NOTES ON THE HOST SPECIFICITY OF Corynosoma hamanni (LINSTOW, 1892) 1

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15 to 30 minutes incubation at room temperature. Adult lung nematodes (*P. rushi*) which had been recovered from the air passages of the lungs were cultured in the same manner as described above.

No cytopathic agents were isolated on the cell cultures. The inoculated cell cultures also failed to demonstrate the hemadsorption phenomenon. These results are in agreement with those reported by Howe (*op. cit.*) who also failed to isolate cytopathic agents from samples of lung tissue from 15 different bighorn sheep that had died in various stages of pneumonia. The validity of these two sets of negative results is open to some question. In the case of the Wyoming work, the lung tissue was stored at -15°C for as long as 18 months before testing for virus (Howe, 1965, Quart. Rep. Wyo. Game & Fish Comm., 21-24; Howe *et al.*, *op. cit.*). The lungs that were used in the present study were stored at -20°C for up to six months in some cases before the tissue was thawed and cultured. Lief (1966, Myxoviruses, Ch. 10, pp. 246-312, *Basic Medical Virology*, J. E. Prier, editor, Williams and Wilkins Co., Baltimore) reports that some myxoviruses survive freezing at -70°C or lyophilization for a long period, but that at 4°C and -20°C they may lose infectivity in a few days. It is possible, therefore, that any viruses that were present at the time of collection were no longer infective at the time of testing.

Additional attempts should be made to isolate respiratory viruses from bighorn sheep nasal swabs and lung tissue using fresh material in order to obtain more reliable results. Studies involving both bacteria and viruses should be continued and expanded to investigate the possibility of a virus-bacteria combined effect similar to that indicated for shipping fever in cattle (Hetrick *et al.*, 1963, Am. J. Vet. Res. 24: 939-947; Saunders *et al.*, 1964, Can. J. Comp. Med. Vet. Sci. 28: 57-62).

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NOTES ON THE HOST SPECIFICITY OF *Corynosoma hamanni* (LINSTOW, 1892)[1].

Spiny-headed worms of the genus *Corynosoma*, Polymorphidae, present an interesting problem in host specificity as they are the only acanthocephalans which have both aquatic birds and mammals as the normal definitive hosts. Our work on the life cycle of *C. hamanni*, coupled with a survey of Antarctic helminth parasites, has produced data on the host specificity of this species.

Materials and Methods

Amphipods of the *Orchomenella plebs-rossi* complex were maintained in aquaria containing aerated sea water under controlled temperature conditions (-2 to 8°). Amphipods were exposed to *C. hamanni* eggs by three methods: maintaining the amphipods in sea water containing seal feces as a food source; exposing the amphipods to chopped female worms for one hour; exposing the amphipods for one hour to eggs removed from the body cavity of female worms. Amphipod intestines were removed according to the technique described by De Giusti (1949. J. Parasit. 35: 437-460) and examined with the aid of a dissecting microscope at 80X magnification and/or a compound microscope at 100X magnification. Seven amphipods from the February batches and 25 amphipods from the September batches were sectioned and stained after preliminary examination.

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Results and Discussion

Table 1 summarizes the data collected on *Orchomenella* spp. exposed to *C. hamanni* eggs. Two *Corynosoma* eggs were found in the intestine of an amphipod in Batch 10 five days after exposure; the results of all other examinations were negative.

In addition to the 812 exposed amphipods, 592 amphipods of the *O. plebs-rossi* complex taken from the stomach of *Rhigophila dearborni* were examined and found to be negative for acanthellas.

C. hamanni has been observed in 8 species of fish: *Trematomus bernacchii, Trematomus borchgrevinki, Trematomus hansoni, Trematomus centronotus, Notothenia rossii* (Baylis, 1929. Discovery Reports 1: 541-560); *Gymnodraco acuticeps, Parachaenichthys georgianus* (Baylis, *op. cit.*); and *Rhigophila dearborni,* representing three families: Nototheniidae, Bathydraconidae and Zoarcidae.

C. hamanni has also been reported from three Antarctic seal species: *Leptonychotes weddelli* (Railliet and Henry, 1907. Exped. Antarct. francaise: 11-14), *Lobodon carcinophagus* (Leiper and Atkinson, 1914. Proc. Zool. Soc. London: 222-226), and *Hydrurga leptonyx* (Linstow, 1892. Jahrb. Hamb. Wiss. Anst. 9(2): 3-15). We found *C. hamanni* in the four *L. weddelli* examined to date. A guinea pig, *Cavia porcellus,* was exposed to encysted juvenile Acanthocephala by placing the worms on its tongue and stimulating it to swallow. Three encysted juvenile *C. hamanni* of 10 fed to the guinea pig were recovered attached to the intestinal wall when the animal was accidentally killed 18 days after exposure. Additional attempts to infect guinea pigs have proved unsuccessful.

We examined 86 birds that breed within the Antarctic circle: 48 *Pygoscelis adelie,* 37 *Catharacta skua maccormicki* and one *Aptenodytes forsteri*; and we have recovered one immature female *C. hamanni* from *P. adelie.* Leiper and Atkinson (1915. Brit. Antarct. ("Terra Nova") Exped., 1910. Nat. Hist. Rep. Zool. 2(3): 19-60) examined the preceding three species and reported no *C. hamanni.* Edmonds (1955. Trans. Roy. Soc. S. Austral. 78: 141-144) reported finding four immature *Corynosoma* spp. from *Pygoscelis papua* on Macquarie Island. It should be noted that in the female recovered from *P. adelie* and the two females recovered from *C. porcellus* the ovary had separated into ovarian masses in the body cavity.

The ovarian masses in two female worms recovered from the guinea pig measured 0.087 - 0.235 X 0.081 - 0.202 mm, with mean dimensions of 0.154 X 0.132 mm. In contrast, the egg masses in the female worm from the Adelie penguin were 0.087 - 0.115 X 0.076 - 0.098 mm; mean 0.105 X 0.090 mm.

The two eggs observed in the intestine of the amphipod are of dubious significance because of the length of time af-

Table 1. *Data on exposure of Orchomenella spp. to eggs of Corynosoma hamanni.*

Batch Number	Date	Approx. no. amphipods in batch	Number females from which eggs obtained	Total no. amphipods examined	Days from exposure to final exam.
1	1/1/65	35	unknown	35	17
2	1/6/65	18	feces	16	17
3	2/12/66	350	10	52	7
4	2/12/66	250	5	10	6
5	2/12/66	250	15	12	7
6	2/12/66	150	15	20	17
7	9/13/66	250	15	189	21
8	9/13/66	250	20	138	22
9	9/13/66	250	19	71	10
10	9/13/66	500	17 chopped	269	22

ter initial exposure, their position in the lumen of the intestine, their possession of shell membranes, and their being the only positive results out of 1404 amphipods examined. They are probably the result of an accidental ingestion by the amphipod. The lack of any developing acanthellas in the 812 exposed *O. plebsrossi* amphipods indicates that these species may not serve as the invertebrate host for *C. hamanni*.

The occurrence of *C. hamanni* in such a wide variety of Antarctic fishes leads one to conclude that *C. hamanni* is not qualitatively specific to any group of Antarctic fishes examined. However, our data (Holloway, Collins, Capraro, 1966. Amer. Soc. Parasit. Prog. and Abstr. p. 27) indicate that *C. hamanni* shows significantly higher incidences of infection in "deep water" coastal fishes than in fishes from shallow water or surface layers. Accordingly, the higher incidences of infection appear to be associated with the deep amphipod stratum composed of *Orchomenella* spp. Considering the large number of Antarctic birds examined, the few *Corynosoma* recovered, and the immaturity of the specimens recovered, it appears that Antarctic birds are heterologous or accidental hosts and that *C. hamanni* may not normally reach functional maturity in them. The occurrence of *C. hamanni* in three species of Antarctic seals indicates it to be specific to marine mammals in nature. These observations support the conclusions of Forssell (1905. Acta Soc. Fauna Flora Fennica 27: 3-30) based on natural and experimental infections, that *Corynosoma* which are characteristically parasites of seals may occur in fish-eating birds, but never reach functional maturity there.

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BOOK REVIEW

Fain, A. A review of the family Epidermoptidae Trouessart parasitic on the skin of birds - (Acarina: Sarcoptiformes). Verhandelinger, Glasse der Wetenschappen, Nr. 84. Paleis der Academien - Hertogsstrant, 1, Brussels, Belgium. 1965. Vol. 1 (text) 176 pp., Vol 2 (figures), 144 pp. Approx. price $16.70 (835 Belgium francs).

Dr. Fain is currently on the faculty of the Institute of Tropical Medicine in Antwerp, Belgium. He had many years of service as a research biologist in the Belgian Congo and Ruanda-Urundi. He has published extensively on mites and other parasites. The present work, printed in English with a summary in Dutch, was supported by a grant from NIAID of the U. S. Public Health Service. For this study Dr. Fain was honored with the H. Schonteden Prize of the Royal Flemish Academy of Belgium.

This encyclopedic review provides a complete coverage of our knowledge of this group of mites. It includes a discussion of anatomy and the morpholical characters used in identification, including a clarification of setal nomeclature as used by the author. As well as a full review of the literature, complete keys are presented to genera and species; a number of new species are described and many new host records are included. A parasite list includes hosts from which collected, class, order and family of host (many have been reported only from parasitic diptera or mallophaga), country of origin and source reference. A separate host-list included in the work adds to its value to other investigators. The figures are very well done and of a size that provides clarity for identification purposes. The author is to be complimented on developing an excellent compendium of knowledge concerning the Epidermoptidae. Carlton M. Herman