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SOME HELMINTHS OF THE MUDSUCKER FISH, *GILLICHTHYS MIRABILIS* COOPER*

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ABSTRACT: *Gillichthys mirabilis* Cooper (mudsucker, long-jawed goby) collected at Baja California, Mexico, near Scammon Lagoon, Salton Sea, Seal Beach and Newport Bay, and San Francisco Bay, California were examined for helminths. The monogenetic trematode, *Gyrodactylus* sp., was found on the gills of fish from all localities except the Salton Sea. A small digenetic trematode was recovered from the posterior intestine of fish from Baja California and is described as *Lecithaster minimus* sp. n. Encysted trematodes and larval cestodes also were found in fish from Baja California and Seal Beach. An adult acanthocephalan, *Microsentis wardae* Martin *and* Multani, 1966, was found in fish from Baja California. A larval acanthocephalan was recovered from the *coelom* of hosts from Seal Beach. The nematode, *Vasorhabdochona cablei* Martin and Zam, 1967, was found in certain blood vessels of fish from Baja California and Seal Beach. Another nematode, *Spirocamallanus pcreirai* (Annereaux, 1946) was found in the intestine of fish from all localities except the Salton Sea.

INTRODUCTION

The mudsucker or long-jawed goby, ***Gillichthys mirabilis*** Cooper, is found along the western coast of United States and Baja California, Mexico, in sloughs, bays, and estuaries. It is an important bait fish for salt- and freshwater fishing being capable of living in both environments and of surviving for extended periods (one week) out of water if kept moist. Collections of 172 fish, 116 from Baja California (near Scammon Lagoon), 12 from the Salton Sea, 30 from estuaries at Seal Beach and Newport Bay, and 24 from San Francisco Bay, have been examined for helminths.

The helminths obtained ***were*** studied alive and as whole mounts and serial sections. Heidenhain's "Susa" fixative and either paracarmine, Galigher's haematoxylin, or Mallory's triple stain was used. All measurements are expressed in millimeters unless otherwise indicated.

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Members of the following groups of helminths were found: Acanthocephala, Trematoda, Cestoda, and Nematoda.

ACANTHOCEPHALA

Microsentis wardae Martin and Multani, 1966 was found in the posterior intestine of about ***93 %*** of the ***Gillichthys mirabilis*** collected near Scammon Lagoon, Baja California but was not found in fish from any other localities. The density of infection ranged from 1-60 worms per fish. This genus and species were described by Martin and Multani *(1966).*

A larval acanthocephalan (Fig. 4) was found in the coelom or attached to mesenteries of fish collected in the Seal Beach area. They are orange-red in life. Fourteen whole mounts stained with paracarmine were measured. Body length 1.16-1.82, av. 1.38, maximum body width 0.56-0.938, av. 0.823, spine lengths 0.028-0.037, spine widths 0.006-0.0 16. The proboscis is thickly set with spines and there are additional spines on the neck. Some larvae were fed to hatchery-raised chicks with negative results. Nadakal (1963) studied the orange pigment of the adult acanthocephalan, ***Pallisentis*** sp., from the intestine of the fish ***Ophiocephafus*** and concluded that it was a carotenoid.

TREMATODA

Monogenetic trematodes, ***Gyrodactylus*** sp., were found on the gills of fish from all localities except the Salton Sea.

A small adult trematode was found in the posterior intestine of 34% of the fish from Baja California, but no other locality, that is described as a new species; Fifty-four worms were found but only 10 were used for the following description.

Lecithaster *minimus*, new species

Figures l-3

Body length 0.322-0.7, av. 0.497; maximum body width 0.154-0.252, av. 0.19; anterior body surface bears sensory papillae, oral sucker length 0.047-0.084, av. 0.068; oral sucker width 0.05-0.087, av. 0.068; pharynx length 0.03 l-0.05, av. 0.039; esophagus short, ceca extend to near posterior end of body, cecal cells and lumen contain globules; ventral sucker 0.062-0.143, av. 0.102 in diam.; right testis length 0.059-0.093; right testis width 0.03 l-0.05, av. 0.042, left testis length 0.059-0.08 1, av. 0.066; left testis width 0.03 l-0.056, av. 0.044; testes at anterior margin of ventral sucker; seminal vesicle saccular,

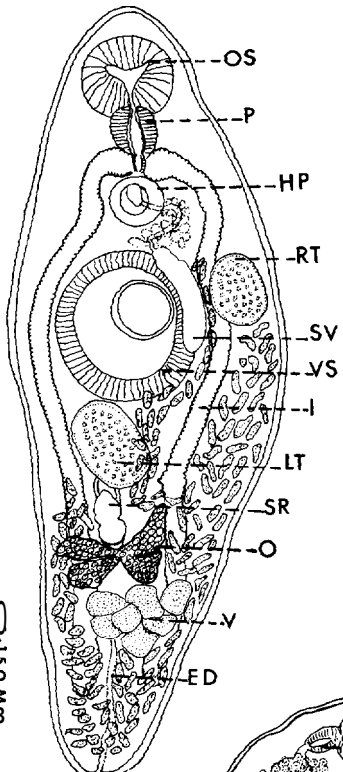

FIG. 1

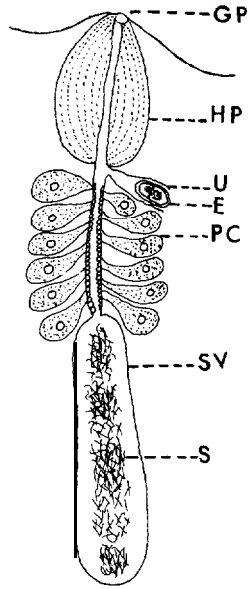

FIG. 3

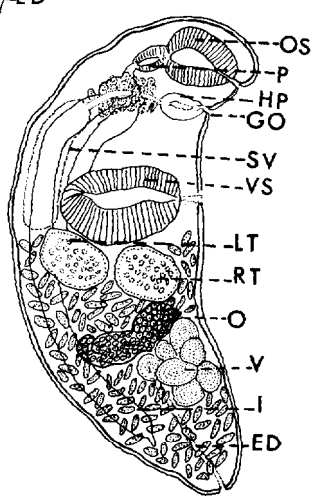

FIG. 2

Figures I-3. Lecithaster minimus, a new species of trematode.

about as long as ventral sucker and close to it; prostate cells free, large, numerous, and with granular cytoplasm; vitellaria near posterior end of body, seven lobed; ovary four-lobed, in posterior half of body; seminal receptacle immediately anterior to ovary; uterus extends in longitudinal loops from near posterior end of body to genital pore where it joins the male duct to empty into a muscular, hermaphroditic bulb averaging 0.03 long and 0.02 wide that in turn empties into the genital pore; genital pore ventral a short distance posterior to cecal bifurcation; eggs oval, with small operculum, length 18-21, av. 19μ ; width 6-9, av. 8μ ; excretory vesicle saccular.

Type specimen deposited in the Hancock Foundation, Parasite Collection no. 70 1.

This species is smaller than any previously described. The sucker ratio is about 1:1.5 while in other species the ventral sucker is 2-4 times larger than the oral sucker.

The genus ***Lecithaster*** was erected by Liihe (190 1) with ***L.*** *bothryophorus* (Olsson) as type. Odhner (1905) declared ***L. bothryophorus*** a synonym of ***L. gibbosus*** (Rud., 1802). Manter and Pritchard (1960) considered the genus ***Mordvilkoviaster*** raised by Pigulewsky (1938) to be a synonym of ***Lecithaster.*** Hunninen and Cable (1943) demonstrated the life cycle of ***Lecithaster*** confusus Odhner, 1905 in which the snail, ***Odostomia*** *trifida* (Totten), is first intermediate host, the copepod, ***Acartia*** *tonsa,* is second intermediate host, and the stickleback, ***Apeltes quadracus,*** is the definitive host. Boyce (1969) stated that ***Lecithaster gibbosus*** (Rud., 1802) uses snails, ***Thais lamellosa*** Gmelin, 1792 and *T.* ***emarginata*** Deshayes, 1839, as first intermediate hosts, the copepods, ***Centropages abdominalis*** Sato, 19 13 and ***Pseudocalanus minutus*** (Krøyer, 1847) as second intermediate hosts, and salmon, *Oncorhynchus* ***gorbuscha,*** as the definitive host. Boyce cites Arai [MS, 1967) as listing the following additional definitive hosts: the kelp greenling, ***Hexagrammos decagrammus,*** the shiner perch, ***Cymatogaster*** *aggregata* Gibbons, 1854, and the tube snout, *Aulorhynchus flavidus* Gill, 1861.

The members of ***Lecithaster*** are widely distributed usually living in marine fish but some have been reported from freshwater fish that probably migrated from the sea. Species have been reported from Canada, ***L. gibbosus,*** Boyce (1969); from the New England Coast of the United States, ***L. confusus,*** Hunninen and Cable (1943); Florida, *L.* ***acutus,*** Linton (19 10), Manter (1947); Nile River, ***L. confusus, L. gibbosus, L. stellatus,*** Looss (1907); England, ***L. gibbosus,*** Nicoll (1907); European arctic, ***L. confusus, L. gibbosus,*** Odhner (1905);

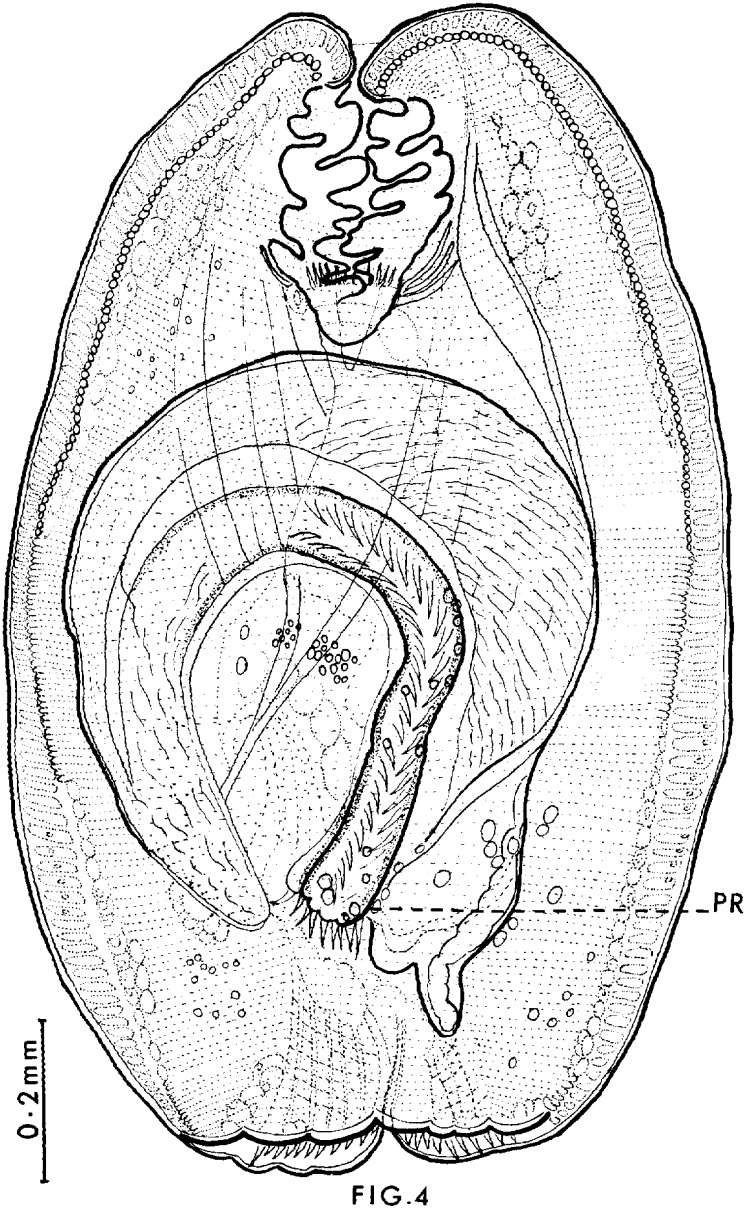

Figure 4. A larval acanthocephalan.

Black Sea, ***L. tauricus,*** Pigulewsky (1938); India, ***L.*** *indicus,* and ***L. extraiohatus,*** Srivastava (193.5); South America, ***L.*** *intermedius,* Szidat (1954); Hawaii, ***L. stellatus,*** Manter and Pritchard (1960); Australia, ***L. testilobatus,*** Manter (1969); and Japan, ***L. stellatus, L. salmonis,*** Yamaguti (1934), ***L. sayori*** (placed in synonymy with ***L. stellatus*** by Manter and Pritchard, (1960) Yamaguti (1938).

King and Noble (1961) described a trematode related to the genus ***Lecithaster*** from ***Gillichthys mirabilis*** collected at Morro Bay, Point Mugu, and Goleta, California which they named ***Hysterolecitha*** *trilocalis.* We have not found this species in any of our collections. Manter and van Cleave (195 1) found a hemiurid trematode in the intestine of ***Gilfichrhys mirabilis*** from the La Jolla, California area but it was too immature to identify.

Several species of trematode metacercariae have been found from time to time encysted in ***G. mirabilis*** tissues. About 43 % of this species of fish from Baja California and Seal Beach had ***Renicola*** sp. encysted in the liver. ***Stictodora (Parastictodora)*** *hancocki* were encysted in tissues near the gills. The life cycle of this species was described by Martin (1950). Occasionally, metacercariae of ***Ascocotyle sexidigita*** were found encysted on the intestine. This species and part of its life cycle were described by Martin and Steele (1970).

CESTODA

No adult cestodes were found in any of the ***G. mirabilis.*** However, about 42% of these fish from Baja California and Seal Beach had larval tetraphyllidean cestodes free in the lumen of the intestine and one, the largest of all, was found in the gall bladder. These larvae probably use small crustacea as intermediate hosts but apparently they will not mature in this fish.

NEMATODA

About 62% of the fish from Baja California and the Seal Beach area (but not from the other localities) harbored ***Vasorhabdochona*** *cablei* in certain visceral blood vessels. This genus and species were described by Martin and Zam (1967).

About 65 % of the fish from Baja California, 40% of those from Seal Beach and 15% from San Francisco Bay harbored ***Spirocamallanus*** *pereirai* which was first described by Anneaux (1946) from smelt, ***Atherinopsis californiensis*** Girard, collected at Bolinas Bay, California. He placed the species in the genus ***Procamallanus.*** Olsen (1952) erected the genus ***Spirocamallanus*** and transferred ***P. pereirai***

to it. **Yamaguti** (1961) listed *Spirocamallanus* as a synonym of *Procamallanus.*

Noble and King (1960) examined ***8 10 Gillichthys*** *mirabilis* collected over a two-year period from Goleta slough near Santa Barbara, California and found-nearly 100% of them infected with *Spirocamallanus* ***pereirai.*** They noted also that changes in the salinity of the environment seemed to have no effect upon the fish or S. ***pereirai.*** They reported that the following fish could also serve as definitive hosts for this nematode: *Leptocottus* ***armatus,*** *Fundulus* ***parvipinnis,*** ***Atherinops*** *affinis,* and *Girella* ***nigricans.***

ABBREVIATIONS USED IN FIGURES 1-3

E=egg, ED=excretory bladder, GO=genital opening, GP=genital pore, HP=hermaphroditic pouch, I=intestine, LT= left testis, O=ovary, OS=oral sucker, P=pharynx, PC=prostate cell, PR=proboscis, RT=right testis, S=sperm, SR=seminal receptacle, SV=seminal vesicle, U=uterus, V= vitellaria, VS=ventral sucker.

All drawings made with the aid of a camera lucida except figure 3.

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