

## Possible Life Cycle of *Longicollum pagrosomi*, an Acanthocephalan Parasite of Cultured Red Sea Bream

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*Longicollum pagrosomi* Yamaguti, 1935 is one of the most pathogenic parasites of red sea bream, *Pagrus major* (Temmink and Schlegel), cultured in western Japan<sup>1)</sup>. This species usually occurs in the host's rectum. *Longicollum pagrosomi* causes various histopathological effects on the host<sup>2)</sup> and in case of heavy infection it can result in the host's mortality<sup>3)</sup>. Little information is available about the life history of *L. pagrosomi*. Yamaguchi<sup>1)</sup> suggested that netpen-reared red sea bream become infected with this parasite by feeding on fresh fish given as food. However, since even artificial pellets-fed red sea bream are frequently and often heavily infected (Nagasawa and Yasumoto, unpublished), it seems possible that animals other than fresh fish are the source of infection at fish farms. Amphipod crustaceans have been reported to serve as intermediate hosts for acanthocephalans of the family Pomphorhynchidae<sup>4)</sup>. During various surveys at fish farms, we found numerous amphipod crustaceans on netpens of red sea bream and expected that those amphipods are intermediate hosts of *L. pagrosomi*. This note deals with the results of experimental infection with *L. pagrosomi* by feeding amphipods collected from netpens to red sea bream.

### Materials and Methods

Amphipods were collected from the netpens of a red sea bream farm at Takashima-cho (33°25'N, 129°46'E), Nagasaki Prefecture, western Japan, on June 12, 1984. These amphipods included 3 species: *Caprella equilibra* Say, *C. californica* Stimpson

(family Caprellidae), and *Jassa* sp. aff. *marmorata* Holmes (family Ischyroceridae). They were brought to the laboratory and kept in a refrigerator until experimental infections. Sixteen age-1 red sea bream (142-183 mm in fork length) were obtained as experimental definitive hosts at the Aquaculture Research Laboratory, Nomozaki-cho, Nagasaki Prefecture. Amphipods mixed with frozen-thawed fish mince were given to 10 fish (Experiment I), while a gelatine capsule containing amphipods was force-fed to each of the remaining 6 fish with a blunt pipette (Experiment II). Unfortunately, the number of amphipods given to the fish was not counted in both experiments. Each group of these fish was kept in a 500 l tank with aeration. Artificial pellets were daily given to the fish. Three were taken from each group at 1, 3, and 5 (only Experiment I) days post-infection (PI) and examined for *L. pagrosomi*. When worms were found, they were removed and identified. The site of infection was also recorded. Prior to these experiments, 20 other red sea bream from the Aquaculture Research Laboratory were dissected and determined to be free of parasites. Water temperatures ranged from 22.8-24.5°C during the experiments.

### Results

*Longicollum pagrosomi* was found in 8 (89%) of 9 fish in Experiment I and 4 (67%) of 6 fish in Experiment II. The intensity of infection in Experiment I ranged from 5-18 (mean 9.5) worms per infected fish and the mean intensities were 6.7, 11.7 and 10.5 worms at 1, 3 and 5 days PI. The intensity of infection in Experiment II ranged from 2-6 (mean 4.0) worms and the mean intensity decreased from 4.7 to 2.0 worms between 1 and 3 days PI. A total of 105 *L. pagrosomi* was recovered from the intestines of 13 fish from both experiments. Most (81; 77%) of the worms occurred in the rectum, although 13 (12%) and 11 (11%) worms were found, respectively, unattached and in other parts of the intestine at 1 day PI. All of the worms found at 3 and 5 days PI were restricted to the rectum. No parasites other than *L. pagrosomi* were found in the intestine.

### Discussion

From the above experiments, it is evident that the amphipods ingested by the red sea bream contained infective larvae of *L. pagrosomi*. We thus suggest

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that red sea bream reared at fish farms get infection with this parasite by feeding on amphipods harboring its larvae. In other words, we think that the life cycle of *L. pagrosomi* is completed in netpens, using red sea bream and amphipods as definitive and intermediate hosts, respectively. Differences in the prevalence and intensity of infection in the fish between two experiments are probably caused by the difference in the method of giving amphipods to the experimental fish and in the abundance of amphipods given. Since we did not directly verify the occurrence of *L. pagrosomi* in the amphipods used for the experiments, parasitological examination of amphipods from netpens is required.

Yamaguti<sup>9)</sup> reported the occurrence of immature *L. pagrosomi* in some teleosts and there is a possibility that small fish straying into netpens are another source of the infection. We should examine those small fish collected from the vicinity of netpens for *L. pagrosomi*.

*Longicollum pagrosomi* became established in the rectum 3 days or less PI. This suggests that *L. pagrosomi* exhibits a high preference for the rectum. It is likely that *L. pagrosomi* migrates to the rectum in a few days even if it is first attached to other parts of the intestine.

In conclusion, amphipod crustaceans serve as intermediate hosts for *L. pagrosomi*. Red sea bream reared at fish farms may become infected with this

parasite by feeding on amphipods occurring on netpens. *Longicollum pagrosomi* shows a preference for the rectum.

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