MICROHABITAT DISTRIBUTION OF METAZOAN PARASITES ON GILLS OF *SILURUS ASOTUS* IN JIANGKOU RESERVOIR, JIANGXI PROVINCE, CHINA*

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Received Apr. 16, 1998; revision accepted July 6, 1999

Abstract This paper deals with the proportional distribution, niche breadth and niche overlap of two metazoan parasites (copepods species, *Ergasilus anchoratus* Markewitsch, 1946 and *Pseudergasilus parasiluri* Yamaguti, 1936) and monogeneans (in the genus *Silurodiscoides* Gassev, 1976) found on gills of the fish, *Silurus asotus* L. from Jiangkou Reservoir in Jiangxi Province, China. *E. anchoratus* was the common and dominant metazoan parasite on gills of the fish in this locality as indicated by the higher infection levels, and distributed almost evenly on gill arches without any observed gill-arch preference, as shown by the wide proportional distribution and broad niche breadth. *P. parasiluri* and monogeneans in *Silurodiscoides* were found also without any significant gill-arch preference although they had a rather narrow niche breadth. The observed significant overlap between *P. parasiluri* and *Silurodiscoides* spp. may be simply due to the lower infection levels of the parasites. The observed pattern of unrestricted distributions of the parasitic copepods on gills of the fish may be accounted for, at least in part, by the moving ability of the copepods, and may also indicate that the parasite does not exhibit any feature of gill-arch preference. However, further experimental research is needed to verify the microhabitat distribution of the parasites.

Key words: parasite ecology, microhabitat distribution, fish parasite, gill-arch preference

INTRODUCTION

Intestinal parasite communities in fish are found normally to be poor in terms of species compositions when compared with those in birds and some other higher vertebrates (Kennedy et al., 1986; Esch et al., 1990). However, ectoparasite compositions on gills of fish are considered as species rich (Koskivaara et al., 1991). The ectoparasite communities on gills of fish have thus formed an interesting subject in ecological studies (Koskivaara et al., 1992; Janovy et al., 1997).

Microhabitat distribution and niche preference of parasites on fish gills were studied by various researchers (Arne and Halton, 1972; Wootten, 1974; Adams, 1986; Buchmann, 1989; Nie, 1996). For monogeneans on gills, intraspecific relationships were considered more important than interspecific interactions as niche-restricting factors (Rohde, 1991). In a detailed study on communities of monogenean parasites on roach *Rutilus rutilus*, Koskivaara and Valtonen (1992) found that multispecies infection may exist without competition between monogenean species due to the possible low resistance of the host to the parasites and the ample resource and space on the host. The gill-arch preference by the monogeneans was to some extent seasonal and thus a simple reflection of seasonality, although some species of the monogeneans studied exhibited some niche restriction (Koskivaara et al., 1992; Nie, 1996).

* Project 39370122 supported by NSFC.
During an investigation into the population biology of a parasitic copepod, *Ergasilus anchoratus* Marke-witsch, 1946 (Nie, 1998), other metazoan parasites, i.e. another species of copepod, *Pseudergasilus parasiluri* Yamauchi, 1936 and monogeneans in the genus of *Silurodiscoides* Gusev, 1976 were recorded also on gills of *Silurus asotus* L. from Jiangkou Reservoir in Jiangxi Province of China. The present study is on the microhabitat distributions of the metazoan parasites on gills of *S. asotus*.

**MATERIALS AND METHODS**

In total, 176 fish from Jiangkou Reservoir (114°8' E, 27°8' N) situated in Jiangxi Province were examined for the presence and number of metazoan parasites on the gills.

Two species of copepods, i.e. *E. anchoratus* and *P. parasiluri*, and monogeneans in the genus *Silurodiscoides* were found on the gills of *S. asotus*. The monogeneans found were not identified into species as their numbers were few and the species in the genus *Silurodiscoides* parasitic on gills of the fish are several (Pan et al., 1990) and examinations of individual specimens which are necessary for the species identification are considered not feasible. Species identification of the monogeneans was thus not done and they were analysed as a group as done by many others (Hanek and Fernando, 1978; Adams, 1986).

The parasite number of the two copepods and the number of monogeneans on gill arches of the same order on the left and right sides were added together, that is, the respective parasite number on the left and right sides of gill arch 1, 2, 3, 4 were added respectively. Gill-arch preferences of the parasites were then compared, according to Koskivaara et al. (1992), using the proportions of specimens of each of the two copepods and the monogeneans on the 4 arches, and the monthly differences in the proportions among gill arches were tested using ANOVA. The niche breadth of the metazoan parasites on the gills was calculated from the 4 gill arches of each individual fish using the method of Koskivaara et al. (1992). For the overlap between species, a proportional similarity measure (Schoener, 1968) was used: \( 1 - \frac{1}{2} (P_{ia} - P_{ja}) \), where \( P_{ia} \) is the proportion of the specimens of species \( i \) in a sample and \( P_{ja} \) is the proportion of species \( j \). Differences in this measure were tested by the Mann-Whitney U-test. All terms used were defined either by Margolis et al. (1982) or Esch et al. (1990).

**RESULTS**

The infection levels of the metazoan parasites found on gills of *S. asotus* were different. The prevalence and abundance of *E. anchoratus* were significantly higher than those of *P. parasiluri* and *Silurodiscoides* spp. (\( P < 0.01 \), G-test of heterogeneity for prevalence and \( t \)-test for parasite number) (Table 1). This indicated that in Jiangkou Reservoir, *E. anchoratus* was the most common and dominant metazoan parasite on gills of *S. asotus*. No statistical difference was found between infection levels of *P. parasiluri* and *Silurodiscoides* spp. (same test as above, but \( P > 0.05 \)).

<table>
<thead>
<tr>
<th></th>
<th><em>E. anchoratus</em></th>
<th><em>P. parasiluri</em></th>
<th><em>Silurodiscoides</em> spp.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prevalence (%)</strong></td>
<td>69.46</td>
<td>13.17</td>
<td>7.78</td>
</tr>
<tr>
<td><strong>Abundance (x ± S.D)</strong></td>
<td>28.95 ± 41.38</td>
<td>0.31 ± 1.50</td>
<td>0.22 ± 0.98</td>
</tr>
</tbody>
</table>

Table 1 The prevalence and abundance of *E. anchoratus*, *P. parasiluri* and *Silurodiscoides* spp. on gills of *Silurus asotus* in Jiangkou Reservoir in Jiangxi Province, China.