

## Male Nipples in Blue and Fin Whales and Their Absence in Sperm Whales

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### Abstract

During the Antarctic Whaling Season of 1947-1948, searches in a series of foetal and postnatal male blue and fin whales gave information on variation, morphology, and morphometry of the nipples sunk in grooves posterior to the penis. A review indicates that male nipples occur in most, probably all, whalebone whales. In 1947-1948, no nipples were found in six postnatal sperm whales, and further evidence, from 41 male foetal sperm whales, and 1,269 male postnatal sperm whales examined in the Southeast Pacific in 1958 to 1962, showed that male sperm whales do not possess nipples.

**Key Words:** Blue whales, fin whales, sperm whales, male nipples, nipple grooves, *Physeter*, *Balaenoptera*

### Introduction

During the Antarctic Whaling Season of 1947-1948, I was the Whale Fishery Inspector on board *FL. F. Southern Harvester* where I also carried out a research programme on whale carcasses for the "Discovery" Investigations which later became part of the British National Institute of Oceanography, afterwards the Institute of Oceanographic Sciences.

One day in the middle of January 1948 a large blue whale (*Balaenoptera musculus*), which had been used as a fender, was heaved up. A fender prevents collision when two ships are alongside each other in the open ocean. On the high seas in the Antarctic, the only way to bring a transport ship alongside the factory ship was to use dead whales as fenders. When the transport sails, the fender whale, according to the regulations of the International Whaling Commission, has to be worked up, that is, separated into blubber, meat, and bones, although only the blubber needs to be used. Fender whales are bloated with the gases of decomposition, and making the first cuts can be dangerous; I have heard of a fenser who was blown overboard and drowned when a fender

whale exploded. This particular blue whale had been used as a fender for two weeks and was much distended. As the whale came to rest between the rolling-blocks (which prevent the whale from rolling all over the deck), I was amazed to see a pair of very obvious nipples protruding from grooves on each side of the raphe, that is, the midline of the ventral surface, just behind the insertion of the penis. Each nipple was white in colour and about the size of a small fist. I was amazed because at that time I knew only that Ommaney (1932) had reported that nipples were present in male fetuses of fin whales, but absent in the adults. I thought as much would apply to blue whales. In the case of this fender whale, the nipples had been forced out from the grooves by pressure of the gases of decomposition. I decided therefore to look for the nipples in blue whales (*Balaenoptera musculus intermedia*) and in fin whales (*B. physalus quoyi*) and also in sperm whales (*Physeter catodon*)<sup>1</sup> whenever opportunity afforded during the expedition to discover something about the incidence, morphology, and morphometry of the nipples. While still unpublished, these observations were briefly noticed by Bannister (1963, p. 113) when describing an intersexual fin whale.

As will be seen, we are now aware that male nipples occur in foetal and postnatal blue and fin whales, but previous work on male nipples, reviewed in the next section, was done on individual captures or strandings. My approach in the present paper is to consider for the first time observations on a series of carcasses to study the incidence, variation, morphology, and morphometry of the nipples and their grooves.

### Previous Work

Slijper (1962, p. 380; 1966, p. 310) said that male cetaceans, "like other male mammals" have rudimentary nipples set in small slits near the anus. He gives the impression that all male cetaceans

<sup>1</sup> Clarke et al. (1988, p. 54) have explained in a footnote why I prefer *Physeter catodon* to *P. macrocephalus* as the specific name of the sperm whale.

have nipples. Ryder (1885), however, was more cautious when he concluded that there was “an important difference” between “the foetal males of some species of Denticetes and some of Mysticetes inasmuch as the latter possess rudimentary mammary glands and the former do not. How universally this may be true we will not know until foetuses of all the former have been studied” (p. 139).

Arvy (1973-1974a, 1973-1974b), who has twice reviewed male nipples in cetaceans, believed that these were probably first mentioned by Pallas (1811) in the white whale (*Delphinapterus leucas*). Actually, the nipples were explicitly recorded more than 150 years earlier. Captain John Monck (1650) was engaged in 1619-1620 in the Spitzbergen fishery for the Greenland whale (*Balaena mysticetus*) and made the following observation:

*The Female commonly exceeds the others in bigness, its privy Members are within the Body, not unlike those of Women, and open and shut as occasion requires. They are to be seen next by their Breasts (where you also find those of the Males) as you may see in the Cut . . . (p. 568)*

Reviewing briefly the incidence of male nipples in other baleen whales, I have found no mention of these in the northern and southern right whales (*Eubalaena glacialis* and *E. australis*). Hale (1931, p. 319) mentioned paired grooves on either side of the anus in the male pygmy right whale (*Neobalaena marginata*), and these may have been grooves containing nipples. Turner (1872, p. 206) and Beaugerard & Boulart (1882, p. 170) found rudimentary nipples in male foetuses of blue whales, and True (1904) described “rudimentary mammae of considerable size concealed in slits like those of the female” (p. 177) in two postnatal blue whales. Ommaney (1932) recorded “rudimentary male nipples” (p. 367) in two foetuses of the southern fin whale (*Balaenoptera physalus quoyi*), but said that such nipples were absent in the adult. The legend to his Plate II, Figure 1, draws attention to “accessory genital grooves” just behind the penis of an adult. As will be seen, if he had poked his finger into these grooves, he would most certainly have found the male nipples. I have seen nipples in a northern male fin whale (*B. p. physalus*) when visiting the whaling station at West Loch Tarbert, Outer Hebrides, Scotland, in June 1951. Andrews (1916, p. 350) found rudimentary nipples in two deep slits just behind the penis of an adult sei whale (*Balaenoptera borealis*). I have found no

information regarding male nipples in Bryde’s whale (*Balaenoptera edeni*). Ommaney (1932) said that, according to Kukenthal (1893, p. 356), whose paper I have not seen, a male nipple develops as far as the formation of a “mammary sac” (p. 367), which is later reabsorbed in “*Balaenoptera rostrata*,” presumably *B. acutorostrata*, the lesser rorqual or minke. Struthers (1888) mentioned a “mammary slit,” (p. 116), curiously enough median and unpaired, containing two nipples in the humpback whale (*Megaptera novaeangliae*). I have found no reference to male nipples in the gray whale (*Eschrichtius robustus*).

Lack of information on male nipples in the northern and southern right whales, Bryde’s whale, and the gray whale does not mean that they may not be present. This review is intended to show that in most or all whalebone whales there are male nipples, rudimentary or developed, in the foetus or in both the foetal and postnatal whale.

There is less information, and some of it contradictory, about male nipples in toothed whales and dolphins, so that Ryder’s cautionary phrase, mentioned above, should be kept in mind. Creighton (1877, p. 29) said that Flower had mentioned to him that in the male common porpoise (*Phocaena phocaena*) there is a single duct without nipples behind the penis. Meek (1918) said that this duct in the porpoise contained “the reduced teats of the mammary gland” (p. 200). He also mentioned “small paired openings of the mammary glands” (p. 200) in a male of the white-beaked dolphin (*Lagenorhynchus albirostris*). Pallas (1811) drew attention to paired grooves behind the penis in the white whale or beluga and asked “*Hae vestigia mamarum in masculo?*” Vladykov (1944) also mentioned “une paire de glandes mammaires” (p. 93) in the male beluga, while Yablokov (1961) said that in this species the male has rudimentary mammary glands which produce a secretion which acts as a recognition signal. Arvy (1973-1974a) considered such a secretion to be most unlikely. Anderson (1878) found small nipple-like structures behind the penis of the gangetic river dolphin (*Platanista gangetica*).

Regarding the sperm whale (*Physeter catodon*), Bennett (1840, Vol. II) said that he “could not detect any trace of rudimentary teats” (p. 169) in a male foetus 4.3 m long. From Paliza’s (1964) Table 5, it is seen that accessory grooves (mostly around the genital and anal areas or on the postanal ventral hump) were found only in sperm whale foetuses larger than 1.00 m examined in Perú; in male foetuses between 1.00 and 4.03 m, these accessory grooves were present in 20% of 41 males. Clarke et al. (1968, Table 25) found that among 1,269 male sperm whale carcasses examined in Chile

and Perú, there were 41% with grooves “around the penis slit”; however, neither Paliza nor Clarke et al. searched these grooves for nipples.

### Material and Methods

On board the *Fl. F. Southern Harvester* in 1948, I searched for nipple grooves and nipples in four male blue whale fetuses, in 16 postnatal male blue whales, in two fin whale fetuses, and in 21 postnatal male fin whales. Six male sperm whales also were searched for nipples. The observations on blue and fin males are reported in Tables 1 and 2, which also record the specimens of nipples and grooves collected from two foetal and three postnatal blue whales and one foetal and two postnatal fin whales. These specimens were preserved in Bouin's fluid or neutral formol and they should be available among the Discovery Collections in the British Museum (Natural History), South Kensington, London.

Because flensing begins in the posterior region of a whale, there was only time to dissect out the nipples and grooves in fetuses and in a few postnatal whales. In most of the latter, the nipple grooves were explored by poking with the fingers, although this palpation could be difficult at times because these grooves are very tightly closed in dead whales.

### Results

#### *Blue and Fin Whales*

The following results emerge on blue and fin whales from inspection of Tables 1 and 2.

Male nipples were found in all fetuses and postnatal whales, except in blue whale SH768, but here the palpation was hasty, with a flenser waiting, and I discount the result. So, all male blue and fin whales, foetal and postnatal, have nipples concealed in a pair of nipple grooves (Figure 1). In one fin whale (SH993), which had been used as a fender, the nipples were protruding (Figure 2). In both blue and fin whales, foetal and postnatal, the grooves were located immediately behind the insertion of the penis and arranged symmetrically on either side of the raphe. In 40% of blue whales and 43% of fin whales, these nipple grooves were the only grooves present in the genital region. In the remaining animals, between one and three pairs of posterior accessory genital grooves were present. In one blue whale (SH934) and one fin whale (SH1437), there were a pair of accessory grooves situated anterior to the penis. The whale SH1437 also had a posterior accessory genital groove, which was singular because it was unpaired. In both spe-

cies, the two nipple grooves were just about equal in length, except in fin whale SH1364. Where dissection could be attempted, the nipples were found to be at the anterior ends of the deepest part of the grooves. In blue whales, the tip of the nipple was as much as 13 cm below the body surface in whale SH948, 26.2 m long. Even in a blue whale foetus of 2.18 m, the tip of the nipple was sunk 0.5 cm below the surface. In fin whales, the tip of the deepest nipple was 8 cm below the surface in whale SH1400, 19.4 m long.

Where possible, I measured the approximate volume of the nipples as the height x width x a second width at right angles. The volume of a nipple from the 2.18 m foetal blue whale was only 0.064 cc, but blue whale SH831, 20.9 m long, had a nipple 46 cc in volume.

The nipples had the form of a short, truncated cone. In the four blue whale fetuses between 2.18 and 4.21 m, the surface of the nipples was smooth; however, in postnatal blue whales the nipples were papillose but (at least in whale SH742) became smooth towards the base. In postnatal fin whales, the nipples were about equally divided between those with smooth and those with papillose surfaces. The colour of the nipples was white in both blue and fin whales. Each nipple had a central canal with a slit-like aperture, except in fin whale SH992 where the aperture was circular. The central canal branched into a series of channels that joined irregular spaces in the connective tissue which formed the base of the nipple between blubber and muscle.

In no part of the nipple or its base was there any visual indication of glandular tissue in blue or fin whales.

Table 3 shows the location of male nipples and dimensions of the nipple grooves as mean percentages of the distance between the centres of the penis and anus in blue and fin whales. The location of the nipples is just about the same in the two species, and there is no great difference in the lengths of the grooves although they were closer together in postnatal fin whales than in postnatal blue whales.

#### *Sperm Whales*

On 25 January 1948, I examined six male sperm whales for any presence of male nipples. Only three whales bore posterior genital grooves and none of these contained nipples when palpated. In two of these three whales, the grooves were paired; the third bore a single groove behind the penis. Six sperm whales are a small sample, but since nipples when present in postnatal cetaceans are always sunk in grooves, and since Clarke et al.

**Table 1.** Notes on nipples and nipple grooves located in carcasses of male blue whales examined on board *F. F. Southern Harvester* during the Antarctic whaling season of 1947-1948

Whale serial number	Length postnatal (m)	Length foetus (m)	Volume (cc)	Nipples			Remarks
				Shape	Colour	Depth of tip below surface (cm)	
<i>Foetal whales</i>							
SH928	(♀ 24.8)	2.18	0.064	Smooth	White	0.5	Only nipple grooves were present.
SH808	(♀ 26.2)	3.28	0.7	Smooth, central canal present with slit-like aperture	White	--	No sign of Ommaney's (1932) "lateral pits" (p. 367). Nipples preserved as Specimen SH74.
SH1184	(♀ 24.4)	3.40	--	Smooth	White	--	Only nipple grooves were present.
SH832	(♀ 27.3)	4.21	0.5 cc	Smooth, central canal present	White	--	No sign of Ommaney's pits. A single pair of accessory genital grooves present behind the nipple grooves. Nipples preserved in Bouin's fluid as Specimen SH80.
<i>Postnatal whales</i>							
SH742	22.6	--	42.2	Short truncated cone; Papillose above; smooth towards base. central canal present with slit-like aperture	White, becoming pink on lower part	--	The nipple integument; pink towards the bottom of the groove, and reflected into blue-grey skin of the whale's belly. The base of the nipple was somewhat fibrous. No macroscopic indication of glandular tissue. The left nipple was preserved as Specimen SH71.
SH831	20.9	--	4.6	Papillose above; central canal	White	8	The canal of the nipple communicated with a series of irregular spaces in the connective tissue between blubber and muscle. No sign of glandular tissue. A nipple preserved as Specimen SH79.
SH768	23.5	--	Pit present at bottom of one groove but no nipple	--	Palpated	--	No nipples were found by palpation, but the observation was hasty as flensing had began in the genital area.
SH876	22.3	--	--	Papillose top	(Palpated only)	--	Only nipple grooves present. Nipples situated at the anterior end of the deep part of the grooves.
SH883	22.0	--	--	--	(Palpated only)	--	Two sets of accessory grooves present besides the nipple grooves which were nearest the raphe.
SH884	22.0	--	--	--	(Palpated only)	--	As above in Whale SH883.
SH885	24.8	--	--	--	(Palpated only)	--	The nipple grooves were nearest the raphe, and lateral to these were three pairs of accessory grooves.

SH886	23.9	--	--	Papillose top	(Palpated only)	--	Only nipple grooves present. Nipples at anterior end of grooves. Photograph (Figure 1).
SH887	25.5	--	--	Papillose top	(Palpated only)	--	Only nipple grooves present. Nipples at anterior end of grooves.
SH912	23.9	--	--	Papillose top	(Palpated only)	--	Only nipple grooves present.
SH934	21.5	--	--	--	(Palpated only)	--	Apart from the nipple grooves there were a pair of accessory genital grooves anterior to the penis.
SH948	26.2	--	7.9	Papillose top	White	13	Only nipple grooves present. Both nipples retained as Specimen SH88.
SH972	23.3	--	--	Papillose top	(Palpated only)	--	One set of accessory genital grooves present additional to the nipple grooves.
SH988	24.1	--	--	Papillose top	(Palpated only)	--	Only nipple grooves present.
SH991	24.7	--	--	Papillose top	(Palpated only)	--	Only nipple grooves present.
SH1506	22.3	--	--	Papillose top	(Palpated only)	10	One pair of accessory genital grooves present.

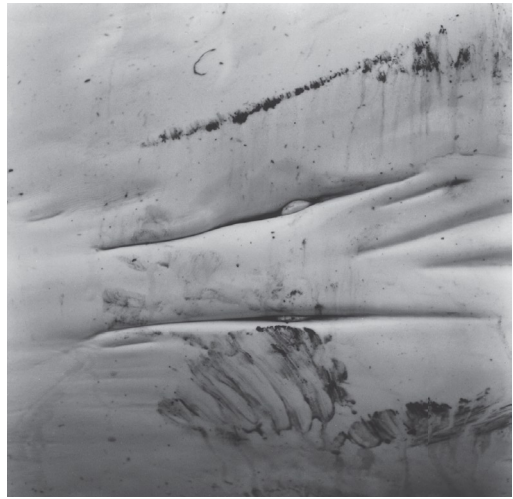
**Table 2.** Notes on nipples and nipple grooves located in carcasses of male fin whales examined on board *Fl. F. Southern Harvester* during the Antarctic whaling season of 1947-1948

Whale serial number	Nipples					Remarks	
	Length postnatal (m)	Length foetus (m)	Volume (cc)	Shape	Colour		Depth of tip below surface (cm)
<i>Foetal whales</i>							
SH1559	(♀ 22.6)	0.63	--	--	--	--	The (presumed) nipple grooves were already slit-like in this small foetus. No sign of Ommaney's (1932) "lateral pits" (p. 367). The nipples were not searched for, but the whole area between penis and anus was dissected and preserved in Bouin's fluid as Specimen SH120. Nipples present. Besides the nipple grooves there was one pair of accessory grooves anterior to the penis and one pair posterior.
SH1228	(♀ 23.0)	4.57	--	--	(Palpated only)	--	
<i>Postnatal whales</i>							
SH764	21.6	--	21	Short, truncated cone, with central canal; Papillose top	White	5	Nipples and their grooves flensed out and preserved complete as Specimen SH72.
SH793	21.3	--	--	Papillose top	(Palpated only)	--	
SH810	20.9	--	5.2	Smooth; central canal present	White	--	Nipples were at the anterior ends of their grooves. Two sets of posterior accessory grooves present. Nipple grooves were those nearest the raphe.
SH877	21.3	--	--	--	(Palpated only)	--	Two sets of accessory genital grooves present besides the nipple grooves which were nearest the raphe.
SH910	21.8	--	--	Papillose top	(Palpated only)	--	Only nipple grooves present.
SH933	20.3	--	--	Papillose top	(Palpated only)	--	Only nipple grooves present.
SH992	20.0	--	6.4	Smooth, with papillae just appearing; round opening to central canal	White	--	Left nipple preserved as Specimen SH89.
SH993	20.7	--	--	Papillose	White	Nipples protruding	A fender whale. The protruding nipples were photographed (Figure 2). One pair of posterior accessory genital grooves was slightly developed.
SH994	19.7	--	--	--	(Palpated only)	--	Only nipple grooves present.

SHI224	21.5	--	--	Papillose	(Palpated only)	--	Only nipple grooves present.
SHI226	18.7	--	--	Papillose	(Palpated only)	--	Only nipple grooves present.
SHI227	19.8	--	(Rather small)	Smooth	(Palpated only)	--	Only nipple grooves present.
SHI281	19.7	--	--	Smooth	(Palpated only)	--	Only nipple grooves present.
SHI290	19.4	--	7.4	Smooth	White	--	One set of posterior accessory genital grooves present besides nipple grooves. Note that nipples were smooth, although this whale was physically mature.
SHI364	20.1	--	--	Smooth	(Palpated only)	--	One posterior accessory genital groove present on left side, beside nipple grooves, one of which was much shorter than the other.
SHI396	20.1	--	--	Papillose	(Palpated only)	--	Two sets of posterior accessory genital grooves present, outside the nipple grooves.
SHI400	19.4	--	--	Smooth	White	8	Only nipple grooves present. The right nipple was fixed in Bouin's fluid as Specimen SHI12.
SHI437	19.7	--	--	--	(Palpated only)	--	Beside the nipple grooves there was an unpaired posterior accessory genital groove and a pair of accessory grooves anterior to the penis.
SHI592	21.3	--	--	Smooth	(Palpated only)	--	Only nipple grooves present.
SHI703	21.3	--	--	Papillose	(Palpated only)	5	Only nipple grooves present.
SHI828	20.4	--	--	Papillose	(Palpated only)	--	One pair of posterior accessory genital grooves lateral to the nipple grooves.



**Figure 1.** Nipple grooves behind the penis of whale SH886 (Blue ♂, 23.9 m long) in 63° 51' S, 78° 53' E, 26 January 1948 (Photograph from Robert Clarke)



**Figure 2.** Male nipples protruding from their grooves in whale SH993 (Fin ♂, 20.7 m long) in 63° 25' S, 86° 00' E, 3 February 1948 (Photograph from Robert Clarke)

**Table 3.** Location of male nipples and description of nipple grooves as percentages of the distance between centres of penis and anus in blue and fin whales

Foetal or postnatal specimen	No. of whales	Percent distance between centres, nipples to penis		Percent lengths of nipple grooves		Distance between grooves at level of nipples	
		Range	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD
<i>Blue whales</i>							
Foetal	3	38-39	38±0.6	10-33	19±12.3	13-14	14±0.6
Postnatal	10	34-48	38±4.1	16-36	25± 5.9	6-16	10±2.6
<i>Fin whales</i>							
Foetal	2	38-39	38±0.7	3-30	17±19.1	10-13	12±2.1
Postnatal	16	31-43	36±3.0	12-32	19± 4.7	1-8	5±2.1

(1968) found that among 1,269 male sperm whales there were only 41% bearing grooves “around the penis slit,” one may say with conviction that nipples are not present in the male sperm whale.

### Discussion

The most significant aspect of the above description is that the male nipples and their bases bore no macroscopic signs of glandular tissue. For that reason, except when quoting from previous authors, I have avoided using words like “male mammary apparatus,” “mammary grooves,” “mammary glands,” “mammas,” and “teats,” so as not to suggest that male nipples have a secretory function.

In her second review on male nipples in cetaceans, Arvy (1973-1974b) speculated on the pos-

sible functions of these. She added, “Are really these some glands? Are they implicated in osmoregulation, in courtship, in cetacean associations, in migrations . . . ?” (p. 223).

I think it would be worthwhile to examine microscopically the nipples and their bases from my preserved material collected during the *Southern Harvester*'s expedition in 1947-1948. I would not expect that any glandular tissue would be found, but I would expect a considerable abundance of nerve endings and nerve fibres. Since copulation in whales and dolphins is always belly-to-belly, it may be that, at least in baleen whales, the nipples of the male are protruded during copulation when the rubbing of these nipples against the female during pelvic thrusts may help to stimulate the male whale to ejaculation. Regarding sperm whales, Clarke et al. (1994) have reasons to sug-



gest that the testes function alternately, so that the males are ready to capture and fertilize as many females as quickly as possible, so it is unlikely that they need nipples to help them to orgasm.

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