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Some Observations on Urine From a Bowhead Whale

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The analysis of urine is an essential part of any examination of an animal to determine its health status. This is true especially when (for purposes of comparison) there is a large store of data about urine of the species in question. The urine of the bowhead whale, *Balaena mysticetus*, has apparently not been examined.

On 18 May 1978 a urine sample identified as having originated from a bowhead whale, designated by the National Marine Fisheries Service as #78B2, was presented to this laboratory. The urine was obtained by cystocentesis from a male about 8.4 m in length, taken by Eskimo hunters on 2 May 1978 at Barrow, Alaska. The urine was refrigerated until 6 May, then frozen. On 15 May the frozen specimen was prepared for shipment. Unforeseen delays during shipment allowed the urine to thaw by the time it reached this laboratory. Findings are presented here not only for general information but also as a small contribution to the data concerned with the biology of this endangered species.

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Results and Discussion

On routine clinical urinalysis the following observations were made. The urine was dark amber, clear, and had no odor. The pH was 5.5, and the specific gravity (SG) was 1.032; there was a trace of protein; and the tests for ketones, glucose, reducing substances, bile pigments, hemoglobin, and urobilinogen were negative. Microscopic examination of the sediment revealed a few red and white cells, but no casts; however, there were myriads of epithelial cells (some were cornified), and there were some bladder transitional cells and caudate cells. There were many unidentified spheroid crystals (probably urates), and there were also occasional oxalate crystals as well as a few triple phosphate crystals.

On further analysis the following results were obtained: Sodium ion 183 meq/l, potassium ion 14.4 meq/l, chloride ion 433 meq/l, osmolality 1,440 milliosmols/l, creatinine 400 mg/dl, urea N 3,000 mg/dl. The amino acid pattern obtained can be seen in Table 1 and is similar to that seen in adult mammals such as the dog. The

Table 1.—Amino acid content of urine from a bowhead whale.

Amino acid	Nanomoles/mg creatinine
Threonine	31
Serine	28
Asparagine	99
Glutamine	32
Proline	64
Glutamic acid	11
Glycine	84
Alanine	43
α Aminoadipic acid	14.5
α Amino-n-butyric acid	17
Valine	18
Half cystine	115
Cystathionine	25
Methionine	10
Isoleucine	Trace
Leucine	18
Tyrosine	29
Phenylalanine	10
Ornithine	Trace
Lysine	17
1-Methylhistidine	Trace
Histidine	16
3-Methylhistidine	Trace
Arginine	Trace
Trimethyl lysine	204
NN dimethylarginine	31
N'N dimethylarginine	24

amino acid determinations were made in a Beckman Amino Acid Analyzer.[1]

While Hill, quoted by Laurie (1933), was correlating the pressure conditions in the lungs of blue whales, *Balaenoptera musculus*, with the gaseous nitrogen content of urine, he also measured the specific gravity of the urine on 13 occasions and the sodium chloride (NaCl) content 43 times. The SG ranged from 1.029 to 1.038 with a mean of 1.034; the NaCl content ranged from 13.33 to 26.60 mg/ml with a mean of 21.30 mg/ml. This is 360 meq/l for both sodium and chloride ions. In the present instance an SG of 1.032 on the bowhead whale urine and sodium ion=183 meq/l and chloride ion=433 meq/l were obtained. Furuhashi (1927) obtained a mean chloride ion value of 318 meq/l on eight samples: Three from fin whales, *B. physalus*; four from sei whales, *B. borealis*; and one from a sperm whale, *Physeter macrocephalus*.

Laurie (1933) obtained chloride values on urine from blue and fin whales ranging from 120 to 455 mM/l with many values near the upper limits.

Lövenbach, quoted by Krogh (1939), obtained chloride values ranging from 75 to 820 mM/l (mainly on *Megoptera boops*)[2]. He stated that the usual range is between 280 and 520 mM/l. Schmidt-Nielsen and Holmsen (1921) obtained values of 266 mM/l and 362 mM/l of sodium and chloride, respectively, on urine from both crustacean-eating whales, *B. borealis*, and from mainly fish-eating whales, *B. physalus*. They also reported on the examination of fresh urine from one *B. borealis* that had a specific gravity of 1.027 and a freezing point depression of −2.46°C. This represents an osmolality of 1,323 mo/l. The chloride ion content of this urine was 181 meq/l.

[1]Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

[2]Present scientific name is *Megaptera novaeangliae*

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Healed Penetrating Injury of a Bowhead Whale

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The bowhead whale has been successfully hunted by the Eskimos of Arctic Alaska for centuries. In recent years increasing concern has been expressed over the rising number of animals taken or struck and lost (Marquette, 1979). The fate of those that are struck and lost is not known; however, it is reasonable to assume that many succumb to their wounds.

An instance of a bowhead whale evidencing a healed penetrating injury is described in this report. Although positive proof is lacking, a reasonable explanation is that the penetration was due either to a harpoon or a bomb fired from a shoulder gun. The whale was taken during the fall 1978 whaling season in the Beaufort Sea off Kaktovik, Barter Island, on the northeastern coast of Arctic Alaska. The animal was struck on 15 September 1978 and lost in an approaching storm. On 21 September, with aircraft support, the animal was found floating approximately 28 km to the west and 4 km from shore. The whalers then beached the animal at that point.

The animal was a male, approximately 10.6 m in length, and was designated as whale #78KK1 by the National Marine Fisheries Service. As the butchering proceeded, large sections (approximately 0.9 m × 0.6 m × 0.2 m) of skin with underlying blubber were removed and placed upon the beach. During collection of tissue specimens from the sections, what appeared to be a scar was noted extending from the skin and through the blubber. The area of suspected scar tissue was a whitish tract that extended through the blubber at an angle; it was 2.5 cm in diameter, 11 cm long, and firmer than the surrounding blubber (Fig. 1). The whitish tract in the blubber, hypodermis, and dermis was continuous externally with an area of white skin, slightly