Some Remarks on the Pygmy Sperm Whale, *Kogia*

By

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Introduction

Prewar Japan has recorded at least eight cases[1] of the pygmy sperm whale, *Kogia* Gray. Dr. Teizo Ogawa (1936–37), professor of anatomy at the University of Tokyo and also a director of the Whales Research Institute has pushed our knowledge of this rather unusual whale so extensively forward, concluding a prospect that kogiids might most probably occur in two specific forms as *Kogia breviceps* (Blainville) and *K. simus* (Owen). Drs. Nagamichi Kuroda and Yaichiro Okada adopted his view in their list and catalogue (1938). Meanwhile in 1937, Dr. Kyosuke Hirasaka, then professor of zoology at the Imperial Taihoku University in Formosa published a paper, in which he described his own Ishigaki-Jima specimen and made simultaneously a wholesale discussion concerning the taxonomic problem of the genus. He related first seven of those specimens mentioned in the beginning (tab. 1).

Table 1. List of prewar kogiids from Japan.

No.	Institution	Sex	Locality	Date	Species after Ogawa	Recorded by
1.	Univ. Tokyo	?	?	?	*Brevic.*	Ogawa
2.	〃	?	Choshi	25–10–13	*Simus*	〃
3.	Kyushu Univ. Fukuoka	?	Awa Prov.	1915	*Brevic.*	〃
4.	Tokyo Med. Coll.	Male	Tsudanuma	30– 9–27	〃	Honda
6.	Former Taihoku Univ.	Female	Ryukyu	8– 3–35	〃	Hirasaka
5.	Tohoku Univ. Sendai	〃	Shiogama	16– 5–35	〃	Ogawa
7.	〃	〃	Linschoten	27– 7–36	*Simus*	〃
8.	〃	Male	Shiogama	7– 7–37	*Brevic.*	〃

Whereas, no record has been known ever since, but recently in 1951 through 1952 the author has secured the specimens of *Kogia* as many as twenty-three, of which eight individuals were examined in the fresh

[1] A skull (M1861) of unknown sex and locality of the National Science Museum in Tokyo is not included, and should be added. Also a skeleton described and figured by van Beneden and Gervais (1868–80) is from Japan, and at least one more (1887) has been known by historical record by Kunika Takenaka (see text).

state. The present paper is the republication that deals with six of them in 1951 from Taiji, Wakayama-Ken (Prefecture). This was partly published in the "Shizen" magazine (1952), but the more important descriptive part has remained unpublished because of its highly specialized interest that did not fit that popular magazine. This paper is naturally of preliminary nature since my acquisition is reasonably expected to grow further in the coming years and also because I have failed to make the thorough study of literatures this time.

Some Exterior Notes

Six kogiids now in question are listed in the following tables and illustrated by figs. 1–3 and 5 (a, b). When I picked up two skulls in the beginning of June 1951, I had certain reason to expect that either of them might be *K. simus* as mentioned by Ogawa. Again in July (22nd and 23rd) four more individuals were added, when I expected the same possibility more strongly. Ogawa's description of *K. simus* is based mainly on the skulls, so if any one of the present four were to be that species, its external characters should be recorded very carefully. It would be very convenient for this problematic comparison of two species since three were brought ashore at the same time by two boats on July 23rd. But my work was pretty difficult because they hurried to flense the whales while they were fresh enough for processing. The greatest failure of myself at the occasion owing to the hurrying up of examination was to have missed the total lengths of nos. 5 and 6, particularly important specimens in the present consideration. It was apparent that these two were important above all, if any considerable difference was searched for among the three, in their external characters. Both were male, still differed to a noticeable extent.

Four animals thus examined in fresh state are roughly, with exception of no. 6, similar in colour, namely dorsal dark gray and ventral ivory white. More or less pinkish or purplish blurs are sometimes seen in the ventral white region, but this seems reasonably to be a post-mortem change as cadaveric livor, as whalers say that this never happens immediately after catch.

But impression of no. 6 is different because purplish brown tinge is added all over, which is noticed particularly on the sides in the dorso-ventral transition zone throughout, from the snout to the trunk. There are distributed a large number of seal-like speck not larger than 1 cm. in length, 3–4 mm. in breadth, situated parallel to the body axis. Moreover, large and small fleckles are scattered among them, but they

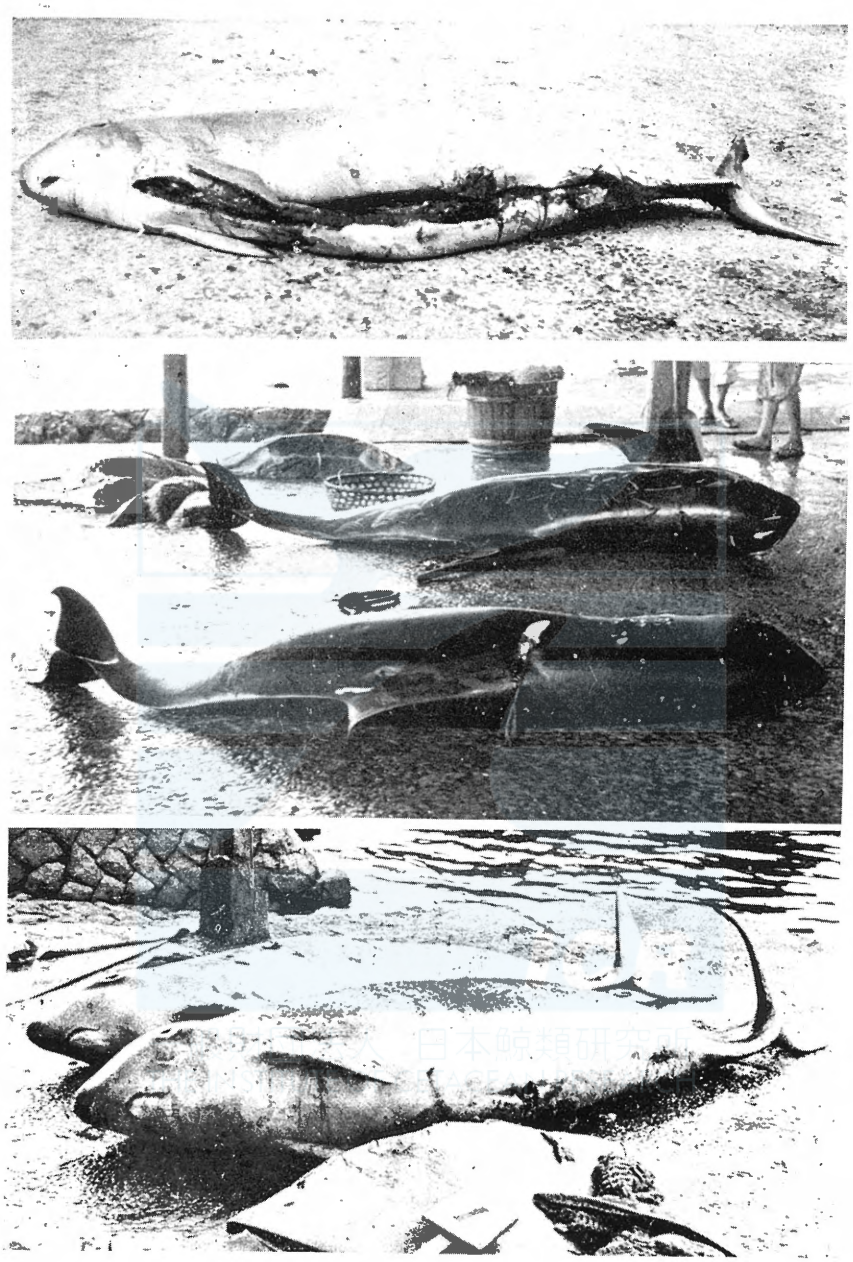

Fig. 1 (*top*). No. 3 female (22–7–51).
Fig. 2 (*middle*). No. 4 female (23–7–51). A Risso's dolphin in the background.
Fig. 3 (*bottom*). Nos. 5 and 6, both male (23–7–51).

are smaller and paler than those specks mentioned above. This animal also differs from the rest in distribution of the ventral light colour which ends about 20 cm. behind the anus, while in others, it expands further caudalward along the keel into the under side of the tail flukes. Hence in no. 6, under side of the caudal portion including tail flukes is darker in purplish dark brown, which is, however, somewhat paler than the dorsal black colour. The Noordwijk specimen from Holland reproduced in oil painting by Boschma (1951), the Grayland specimen reported by Scheffer and Slipp (1948), the Imperial Beach specimen of Hubbs (1951) as well as two of mine (nos. 21 and 22) examined at Taiji in 1952 correspond well with this manner of colour distribution. Very recently

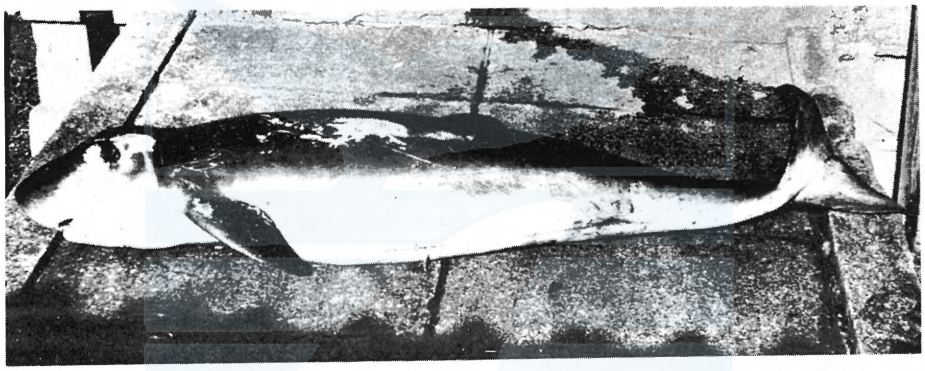

Fig. 4. No. 7 male from Tamashima (23-11-51).

Kuroda (1953), believer of Ogawa's opinion of *K. simus*, has published a monograph of Japanese mammals, in which he gives this type of colouration to *K. breviceps*, apparently based on the painting of Boschma, and to *K. simus* he gives another, not far differing one from my nos. 3-5. This colouration of *K. simus* differs from my nos. 3-5 in one major respect that the dorsal black is interrupted in sideward continuity into the lateral side of the flipper. This is obviously derived from Owen.

The exterior of *Kogia* has been given in figures and plates by Owen (1866), Kellogg (1940), Fraser (1948), Boschma (1951) and Kuroda (1953), as partly introduced above, but none of them reproduces the following pattern which seemingly characterizes the genus. This pattern is located behind the eye and in front of the flipper, and really related with the external ear hole. The pattern consists of two processes of the ventral white colour upward into the dorsal black region as shown in fig. 5 a and b. The rostral one ascends vertically toward the ear hole, but is toned more or less faintly according to individual animals. Meanwhile

another one is falciform, ascending in a broader arc which ends also pointing toward the ear hole from behind. To the consequence, a relatively large island of dorsal colour is left encompassed between the two markings. The posterior falciform marking begins closely in front of the flippers, where the dorsal black of the posterior border extends in a limbus-like hook into the ventral white, curving and tapering rostrally,

Table 2. External measurements (mm). All measurements are made in a straight line, but (*2*) and (*3*) are projected upon the body axis.

Specimen number Sex	No. 3 Female	No. 4 Female	No. 5 Male	No. 6 Male
1. Total length, from snout to notch of flukes	2180	2220	—	—
2. From snout to tip of lower jaw	105	75	100	110
3. From snout to center of blowhole	160	163	200	200
4. Length of blowhole	—	50	—	65
5. From snout to center of eye	240	225	245	250
6. From center of eye to ear hole	45	77	80	80
7. Lower jaw, from tip to corner of gape	75	93	90	105
8. From snout to tip of flipper	790	785	870	860
9. From notch of flukes to rear base of dorsal fin.	910	930	1140	1030
10. Dorsal fin, length at base	300	340	330	420
11. Height of dorsal fin	145	130	110	175
12. From notch of flukes to anus	650	685	820	820
13. From notch of flukes to center of vulva	685	725	—	—
14. From anus to center of vulva	40	—	685	680
15. Flipper, radial length	325	330	370	375
16. Flipper, ulnar length	265	240	240	275
17. Greatest width of flipper	125	120	130	150
18. Left fluke, from tip to notch	—	285	—	395
19. Right fluke, from tip to notch	310	275	330	—
20. Tail flukes, distance between tips	560	535	—	—
21. Breadth of fluke at base	—	—	200	220
22. Depth of body at anus	—	375	400	440
23. Length of head, from snout to condyle	—	—	360	400

thus giving a strong accentuating impression to the pattern. In regard to this pattern, no. 7 male from Tamashima (Okayama-Ken) agrees well (fig. 4), to say nothing of the later additions from Taiji (nos. 21–23). Also Ogawa's specimen (no. 8 of tab. 1) from Shiogama (Miyagi-Ken) seems similarly patterned though indicated dimly in the photograph. No other record has seemingly described the pattern before, hence I thought either that this has been overlooked or that this might be a hitherto unnoticed character of the Japanese kogiids. But recently Hubbs (1951) mentioned a similar pattern which, thanks to the alive condition of

his Imperial Beach specimen, was well illustrated to consist of a "bracket-like mark", a falciform marking similar to my cases as reproduced in fig. 5 c for comparison. It is important in this connection that Hubbs introduced an information of G. L. Camp concerning a female together with a fetus of it stranded near New York some years before him, that they showed also the similar pattern which could be expected to be a generic character of *Kogia*. Without doubt I agree with and admire his opinion, but should point out that kogiids from the Japanese waters differ to a certain extent from those from the American coasts both Pacific and Atlantic, as is obvious from the foregoing descriptions and fig. 5.

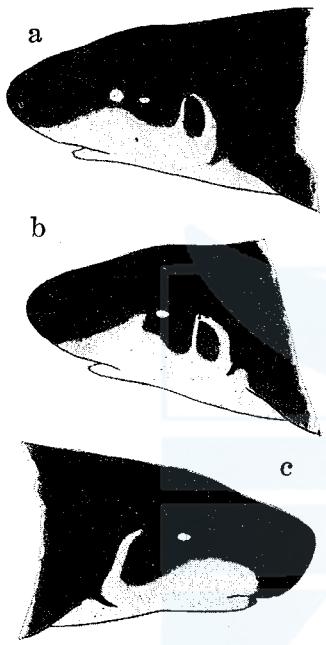

Fig. 5. Head of *Kogia* showing various pattern types. *Top-* no. 5, *middle-* no. 6, *bottom-* Imperial Beach specimen (reproduction after Hubbs, 1951).

Another slight difference pertaining to the colour pattern of my cases from the Imperial Beach specimen is the stronger upward extension of the ventral white closely in front of the eye, and an extreme case is shown in no. 5, where the extended white is torn up and separated in a round patch (fig. 5 a).

Problems in the Skeleton

The separation of *K. simus* from *K. breviceps* suggested by Ogawa is based on the differences particulary of the skull besides the dentition, which are summarized as follows:

1. The rostrum is more sharply pointed at its extremity in *breviceps*, while in *simus* it is less pointed and rather round.

2. The large fossa bordered by the maxillaries on the facial region of the skull is narrower and deeper in *breviceps* than *simus*. Consequently the bordering wall of the fossa is steep in the former and in the latter lower, sloping more gently.

3. In *breviceps*, the maxillaries are seen broader on the sides, and the suture line between this bone and the malars is rather irregular, while in *simus* beautifully marked by an S-shape.

4. The antorbital process of the malars extends shorter in *breviceps* than *simus*.

5. The palatal bones of *breviceps* present wider on the cranial basis, but in *simus* they show very limited appearance between the maxillaries and pterygoids.

6. The roof of the orbit curves more gently in *breviceps*.

7. The upper part of the frontals of *simus* is interposed between the maxillaries and the occipital further than *breviceps*.

8. The breadth of the temporal fossa far exceeds the depth in *breviceps*, while these do not differ so much in *simus*.

9. The squamous part of the occipital swells out spherically above the occipital condyles in *breviceps*, while in *simus* it rather caves in.

10. In *breviceps*, the mandibular symphysis is longer and the mandibular rami gradually diverge sideways, whereas in *simus* this divergence is abrupt.

11. Other than the skull differences, the spinous process of the cervical vertebrae, fused into a single bone, is peculiarly much longer in *breviceps* than *simus*.

Through a close examination keeping these differences noticed by Ogawa in mind, the skulls nos. 2 and 6 come especially to the fore out of my specimens with more characters of *K. simus* apparent, and besides, it is noticed at the same time that no. 5 often shows a tendency to resemble this species. Among the above mentioned comparisons, the articles 2nd, 4th, 6th and 7th actively distinguish the groups, but even the rest does not make special oppositions with exception of 8th which seems alone really opposite.

The measurements of the skulls are given by tab. 3, and indices calculated with certain prospects are listed in tab. 4, most of which, however, does not fully satisfy me. Difference of the malar index (*5*) is not new because it may be expected through the 4th article of Ogawa's comparison, but the grouping by the length-breadth index (*4*) seems to bring some significance. From the measurements in the previous records the indices are available for the present consideration as: 84.8 (Wall), 85.0 (Le Danois, Hirasaka, Ogawa), 88.2, 89.8 (v. Schulte) and 90.4 (Owen). It seems of particular significance here to note that the greatest index is derived from Owen's specimen, the type of *K. simus*. If the species has been properly established and the greater length-breadth index of nineties be of it, nos. 2 and 6 might be reasonably identified to be that species. Regrettable matter in this connection is that the index is not obtainable of the two skulls of Ogawa's *K. simus*. I expected above all much in vain from the indices related to the occipital bone (*6–9*) because I thought that its squamous part (supraoccipital)

Table 3. Skull measurements (mm). When certain artifacts are added, measurements are marked *, for instance, separated mandibles brought together after maceration.

Specimen number	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
1. Total (condylo-basal) length	276	302	(Skull is preserved for soft part anatomy, hence no measurements)	271	284	297
2. Length of rostrum, from tip to fundus of antorbital notch, left	132	164		140	165	160
—, right	126	158		136	149	149
3. Breadth of rostrum at base	129	139		128	136	140
4. Ditto at middle of rostrum	92	115		79	99	86
5. Ditto at extremity	39	31		23	32	26
6. Greatest breadth of premaxillae	71	—		76	85	84
7. Breadth of premaxillae at middle of rostrum	44	63		39	54	41
8. Distance between tips of premaxillae	15	14		10	14	15
9. Facial length, from tip of rostrum to rear of maxillae	228	258		235	250	265
10. Facial breadth, greatest breadth of maxillar (facial) fossa	165	180		169	182	196
11. From tip of rostrum to rear margin of superior nares, left	147	170		157	168	174
—, right	141	157		146	154	166
12. From tip of rostrum to rear of pterygoids (median)	149	182		151	163	175
13. Breadth between orbits	230	253		218	240	259
14. Breadth between temporal fossae	169	199		158	164	213
15. Breadth between postorbital processes, Greatest breadth	250	279		234	256	277
16. Width of occipital foramen	35	38		34	30	33
17. Distance between lateral margins of occipital condyles	75	86		72	76	82
18. Greatest breadth of occipital	208	235		210	220	236
19. Greatest height of occipital	139	152		145	145	152
20. Height of supraoccipital	95	106		103	100	105
21. Length of mandible	234	256	227	224*	253	255
22. Length of symphysis	34	46	39	30*	45	45
23. Width of proximal end of symphysis	25	42	27	24	30	38
24. Length of alveolar region, left	94	103	104	102	108	106
—, right	93	97	105	100	106	107
25. Height of coronoid	70	77	73	61	67	65
26. Breadth between mandibular condyles	201*	252	220*	198*	229*	248

might well be correlated with the spinous process of the cervical vertebrae, which differs so remarkably between two species according to Ogawa, and also because the process of my no. 6 really extends so noticeably (fig. 8).

Nos. 2 and 6 show some other common characteristics, among which it seems important that the mid-facial crest is broader in comparison with no. 5, and no saying far broader than other individuals. Another

Table 4. Indices of skull.
Figures, italic type in parentheses, indicate the articles of tab. 3.

Specimen number	No. 1	No. 2	No. 4	No. 5	No. 6
1. Facial length-breadth index, $(10)/(9)\times100$	72.4	69.8	71.9	72.8	74.0
2. Facial length index, $(9)/(1)\times100$	82.5	85.4	86.7	88.0	89.3
3. Rostrum index, $(2)/(1)\times100$	47.8	54.3	51.7	58.1	53.9
4. Length-breadth index, $(15)/(1)\times100$	90.6	92.4	86.4	90.1	93.3
5. Malar index	26.1	33.1	24.9	30.6	33.5
6. Occipital index, $(19)/(1)\times100$	50.4	50.4	53.5	51.0	51.2
7. Facial-occipital index, $(19)/(9)\times100$	60.0	58.9	61.7	58.0	57.5
8. Squamous occipital index, $(20)/(19)\times100$	68.3	69.8	71.0	69.0	69.1
9. Squamous height index, $(20)/(1)\times100$	34.4	35.1	38.0	35.2	35.4

interesting peculiarity common to these two is the morphology of the occipital condyles: In nos. 2 and 6 the lower extremities of condyles are situated very close and the articulation surface itself is rough in a peculiar way, while in other skulls the spheric smooth condyles stay distinctly apart from each other (fig. 6). These two types of condyle are extremes, and there is no intermediate between them. The Tsudanuma specimen alone, one of the most typical *K. breviceps* from Japan and also male, seems to keep the close condyles like nos. 2 and 6, according to a photograph of Ogawa. The relation between type of condyles and either species appears, therefore, indefinite.

The mandible of typical *K. breviceps* mentioned by Ogawa is that of no. 3 alone; nos. 2 and 6 fully represent once again the characters of *K. simus*; and the rest the intermediate form which rather resembles the latter species (fig.7). With this general tendency of shorter symphysis the small dental formula may have some intimate relation. None of my specimens has more than 21 teeth in the lower jaws, in spite that the dentition of *K. breviceps* is said to be usually 12–14 pairs (tab. 5). In this respect, nos. 2 and 6 may be identified as *K. simus*

Table 5. Dental formulae.
Absence of upper teeth in no. 1 is not certainly examined, they may be possibly lost. The side is unknown of the upper tooth in no. 2.

No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
$\frac{0:0}{11:10}$	$\frac{1}{8:9}$	$\frac{1:0}{9:10}$	$\frac{1:1}{9:10}$	$\frac{2:2}{10:10}$	$\frac{0:1}{9:9}$

and the rest to interlink this and the typical dentition of *K. breviceps*. One more note seems necessary concerning the upper teeth which are also said to characterize *K. simus* and really very popular in my cases.

This may be judged literally to agree *K. simus* on one hand, but on the other that they exist in reality more than it has been thought before, because they are easily stripped off or decayed away with the gum during the procedures prior to the examination by cetologists or exhibition at museums.

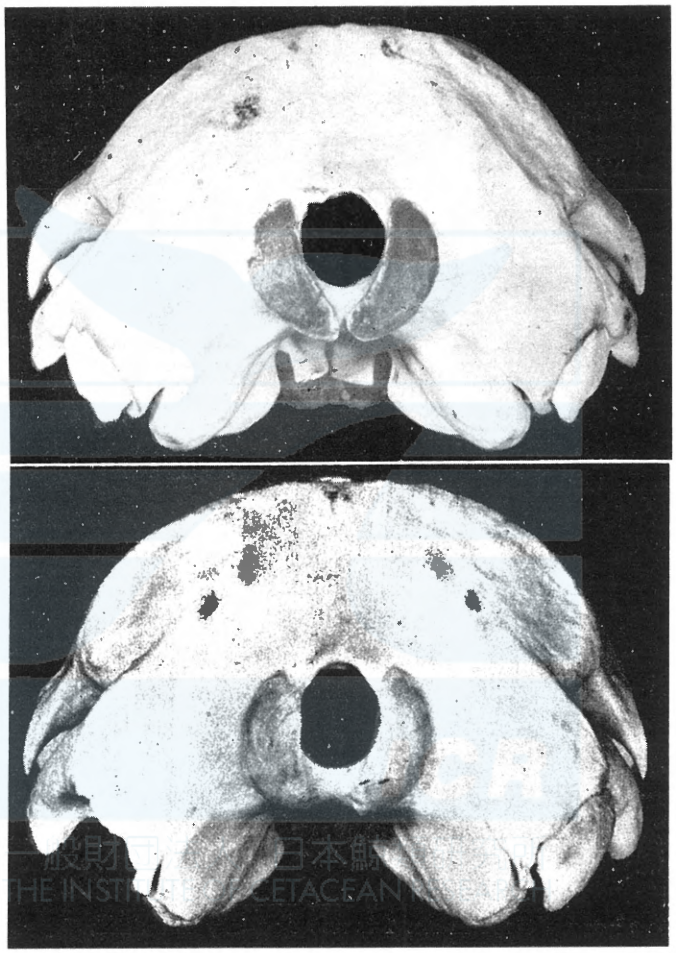

Fig. 6. Rear view of skull. *Upper*- no. 2, *lower*- no. 5. Note occipital condyles distinctly different.

The vertebral formula is included in tab. 6, in which nos. 3–5 are noticed to be greater than the previous records. The total number is 50–55 after Le Danois (1911), and 56 of Ogawa's female (no. 6 of tab. 1) exceeds this range by one segment. But my nos. 3–5 are still more. Whereas no. 6 stays in the range of Le Danois with less segments, and

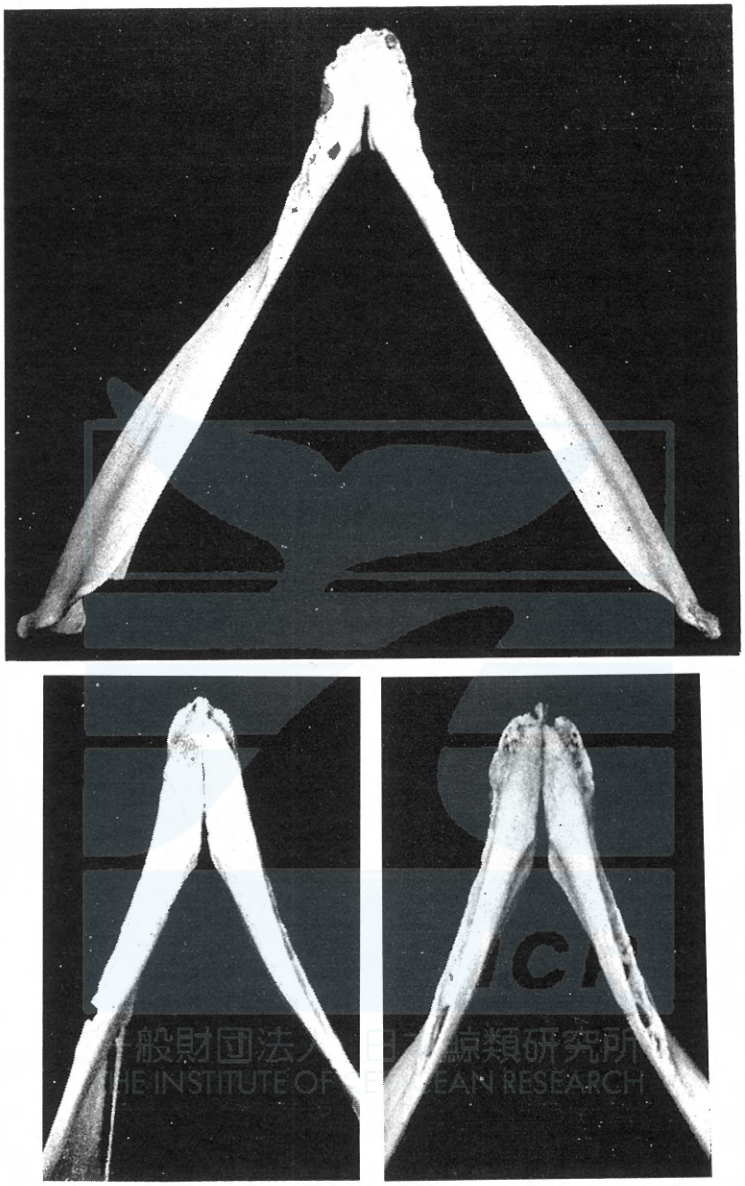

Fig. 7. Mandible. *Top*- no. 2, *bottom* nos- 3 (*left*) and 5 (*right*). Nos. 3, 5 and 2 show a serial difference of symphyseal region in the given order. No. 2 alone is perfectly ankylosed.

thus shows the tendency of *K. simus* noticed by Beddard (1900–23) in comparison with the rest specimens, though his actual numbers are less than my cases, viz. 54 for *breviceps*, 50 for *simus*. The discrepancy in

dorsal as well as lumbar vertebrae must here be allowed, though the distribution in these regions has been said to distinguish the animal rather than the total number. The discrepancy is naturally related to the less ribs of no. 6.

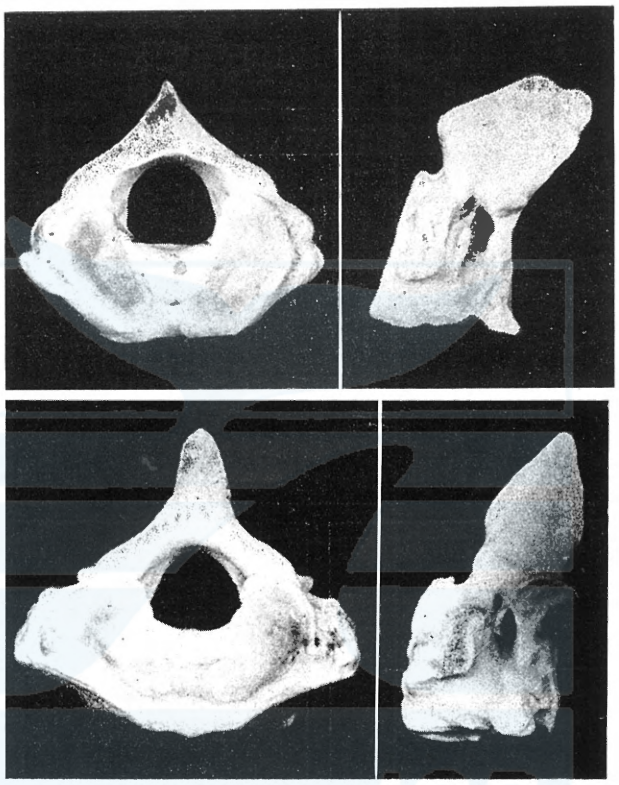

Fig. 8. Cervical vertebrae, cranial and side views. *Upper-* no. 5, *lower-* no. 6. Note the different length of spinous process.

However, what interests me most about the vertebrae is the morphology rather than the formular number, namely the spinous process differs in its relative dimension also outside the cervical region, concerning which the difference has been recorded by Ogawa as quoted in the beginning and illustrated by fig. 8 of my nos. 5 and 6. The indices are tabled in tab. 7 which indicates that the spinous process of no. 6 is obviously longer than no. 3. Concerning the first caudal, the indices differ also in the same way, and no. 5 interlinks nos. 3 and 6 (figs. 9, 10). The spinous process that varies thus in length is naturally expected to give the appearance of animals certain difference as a result, which however, I did not notice when some were searched for between nos.

Table 6. Bone numbers.

Specimen number	No. 3	No. 4	No. 5	No. 6
Vertebrae, total	57	57	57	54
Cervical	7	7	7	7
Dorsal	13	13	13	12
Lumbar	12	11	10	11
Caudal	25	26	27	24
Chevron	14	16	18	16
Costal pair	13	13	13	12
Pair with tuberculum	8	8	8	8

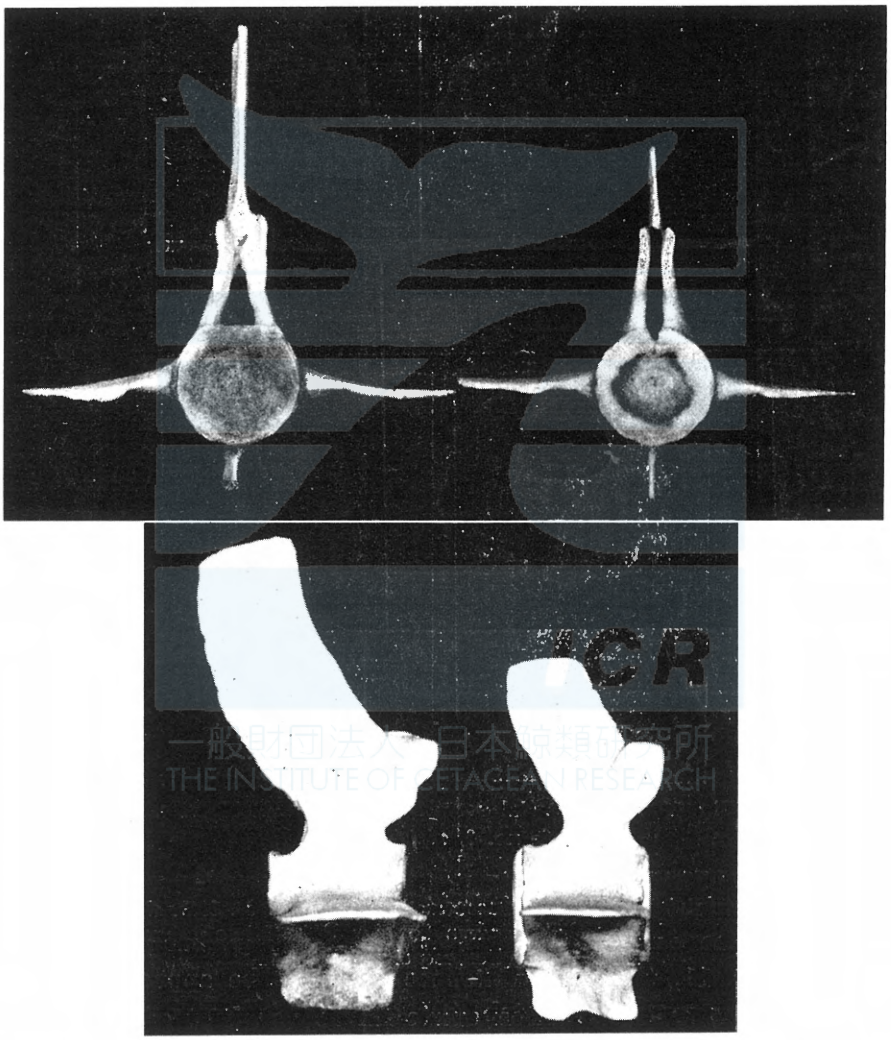

Fig. 9. Lumbar vertebra, cranial and side views. *Left*- no. 6 fifth, *right*- no. 5 eighth, hence difference in length of spinous process is exaggerated.

Table 7. Vertebral indices.

$$\frac{(\textit{Depth of corpus})}{(\textit{Entire depth including spinous process})} \times 100$$

Sp. no.	No. 3	No. 5	No. 6
D 7	24.6	—	22.2
D 8	24.2	—	22.7
L 5	29.1	—	28.1
Ca 1	43.4	42.4	41.2

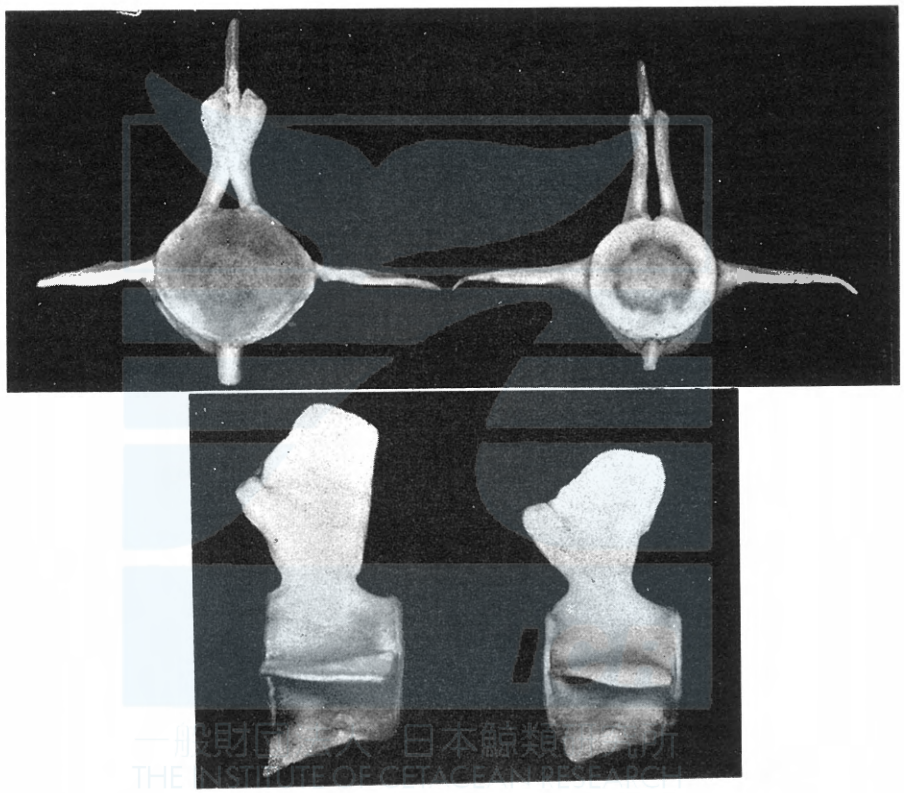

Fig. 10. First caudal vertebra, cranial and side views.
Left- no. 6, *right-* no. 5.

5 and 6 at beach. Therefore, it seems very hard to mark the difference according to the exterior, but let us once again go back and compare the two in fig. 11, then the difference seems to be appreciated in the depth of body as compared in tab. 2 (*22*), yet this seems not so distinct as to make us decisive.

Another interesting comparison should be mentioned finally. It is

the sternum, of which the jugular incisure is peculiarly far deeper in no. 6 than all others (fig. 12). Here is too no intermediate, though slight differences are present in the group of no. 5. In the meantime, I missed the important knowledge of the digital formula because of failure in the course of preparation.

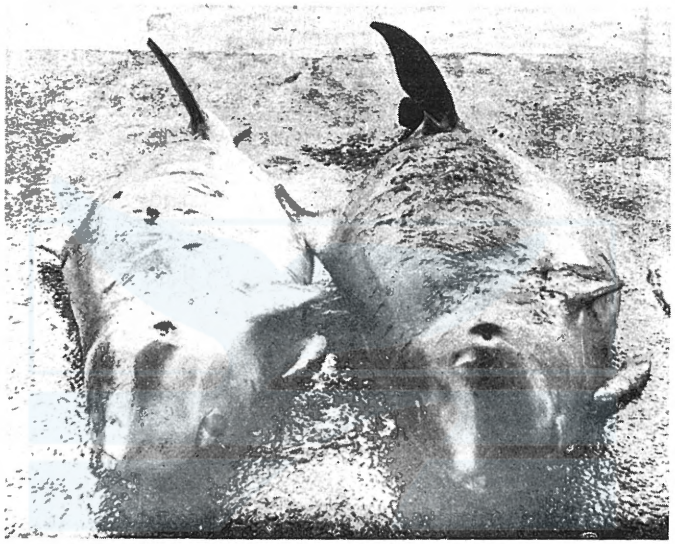

Fig. 11. Nos. 5 (*left*) and 6, (*right*), front view for better comparison of body depth.

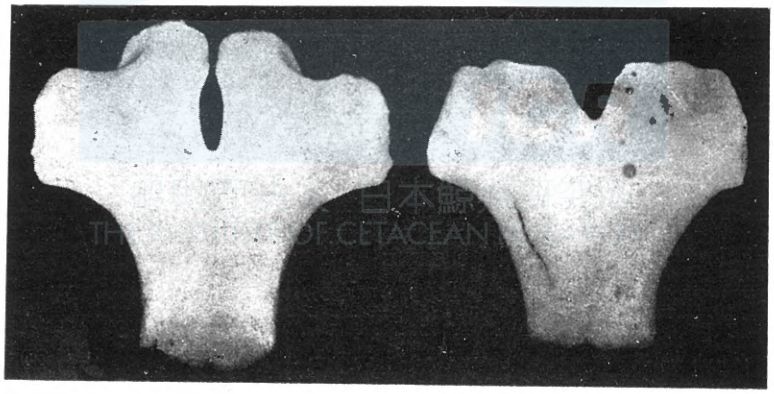

Fig. 12. Sternum. *Left*- no. 6, *right*- no. 5. Note jugular incisure.

Since both nos. 5 and 6 were brought ashore by one boat "Takara Maru", I liked to know what was known at sea, especially if they belonged to the same school or were separated. Gunner Mioji Kishi gave

me a detailed information, through which it was testified that no. 5 was with no. 4 in a school of six or seven whales, and no. 6 in another of two to three. This may somewhat favour on one hand the opinion to recognize *K. simus* and seems on the other to be a new knowledge of the habits of kogiids.

I do not think that the above results perfectly distinguish *K. simus* from *K. breviceps*, though two rather distinct types apparently do exist. If these types were connected continuously by certain link, I could agree in the recent opinion since Hector (1877) to unify all species of *Kogia* into one. Nevertheless, the intermediate form between two types like no. 6 and others has not been procured until now in spite of my eager wish to have some. I must mention at the end one more discussion concerning the lasting question of the size of *Kogia* in relation with the systematic problem.

Le Danois (1911) and v. Schulte (1917) pointed out the immaturity of the type specimen of Owen, which seemingly gave rise to the recent and leading opinion of unifiers. Hirasaka (1937) thought also likewise and proposed 30 cm. long skull as the demarcation, saying that the larger animals than this size represent more characters of *K. breviceps* and the lesser ones *K. simus*. However, most of my specimens are not larger than 30 cm. in the length of skull and no. 2 alone slightly exceeds this demarcation. Moreover, among my specimens, nos. 2 and 6, which are regarded more strongly as *K. simus* after Ogawa, belong to the larger group, obviously full grown judging from the ossification examined in the entire skeleton. Whereas, the rest belong to the lesser group which shows more characters of *K. breviceps*, still they are never immature. No. 5 is above all perfectly ossified and even the smallest no. 4 was lactating. To the remark of pregnancy a special importance has been attached by Ogawa as the most reliable sign of maturity, and either of nos. 1 and 2 was certainly pregnant, which I suppose to be no. 1. I am now of opinion that kogiids vary considerably in size, and that sexual maturity should be carefully considered not to confuse with the grown-up animals of perfect ossification. And I, apart from the systematic problem whether or not *K. simus* be separated, oppose to the opinion that the younger animals with the skull under 30 cm. are gradually converted from the initial resemblance to *K. simus* into the general type of *K. breviceps* as they grow up. This opposition has been raised already by Ogawa himself (1939), with whom I agree.

Another opinion of myself is this, that the lasting dispute has been caused because no addition of typical *K. simus* has been known after

Owen, and I wonder from time to time that the whole discussions might be utterly inappropriate and we should look forward to the future specimens. In 1952, I secured a female porpoise of *Feresa intermedia* which seems to have disappeared long ago from the current interest of cetologists and I myself too have never dreamed of such an unusual acquisition. Who can deny the future possibility of Owen's *K. simus* to appear before us?

Some Miscellaneous Notes

Van Beneden and Gervais (1868–80) introduced the name "*Uki-Kujira*" to be used by the Japanese of *Kogia*, of which they were informed of their *Kogia du Japon* labelled by the sender, the Japanese Government at the time. But nevertheless, its source has remained unknown for long, and the current name "*Komakko*" has been given to it, as the English name lesser or pygmy sperm whale means it, after the whale has been added to the cetacean fauna of Japan by the Japanese zoologists first in 1927. I have been afraid deeply in this connection, that this name would bring some confusion sometime and somewhere, since the name belongs to the routine vocabulary of our whalers who mean by it the small-sized sperm whale under the limitation of the international regulation instead of *Kogia*. And really the matter seems serious because the Japanese are the famous whaling nation, to whom sperm whales have a top importance and also because kogiids too are practically included in the catch of smaller cetaceans at Taiji, and Shiogama (nos. 6, 8 in tab. 1) to say the least. The catch of kogiids at Shiogama is rather limited, but at Taiji it is annually constant, around ten out of several hundreds of blackfish, dolphins and porpoises. The records of kogiids have been steadily increased the world over but they are mostly stranded cases and accordingly infrequent. The constant catch at Taiji is, therefore, quite exceptional on earth, and kogiids have been called "*Tsunabi*" among whalers there[1]. The appearance of kogiids off Taiji is confined to the trying summer season probably due to their migrating habit. All this was unmasked in 1951 and made known first to the public by myself, since then I have made a proposition of this vivid name "*Tsunabi*" to substitute the confusing "*Komakko*". Its origin is, however, not known, but after the opinion of Mr. Chuhei Mizutani, it is reasonably supposed that they have named so after a kind of firework *tsunabi* which is propelled in the air along a line. The strange habit

1) Prof. Ogawa (1936–37) introduced another name "*Zaru-Kaburi*", possibly translated as "with basket on", from Shiogama after a witness' saying of no. 6 in tab. 1.

of kogiids at sea, jointly stressed by the veteran whalers there, must have made whalers of old days associate with this type of firework, their favourite boyhood hobby, Mizutani suggested. The strange habit of kogiids goes like this, that they are very often found basking at the surface of sea and stay so innocent of the approach of whalers that harpooning is not very difficult. Then they are frightened at the sudden attack and submerge to the depths, when, regardless of success or failure, they leave evacuations which are easily mistaken by the beginners for bleeding. Some persons call kogiids for this habit as the skunk of the sea. And Mizutani concluded that this evacuating habit and instant disappearance suggested *tsunabi*, the rocketting firework. The evacuation at time of shock in kogiids interested me very much because it is also the case with the closely allied true sperm whale, which I have observed myself, and of which also some leading gunners of my acquaintance testified to my enquiry. It is especially important that this name lives with whalers, presumably only whalers in the world who prey upon kogiids at present as well as in history. Dr. Remington Kellogg of the U. S. National Museum in Washington wrote me some time ago that so many acquisition of kogiids suggested their more frequent occurrence off the coast of Japan than elsewhere. But I necessarily add some words concerning this that it may be a mere outward phenomenon thanks to the local but traditional whaling at Taiji.

The basking nature of kogiids as included in the just mentioned story agrees well with the record of Drinker together with the slow-moving, lethargic nature mentioned by Allen (1941). Since the ancient name "*Uki-Kujira*" of unknown source and locality means "floating whale" which, without doubt, names our kogiids so properly and wonderfully that I had imagined that the name was originated somewhere where the whaling was as prosperous as Taiji for some time in history and they must have called our kogiids so after very close and careful observations at sea. Soon later this imagination has been fortunately proved right when I read a manuscript by Kunika Takenaka, entitled "Bonan Hogei-Shi" (Whaling in Southern Awa) and written in 1887. I found "*Uki-Kujira*" in the writing, together with Pacific bottle-nosed whale (*Berardius*), Cuvier's beaked whale (*Ziphius*) and blackfish (*Globicephalus*) to be hunted by ancient whalers in the province of Awa. It was fortunate that the author himself experienced a case on June 12th, 1887, of which he gave a painting (fig. 13), and through this and descriptions my imagination has been proved perfectly right. How many kogiids were caught there, I do not know. But pretty often

procurements from that province may be definitely expected as indicated by tab. 1 (nos. 2, 3, and presumably inclusive of no. 1 without locality). Also *Kogia du Japon* of van Beneden and Gervais seems in consequence most probably to be recorded from the province of Awa. With the

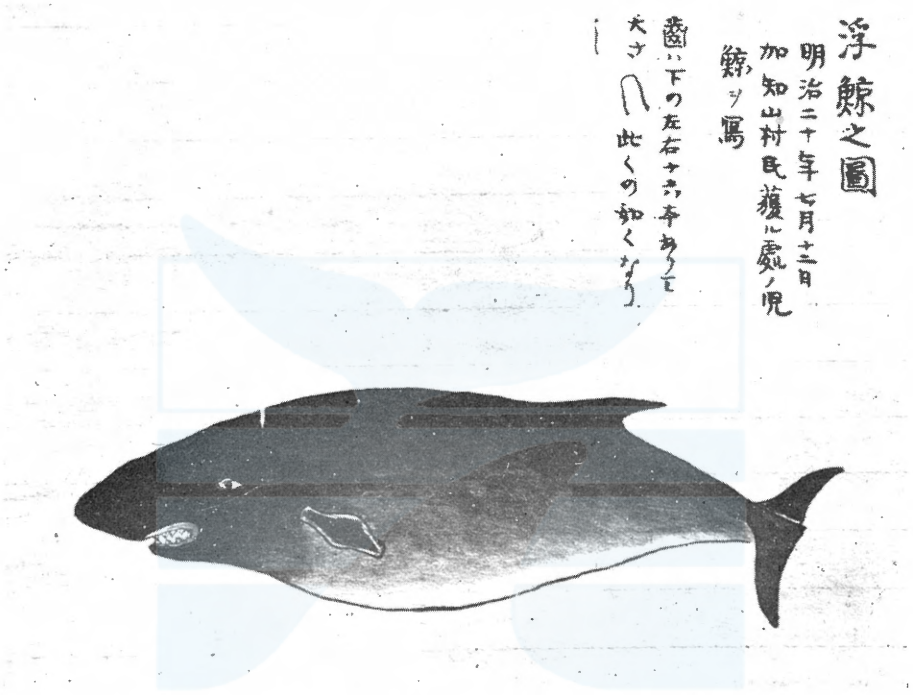

Fig. 13. "Uki-Kujira" by Kunika Takenaka. Upper teeth are obviously figured by careless mistake, judging from the seemingly correct description, 16 in lower jaws.

decline of ancient whaling there, which apparently happened in relatively recent years, "*Uki-Kujira*" appears to have been fated absolutely forgotten, even among the present *Berardius* whalers there, and barely some two or three skulls have been kept unnoticed until the recent renaisscence of Japanese cetology, to which Prof. Ogawa has made so great contributions.

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and gunners, and many others. Drs. Teizo Ogawa and Ryoji Ura have encouraged my work very much, to both of them and to my father Dr. Manabu Yamada I owed much in finance. Informations have been given timely concerning the writing of Takenaka through Mr. Asakichi Izukawa and Dr. Yukichi Habara. Dr. Remington Kellogg kindly suggested me of Allen's paper, of which Miss Barbara Lawrence sent me a copy. To all of them I express my deep appreciation.

Summary

Six specimens of *Kogia*, Gray in 1951 from Taiji, Wakayama-Ken, Japan, are described in relation to the lasting systematic question, and summarized as follows, but they are just preliminarily mentioned.

1) External characters of nos. 3–6 mark off no. 6 from others.

2) Somewhat complicated pattern of the dorsal gray and ventral white is newly noticed around the eye and ear hole, to which the Imperial Beach specimen of Hubbs alone shows certain resemblance.

3) Skulls are divided into two groups, nos. 2 and 6 and others. The former are larger and show more characters of *K. simus* persisted by Ogawa. Some common peculiarities in nos. 2 and 6 are described.

4) Mandibles as well as dental formulae show general resemblances to *K. simus*, and the upper teeth are really very popular.

5) Skeleton other than the skull also distinguishes no. 6, in which the vertebral spines are remarkably longer and the jugular incisure of sternum is quite different. No intermediate is learned to bring continuity.

6) Two groups thus marked result a strong opposition against the dominant opinion of recent time that the younger animals of initial resemblance with *K. simus* turn into the general type of *K. breviceps* as they grow.

7) Some habits of kogiids are introduced in connection with the forgotten name "*Uki-Kujira*" and proposal of vivid name "*Tsunabi*" to substitute the current "*Komakko*" for fear of confusion.

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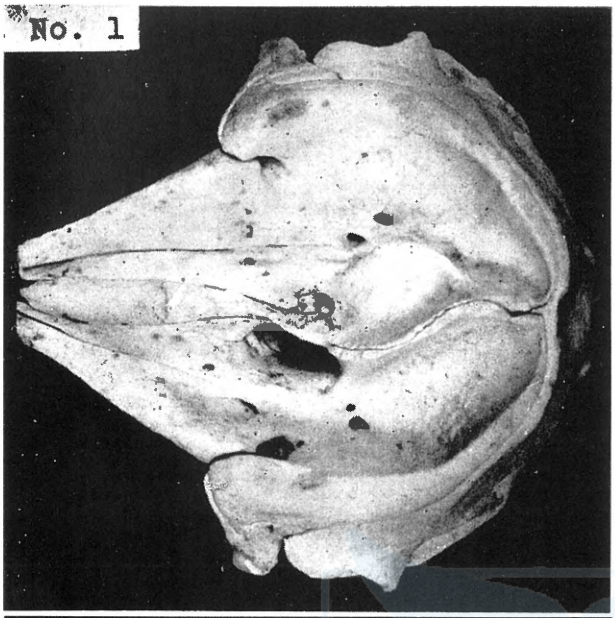
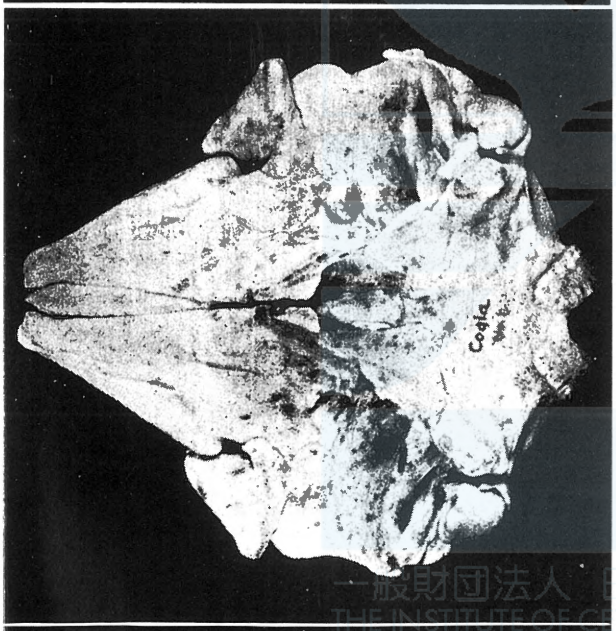
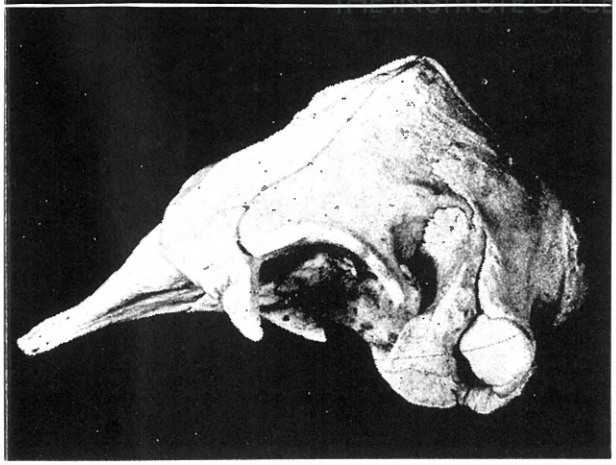
Explanation to Plate.

Dorsal, ventral and side views (from top to bottom of each column) of skulls, nos. 1, 2 and 4–6. The tympanic bulla or the mastoid process of ear bone is often dislocated.

No. 1







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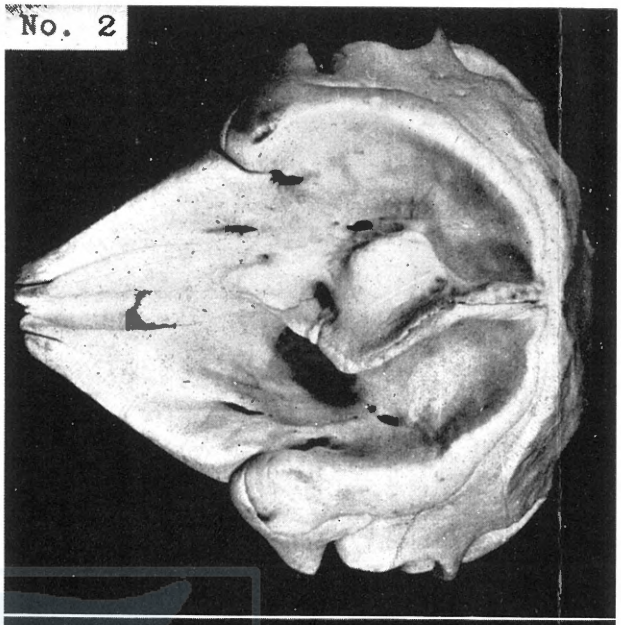

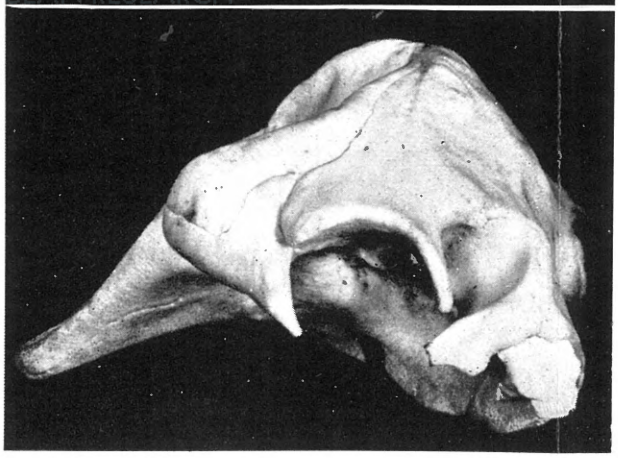

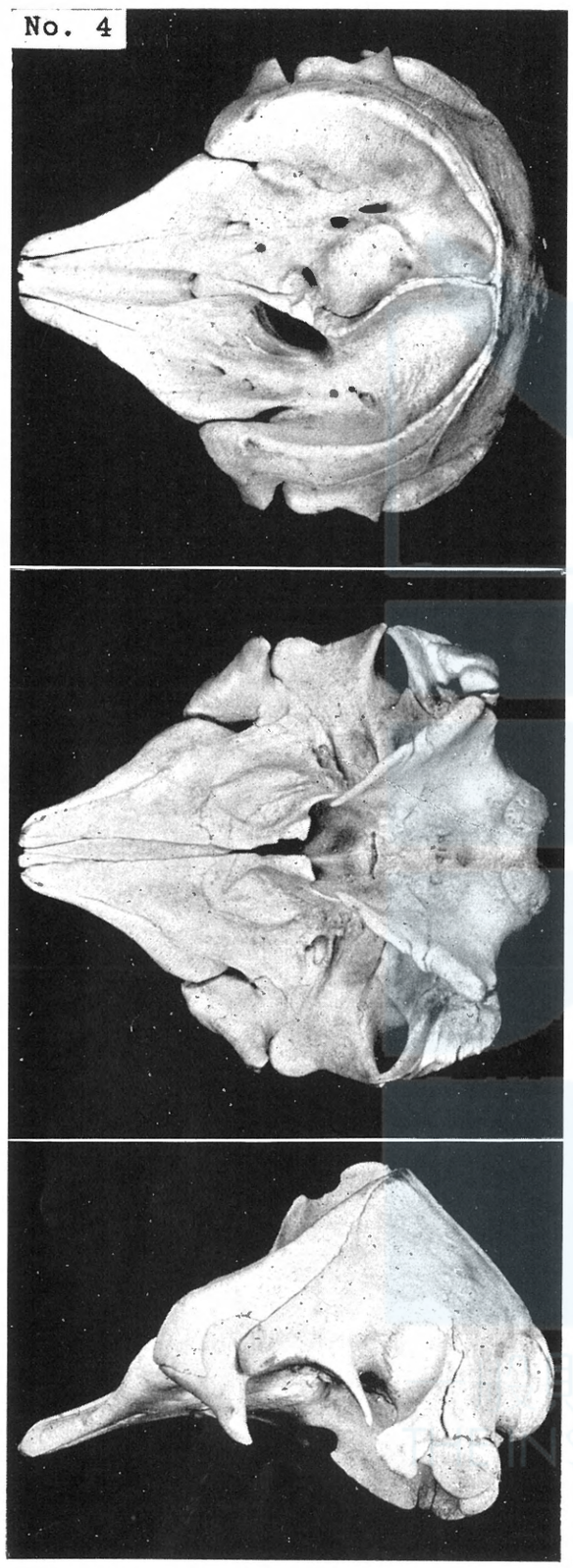
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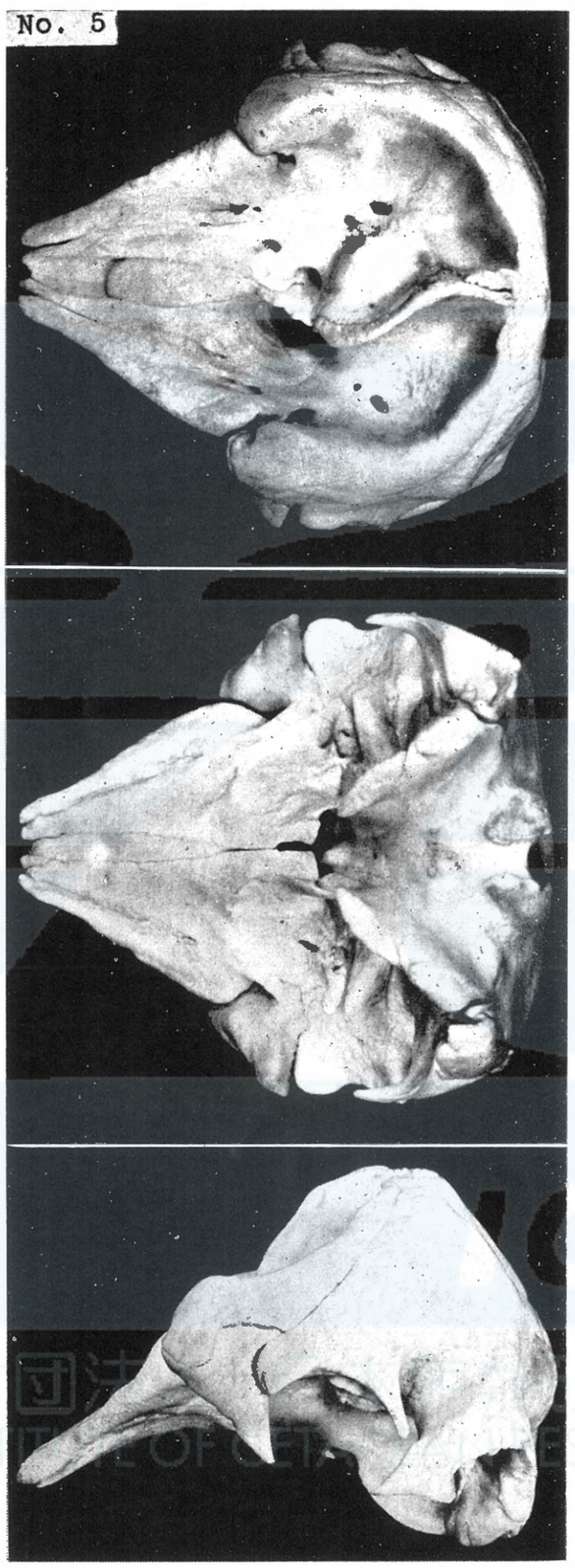
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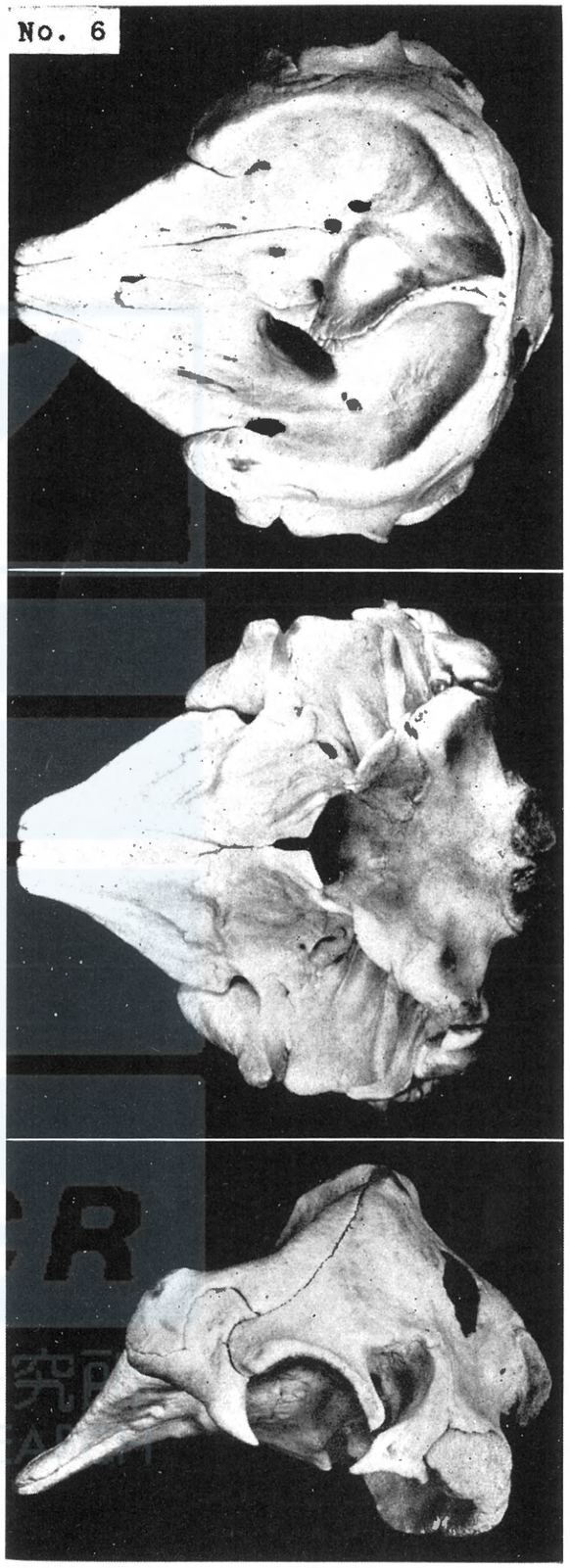
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