NASAL MITES (ACARI:HALARACHNIDAE) IN THE SPOTTED SEAL, Phoca largha PALLAS, AND OTHER PINNIPEDS OF ALASKAN WATERS

Authors: FAY, FRANCIS H., and FURMAN, DEANE P.

Source: Journal of Wildlife Diseases, 18(1) : 63-68

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-18.1.63

NASAL MITES (ACARI:HALARACHNIDAE) IN THE SPOTTED SEAL, *Phoca largha* PALLAS, AND OTHER PINNIPEDS OF ALASKAN WATERS

FRANCIS H. FAY, Institute of Marine Science, University of Alaska, Fairbanks, Alaska 99701, USA.
DEANE P. FURMAN, Division of Entomology and Parasitology, University of California, Berkeley, California 94720, USA.

Abstract: The nasal passages of 349 pinnipeds of seven species were examined for halarachnid mites. Each of seven Steller sea lions *(Eumetopias jubatus),* 75 of 99 harbor seals *(Phoca vitulina),* and four of 71 spotted seals *(P. largha)* were infected, but none of 28 walruses *(Odobenus rosmarus),* 43 ringed seals *(Phoca hispida),* 58 ribbon seals *(P. fasciata),* and 43 bearded seals *(Erignathus barbatus)* was infected. The sea lions harbored *Orthohalarachne attenuata* (Banks, 1910) and *O. diminuata* (Doetschman, 1944), and the harbor and spotted seals harbored *Halarachne halichoeri* Allman, 1847. The finding of *H. halichoeri* in the spotted seals is a new host record.

INTRODUCTION

Halarachnid mites are parasites of the respiratory tract of mammals, mainly inhabiting the nasal passages. Mites of two genera are parasitic in seals, sea lions and walruses (Pinnipedia): *Orthohalarachne* Newell, 1947 in the Otariidae (fur seals and sea lions) and Odobenidae (walruses), and *Halarachne* Allman, 1847 in the Phocidae (hair seals). In Alaskan waters, *Orthohalarachne attenuata* (Banks, 1910) and *O. diminuata* (Doetschman, 1944) have been reported as present in northern fur seals, *Callorhinus ursinus* (Linnaeus), of the Pribilof Islands[1,15] and Steller sea lions, *Eumetopias jubatus* (Schreber), of the Gulf of Alaska and Bering Sea.[19] *Halarachne halichoeri* Allman, 1847 has been recorded from harbor seals, *Phoca vitulina* Linnaeus, of the Pribilof Islands.[8,9] The presence or absence of nasal mites in four other species of pinnipeds that inhabit Alaskan waters has not been recorded. These are the spotted seal *(Phoca largha* Pallas), ringed seal *(P. hispida* Schreber), ribbon seal *(P. fasciata* Zimmermann), and bearded seal *(Erignathus barbatus* [Erxleben]). In a fifth, the walrus *(Odobenus rosmarus* [Linnaeus]), nasal mites have been reported only once.[16] One of us (FHF) undertook a survey of nasal parasites in samples of those species during 1975-80 and examined a number of Steller sea lions and harbor seals, as well. The objectives of the survey were to determine the frequency of occurrence of halarachnid mites in Alaskan pinnipeds, and to assess their importance as pathogens.

MATERIALS AND METHODS

Spotted and ribbon seals and walruses were obtained from the pack ice of the eastern Bering Sea; ringed and bearded seals were obtained from that area as well as from the eastern Chukchi and western Beaufort Seas; harbor seals and Steller sea lions were from the southeastern Bering Sea and from the Gulf of Alaska. These pinnipeds were taken principally in connection with other studies related to resource management and environmental impacts of outer continental shelf oil development. The frozen head of each specimen was made available to us several weeks or months after collection. Before examination,

each head was thawed, the skin and blubber were removed, and the musculature of the floor of the mouth, the tongue, soft palate, and larynx were excised as a unit to expose the nasopharynx. The larynx and anterior end of the trachea were opened for inspection, and the nasopharynx, choanae, and posterior maxilloturbinates were examined with the aid of directed light. The anterior parts of the nasal passages and turbinates were inspected via the nares, which were opened to their fullest extent by incision. In about 10% of the skulls, the bony walls of the nasal passages had been broken, hence they were removed to permit inspection of the entire nasal tract, including the deep parts of the turbinal labyrinth. Mites collected from each of the infested sea lions and spotted seals and from 20 of the harbor seals were placed in tap water, cleaned of mucous and other debris, and fixed in 70% ethanol for storage and subsequent study.

RESULTS

Nasal mites were found in only three of the seven species of pinnipeds surveyed (Table 1); in only the harbor seal and Steller sea lion were they present often and in large numbers. All of the mites found in the harbor and spotted seals were adults and larvae of *Halarachne halichoeri* Allman. Those in the sea lions were adults and larvae of *Orthohalarachne attenuata* (Banks) and *O. diminuata* (Doetschman).

In all cases, the mature adult mites were situated mainly on the walls of the choanae, just posterior to the maxilloturbinates, and to a lesser extent on the dorsal wall of the nasopharynx. Mature adults were not found within the turbinates or farther anterior in the nasal passages. Numerous larvae and one teneral adult of *H. halichoeri* were found only in the distal parts of the nasal passages of the harbor seals, where they congregated mainly in the alar folds of the median septum, about 2 to 3 cm posterior to the external nares. In one seal, there were many larvae also in the turbinates. Larvae were not found in the spotted seals. In the sea lions, larvae of both *O. attenuata* and *O. diminuata* were present in the choanae and nasopharynx, as well as in the anterior passages. Five teneral adults of *O. diminuata* also were found in the anterior nares of one sea lion. Of 636 *H. halichoeri* collected from the harbor and spotted seals, 400 were adults and 236 were larvae. Of the *Orthohalarachne* spp. in the sea lions, 155 were adults (148 *O. attenuata*, 7 *O. diminuata)* and 38 were larvae. Specimens of these have been deposited in the United States National Museum Collection. In all of the pinnipeds, mites were absent from the larynx and anterior end of the trachea.

The occurrence of *H. halichoeri* in the harbor seals was not clearly related to

TABLE 1. Frequency of occurrence of halarachnid mites in nasal passages of Alaskan pinnipeds.

Pinniped species	Number examined	Specimens with mites	
		Number	Percent
Eumetopias jubatus	7	7	100
Odobenus rosmarus	28	0	0
Phoca vitulina	99	75	75
Phoca largha	71	4	6
Phoca hispida	43	0	0
Phoca fasciata	58	0	0
Erignathus barbatus	43	0	0
Total	349	86	

either sex or age of the hosts (Table 2). Although prevalence of the parasites appeared to be lowest in young of the year (3-10 mos) and in the oldest seals (16-27 yrs), the samples for those age classes were too small to give reliable results.

In a sample of 12 infested harbor seals ranging in age from 2 to 10 years, the number of adult *H. halichoeri* ranged from 5 to 59 (mean, 24) and the number of larvae from 6 to 87 (mean, 16) per seal. There was no obvious correlation between age of host and numbers of adult and larval mites harbored, nor was there a correlation with season of the year in which hosts were collected. In four spotted seals (2 subadult, 2 adult), there were from 2 to 7 (mean, 4) adult *H. halichoeri* and no larvae.

Four adult sea lions, ranging in age from 5 to 18 years, and one adult of undetermined age had from 4 to 36 (mean, 22) adult mites and 0 to 18 (mean, 4) larvae per animal. Adults of *O. attenuata* occurred in all 5 hosts, but larvae appeared only in 1 host 5 years of age; adults and larvae of *O. diminuata* occurred in two of the 5-year-old hosts. In a pooled collection from two 10-month-old hosts, 32 adult and 10 larval mites representing both species of *Orthohalarachne* were recorded.

Lesions associated with either the adult or larval mites were not evident in any of the harbor or spotted seals. In the sea lions, however, the adult mites in the choanae and nasopharynx appeared to have caused local inflammation and swelling in the tissues immediately surrounding the embedded head and thorax of each parasite. Although these effects appeared to be minor where infections were by less than 20 mites, heavier infections did appear to be sufficient to cause significant irritation.

DISCUSSION

The findings from this survey have confirmed that halarachnid mites are common parasites of the respiratory tract of harbor seals and Steller sea lions in Alaskan waters. That these mites often are present also in northern fur seals of the north Pacific region was confirmed previously.[6,10,11,13,14] The apparent absence of these mites from walruses and from ringed, ribbon, and bearded seals examined in this survey is equivocal. Because we were able to search the entire nasal tracts of only about 10% of the specimens and were limited to inspecting only the anterior and posterior nasal passages of the rest, the possibility that some infections deep in the turbinal labyrinths could have been overlooked in the latter group cannot be denied. In those specimens that were fully dissected and examined, however, mites were not found within the labyrinths. In the one harbor seal where they were found there, their presence was detected during inspection through the anterior nares. In that case, a large population (57 adults and >80 larvae) was present also in the nasal chambers ahead of and behind the labyrinth. Kurochkin and Sobolewsky's[13,14] thorough examinations of 69 fur seals, sea lions, and harbor and spotted seals

TABLE 2. Number of Alaskan harbor seals infected with *H. halichoeri* per number examined, in relation to sex and age of the hosts.

	Age*					
Sex	3-10 mos	1-5 yrs	6-10 yrs	11-15 yrs	16-27 yrs	Unknown
Male	1/2	12/14	8/8	7/8	1/2	—
Female	0/3	13/14	11/15	9/10	6/9	—
Total	1/5	25/28	19/23	16/18	7/11	7/14

*From data supplied by K.W. Pitcher, Alaska Department of Fish and Game.

also did not disclose any mites within the turbinal labyrinths, though some were found attached to the posterior part of the maxilloturbinates where they would have been visible through the choanae. Thus, we feel that our results at least indicate that nasal mites are not often present or abundant in walruses or in ringed, ribbon, and bearded seals, though the possibility of very light infections deep in the turbinates cannot be entirely discounted. Halarachnid mites have not been reported from any of those seals elsewhere in the Northern Hemisphere, and the only report of their presence in the walrus was from a specimen that had been captured as a calf near Franz Josef Land, Barents Sea and reared in captivity for 7 years in Hamburg, Germany.[16]

Our finding of *O. diminuata* in the Steller sea lion appears to be the first confirmed record from that host. A recent report[11] indicates that adults of *O. diminuata* in the northern fur seal primarily are located in the bronchi and bronchioles of the lungs. If this is the site of predilection for these mites in the Steller sea lion, it is probable that only a small fraction of the adult population of *O. dimenuata* was recovered from these hosts in our survey.

The spotted seal of the eastern Bering Sea is reported here for the first time as a host of *H. halichoeri*. Apparently, only five of these seals had been examined previously for nasal mites, and none was found to be infected.[13] The spotted seal is a very close relative of the harbor seal, with which it is sympatric to a considerable extent in the southern Bering and Okhotsk Seas.[4,5,17,18] These sibling species are reproductively isolated by physiological and ecological factors, but they do mingle to some extent on haulout areas on the ice in spring and on shore in summer. The low prevalence of infection of spotted seals with nasal mites that occur commonly in harbor seals seems consistent with the known low degree of contact between these two species.

Kurochkin and Sobolewsky[13] have suggested that the transmission of halarachnids between pinniped hosts may be effected by expulsion of the mites into the atmosphere during sneezing and coughing, possibly induced by the parasites' irritation of the nasal passages. We suggest that transmission of the mites among harbor and spotted seals, which rarely sneeze or cough, takes place mainly through direct nasal contact or "breath-exchange" during nonaggressive nosing. In these seals, nasal contact seems to be most frequent during the breeding season,[2,3,7,12] but it probably takes place to some degree yearround wherever these seals congregate. We found larvae in the vicinity of the external nares of seals taken in February, March, May, June, and November, which suggests that the mites reproduce year-round and can be transmitted to new hosts at any time.

Acknowledgements

We wish to thank K.W. Pitcher, D.G. Calkins, and J.J. Burns of the Alaska Department of Fish and Game, R. Elsner of the University of Alaska, and Y.A. Bukhtiarov of the USSR Pacific Institute of Fisheries and Oceanography who made available most of the pinnipeds examined in this study. We also thank R.L. Rausch and L. Margolis for providing helpful suggestions on an earlier draft of the manuscript. The work was supported by the Bureau of Land Management through interagency agreement with the National Oceanic and Atmospheric Administration, under which a multi-year program responding to needs of petroleum development of the Alaskan continental shelf is managed by the Outer Continental Shelf Environmental Assessment Program (OCSEAP) Office.

LITERATURE CITED

1. BANKS, N. 1910. New American mites. Proc. Ent. Soc. Wash. 12: 2-12.
2. BEIER, J.C. and D. WARTZOK. 1979. Mating behaviour of captive spotted seals *(Phoca largha)*. Anim. Behav. 27: 772-781.
3. BISHOP, R.H. 1967. Reproduction, age determination, and behavior of the harbor seal, *Phoca vitulina* L., in the Gulf of Alaska. M.S. Thesis, University of Alaska, Fairbanks, Alaska.
4. CHAPSKII, K.K. 1969. Taxonomy of seals of the genus *Phoca sensu stricto* in the light of contemporary craniological data. In: *Marine Mammals*. V.A. Arsen'ev, B.A. Zenkovich, and K.K. Chapskii, eds., pp. 294-304. Nauka, Moscow.
5. ——. 1975. Taxonomy of seals of the genus *Phoca sensu stricto*. In: *Marine Mammals*. G.B. Agarkov, ed., pt. 2, pp. 159-162. Naukova Dumka, Kiev.
6. DUNLAP, J.S., R.C. PIPER and M.C. KEYES. 1976. Lesions associated with *Orthohalarachne attenuata* (Halarachnidae) in the northern fur seal *(Callorhinus ursinus)*. J. Wildl. Dis. 12: 42-44.
7. FINCH, V.A. 1966. Maternal behavior in the harbor seal. M.S. Thesis, San Francisco State College, San Francisco.
8. FURMAN, D.P. and M.D. DAILEY. 1980. The genus *Halarachne* (Acari: Halarachnidae), with the description of a new species from the Hawaiian monk seal. J. Med. Ent. 17: 352-359.
9. KENYON, K.W., C.E. YUNKER and I.M. NEWELL. 1965. Nasal mites (Halarachnidae) in the sea otter. J. Parasit. 51: 960.
10. KEYES, M.C. 1965. Pathology of the northern fur seal. J. Am. vet. med. Ass. 147: 1090-1095.
11. KIM, K.C., V.L. HAAS and M.C. KEYES. 1980. Populations, microhabitat preference and effects of infestation of two species of *Orthohalarachne* (Halarachnidae: Acarina) in the northern fur seal. J. Wildl. Dis. 16: 45-51.
12. KNUDTSON, P.M. 1977. Observations on the breeding behavior of the harbor seal, in Humboldt Bay, California. Calif. Fish & Game 63: 66-70.
13. KUROCHKIN, Y.V. and E.I. SOBOLEWSKY. 1971. Infection by mites *Orthohalarachne attenuata* (Banks, 1910) of the nasal cavity of pinnipeds of the northwestern part of the Pacific Ocean. In: *Marine Mammals (Fur Seals and Hair Seals)*. V.A. Arsen'ev and E.A. Tikhomirov, eds., pp. 305-307. Otdel Nauchno-tekhnicheskoi Informatsii, Moscow.
14. —— and ——. 1975. Nasal mites *Orthohalarachne attenuata* of northern fur seals. Rapp. P.-v. Réun. Cons. int. Explor. Mer 169: 362.
15. NEWELL, I.M. 1947. Studies on the morphology and systematics of the family Halarachnidae Oudemans 1906 (Acari, Parasitoidea). Bull. Bingham Oceanog. Coll. 10: 235-266.
16. OUDEMANS, A.C. 1916. Acarologische Aanteekeningen LX. Entomol. Ber. 4: 308-316.
17. SHAUGHNESSY, P.D. 1975. Biochemical comparison of the harbour seals *Phoca vitulina richardi* and *P. v. largha*. Rapp. P.-v. Réun. Cons. int. Explor. Mer 169: 70-73.
18. —— and F.H. FAY. 1977. A review of the taxonomy and nomenclature of North Pacific harbour seals. J. Zool. 182: 385-419.

19. THORSTEINSON, F.V. and C.J. LENSINK. 1962. Biological observations of Steller sea lions during an experimental harvest. J. Wildl. Manage. 26: 353-359.

Received for publication 23 March 1981