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A Left-handed *Grubea* sp. from the Pacific Coast, Baja California, Mexico

EDWARD D. WAGNER

Department of Microbiology, Loma Linda University, Loma Linda, California 92354

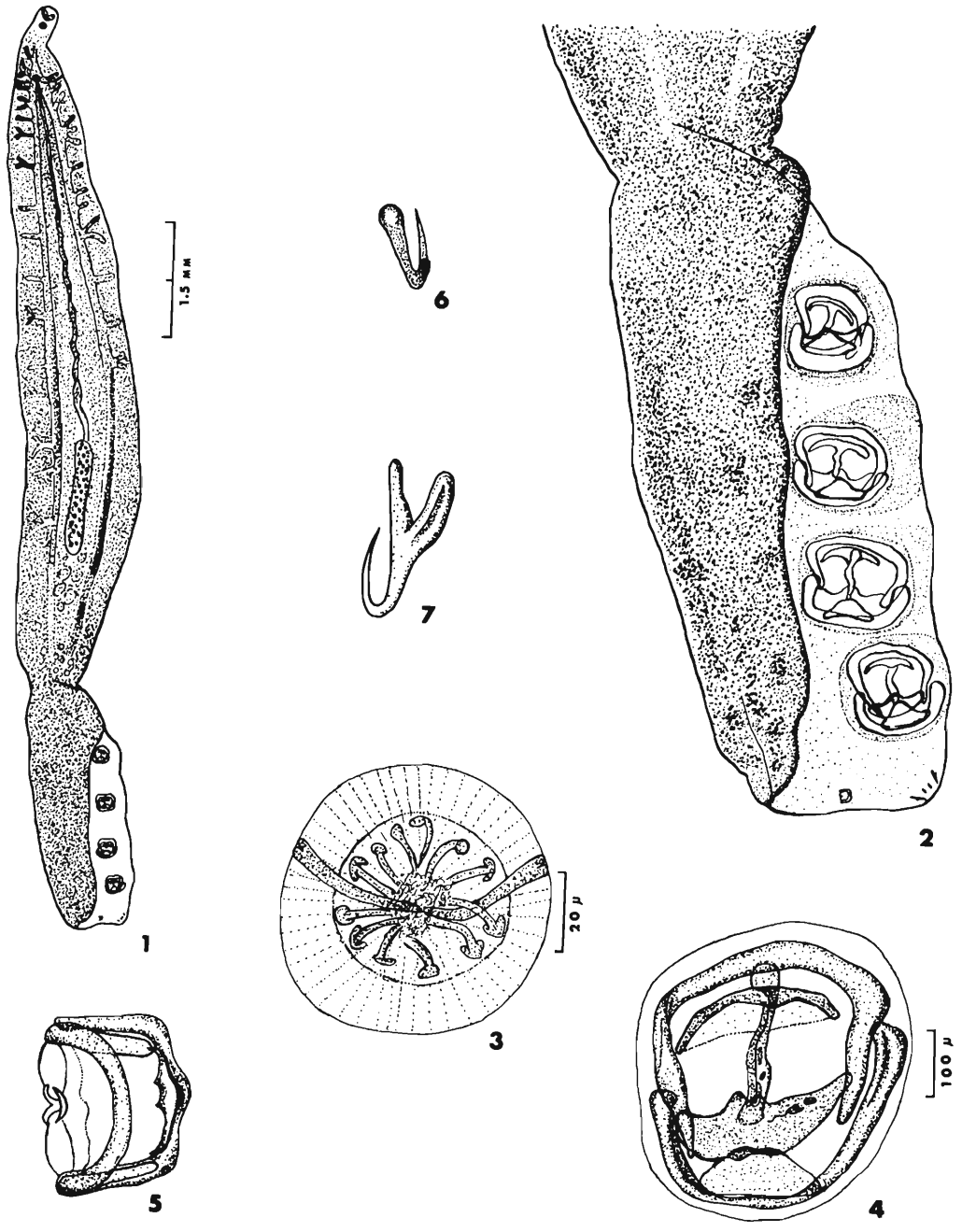
ABSTRACT: A *Grubea* sp. collected from the gills of the Pacific bonito, *Sarda chiliensis*, is described. It is the first *Grubea* sp. reported from the proximity of the Pacific Coast of the USA and from the bonito host. It differs mainly from the other species described, namely *G. cochlear* from Europe and *G. pneumatophori* from the Woods Hole region, Massachusetts, in that the opisthohaptoral clamps are on the left side, rather than on the right, and there is an extra subtriangular piece in the clamps. A new species designation is not made because only one specimen is available for study and some structures are not discernible.

Two species of *Grubea* of the family Mazocraeidae have been described. They are *Grubea cochlear* Diesing, 1858 (syn. *Octobothrium scombri* Nordm. ? of Grube, 1855; *Pleurocotylus scombri* van Beneden et Hesse, 1863), on the gills of *Scomber scombrus* of Europe, and *Grubea pneumatophori* Price, 1961 (syn. *Pleurocotyle scombri* of Linton, 1940), on the gills of *Pneumatophorus grex*, Woods Hole, Mass. The latter species description is based on a single specimen of poor condition collected in 1908 and is of doubtful specific status (Price, 1961). *G. cochlear* has previously been reported from the Mediterranean on the gills of the mackerel, *Scomber scombrus*, from Genoa, Italy, and on *S. colias* from Naples, Italy. *G. pneumatophori* of the Atlantic from the Woods Hole region, Massachusetts, was found on the gills of the "chub mackerel," *Pneumatophorus grex* (= *Scomber colias*).

Apparently this form is seen very infrequently as descriptions are based on few specimens. Manter (1956, pers. comm.) found it strange that *Grubea* is always found in such small numbers, and was inclined to believe that the true or most favorable host has not yet been found.

Sproston (1946) reports that "Though the gills of over a thousand mackerel have been examined for this trematode throughout the year, from various places off the S. W. coast of England, none has been found."

In June 1966, during the examination of marine fishes collected at Ensenada, Baja California, Mexico, a single specimen of *Grubea* sp. was found on the gills of the Pacific bonito, *Sarda chiliensis*. The specimen was observed alive in saline and it was noted that the clamps of the opisthohaptor were on the left side rather than on the right side as described for the *Grubea* sp. Upon examination of the stained and mounted specimen it became apparent that



Figures 1–7. *Grubea* sp. of the Pacific. 1. Whole mount, dorsal view (body), ventral view (opisthohaptor). 2. Opisthohaptor enlarged, showing the four sinistral clamps, ventral view, and the dextral small clamp and anchors. 3. Genital corona. 4. Haptoral clamp, one of four. 5. Small clamp. 6. Small, inner anchor. 7. Outer anchor.

Table 1. Measurements in mm and structural details of the known *Grubea* spp.

	Pacific *Grubea*	*Grubea cochlear*	*Grubea pneumatophori*
Body			
Length × width	12 × 1.5	10–15 × ?	8.6 × 1.5
Prohaptoral Suckers	0.120 × 0.075	—	0.096 × 0.056
Opisthohaptoral			
Clamps (large) width	0.40 (sinistral)	0.518 max. (dextral)	0.43 (dextral)
Clamp (small) width	0.060 (dextral)	0.070 (sinistral)	0.044 (sinistral)
Anchors			
Large, outermost, length	0.024	—	0.040
Small, innermost, length	0.013	—	0.028
Pharynx	0.084 × 0.087	—	0.09 × 0.08
Genital aperture (from ant. end)	0.73	—	0.6
Genital Corona			
No. hooks (inner)	12	13–16	13–14
Inner hooks	0.015	0.012	0.02
2 outer hooks	0.033	—	0.02 (on pad)
Testes	Probably numerous	Numerous	Few
Ovary	Elongated	Cylindrical	U-shaped
Vagina	Probably double	Double	Double
Vitelline follicles	Beginning 0.39 below genital aperture. Dense posteriorly	Absent anterior portion; diffuse, extending into caudal disc	Occupying almost entire body from genital aperture into opisthohaptor

the large clamps were indeed in the sinistral position, in ventral view, but that the body of the trematode was twisted over on itself so that it was presented in dorsal view (Figs. 1–7). The tear that is seen in the haptor above and below the four main clamps may have been present before the worm was removed, or the tear may have occurred upon removal from the gills, and the haptor was folded over before fixation.

A description of this form is given in the hope that it may help to clarify the taxonomic status. Also, the locality record in the proximity of the Pacific side of the USA and the listing of the new host may be of value and interest.

Although the specimen is significantly different from the two species described (which may be synonyms), no new species designation will be made because only one specimen is available for study, some structures are not clearly discernible, and because prior descriptions of *Grubea* are inadequate and based on few forms seen. The Pacific *Grubea* (Figs. 1–7) is compared with the two described species in Table 1, based on descriptions by Diesing (1858), Palombi (1949), Sproston (1946, after Parona and Perugia), Linton (1940), and Price (1961).

The most significant differences of the Pacific *Grubea* sp. as compared to the other species are: (1) Reversed position of the four large sinistral clamps and one small dextral clamp as compared with the two described species. (2) The large anchors are more robust and the roots appear more nearly equal in length than those of the two described species. (3) The large clamps have an extra element, a subtriangular piece. (4) There are 12 atrial or genital hooks, as compared with 13 or 16 in *G. cochlear* and 13 or 14 in *G. pneumatophori*. (5) The clamps are of equal size and shape, whereas in *G. pneumatophori* the posterior clamp is conspicuously smaller than the other three.

The subfamily Grubeinae Price, 1961, is to be emended to read, in part ". . . with four modified mazocraeid clamps in a vertical row along right margin and a single minute clamp on the left side, or with the four main clamps on the left side, and the small clamp on the right side, the single clamp comparable in position to most posterior on opposite side, . . ."

As noted by McMahon, 1964, reversal of the opisthohaptor or larval end in asymmetrical monogenids has been noted in other forms, such as in *Scomberocotyle scomberomori*.

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The Effect of Anthelmintic Therapy upon Early Parasitic Stages of the Dog Hookworm, *Ancylostoma caninum*

D. KENDALL HASS

Department of Veterinary Therapeutics, Animal Health, Biological Sciences Research Center, Shell Development Company, P.O. Box 4248, Modesto, California 95352

ABSTRACT: Twenty-five beagle dogs, 5½ to 6 months of age with no history of prior exposure to hookworm, were infected percutaneously with 6,000 infective *Ancylostoma caninum* larvae per dog. Groups of five dogs each were treated with vincofos (18 mg/kg) on 1, 2, 6, or 10 days post-exposure to the infection. One group remained as the nonmedicated controls. Due to the severe hookworm infection, most of the dogs in the days 1 and 2 treatment groups and the nonmedicated controls died within 12 to 18 days of exposure. All dogs in the days 6 and 10 treatment groups survived to termination of the experiment on the 23rd day of infection. Based upon the numbers of worms collected from the nonmedicated controls versus those from the treatment groups, therapy on the 1st day of infection reduced the hookworm population by 8%, on the 2nd day, 51%, on the 6th day, 93%, and on the 10th day, 94%. It was concluded that the drug was not effective for the third-stage larvae migrating in the tissues, but was effective for those larvae (late third or early fourth stages) returning to the intestinal lumen, and highly effective for the fourth-stage larval and juvenile hookworms.

The organophosphorous anthelmintic, vincofos (2, 2-dichlorovinyl, methyl, n-octylphosphate), has shown a high degree of anthelmintic efficacy for the nematode and cestode parasites of dogs (Hass and Collins, 1974). During one of the clinical trials, a limited number of dogs were treated and held for a period of time to determine the anthelmintic effect upon immature or juvenile hookworm populations. No hookworm eggs were subsequently found in the feces which suggests that the drug could have an effect upon the immature forms of this parasite. This report presents the data obtained from a study wherein dog hookworm infections were treated at timed intervals to determine anthelmintic efficacy for the immature parasites.

Materials and Methods

Twenty-five beagle dogs, with no history of prior exposure to hookworm infections, 5½ to 6 months of age and weighing 6.08 to 7.44 kg, were used in this study. Each dog was given a single percutaneous exposure to 6,000 infective