OSTEOLOGICAL NOTE OF AN ANTARCTIC SEI WHALE

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ABSTRACT

This is a report of measurements on the skeleton of a male sei whale caught in the Antarctic.

The skeleton of a sei whale (*Balaenoptera borealis*) was collected in the Antarctic Ocean for the purpose of exhibits at the Taiji Whale Museum.

Taiji is the place where ancient Japanese whaling commenced. It is famed that Taiji whalers first established their revolutionary method of taking whales, in which whales are entangled in a net to prevent them from escape and killed with hand harpoons. Until now, Taiji Town, Wakayama Pref., has yielded many gunners and crew of factory ships and catcher boats.

When The Whale Museum was constructed by the demand of town people, various specimens were collected as varid and many as possible in the districts far and near.

Catch data of this whale is as follows:

Date of catch	Feb. 18, 1967
position of catch	58°-53′S, 83°-09′E
water temperature at the time	1.8°C
air temperature at the time	2.0°C
body length	15.3 m
sex	female
number of corpus luteum and albicans	R. 0, 3 L. 1, 3
fetus: body length	268 cm
sex	male
name of the catcher boat	the Kyo-maru No. 10.
name of the sender	Mr. K. Sakamoto

The skeleton had arrived Yokohama from the Antarctic whaling ground in April 1967 and has been buried in the sandy ground of Tokai University campus, Orido in Shimizu City, Shizuoka Pref. It was excavated on Sept. 9, 1968 and it takes 15 days to be cleaned and measured.

This report is merely a record of measurements on the skeleton of the sei whale, not a comparative study, and we did not find peculiar characters in the skeleton, so no discussion were done.

Measurements of the skull are shown in Table 1 and the dorsal, lateral and ventral views are shown in Plate I. As it is seen in the Plate I, the tip of rostrum was broken at the time of excavation, but most of the fragments were secured.

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Some errors were made after it was measured and photographs were taken. When the exhibition was arranged, waiting for its repairement, the broken pieces had been kept aside. But one of the laborer took it for rubbish and threw it into the reclaiming hole. Though we looked for, it could not be found again. Now the skull is appeared in original shape repaired with a unit of another tip from the Antarctic.

Measurements of vertebra are shown in Table 2, as well as in Plate II. The vertebral formula is

C 7+D 13+L 14+Ca 22=56

All epiphyses of the vertebrae are ankylosed to the centrum, but still, gaps are seen in the Dorsal and Lumbar vertebrae. Compared with the spinal processes of *B. edeni*, those in this species are less slanted to the backward.

In the 2nd to 6th cervical vertebrae the upper and lower lateral processes are united at the tip to form a loop, but in the 1st and 7th they are separated.

There are 13 pairs of ribs and the 1st rib has bilateral head, this character is common with *B. borealis* as seen in Fig. 6 of Plate II. Measurements of ribs are shown in Table 3.

There are fourteen lumbar vertebrae.

There are twenty one caudal vertebrae as shown in Fig. 4 and Fig. 5 of Plate II. It is certain that one more vertebra might have existed at the extreme rear, but seems to have been lost at collection. In the 1st caudal vertebra, the facet where chevron bone attached to is clear and was easy to be distinguished as seen in Fig. 7 of Plate II. Ten pairs of chevron bones are present, none of which has laminae separating to both side. Their measurements are shown in Table 4.

The hyoid bones are slender in shape and the basihyal and the thyrohyals are combined. Measurements of this bone is shown together with Fig. 1. There are no special feature on the specific consideration.

The sternum has short processes and is roughly star-like in shape as shown in Fig. 2. This bone is 28 cm in length and about 45 cm in breadth. Right posterior arm was broken off.

Pelvic bones were missed at collection.

The scapula is shown in Fig. 3 with measured data. The acromion and the colacoid are well developed. Fortunately, both sides of humerus, radius and ulna were collected and are present, the phalangial bones were cleaned up at The Whales Research Institute and transported to Taiji, but they were lost during the preparation of exhibition. Measurements of the above three are shown in Table 5.

We express sincere gratitude to Director Hideo Omura of The Whales Reseach Institute and to Prof. M. Iwashita and the stuff members of the Faculty of Marine Science and Technology of the Tokai University for help in burying and cleaning the skeleton at their campus. Our gratitude are also to the director, Mr. T. Higashi, and the stuff members of the Taiji Whale Museum for cooperation throughout the study.

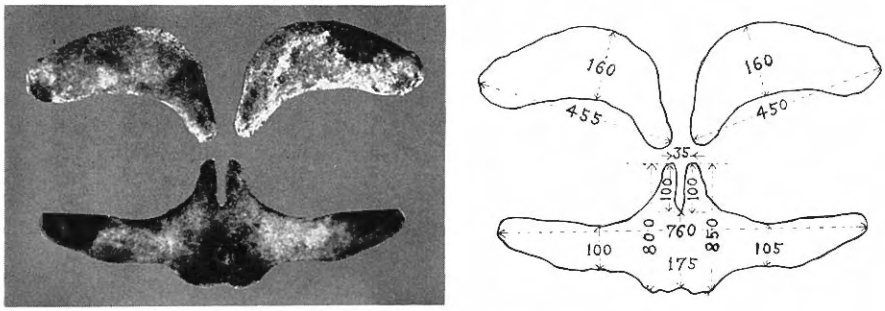


Fig. 1. Hyoid bones and their measurements of the Antarctic sei whale.

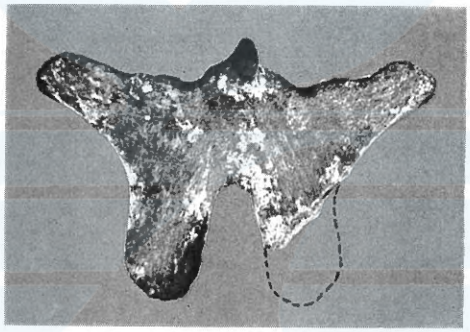


Fig. 2. Sternum of the Antarctic sei whale.

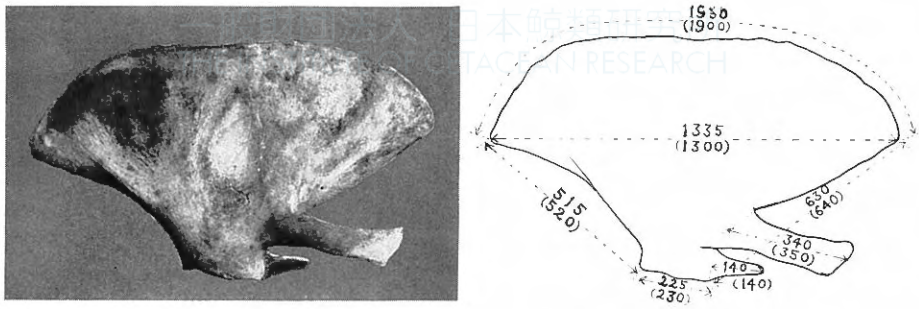


Fig. 3. Scapula and the measurements of the Antarctic sei whale (data of right scapula is in parentheses).

TABLE 1. SKULL MEASUREMENTS OF THE ANTARCTIC SEI WHALE

Measurements		Actual length (mm)	% of skull length	% of skull breadth
Length of skull, straight		3790	100.0	231.1
Length of beak		2630	69.4	160.4
Length of premaxillary, straight	R.	2980	78.6	181.7
	L.	2960	78.1	180.5
Length of maxillary along upper surface	R.	2860	75.5	174.4
	L.	2860	75.5	174.4
Tip of premaxillary to posterior end of maxillary	R.	3010	79.4	183.5
	L.	3010	79.4	183.5
Tip of premaxillary to vertex		2987	78.8	182.1
Tip of premaxillary to tip of nasals (mesial)		2635	69.5	160.7
Tip of premaxillary to anterior end of palatines (mesial)		2700	71.2	164.6
Tip of premaxillary to posterior end of palatines (mesial)		3260	86.0	198.8
Tip of premaxillary to posterior end of pterygoid		3470	91.6	211.6
Tip of premaxillary to anterior end of maxillary	R.	80	2.1	4.9
	L.	90	2.4	5.5
Length of supraoccipital from foramen magnum		800	21.1	48.8
Greatest breadth of skull, squamosal		1640	43.3	100.0
Breadth of skull, frontal		1550	40.9	94.5
Breadth of skull, maxillary		1420	37.5	86.6
Breadth of beak at base		990	26.1	60.4
Breadth of beak at middle		620	16.4	37.8
Breadth across premaxillaries, greatest		370	9.8	22.6
Breadth across premaxillaries, at base of beak		280	7.4	17.1
Breadth across premaxillaries, at middle of beak		260	6.9	15.9
Breadth across maxillaries at posterior ends		320	8.4	19.5
Breadth of pterygoids		280	7.4	17.1
Breadth of palatines		480	12.7	29.3
Breadth between tympanic bullae, outer		550	14.5	33.5
Length of nasals mesially		260	6.9	15.9
Length of nasals, laterally	R.	310	8.2	18.9
	L.	290	7.7	17.7
Breadth of nasals at anterior ends		170	4.5	10.4
Breadth of nasals at posterior ends		87	2.3	5.3
Breadth of orbit (frontal wing)	R.	260	6.9	15.9
	L.	260	6.9	15.9
Breadth of occipital between aquamosal sutures		1190	31.4	72.6
Breadth across occipital condyle		300	7.9	18.3
Height of occipital codyle	R.	210	5.5	12.8
	L.	210	5.5	12.8
Breadth of foramen magnum		110	2.9	6.7
Height of foramen magnum		145	3.8	8.8
Breadth across mastoid process, tip to tip		1280	33.8	78.1
Breadth across mastoid process, greatest		1460	38.5	89.0
Length of mandible, straight	R.	3460	91.3	211.0
	L.	3470	91.6	211.6
Length of mandible, along outer curve	R.	3610	95.3	220.1
	L.	3630	95.8	221.3
Height of mandible at coronoid	R.	400	10.6	24.4
	L.	390	10.3	23.7
Height of mandible at processus articularis	R.	275	7.3	16.8
	L.	294	7.8	17.9
Height of mandible at middle	R.	270	7.1	16.5
	L.	270	7.1	16.5

TABLE 2. MEASUREMENTS OF VERTEBRAE OF THE ANTARCTIC SEI WHALE (cm)

Serial No.	Vertebral No.	Greatest breadth	Greatest height	Centrum		
				Breadth	Height	Length
1	C 1	54.0	34.0	30.0	21.0	11.0
2	2	79.0	35.0	31.0	18.0	8.0
3	3	73.0	31.0	26.0	19.0	6.0
4	4	78.0	36.0	25.0	20.0	6.0
5	5	75.0	38.0	24.0	20.0	6.5
6	6	71.0	43.0	24.0	20.0	7.0
7	7	71.0	45.0	25.0	20.0	8.0
8	D 1	72.0	46.0	26.0	20.0	9.0
9	2	73.0	49.0	27.0	20.0	11.0
10	3	73.0	56.0	27.0	20.0	14.3
11	4	80.0	61.0	28.0	20.0	16.0
12	5	86.0	64.0	27.0	19.0	17.0
13	6	94.0	67.0	26.0	19.0	18.3
14	7	99.0	76.0	26.0	19.0	19.7
15	8	104.0	73.0	26.0	19.0	20.6
16	9	106.0	75.0	26.0	20.0	21.3
17	10	107.0	76.0	26.0	20.0	21.7
18	11	108.0	78.0	26.0	20.0	22.2
19	12	109.0	79.0	27.0	20.0	22.4
20	13	103.0	82.0	27.0	20.0	23.2
21	L 1	108.0	84.0	27.0	21.0	23.7
22	2	107.0	85.0	27.0	22.0	24.2
23	3	102.0	88.0	28.0	22.0	24.5
24	4	108.0	87.0	28.0	22.0	25.3
25	5	106.0	89.0	28.0	22.0	25.7
26	6	108.0	90.0	28.0	23.0	26.3
27	7	105.0	91.0	29.0	24.0	26.9
28	8	103.0	91.0	29.0	24.0	27.3
29	9	101.0	90.0	29.0	24.0	27.9
30	10	100.0	90.0	29.0	24.0	28.6
31	11	99.0	90.0	30.0	25.0	29.5
32	12	94.0	90.0	30.0	25.0	30.0
33	13	89.0	90.0	31.0	26.0	30.2
34	14	82.0	87.0	31.0	26.0	30.6
35	Ca 1	78.0	85.0	31.0	27.0	30.4
36	2	72.0	81.0	32.0	27.0	30.6
37	3	69.0	75.0	32.0	28.0	30.7
38	4	63.0	69.0	32.0	27.0	30.8
39	5	59.0	62.0	32.0	28.0	30.7
40	6	50.0	53.0	32.0	29.0	29.9
41	7	48.0	44.0	32.0	28.0	29.8
42	8	40.0	40.0	32.0	28.0	29.2
43	9	36.0	37.0*	31.0	28.0	28.0
44	10	30.0	34.0	28.0	27.0	26.7
45	11	28.0	31.0	26.0	26.0	25.0
46	12	25.0	27.0	24.0	22.0	19.5
47	13	21.0	22.0	20.0	19.0	14.4

Continued . . .

TABLE 2. Continued.

Serial No.	Vertebral No.	Greatest breadth	Greatest height	Centrum		
				Breadth	Height	Length
48	14	19.0	18.0	17.0	15.0	11.9
49	15	17.0	15.0	15.0	13.0	10.9
50	16	14.0	14.0	13.0	12.0	10.0
51	17	11.0	11.0	10.0	10.0	8.8
52	18	9.0	9.0	9.0	8.0	7.0
53	19	7.0	7.0	7.0	6.0	6.1
54	20	5.0	4.0	5.0	4.0	5.3
55	21	4.5	3.0	4.5	3.0	4.0
56	22	lost				

*: has some deficit

TABLE 3. STRAIGHT LENGTH OF RIBS OF THE ANTARCTIC SEI WHALE (cm)

Rib No.	right	left
1	89	88
2	148	151
3	181	201
4	197	209
5	176+	209
6	208	205
7	204	200
8	198	190
9	181	181
10	170	170
11	158	146
12	148	146
13	139	135

TABLE 4. MEASUREMENTS OF CHEVRON BONES OF THE ANTARCTIC SEI WHALE (mm)

No.	Length	Height	Breadth, (greatest)
1	110	240	170
2	120	300	160
3	150	300	210
4	140	310	210
5	150	180	180
6	140	230	190
7	130	230	180
8	130	190	160
9	120	160	140
10	120	120	130

TABLE 5. MEASUREMENTS OF HUMERUS, RADIUS AND ULNA OF THE ANTARCTIC SEI WHALE (mm)

	Length at center	Breadth at middle
Humerus		
Right	410	160
Left	410	160
Radius		
Right	680	85
Left	670	85
Ulna		
Right	720	70
Left	740	70

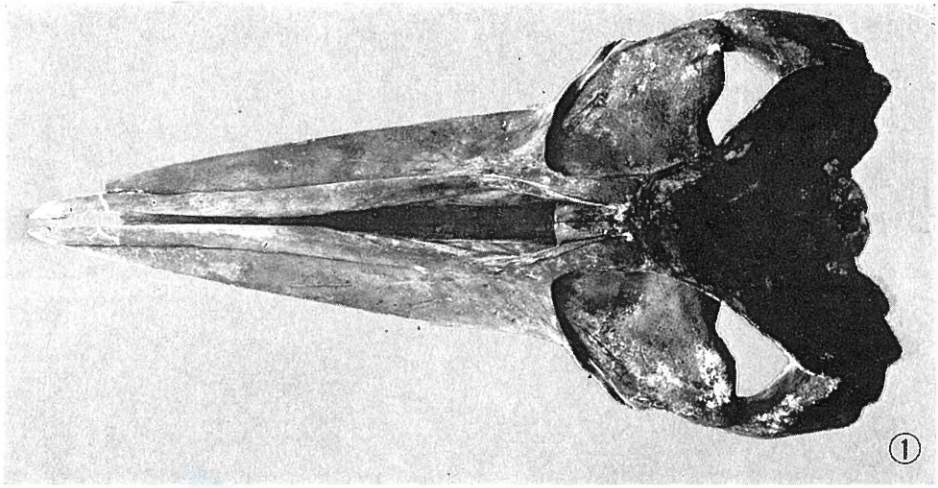
EXPLANATION OF PLATES

PLATE I

Fig. 1. Dorsal view of the skull of the Antarctic sei whale.
Fig. 2. Lateral view of the skull of the Antarctic sei whale.
Fig. 3. Ventral view of the skull of the Antarctic sei whale.
Fig. 4. Dorsal view of the mandibles of the Antarctic sei whale.

PLATE II

Fig. 1. Lateral view of the cervical vertebrae of the Antarctic sei whale.
Fig. 2. Lateral view of the thoracic vertebrae of the Antarctic sei whale.
Fig. 3. Lateral view of the lumbar vertebrae of the Antarctic sei whale.
Fig. 4. Lateral view of the caudal vertebrae (1st 12th) of the Antarctic sei whale.
Fig. 5. Lateral view of the caudal vertebrae (13th 21th) of the Antarctic sei whale.
Fig. 6. Caudal view of the 1st right side rib of the Antarctic sei whale.
Fig. 7. Ventral view of the vertebrae of the Antarctic sei whale from 13th lumbar to 2nd caudal, showing attachment facets for chevrons.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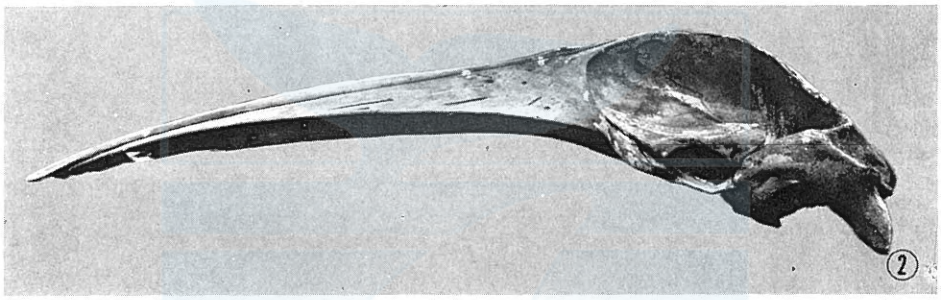
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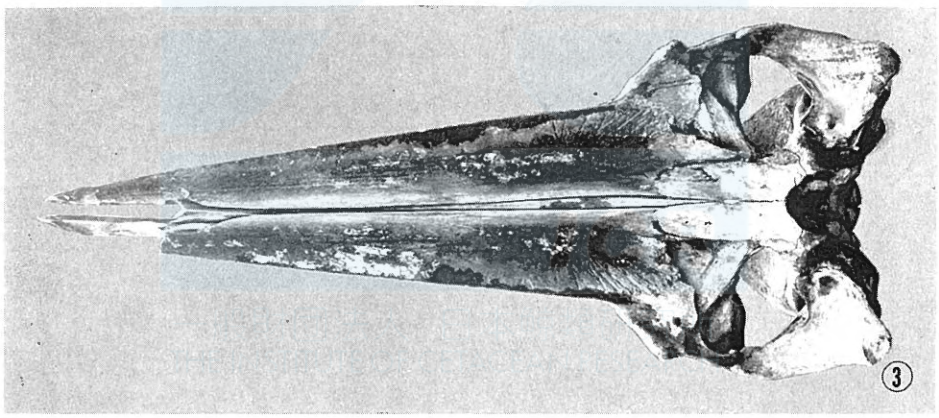
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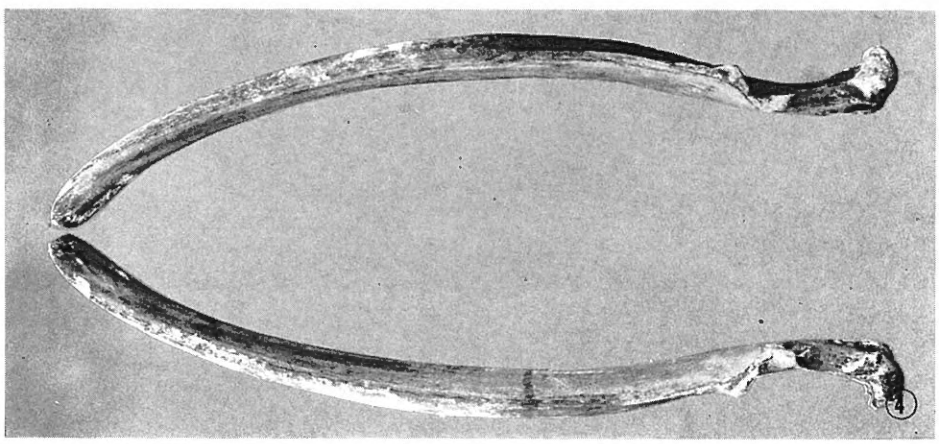
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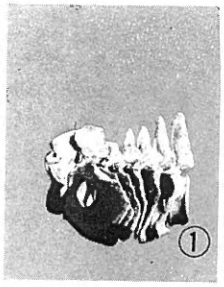
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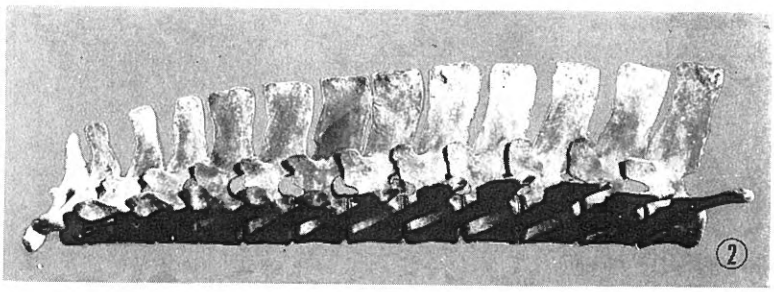
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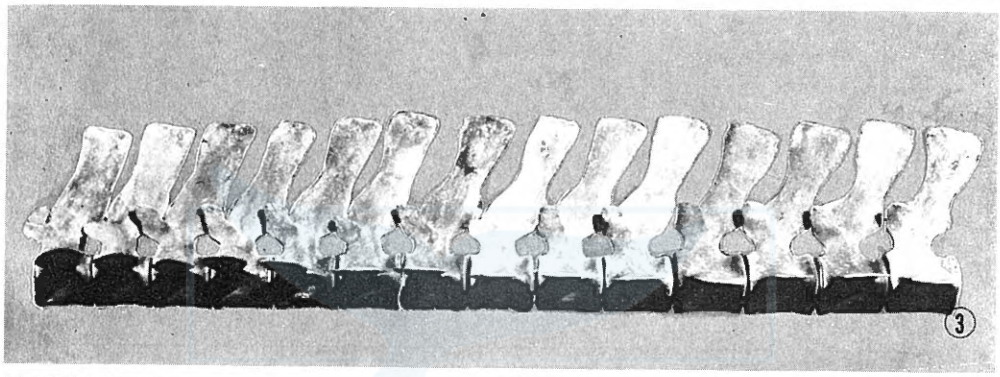
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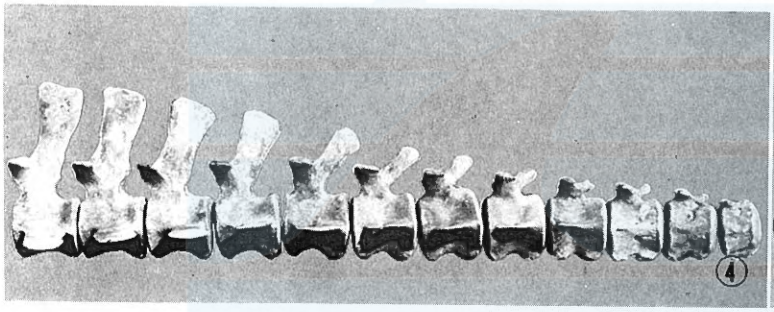
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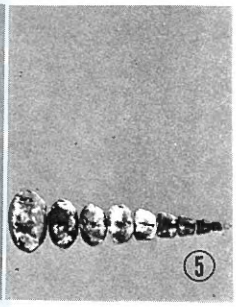
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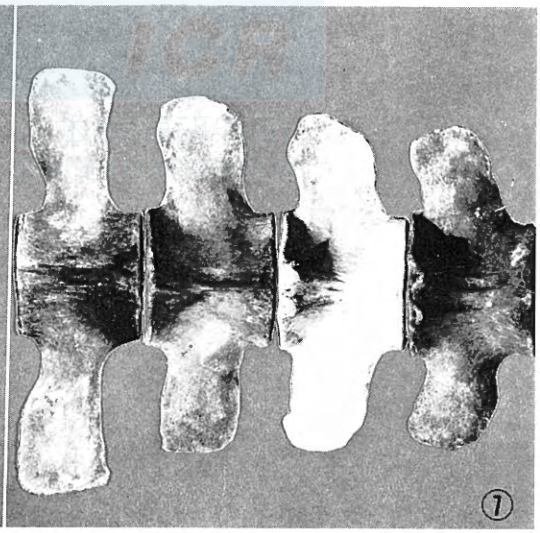
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