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Helminths of the Beluga Whale (*Delphinapterus leucas*) from the Mackenzie River Delta, Northwest Territories

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There are scattered reports on the helminth fauna of the beluga whale from Arctic waters of North America. Lyster (1940, Can. J. Res. 18D: 395–409) reported *Anisakis simplex, Anisakis* sp. and *Corynosoma strumosum* from beluga collected in the Gulf of St. Lawrence. Brandly and Rausch (1950, Arctic 3: 105–107) reported the presence of the nematode *Trichinella* sp. from beluga collected in Alaskan waters. Doan and Douglas (1953, Bull. Fish. Res. Board Can. 98: 1–27) reported *Anisakis simplex* and *Stenurus arcticus* (=*Pharurus pallasii*) from whales collected at Churchill, Manitoba. Brodie (1971, J. Fish. Res. Board Can. 28: 1309–1318) reported *Crassicauda* sp. from the middle ear of beluga collected in Cumberland Sound. The identification of this nematode in the middle ear is questionable; *Crassicauda* is normally a parasite of the renal system. These specimens were likely *Pharurus pallasii* (Arnold and Gaskin, 1975, Can. J. Zool. 53: 713–735). In an annotated list of parasites from sea mammals in North America, Margolis and Dailey (1972, NOAA Tech. Rep. NMFS SSRF-647, 23 pp.) added the following species to those reported in beluga: *Hadwenius seymouri, Pharurus oserskaiae* (=*P. pallasii*), *Corynosoma semerme, C. similis* and *C. wegeneri*. Arnold and Gaskin (1975, op. cit.) reported *Stenurus arctomarinus* in beluga collected from the Mackenzie River Delta and Churchill, Manitoba; they also reported *Pharurus pallasii* in whales from the same two localities plus New Brunswick. Kenyon and Kenyon (1977, J. Wildl. Dis. 13: 338–340) reported on the prevalence of *Pharurus pallasii* in beluga collected in the Churchill River, Manitoba. Burns and Seaman (1985, Final Report, Outer Continental Shelf Environmental Assessment Program, Alaska Dept. of Fish and Game, Fairbanks, 129 pp.) reported *Otophocaenurus oserskoi* (=*P. pallasii*) in beluga from Alaska. In this note, we present data on the helminth fauna of 10 beluga collected in the Mackenzie River Delta, Northwest Territories, Canada.

Between 7 and 25 July 1984 we examined 10 carcasses of whales which had been killed by Inuvialuit hunters in the Kugmallit Bay region of the Mackenzie Delta. Most necropsies were completed within 24 hr following host death and all necropsies were conducted under field conditions. The following procedures were employed.

The stomach was tied off at the anterior and posterior ends and each of the three compartments was examined macroscopically for helminths. A sample of diaphragm (4 × 8 cm) was removed and preserved in AFA. The anterior and posterior ends of the intestine were tied, the intestine was then removed from the carcass and divided into 20 approximately equal sections. The anterior 7 to 8 cm of each section (posterior 7 to 8 cm for rectum) was removed and preserved in AFA for detailed analysis in the laboratory. The remaining portion of each intestinal section

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TABLE 1. Relative intensity and location of helminths from 10 beluga from the Mackenzie Delta.

Host characteristics			Species of helminth				
No.	Sex	Length (cm)	*Contracaecum* sp. (larvae)	*Anisakis simplex*	*Pharurus pallasii*	*Hadwenius seymouri*	*Leucasiella arctica*
1	Male	424	L[a] 1, 2[b]		H 3	M 2	
2	Female	310	M 1	L 1		L 2	
3	Male	410	H 1		M 3		
4	Male	418	L 1		H 3		
5	Male	431	H 1		M 3		
6	Female	371	H 1		M 3		
7	Male	415	L 1		M 3	L 2	L 4
8	Male	443	M 1, 2		H 3	L 2	
9	Male	349	L 1, 2		M 3		
10	Male	401	M 1	L 1			

[a] Relative intensity categories were: L = less than 20 worms; M = 20–80 worms; H = greater than 80 worms.
[b] Site in host: 1 = stomach; 2 = intestine; 3 = ears; 4 = rectum.

was examined macroscopically at necropsy. Solid organs (e.g., heart, lung, kidney, liver) and their associated vessels and ducts were sliced and examined using a 20-mesh sieve and river water. Particular attention was paid to the tympanic membrane and auditory ossicles of the middle ear and to the blowhole and sinuses.

In the laboratory, the samples of diaphragm were examined microscopically, but no digestions were performed. Each of the subsamples from each of the intestinal sections was opened, the mucosal surfaces scraped and the contents and scrapings were diluted with water. This mixture was then examined microscopically with a dissecting microscope at 68×.

Because most of each necropsy was conducted in the field, and time limitations were strict, it was impossible to make accurate counts of the helminths encountered. Therefore the data obtained are largely qualitative, however to allow some quantitative assessment of relative intensity, the helminths were recorded as being present in low (<20 individuals), moderate (20–80 individuals) and high (>80 individuals) numbers.

Nematodes were fixed in acetic acid, stored in a mixture of 70% ethanol and 10% glycerin and examined as temporary wet mounts in lactophenol. Trematodes were fixed in AFA and stained in Ehrlich's or Delafield's hematoxylin. Representative specimens of helminths found in this analysis have been deposited in the U.S. National Parasite Collection, Beltsville, Maryland 20705, USA (Accession Nos. 78969–78973), the National Museum of Canada Invertebrate Collection, National Museum of Natural Sciences, Invertebrate Zoology Division, Ottawa, Ontario K1A 0M8, Canada (Accession Nos. NMCP1985-0171–0175) and the University of Alberta Parasitology Collection, Department of Zoology, University of Alberta, Edmonton, Alberta T6G 2E9, Canada (Accession Nos. UAPC 11103–11107).

Five species of helminths (two trematodes, three nematodes) were found (Table 1). No beluga was helminth-free, a maximum of four species was found in one individual. Most organs were helminth-free. Intestinal sections 7 through 20 were free of helminths.

Hadwenius seymouri Price, 1932 was found in four beluga, in low to moderate numbers, and always within the first six sections of the intestine (ca. 6 meters). *Leucasiella arctica* Delyamure and Kleinenberg, 1958 was rare. One host harbored three individuals in the rectum.

Pharurus pallasii (van Beneden, 1870) Arnold and Gaskin, 1975 was recovered

from the ears of eight hosts. Three of the hosts had >80 worms, the others had between 20 and 80. *Anisakis simplex* (Rudolphi, 1809) Baylis, 1920 was rare. One host was infected with one female, a second host was infected with four males. All specimens were located in the first compartment of the stomach. Fourth stage larvae of *Contracaecum* sp. were the most prevalent and abundant helminth encountered. All hosts were infected and the infections ranged from low to high numbers. *Contracaecum* sp. occurred in all three of the stomach compartments and were found in the small intestine in the first six sections.

With the exception of *Contracaecum*, all species have been reported previously in beluga. This is the first report of *Leucasiella arctica* and *Contracaecum* from Nearctic waters and the genus *Contracaecum* is reported from beluga for the first time.

Although the data presented are not strictly quantitative, beluga from the Kugmallit Bay region of the MacKenzie Delta did not appear to be seriously parasitized by helminths. In fact, most organs (including much of the small intestine) were virtually helminth-free.

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Methods of Urine Collection for Male White-tailed Deer

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Wildlife biologists are increasing their use of physiological and biochemical indices to assess individual or collective condition. Hematological and chemical analyses have been used widely in many species to study disease (Davis et al., 1981, Infectious Diseases of Wild Mammals, 2nd Ed., Iowa State University Press, Ames, Iowa, 446 pp.), reproduction (Plotka et al., 1977, Biol. Reprod. 16: 340–343), nutrition (Seal et al., 1978, J. Wildl. Manage. 442: 776–790), and stress (Rehbinder and Edquist, 1981, Acta Vet. Scand. 22: 480–492). Blood parameters, however, can be influenced by drug immobilization and handling (Seal et al., 1972, J. Wildl. Manage. 36: 1034–1040; Mautz et al., 1980, J. Wildl. Manage. 44: 343–351). Urine may be less affected by factors invoking a stress response (Warren and Whelan, 1981, J. Wildl. Dis. 17: 479–483).

Urinalysis is used extensively for diagnosis of disease in humans (Harrison et al.,

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