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INFECTION OF THE COMMON GOBY, POMATOSCHISTUS MICROPS, WITH APHALLOIDES COELOMICOLA (Trematoda Digenea)

Besmetting van de brakwatergrondel, Pomatoschistus microps, met Aphalloides coelomicola (Trematoda Digenea).

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INTRODUCTION.

During Summer and Autumn, large numbers of the Common Goby, **Pomatoschistus microps,** occurred in the Dievengat, a shallow brackish water habitat in the North of Belgium. For a description of the habitat see VAES (1977). Practically all fishes were infected with the trematode **Aphalloides coelomicola.** The course of the infection was followed from July till October.

MATERIAL AND METHODS.

1. The host

P. microps is a euryhaline species which can be found all along the European coast from Norway to the Sea of Azov (DUNCKER, 1928 ; NAIDENOVA, 1970). During Summer and Autumm, the fishes live in shallow water, where breeding takes place. In Winter, they migrate seawards to deeper water (JONES & MILLER, 1966 ; MUUS, 1967). Occasionally the species can be found in land-locked pools such as the Dievengat (e.g. also in the Languedoc, France : MAILLARD, 1973).

Spawning takes place from April-May to August. The eggs hatch after 7-10 days at 19-22°C (NYMAN, 1953). The larvae are pelagic during the

first weeks, until they reach a length of 10-12 mm, and then sink to the bottom.

During Summer, there is a relation between body length and water depth : MUUS (1967) found maximum lenghts of 30-35 mm at a depth of 12-25 cm, and 35-40 mm at a depth of 40-60 cm. Maximum length varies from 50 mm (DECKERT & BAUCH, 1955) to 64 mm (JONES & MILLER, 1966).

The total life-span is 1-1½ years ; few individuals will survive a second Winter.

2. The parasite

A. coelomicola was first described by DOLLFUS et al. (1957) and reported by REBECQ (1964) in the Camargue, by NAIDENOVA (1970) in the Black Sea and the Sea of Azov, and by MAILLARD (1973) in the Languedoc.

The complete life cyclus was described by MAILLARD (1973). **Hydrobia stagnorum** was found to be the first intermediate host. The cercariae penetrate **P. microps** and encyst in the mesenterium. After 8-10 days they excyst and become adults in the coelome. Production of eggs starts after 1 month.

3. Techniques

The fishes were caught easily by pressing the sieve with which we collected the benthos (diameter 21 cm) into the sandy bottom. After a few minutes, several fishes had swum into the sieve and stayed circling at the bottom. By lifting the sieve abruptly, most of them were caught. The catches were made at ± 5 m from the shore, at a depth of ± 20 cm.

In the laboratory the fishes were measured and an incision was made from the anus to the pectoral fins. The adult parasites were removed from the coelome and counted.

RESULTS.

1. The host population.

Eggs and larvae of the common Goby were found from the beginning of June. The eggs were deposited in empty shells of **Cerastoderma glaucum.**

In 1973, 30 fishes, caught from July to October, were measured and in 1974 again 30 fishes caught from July to August, when our investigations were stopped. The results of both years are combined.

In Winter 1975 (January-March), 4 fishes were caught accidentally by VANOVERSCHELDE in the brook which supplies the water to the Dievengat. Only 2 of these could be measured. Table 1 gives the number of fishes examined, their average length, and their relative distribution in the different length-classes.

TABLE 1 : **mean length and relative distribution of the hosts.**

Month	Nr. exam.	Average length (mm)	Length-classes (mm) 16-20	21-25	26-30	30
VII	20	22.9 ± 2.7	25 %	50 %	25 %	—
VIII	20	22.7 ± 4.2	35 %	40 %	20 %	5 %
IX	10	27.1 ± 2.3	—	30 %	60 %	10 %
X	10	28.1 ± 2.5	—	—	80 %	20 %
I-III	2	25.5 ± 3.5	—	50 %	50 %	—

In July and August, the relative compositon of the samples remains the same : young post-pelagic stages replace the larger fishes which migrate towards deeper water. In September, the breeding season is over, and no more young fishes are added to the population ; class 16-20 mm disappears, and most of the fishes belong to class 26-30 mm. The mean length is significantly higher than in the previous months. In October, all fishes we examined were larger than 25 mm, and in November no more fishes were seen near the shore.

The few fishes caught in Winter were relatively small ; they must have been born at the end of the breeding-period.

2. The parasite population.

All fishes contained more than 100 metacercariae. Only 3 fishes were found without adult parasites in the coelome. From August on, all hosts were infected with 2-35 adults.

TABLE 2 : **infection with adults, incidence and Mean Worm Burden**

Month	Nr. exam.	Nr. infect.	%	Total nr. of adults	MWB (Min-Max)
VII	21	18	85.7	95	5.3 (1-12)
VIII	20	20	100	299	15.0 (2-33)
IX	10	10	100	211	21.1 (9-33)
X	10	10	100	211	21.1 (8-35)
I–III	4	4	100	18	4.5 (3- 6)
Total	65	62	95.4	834	13.4 (1-35)

The mean worm burden is low in July, increases in August and September and stays at the same level in October.

There seems to be a limit to the intensity of infection : from August to October, the maximum number of parasites per host remains practically the same (33-35).

The intensity of infection of the 4 fishes caught in Winter is very low : they contained resp. 3, 4, 5 and 6 parasites.

SUMMARY AND DISCUSSION.

The progress of infection of **P. microps** with **A. coelomicola** can be summarized as follows :

1. spawning of the host begins in May-June. During June, most of the young fishes will finish their pelagic phase and sink to the bottom.

2. at this period, the emission of cercariae from the first intermediate host, **Hydrobia stagnorum,** will have begun. The young fishes will be infected very quickly ; we never found a host without metacercariae.

3. excystment of the metacercariae begins after 8-10 days. In July, the large majority of the fishes are infected (more thans 85%), but the intensity of infection is still relatively low. It increases during the following months (August-September). In October, the MWB remains constant ; it is possible that a decrease in temperature will limit excystation of the metacercariae.

4. It is noteworthy that the maximum number of parasites in a host remains almost constant from August till October. This could mean that a heavier infection is lethal for hosts in this age-group. In one fish, chosen at random, the weight of host and parasite-burden was determined. The fish contained 23 adults.

Fresh weight :	host	71.80 mg
	parasites	25.75 mg
	i.e. 35.9 % of the host body-weight.	
Dry weight :	host	11.41 mg
	parasite	6.69 mg
	i.e. 56.6 % of the host body-weight.	

As we only studied a segment of the total population, we have no information how the infection progresses in older hosts. MAILLARD (1973) observed a maximal infection of 60 adults/fish, without giving the length of the host. REIMER (1970) found that the incidence of infection of **P. microps** with **A. timmi** was maximal in fishes of 31-35 mm, and then decreased. Fishes larger than 38 mm were never infected. This could mean that only uninfected fishes can reach maturity and propagate.

Probably the same evolution occurs in the Dievengat.

We already discussed the fact that the life-cycle of the parasite can only continue after the death of the host, as the eggs cannot escape from the host (VAES, 1977).

The density of the host can be very high at the end of the summer : HEIP (pers. com.) counted ± 100 fishes/m^2 in September 1971. As there is no connection with the sea, all fishes have to remain in the Dievengat. The sharp drop in density in November is therefore most likely due to an increased mortality of the host.

Lastly, although the number of fishes caught in the Winter is small, it is striking that they contain only a limited number of parasites.

It seems therefore likely that most of the heavily infected fishes will die in the course of summer and autumn, and only the least infected fishes will survive the Winter till the spawning-period in the following Spring.

Considering these observations, we surmise that **A. coelomicola** is an important regulating factor of the population of **P. microps** in the Dievengat.

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