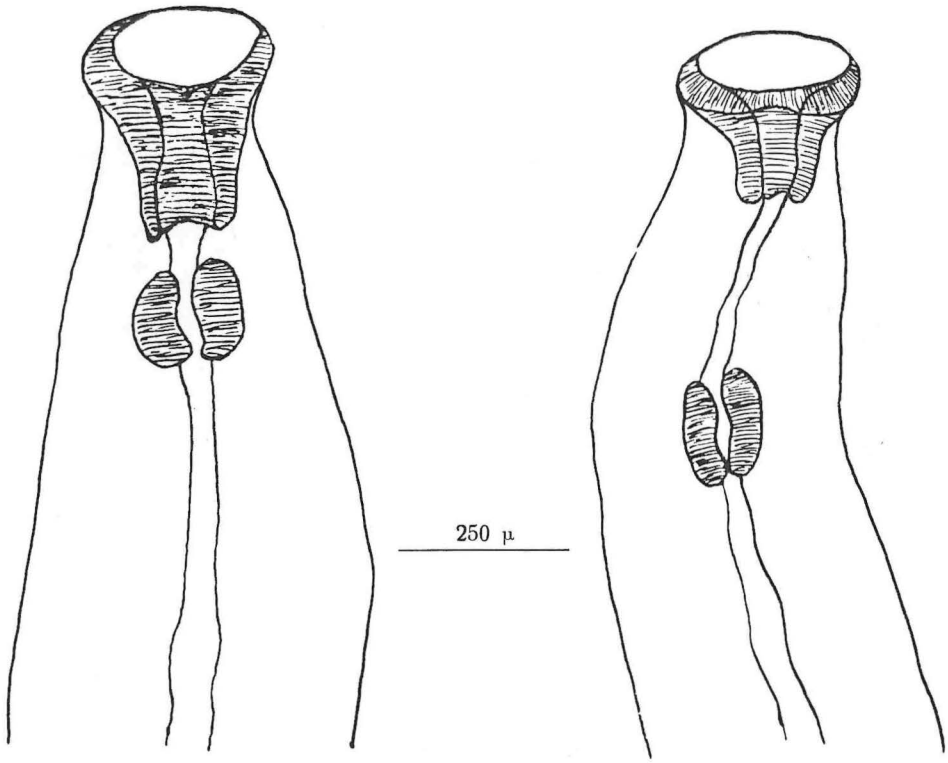


Fig. 3. Frontpart of *Opechona bacillaris* (Molin, 1859)

Dinuridae Skrjabin et Guschanskaja, 1954

Lecithocladium excisum (Rud., 1819) Lühe, 1901

This species was the most common parasite found in the stomach of *Scomber scombrus*. Its body measures varied to a considerable extent, according to movement of specimens in the course of fixation.

Halipegidae Poche, 1925

Derogenes ruber, Lühe, 1900

This parasite occurred twice in the gall-bladder of three specimens of *Trigla lyra*. It was discovered for the first time by Lühe in 1900 in the same organ of the mentioned host. While alive, this helminth was red and was characterized by the following body measures:

body length	4,2 —4,5	ovary	0,252
body width	1,3 —1,8		0,252[x]
oral sucker	0,505	egg	0,023
	0,505[x]		0,023[x]
pharynx	0,168	vitellaria right	0,44
acetabulum	0,95 —1,29		0,42[x]
testis right	0,252	vitellaria left	0,47
	0,168[x]		0.44[x]
testis left	0,196—0,140		

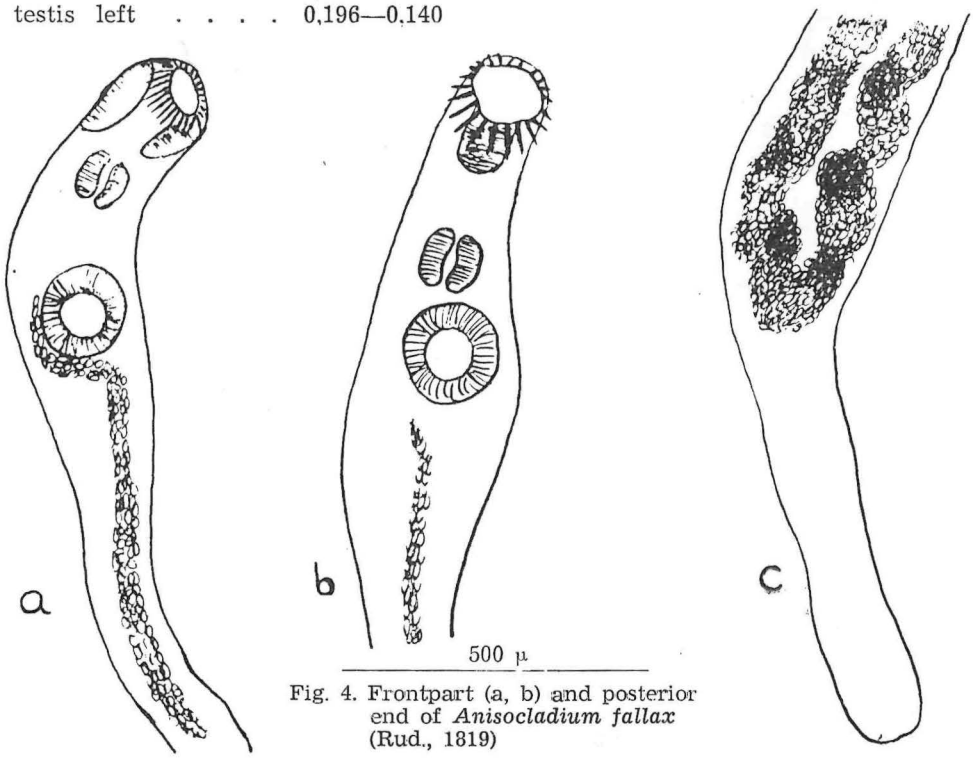


Fig. 4. Frontpart (a, b) and posterior end of *Anisocladium fallax* (Rud., 1819)

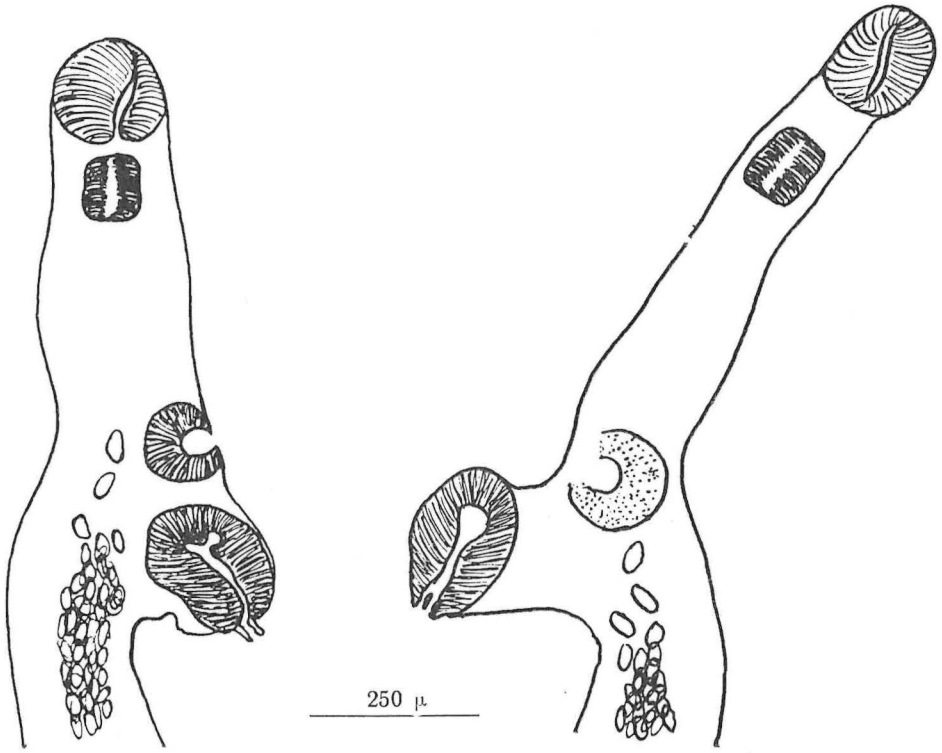


Fig. 5. Frontpart of *Opecoeloides furcatus* (Bremser)

Dercgenes varicus (Müller, 1784) Looss, 1901

Only one specimen of this species was found in the first third of the small intestine of *Merlucius merlucius.* This is a widely distributed parasite, found in more than 90 fish species in Denmark, Canada, Japan, the USS and USSR, etc.

Bucephalidae Poche, 1907

Prosorhynchus crucibulus (Rud., 1819) Odhner, 1905

This species was found in the duodenum of *Conger conger.* The body measures of this specimen, and especially the position of its genital organs, varied considerably.

Monorchidae Odhner, 1911

Monorchis monorchis (Stossich, 1890)

This helminth was found in the middle part of the intestine of *Blennius gattorugine* and *Sargus annularis.* Another species, named *Monorchis parvus,* occurring in the intestine of *Sargus annularis,* was described by Looss in 1902.

In spite of smaller body measures, this helminth was not considered by Ben Dawers to be a separate type of the species. In his opinion, it may be identified with *Monorchis monorchis.*

Here are the body measures of *Monorchis monorchis* (in millimetres):

body length	0,78 —0,85	testis	0,22
body width	0,61 —0,62		0,14[x]
oral sucker	0,157	ovary	0,168
pharynx	0,069		0,11 [x]
acetabulum	0,069	egg	0,023
			0,009[x]

Hemiuridae Lühe, 1901

Hemiurus lühei Odhner, 1905

Only two specimens of this fluke were found in the intestine of *Alosa fallax nilotica.*

Hemiurus rugosus Looss, 1907

This parasite occurred only once in the stomachs of two specimens of *Clupea pilchardus.*

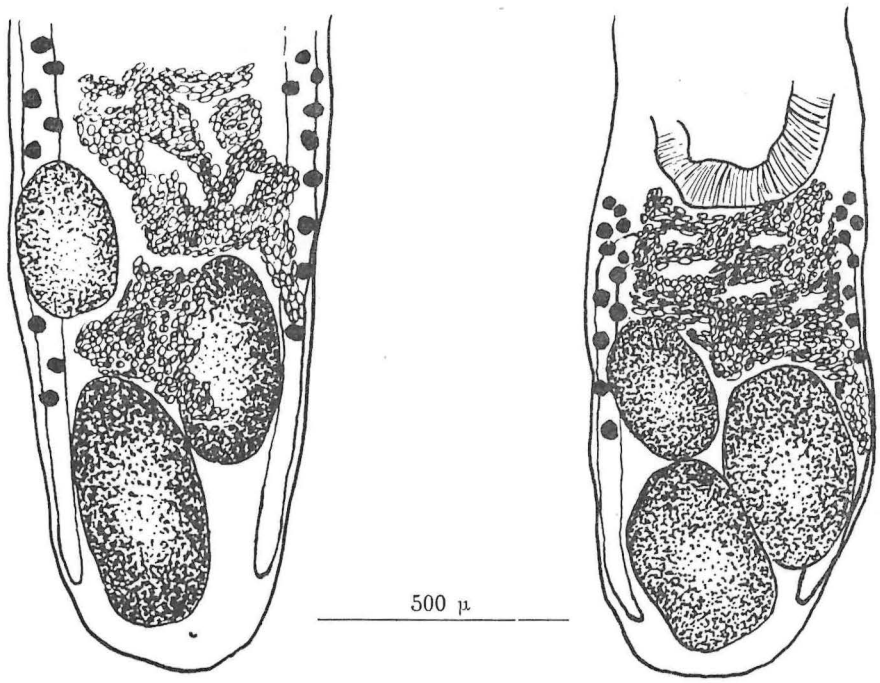


Fig. 6. Region of genital organs of *Tergestia laticollis* (Rud., 1919)

SUMMARY

A large number of fishes collected in the Adriatic, in the proximity of Split, were examined for helminth parasites during the spring months of the year 1966. The present paper deals with one group of flukes found in the examined fishes, i. e.:

Mesometra orbicularis (Rud., 1819) Lühe, 1901; *M. brachycoelia* Lühe, 1901; *M. orbicularis* (Rud.,) *minutaculeata* Dollfus, 1947; *M. brachycoelia* (Lühe), *minimispinis* Dollfus, 1947; *Anisocoelium capitellatum* (Rud., 1819); *Anisocladium fallax* (Rud., 1819); *Opechona bacillaris* (Molin, 1859) Looss, 1907; *Opecoeloides furcatus* (Bremser in Rudolphi, 1819) Odhner, 1928; *Deropristis onflata* (Molin, 1859); *Tergestia laticollis* (Rud., 1819) Stossich, 1899; *Lecithocladium excisum* (Rud., 1819) Lühe, 1901; *Derogenes ruber* Lühe, 1900; *D. varicus* (Müller, 1784) Looss, 1901; *Prosorhynchus crucibulus* (Rud., 1819) Odhner, 1905; *Monorchis monorchis* (Stossich, 1890); *Hemiurus lühei* Odhner, 1905; *H. rugosus* Looss, 1907.

Generally speaking, most of the flukes are frequently occurrent in the fishes of the Adriatic Sea, and their occurrence (Triest, Split) was already recorded by earlier investigators (Stossich, Lühe, Janiszewska). According to the available literature, only two species *(Deropristis inflata, Hemiurus lühei)* and two subspecies *(Mesometra orbicularis* (Rud.) *minutacualata, M. brachycoelia* (Lühe) *minimispins*) seem to have been recorded for the first time among the parasitic helminth fauna in Yugoslavia.

Crenilabrus cinereus, C. tinca, and *Diplodus annularis* belong to species that were known before to be hosts of *Tergestia laticollis.*

Besides different data showing body measure of the examined parasites, the paper also contains drawings of helminths and information about their localization and distribution.

ACKNOWLEDGEMENT

While deeply appreciating the kindness shown to me by the Secretariat of the Belgrade University, I wish to express my gratefulness to the director and staff of the Institute of Oceanography and Fisheries, Split, for their precious help. Particular thanks are due to Messrs. D. Morović and Š. Županović, scientific researchers at the Institute, for their aid rendered in the identification of fishes.

REFERENCES

Baylis, A. A. & Idris Jones, E.: Records of parasitic worms from marine fishes at Plymouth. — J. Marine Biol. Auss. U. K., N. S., 18, 1933, p. 627—634.

Dawes, B.: The Trematoda of British Fishes. — Royal Society, London, 1947, p. 165—301.

Dollfus, R. Ph.: Sur quelques trematodes intestinaux de *Box salpa* (L., 1758) (poisson teléostéen) de la Méditerranée. — Ann. parasitol., 22, p. 324—331, 1947.

Janiszewska, J.: Some Adriatic Sea Fish Trematodes. — Zoologica Poloniae, 6, 1951, p. 20—48.

Lebour, M. V.: Trematodes of the Northumberland Coast, No. 2. — Trans. Nat. Hist. Soc. Northumb., 3, 1908, p. 28—45.

Little, P. A.: The Trematode parasites of Irish Marine Fishes. — Parasitology, 21, 1929, p. 22—30.

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

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

Nicoll, W.: A contribution towards a knowledge of the entozoa of British Marine Fishes. — Ann. Mag. Nat. Hist., 19, 1907, p. 66—94.

Nicoll, W.: The Trematode parasites of North Queensland. — Parasitology, 6, p. 333—350.

Nicoll, W.: A list of the Trematode parasites of British Marine Fishes. — Parasitology, 7, 1915, p. 339—378.

Palombi, A.: Il polimorfismo nei Trematodi Richerche sperimentali sui *Helicometra fasciata* (Rud.). — Ann. Mus. Zool. Univ. Napoli, 6. 1931, p. 1—8.

Rees, G. Q Llewellyn, J.: A record of the Trematode and Cestode parasites of fishes from the Porcupine Bank, Irish Atlantic Slope and Irish Sea. — Parasitology, 33, 1941, p. 39—393.

Stossich, M.: Brani di elmintologia tergestina. Ser III & IV. Boll. della Societa Adriatica di Scienze Naturali. — Natur, 9. 1887, p. 1—7.

Skrjabin, K. J.: Trematodi životnjih i čeloveka. T. IX, 1954, X, 1955, XI, 1955, XIII, 1957, XV, 1958, XVIII, 1960, XX, 1962, XXI, 1963, XXII, 1966.

Timon-David, J.: Recherches sur les trematodes parasites des oursins en Mediterranée. — Bull. Inst. Océan. Monaco, 625, 1934, p. 1—16.

Yamaguti, S.: Studies on the helminth fauna of Japan. Part 2. Trematodes of Fishes. I. — Japan J. Zool., 5, 1934, p. 249—541.

Yamaguti, S.: *Systhema helminthum* I. The Digenetic Trematodes of Vertebrates. Part I—II., 1958.

PARASITSKI HELMINTI U JADRANSKIM RIBAMA

Ottó Sey

Kratak sadržaj

Mnogo riba, sabranih u Jadranu, u blizini Splita, ispitali smo da bi utvrdili množinu intestinalnih parasita kroz proljetne mjesece godine 1963. Ova radnja obrađuje jednu grupu takvih parasita pronađenih u ispitanim ribama.

Općenito govoreći, većina parasita se često javlja u ribama Jadranskog mora, pa su već raniji istraživači (Stossich, Lühe, Janiszewska) zabilježili njihovu čestu prisutnost (Trst, Split). Prema raspoloživoj literaturi izgleda da su samo dvije vrste bile zabilježene po prvi put među parasitskom faunom helminta u Jugoslaviji i to *Deropristis inflata* i *Hemiurus lühei,* te dvije podvrste i to *Mesometra orbicularis* (Rud.) *minutacualata* i *M. brachycoelia* (Lübe) *minimispins.*

Crenilabrus cinereus, C. tinca, i *Diplodus annularis* pripadaju vrstama, za koje se otprije znalo da su organizmi-domaćini *Tergestia laticollis.*

Pored raznih podataka, koji se odnose na dužine tijela ispitanih parasita, radnja također sadrži crteže crva kao i pojedinosti o njihovoj lokalizaciji i rasprostranjenosti.