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□ Brief Communication □

Two species of goby, *Boleophthalmus pectinirostris* and *Scartelaos* sp., as the new second intermediate hosts of heterophyid fluke in Korea

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Abstract: A survey was performed in order to determine the infection status of the metacercariae of heterophyid fluke in two goby species, *Boleophthalmus pectinirostris* and *Scartelaos* sp., collected from Gangjin-gun, and Shinan-gun, Sooncheon-shi, Jeollanam-do, Republic of Korea. A total of three metacercariae of *Heterophyopsis continua* was found in only one *B. pectinirostris* (10.0%) from Gangjin-gun. *Heterophyes nocens* metacercariae were detected in 24 *B. pectinirostris* (96.0%) and 14 *Scartelaos* sp. (63.6%) from Shinan-gun. *Heterophyopsis continua* metacercariae were found in 11 *B. pectinirostris* (44.0%) and 21 *Scartelaos* sp. (95.5%) from Shinan-gun. *Stictodora fuscata* metacercariae were detected in 18 *B. pectinirostris* (72.0%) from Shinan-gun. No metacercariae were detected in 20 *B. pectinirostris* from Sooncheon-shi. From the above results, this study is the first to prove that *B. pectinirostris* and *Scartelaos* sp. serve as the second intermediate hosts of some heterophyid flukes in Korea.

Key words: gobies, second intermediate host, heterophyid fluke, metacercaria

Heterophyid flukes (Trematoda: Heterophyidae) are very small parasites which live in the small intestines of fish-eating birds and mammals. More than 30 species of heterophyid flukes have been known to infect human beings all over the world (Ito, 1964; Yu and Mott, 1994). Out of 10 human-infecting species reported in Korea, six of them, *Heterophyes nocens*, *Heterophyopsis continua*, *Pygidiopsis summa*, *Stellantchasmus falcatus*, *Stictodora fuscata*, and *Stictodora lari*, are contracted through the consumption of the raw flesh of brackish water fishes (Chai and Lee, 2002). *Lateolabrax japonicus* (perch), *Konosirus punctatus* (shad), *Mugil cephalus* (mullet), and *Acanthogobius flavimanus* (goby) have all been reported as sources of infection (Chun, 1960 & 1963; Seo et al., 1980, 1981, 1984; Chai and Sohn, 1988; Chai et al., 1989; Sohn et al., 1994; Sohn and Moon, 2001). However, the bluespotted mud hopper, *Boleopthalmus pectinirostris*, and *Scartelaos* sp. have not been evaluated as intermediate hosts of heterophyid flukes in Korea. Therefore, we collected and surveyed two species of goby, *B. pectinirostris* and *Scartelaos* sp., from three coastal areas of Jeollanam-do for heterophyid fluke metacercariae.

Two species of goby, *B. pectinirostris* and *Scartelaos* sp. (Fig. 1), were collected in Sooncheon-shi, Gangjin-gun, and Shinan-gun, Jeollanam-do, Korea, between June and September, 1999 (Table 1). All of the collected fish were transferred to our laboratory and examined individually by the pepsin-HCl artificial diges-

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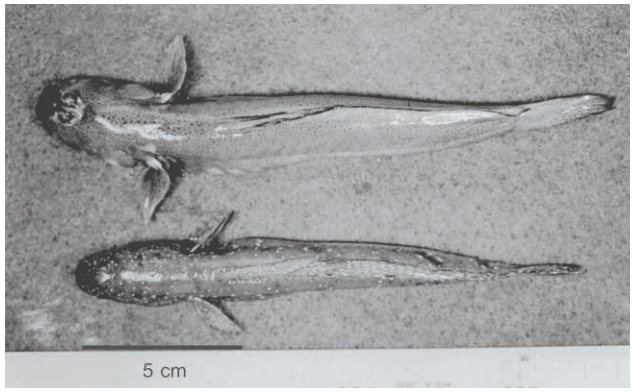

Fig. 1. Two species of gobies, *Boleophthalmus pectinirostris* (lower one) and *Scartelaos* sp. (upper one) collected from Shinan-gun, Jeollanam-do, Korea.

tion method for trematode metacercariae.

No metacercariae were detected in 20 *B. pectinirostris* collected at Sooncheon-shi. *H. nocens* metacercariae were detected in 24 *B. pectinirostris* (96.0%) and 14 *Scartelaos* sp. (63.6%) from Shinan-gun. The detailed infection status of *H. nocens* metacercariae is provided in Table 2. *H. continua* metacercariae were found in only one *B. pectinirostris* (10%) from Gangjin-gun. They were also detected in 11 *B. pectinirostris* (44.0%) and 21 *Scartelaos* sp. (95.5%) from Shinan-gun. Data regarding infection status with *H. continua* metacercariae is shown in Table 3. *S. fuscata* metacercariae were detected in 18 (72.0%) out of 25 *B. pectinirostris* from Shinan-gun. The metacercarial density in the fish ranged from 15 to 256 (82.7 in average).

Several investigators in Korea have previously reported on the metacercariae of heterophyid flukes collected from fish acting as intermediate hosts (Chai and Lee, 2002). Chun (1960) first detected *H. continua* metacercariae from perches and shads. Chun (1963) isolated *P. summa* metacercariae in mullets. Seo et al. (1980) newly described the metacercariae of *H. nocens* from mullets. Chai and Sohn (1988) identified *S. falcatus* metacercariae encysted in mullets. Chai et al. (1989) found *Stictodora lari* metacercariae in a goby species, *A. flavimanus*. Sohn et al. (1994) detected *S. fuscata* metacercariae from gobies. Sohn et al. (2003) also identified *Acanthotrema felis* metacercariae collected from gobies. Among these metacercariae, those of *H. nocens*, *H. continua*, and *S. fuscata* were found in two goby species, *B. pectinirostris* and *Scartelaos* sp., in the present study.

Endemic foci of *H. nocens* infection are scattered around the southwestern coastal areas and islands, especially in Shinan-gun and Muan-gun, Jeollanam-do, Korea (Chai and Lee, 2002). Some species of brackish water fish, including *M. cephalus*, *A. flavimanus*, *Tridentiger obscurus*, *Liza haematocheila*, *Therapon oxyrhynchus*, and *Glossogobius giuris brunneus*, have been reported as sources of infection in Japan and Korea (Komiya, 1965; Seo et al. 1980, 1981). In the present study we are the first to prove that *B. pectinirostris* and *Scartelaos* sp. from Shinan-gun also serve as the second intermediate hosts of *H. nocens*. They may act as sources of human infection in endemic areas.

Many fish species, such as *M. cephalus*, *L. japonicus*, *A. flavimanus*, *K. punctatus*, *Plecoglossus altivelis*, *Conger myriaster*, *Harengula zunasi*, *Dorosoma thrissa*, *Coilia* sp.,

Table 1. The bluespotted mud hopper, *Boleopthalmus pectinirostris*, and *Scartelaos* sp. collected from three coastal areas of Jeollanam-do, Korea

Locality collected	No. of fish examined	Length (cm)		Weight (g)	
		Range	Average	Range	Average
Sooncheon-shi	20	12.9-15.2	14.0	32.1-53.5	41.0
Gangjin-gun	10	12.5-14.7	13.6	28.1-40.7	35.8
Shinan-gun					
Aphae-myon	18	7.0- 8.9	7.9	4.8-11.3	7.7
Jido-myon	7[a)]	11.3-13.2	12.2	18.1-28.2	22.6
Jido-myon	22[b)]	11.6-17.6	15.5	20.0-58.7	46.1

[a)]All of examined fishes were *Boleopthalmus pectinirostris*.
[b)]All of examined fishes were *Scartelaos* sp.

Table 2. The infection status of *Heterophyes nocens* metacercariae in *Boleopthalmus pectinirostris* and *Scartelaos* sp. from three coastal areas of Jeollanam-do, Korea

Locality	No. (%) of fish Infected	No. of metacercariae detected		
		Total	Range	Average
Sooncheon-shi	0	-	-	-
Gangjin-gun	0	-	-	-
Shinan-gun	38 (80.9)	557	1-34	14.7
Aphae-myon	18 (100.0)	406	11-34	22.6
Jido-myon	6 (85.7)[a)]	35	2- 9	5.8
Jido-myon	14 (63.6)[b)]	116	1-21	8.3

[a)]All of infected fishes were *Boleopthalmus pectinirostris*.
[b)]All of infected fishes were *Scartelaos* sp.

Table 3. The infection status of *Heterophyopsis continua* metacercariae in *Boleopthalmus pectinirostris* and *Scartelaos* sp. from three coastal areas of Jeollanam-do, Korea

Locality	No. (%) of fish Infected	No. of metacercariae detected		
		Total	Range	Average
Sooncheon-shi	0	-	-	-
Gangjin-gun	1 (10.0)	3	-	3
Shinan-gun	32 (68.1)	302	1-42	9.4
Aphae-myon	4 (22.2)	5	1- 2	1.3
Jido-myon	7 (100.0)[a)]	99	1-42	14.1
Jido-myon	21 (95.5)[b)]	198	1-24	9.4

[a)]All of infected fishes were *Boleopthalmus pectinirostris*.
[b)]All of infected fishes were *Scartelaos* sp.

Cyprinus carpio, *Mugil affinis*, *Gobius nebulosus*, and *B. pectinirostris*, have been recorded as the second intermediate hosts of *H. continua* in Japan, Korea, and China (Kanemitsu et al., 1953; Chun 1960; Komiya, 1965; Kobayashi, 1968; Seo et al., 1984; Cho and Kim, 1985; Sohn et al., 1994; Kim et al., 1996; Sohn and Moon, 2001). Among these fish hosts, *M. cephalus*, *L. japonicus*, *A. flavimanus*, *K. punctatus*, *P. altivelis*, and *C. myriaster* have been recorded in Korea. Accordingly, two species of goby, *B. pectinirostris* and *Scartelaos* sp., should be added to the list of fish which act as intermediate hosts of *H. continua* in Korea, although *B. pectinirostris* has previously been recorded as an intermediate host in China (Kobayashi, 1968).

By the present study, it was first proved that the bluespotted mud hopper, *B. pectinirostris*, is the second intermediate host of *S. fuscata*. Up to the present time, two species of brackish water fish, *M. cephalus* and *A. flavimanus*, have been recorded as the second intermediate hosts of *S. fuscata* in Japan and Korea (Onji and Nishio, 1916; Sohn et al., 1994). In the present study, we have confirmed that *B. pectinirostris* and *Scartelaos* sp. are newly-identified second intermediate hosts of *H. nocens*, *H. continua*, and *S. fuscata* in Korea.

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