

## Even young fish inhabit a large area.

Most parasites live upon several specific hosts during their lifetime.

The characteristic of parasites can be used to determine the range in which an animal moves and the connections with other organisms.

Fish were found to travel a long distance from their early stages and inhabit a large area.

Parasites are “biological tags” that are easy to use and provide much information on the ecology of organisms.



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Center and the main stream of the Kiso River. The lower ends of the experimental streams (terminal reservoir mouths) are approximately 700 m away from the Kiso River.

## Tag parasites

Of those fish parasites, parasite species that have an intermediate host not found in the experimental streams or the Shin-Sakai Stream were used as tag parasites, and fish infected with the parasites were regarded as having migrated from the main stream of the Kiso River.

There were seven tag parasite species, which were trematodes. Trematode larvae (cercariae) swim to reach their fish hosts, but are weak swimmers and cannot swim against the water current. They metamorphose into the next-stage larvae (metacercariae) on fish. In general, metacercariae do not fall off from their host fish once they have been infected.

## Materials and Methods

On May 10, 2001, the experimental streams were opened, and water was allowed to pass through. All adult fish found in the experimental streams in this year were those that had migrated from the Shin-Sakai Stream, and had possibly carried parasites already. Thus, it was decided that only those 0-year-old fish that had hatched in the experimental streams would be surveyed, and *Gnathopogon elongatus* was used since for this species 0-year-old fish and adult fish are easily distinguishable by their body size. 0-year-old fish were collected non-periodically from July to December, and were dissected in order to examine infection with the tag parasites.

## Results

By July 3 infected young fish were found in Experimental Stream A (minimum body length of 29.7 mm). No infected young fish were found in Experimental Stream B probably because the place from which the fish were captured was isolated after May 31. The number of fish carrying the tag parasites increased from summer to autumn, and from late November to early December, 71% of 0-year-old fish were infected. This percentage showed no significant difference from the percentage of young *Gnathopogon elongatus* captured in the Shin-Sakai Stream in January and October 2001.

## Discussion

Freshwater fish are known to migrate during their spawning seasons and swim into temporal water areas, such as paddy fields and stream branches. The experimental streams are likely to serve as a temporal water area. The study showed that not only adult fish but also young fish, which were believed to be stationary, can move more than 700 m.

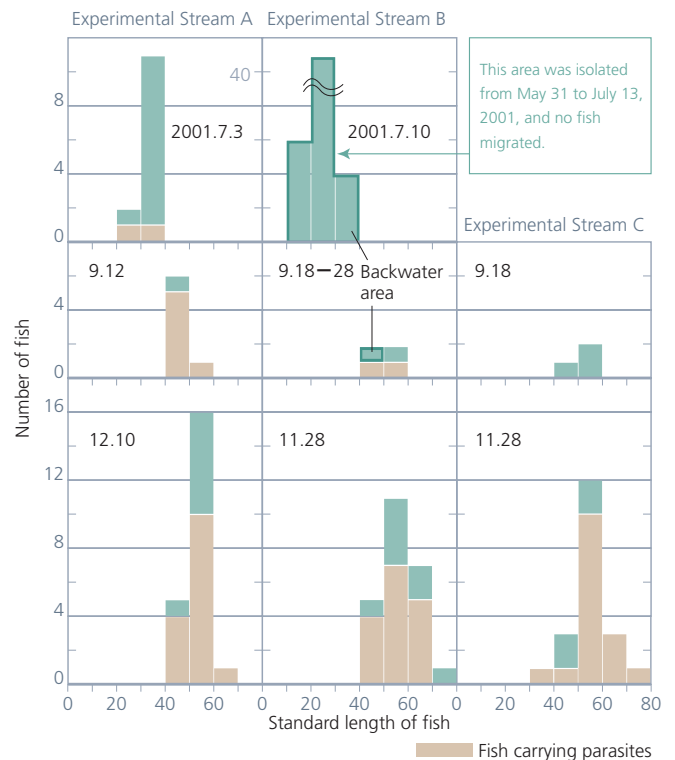
### Experimental procedure



Dissecting a fish

Looking for parasites under a microscope

### Growth of *Gnathopogon elongatus* and infection with the tag parasites



### Column

Fish parasites with known life-cycles are available as a biomarker indicating their host migration. A parasite in a fish is a direct evidence that the fish has eaten, or contacted with, the former host organisms (usually intermediate hosts). When the former hosts are restricted in a certain environment such as lakes, marine or unpolluted water, the parasite also indicates that the fish has migrated from the sites with such environment.