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First records of the pygmy sperm whale, *Kogia breviceps*, in Scotland

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The pygmy sperm whale, *Kogia breviceps*, is a poorly known cetacean species, which has been recorded rarely in the British Isles (Leaper and Evans, 2008). It is an oceanic species that inhabits tropical to warmer temperate waters worldwide (Caldwell and Caldwell, 1989). In the North Atlantic it strands reasonably commonly on the coast of the southeast USA (125 strandings between Puerto Rico and Maine 1999-2003 (Waring *et al.,* 2005) as far north as Canada, and in the eastern Atlantic it has been recorded from the Bay of Biscay, stranding from Portugal to the western coast of France with fewer records from the Netherlands and the British Isles (Evans, 1991; Santos *et al.*, 2006). Here we record the first strandings of pygmy sperm whales in Scotland.

Pygmy sperm whales are usually found in small groups of up to six individuals, but more often they are seen alone or in pairs; strandings are most often large males, or mothers and their calves of varying ages, or single females that have recently given birth (Caldwell and Caldwell, 1989; McAlpine, 2002). They feed mostly on

squid (e.g., *Brachioteuthis, Chiroteuthis, Chtenopteryx, Galiteuthis, Gonatus, Histioteuthis, Lepidoteuthis, Loligo, Mastiogoteuthis, Ommastrephes, Pholidoteuthis, Taonius, Teuthhowenia, Todarodes*), octopus (*Eledona* sp., *Octopoteuthis*) and sepiolids (*Sepiola, Rossia*), and also some deep-water fish (e.g., *Micromesistius* spp., *Chauliodus sloani*) and crustaceans (e.g., swimming crabs, *Polybius henslowi*, mysids, *Gnathophausia* sp.) at or near the bottom of the sea at a depth of 500-1000 metres on the deep shelf or slope, although dives may be less than this, because both squid and fish commonly migrate towards the surface at night (Caldwell and Caldwell, 1989; Evans, 1991; Santos *et al.*, 2006). Females and their well-grown calves may feed on coastal cephalopod species, where available.

Pygmy sperm whales grow to about 3.8 m long and weigh up to 450 kg (Caldwell and Caldwell, 1989; McAlpine, 2002). In recent strandings in Spain and France body length (from tip of upper jaw to fluke notch in a straight line) ranged from 1.6 m to 2.75 m for males (n=9), and 1.47 m to 3.24 m in females (n=8) (Santos *et al.*, 2006). Females reach sexual maturity at about 2.6 metres in length and give birth to a calf of about 1.2 m after an estimated gestation of about nine months (Caldwell and Caldwell, 1989; McAlpine, 2002).

Pygmy sperm whales strand rarely in the British Isles. Since formal records began in 1913, there were only eight strandings on the British coast from 1980 to 2006, mostly in southwest England and Wales (Sabin *et al.*, 2003). In 1999 an adult female and a calf of unknown sex stranded at Loch Ryan, Stranraer, Dumfries and Galloway. Measurements and other details of these specimens are given in Table 1. The adult female was in the early stages of pregnancy with a male foetus 25 cm long. The dead calf floated away, but was subsequently recovered 11 days later after being buried at a landfill site, by which time it was too decomposed to determine its sex. Analysis of stomach contents of the mother and calf have confirmed that their diet comprised mainly oceanic squid, mainly three species of *Histioteuthis*, but also 11 other cephalopod species from a total of nine families, as well as unidentified fish and crustaceans (shrimps) (Santos *et al.*, 2006). The skeletons of the female and calf are in the collections of the National Museums Scotland (NMS.Z.1999.264.1-2) and the male foetus is preserved intact in spirit (NMS.Z.1999.264.3). A cast of the head of the adult female was also taken for future reference. Measurements and characteristics of the skull and mandible of the adult female (NMS.Z.1999.264.1), following Ross (1984), are given in Table 1 in comparison with similar data from a specimen that stranded in Ireland, which is also in NMS's collection. Both specimens have 13 tooth alveoli on each side of the mandible, which falls within the reported range of 11-17 (Best, 2007). There were no teeth in the maxillae of either specimen.

There were no further records in Scotland until 2007 when one or two pygmy sperm whales were reported from Shetland (Harvey *et al.*, 2011). An animal was seen and photographed off the west mainland of Shetland at Aith on 14th October 2007 (Irene Gray pers. comm.), although two animals of different sizes were seen together at Olnafirth, Delting on 15th October (Gibby Fraser, pers. comm.). On 17th October a pygmy sperm whale was photographed at Busta Voe (HU357679) (Roger Tait, pers. comm.). Later the same day a young animal was stranded alive at Brae. Therefore, the two animals seen at Olnafirth may have been an adult female and a well-grown calf, which eventually stranded and was euthanased by a vet.
The stranded animal was initially identified as an Atlantic white-sided dolphin, *Leucopleurus acutus*, but by the time it had been correctly identified this specimen had been irretrievably buried at a landfill site in Lerwick.

No.	Sex	Age	Length (m)	Date	Location	SW no	Comments
1.	F	Adult	2.68	18.10.99	Loch Ryan, Stranraer, Dumfries and Galloway	SW1999/185d.1	Pregnant with 25-cm-long foetus
2.	U	Juvenile	2.08	18.10.99	Loch Ryan, Stranraer, Dumfries and Galloway	SW1999/185d.2	Refloated and restranded 11 days later
3.	U	Juvenile	c.2.1-2.4	17.10.07	Brae,Shetland (HU355680)	SW2007/207A	Specimen lost at landfill site
4.	M	Adult	2.11	6.10.11	Easdale, Seil, Argyll (NM75231686)	SW2011/459	

Table 1. Strandings of pygmy sperm whales, *Kogia breviceps*, in Scotland.

Fortunately, digital photographs were taken prior to burial, which allowed correct identification (Fig. 1) (Ellis Nicolson, pers. comm.), but the loss of this important specimen demonstrates the importance of ensuring that identification is confirmed before an animal is disposed of. Cuts on the animal photographed by Roger Tait, including a distinctive one on the left side of the spermaceti organ, appear to match those on the stranded animal (Fig. 1). However, a distinctive cut on the upper left hand side in front of the dorsal fin, which can be seen in the photographs by Irene Gray and Roger Tait, is apparently absent from the stranded animal and the cut on the spermaceti organ appears to be longer in the live animal. Closer examination of Roger Tait's photographs reveals two whale barnacles (Family Coronulidae) on the upper left side of the tail stock (Fig. 2 b,c), which appear to be absent from the stranded animal (Fig. 2 a). As far as we know this is the first record of whale barnacles on this species and genus, but unfortunately the quality of the photograph does not allow a more specific identification. Roger Tait estimated that the live animal was perhaps 10 feet (3 metres) long, whereas the stranded animal, compared with the wheel barrow, is probably 2.1-2.4 metres long. Although uncertain, evidence from these photographs supports the presence of two animals in Shetland and that it was the younger of these that stranded.

a.

b.

Fig. 1. Photographs of pygmy sperm whale from Shetland, 2007. a. Live animal Busta Voe, 17 October 2007 (Roger Tait), b. stranded animal prior to disposal on 17th October 2007 (Ellis Nicolson). Skin lesion present in the living animal (a., arrow) is not apparent in stranded one.

a.

b.

c.

Fig. 2. Photographs of pygmy sperm whale from Shetland. a. No whale barnacles are apparently present on the tail stock of the stranded animal from Shetland, but are visible on the live swimming animal (c; arrow). See close up in b.

On 6th October 2011 a juvenile male pygmy sperm whale stranded at Easdale, Seil, Argyll (Table 1). The skeleton is preserved at NMS (register no. NMS.Z.2011.97.192) and measurements of the skull are given in Table 2. A small whale barnacle was observed on the right side of the dorsal fin of this

specimen, but was not recovered. Stomach contents included fish eye lenses, otoliths, squid beaks and small fragments of squid tissue, showing that it had fed recently, but these have not yet been identified.

	Measurement (m)	Adult female Stranraer, Dumfries and Galloway, 18.10.99 NMS.Z.1999.264.1	Juvenile male Easdale, Seil, Argyll 6.10.11 NMS.Z.2011.97.192	Subadult male Beartragh Bay, Co. Mayo, Ireland, 19.6.99 NMS.Z.2001.108.28
1	Total (condylobasal) length	372.0	291.0	307.5
2	Rostrum length	192.3	142.3	156.6
3	Basal width of rostrum	158.1	140.3	130.9
4	Width of rostrum at its midlength	103.8	97.0	96.5
5	Breadth across pre-orbital angles of supra-orbital processes	302.2	263.3/267.8	264.4
6	Breadth across post-orbital processes of frontals	324.0	269.8	276.6
7	Breadth of skull across zygomatic processes of squamosals	310.0	267.4	262.3
8	Height of vertex	265.2	201.9	215.9
9	Width of vertex	49.9	20.9	25.2
10	Width of supra-occipital at narrowest part between posterior margins of temporal fossae	236.0	194.2	196.8
11	Tip rostrum to anterior border of left naris	187.1	137.9	145.7
12	Height of ventral border of foramen magnum	119.9	95.0	99.8
13	Length maxillary tooth groove, right	153.6	60.0	103.0
14	Length maxillary tooth groove, left	156.2	(est.) 52.5	116.7
15	Width between outer margins of occipital condyles	81.3	66.5	65.2
16	Tip of rostrum to hind margin of pterygoids near the midline	224.5	173.8	191.1
17	Length of mandible, left side	(est.) 325.0	(est.) 270.6	265.6
18	Number of alveoli, left	13	11	13
19	Number of alveoli, right	13	11	13
20	Height of mandible at coronoid process, left side	92.9	(est.) 74.3	74.4
21	Length of mandibular symphysis, left side	(est.) 68.2	(est.) 59.3	55.1
22	Length of tooth row, lower left	(est) 132.6	(est.) 90.4	114.3
23	Length of tooth row, lower right	(est.) 138.5	(est.) 91.3	(est.) 119.0
24	Height dorsal border of foramen magnum to vertex	133.5	117.0	121.0
25	Length, anterior margin mesorostral ossification to anterior border of left naris	28.9	12.5	24.0

Table 2. Measurements of the skulls of an adult female pygmy sperm whale stranded at Stranraer, a juvenile male from Argyll and a subadult male from Co. Mayo, Ireland. All specimens in National Museums Scotland. Measurements follow Ross (1984).

These are the first records and strandings of pygmy sperm whale in Scotland and have coincided with an increase of other warm water cetacean stranding on the Scottish coast since the late 1980s, including striped dolphin, *Stenella coeruleoalba*, and Fraser's dolphin, *Lagenodelphis hosei* (Reid *et al.*, 1996; Bones *et al.*, 1998). Analyses of strandings patterns in Scotland suggest that these warm-water species may be moving further north, owing to warmer sea temperatures as a result of global climate change (MacCleod *et al.*, 2005). Interestingly, both records appear to be of mothers and a calf at the same time of the year, which is consistent with strandings elsewhere. Taking the foetus length of 25cm as about two months into gestation (i.e. about 20% of birth length), indicates conception occurred in about August, suggesting the older calf was about five to six months old. There is a risk that strandings of pygmy sperm whales might be confused with large porpoises, but it will be interesting to see if the trend continues with increasing records of this species as we have seen already with the striped dolphin.

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Scottish Centre for Ecology and the Natural Environment and Glasgow Natural History Society Photographic Competition 2012

First Prize. Male palmate newt (*Lissotriton helveticus*), Ben Lomond April 2011, Anna Muir

Second prize The Dubh Lochan, Loch Lomondside, John Hume