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A contribution to the knowledge of the helminth fauna
of vimba, *Vimba vimba* (L.), in the River VistulaPrzyczynek do znajomości helmintofauny certy, *Vimba vimba* (L.), rzeki Wisły

Vimba is a Palearctic fish species inhabiting European rivers, the west boundary of its distribution range running along the river Weser. It also occurs in the rivers draining into the Black Sea and the Caspian Sea. Its distribution area in Poland covers the rivers Vistula and Odra, including their tributaries, and some smaller rivers which flow into the Baltic. It is the only cyprinid fish species in Poland that carries out long migrations for spawning. Plińska et al. 1951, while studying the maximum migration range of the fish, found that many of the upstream migrating vimbas are capable of covering the distance from the mouth to the upper reaches of the Vistula within the period from the autumn into the late spring. Spawning completed in May-July, the vimba is said to float down to the sea. It was only in 1960 that Bonemps succeeded in obtaining some more detail picture of the biology and migration of the Vistula vimba.

The highest abundance of vimba is noted in the Vistula basin, including the Gulf of Gdańsk. It is, however, surprising that the effectiveness of the vimba fishing decreases from year to year. According to the reports of the Poland Fisheries Cooperative Society "Wisła", Warszawa, the number of fish caught in 1965—1968 amounted to 50% of that recovered in 1960—1964. It would be of interest to know what are the factors that contribute to this phenomenon. The answer to the question seems to rest on an increasing contamination of the river by the poisonous sewage from the industrial establishments, as well as on the rising number of the water dams that restrict the upstream fish migration. Attempts have been recently made to set a project of rearing the vimba in hatcheries for stocking natural waters. There are grounds for hoping that these practical means may gradually improve vimba fishing in the middle and upper reaches of Vistula.

Of particular interest to the fishery biologist may, perhaps, be the problem of parasites in relation to the vimba fishery management. However, no attention was so far paid to parasites of this fish species. This fact explains the extreme scarcity of the relevant data. Some vimba parasites (three monogenean species and an acanthocephalan) are found in the lists given in works

by Prost 1957 and Dąbrowska 1970. Attempts to determine the specific composition of the parasite fauna of the vimba in Vistula have been made by Kozicka (personal communication). Much more information on the vimba parasites is available in other countries, and in particular in the Soviet Union (Sevčenko 1954, Gecevičute 1953), and in Finland (Schneider 1902, Levander 1909).

The aim of the present investigations was, therefore, to contribute the knowledge of the vimba parasites occurring in Poland. These investigations are, however, largely of a preliminary nature and provide a foundation upon which subsequent work may be based.

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Material and methods

A total of 90 vimba specimens caught by using trammel nets in three fishing grounds (Table I) were autopsied. The length of the fish averaged 33.18 cm (l.t.) and 26.62 cm (l.c.), the weight 406 g, the age being 6 years on an average; some fish aged 5 or 7 years. The fish were examined as soon as possible after capture, before post-mortem effects occurred. The majority of fish were captured in the evening or in the night, in most cases examination was performed in the morning and completed within 8-12 hours of the capture of the fish. Internal helminths were collected. Most parasites were alive when collected. Trematodes were kept in the tap water till natural death. All other parasites were preserved in alcohol and stained in alum carmine. Trematodes and acanthocephalans were examined in toto after clearing when remaining in creosote. Cestodes were mounted in Canada balsam.

Table I
Number of vimbas, *Vimba vimba* (L.), collected
in various reaches of the Vistula

Localities	No. of fish	
	examined	infected
Vicinity of Dąblin	15	—
Vicinity of Warszawa	60	12
Estuary area (Świbno) incl. Gulf of Gdańsk	15	9
Total	90	21

Helminths found

Trematoda

Asymphylogora demeli Markowski, 1935

An adult recorded in the intestine of a vimba captured in July, 1968, in the Vistula near Warszawa 20 km downstream. This is a new host record for the trematode and a new locality record.

A. demeli has hitherto been reported from *Pomatoschistus minutus* (Pall.), *P. microps* (Kröyer), *Gobius niger* L. and *Nerophis ophidion* (L.) of the Gulf

of Gdańsk (Markowski 1935, 1939, Szidat 1943, Koter 1962). Koval 1950 recorded this trematode in *Cyprinidae* of the Dnieper.

Asymphyloglora kubanicum (Issaitschikoff, 1923)

An adult recorded in the intestine of a vimba specimen captured in April, 1968, in Vistula near Warszawa 20 km downstream. This record is new to Poland. The species has hitherto been reported from *Cyprinidae* of the basins of the Aral and Black seas. Morphological characters of the specimen found correspond with those given by Markevič 1951.

Palaeorchis skrjabini Kowal, 1950

An adult specimen was recorded in the intestine of a vimba caught in May, 1968, in the Vistula near Warszawa about 20 km downstream. This species is new to Poland. It has been reported from the intestine of *Neogobius fluviatilis* (Pall.) of Dnieper (Koval 1950).

Palaeorchis unicus Szidat, 1943

An adult trematode was found in the intestine of a vimba specimen captured in July, 1968, in the Vistula near Warszawa about 20 km downstream. This species is a new record for Poland, *Vimba vimba* being new host record for *P. unicus*.

P. unicus has hitherto been reported in few cases from cyprinid fish of some rivers draining into the Baltic and into the Black Sea (Dnieper, Southern Bug river, Danube).

Sphaerostomum globiporum (Rud., 1802) nec Looss, 1899 p.p.

Seven adult specimens were recorded in the intestine of a vimba caught in June, 1968, in the Vistula near Warszawa about 20 km downstream. *Vimba vimba* is a new host record for the trematode species in Poland. The characters of the specimens found correspond with those regarded by Ślusarski 1958 as being of taxonomic importance.

Szidat 1944 regarded this trematode to be a species specific of *Rutilus rutilus* (L.). Indeed, it was later reported from this fish species of various bodies of water in Poland by Kozicka 1953, 1959, E. Grabda et al. 1961, Perłowska 1969 and Puciłowska 1969. However, it was also found in other cyprinid fish (Kozicka 1953, 1958, 1959, Radwan 1960, E. Grabda et al. 1961, Borowik 1968, Perłowska 1969, Puciłowska 1969). Moreover, Ślusarski 1958 and E. Grabda et al. 1961 recorded this species in *Salmo trutta m. lacustris* L., and Puciłowska 1969 in *Esox lucius* L. and *Perca fluviatilis* L. Specimens reported by Sinicyn 1905 as "*Sphaerostomum globiporum* (R.)" from *Cyprinidae* cannot be discussed here, as they have been based on taxonomic criteria for *S. globiporum* (Rud., 1802) of Looss, 1899.

Cestoda

Caryophyllaeus laticeps (Pallas, 1781)

This cestode species was recorded in the Vistula estuary area, including the Gulf of Gdańsk, in September, 1968, and in its middle reaches near Warszawa about 20 km downstream. It occurred in about 13% of the total number of the fish examined in these areas, the intensity of infection ranging 1—19

specimens (3.5 on an average per fish). *Vimba vimba* is a new host record for *C. laticeps* in Poland.

C. laticeps is rather common in Poland. It was reported from *Cyprinus carpio* L., *Carassius carassius* (L.), *Rutilus rutilus* (L.), *Tinca tinca* (L.), *Abramis brama* (L.), *Blicca bjoerkna* (L.), *Leuciscus idus* (L.), and *Esox lucius* L., being recorded in ponds near Grajewo, in Drużno Lake and the Vistula near Warszawa, including the Zegrzyński Dam Reservoir (Ruszkowski 1925, Sekutowicz 1934, Kozicka 1959, Perłowska 1969, Puciłowska 1969). The cestode has been frequently recorded by Ślusarski (personal communication) in *Leuciscus cephalus* (L.), *Barbus meridionalis petenyi* (Heck.), *Gobio gobio* (L.) of the river Poprad near Muszyna, and in *Barbus barbus* (L.) of the river San near Sanok.

C. laticeps occurred in 9 of 15 fish caught in the estuary area of the Vistula, in the autumn. Only 5% of vimbas collected in the middle reaches of the river were infected with the cestode, no infection being recorded in fish captured in the river near Dąblin. Kozicka (personal communication) found cestodes of the genus *Caryophyllaeus* in vimbas of the Vistula near Włocławek (lower reaches of the river). From these data arises the suggestion that the cestode fauna becomes gradually reduced with the distance travelled by the migrating vimba's parr stage, thus showing a phenomenon similar to that observed by Dogiel and Petruschewsky 1934 and Ślusarski 1958 in the case of the anadromic migration of the salmon. In view of a poor material collected in the present study, of course, any suggestions which may be put forward on this subject in the case of vimba must be regarded as mere hypotheses. In considering the reasons for the reduction of the cestode fauna in vimba in the upper reaches of the river, we have every reason to believe that the phenomenon, if really occurs, does not follow from the exposure of the migrating fish to the influence of the fresh water. In fact, *C. laticeps* is considered to be a fresh-water parasite (Kowalewski 1896, Sekutowicz 1934, Janiszewska 1954). Other causes may, however, come into play. Perhaps the answer lies either in the physiology of the migrating fish or in the pollution of the Vistula water in the downstream vicinity of Warszawa which contains eight times more phenol than the estuary area. Nor must we overlook the possible role of the rising content of the heavy metal salts in the water. The fragmentary data available do not, however, permit one to make general statements about the character of the parasite fauna of migrating vimba. Further planned investigations on the relationships in other components of the parasite fauna of this species are needed.

Acanthocephala

Acanthocephalus anguillae (Müller, 1780) Lühe, 1911

Two young specimens, a male and a female, were recorded in the intestine of two vimbas. This is a new host record for Poland. Some characters of these specimens are given below (Fig. 1 a, b).

Male: total length 6.9 mm, width 1.03 mm. The club-shaped proboscis 0.68 mm long by 0.32 mm wide, armed with 10 longitudinal rows of five hooks each. Spike of the largest hook 0.14 mm long.

Female: total length 12.71 mm, width 1.58 mm. Proboscis 0.824 mm long by 0.383 mm wide. Hooks in 10 longitudinal rows, five per row. The length of the largest hook 0.193 mm.

A. anguillae occurs in various fresh-water fish, most often in cyprinids, occasionally in eels, perches, burbot, pikes, graylings, eel pouts, sturgeons, salmonids, and some others. It was reported from rivers of the Baltic, Black and Caspian seas basins. In Poland the species was found in cyprinids,

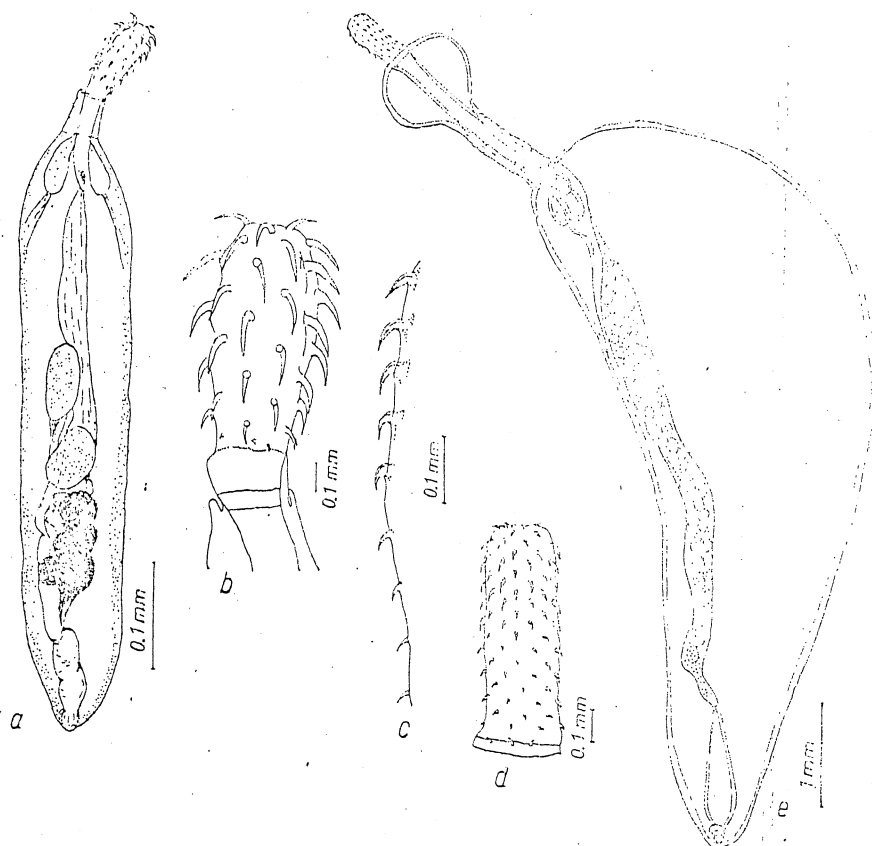


Fig. 1. a, b — *Acanthocephalus anguillae*; a — male; b — proboscis of the male; c, d, e — *Pomphorhynchus* sp. from *Vimba vimba* of the Vistula; c — longitudinal row of hooks; d — proboscis of the female; e — young female

Anguilla anguilla (L.), *Esox lucius* L., *Perca fluviatilis* L. and *Lota lota* (L.) (Ruszkowski 1925, Kozicka 1951, 1953, 1959, Wysocka 1965, Perłowska 1969, Dąbrowska 1970, Ejsymont 1970).

Genus *Pomphorhynchus* Monticelli, 1905

Pomphorhynchus sp.

Three juvenile females were recorded in a vimba captured in the Vistula near Warszawa about 20 km downstream. These specimens showed poorly developed hooks and genital organs. This made a determination of species impossible. They mostly resemble representatives of the genus *Pomphorhynchus*.

Table II

The length relationships of the hook spikes in a longitudinal row of three *Pomphorhynchus* sp. specimens (all measurements in μ)

Hooks in order of precedence (from anterior end to the base of proboscis)	Specimens		
	1st	2nd	3rd
1	33.2	35.6	42.2
2	48.8	45.4	45.4
3	46.8	43.5	46.8
4	46.8	45.9	45.4
5	34.1	45.4	42.2
6	23.9	36.0	33.7
7	22.0	28.6	25.3
8	20.6	28.1	22.0
9		17.8	25.8
10		19.2	22.9
11		29.9	14.9

Table III

Helminth parasites recorded by various authors in *Vimba vimba* in Poland (all records concern the Vistula)

Parasite	No. of fish examined by		
	Prost 1957	Dąbrowska 1970	Present author
	65	9	90
<i>Diplozoon paradoxum</i> Nordmann, 1832	+	+	
<i>Dactylogyrus sphyrna</i> Linstow, 1878	+		
<i>Dactylogyrus cornu</i> Linstow, 1878	+		
<i>Sphaerostomum globiporum</i> (Rud., 1802)			+
<i>Asymphylodora demeli</i> Markowski, 1935			+
<i>Asymphylodora kubanicum</i> (Issaïtsch., 1923)			+
<i>Palaeorchis skrjabini</i> Kowal, 1950			+
<i>Palaeorchis unicus</i> Szidat, 1943			+
<i>Caryophyllaeus laticeps</i> (Pallas, 1781)			+
<i>Metechinorhynchus salmonis</i> (Müller, 1780)		+	+
<i>Acanthocephalus anguillae</i> (Müller, 1780)			+
<i>Pomphorhynchus</i> sp.			+

Description. Acanthocephalans of the genus *Pomphorhynchus*, 8.464—9.885 mm long by 2.314—2.714 mm wide. Anterior portion of the body considerably thicker than the posterior. Proboscis cylindrical, 0.672—0.7 mm long, 0.248—0.294 mm wide, armed with 16 longitudinal rows of 11 hooks each. One specimen shows 17 rows and 8 hooks per row. The hook spikes gradually decrease in size along the proboscis from its free extremity to the base, the first spike of each row being somewhat shorter than the second. The length relationships of the hook spikes are compared in Table II. Roots of the hooks were not observed. The narrow part of the neck cylindrical, 1.071—1.086 mm long by 0.343—0.393 mm wide. Bulb 0.82—1.0 mm in diameter, 0.73—0.795 mm long. Proboscidal sheath 2.17—2.252 mm long, somewhat exceeding the length of neck. Its wall shows two layers. Laminisci oval in outline, measuring 0.3—0.36 by 0.185—0.2 mm. All the measurements were made on fixed specimens.

Summary

An examination of 90 vimbas collected between April and September, 1968, in the middle reaches of the Vistula and in the estuary area of the river, including the Gulf of Gdańsk, revealed 5 trematode, 1 cestode and 2 acanthocephalan species (one unspecified *Pomphorhynchus*). The helminths were detected in 23.3% of the total number of fish examined. *Vimba* was found to be a new host record for *Palaeorchis unicus*, *P. skrjabini* and *Asymphylogora kubanicum*, all these trematode species being reported for the first time from Poland. *Acanthocephalus anguillae*, *Caryophyllaeus laticeps*, *Sphaerostomum globiporum* and *Asymphylogora demeli* are recorded for the first time from vimba in Poland, the middle reaches of the Vistula being a new locality record for the latter trematode species. Changes in the incidence of *C. laticeps* in vimba observed in different reaches of the river are briefly discussed.

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STRESZCZENIE

Zebrany materiał pochodzi z 90 cert, *Vimba vimba* (L.), złowionych w okresie od kwietnia do września jednego roku w Wiśle, w okolicy Dębina i Warszawy oraz w strefie przyujściowej łącznie z Zatoką Gdańską. W wyniku

badania tych ryb autor stwierdził pasożyty jelitowe u 23,3% certy, wśród nich 5 gatunków *Trematoda*, 1 gatunek *Cestoda* i 2 gatunki *Acanthocephala* (jeden z nich, *Pomphorhynchus* sp. określony tylko do rodzaju) oraz *Nematoda*. Autor jednak nie uwzględnia nicieni w niniejszej pracy. Przywry *Palaeorchis unicus*, *P. skrjabini* i *Asymphylogora kubanicum* zostały stwierdzone po raz pierwszy w Polsce, uzupełniając zarazem ogólną listę pasożytów certy. Na listę pasożytów tej ryby w Polsce wpisuje autor po raz pierwszy koleogłowa *Acanthocephalus anguillae*, tasiemca *Caryophyllaeus laticeps* oraz przywry *Sphaerostomum globiporum* i *Asymphylogora demeli*. Ponadto środkowy bieg Wisły jest nowym, stwierdzonym przez autora stanowiskiem *A. demeli* w obrębie zlewiska Bałtyku. Autor zauważył, że ekstensywność inwazji *Caryophyllaeus laticeps* u certy była różna w różnych stanowiskach tego tasiemca, z których pochodziły badane ryby.

