FIRST RECORD OF *MESOPLODON DENSIROSTRIS* FROM FORMOSA

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ABSTRACT

Two records of female *Mesoplodon densirostris* are reported. Comments on the external character, skull and flipper of the younger specimen, and that on mandible of the older female are made.

INTRODUCTION

The Blainville's beaked whale, *Mesoplodon densirostris* is one of the rare species of the Odontoceti. Moore (1958) and McCann (1964) suggested that it distributes in the warmer waters. In 1963, Galbreath reported the stranding of two *M. densirostris* at Midway Islands in the central North Pacific, which is the first record in the North Pacific.

Here, are reported two specimens from Formosa, which are the first record of this species from the western North Pacific.

REFERRED SPECIMENS

Followings, referred specimens, are kept in Ocean Research Institute, Univ. of Tokyo.

TK 245: Mandibles with teeth. Collected by M. Nishiwaki in Aug., 1968 at the fish market in Pei-kan town (approximately 23°30′N, 120°25′E). Presumably of adult female, no other data.

TK 256: Female in puberty stage, Body length 3.56 m. Collected by T. Kasuya on April 20, 1968 at the fish market in Pei-kan town. Skull, mandibles with teeth and left flipper were collected.

LOCALITY AND DISTRIBUTION

According to the manager of the fish market in Pei-kan, the whale, TK 256, was brought from Su-aō (approximately 24°35′N, 121°50′E), on the north east coast of Formosa. Mr. Hung-chia Yang of Taiwan Fisheries Research Institute informed us that there are small fishing boats operating mostly with hand harpoons, and that there has been no pelagic tuna boat, which occasionally catch *Mesoplodon* (McCann, 1963, 1964). So we consider that this specimen was caught off the east coast of Formosa by some local fishermen with harpoon. This consideration is supported by a deep injury at just right side of the base of dorsal fin (Plate II, Fig. 3.)

The other specimen TK 245 had been deserted out side the fish market. This

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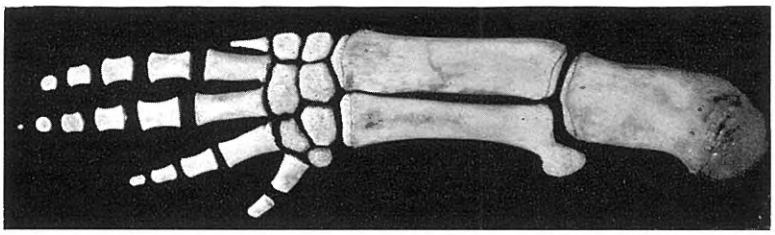

Fig. 1. Dorsal aspect of the bones in the left flipper of *M. densirostris*. TK 256. Proximal epiphysis of ulna is missed.

TABLE 1. LOCALITY OF OCCURRENCE OF *MESOPLODON DENSIROSTRIS*

North Pacific		
1961, Apr.,	2 ♀♀,	Midway Islands; Galbreath (1963)
1968, Apr.,	1 ♀,	Formosa; Present specimen TK 256
1968, Aug.,	1 ♀,	Formosa; Present specimen TK 245
South Pacific		
1869, — ,	1,	Lord Howe Island; Raven (1942), McCann (1964)
1924, — ,	1,	Yeppon, Queensland; Longman (1926) cited in Moore (1958)
1964, Jul.,	1 ♂,	West coast of Tasmania; Guiler (1966)
Indian Ocean		
1839, — ,	1 ♂,	Seychells Islands; Van Beneden and Gervais (1868-1879) cited in Moore (1958)
1872, — ,	1,	Algoa Bay, South Africa; Raven (1942)
1952, — ,	2,	Algoa Bay South Africa; Barnard (1954) cited in Moore (1958)
1963, June,	1 ♂,	5°S, 65°E; McCann (1963)
1963, Oct.,	1 ♂,	24°40′S, 105°35′E; McCann (1964)
North Atlantic		
1898, Aug.,	1 ♀,	Annisquan, Massachusetts; Allen (1906)
1913, June,	1 ♂,	Corson's Inlet, New Jersey; Ulmer (1941), Moore (1966)
1917, — ,	1,	Madeira Islands; Harmer (1924) cited in Moore (1958)
1923, — ,	1 ♂,	Boque Banks, North Carolina; Ulmer (1941), Moore (1966)
1925, May,	1,	Long Island, New York; Raven (1942)
1940, Feb.,	1 ♂,	Halifax, Nova Scotia; Raven (1942)
1944, Oct.,	1 ♂,	Bahama Islands; Moore (1958)

whale was supposed to be caught in the coastal waters of Formosa, but we have no convincing information.

Table 1 shows the localities of 20 records of *M. densirostris*. The present specimens are the latest two, and are the first record from the western North Pacific. As mentioned by Moore (1958) this species seems to inhabit in the warmer waters. The extended range of distribution to the north along the east coast of North America will be a result of the influence of the Gulf Stream. On the other hand, there has been no record of *M. densirostris* in the coast of Japan. Though one was reported from Kyushu by Ogawa (1938), it was reidentified as *M. ginkgodens* (Nishiwaki and Kamiya, 1958). Considering the influence of the Japan current, expectation of the future occurrence of this species in the waters from north of Formosa to the coastal waters of Japan is not unreasonable.

MORPHOLOGY

The external characters of the specimen TK 256, which is a 3.56 m long young female, was observed. No corpus luteum or corpus albicans was found in the ovaries, and diameter of the largest Graafian folicle was about 1 mm. Therefore this whale was considered to be in puberty stage.

The external colouration of the darkly pigmented area was bluish black. However, the whale died several days before the observation, so the colouration will have changed into darker as the common case of the cetaceans. The dorsal and lateral side of the animal was darkly pigmented, which faded gradually into the paler area in the ventral. The throat and chest between two flippers were slaty gray. The ventral area from umbilicus to anus was pure white. The anus, mammaly slit and genital aperture were not pigmented. The tail peduncle and the both surfaces of the tail flukes were darkly pigmented. Though the both sides of the flippers were pigmented, the ventral surface was slightly paler. This pattern of the pigmentation

TABLE 2. EXTERNAL MEASUREMENTS OF *MESOPLODON DENSIROSTRIS*

Measurements		TK 256 female		Allen (1906) female*	Guiler (1966) male	Raven (1942) male
1. Total length, tip of upper jaw to tail notch		356 cm	100 %	401 cm	412 cm	439 cm
2. Length from tip of upper jaw to nostril		46	12.9	—%	—%	11.7
3. Length from tip of upper jaw to center of eye		51	14.3	—	—	13.9
4. Length from tip of upper jaw to angle of gape		32	9.0	8.5	—	—
5. Length from tip of upper jaw to anterior insertion of flipper		94	26.4	—	25.3	23.1
6. Length from tip of upper jaw to tip of flipper		133	37.4	—	—	—
7. Length from tip of upper jaw to anterior end of throat groove	L.	24	6.7	6.3	—	—
	R.	20	5.6		—	—
8. Length of throat groove	L.	34	9.6	—	—	—
	R.	39	11.0	—	—	—
9. Length from tail notch to center of anus		87	24.4	25.9	20.4	26.5
10. Length from tail notch to center of reproductive aperture		100	28.1	—	29.6	36.3
11. Length from tail notch to umbilicus		169	47.5	—	—	52.5
12. Length from tail notch to anterior insertion of dorsal fin		145	40.7	—	—	—
13. Length from tail notch to tip of dorsal fin		120	33.7	—	26.5	—
14. Length from tail notch to anterior insertion of tail flukes		28	7.9	—	—	—
15. Tail flukes, total spread		80	22.5	23.4	—	23.7
16. Dorsal fin, height		19	5.3	—	—	—
17. Dorsal fin, length of base		28	7.9	—	—	—
18. Flipper, straight length from anterior insertion to tip		41	11.5	—	—	—
19. Flipper, anterior insertion to tip along the anterior edge		42	11.8	—	—	—
20. Flipper, straight length from axilla to tip		30	8.4	—	—	—
21. Flipper, greatest width		12	3.4	—	—	—

* Annisquan specimen, misidentified as *M. bidens*.

nearly coincides with that reported by Allen (1906).

The external measurements of TK 256 and those of other individuals of *M. densirostris* reported by Allen (1906), Raven (1942) and Guiler (1966) are shown in Table 1. The measurements of these 4 individuals fit fairly well.

As seen in Plate II, the mandibular tooth does not erupt and the swelling of the posterior part of the mandible is not so conspicuous as reported by Andrews (1914), Raven (1942) and McCann (1963). This difference is considered to depend on sex and age, especially on the former.

The dorsal fin was nearly triangular and the tip is pointed to the posterior, which resembles more to that of Raven (1942) than that of Andrews (1914). The flippers and the tail flukes showed no significant difference from those of other ziphioid whales.

As seen in Plate I, the genital aperture and the anus are situated in a continual groove.

OSTEOLOGY

Mandible The specimens TK 245 and TK 256 were collected on separate occasions. The mandibles show similar diagnostic features of relative position of the tooth and symphysis, of plateau like elevation of the upper edge of the mandibles around the alveolus, and of the shape of mandibular tooth. Because of above resemblance, these two specimens are considered to be of same species. However, there are some differences between the two specimens. In TK 245 the mandibular length is about

TABLE 3. SKULL DIMENSIONS OF *M. DENSIROSTRIS*

	Measurements	TK 256	Range of *M. densirostris*	Sample size
1.	Total (condylo-basal) length	725 mm	665–770 mm	4
2.	Rostrum, length from level of base of antorbital notches	63.7%	60–64%	4
3.	Rostrum, width between base of antorbital notches	22.3	24–28	4
4.	Rostrum, width at midlength	5.6	8–9	4
5.	Rostrum, depth at midlength	7.0	9–11	3
6.	Rostrum, least breadth proximal to midlength	6.1	6–8	2
7.	Rostrum, depth at same point	8.8	11–12	2
10.	Breadth of premaxillae at expanded proximal ends	16.6	16–20	4
12.	Least breadth of premaxillae opposite anterior nares	12.6	12–16	4
13.	Breadth of premaxillae opposite pemaxillary foramina	11.2	8–9	4
14.	Least distance between the posterodorsal margins of the maxillary foramina	8.4	6–9	4
17.	Distance between posterior border of maxillary foramen and anterior extremity of maxillary protuberance	9.0	8–10	4
21.	Breadth of anterior nares	5.9	4–6	4
34.	Length of vomer visible on palate	13.0	30–31	2
35.	Width at centers of orbits	37.2	40–47	4
37.	Width on zygomatic processes of squamosals	38.1	40–48	3
44.	Width of occipital condyles	11.4	14–15	4
46.	Height, vertex to inferior border of pterigoids	33.8	39–43	4

6 cm longer than that of TK 256 and the plateau around the alveolus is more prominent in TK 245.

Differences are also found in the shape and size of the teeth (Plate IV and Table 4). The pulp cavity of TK 245 is partly closed but that of TK 256 is still perfectly open. The number of growth ridges on the surface of cement, which reflect periodical growth of the tooth, is counted 11 and 8 respectively. If annual accumulation of the growth layers is accepted as in the case of the sperm whale (Ohsumi *et al*, 1963), the age of TK 245 and TK 256 are considered to be about 10 and 7 years old respectively. Accordingly, it is considered that several morphological differences between the two mandibles are due to the difference of age of the animals. As mentioned in the former chapter, TK 256 is a female in puberty stage, so TK 245 is probably a newly matured animal. The condition of the latter tooth, which is small and almost perfectly concealed in the alveolus, suggests this individual to be female.

The mandibular teeth of the present specimens are laterally compressed, and situated far behind the posterior end of mandibular symphysis and on the low plateau. The lateral view shapes an acute-angled triangle, and the anterior edge is slightly shorter than the posterior. The long axis of the tooth is inclined to the anterior direction, but the tip pointed nearly upward. At the top of the tooth, slightly posterior to the center, there is a small denticle which remains perfect because of the unerupted condition of the tooth. These diagnostic features coincide only with *Mesoplodon densirostris* among the known species of the genus *Mesoplodon*. Especially the shape of the tooth coincides with that of the formerly reported female specimens (Allen 1906, Raven 1942, private letter of J. C. Besharse on Midway specimens).

Skull The skull is collected only from TK 256. Several important measurements of the skull are shown in Table 3 with those of the *M. densirostris* in Moore (1958). Though, it shows that the present specimen has slender rostrum, most of the measurements fit with those of the other specimens.

On the present specimen, the length of vomer visible on palate is only 13% of total length of skull while the corresponding measurements of the two other specimens are 30 and 31%. This part is easily influenced by the condition of the maxillae, so the length of vomer visible on palate will not be an important taxonomical character.

On the dorsal view, the mesorostral cartilage is not ossified. The maxillary prominences are low and the prominential notches are shallow. Maxillary foramina opens forwardly in the bottom of the narrow parallel grooves. The lacrimal is visible at the bottom of antorbital notch. The lateral edges of the expansion of the maxillae above the temporal fossa are nearly straight and they open anteriorly. There is a deep notch between the supra narial crests formed by maxillae, premaxillae and frontals (Plate III, top and bottom). As pointed out by Moore (1966) the lateral margins of the left spiracular plate is horizontal in the profile. These characters well coincide with those of other *M. densirostris*.

Flipper The left flipper of TK 256 was collected. Its phalangeal formula is I: 1, II: 5, III: 6, IV: 4, V: 2.

TABLE 4. SKULL DIMENSIONS OF *MESOPLODON DENSIROSTRIS* FROM FORMOSA

	Measurements		TK 256 mm	TK 256 percentage of total length*	TK 245 mm	TK 245 percentage of total length*
1.	Total (condylo-basal) length		725	100.0	—	—
2.	Rostrum, length from level of base of antorbital notches		462	63.7	—	—
3.	Rostrum, width between base of antorbital notches		162	22.3	—	—
4.	Rostrum, width at midlength		41	5.6	—	—
5.	Rostrum, depth at midlength		51	7.0	—	—
6.	Rostrum, least breadth proximal to midlength		44	6.1	—	—
7.	Rostrum, depth at the same point		64	8.8	—	—
8.	Rostrum, width between prominential notches		95	13.1	—	—
9.	Breadth of premaxillae at midlength of rostrum		27	3.7	—	—
10.	Breadth of premaxillae at expanded proximal ends		120	16.6	—	—
11.	Greatest breadth of premaxillae in front of anterior nares		96	13.2	—	—
12.	Least breadth of premaxillae opposite anterior nares		91	12.6	—	—
13.	Breadth of premaxillae opposite premaxillary foramina		81	11.2	—	—
14.	Least distance between the posterodorsal margins of the maxillary foramina		61	8.4	—	—
15.	Least distance between premaxillary foramina		37	5.1	—	—
16.	Least distance between maxillary and premaxillary foramina	L.	14	1.9	—	—
		R.	11	1.5	—	—
17.	Distance between posterior border of maxillary foramen and anterior extremity of maxillary protuberance	L.	65	9.0	—	—
		R.	63	8.7	—	—
18.	Length of nasal suture line (anteroposterior)		14	1.9	—	—
19.	Length of nasal at the vertex of skull	L.	13	1.8	—	—
		R.	23	3.2	—	—
20.	Greatest breadth of nasals at the vertex of skull		26	3.6	—	—
21.	Breadth of anterior nares		43	5.9	—	—
22.	Breadth of posterior nares immediately behind pterigoid processes		69	9.5	—	—
23.	Length from tip of rostrum to prominential notch (median)		436	60.1	—	—
24.	Length from tip of rostrum to bottom of maxillary notches		472	65.1	—	—
25.	Length from tip of rostrum to anterior end of vomer		183	25.2	—	—
26.	Length from tip of rostrum to anterior margin of anterior nares		542	74.8	—	—
27.	Length from tip of rostrum to nasal vertex		587	81.0	—	—
28.	Length from tip of rostrum to madial suture line of posterior end of pterygoids		551	76.0	—	—
29.	Length from tip of rostrum to level of antorbital processes of maxillae		461	63.6	—	—
30.	Length from tip of rostrum to occipitofrontal vertex		607	83.7	—	—
31.	Length from tip of rostrum to posterior median end of maxillae on palate		462	63.7	—	—
32.	Length from tip of rostrum to most anterior point of palatines		333	45.9	—	—
33.	Length of premaxilla	L.	616	85.0	—	—
		R.	620	85.5	—	—
34.	Length of vomer visible on palate		94	13.0	—	—
35.	Breadth across centers of orbits		270	37.2	—	—
36.	Breadth across postorbital processes	Ca.	289	39.9	—	—

Continued . . .

TABLE 4. Continued.

Measurements		TK 256 mm	TK 256 percentage of total length*	TK 245 mm	TK 245 percentage of total length*
37. Breadth across zygomatic processes		276	38.1	—	—
38. Breadth across posterior margins of temporal fossae		186	25.7	—	—
39. Diameter of orbit (antero-posterior)	R.	95	13.1	—	—
40. Length of temporal fossa	L.	80	11.0	—	—
	R.	83	11.4	—	—
41. Depth of temporal fossa	L.	62	8.6	—	—
	R.	64	8.8	—	—
42. Length of tympanic bone	R.	54	7.0	—	—
43. Greatest breadth of tympanic bone	R.	40	5.5	—	—
44. Breadth of occipital condyles		83	11.4	—	—
45. Length of occipital condyle	L.	63	8.7	—	—
	R.	61	8.8	—	—
46. Breadth of foramen magnum		33	4.6	—	—
47. Height vertex to inferior border of pterygoids		248	33.8	—	—
48. Length of mandible (median)		615	84.8	—	—
49. Length of mandibular ramus	L.	625	100.0	—	—
	R.	623	100.0	681	100.0
50. Length of mandibular symphysis	L.	159	25.4	—	—
	R.	160	25.7	206	30.2
51. Distance from anterior end of mandible to coronoid process	L.	604	96.6	—	—
	R.	607	97.4	664	97.5
52. Distance from anterior end of mandible to angle	L.	629	100.6	—	—
	R.	632	101.4	—	—
53. Distance from anterior end of mandible to anterior lip of alveolus	L.	253	40.5	299	43.9
	R.	252	40.4	296	43.5
54. Distance from anterior end of mandible to posterior lip of alveolus	L.	278	44.5	326	47.9
	R.	278	44.6	325	47.7
55. Depth of mandible at posterior lip of alveolus	L.	73	11.7	86	12.6
	R.	73	11.7	87	12.8
56. Depth between angle and coronoid process	L.	114	18.2	—	—
	R.	113	18.1	—	—
57. Breadth across mandibular condyles		240	33.1	—	—
58. Length of tooth	L.	51	8.2	L. 57	8.4
59. Breadth of tooth (antero-posterior)		39	6.2	L. 48	7.0
60. Breadth of tooth (transverse)		10	1.6	L. 12	1.8

* Measurements of mandibles are shown in the percentage of length of mandible

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EXPLANATION OF PLATES

PLATE I

Fig. 1. Throat region of *M. densirostris*, TK 256.
Fig. 2. Ventral aspect of thoracic region of the same specimen.
Fig. 3. Ventral aspect of tail region of the same specimen.

PLATE II

Fig. 1. Lateral aspect of head region of *M. densirostris*, TK 256.
Fig. 2. Ventral aspect of tail flukes of the same specimen.
Fig. 3. Dorsal fin of the same specimen seen from the right side. A wound slightly below the base of dorsal fin will have been caused by hand harpoon.
Fig. 4. Ventral aspect of left flipper of the same specimen.

PLATE III

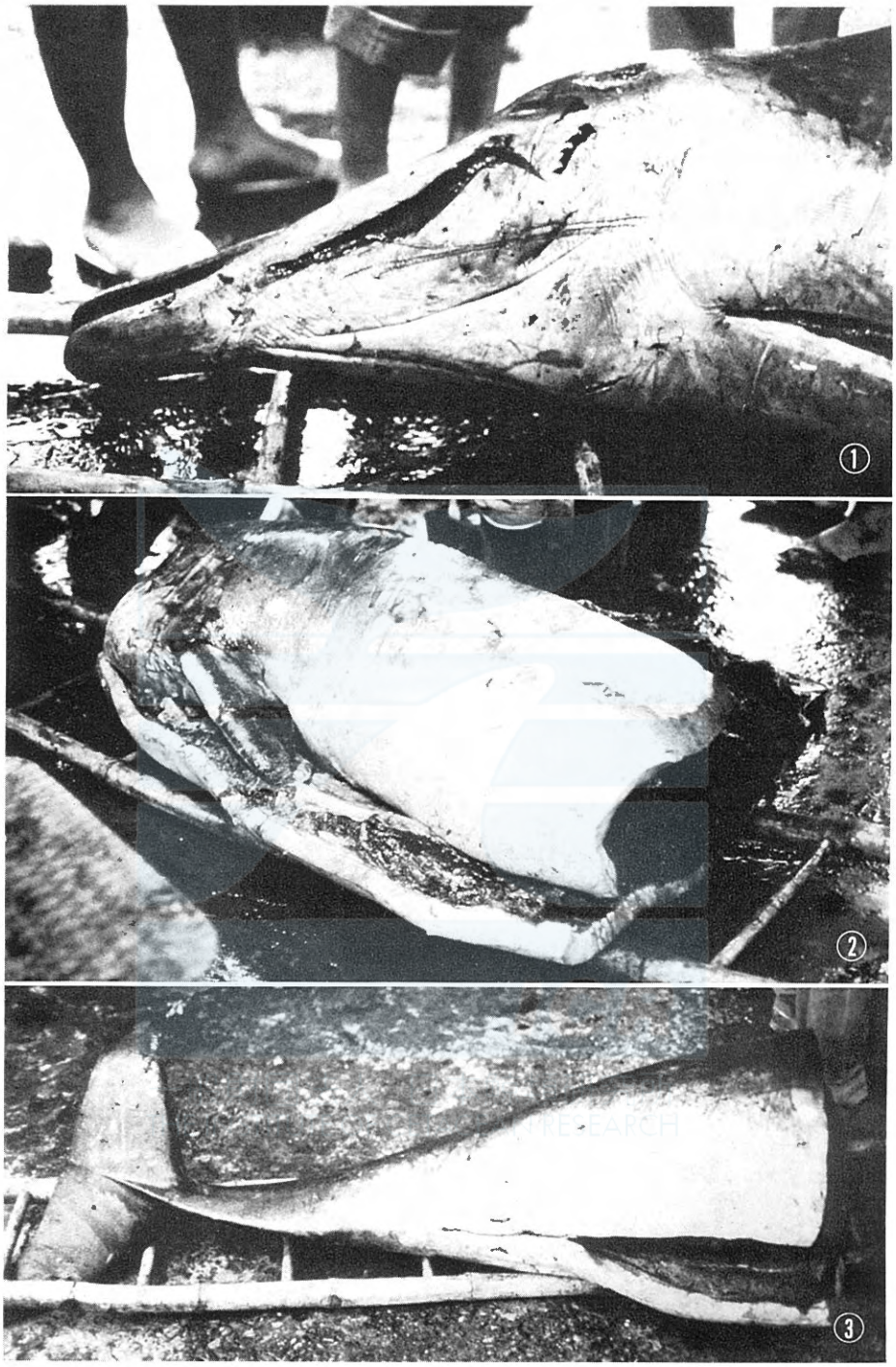
Dorsal, lateral, ventral and posterior (top to bottom) aspects of the skull of *M. densirostris*, TK 256.

PLATE IV

Fig. 1. Dorsal and lateral aspects of the mandible of *M. densirostris*, TK 256. White mark indicates the position of the tip of the mandibular tooth.
Fig. 2. Dorsal and lateral aspects of the mandible of *M. densirostris*, TK 245. White mark indicates the same with Fig. 1.

PLATE V

Fig. 1. Outer, ventral and posterior (top to bottom) aspects of the left mandibular tooth of *M. densirostris*, TK 256.
Fig. 2. Outer, ventral and posterior (top to bottom) aspects of the left mandibular tooth of *M. densirostris*, TK 245.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