J. Fish Pathol., 10(2) : 137 ~ 142

The helminthic parasites of greenling, *Hexagrammos otakii* Jordan et Starks, from the Korean southern sea

Ki-Hong Kim†, Sung-Hoi Huh* and Bo-Young Jee**

Department of Fish Pathology, College of Fisheries Sciences and

**Department of Oceanography, College of Marine Sciences and Technology,*

Pukyong National University, Pusan 608-737

***Pathology Division, National Fisheries Research and Development Institute, Pusan 619-900*

A monogenean gill parasite, *Prosomicrocotyla gotoi*, and a digenean intestinal fluke, *Opecoelus sphaericus*, were found from greenilngs (*Hexagrammos otakii*) captured at the Korean southern sea. *P. gotoi* was characterized by having two separated frills of opisthaptor and distinguished from *P. chirii* in testis and clamp numbers. *O. sphaericus* had three pairs of finger-like marginal appendages on the ventral sucker and the parasite was distinguished from *O. nipponicus* in the location pattern of testes. These two helminth species were the first recording species in Korea.

Key words : *Prosomicrocotyla gotoi*, *Opecoelus sphaericus*, Greenling, Monogenea, Digenea

Greenlings, *Hexagrammos otakii*, are commonly found in the coast of Korea and eaten popularly as a sliced raw fish in Korea. Recently many fisheries units culture greenlings in the caged pen and some scientists endeavor to rear this species in the terrestrial tank system. Such an artificial culture system exerts adverse effects on fish hosts, but that is advantageous to some parasites because they can increase the likelihood of transmission (Godin and Sproul, 1988).

To culture fish, therefore, the pathogens including virus, bacteria, parasite of the fish must be investigated thoroughly. But there are no data on the pathogens of greenlings in our country. Therefore, we investigated the helminthic parasites of greenlings, which were caught in the South Coast of Korea.

Materials and Methods

†Corresponding author

Greenlings were collected by trawl in Kwangyang Bay, Hadong-Gun between August, 1996 and May, 1997. Collected greenlings were transported to the our laboratory in live state and examined all organs for parasites.

The recovered worms were fixed in hot 70% alcohol and stained with Semichon's acetocarmine, then mounted with canada balsam. Mounted specimens were measured and observed with a light microscope and were illustrated with the aid of a camera lucida.

Results

One monogenean species, *Prosomicrocotyla gotoi*, was found on the gills and one digenean species, *Opecoelus sphaericus*, parasitized in the intestine of greenlings. These two species were the first recording species in Korea.

***Prosomicrocotyla gotoi* (Yamaguti, 1934) (Fig.1)**

Synonym : *Microcotyle gotoi* Yamaguti, 1934

Description based on 5 adult specimens. Body elongated spatular form, tapering to anterior end, 3.75-3.95 mm long, 0.98-1.03 mm wide at level of ovary. Tegument without any armaments. One pair of globular suckers located in prohapor, 0.0375-0.0625×0.0325-0.0475 mm. Opisthaptor divided into left and right frills commencing at level of ovary: each frill armed by 32-56 clamps. Clamps similar in structure but dissimilar in size, the largest clamp 0.093−0.095×0.113-0.120 mm. Clamp skeleton composed of three pairs of lateral sclerites - two of which strongly recurved, almost meeting near distal end - and one median sclerite with a supplementary process. Pharynx spherical, 0.050-0.063×0.050-0.058 mm. Esophagus simple cylindrical without lateral diverticula. Intestine diverticulate, extending into posterior end of body. Testes 43-50 in number, irregular in shape, between intestinal crura. Vas deferens expanded to form sinuous seminal vesicle, running anteriorly in midline, dorsal to uterus. Genital atrium ovoid, armed with numerous inner spines, anterior to level of intestinal bifurcation, 0.068-0.075×0.053-0.075 mm. Ovary long, tubular, pretesticular, question mark shaped. Ootype elongated spindle shaped, dorsal to vitelline reservoir. Vaginal pore oval, dorsally opened, with several inner protuberances, located one-third of way from genital atrium to ovary. Vitelline follicles laterally distributed extending from level of intestinal bifurcation into poterior end of body. Eggs fusiform, 0.188-0.213× 0.060-0.88 mm, filamented at each pole.

***Opecoelus sphaericus* Ozaki, 1925 (Fig.2)**

Description based on 5 adult specimens. Body slender cylindrical form, 2.87-3.90 mm long, 0.38-0.43 mm wide. Tegument smooth. Oral sucker subterminal, 0.145-0.150×0.125-0.145 mm. Prepharynx and esophagus very short. Pharynx well developed, 0.130-0.135×0.083-

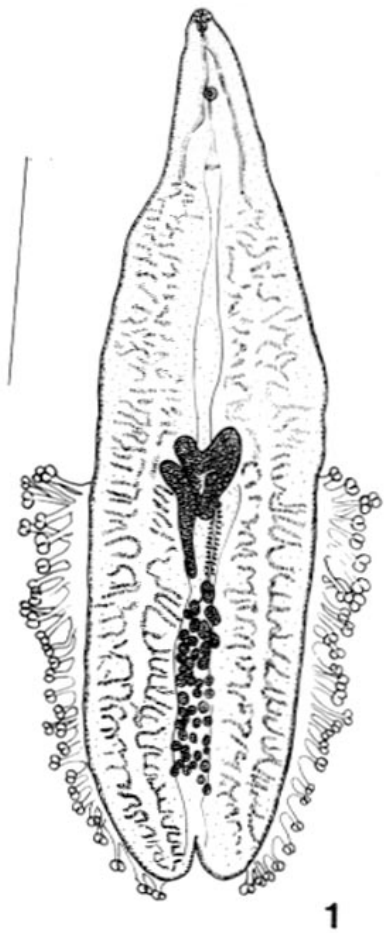

Fig. 1. *Prosomicrocotyla gotoi* — ventral view (Scale bar unit : 1㎜)

Fig. 2. *Opecoelus sphaericus* — ventral view (Scale bar unit : 1㎜)

0.120 mm. Intestinal caeca unite at the posterior extremity of body. Ventral sucker pedunculated, with three pairs of finger-like marginal appendages, 0.15-0.22 mm in diameter.

Testes elongated oval, entire or sometimes indented irregularly, tandem, anterior testis 0.30 ×0.20-0.23 mm, posterior testis 0.26-0.33×0.21-0.26 mm. Cirrus pouch small, situated immediately behind caecal bifurcation. External seminal vesicle elongated-claviform, lying free in parenchyma, extending far beyond posterior border of ventral sucker. Ovary three-lobed, heart-shaped, median, pretesticular, 0.15-0.17× 0.16-0.20 mm. Uterus preovarian. Eggs 0.068-0.075×0.045-0.048 mm. Vitelline follicles

reaching anteriorly to level of posterior border of ventral sucker, confluent posttesticularly.

Discussion

Prosomicrocotyla is a genus in the family Microcotylidae. Yamaguti (1934) reported *Microcotyle gotoi* as a new species and later he (1958) established a new genus *Prosomicrocotyla* using this species as a type species. The opisthaptor of *Prosomicrocotyla* is divided into two separate marginal frills and this is the most distinguishing characteristic of *Prosomicrocotyla* from *Microcotyle*. The morphological characteristics of our specimens were well coincided with Yamaguti's (1934, 1958) descriptions (Table 1). Only two species -*P. gotoi* and *P. chiri*- are recorded in the genus *Prosomicrocotyla* and *P. gotoi* can be distinguished from *P. chiri* by the clamp number and the testis number.

Polyopisthocotylean monogeneans are sanguinivorous (Llewellyn, 1954; Halton and Jennings, 1965). Even though the amount of blood ingested by each worm is small, massive infections would be expected to remove a significant amount of blood. Especially, the caged-culture system provides very good conditions for prospering of monogeneans. In order to culture greenlings successfully, therefore, the biology and the treatment measures of *P. gotoi* must be established.

The genus *Opecoelus* was established by Ozaki (1925) and the diagnostic features of this genus from other genera in Opecoelidae are as following; intestinal caeca uniting to open through a ventral common anus near posterior end of body and ventral sucker bearing 3 (or rarely 5 or none) pairs of papilliform or digitiform marginal appendages (Shimazu, 1988). Two species of this genus - *O. sphaericus* and *O. nipponicus* - were recorded as digeneans of *Hexagrammos otakii*

Table 1. The dimensional comparison of *Prosomicrocotyla gotoi* between original description and the present material (unit : mm)

Features	Yamaguti (1934)	Present material
Body lenght	2.7-3.1 〈3.9-5.5〉	3.75-3.95
Body width	0.75-1.0〈0.18-1.6〉	
Anterior sucker	0.036-0.042×0.03	0.0375-0.0625×0.0325-0.0475
Pharynx	0.042-0.045 in dia.	0.050-0.063×0.050-0.058
Testes number	78-86 〈40-90〉	43-50
Egg	0.16-0.9 long	0.188-0.213×-0.060-0.088
Clamp number	36-44 pairs 〈25-52〉	32-56 pairs

The figures in 〈 〉 designate the description of Yamaguti (1958)

in Japan. These two species are very similar in morphology, but can be distinguished by the testes location and the distribution pattern of vitelline follicles. The testes are distinctly separated and the vitelline follicles are not interrupted at the level of the testes in *O. sphaericus*. The interrupted pattern of the vitelline follicles at the level of the testes, however, is not considered as a distinguishing feature between those two species. Because several of our specimens show interrupted pattern of vitellaria this phenomenon may be related simply to the increasing volume of the testes.

The pathological effects of parasitising intestinal digeneans in fish are not well established. However, several scientists have reported that intestinal helminths can exert a wide range of physiological and behavioural effects upon their fish hosts (Moore, 1984; Sindermann, 1987; Godin and Sproul, 1988; Garnick and Margolis, 1990). In our study, almost all individuals of greenling were infected with *O. sphaericus* and probably some harmful effects might have been exerted on the fish host. The digenean parasites, however, seldom have been shown to infect massively in culture systems because of their complex life cycle.

References

Garnick, E. and Margolis, L. : Influence of four species of helminth parasites on orientation of seaward migrating sockeye salmon (*Oncorhynchus nerka*) smolts. Can. J. Fish. Aquat. Sci., 47(12) : 2380-2389, 1990.

Gordin, J. J. and Sproul, C. D. : Risk taking in parasitized sticklebacks under threat of predation: effects of energetic need and food availability. Can. J. Zool., 66 : 2360-2367, 1988.

Halton, D. W. and Jennings, J. B. : Observations on the nutrition of monogenetic trematodes. Biol. Bull., 129 : 257-272, 1965.

Llewellyn, J. : Observation on the food and gut pigment of the Polyopisthocotylea (Trematoda: Monogenea). Parasitology, 44 : 428-437, 1954.

Moore, J. : Parasites that change the behaviour of their host. Sci. Am., 250 : 108-115, 1984.

Ozaki, Y : Preliminary notes on a trematode with anus. Zool. Mag., 37 : 416-423, pl.8, 1925 (in Japanese).

Shimazu, T. : Trematodes of the genera *Coitocaecum*, *Dimerosaccus* and *Opecoelus* (Opecoelidae: Opecoelinae) from freshwater fishes of Japan. Proc. Jpn, Soc. Syst. Zool., No. 37 : 1-19, 1988.

Sindermann, C. J. : Effects of parasites on fish populations: practical considerations. Int. J. Parasitol., 17 : 371-382, 1987.

Yamaguti, S. : Studies on the helminth fauna of Japan. Part 2. Trematodes of fishes, I. Jap. J. Zool., 5 : 249-541, 1934.

Yamaguti, S. : Studies on the helminth fauna of Japan. Part 53. Trematodes of fishes, XII. Seto Mar. Biol. Lab., 7(1) : 53-88, 1958.

한국 남해안산 쥐노래미에 기생하는 연충류

김기홍 · 허성희* · 지보영**

부경대학교 수산과학대학 어병학과, *해양과학대학 해양학과, **국립수산진흥원 병리과

한국 남해안에서 채집한 쥐노래미를 대상으로 기생성 연충류를 조사한 결과 아가미에 기생하는 단생흡충류, *Prosomicrocotyla gotoi*, 1종과 장관에 기생하는 흡충류, *Opecoelus sphaericus*, 1종이 발견되었다. 이 두종은 모두 우리나라에서는 처음 기록되는 미기록종들이었다.

*P. gotoi*는 후고착반(*opisthaptor*)이 두갈래로 나뉘어진 frill형태에 의해 특징지워지며, 유사종인 *P. chirii*와는 고환과 clamp의 수에 의해 구별되었다. *O. sphaericus*는 복흡반의 가장자리에 3쌍의 손가락 모양 돌기가 나 있었으며, 유사종인 *O. nipponicus*와는 고환의 위치에 의해서 구별되어졌다.

Key words : *Prosomicrocotyla gotoi*, *Opecoelus sphaericus*, Greenling, Monogenea, Digenea