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Author: SHULTS, LARRY M.

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HELMINTHS OF THE SPOTTED SEAL, *Phoca largha*, FROM THE BERING SEA

LARRY M. SHULTS, Division of Microbiology and Veterinary Medicine, University of Wyoming, Box 3354, University Station, Laramie, Wyoming 82071, USA.

Abstract: Fifty-five spotted seals, *Phoca largha*, from the seasonal pack ice of the Bering Sea were examined for helminth parasites. Twelve species of helminths were found: *Anophryocephalus ochotensis*, *Diplogonoporus tetraapterus*, *Diphyllbothrium cordatum*, *Phocanema decipiens*, *Contracaecum osculatum*, *Dipetalonema spirocauda*, *Phocitrema fusiforme*, *Corynosoma semerme*, *C. strumosum*, *C. validum*, *C. villosum*, and *Bolbosoma* sp. Six species are new host records (*A. ochotensis*, *D. tetraapterus*, *D. cordatum*, *D. spirocauda*, *C. validum*, and *C. villosum*).

INTRODUCTION

In the course of life history investigations of marine mammals in areas of potential petroleum development in Alaska, 55 spotted or larga seals, *Phoca largha* Pallas, 1811, were made available by personnel of the Alaska Department of Fish and Game for necropsy to determine the kinds and prevalence of helminth infections.

These seals were taken from the seasonal pack ice of the Bering Sea where they utilize the drifting sea ice as a platform on which to bear their white-coated young and to haul out during the molt. This utilization of the seasonal pack ice is in direct contrast to harbor seals, *Phoca vitulina richardsi*, which occur mainly in ice-free areas and utilize rocky islets, sand bars and mud flats on which to bear their non-white young and to molt.⁷

MATERIALS AND METHODS

The lungs, heart, and liver were excised and examined macroscopically for the presence of helminths. The stomach was opened, ingesta were removed, and nematodes were preserved in 10% formalin. The entire intestinal tract was opened, and the contents were diluted with tap water, decanted, and examined both macroscopically and with the aid of

a 10× dissecting microscope. The helminths collected were fixed in hot 10% formalin after being relaxed in tap water containing a few drops of pentobarbital sodium. After fixation, cestodes, trematodes and acanthocephalans were stained with Semichon's acetocarmine, dehydrated in ethanol, cleared in terpineol and mounted permanently in synthetic resin. Nematodes were stained in the same manner, washed in 70% ethanol, and mounted in Hoyer's solution. Musculature was not examined.

RESULTS

Spotted seals examined in this study were infected by 12 species of helminths. Representative specimens have been deposited in the U.S. National Museum Helminthological Collection (USNM#). Generally, gross lesions associated with presence of helminths was not evident, but in a few instances the stomach nematodes, *Phocanema decipiens* and *Contracaecum osculatum*, had caused ulceration of the stomach wall.

Anophryocephalus ochotensis Delyamure et Krotov, 1955, was the most common cestode and occurred in the small intestine of 39 (71%) of the seals examined. This species has not been reported previously from *P. largha*, although *A. skrjabini* has been found in

the same host in the Okhotsk Sea where it was primarily a parasite of young animals.⁴ However, *A. ochotensis* was found in both juveniles and adults in this study. This parasite commonly infects harbor seals (*Phoca vitulina*), Steller sea lions (*Eumetopias jubatus*) and ribbon seals (*P. fasciata*) in Alaskan waters.⁸ USNM# 76188.

Diplogonoporus tetrapterus (von Siebold, 1848), was found in the small intestine of 13 of the 55 seals (24%) and is a common parasite of other Alaskan pinnipeds.⁸ It has not been reported previously from this host, although Belopolskaya¹ described a species, *D. mutabilis*, from *P. largha* in the Sea of Japan. *D. mutabilis* has a variable number of genital complexes (2-5) per proglottid. Rausch⁵ reported similar variability (1-4 sets per proglottid) in *D. tetrapterus*. Hence, I suggest that *D. mutabilis* be considered as *species inquirendae* until further investigations of variability within this genus are completed. USNM# 76190.

Diphyllbothrium cordatum (Leuckart, 1863) Geddoelst, 1911, is a common parasite of bearded seals (*Erignathus barbatus*) but has not been reported previously from the spotted seal. It was present in the small intestine of 11 (20%) of the seals and has been recovered from ribbon seals and ringed seals (*Phoca hispida*) in the Bering and Chukchi Seas.⁸ USNM# 76189.

Phocitrema fusiforme Goto and Ozaki, 1930, was the only trematode found in the spotted seals examined in this study. It occurred in 5 (9%). *P. fusiforme* has been reported from *P. largha* in both the Sea of Japan and Okhotsk Sea as well as from seals (probably *P. largha*) taken at St. Lawrence Island in the Bering Sea.^{1,4,6} USNM# 76191.

Phocanema decipiens (Krabbe, 1878) Myers, 1959, a stomach nematode, was found in 14 (25%) of the spotted seals examined. It is a common parasite also of Steller sea lions, bearded seals and

walrus (*Odobenus rosmarus*) in Alaskan waters,⁸ and has been reported from spotted seals in the Sea of Japan and the Okhotsk Sea.^{1,4} USNM# 76192.

Contracaecum osculatum (Rudolphi, 1802) Baylis, 1920, occurred in the stomach and pylorus of 39 (71%) of the spotted seals. It is a common parasite of other pinnipeds worldwide.² USNM# 76193.

Dipetalonema spirocauda (Leidy, 1858) Anderson, 1959, was found in 1 of 55 (2%) of the spotted seals. Four specimens of this helminth were found in the right ventricle. *D. spirocauda* is a common parasite of Pacific harbor seals in the Gulf of Alaska and it has been found in that host from Otter Island in the Bering Sea.⁸ The parasite has not been reported previously from the spotted seal. USNM# 76194.

Corynosoma strumosum (Rudolphi, 1802) was the most common helminth in *P. largha*, where it occurred in the small intestine of 52 of the 55 (95%) seals examined. It has been reported previously from this host in the Sea of Japan, Bering Sea and Okhotsk Sea and is a common parasite of most pinnipeds of the Northern Hemisphere.^{1,2,3,4} USNM# 76195.

Corynosoma semerme (Forssell, 1904) Lühe, 1911, occurred in 28 (51%) of the seals examined. This species also occurs in most of the other pinnipeds of the Northern Hemisphere.² USNM# 76196.

Corynosoma validum Van Cleave, 1953, was found in 3 of the 55 (5%) seals examined and is a first report in spotted seals. The acanthocephalan is a common intestinal helminth of bearded seals and walrus from the Bering Sea and occurs infrequently in other pinnipeds of that region. It has been recovered from ribbon, ringed, and harbor seals as well as from Steller sea lions. The parasite occurred in very few individuals and in very small numbers per host.⁸ USNM# 76197.

Corynosoma villosum Van Cleave, 1953 was found in only 1 (2%) of the *P. largha* examined. It is a common parasite of Steller sea lions and harbor seals in Alaskan water.⁸ This is the first report of it in the spotted seal. USNM# 76198.

A species of *Bolbosoma* was found in the small intestine of 1 (2%) of the seals examined. However, specific determination was not feasible due to the immaturity of the specimens. *Bolbosoma niponicum* has been reported from *P. largha* taken in the Okhotsk Sea.⁴ USNM# 76199.

DISCUSSION

The helminth fauna of Bering Sea spotted seals is very similar to that of other phocine seals from the same area but differs from that of spotted seals in the Sea of Japan and the Okhotsk Sea.^{1,4,8} Four of the eight species of helminths found in this host in the Sea of Japan did not occur in the seals from the Bering Sea examined in this study. These were *Trigonocotyle skrjabini*,

Phocascaris phocae, *Anisakis* sp., and *Otostrongylus circumlitus*. In addition, Belopolskaya described *Diplogonoporus mutabilis* as a new species, based on its variable number of genital complexes.¹ Because the same kind of variation occurs in *D. tetraapterus*,⁵ *D. mutabilis* does not appear to be a valid taxon. Belopolskaya also listed *Corynosoma osmeri* as a parasite of the spotted seal. This species is a synonym of *Corynosoma strumosum*.⁹

Popov and Bukhitarov listed 13 species of helminths from spotted seals collected in the Okhotsk Sea, seven of which (*Anophryocephalus skrjabini*, *Pyramicocephalus phocarum*, an unidentified species of Diphyllbothriidae, *Anisakis simplex*, *Anisakis* sp., *Phocascaris cystophorae*, and *Terranova azarasi*) were not found in specimens examined from the Bering Sea.⁴ Similarly, 5 of the 12 found in this study did not occur in the Okhotsk seals (*Diplogonoporus tetraapterus*, *Anophryocephalus ochotensis*, *Dipetalonema spirocauda*, *Corynosoma validum* and *C. villosum*).

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