

## Studies on Gill Infection of Rockfishes, *Sebastes* spp. Caused by Monogenetic Trematodes

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**Abstract** - The study of the gill infection of rockfishes, *Sebastes* spp. by monogenetic trematodes conducted during March 2002 to June 2002 are presented. Three species are reported from examination of 23 rockfishes collected from Oregon Coast Aquarium and Newport fish market, Oregon. Ten rockfishes belonging to three species showed an infection rate of 43.5%. A total of 135 monogenetic trematodes was found in the gills of *Sebastes* spp. Of 135 worms recovered from the gills of 4 harbor rockfishes, two were *Sebastes maliger*, 14 *S. melanops*, 110 *S. pinniger*, and 9 *S. crameri*. Prevalence and intensity in *Microcotyle sebastis* were 11.9% and 4.0, and for *Trochopus trituba* they were 81.5% and 55.0, and for *Trochopus australis*, they were 6.7% and 2.3, respectively. These worms are mainly found firmly attached to the primary lamellae of the gills of the rockfishes.

**Key words** : rockfish, monogenetic trematodes, *Microcotyle sebastis*, *Trochopus trituba*, *Trochopus australis*

### INTRODUCTION

A great number of species of monogenean helminths has been reported from marine fishes of Pacific waters (Winter 1955). The infection of parasites has been useful in providing information in the diverse regions as the phylogenetic and ecological relationships of their host.

The parasites by ectoparasitic monogenean helminths have harmful effects on fish when it is intense and concentrated in the gills. Gill lesions of the monogenetic trematodes are characterized by the impairment of respiration and excretory functions, and affect the growth rate or predispose fish to other diseases. The heavy infections of the monogeneans are considered dangerous to fish populations to cause mortalities (Prost 1973;

Roberts 1978; Rohde 1984; Lester and Adams 1974).

This study is based on the monogenetic trematodes collected from 23 *Sebastes* spp. and undertaken to investigate the prevalence and intensity of parasites occurring in the gills of rockfishes.

### MATERIALS AND METHODS

Twenty three specimens of rockfishes ranging in size from 33.7 to 58.0 cm, three quillback rockfish, *Sebastes maliger* Jordan and Gilbert, 7 black rockfish, *S. melanops* Girard, 3 canary rockfish, *S. pinniger* Gill and 10 darkblotched rockfish, *S. crameri* Jordan were collected for monogenetic trematodes from Oregon Coast Aquarium and Newport fish market, Oregon. The host specimens were transported on ice to laboratory, where they were examined for monogenetic trematodes using conventional parasitological techniques (Hoffmann 1967).

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The whole gills from each fish were excised.

Gills of fish were placed separately into a 1 : 4000 formalin solution. The parasites were removed for examination after one hour and the identifications and degree of infection were recorded. Monogenetic trematodes were fixed in AFA (Alcohol-Formal-Acetic acid solution) and preserved in 70% alcohol. The worms were examined under a stereomicroscope using magnifications of 50x. Hosts were identified using the keys and systematics of Kramer and O'Connell (1995). The procedures for examination of monogenea were made according to Palsson and Beverly-Burton (1983).

Parasite prevalence and intensity of infection were calculated for parasites of rockfish samples. The terms of the prevalence and intensity are used in accordance with Margolis (1982). Prevalence refers to the percentage of infected hosts in a specimen, and intensity the number of parasites in an individual host.

## RESULTS

Ten of 23 (43.5%) *Sebastes* spp. encountered during the examination being represented by monogenetic trematodes. Of 23 rockfishes, 13 remained free from the monogenea. Three different species of parasites were recovered from examination of *Sebastes* spp. In the present study 33.3% of the quillback rockfish, *S. maliger*, 42.9% of the black rockfish, *S. melanops*, 66.7% of the canary rockfish, *S. pinniger*, and 40.0% of the dark-blotched rockfish, *S. crameri*. In separate lamellae of the gills, 135 worms were found. Of 135 monogenean helminths from *Sebastes* spp., two recovered in the *S. maliger*, 14 in the *S. melanops*, 110 in the *S. pinniger*, and 9 in the *S. crameri*.

Of the monogenetic trematodes recovered from *Sebastes* spp., 81.5% were infected with *Trochopus trituba*, 11.9% by *Microcotyle sebastis* and 6.7% by *Trochopus australis*. *M. sebastis* were found ranging from 0 to 5 per infected fish. The number of parasites in the *T. trituba* varied from 49 to 61, whereas the number of *T. australis* varied from 1 to 3. The average number per infected fish was 4.0 for *M. sebastis*, 2.3 for *T. australis*, and 55.0 for *T. trituba*.

## DISCUSSION

A total of three monogenetic trematodes species have been collected. *Microcotyle sebastis* Goto, is a monogenean parasite of the gills belonging to the family Microcotylidae and *Trochopus trituba* Pratt and Aldrich, and *T. australis*, Richardson, belonging to the family Capsalidae. Of 23 rockfishes, 13 remained free from the monogenea. In all, the infected rockfishes carried 135 parasites, 126 of which were in the aquarium. In four host specimens, each infected fish carried but a single specimen of monogenean helminth. *M. sebastis* were common to both *S. maliger* and *S. melanops*.

The amount of infection in terms of both prevalence and intensity was greatest in *T. trituba* of *S. pinniger*, and least in *M. sebastis* of *S. maliger*. Prevalence was low with the notable exceptions of *T. trituba*. Notably high levels of prevalence were shown by *T. trituba*. *M. sebastis* are found moderate numbers in the *S. melanops*, but lowest numbers in *S. maliger*. Intensity varied greatly with both rockfish and parasite species. *S. pinniger* occurred at a distinctively high level of intensity in *T. trituba*, but *S. maliger* and *S. crameri* appeared at lower levels in *M. sebastis* and *T. australis*. Moderate low level of intensity was occurred by *S. melanops* in *M. sebastis*. The difference in levels of intensity between *T. trituba* and *T. australis* is remarkable in two rockfishes of the same genus.

The worms are found in the primary lamella from the

**Table 1.** Number of *Sebastes* spp. examined and number and percentage in parentheses infected with monogenean helminths

Host	Mean length (cm)	No. examined	No. infected	Percentage
<i>Sebastes maliger</i> Jordan and Gillbert	36.4	3	1	33.3
<i>Sebastes melanops</i> Girard	43.6	7	3	42.9
<i>Sebastes pinniger</i> Gill	58.0	3	2	66.7
<i>Sebastes crameri</i> Jordan	33.7	10	4	40.0
Total		23	10	43.5

**Table 2.** Parasites recovered from rockfishes, *Sebastes* spp. at the Oregon coast aquarium and Newport fish market

Host	Parasites	No. infected	Locality
<i>S. maliger</i>	<i>Microcotyle sebastis</i>	2	Aquarium
<i>S. melanops</i>	<i>M. sebastis</i>	14	Aquarium
<i>S. pinniger</i>	<i>Trochopus trituba</i>	110	Aquarium
<i>S. crameri</i>	<i>T. australis</i>	9	Fish market
Total		135	

**Table 3.** Details of infection of *Sebastes* spp. with monogenean helminths

Species	Prevalence (%)	Intensity	
		Range	Mean
<i>Microcotyle sebastis</i>	11.9	0-5	4.0
<i>Trochopus trituba</i>	81.5	49-61	55.0
<i>Trochopus australis</i>	6.7	1-3	2.3

distal tip or from the base of the gills. The degree of gill infestation by external parasites is related to respiratory volume and the specific pattern of water flow. The adhesive attitude of these worms is characteristic of the monogenetic trematodes and appears to lessen the effects of water currents (Kearn 1966; Paling 1966). Llewellyn (1956) reported that the distribution of monogenean helminths on the gills may be due to the pattern of the flow of the gill ventilation current. It may be considered that rockfishes belonging to the different genera acquire their infestation with these worms from infected tanks even though incoming fishes routinely are treated.

## REFERENCES

- Hoffmann GL. 1967. Parasites of north American freshwater fishes. University of California Press, Berkeley, CA. pp.6-10.
- Kearn GC. 1966. The adhesive mechanism of the monogenean parasite *Tetraonchus monenteron* from the gills of the pike (*Exox lucius*). Parasitol. 56:505-510.
- Kramer DE and VM O'Connell. 1995. Guide to Northeast Pacific Rockfishes. Genera *Sebastes* and *Sebastolobus*. Alaska Sea Grant. Marine Advisory Bulletin No. 25. pp.1-78.
- Lester RJG and JR Adams. 1974. *Gyrodactylus alexanderi*: reproduction, mortality, and effect on its host *Gasterosteus aculeatus*. Can. J. Zool. 52:827-833.
- Llewellyn J. 1956. The host specificity, microecology, adhesive attitude, and comparative morphology of some trematode gill parasites. J. Mar. Biol. Assoc. U. K. 36: 243-259.
- Margolis L. 1982. Parasitology of Pacific Salmon—an overview. pp.135-226. In Aspects of parasitology—a festschrift dedicated to the 50th anniversary of the institute of parasitology of McGill University, 1932-1982. McGill University, Montreal, Canada.
- Paling J. 1966. The attachment of the monogenean *Diplectanum aequans* (Wagener). Dying to the gills of *Morone labrax* L. Parasitology 56:493-503.
- Palsson J and M Beverley-Burton. 1983. *Laminscus* n. g. (Monogenea:Gyrodactylidae) from Capelin, *Mallotus villosus* (Muller) (Pisces: Osmeridae) in the Northwest Atlantic with redescription of *L. gussevi* n. comb., *Gyrodactyloides petruschewskii* and *G. andrichewi*. Can. J. Zool. 61:298-306.
- Prost M. 1973. Fish Monogenoidea of Poland. II. Parasites of *Ictalurus nebulosus* (Le Sueur). Revision of genera *Cleidodiscus* Muller, 1934 and *Urocleidus* Muller, 1934. Acta Parasitol. Pol. 21:315-326.
- Roberts RJ. 1978. The pathophysiology and systemic pathology of teleosts. Fish Pathology Bailliere Tindall, pp.58-91.
- Rohde K. 1984. Disease caused by metazoans: Helminths. In: "Diseases of marine animals," vol. IV(1): Introduction, Pisces (O. Kinne, ed). pp.210-229. Biologische Anstalt Helgoland, Hamburg.
- Winter HA. 1955. *Capsula caballeroi* sp. n., Parasito de *Sarda orientalis*, con un cata'logo de los trema'todos monogen'eos de los peces del Oce'ano Pacifico de las Americas. Rev. Brasil Biol. 15:9-32.

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