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First recorded stranding of a short-finned pilot whale, *Globicephala macrorhynchus*, in Britain.



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First recorded stranding of a short-finned pilot whale, *Globicephala macrorhynchus*, in Britain.

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ABSTRACT

A male pilot whale, *Globicephala* sp., was reported as a live stranding on 1st March 2012 at Hazelbeach, near Neyland, Pembrokeshire. It was euthanased and its skull was recovered during an onsite necropsy. Examination of the skull and contemporary photographs of the stranded animal confirm that this is the first record of short-finned pilot whale, *Globicephala macrorhynchus*, in Britain.

INTRODUCTION

Both species of pilot whale, *Globicephala* spp., occur in the North Atlantic Ocean, but only one occurs in British seas (Boran et al. 2008, Crawley et al. 2020). The long-finned pilot whale, *Globicephala melas*, strands frequently around the coast of Britain and is particularly vulnerable to mass strandings of tens of individuals (Abend and Smith 1999; Coombs et al. 2019). It is a pelagic species that occurs in temperate and subpolar seas, and it has a global distribution in the southern oceans as far south as 65° S and occurs also in the North Atlantic Ocean, beyond 60° N (Jefferson et al. 2015, Crawley et al. 2020). In Europe long-finned pilot whales are particularly frequent from west Norway, Iceland and the Faroe Islands, extending to northern and western Scotland, western Ireland, and southwest England (Boran et al. 2008). They occur also in the Bay of Biscay south to the Iberian Peninsula and the Mediterranean Sea (Boran et al. 2008). The short-finned pilot whale, *G. macrorhynchus*, also has a global distribution, but occurs more frequently in tropical to warm temperate

seas, including the Atlantic but excluding the Mediterranean Sea, and does not normally range beyond 50° N and 40° S (Jefferson et al. 2015). In Europe it does not normally occur further north than beyond the southern Bay of Biscay (Still et al. 2019).

There is some overlap between the two species in the eastern North Atlantic (Nores and Pérez 1988) and hybridisation has occurred between the two species, which may have been exacerbated by climate change, allowing the northward movement of the short-finned pilot whale into the distribution of the long-finned pilot whale (Miralles et al. 2013, 2016). Outside the typical distribution of *G. macrorhynchus* in the northeastern Atlantic there have been two strandings records during the 19th century in Belgium and there was a sighting record by the *Song of the Whale Team* of a pod of five individuals off southwest Iceland in 2012 (Slijper 1938, GBIF, OBIS; Table 1).

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Table 1 Records of short-finned pilot whale in the northeast Atlantic Ocean from outside the typical distribution. RBINS – Royal Belgian Institute of Natural Sciences.

Date	Location	Latitude, longitude	Sex	Age	Length (m)	Museum specimen no.	Form	Reference
Beginning April 1856	Between Heist and Blankenberge, Belgium	51.217, 4.417	F	SA		RBINS 1514C	Skeleton	Slijper 1938
27.4.1864	The Scheldt, Antwerp, Belgium	51.350, 3.250	M	J	3.65	RBINS 1514B	Skeleton	Slijper 1938
8.8.2012	Southwest Iceland	64.914, -24.15					Sighting record of 5 individuals	GBIF/OBIS dataset 1158

SPECIMEN

On 1st March 2012 a moribund pilot whale was reported to the UK Cetacean Strandings Investigation Programme (CSIP) by Milford Haven coast guard after having been seen to strand alive at several locations in the Milford Haven area. It was logging on the surface with small craft able to approach and touch it with very little reaction. It was found floating alive at Hazelbeach near Neyland, Pembrokeshire (UK grid reference SM 951 048, 51.705° N, 4.9661° W; CSIP strandings no. SW2012/80). Owing to its emaciated and moribund state, it was euthanased and a field necropsy carried out on site by CSIP staff. It is a juvenile male, with maturity status confirmed by visual examination of testes during the gross examination, that measured 388 centimetres long. The animal was judged to be in a moderate nutritional condition, with no evidence of recent feeding. It had a moderate parasitic burden within the stomachs and a moderate to severe intestinal parasite burden. A wide variety of samples and data were collected, including skin, blubber, muscle, liver, kidney, rib and gastrointestinal tract contents, as well as a range of samples for bacteriology and histopathology. The necropsy concluded that it was nutritionally compromised and outside its normal habitat, with a moderate-severe gastrointestinal parasitic burden. The skull and mandible were recovered and are registered in the collections of National Museums Scotland (NMS.Z.2022.10) (Figure 1).

Because long-finned pilot whales strand so frequently on the British coast, this specimen was also initially identified as this species. However, close examination of the skull showed that it has the characteristics of the short-finned pilot whale, *G. macrorhynchus*. The two species are very similar both externally and skeletally, which makes identification difficult at sea and from skeletal remains. Two cranial characters are most often used to distinguish between them, including numbers of teeth and the lateral extent of the premaxilla relative to the maxilla on the anterior rostrum. Tooth number per jaw quadrant ranges 7-9 in *G. macrorhynchus* and 9-12 in *G. melas*, so that there is some overlap between the two species (Van Bree 1971; Bernard & Reilly 1999; Best 2007). The premaxilla overlays the maxilla in both species, but in the short-finned pilot whale it usually covers the maxilla completely in the anterior half of the rostrum, whereas in the long-

finned pilot whale the maxilla is broader than the premaxilla by at least 10 mm (Figure 1). The overall shape of the rostrum is broader and blunter in the short-finned pilot whale, although this is less evident in younger animals. In the Hazelbeach specimen the maxilla is not visible in the anterior dorsal rostrum and the tooth count in each quadrant is less than 9 (Table 2), thus identifying this specimen as *G. macrorhynchus*.

A selection of skull measurements was taken, following (Yuen et al. 2017) and based on measurements most frequently recorded in the literature, using digital calipers to an accuracy of 0.1 mm (see Appendix). In comparison with skull measurements from the literature (Appendix), the skull measurements of the Hazelbeach whale fall within the ranges for other Atlantic as well as Pacific short-finned pilot whales. However, note that all but one of the comparative skulls are from unsexed individuals. Externally the key characteristic that separates the two species of pilot whale is the relative length of the pectoral flipper as their names suggest. Typically, short-finned pilot whale pectoral fins are cited as being about one sixth of body length, whereas those of long-finned pilot whales are about one fifth of body length (Bernard & Reilly 1999, Olson 2009). Bloch et al. (1993) found that in 510 long-finned pilot whales from the Faroe Islands flipper length was 14.7-30.3% of total length with an average of 22.3%, so that about 2.4% of *G. melas* specimens overlap with *G. macrorhynchus* in flipper length. Unfortunately, we have no measurements of the Hazelbeach whale's flippers, which would aid species identification.

Examination of photographs of both species showed that in short-finned pilot whales the pectoral flippers extend posteriorly in a line only as far as the anterior part of the dorsal fin, whereas in long-finned pilot whales pectoral flippers extend posteriorly as far as the posterior of the dorsal fin, although this is variable. Probably owing to the previous assumption that the Hazelbeach pilot whale was *G. melas*, there are a few photographs of this specimen, which were taken just before or after it was euthanased and in most it is difficult to see the relative lengths of the pectoral flippers (Figure 2). There is also a video: <https://m.youtube.com/watch?v=jjlRtFrozRs>. There is a photograph, which shows that the pectoral fins appear to extend only as far as the anterior dorsal fin (Figure 2c),

which is consistent with an identification as *G. macrorhynchus*. However, we are cautious about this evidence owing to the orientation of the whale in this photograph.

Although variable, further external characters for *G. macrorhynchus* may include a rather faint to missing, pale cap and eye stripe combined with an inconspicuous pale grey or brownish saddle and much less defined anchor-shaped throat markings. Adult *G. melas* often have a more pronounced/ extensive overhang to the melon, brighter eye and throat patterns and well-defined white saddle markings. Their flippers also tend to have a more well-defined sickle-shaped “elbow” (Shirihai & Jarrett, 2006). However, given their variability we were unable to use any of these characteristics to identify the Hazelbeach whale.

Based on its length, the Hazelbeach pilot whale is a juvenile male (Kasuya and Marsh 1984, Kasuya and Tai, 1993). Adult males reach up to 7.2 metres long in the Pacific and 5.35 metres long in the Atlantic; adult females reach up to 5.5 metres and 4.5 metres long in the Pacific and Atlantic, respectively (Chivers et al. 2018). Based on

data in Kasuya and Tai (1993) on the northern Pacific form of *G. macrorhynchus*, males of mean length 3.894 m were c.5.5 years old, whereas the equation for age and total length for early maturing *G. macrorhynchus* of the southern form in Kasuya and Marsh (1984) gives an age of c.11 years and c.13-14 years old in Kasuya and Matsui (1984). The roots of the teeth are open and pulp cavities range from 0.1 to 3.73 mm in diameter in the mandibular teeth. Kasuya and Matsui (1984) determined degree of closure of pulp cavities of short-finned pilot whale teeth from off the Pacific coast of Japan. Complete closure of the roots occurred at a minimum age of 26.5 years old in males, as determined from dentinal growth layers, which is beyond the asymptotic length of males. Therefore, the Hazelbeach whale is a young animal based on its teeth, although examination of the testes at necropsy confirmed that it is a juvenile. Sectioning of the teeth of the Hazelbeach whale will confirm its age and its similarity in growth characteristics to either northern or southern Pacific *G. macrorhynchus*.

Table 2 Tooth counts in upper and lower jaw quadrants of pilot whales (Bernard and Reilly 1999).

Pilot whale	Upper	Lower
<i>Globicephala melas</i>	9-12	9-12
<i>Globicephala macrorhynchus</i>	7-9	7-9
Hazelbeach pilot whale	8	7 (left); 8 (right)

Figure 1: Dorsal views of (a) the skull of the Hazelbeach pilot whale (NMS.Z.2022.10), (b) the skull of a long-finned pilot whale (NMS.Z.2020.9.4) and (c) the dentition of the Hazelbeach pilot whale (NMS.Z.2020.10) © National Museums Scotland.

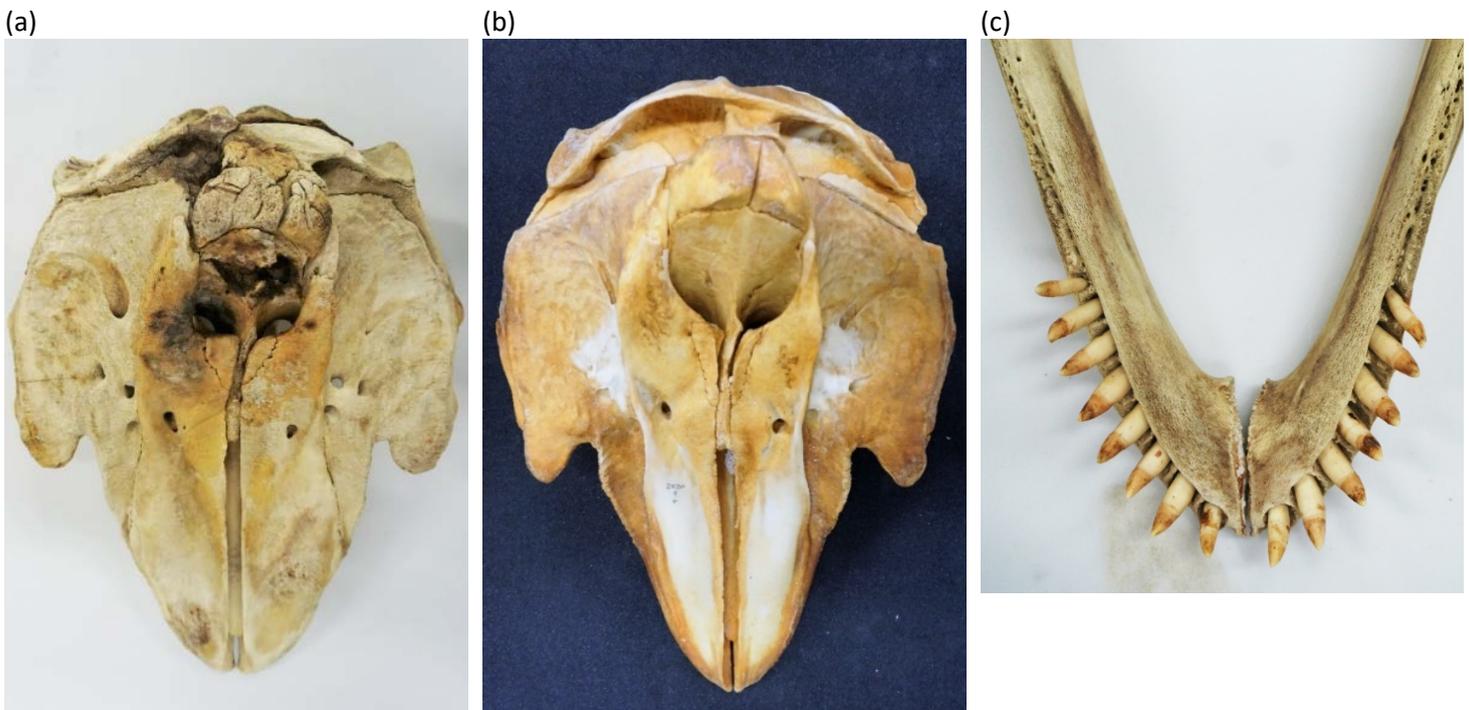


Figure 2: A juvenile male short-finned pilot whale, *Globicephala macrorhynchus*, that stranded alive on 1st March 2012 at Hazelbeach near Neyland, Pembrokeshire. (a) and (b) © Rod Penrose MEM/CSIP. (c) © Nick O'Sullivan, Sea Trust Wales <http://whaleswales.blogspot.com/>

(a)



(b)



(c)



DISCUSSION

This is the fifth new cetacean species to be recorded stranded in Britain since strandings schemes began in 1990, including also Fraser's dolphin, *Lagenodelphis hosei*, dwarf sperm whale, *Kogia sima*, Blainville's beaked whale, *Mesoplodon densirostris*, and True's beaked whale, *M. mirus*. This may in part reflect increased public reporting effort through the UK strandings schemes, combined with widespread mobile phone technology, but these are mostly species that occur normally in warmer

waters, which could also potentially reflect changing climatic and ecological conditions.

In summary, skull characteristics, tooth counts, and possibly relative pectoral flipper lengths support the identification of the Hazelbeach pilot whale as *Globicephala macrorhynchus*, which is the first record for Britain and the most northerly stranding of this species in the northeastern Atlantic Ocean.

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[OBIS-SEAMAP Species Profile - Globicephala macrorhynchus \(Short-finned Pilot Whale\) \(duke.edu\)](#)

OBIS. [OBIS-SEAMAP Species Profile - Globicephala macrorhynchus \(Short-finned Pilot Whale\) \(duke.edu\)](#) (dataset 1158).

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Appendix:

Skull measurements of the Hazelbeach pilot whale in comparison with those of short-finned pilot whale in the literature. Note Kasyua (1975) only recorded skulls with lengths >540 mm. Key: M – male; U – unknown.

		Z.2021.20	Kasuya 1975	Kasuya 1975	True 1889	Moore 1953	Paradiso 1958	Fraser 1950	Duguy 1968
	Sex	M	U	U	1 M/U	U	U	U	U
	n	1	13	24	4	5	1	4	1
	Location	Hazelbeach, UK	N. Atlantic	N. Pacific	Florida and Virginia, USA	Florida, USA	Virginia, USA	Dakar, Senegal	Île de Ré, France
Skull measurement:									
Condylobasal length	CBL	637.7	544-680	540-748	612-690	585-663	650	555-640	677
Length of rostrum	LR	329			316-353	283-333	325	262-321	350
Width of rostrum base	WBR	262.3			262-317		262	212-266	285
Width of rostrum at midlength	WRM	212.2			231-269	159-221	210	171-206	233
Width of premaxillaries at midlength of rostrum	WPM	205.4			229-274		174	163-198	212?
Distance from rostrum to external nares	DRE	439.3			415-481		441	c.380-400	490
Distance from tip of rostrum to internal nares	DRI	407.5							410
Greatest preorbital width	GPR	427.2					439	343-457	
Greatest postorbital width	GPS	464.4						375-488	480
Least supraorbital width	LSO	410.4				349-460			530
Greatest width across zygomatic processes at squamosal	GWZ	464.4				393-501		380-450	525
Length of upper left toothrow from hindmost alveolus to rostrum tip	LPL	144.5							190
Length of lower left tooth row	LLTR	135.7				138-188	145		
Greatest length of left ramus	LLM	525.4					525		

