A PYGMY SPERM WHALE STRANDED AT TOKAIMURA, IBARAGI, JAPAN

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It was informed that on 29 September 1979 a pygmy sperm whale was found stranded on beach of Tokaimura, Ibaragi. One of the authors (Y.T.) went there on 2 October 1979 and confirmed that the whale was a young male *Kogia*. The body of the whale was already half-decomposed, but she made measurements of body proportions (Table 1) and brought back the head of that whale for precise identification of the species. The skull of the whale was obtained by boiling the head at WRI and the species was identified as *Kogia breviceps*, based upon the key characters of Handley (1966).

For long years most workers accepted that there was a single but variable species in the genus *Kogia*, while as many as seven species have been described. Following works by Ogawa (1936–37) and Yamada (1954), Handley (1966) established that there are two well-defined species, the pygmy sperm whale *Kogia breviceps* Blainville, 1838 and the dwarf sperm whale, *Kogia simus* Owen, 1866.

Recently Ross (1979) made extensive study of pygmy and dwarf sperm whales, using at least 80 animals recorded on the southern African coast up to the end of 1975. He compared the material of *K. breviceps* and *K. simus* and confirmed Handley's (1966) distinction of the two species based on cranial and external characters, with the exception of the relative height of the foramen magnum and the position of the dorsal fin relative to body length, which should be used with caution in specific identification.

Handley (1966) listed up distinguishing characteristics of *Kogia breviceps* and *K. simus* in his Table 1. The majority of these differences refer to features of the cranium and mandible. According to Ross (1979) the most distinctive cranial characters are the shape of the dorsal sagittal septum near the vertex and the dorsal cranial fossae. In *K. breviceps* the sagittal septum near the vertex is broad, whereas in *K. simus* it is narrow. The shape of the dorsal cranial fossae of the two species is different in that that in *K. breviceps* the left fossa is conspicuously narrower than the right, and each fossa slopes gradually from the dorsal rim of the skull. In *K. simus* dorsal rim of the cranial fossae is sub-spherical, and the posterior wall of each fossa is steep, giving a cupped appearance to the skull.

In the characters listed above the Tokaimura specimen (Figs 1–4) agrees well to those of *K. breviceps*. In the mandible Handley (1966) noted the number of mandibular teeth, 12–16 pairs in *K. breviceps* and 8–11 pairs in *K. simus*. He noted, however, in rare case 10 or 11 pairs in the former and 13 pairs in the latter. The length of mandibular symphysis is longer in *K. breviceps* than in *K. simus*.

The Tokaimura specimen had 24 teeth in all and this was estimated that

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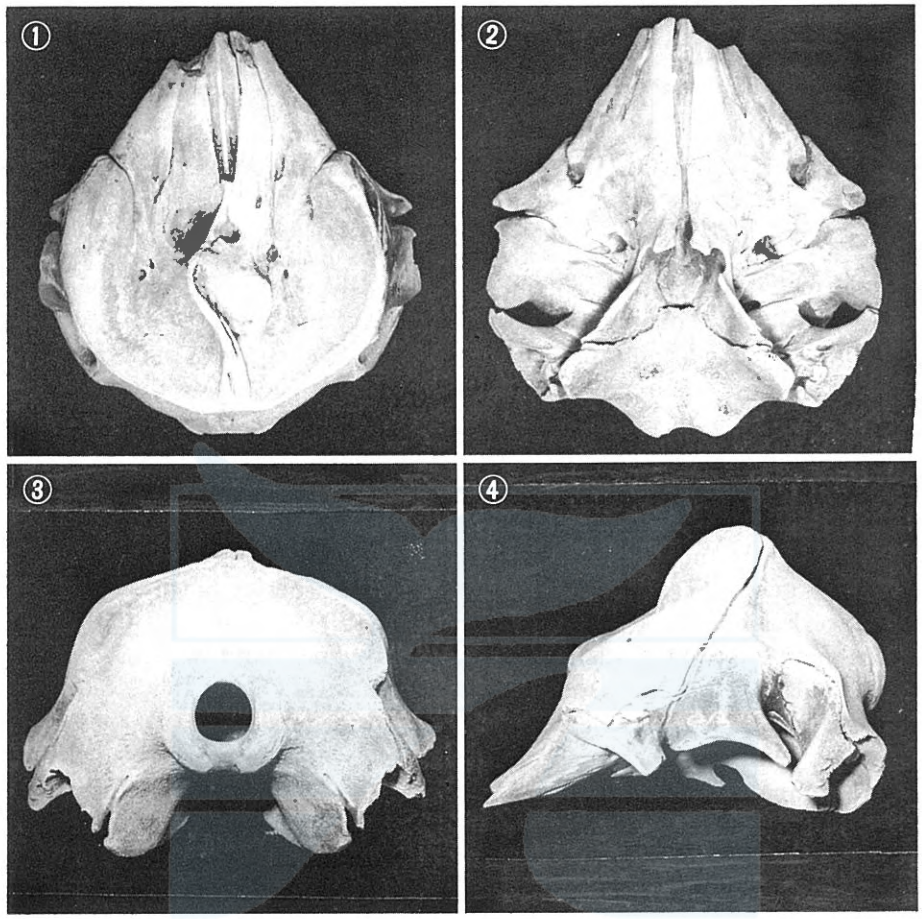

Fig. 1. The skull of the Tokaimura specimen of *Kogia breviceps*. Dorsal view.
Fig. 2. The same skull. Ventral View.
Fig. 3. The same skull. Posterior view.
Fig. 4. The same skull. Lateral view.

originally it had 13 pairs and 2 were missed, judged from the shape of the teeth. One is very small and curved greatly (straight length 9 mm). This agrees with the character of *K. breviceps*. The mandibles of the Tokaimura specimen were broken into small pieces and we can not measure the length of the symphysis. No maxillary tooth was found.

Measurements of the skull of the Tokaimura specimen are shown in Table 2. In this table the measurement numbers are the same to those used by Ross (1979). As seen in this table 20 mm was added for breakage. This figure was carefully decided, but in any case this is an estimate. The result was compared with Table 26 of Ross (1979) and found no special feature. Most of them are within the ranges of his value. Measurements no. 3 (Rostrum, basal width) and no. 12 (Height of ventral border of foramen magnum) are outside his ranges, but very

TABLE 1. BODY PROPORTION OF THE TOKAIMURA SPECIMEN OF *KOGIA BREVICEPS*

	Measurements	in mm	% of Total length
1.	Tip of snout to notch of flukes (Total length)	2,480	100
2.	Tip of snout to center of eye	270	10.9
3.	Tip of snout to blowhole	240	9.7
4.	Tip of snout to ant. insertion of flipper	430	17.3
5.	Tip of snout to ant. insertion of dorsal fin	1,370	55.2
6.	Tip of snout to tip of dorsal fin	1,515	61.1
7.	Length of gape	66	2.7
8.	Length of blowhole	40	1.6
9.	Length of eye	42	1.7
10.	Notch of flukes to umbilicus	1,570	63.3
11.	Notch of flukes to genital slit (male)	1,455	58.7
12.	Notch of flukes to anus	685	27.6
13.	Girth on transverse plane at ant. insertion of dorsal fin	1,960	79.0
14.	Girth on transverse plane at anus	980	39.5
15.	Length flipper, ant. insertion to tip	325	13.1
16.	Length flipper, axilla to tip	260	10.5
17.	Height, dorsal fin	83	3.3
18.	Length, dorsal fin	165	6.7
19.	Width of flukes, tip to tip	580	23.4
20.	Anterior border of flukes to notch	170	6.9
21.	Anterior border of flukes to tip	400	16.1

TABLE 2. CRANIAL MEASUREMENTS OF THE TOKAIMURA SPECIMEN OF *KOGIA BREVICEPS*

	Measurements	in mm	% of Total length
1.	Total (condylobasal) length*	337	100
2.	Rostrum, length**	126	37.4
3.	Rostrum basal width**	158	46.9
4.	Rostrum, width at its middle**	113	33.5
5.	Breadth across pre-orbital angles of supra-orbital processes	277	82.2
6.	Breadth across post-orbital processes	288	85.5
7.	Zygomatic width	278	82.5
8.	Height to vertex	217	64.4
9.	Width of vertex	25	7.4
10.	Width of supra-occipital at narrowest part between posterior margins of temporal fossae	197	58.5
11.	Tip rostrum-left naris	163	48.4
12.	Height of ventral border of foramen magnum	75	22.3
13.	Length maxillary toothgroove-right	64+	
14.	Length maxillary toothgroove-left	52+	
15.	Width outer margins occipital condyles	78	23.1
16.	Tip rostrum-hind margin pterygoids	181	53.7
⋮			
24.	Height dorsal border of foramen magnum to vertex	105	31.2

* 20 mm added for breakage.

** Measured ventrally.

close to his upper ranges.

The cranial measurements of *Kogia*, however, subject to wide ranges of individual variation, judged from figures in Tables 26 and 27 of Ross (1979), and it seems very difficult to separate both species from cranial measurements alone. In some cases, however, condylobasal length of the skull may useful. Handley (1966) gives condylobasal length of adult specimens of *K. breviceps* and *K. simus* as 391–469 mm and 262–302 mm respectively. The condylobasal length of the Tokaimura specimen was estimated 337 mm as shown in Table 2. This length is much larger than those of *K. simus*, but still this whale was judged to be immature and bones of skull are fused loosely. The largest tooth measures 19 mm in length and pulp cavity is not closed. In *K. breviceps*, however, the pulp cavity appears to remain open at the base of tooth throughout life (Ross, 1979).

Body proportion or external measurements of the Tokaimura specimen of *K. breviceps* (Table 1) are compared to Table 3 of Ross (1979) and found slight differences between those, but we can not conclude anything at this moment and further collection of material is needed. According to Table 3 of Ross (1979) no distinct difference was observed between *K. breviceps* and *K. simus*, excepting the height of dorsal fin. This value is 2.3–4.7% of total body length in *K. breviceps* (12 specimens) and 5.4–10.0% in *K. simus* (19 specimens), the latter species having quite taller dorsal fin than the former. This height of dorsal fin of the Tokaimura specimen is 3.3% of the body length and this value is within the ranges of those of *K. breviceps* (Table 1).

Yamada (1954) gives measurements of body proportions of his specimen nos 3, 4, 5 and 6. Among them total length was not measured in nos 5 and 6. We calculated, therefore, percentage figures of the height of the dorsal fin against total body length for his specimen nos 3 and 4, and got the value of 6.7 and 5.9% respectively. These are all within the ranges for *K. simus*.

Further he presents cranial photographs of the specimen nos 1, 2, 4, 5 and 6. Judged from these photographs we assumed that his no. 4 specimen is *K. simus*, being the sagittal septum near the vertex is very narrow and the cranial fossae giving a cupped appearance of the skull.

In this way we can further assume that his specimen no. 1 is probably *K. simus* and nos 2, 5 and 6 to be *K. breviceps*. This can be checked by the length of mandibular symphysis. According to Ross (1979) this length is 13.7–26.3% of the skull length in *K. breviceps*, whereas the corresponding figures in *K. simus* is 11.1–15.8%. We calculated this value for nos 1, 2, 4, 5 and 6 from his Table 3. These are 12.3, 15.2, 11.1, 15.8 and 15.2% of their skull length respectively. Our conclusion is, therefore, Yamada's specimen nos 1, 3 and 4 are probably assigned to *K. simus* and nos 2, 5 and 6 to *K. breviceps*.

From the coast of Japan *Kogia* was first reported by Van Beneden and Gervais (1868–1879). The species of this *Kogia* (du Japon) is judged to be *K. breviceps* from drawings shown in PL. LXI of their report. The left dorsal cranial fossa is much narrower than the right and the posterior wall of each fossa seems to slope gradually from the dorsal rim of the skull. The condylobasal length of the skull

is estimated to be 342 mm (measured length from the drawing was multiplied by 3). Width of the vertex was estimated as wide as 18 mm and this is 5.3% of the total length. This value is smaller than that of the Tokaimura specimen (Table 2), but still within the ranges of values given by Ross (1979), or 5.0–11.9% in 22 specimens. Further right mandible has 13 teeth and no maxillary tooth present.

Honda (1928) reported a *Kogia* was stranded on the coast of Tsudanuma, Chiba, on 1 October 1927. This whale had 13 pairs of teeth on mandibles. No maxillary tooth present. Sex was determined as male and he gives general description, external as well as internal, of the whale body. He collected skull and other bones of this whale. The skull was studied later by Ogawa (1936–37) and it is possible that the species is *K. breviceps*.

Hirasaka (1936) reported stranding of a *Cogia* (*Kogia*) *breviceps* at Ishigaki-jima, Okinawa, on 8 March 1935. He gives a photograph of this whale and reports that the body length was said as 8 shaku (2.4 m), and no further information available. From the photograph shown in his paper it is true that the animal belongs to the genus *Kogia*, but the species can not be identified from this photograph alone.

Hirasaka (1937), however, obtained skull and post-cranial bones of this whale later and identified the species as *Kogia breviceps*. According to him, however, he perceived several characters similar to those of the *simus*-type but there are some others that contradict them, showing the general characteristics of the *breviceps*. His opinion was that the younger individual with a skull of under 300 mm (skull length of his speciemen is 290.5 mm) gradually change to a general type (of *breviceps*) after accomplishing a certain period of growth.

He gives, however, photographs of the skull of his *Kogia*. Judged from these photographs we consider this whale would be a *Kogia simus*. The dorsal rim of the cranial fossae is sub-spherical and the posterior wall of each fossa seems steep, giving a cupped appearance. The dorsal sagittal septum near the vertex is not broad. The number of alveoli in each mandible is 9 and the length of symphysis is 14.8% of the skull length.

Ogawa (1936—1937) studied five skulls and other bones, including those obtained by Honda (1928). He recognized both *K. breviceps* and *K. simus* occur on the coast of Japan. He thought that his specimen nos 2, 3 and 4 whales are *K. breviceps* and nos 1 and 5 whales are *K. simus*. These are supported by his description and photographs in his paper. He was also of opinion that the *Kogia* (du Japon) reported by Van Beneden and Gervais (1868–1879) should be assigned to *K. breviceps*.

Yamada (1954) studied six specimens of *Kogia* taken at Taiji, Wakayama and measured external as well as cranial proportions. His specimens are smaller in length in general and the condylobasal length ranged 276–302 mm. The highest number of teeth on one mandible is eleven and others are 8–10. Maxillary tooth is common in all specimens. His report was preliminary and no definite conclusion was stated as to the distinction between *K. breviceps* and *K. simus*. He stressed, however, a strong opposition against the dominant opinion of recent (then) time

that the younger animals of initial resemblance with *K. simus* turn into the general type of *K. breviceps* as they grow. Then his paper was followed by Handley (1966) as stated before. We also commented Yamada's paper (1954) in some extent as stated already. In this case, however, the number of teeth was not a good criterion in separating the two species.

Since then no scientific paper on the genus *Kogia* has been appeared in Japan to our knowledge.

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