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NOTE ON THE OCCURRENCE OF ACANTHOCEPHALA LARVAE IN GAMMARIDEAN AMPHIPODA FROM THE RIVER SLACK (FRANCE, DÉPT. PAS-DE-CALAIS)

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ABSTRACT

In gammaridean Amphipoda from the river Slack in northern France larval stages of two Acanthocephala species have been found. In *Gammarus fossarum* larvae of *Polymorphus minutus*, a parasite of waterfowl, occurred. This worm was found only once in *Echinogammarus berilloni*. Larvae of *Metechinorhynchus truttae*, parasitizing fish, were harboured only by *E. berilloni* and have not been encountered in *Gammarus fossarum* during the present investigations.

For several years investigations of the gammarid fauna in the Slack, a small stream north of Boulogne ^{s}/mer (France), have been undertaken by members of the Institute of Taxonomic Zoology in Amsterdam (e.g. Stock et al., 1966; Dennert et al., 1969).

Thanks to the kindness of Drs. A. Goedmakers a number of gammarids, harbouring Acanthocephala larvae, from the river Slack were placed at my disposal. The specimens were fixed in 70% alcohol. It was rather difficult or impossible to determine the species of the parasites, since the proboscis of the worm is still inverted in the larval stage. When the acanthocephalan larvae are alive it is possible in some cases to provoke evagination of the proboscis by gently squeezing the worm. For this purpose several hundreds of gammarids were collected from some localities in the river Slack in March 1977. These animals have been examined alive for the presence of Acanthocephala larvae. After removal, the parasites were fixed in 4% formaldehyde and clarified in lactic acid for study under a microscope.

RESULTS

Table I shows the localities, from upstream downwards, where infested gammarids have been collected. Two species of Acanthocephala were met, viz.

Polymorphus minutus (Goeze, 1782) and *Metechinorhynchus truttae* (Schrank, 1788), the former being a parasite of waterfowl, the latter having fish for the final host.

Metechinorhynchus truttae was found to occur much more rarely than *P. minutus*. On the upstream stations of Les Moines and Héronval about 50% of *Gammarus fossarum* Koch, 1836, was infested by the latter parasite. One amphipod was found to harbour up to 26 acanthocephalan larvae! Near Les Moines *Echinogammarus berilloni* (Catta, 1878) was found to coexist with *G. fossarum*, but *Polymorphus minutus* was found only in the latter gammarid, while *E. berilloni* was infested by *M. truttae*. In other localities *Polymorphus minutus* was encountered only in *Echinogammarus berilloni*, while *Metechinorhynchus truttae* never occurred in *G. fossarum*.

At the stations furthest upstream in the Slack, where *Echinogammarus berilloni* does not occur, only *P. minutus* larvae are harboured by *Gammarus*. Downstream of Sainte Godeleine, where *Gammarus fossarum* is absent, only *M. truttae* have been encountered, harboured by *E. berilloni*.

Gammarus pulex pulex (Linnaeus, 1758) is found as well in the river Slack, in coexistence with *Gammarus fossarum* and/or *Echinogammarus berilloni* (see Stock et al., 1966). During the present study, though, no infested *Gammarus pulex* were collected.

Mostly the infective larva of the Acanthocephala (= cystacanth) was found in the amphipods, but some earlier stages (acanthella) of both parasite species have been met with as well. The cystacanths were always surrounded by a transparent, more or less brownish, membrane.

DISCUSSION

The present data, although far from complete, demonstrate one remarkable phenomenon, viz. the exclusive occurrence of *Metechinorhynchus truttae* in *Echinogammarus berilloni*. This parasite is absent in *Gammarus fossarum*, which gammarid was found to harbour *Polymorphus minutus* at the same locality in the river. The highest infections of the latter amphipod by *P. minutus* have been established upstream of Herpont. According to Stock et al. (1966), *Gammarus fossarum* becomes more and more abundant here, while *Echinogammarus berilloni* is found rarely or is totally absent upstream of this locality. During the present study *E. berilloni* was found to occur up to Les Moines, between Herpont and Héronval, this being at the same time the most upstream station where the parasite *M. truttae* was encountered.

Polymorphus minutus is a widely distributed acanthocephalan, mentioned to occur in *Gammarus pulex*, *G. lacustris* Sars, 1863, and *G. duebeni* Liljeborg, 1851, in Great Britain by Hynes & Nicholas (1958); in *Gammarus roeseli* Gervais, 1855, (cf. Scheer, 1935) from Germany and in *Gammarus fossarum* from the Rhône (Van Maren, unpublished). Untill now no data were available on its occurrence in *Echinogammarus berilloni*. Only one invasive larva (cystacanth) has been met with during the present investigations of this gammarid species, in spite of the heavy infections of *Gammarus fossarum* by this parasite in localities where both gammarids coexist.

The absence of larvae of *Metechinorhynchus truttae* in *Gammarus fossarum* from the river Slack is the more puzzling, since this parasite was found in *G. fossarum* from the Rhône river system (Van Maren, unpublished) and is recorded as occurring in the same amphipod from the Fulda (Germany) by Lehman (1967). According to this author the presence of the acanthocephalan larvae in the amphipods seems to be one of the factors affecting the drift rate of *Gammarus fossarum*. The infested gammarids are found more often in the drift samples (especially upstream samples!) than would be in agreement with the proportion they form of the total population.

Awachie (1967) demonstrated that co-invasion of *Gammarus pulex* by *Polymorphus minutus* and *Metechinorhynchus truttae* larvae is possible without any apparent deleterious effects on either species, although he rarely found amphipods harbouring both parasites under natural conditions. In *Gammarus fossarum* from the Ain (Rhône river system) both acanthocephalans were found to coexist as well, but likewise only on rare occasions (Van Maren, unpublished). The present data are in agreement with these observations.

A certain specificity of acanthocephalans towards their intermediate gammarid host has been demonstrated (Hynes & Nicholas, 1958) and could be an explanation for the distribution of the parasites in the gammarids from the Slack.

The above findings, however, might be also due to external environmental factors. *Polymorphus minutus* is a parasite of waterfowl, particularly of ducks. *Metechinogammarus truttae* parasitizes fish in its adult stage. To become infested, the amphipods have to swallow the eggs of the acanthocephalans. So feeding by *Gammarus fossarum* and *Echinogammarus berilloni* in different parts of the river, coinciding with the biotopes of the bird and fish hosts respectively, might be another explanation for the occurrence of the parasites in different gammarid species.

Since hardly any *Gammarus pulex* have been collected during the present study, nothing can be concluded from the fact that no infested specimens were encountered.

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TABLE I

THE OCCURRENCE OF ACANTHOCEPHALA IN GAMMARIDS ON SEVERAL LOCALITIES IN THE RIVER SLACK (FROM UPSTREAM TO DOWNSTREAM)

Station*)	Gammarid species	Acanthocephala
La Fontaine	*G. fossarum*	*Polymorphus minutus*
Héronval	*G. fossarum*	*Polymorphus minutus*
Les Moines	*G. fossarum*	*Polymorphus minutus*
	E. berilloni	*Metechinorhynchus truttae*
Herpont	*G. fossarum*	*Polymorphus minutus*
	E. berilloni	*Metechinorhynchus truttae*
Boubourg	*G. fossarum*	*Polymorphus minutus*
	E. berilloni	*Metechinorhynchus truttae*
Réty	*G. fossarum*	*Polymorphus minutus*
	E. berilloni	*P. minutus + M. truttae*
B^{sse}. Wioves	*G. fossarum*	*Polymorphus minutus*
	E. berilloni	*Metechinorhynchus truttae*
S^{te}. Godeleine	*G. fossarum*	*Polymorphus minutus*
	E. berilloni	*Metechinorhynchus truttae*
D 242^{E}	*E. berilloni*	*Metechinorhynchus truttae*
Rinxent	*E. berilloni*	*Metechinorhynchus truttae*

*) For the exact position of the sampling stations, see table II below.

TABLE II

POSITION OF THE SAMPLING STATIONS IN THE RIVER SLACK (N-France, dépt. Pas-de-Calais)

Station	Position
La Fonteine	near the sources of La Slack, SW of the village of La Fontaine
Héronval	at the chicken-farm of "Héronval", S of Hardinghen
Les Moines	near the farm of "Les Moines", SW of Hardinghen
Herpont	near the bridge of road D 127, SE of Réty
Boubourg	near the farm of "Boubourg", SE of Réty
Réty	near the bridge of road D 127^{E}, at Réty
B^{sse}. Wioves	near Basse Wioves, SW of Réty
S^{te}. Godeleine	near the bridge of road D 232, W of Réty
D 242^{E}	near the bridge of road D 242^{E}, SE of Rinxent
Rinxent	near the railway, at Rinxent