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Preliminary Studies on Metazoan Parasites of Chum Salmon
(*Oncorhynchus keta*) in Korea

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Preliminary Studies on Metazoan Parasites of Chum Salmon (*Oncorhynchus keta*) in Korea

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Abstract

Parasites as ‘biological tags’ have been used for fish population studies. For example, parasites have been successfully used for studying stock structure, stock identification and migration routes of anadromous fishes such as Pacific salmon (*Oncorhynchus* spp.). Most of *Oncorhynchus* species migrating to East Coast of Korea is Chum salmon (*O. keta*), although Cherry salmon (*O. masou*) was also recorded. The annual catches and releases of *O. keta* in Korea have been increased, but no systematic and clear information, such as migration routes, are available yet. The information on their parasites is not available, neither.

We investigated metazoan parasites of 80 *O. keta* from Namdae River caught in 2004. Whole fish were frozen and transported to the laboratory, where they were measured, thawed and dissected to investigate metazoan parasites.

Parasite species found were 1 digenea (1 Digenea sp.), 3 cestoda (*Eubothrium* sp., *Nybelinia* sp. plerocercoid, 1 cestoda sp.), 3 nematoda (*Anisakis simplex* larva, *Contracaecum* sp. larva, *Hysterothylacium* sp.larva), and 1 copepoda (*Lepeophtherius salmonis*). All the fish examined had at least 1 parasite species. The most abundant parasite was *Eubothrium* sp. (93.8% of fish examined were infected), and the number of *Eubothrium* sp. from infected fish was ranged from 29 to more than 100 per individual fish. One digenea species was recorded from 25 individual fish, and some nematoda species recorded were not possible to conduct precise identification. *L. salmonis* were recorded from the skin of fish examined, but the prevalence of infection was low (6% of fish examined were infected).

More detailed and large-scale studies will provide more important and precise information on the parasitic fauna of *O. keta* in Korea. And this will be helpful for clarifying migration routes, stock identification and obtaining other biological information of *O. keta* in Korea.

Introduction

By investigating parasitic fauna of a certain fish species, much information such as the population structure, stock identification, migration routes, diet and so forth can be obtained. Although there can be some limitations on using parasites as biological tags for population studies of marine fishes (see Arthur, 1997), the advantages over other tagging methods make us use fish parasites as biological tags. In particular, they are less expensive and more appropriate for investigating small delicate fish and invertebrates (MacKenzie and Abaunza, 1998).

For anadromous fish, geographical origin of salmonid fishes caught in the North Pacific region has been of much interest for certain countries in terms of fish stock management. And since Margolis published the first report of the oceanic distribution of Pacific salmon of the genus *Oncorhynchus* (Margolis, 1992), many researchers have reported geographical distribution, stock identification of the genus *Oncorhynchus*, most of which have been conducted with the myxosporean parasites (Awakura, Nagasawa and Urawa, 1995).

Korea has been releasing and catching salmonid fish like other North Pacific countries, and most of catch is occupied by *Oncorhynchus keta*. However, no systematic efforts have been made for investigating migration routes nor increasing migration rates, and annual catches and releases of *O. keta* have been fluctuated, recently (Lee et al., 2005).

The present study was undertaken to investigate metazoan parasites of *O. keta* in Korea and potential use of metazoan parasites as biological tags of *O. keta* stocks.

Materials and Methods

We investigated metazoan parasites of 80 *O. keta* (Fork length ranges from 56.2 cm ~ 70.5 cm, Total weight ranges from 2.35 kg ~ 6.67 kg) caught from Namdae River, in 2004. Whole fish were frozen and transported to the laboratory, where they were measured, thawed and dissected to investigate metazoan parasites. External parasites were examined, fixed with 10% buffered formalin or 70% ethanol, and identified. Gastrointestinal tracts were opened longitudinally, and the contents rinsed into beakers and examined for endoparasites. The parasites were fixed with APG or 10% buffered formalin, and stained when necessary. All parasites found were identified to the lowest taxon as possible, and the prevalence of infection, which is the proportion of hosts (%) infected with a particular parasite species, was measured. Intensity is the number of a particular parasite species in an individual infected host.

Results and Discussion

Parasite species found were 1 digenea (1 Digenea sp.), 3 cestoda (*Eubothrium* sp., *Nybelinia* sp. plerocercoid, 1 cestoda sp.), 3 nematoda (*Anisakis simplex* larva, *Contracaecum* sp. larva.

Hysterothylacium sp.larva), and 1 copepoda (*Lepeophtherius salmonis*) (Table 1). All the fish examined had at least 1 parasite species. The most abundant parasite was *Eubothrium* sp. (93.8% of fish examined were infected), and the number of *Eubothrium* sp. from infected fish were ranged from 29 to more than 100 per individual fish. Due to difficulties in the identification of intestinal cestodes, the data recorded may be possibly changed by further investigation. One digenea species was recorded from 25 individual fish, and some nematoda species recorded were not possible to conduct precise identification. With the digenea and 1 unidentified cestoda, Nematoda species recorded here await further species identification. *L. salmonis* were recorded from the skin of fish examined, but the prevalence of infection was low (6% of fish examined were infected).

Table 1. Prevalence of Infection (%) and Mean Intensity (\pm S.D.) of Metazoan Parasites from *O. keta* in Namdae River. The number of fish examined was 80.

	P (%)	Mean Intensity	Infection Site
Unidentified Digenea sp.	31.3 %	6.08 \pm 3.74	Gastrointestinal tract
<i>Eubothrium</i> sp.	93.8 %	*71.2 \pm 23.9	Intestine
<i>Nybelinia</i> sp. plerocercoid	28.8 %	2.82 \pm 1.99	Musculature
Unidentified Cestoda sp.	NC	NC	Intestine
<i>Anisakis simplex</i> larva	17.5 %	1.36 \pm 0.63	Body Cavity, Musculature
<i>Contracaecum</i> sp. larva	8.75 %	1.13 \pm 0.35	Body Cavity Musculature
<i>Hysterothylacium</i> sp. larvae	5.00 %	1.25 \pm 0.50	Body Cavity, Musculature
Unidentified Nematoda sp.	NC	NC	Body Cavity
<i>Lepeophtherius salmonis</i>	6.3 %	2.40 \pm 1.14	skin, fin

P: Prevalence of Infection

NC: Not Counted

*: When one individual fish harbored more than 50 *Eubothrium* sp., the number of *Eubothrium* sp. was considered 50.

Due to lack of sufficient information on parasites of *O. keta* in literature and no information on protozoan parasites of *O. keta* in this study, direct comparison was not possible. More detailed and large-scale studies are necessary for providing useful information on *O. keta* population in Korea. Myxosporean parasites have been used successfully as biological tags in salmonid fishes (Awakura et al., 1995), Hence this approach would be interesting.

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