RECENT RECORD OF GRAY WHALE IN THE ADJACENT WATERS OF JAPAN AND A CONSIDERATION ON ITS MIGRATION

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INTRODUCTION

Mizue (1951) made a biological analyses on the catch record of the gray whale in the Korean waters. According to Mizue and Kasahara (1950), there has been no occurrence of this species in that area since 1933 inspite of continuous whaling operation.

Although this species has been protected by the Japanese Government since 1944, record of neither sighting nor stranding had been obtained in the adjacent waters of Japan until recently. The fact had led us to the conception that the gray whale might have been exterminated.

Then two records were obtained from the Pacific coast of Japan. Here are the detailed information of them and our consideration on the migration route of gray whales in the adjacent waters of Japan.

RECENT RECORDS OF THE OCCURRENCE

The first record

The first record was informed by Mr. K. Shimizu, a gunner of a small local whaling boat, Katsu Maru (8 gross tons). He saw a gray whale swimming south at 135° 55′E, 33° 29′N, about 2.5 nautical miles east from Kii-Oshima Island and the nearest distant to the Japanese main land was also about 2.5 miles from the spot.

The water depth of that spot is indicated in a chart as approximately 80 m. The pity was that he could not say in which year the incident happened, only recalled the date and the month, June 10 because an annual event was taken place on that day in his town. He said that it was about 10 years ago, that is nearly 1959.

The second record

The second record of a gray whale was obtained off the estuary of the Kumano River, 136°01.7′E, 33°43′N, where sand beach was on the both sides of the estuary and a small lagoon was inside the dunes.

In the morning of Feb. 2, 1968, a gray whale staying by a drag-net for sardine fishing, was discovered by the local fishermen, at about half a mile from the land, and the water depth around there was nearly 10 m. According to the fishermen's report, the whale was staying around the spot of discovery more than 9 hours, never entered into the river, and finally died. Death might be caused by the wound

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made by someone during the evening of the day.

By the effort of some certain people of the near by town, body length measurement and sex check were done and an almost complete skeleton was preserved. It is now kept at the Taiji Whale Museum.

NAMING AND AGE

The whale which was named as Shingu specimen thereafter, was a female, quite young, 9.0 m in total body length and the longest baleen plate of it was measured along the lateral edge as 15.0 cm from gum to the tip. Two growth ridges and a neonatal mark are observed on the plates. The age of this whale is, therefore, presumed as more than one year old but younger than two.

OSTEOLOGICAL NOTE

Skull

General feature of the skull of Shingu specimen is little different from that reported by Andrews (1914).

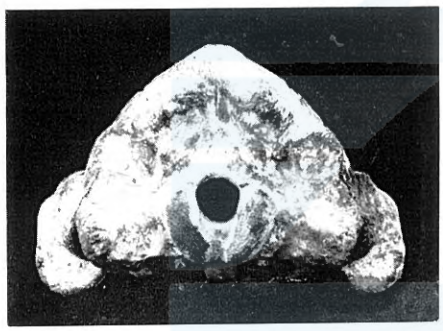

Fig. 1. Posterior view of the skull of Shingu specimen.

Fig. 2. Inner surface of the sternum of Shingu specimen.

In the photograph of his skull from California, the nasals are fused at the mesial surface, and the anterior border of the nasals is protruded in the middle. However, in his Korean specimen, although the length of the skull is nearly same value as that of the Californian, the nasals are not fused and no conspicuous protrusion. Though Shingu specimen was very young, nasals of which are fused and the shape of anterior surface of the nasals resembles to that of the Californian. To reach a conclusion on the problem of the populations by the feature of the nasals, we need more data.

Vertebrae

The vertebral formula of Shingu specimen is C 7+D 14+L 12+Ca 23=56. This formula coincides quite well with the formula presented by Andrews. At

the spot of excavation of the skeleton, though the last caudal vertebra was confirmed and number of the vertebrae was counted, the last one was lost afterward.

All the epiphyses of the vertebrae, from the 2nd cervical to the last caudal, are not fused to the centrums. Seven cervical vertebrae are all independent.

The transverse processes of the 14th, the last, thoracic vertebra, have no articular facet for the heads of the ribs, they have only a slight swelling at each distal end. The widest stretch of the transverse processes is in the 8th Lumbar. The highest spinal process is in the 10th Lumbar. The tranceverse processes disappear from the 12th caudal toward the rear, the neural arch opens and the canal disappears from the same vertebra. The ratio of each section in the length of the vertebral column are C:5.2% D:23.0% L:29.5% Ca:42.3%.

Length of all centrums in the vertebral column are summed up as 645 cm, add the length of skull to this value, the total length of the whole skeleton is 848 cm. If the length of the removed connective tissue is added, the body length of the whale must be about 9.00 m.

Ribs

14 pair of ribs are in Shingu specimen. Among them, the 3rd, the 4th, the 5th and the 6th are two headed. The 14th ribs are not articulated with the transverse process of the vertebra.

Chevron bones

There are 11 pairs of chevron bones, among which the 1st, the 9th, the 10th and the 11th are separated into two laminae. The laminae of the 1st is fused to

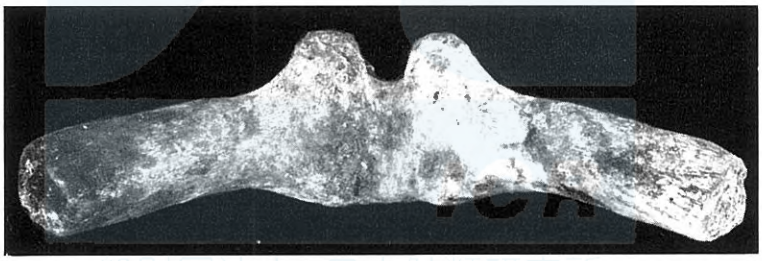

Fig. 3. Hyoid bones of Shinga specimen, Basi and thyrohyals are fused.

Fig. 4. Left lateral view of chevron bones of Shingu specimen.

the centrum of the 1st caudal vertebra. This phenomenon is reported by Andrew (1914) and seems to be common to the whales of this species.

TABLE 1. SKULL MEASUREMENTS OF THE GRAY WHALE FROM SHINGU

			in mm	% of total length
1.	Total length, from tip of pmx. to occipital condyle (straight)		2000	100
2.	Greatest breadth of skull		890	44.5
3.	Length of rostrum		1314	65.7
4.	Breadth of rostrum at base		466	23.3
5.	Breadth of rostrum at mid-length of rostrum		288	14.4
6.	Breadth of pmx. at the same point		143	7.2
7.	Breadth of pmx. across superior nares		253	12.7
8.	Length of the mx. from frontal border	R.	1281+	64.1+
		L.	1283	64.2
9.	Greatest breadth across mx. proximally		708	35.4
10.	Length of pmx.	R.	1580	79.0
		L.	1556	77.8
11.	Length of nasals in median line		297	14.9
12.	Breadth of nasals at anterior ends		121	6.1
13.	Distance from anterior end of nasals to anterior end of supraoccipital		342	17.1
14.	Length of orbit (least)	R.	154	7.7
		L.	153	7.7
15.	Length of paratine bones visible on palate	R. & L.	375	18.8
16.	Breadth across anterior ends of zygomatic proc. of squamosal		823	41.2
17.	Breadth across anterior angles of orbital proc. of frontal		726	36.3
18.	Breadth across posterior angles of orbital proc. of frontal		815	40.8
19.	Depth of skull from crest of supraoccipital to lowest point of pterygiod		608	30.4
20.	Greatest breadth of superior nares		178	8.9
21.	Breadth of occipital condyles		265	13.3
22.	Height of occipital condyles		185	9.3
23.	Breadth of foramen magnum		100	5.0
24.	Height of foramen magnum		107	5.4
25.	Length of mandible (straight)	R.	1781	89.1
		L.	1750	87.5
26.	Length of mandible (along the curve)	R.	1835	91.8
		L.	1810	90.5
27.	Straight length from tip of mandible to end of coronoid proc.	R.	1373	68.7
		L.	1352	67.6
28.	Depth of mandible at middle	R.	192	9.6
		L.	200	10.0
29.	Depth of mandibular condyle	R.	286	14.3
		L.	283	14.2
30.	Greatest length of tympanic bulla	R. & L.	106	5.3
31.	Greatest width of tympanic bulla	R. & L.	88	4.4

TABLE 2. VERTEBRAL MEASUREMENTS OF OF THE GRAY WHALE FROM SHINGU (mm)

Vertebral No.	Position of measurement			Vertebral No.	Position of measurement		
	1	2	3		1	2	3
C 1	357	295	60	8	634	433	162
2	471	297	64	9	618	425	166
3	399	262	42	10	603	435	173
4	395	258	35	11	585	430	175
5	395	262	40	12	567	424	175
6	382	262	46	Ca 1	533	421	187
7	386	270	51	2	493	406	182
D 1	397	282	55	3	461	400	184
2	419	288	65	4	429	377	187
3	420	298	75	5	391	358	186
4	422	313	84	6	340+	339	184
5	401	324	91	7	334	320	171
6	410	333	96	8	298	315	167
7	410	345	111	9	265	288	160
8	432	367	120	10	246	270	158
9	470	376	126	11	224	242	149
10	507	381	129	12	208	204	133
11	526	383	131	13	184	163	111
12	550	390	133	14	160	124	93
13	575	388	131	15	138	109	80
14	595	368	142	16	122	108	76
L 1	598	392	140	17	113	88	71
2	576	398	143	18	102	80	66
3	580	409	147	19	87	68	62
4	589	417	155	20	72	53	51
5	598	427	154	21	56	44	43
6	605	424	163	22	41	30	35+
7	628	428	158	23	+	+	+

1 : breadth across transverse proc.
2 : greatest height.
3 : length of centrum.

TABLE 3. MEASUREMENTS OF RIBS OF THE GRAY WHALE FROM SHINGU (mm)

No. of ribs	Right		Left	
	A	B	A	B
1	885	—	910	—
2	1020	—	1155	—
3*	1350	195	1365	190+
4*	1500	180	1500	190
5*	1565	180	1570	175
6*	1640	145	1625	140
7	1630	—	1610	—
8	1545	—	1575	—
9	1470	—	1500	—
10	1400	—	1410	—
11	1295	—	1315	—
12	1210	—	1220	—
13	1145	—	1145	—
14	1050	—	1060	—

A: length from dorsal tubarcle to distal end along lateral border.
B: distance from tip of head to dorsal tubercle.
* two headed rib.

TABLE 4. MEASUREMENTS OF HYOID BONES (mm)

Measurements	
1. Extreme breath of base (thyro-and basihyal)	439
2. Breadth of base between medial borders of distal facet of thyrohyal	347
3. Antero-posterior length of basihyal, at the notch	78
4. Antero-posterior length of basihyal, at the anterior protuberance (R. and L.)	109
5. Width across the anterior protuberances of basihyal	107
6. Width between the anterior protuberances of basihyal	33
7. Antero-posterior length of the facet of distal end of thyrohyal	R. 55
	L. 60

TABLE 5. MEASUREMENTS OF CHEVRON BONES OF THE GRAY WHALE FROM SHINGU (mm)

No.	Height	Length	Breadth
1*	63	72	77
2	126	77	107
3	183+	96	117
4	140	100	112
5	127	122	108
6	119	99	109
7	100	88	104
8	76	92	97
9**	94	80	—
10**	57	59	—
11**	31	41	—

* Fused to 1st caudal vertebra
** Both laminae are separated

TABLE 6. MEASUREMENTS OF SCAPULAE OF THE GRAY WHALE FROM SHINGU (mm)

	Right	Left
1. Greatest hight (vertical)	495	514
2. Greatest breadth	757	761
3. Distance from antero-dorsal angle to anterior point of glenoid fossa	431	438
4. Distance from postero-dorsal angle to posterior point of glenoid fossa	406	407
5. Length of acromion (inferior edge)	193	190
6. Breadth of acromion, distal	132	145
7. Length of coracoid (inferior edge)	58	62
8. Length of glenoid fossa	253	245
9. Breadth of glenoid fossa	202	198

TABLE 7. MEASUREMENTS OF PECTORAL LIMB BONES OF THE GRAY WHALE FROM SHINGU (mm)

	Right	Left
Humerus		
Greatest length	391	390
Greatest breadth, proximal*	218	216
Greatest breadth, distal*	237	237
Radius		
Greatest length	567	556
Greatest breadth, proximal	152	152
Greatest breadth, distal	182	185
Ulna		
Greatest length	502	514
Greatest breadth, proximal	144	141
Greatest breadth, distal	177	177

* Excluding the epiphysis.

DISCUSSION

General opinion of scientists is that gray whales in Asian side of the Pacific are of different stock from those in American side. In Asian side, they had been caught continuously in the Sea of Japan and the Yellow Sea, until 1933. Most of them migrated along the Korean coast and a few did along the northern Kyushu coast (Kasahara 1950; Mizue 1951). Dr. K. Nasu of the Far Seas Fisheries Research Laboratory got an old statistics of the whaling operated in every winter at Tsuro (33°32′N, 134°09′E) and Kubotsu (32°46′N, 133°00′E), Shikoku, Japan. According to his private information, 101 gray whales were caught by a net or a hand harpoon during the 16 years from 1849 to 1865, annual number of the catch fluctuated from one to ten. He told in his another private information that 64 whales were caught during the 22 years from 1875 to 1897 by the same whaling party. However, inspite of continuous whaling operation, in the waters of Shikoku and of southern Kyushu, no catch has been reported since 1911 (Kasahara 1950). At the northern Pacific coast of Japan, 5 gray whales were caught between 1911 and 1942, one at the Kuril Is., one at Nemuro, Hokkaido and three at Ayukawa, Miyagi Pref. (Mizue 1951). These pieces of information indicate the fact that the gray whale in the Pacific coast of southeast Japan, once comparatively abundant, was reduced and nearly exterminated by the end of 19th century while still abundant in the Korean coast.

The present records tell the fact that there are few gray whales migrating to the Pacific coast of Japan in recent years. Considered the above mentioned records of catch, it is possible for us to assume a migration route from the Kuril Islands to Shikoku along the Pacific coast.

Though a question of what population were they belonged to is still left, we are inclined to think that the gray whales of the present records may have been the strayed individuals from the Bering Sea.

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EXPLANATION OF PLATES

PLATE I

Dorsal, lateral and ventral views of the skull, and innerlateral view of the right mandible of the gray whale from Shingu.

PLATE II

Lateral views of cervical and thoracic, lumbar, caudal and caudal vertebrae. Anterior view of atlas and axis, posterior views of atlas, axis and the first caudal vertebrae. (top to bottom)

PLATE III

1. Outer-lateral views of left and right scapulae.
2. Lateral view of the left series of the ribs.

PLATE IV

Left and right humerus, ulna, radius and phalanges of the Shingu specimen.