

# Ingutuk: A Morphological Variant of the Bowhead Whale, *Balaena mysticetus*

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## Introduction

Eighteenth and nineteenth century commercial whalers working in Northern Hemisphere waters pursued and nearly exterminated all species of whales belonging to the family Balaenidae, collectively known as "right whales." In describing the right whales that they hunted, the whalers recognized at least five types. The two most notable were the Pacific and Atlantic right whale, *Balaena* (= *Eubalaena*) *glacialis*, and the Greenland right or bowhead whale, *Balaena mysticetus*. The three others were referred to as the "great polar whale," the "arctic ice whale," and Roys' "bunchback" (Scammon, 1874), all three of which looked like and were taken with bowhead whales.

During the annual hunt of bowhead whales in Alaska, Eskimo whalers recognize a whale which looks somewhat different from most bowheads in the population. They call this animal ingutuk. On 3 May 1978, a bowhead whale taken at Barrow, Alaska, was identified by some Eskimos as an ingutuk. The taking of this whale exceeded by one the three-whale quota established for Barrow by agreement between the U.S. government and the Alaskan Eskimo Whaling Commission under a mandate from the International Whaling Commission (IWC). Eskimo

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whalers argued that the harvest restriction imposed by the IWC applied only to bowheads and, therefore, an unlimited number of ingutuks could be taken. Some Eskimos contended that the ingutuk was a different species than the bowhead; some that it was *B. glacialis*; and others thought it was neither *B. mysticetus* nor *B. glacialis*.

This paper is a preliminary evaluation of historical information and recent biological data relevant to the question of whether the ingutuk is: 1) A distinct species, 2) *B. glacialis*, or 3) a morphological variant of *B. mysticetus*.

## Historical Evidence

### Taxonomic Considerations and Eskimo Nomenclature

Clear morphological distinctions have been established between *B. glacialis* and *B. mysticetus* (e.g., Eschricht and Reinhardt, 1866; True, 1904; Allen, 1908; Rice, 1977). For example, *B. glacialis* possess characteristic callosities on their heads; bowheads do not. Among people who are familiar with both species there is no confusion in identification. *Balaena glacialis* occurred in the summer near St. Lawrence Island until several decades ago (Tomilin, 1957; Omura et al., 1969). Eskimo whalers there clearly recognize the distinction between the two species.

The term "great polar whale" frequently occurred in the literature independent of references to Greenland right or bowhead whales. However, from the sketches and notes in Scoresby (1820), Cheever (1850), and Scammon (1874)—we have little doubt that the great polar whale and the bowhead were the same. Identities of the Arctic ice whale and the bunchback are less clear.

Both were taken with bowheads, though they were frequently described as smaller and occurring earlier in the spring than bowheads (Scoresby, 1820; Scammon, 1874). The Arctic ice whale was described by commercial whalers as a smaller bowhead-like whale, closely associated with the ice and more docile than the larger bowheads which were taken in open water. In contrast, some behavioral differences as well as the occurrence of a bulge or lump on the caudal peduncle were characteristic of the bunchback whale. Some of the characteristics ascribed to the Arctic ice whale and the bunchback, in part, also describe the ingutuk.

Classification of the ingutuk has perplexed Yankee and Eskimo whalers alike. Hadley (1915), Allen (cited in Bailey and Hendee, 1926), and Brower,<sup>1</sup> well-known commercial whalers in Alaska at the turn of the 20th century, believed that the ingutuk was a separate species from the bowhead. Stefansson (1944) reported that some Eskimos believed the ingutuk to be a separate species, whereas others considered it to be a yearling or 2-year-old bowhead. Scammon (1874) regarded differences in appearance among bowheads as age-related.

Confusion over the proper usage of Eskimo terms also may have added to the controversy. In the Eskimo spoken languages of Inupiaq and Yup'ik there are different names for each age, sex, or developmental stage of most animal species, including the bowhead. The Inupiaq word for bowhead is agvik, which means "the whale." The more commonly seen slender bowhead is called usingwachaek by Inupiaq speakers in villages from Point Hope south. North and east of Point Hope variations of the term kairalik<sup>2</sup> (Rice, 1977) or kiyalalik<sup>3,4</sup> describe size categories of

<sup>1</sup>Brower, C. D. 1863-1939. The northernmost American. An autobiography. 895 p. (Condensed and published as: Brower, C. D. 1942. Fifty years below zero. Dodd, Mead and Co., N. Y., 310 p.)

<sup>2</sup>Arnold Brower, Sr., Barrow, AK 99723, pers. commun.

<sup>3</sup>Naval Arctic Research Laboratory, 1972. Eskimo whaling at Barrow, Alaska. Unpubl. manuscript, 24 p. Naval Arctic Research Laboratory, Barrow, AK 99723.

<sup>4</sup>Durham, F. E. 1972. Biology of the bowhead whale (*Balaena mysticetus*) in the western Arctic. Unpubl. manuscript, 99 p. Dep. Biol., Univ. South Calif., Los Angeles, CA 90007.

the apparent adult, long-slender (usingwachaek) bowhead. Kiyralik is a small bowhead; kiyralivuk, a large male, and kiyralivoak, an extra large male. Short, fat whales (about 8 m in length) with some features distinct from usingwachaek and kiyralik are called ingutuk. Both sexes are included in this term (see footnote 3), but it is generally associated with females, as larger females with apparent ingutuk features are called ingutuvuk ("one who carries calf").

### Geographic Isolation

If ingutuks are not *B. glacialis*, perhaps their occurrence in the western Arctic bowhead population is a result of emigration from isolated bowhead populations in the Okhotsk Sea (U.S.S.R.) or the North Atlantic Ocean. Subspecific separation between the Okhotsk and western Arctic bowhead populations has been suggested by Berzin and Kuz'min (1975), though data to support this hypothesis, if available, were not presented. Plots of early Yankee bowhead harvest records (Townsend, 1935) suggest that these two populations were once one. This contention is supported by recent analysis of additional historical whaling records<sup>5</sup>. However, currently there are so few whales in the western Arctic and Okhotsk populations that continued intermixing is unlikely.

Emigration of ingutuks from the North Atlantic population(s) of bowheads by way of Canada appears plausible (from review of Figure 1 in Braham et al.<sup>6</sup>); however, the infrequency of sightings in northern Canada east of Amundsen Gulf suggests separation. Whaling gear (e.g., harpoon lances and bombs) from Atlantic whalers has been found in bowheads taken in the Bering Sea and U.S. Arctic Ocean

<sup>5</sup>John Bockstoce, Curator of Ethnology, New Bedford Whaling Museum, 18 Johnny Cake Hill, New Bedford, MA 02740, pers. commun.

<sup>6</sup>Braham, H., B. Krogman, and G. Carroll. 1979. Population biology of the bowhead whale (*Balaena mysticetus*) II: Migration, distribution, and abundance in the Bering, Chukchi, and Beaufort Seas, with notes on the distribution and life history of white whales (*Delphinapterus leucas*). Unpubl. final OCSEAP report, 118 p. Natl. Mar. Mammal Lab., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way N.E., Bldg. 32, Seattle, WA 98115.

Table 1.—Bowhead whale characters used by Eskimos, early naturalists, and Yankee whalers to separate ingutuks from bowheads. "Positive characters" are those features believed to be common to ingutuks only; "shared characters" can be classified to noningutuk variants. Data were compiled from unpublished manuscripts of F. Durham<sup>1</sup> and D. Foote<sup>2</sup>, interviews with Alaskan Eskimos, and accounts of early whalers (Scoresby, 1820; Eschricht and Reinhart, 1866; Scammon, 1874; Allen, 1908; and Bower<sup>3</sup>).

Positive characters	Shared characters	Insufficient evidence
Shorter baleen	Short body length	Thicker, two layer blubber
Thinner, lighter baleen	Skin color greyish	Denser bone
Greater girth per length	Secondary mandibular curve	Thicker skin
Meat more tender	Baleen color greyish	Gum tissue extends farther down baleen
	Straight baleen rows	
	Rostrum flattened	
	Gum tissue whiter	
	Mouth more curved	
	Padded loins	
	Caudal hump	
	Flippers shorter, wider, and less pointed	
	Flukes smaller, smooth edges	
	Docile	
	Readily floats	

<sup>1</sup>Durham, F. E. 1972. Biology of the bowhead whale (*Balaena mysticetus*) in the western Arctic. Unpubl. manuscript, 99 p. Dep. Biol., Univ. South. Calif., Los Angeles, CA 90007.

<sup>2</sup>Foote, D. C. 1964. Observations of the bowhead whale at Point Hope, Alaska. Unpubl. manuscript, 78 p. Geogr. Dep., McGill Univ., Montreal, Que., Can.

<sup>3</sup>Brower, C. D. 1863-1939. The northernmost American. An autobiography. 895 p. (Condensed and published as Brower, C. D. 1942. Fifty years below zero. Dodd, Mead and Co., N.Y., 310 p.)

(Eschricht and Reinhart, 1866; Scammon, 1874; Tomilin, 1957). One cannot rule out the possibility, however, that commercial whalers and Eskimos frequently traded or sold their hunting gear to other whalers and Eskimos across the circumpolar region.

### Proportion of Ingutuks Observed

Estimates of ingutuks in the population are available from data of Foote<sup>7</sup> and from Eskimo harvest data of 1973-79. Foote spent several years during the early 1960's studying bowhead whales at Point Hope, Alaska. The ingutuk problem was of particular interest to him. With the aid of several experienced Eskimo whalers, Foote attempted to determine what percentage of the population migrating past Point Hope consisted of ingutuks. In 1962 he classified 12 of 80 whales (15 percent) as ingutuk and 85 percent as usingwachaek. From 1973 to June 1979 Eskimo whalers at Point Hope and Barrow landed 112 bowheads, of which 14 (12.5 percent) were described by the whalers as ingutuks. The similarity of these two estimates suggests that the percentage of ingutuks in the population has not changed appreciably over the past 15 years.

<sup>7</sup>Foote, D. C. 1964. Observations of the bowhead whale at Point Hope, Alaska. Unpubl. manuscript, 78 p. Geogr. Dep., McGill Univ., Montreal, Que., Can.

## Biological Evidence

### Morphological Features

Eskimos, Yankee whalers, and scientists have identified 22 morphological and behavioral features that describe the differences among whales in the bowhead population (Table 1). From reviewing these characters with experienced Eskimo whalers and interpreting the unpublished findings of Foote (footnote 7) and Durham (footnote 4), we found that 14 characters (61 percent) were not unique to the ingutuk. Four characters (18 percent) appear to be uniquely descriptive of ingutuk; the remaining four characters cannot be assigned clearly to either form.

These data do not exclude the possibility that the ingutuk represents one end of the normal distribution of characters. Occasional whales with a combination of characters usually attributed to ingutuk, usingwachaek, and kiyralik have been reported (footnote 4), suggesting that a range of features may occur within a given individual as well as within the population. While numerous contradictions exist, a suite of characters seems to exist that distinguishes ingutuks from other bowheads more often than would be expected from random association.

### Sex and Size-Class Variation

Several Eskimos interviewed at Barrow in 1977 and 1978 stated that the

**Table 2.—Sex and size categorization of the reported ingutuk and ingutuvuk bowhead whales taken by Alaskan Eskimos, 1973-79. Data from Braham et al.<sup>1</sup>, 1980; and Marquette<sup>2</sup>, 1979.**

Date killed	Size (cm)		Eskimo village where taken
	Males	Females	
23 May 1973 <sup>3</sup>		855	Barrow
16 May 1974		41,135	Barrow
29 May 1974		724	Barrow
24 Apr 1975		4.5(1,097)	Point Hope
10 May 1975		846	Point Hope
13 May 1975 <sup>4</sup>		927	Barrow
20 May 1975		784	Barrow
6 May 1976		825	Point Hope
17 May 1976		854	Barrow
10 Sep 1976		41,600	Barrow
2 May 1978 <sup>7</sup>	838		Barrow
17 Apr 1979		853	Point Hope
16 May 1979	874		Barrow
26 May 1979	830		Barrow

<sup>1</sup>Braham, H., B. Krogman, W. Marquette, D. Rugh, J. Johnson, M. Nerini, S. Leatherwood, M. Dahlheim, R. Sonntag, G. Carroll, T. Bray, S. Savage, and J. Cabbage. 1979. Bowhead whale (*Balaena mysticetus*) preliminary research results, June-December 1978. NWAFC Processed rep. 79-8, 40 p. Natl. Mar. Mammal Lab., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way N.E., Seattle, WA 98115.

<sup>2</sup>Marquette, W. 1977. The 1976 catch of bowhead whales (*Balaena mysticetus*) by Alaskan Eskimos, with a review of the fishery, 1973-1976, and a biological summary of the species. Processed rep., 80 p. Natl. Mar. Mammal Lab., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way N.E., Seattle, WA 98115.

<sup>3</sup>Only Barrow spring data.

<sup>4</sup>Reported to be an ingutuvuk.

<sup>5</sup>Sex not determined; thought to be a female.

<sup>6</sup>Extracted from Marquette (NMFS) field notes.

<sup>7</sup>Data from 1977 are incomplete. None of the 29 whales landed that year was identified as ingutuk. The whale taken 3 May 1978 at Barrow was incorrectly identified as ingutuk (Braham et al., 1979); it does not appear in this table.

term ingutuk refers to a short, fat female; none knew of the Eskimo name for a male ingutuk. According to Rainey (1947) some morphological and behavioral characteristics attributed to ingutuks also described young female bowheads.

Since 1973 National Marine Fisheries Service biologists have collected size and sex data on ingutuks at Point Hope and Barrow, Alaska (Marquette<sup>8</sup>; 1979). From April 1973 to June 1979, 14 harvested whales were identified by Eskimos as ingutuks. Of these, 10 were females, 1 was thought to be a female (but not verified), and 3 were males (Table 2). The males were taken during the 1978 and 1979 spring hunts

<sup>8</sup>Marquette, W. 1977. The 1976 catch of bowhead whales (*Balaena mysticetus*) by Alaskan Eskimos, with a review of the fishery, 1973-76, and a biological summary of the species. Processed rep., 79 p. Natl. Mar. Mammal Lab., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way N.E., Bldg. 32, Seattle, WA 98115.

**Table 3.—Contingency tables of frequency distribution for comparison of total body length and sex ratio (where measurements and sex were appropriately determined) among ingutuk versus bowhead whales from the western Arctic population taken during the Alaskan Eskimo subsistence hunt at Point Hope and Barrow, Alaska, 1973-79.**

	Among size comparison				Among sex ratio comparison			
	Frequency distribution				Frequency distribution			
	Greater than 1,000 cm		Less than 1,000 cm		Males		Females	
	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.
Ingutuks	3	5.22	11	8.78	3	6.42	110	6.58
Bowheads <sup>2</sup>	44	41.78	68	70.22	35	31.58	29	32.42
	$\Sigma\chi^2 = 1.70^{ns}$ (1 df)				$\Sigma\chi^2 = 4.32^*$ (1 df)			
	ns = not significant. * = significant at the 0.05 level (Yates correction).							

<sup>1</sup>The 1,097 cm whale taken at Point Hope on 24 April 1975 was not used in this analysis because its sex was not confirmed.

<sup>2</sup>Refers to all noningutuk type whales taken during the bowhead whale hunt.

(Braham et al., 1979; 1980). The mean length of males was 847.3 cm (standard deviation [SD] 23.4,  $n = 3$ ); for females the mean length was 940.3 cm (SD 255.8,  $n = 10$ ). Foote (footnote 7) observed only one male ingutuk taken during his study at Point Hope.

Because by inference the term ingutuk is related to ingutuvuk, we tested to see whether there was a disproportionate number of female ingutuks (including ingutuvuks) in the bowhead population. There were 3 male and 10 female ingutuks tested against 35 male and 29 female bowheads (total 64 bowheads sexed) (Table 3). A significant difference was found ( $\chi^2: P < 0.05$ ) suggesting that the ingutuk phenotypic expression is predominantly a female related trait. We reject the alternate possibility that female ingutuks are selected during the hunt since the sex of a whale cannot be determined prior to a kill. Since no special term is used for male ingutuks, we must assume that the term ingutuk had or has no special gender or that it is actually a female term, as is ingutuvuk (footnote 3). In at least two instances NMFS biologists have received testes from two noningutuk whales sexed as females. Thus, the sex identification of ingutuks prior to 1978 is in question. The male-to-female sex ratio of all identified bowheads harvested since 1973 is approximately 1.13:1.00.

The fact that 3 of 14 ingutuk-type whales taken since 1973 were over

1,000 cm in length suggests that ingutuks grow to become ingutuvuks (Marquette, footnote 8 and 1979); we chose 1,000 cm as the length to test whether the ingutuk type was represented differently in the bowhead population according to size. There were 3 ingutuks less than 1,000 cm and 11 greater than 1,000 cm tested against 44 bowheads less than 1,000 cm and 63 greater than 1,000 cm. No difference in length was found for the two size categories between ingutuks (including ingutuvuks) and all other bowheads (Table 3).

### Genetic-Biochemical Analysis

Since 1977, NMFS has been investigating the genetics and biochemistry of bowhead whales in an attempt to describe further the biology of this species. Four bowhead whales were karyotyped in 1978; each had a diploid chromosome count ( $2n$ ) of 42 (Jarrell, 1979). An additional four have been karyotyped since 1978 with the same results. We examined the chromosomes of one ingutuk and found it to be similar to other bowheads. All other baleen whales tested have a chromosome count of 44 (Duffield, 1977). No chromosome samples have been collected from *B. glacialis* for comparison.

Electrophoretic analysis of liver tissues from nine bowheads (including one ingutuk) collected in 1977 and 1978 showed that 6 of the 30 enzyme systems (20 percent) tested exhibited variability

in at least one individual<sup>9</sup>. One whale accounted for much of this variability, differing from the others in 4 of 30 enzyme systems. However, this whale did not possess morphological characteristics attributed to ingutuk. Conversely, the ingutuk sampled was not distinguishable from the other bowheads by electrophoresis.

Electrophoretic analysis of blood proteins provided similar results<sup>10</sup>. Of three whales sampled in 1978, all had identical hemoglobins. One animal differed in one of five serum proteins; it was not the ingutuk specimen.

These findings, although based on few samples, suggest that protein variability is not correlated with observed morphological differences within the species. Electrophoretic data from marine mammals should, however, be viewed with caution (Sharp, In press).

### Conclusions

It is indisputable that some bowhead whales differ in appearance, morphologically, although it often takes an experienced observer to make the distinction. The most apparent morphological variant is called ingutuk. However, the preponderant circumstantial and direct evidence suggests that a clear distinction between ingutuk and noningutuk bowheads cannot always be made.

The possibility that the ingutuk is a developmental stage which will grow to become an ingutuvuk, and presumably a "normal" bowhead, is suggested by the use of the word in some Eskimo villages as well as by size comparisons among harvested animals. The discrepancies noted in assigning "ingutuk" to the female gender may, in fact, be because ingutuk is a female sex-related trait, or perhaps simply because of inaccuracies in sexing animals.

Although morphometric and genetic-biochemical analyses of bowhead whales are not complete, we believe that the ingutuk is not a species

separate from the bowhead. This conclusion is supported by the most experienced Eskimo whaling captains we interviewed<sup>11</sup> (footnote 2). While future research will be aimed at further investigation of the explanations presented in this paper, it appears that the ingutuk is within the range of variation in the western Arctic population of bowhead whales.

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<sup>9</sup>Analysis conducted by Dennis Hedgecock, Univ. Calif., Bodega Marine Laboratory, Bodega Bay, CA 94923.

<sup>10</sup>Analysis conducted by Deborah Duffield, Biol. Dep., Portland State Univ., Portland, OR 97207.

<sup>11</sup>Vernon Slwooko and Conrad Oozeva, Gambell, AK 99742; Jerry Wongittilin, Sr., Savoonga, AK 99759, pers. commun.