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Phrixocephalus umbellatus (Copepoda: Lernaeidae) from Marine Fish, *Branchiostegus japonicus* of the Korean Southern Sea

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A species of the parasitic copepods, *Phrixocephalus umbellatus* (Lernaeidae; Cyclopoida) from *Branchiostegus japonicus*, is described and reported for the first time in Korea. The parasite was recovered from the eye of host. *P. umbellatus* was easily identified by the body shape, extensive ramification of the antennal processes, and numerous branches on the thoracic horns. The parasite inserted its head and the anterior portion of thorax up to the 4th segment in the eye ball of the host through a narrow hole, which it usually burrowed near the upper margin of the cornea above the crystalline lens. Prevalence of the parasite increased from 3.3% in January to 11.9% in June.

Key words : Parasitic copepoda, *Phrixocephalus umbellatus*, Korean fish, *Branchiostegus japonicus*

Introduction

Because of serious economic damage, copepod parasites have been considered as enemies of fishes (Kabata, 1979; Suh et al., 1992, 1993; Choi et al., 1994, 1995, 1996b, 1998), shellfishes (Wilson, 1938; Davey et al., 1978; Paul, 1983; Suh and Choi, 1990, 1991; Choi and Suh, 1991), and ascidians (Choi and Hong, 1994). Kabata (1981) reviewed the effects of copepod infections on their fish hosts and divided them into two categories: The first, local effects are those limited to the immediate vicinity of the copepod's attachment site and are mainly due to the mechanical influences of its attachment and feeding activities. The second, general effects are those which manifest themselves at sites remote from the permanent habitat of the adult parasite. Choi et al.(1996a) examined histologically fish gills invaded by the second antenna of *Acanthochondria sprigera* and found that copepod eat oesophageal mucous.

We had an opportunity to examine specimens of marine fish, *Branchiostegus japonicus*. Having studied this material, we recovered a species of copepod parasites, *Phrixocephalus umbellatus* for the first time in Korea.

Materials and Methods

The fish examined for the copepod parasites were taken from January 1997 to December 1998 in the south sea, Korea (32° 50'N, 126° 25'E). The copepod parasites were removed from the eye of *Branchiostegus japonicus*, and all the parasites were fixed in 5% buffered formalin-seawater. For morphological observation the copepods were cleared in lactic acid and dissected on wooden slides as used by Humes and Gooding (1964). All figures were drawn with the aid of a camera lucida. Body structures are described according to the terminology of Shiino (1956), Yamaguti (1963) and Kabata (1979).

Result and Discussion

The classification of copepods is listed as follows : Suborder Cyclopoida Sars, 1886

Family Lernaeidae Cobbold, 1879

Phrixocephalus umbellatus.Shiino, 1956

1. *Prevalence*

Prevalence of *Phrixocephalus umbellatus* was studied by monthly investigation for two years period. There were detected 25 parasited among 1,249 investigated fish. The parasitic intensity was showed two female parasites per fish in the maximum. Prevalence of the parasite varied during investigated period, such as 0%, 3.3%, 11.9%(Table 1).

2. *Habitat*

Phrixocephalus is a genus of lernaeid copepods which shows the peculiar mode of life to live upon marine bottom-fishes inserting the anterior part of body in the eye. The fixation of body within the host eye is insured not only by the neck, but also by the filiform processes which project from the side head and send forth many branches and branchlets. Spreading throughout the wall of eye ball on its median side, these, as a whole, make an umbrella-like organ which takes firm hold of the ball to become an effective anchor. They are enveloped by the cyst-like thickening of the chorioid tissue of eye, but invade neither the sclera, nor the retina.

Table 1. Data on the prevalence and relative of *Phrixocephalus umbellatus* on the *Branchiostegus japonicus* from January 1997 to December 1998

Date	Number of fish		Prevalence (%)
	examined	infected	
Jan. 1997	49	2	4.1
Feb.	60	2	3.3
Mar.	60	0	0
Apr.	52	0	0
May	60	0	0
June	60	6	10.0
Sep.	60	0	0
Oct.	60	0	0
Nov.	60	0	0
Dec.	60	0	0
Jan. 1998	60	2	3.3
Feb.	60	1	1.7
Mar.	60	2	3.3
Apr.	60	0	0
May	60	0	0
June	84	10	11.9
Sep.	60	0	0
Oct.	76	0	0
Nov.	89	0	0
Dec.	59	0	0

3. *Description*

Female : Body (Fig. 1), brownish in preservative, with head processes much paler in color and antennal branch darker; egg strings yellowish brown. Head (Fig. 2A) produced and more or less tubercular on anterior margin, continuing back to the ventral face of neck without distinct demarcation. Lateral processes in 2 pairs, each being divided from the very base into a few branches which shoot out many branchlets; these overlapping one another all around head circumference. Neck (Fig. 2B, C), comparatively long, jointed with trunk at right angles, with the region posterior to thoracic horns much narrowed, curved ventrally nearly at right angles and inserted to trunk some distance behind anterior end; thoracic horns present at posterior 1/3 of neck; dorsal pair 5 or 6

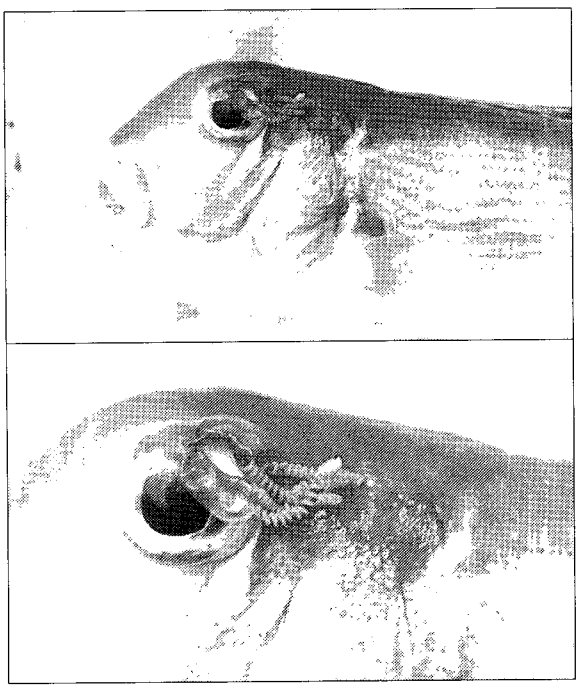

Fig. 1. *Phrixocephalus umbellatus* on the eye of *Branchiostegus japonicus*.

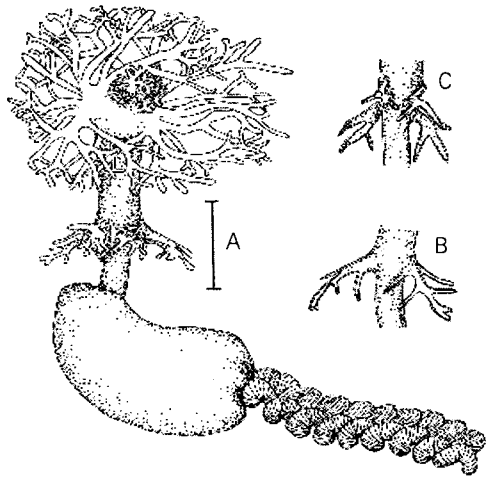

Fig. 2. ***Phrixocephalus umbellatus*** **Shiino, Female: A, head and neck in ventral view, trunk in side view; B, thoracic horns, dorsal view; C, same, ventral view. Scale bar: A~C=3mm.**

branches, and ventral horns divided from the very base into 5 divergent branches. Trunk about as long as head and neck combined together, rather thick, with concave dorsal and convex ventral faces. Caudal end winding, well round, and swollen ventrally. Egg tubes slightly divergent in both case.

4. *Remarks*

Phrixocephalus umbellatus was first reported from *Callionymus richardsoni* at sea of Japan (Shiino, 1956). The Korean fish, *Branchiostegus japonicus* should be considered as an additional host of this species because *P. umbellatus* were recovered from the south sea of Korea. *P. umbellatus* is easily identified by the body shape, extensive ramification of the antennal processes, and numerous branches on the thoracic horns. Resembling in many respects of original species, the present species differs from it as Table 2.

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Table 2. Comparison of morphological features among ***Phrixocephalus umbellatus*** **which infected in the marine fish,** ***Branchiostegus japonicus*****. Measurements in mm.**

Items	*Phrixocephalus umbellatus*					
	Present	Shiino(1956)				
		Holotype	Paratype	Dextral	Sinistral	No.318
Host	*Branchiostegus japonicus*	*Callionymus richardsoni*				
Transverse diameter of head processes	8.56 (7.79-8.73)	7.70	6.60	4.46	3.48	
Dorsoventral diameter of head processes	6.52 (5.41-6.67)	6.39	5.70	3.92	2.04	
Length of head and neck	7.53 (4.35-7.76)	6.60	5.58	4.62	2.60	3.08
Length of trunk	7.12 (6.75-7.25)	6.46	6.15	5.54	3.93	4.31
Thickness of trunk	3.92 (3.87-4.34)		4.46	2.54	2.13	2.62
Width of trunk	3.78 (3.45-3.86)		3.16	2.54		2.23
Length of egg string	7.75 (6.23-8.12)			7.93	3.67	7.30

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