

## Infestation Status of Parasitic Copepod, *Clavella adunca* (Strom) on Black Rockfish, *Sebastes melanops*

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**Abstract** - The occurrence and infection level of parasitic copepod *Clavella adunca* on the black rockfish, *Sebastes melanops* at the Hatfield Marine Science Center Aquarium were studied. *C. adunca* was usually found on the base of fins, preferably on the pectoral fins. Seven specimens of black rockfish, *Sebastes melanops* were collected from Oregon Coast Aquarium. Copepods of ten *Clavella adunca* were present as ectoparasites attached to the fins in the black rockfish. The prevalence and relative density of *Clavella adunca* were 28.6% and 1.4 respectively. It is considered that the tissue of the fin membrane offers the most favorable conditions for the attachment of *C. adunca*.

**Key words** : Copepod, *Clavella adunca*, Black rockfish, Infestation, Pectoral fins

### INTRODUCTION

The genus *Clavella* Oken, 1815, described parasitic copepods belonging to the family Lernaeopodidae. The parasitic copepod species in the present study were identified as *Clavella adunca* of which belong to the suborder Siphonostomatoida. The copepods parasitize teleost fishes and are widespread in both the Atlantic and Pacific Oceans (Kabata 1970).

*Clavella* copepods are important parasites of both marine and fresh-water fish, which may be killed by only a few parasites. Several members of the lernaeopod *Clavella*, parasitic on the fins of fishes, may cause lesions and tumors (Poulsen 1939; Nunes-Ruivo 1957; Kabata 1970). Attaching in great numbers on the fins of fishes, the copepods disturb respiratory processes, damage the tissues of the fins, and cause deterioration in the condition of the host and sometimes epizootics. *C. adunca* is one of the most commonest crustaceans para-

sitic on fish (Wilson 1915; Heegaard 1947; Kabata 1979). Nunes-Ruivo (1957) described for the first time the existence of definite differences between the maxillae of *C. adunca* and *C. dubia*. The view of *Clavella adunca* (Strom 1762) have been reported by Kabata (1979), who suggested the recognition of similarity between *C. adunca* and *C. uncinata* by the adoption of trinominal nomenclature. The mature female copepods are usually found attached to the fish, with the distinctive paired egg sacs at the posterior end (Leigh-Sharpe 1920).

The purpose of this study is to describe the infestation status of the parasitic copepod, *Clavella adunca* on the black rockfish, *Sebastes melanops*.

### MATERIALS AND METHODS

Seven specimens of the black rockfish, *Sebastes melanops* were collected alive from Hatfield Marine Science Center Aquarium from September 19 to October 22, 2001. Collected fish were transported to the laboratory of Oregon State University. All fins and gills were fixed

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in 10% formalin.

Copepods in coiled form were removed from the fins and placed in petri dishes with the saline solution. Worms were washed with glycerin. *C. adunca* were sorted with a micropin under a stereomicroscope. The length and width of parasitic copepods were measured and then they were stored in 70% alcohol.

According to Margolis *et al.* (1982) the prevalence was expressed as a percentage of the number of host specimens infected by parasites divided by the number of fish examined. Relative density was obtained as the total number of parasites divided by the total number of host specimens examined. Average intensity was calculated as the average number of parasites found per infected fish.

## RESULTS

The average length of the cephalothorax of the black rockfish was 2.75 mm, ranging from 2.7 to 2.8 mm. The mean width of the cephalothorax was 0.55 mm, ranging from 0.5 to 0.6 mm. The average length of the trunk was 2.55 mm, ranging from 2.4 to 2.7 mm. The mean width of the trunk was 2.15 mm, ranging from 1.9 to 2.4 mm. The average length of the ovisac was 3.0 mm, ranging from 2.6 to 3.4 mm. The mean width of the ovisac was 0.5 mm, ranging from 0.4 to 0.6 mm (Table 1).

The distribution of *C. adunca* on the fins of black rockfish is shown in Table 2. Out of ten copepods, six were attached to the pectoral, three to the dorsal, and one to the caudal fins. No parasites were found on the pelvic and anal fins (Table 2). A high proportion of copepods (60.0%) was found attached to the pectoral fins. *C. adunca* showed a preference for pectoral fins. Of seven specimens of the black rockfish examined, two fish were infected by ten individuals of *C. adunca*. Therefore, the

**Table 1.** Measurements of *Clavella adunca* on the fins of the black rockfish, *Sebastes melanops*

Species	Body	
	Length	Width
Cephalothorax	2.7~2.8	0.5~0.6
Trunk	2.4~2.7	1.9~2.4
Ovisac	2.6~3.4	0.4~0.6

**Table 2.** Distribution of *Clavella adunca* on the fins of the black rockfish, *Sebastes melanops*

Fins	Number of parasites	Percentage of total
Pectoral	6	60.0
Caudal	1	10.0
Dorsal	3	30.0
Pelvic	0	0
Anal	0	0
Total	10	100.0

**Table 3.** Prevalence and relative density of *Clavella adunca* on the black rockfish, *Sebastes melanops* from the Oregon Coast Aquarium

No. of fish examined	7
No. of fish infected	2
Prevalence (%)	28.6
No. of parasites	10
Relative density	1.4
Average intensity	5

prevalence, relative density, and average intensity were 28.6%, 1.4 and 5, respectively (Table 2).

## DISCUSSION

In this study, ten individuals of the parasitic copepods, *Clavella adunca* were recovered from seven black rockfish. In the Kurile-Kamchatka area of the north-western Pacific, Vinogradov (1968) suggests that copepods are the most abundant animals at almost all levels. With the average length of cephalothorax 2.8 mm, its trunk was 2.6 mm and ovisacs was 3.0 mm (Table 1). The length of cephalothorax (2.7~2.8 mm) was longer than that of the trunk (2.4~2.7 mm). Ovisacs (2.6~3.4 mm) was longer than the trunk (2.4~2.7 mm) by a fourth (Table 1). A long ovisacs was typical of *C. adunca*. *C. adunca* were distinguished from the form by the relatively wide trunk and cephalothorax. Specimens of black rockfish at Hatfield Marine Science Center Aquarium was infected with copepod parasites, identified as *Clavella adunca*. *C. adunca* in the coiled form lost their tightly packed configuration, tending towards a loosely coiled form similar to that reported by Gooding and Humes (1963) for *H. cyclopterina*.

The external body surface, gills and fins of each black rockfish were examined. Worms were found commonly

on the fins and infected. The mean number of parasites per fish was 1.4. The species showed the preference for pectoral, dorsal and pelvic fins, but any specimens were not found on the pelvic and anal fins (Table 2). Poulsen (1939) reported that *C. adunca* was normally found on the unpaired fins and almost exclusively on their brim. For the black rockfish, the parasitological habitat found is supported by the negative search for *C. adunca* in gills. Attachment on pectoral fins of black rockfish was on the dorsal surface near the trailing edge closest to the body. Froiland (1974) mentioned that *Clavella* sp. was the dominant parasite on the fins of polar cod in the Barents Sea. The fact that black rockfish harboured these worms on the pectoral fins may justify the assumption that the pectoral fins are easily attacked.

Incidences of infestation are expressed as a percentage of seven specimens of black rockfish, *Sebastes melanops* examined. A total of ten *C. adunca* were found to infect 28.6% of the black rockfish examined (Table 3). Schram (1980) reported that *C. adunca* infested whiting and 26.9% were parasitized with intensity a mean 1.4 parasites per infected fish. The prevalence of the present study was similar to that of Schram (1980) and higher than 19.3% of Polyanskii (1955) in the cod, *Morhua morhua*.

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(Received 27 August 2002, accepted 16 October 2002)