

A fossil walrus from the Okhotsk coast*

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The Public Museum of the Amur District provided the Geological Museum of the Academy of Sciences with a fragment of a walrus skull, undoubtedly a fossil, for scientific analysis. There are no stratigraphic data whatsoever about this finding. According to information from V. M. Popov, the Superintendent of the Museum, it is known only that the “head of the walrus was found on the shore of the Okhotsk Sea, near Petrovsk, and was obtained from the native Giliaks in the town of Nikolaevsk in July 1891.” Since we know of only one other fossil walrus found within the limits of the Pacific Ocean up to now, and that one was on Sakhalin,¹ this remnant deserves attention.

The fragmentary skull is presented in Table 1 and Fig. 1. The fracture passes somewhat behind the fronto-nasal junction and across the anterior end of the right zygomatic arch; on the left side, moreover, it is broken across the alveolus of the tusk, and the whole specimen is greatly rounded — so much so that, in some places the external layer of bone was destroyed, exposing the inner, spongy material. All of the edges of the bones also were greatly rounded, as was the alveolus of the right tusk, and in the left tooth row, the alveoli of only the first three most deeply seated teeth were preserved (the fourth, M³, either had been absent or its alveolus was very shallow); the aforementioned anterior end of the right zygomatic arch, perforated by the infraorbital foramen, was rounded so much that it appears as a small, rounded [p. 2] cross-section of an ear. One can imagine that the left side of the skull, which was subjected to damage by the sea, originally was unearthed from the rocks in a coastal bluff, and then fell out and was rounded by the sea, like a boulder.

The first conspicuous characteristics of the described fragment are: the very narrow palate and the very large alveolus of the tusk (Table 1, Fig. 1). With the dental row in a

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¹ Matsumoto, *Sc. Rep. Tohoku Imp. Univ., Sendai, Japan, sec. ser.*, v. X, No. 1, 1926, p. 13.

horizontal position, the surface of the anterior part of the skull forms an angle of a little less than 45 degrees from the vertical (and from the surface of the nasal bones, slightly inclined forward, an angle of 45 degrees); thus (and this is particularly clear from the broken left, alveolus), the orientation of the base of the tusks was downward and a little forward, at an angle from the vertical somewhat less than that of the anterior wall of the skull (the anterior walls of the alveoli are thickened ventrally).

The nasal bones form a small depression in the upper surface of the skull (Table 1, Fig. 4); they are completely fused along the midline, whereas the lateral sutures still can be located. A vertical line dropped from the anterior edge of the nasal bones would pass somewhat forward of the posterior edge of the alveolus of the tusk (if the worn away part were restored). The nasal aperture is heart-shaped (Table 1, Fig. 3); its height is greater than its width. Having the sutures preserved, one can note [on each side] a small process of the intermaxillary bones between the maxillaries and the nasals, to approximately one-third the length of the latter. Also notable on the anterior surface of the skull are the sutures between the maxillae and intermaxillae descending in irregular arcs to the anterior external angle of the alveoli of the tusks.

The palate is narrow, expanding posteriorly; the narrow and deep anterior part of it is separated from the wider posterior part by a slight constriction, due to expansion of the maxillary bones between I^3 and M^1 . The surface of the posterior wall of the alveolus of the tusk lies only a little ahead of the posterior border of the last tooth.

The tooth row consists of four teeth, which are round to slightly oval in cross-section, obliquely set (inclined downward and forward), and have a saddle-shaped plane of abrasion. The first tooth (I^3) is equal in size to the third (M^2); the second tooth (M^1) is the smallest; there is no sign of a fifth tooth.

[\[p. 3\]](#)

Table 1 (see next page)

Comparison and Distinction.—Of the fossil remains of walruses, which are few, the most similar in location is the one from Sakhalin. The geological age of that one, as of the one

described here, is unknown. The broken skull [of the Sakhalin specimen], also the anterior part, was found there in “ancient beach sand,” possibly of late Quaternary age. In degree of mineralization, it resembles the preservation of the mammoth fauna and is yellowish-brown in color. The Okhotsk fossil apparently is more [p. 4] completely mineralized and is grayish-brown in color.

The Sakhalin form² was described under the specific name of the Recent Pacific Ocean form, *Odobenus (Trichechus) obesus*. Actually, to judge as far as possible from the photograph,³ the anterior part of the snout does show the typical right angle (anterior wall of the snout inclined at a right angle to the frontal part), which is one of the characteristic features of the Pacific walrus, compared with the Atlantic;⁴ at the same time, all dimensions of the Sakhalin specimen approach or exceed the limits of observed individual variation in dimensions of the skulls of Recent *Trichechus obesus*.

Table 1. Measurements in mm.

	Okhotsk walrus	Sakhalin walrus	<i>Trichechus virginianus</i>
Distance from posterior side of infraorbital foramen to the anterior end (the most protuberant part) of the anterior wall	> 170	< 150	–
Greatest width of the anterior wall (half is 135 mm).	270	245	(243) 205
Height of the anterior part (from the naso-frontal structure	> 250	230	–
Nasal bones, length	105	82	–
Nasal bones, width, combined, anteriorly	55	–	–
Nasal bones, width, combined, posteriorly	90	72	–
Nasal aperture (height x width)	70 x 55	–	51 x 70
Dimensions of the tusk at the base . . .	95 x 65 ¹	82 x 58	75 x 45
Overall length of tooth row	116	108-111	108
I ³ (length x width)	29 x 27	(23 x 29)	35 x 25

² Matsumoto, *loc. cit.*

³ Matsumoto, *loc. cit.*, p1. VII, fig. 1

⁴ Allen, History of N. American Pinnipeds. - Misc. Publ. No. 12, *U.S. Geol. a. Geogr. Survey of the Territ.*, 1880, pp. 156-7.

		21 x 27	
M ¹ (length x width)	22 x 26	21 x 22	23 x 25
M ² (length x width)	29 x 27	28 x 23	30 x 30
M ³ (length x width)	26 x 29	24 x 21	30 x 30
Distance (diastema) between I ³ and M ¹ . .	–	10–11	–
Distance between inner edges of I ³ (width of palate)	25	31	28–35
Distance between inner edges of M ³ (width of palate)	80	--	70
Distance between inner edges of C at alveoli	100?	--	100

¹Dimensions taken not along the border of the alveolus, which is broken obliquely to the axis of the tusk, but on a plane perpendicular to that axis.

The Okhotsk form shows some different characteristics. First of all, the anterior wall of its skull forms, as we saw, an obtuse angle with the frontal part; in that connection it would be convergent on the Atlantic walrus, *Tr. rosmarus*. This difference in angle can be seen clearly if the profile of the Sakhalin skull (from Matsumoto's photo) is superimposed on the photo of the Okhotsk fragment. The Okhotsk form is more massive than the Sakhalin, but not all dimensions are proportionally greater. Thus, the nasal bones in the Sakhalin form are shorter but, at the same time, wider; they are nearly rectangular in outline, whereas in the Okhotsk form they are noticeably tapered anteriorly. The tooth row is very similar in both forms (in the Sakhalin, all of the teeth are somewhat smaller), but the palate of the Sakhalin is slightly wider and is not tapered as was described for the Okhotsk. One must bear in mind, however, that the width of the palate actually appears not to be consistent with size (as can be seen from a survey of the excellent collection of skulls in the Zoological Museum of the Academy of Sciences), and among the Recent walruses, also, there are examples with a very narrow palate;⁵ possibly the width of the palate is connected with [p. 5] the size of the tusks. The nasal aperture apparently has the same shape in both forms. Finally, the dimensions of the tusks (at the base) of the Sakhalin form are noticeably less than in the Okhotsk.

⁵ *Tr. rosmarus* from the mouth of the Khatanga (collection of the Zoological Museum) has a distance between the I²'s of 21 mm, while in another example (from 174°E), it amounts to 40 mm.

There is considerably more comprehensive material concerning the fossil (Quaternary) walrus of the Atlantic Ocean, *Trichechus virginianus*.⁶ The available complete skull of it is very close to the Recent Atlantic *Tr. rosmarus*,⁷ from which it is distinguished, by the way, by its somewhat more massive molars and so on. In the same dimensions of the skull, *Tr. virginianus* is somewhat smaller, not only than ours but the Sakhalin as well, particularly in the dimensions of its tusks; nonetheless, its molar teeth are more massive than in the Okhotsk specimen.

In general, the profile (side view) of the anterior part of the skull bears a marked resemblance to that of the Okhotsk specimen, but the structure of the ventral side is completely different: in addition to its smaller tusks, it is distinguished from our specimen by its wider palate, more massive molars, larger M³ (also M², which is no less), and convex rather than concave anterior border, which undoubtedly is connected with the less anterior position of the tusk alveoli.⁸

A very interesting analysis of the Quaternary Atlantic forms was presented by Rhoads,⁹ on the basis of the materials that were described earlier by Leidy (cited above). His data show that some of the characteristics of the Quaternary forms that distinguish them from the Recent Atlantic *Tr. rosmarus* at the same time link them together with the Okhotsk. This is evident in the absolute dimensions of the teeth (larger than in the [p. 6] Recent walruses), as well as in the relative dimensions (among themselves): the I is larger than in both of the Recent forms, and M³ is less reduced; in both forms, the smallest tooth is M¹. Furthermore, there is greater depth and narrowness in the shape of the palate. The nasal bones also are larger than in the Recent walruses, but in the Okhotsk form they taper anteriorly, whereas here [in the Atlantic Quaternaries] they widen. Still another distinctive characteristic of the Okhotsk form and *Tr. virginianus* can be noted – the later fusion of the sutures. Nevertheless, the tusks of *Tr. virginianus* are nearer to the Atlantic walrus in dimensions, whereas they are larger in the

⁶ De Kay, *Zoology of N. York, Part I, Mammalia*, p. 56, pl. 19, fig. 1a,b.—Leidy, *Trans. Amer. Philos. Soc., Philadelphia*, XI, 1860, p. 83, pl. IV, fig. 1, 2, pl. V, fig. 1.

⁷ Leidy, *loc. cit.*, pl. IV, fig. 1.

⁸ We can note that, in the examples of Recent *Tr. rosmarus* illustrated by Hasse (*Bull. Soc. Belge de Geol., Pal., Hydrol., Mem.*, vol. XXIII, fasc. III, 1910, p. 293), the anterior part of the upper jaw protrudes still more considerably ahead of the tusks; the palate is still wider, and the teeth are considerably smaller, particularly I³, which is separated from M¹ by a clear diastema (even though Hasse indicates it as equal to 0).

⁹ *Proc. Ac. N. Sc. Philadelphia*, 1898, p. 196.

Okhotsk form than in the Recent Pacific form (in one very large example of the Kamchatka walrus in the collection of the Zoological Museum, the dimensions of the tusks at the base were equal to 80 x 60 mm). Thus, this latter character can be considered as the result of specialization of the Okhotsk form. It is important to note further that, in *Tr. virginianus* (the reported entire skull), there is not the narrowing of the anterior part of the skull, in comparison with the occipital, which characterizes *Tr. rosmarus*.

As regards the other fossil remains, the nearest of all to the form described here is *Trichechus huxleyi*, known primarily from a single tusk and, by referral to that species, an incomplete skull.¹⁰ Those remains came from Quaternary¹¹ (or Pliocene?) deposits of England and the northern coast of western Europe. The referred remains of the skull, judging from the photograph,¹² have similarity to the Okhotsk form in the shape of the palate and in the profile, but it apparently has a greater number of teeth (the description is not explicit, and the photographic print is not clear). The characteristically curved tusks of this form cannot be used for comparison, because of the absence of tusks in our fossil.¹³

[p. 7] The rest of the Quaternary fossil walruses cannot be compared with the one described here, since they refer to other parts of the skeleton (*Tr. konincki*).

The more ancient fossil walruses of the upper Tertiary, referred to the genus *Alachtherium*,¹⁴ possess a much less specialized dental apparatus.

Summing up, we are obliged to recognize that the Okhotsk form is very close to the fossil *Tr. obesus* from Sakhalin but is distinguished from it by several characters that, at the same time, link it with the Atlantic Quaternary *Tr. virginianus*. Because those features and several others

¹⁰ Rutten, On fossil trichechids from Zeeland and Belgium.- *Proc. Sect. Sciences, Roy. Ac. Sc., Amsterdam*, v. 10, p. 2-14, 1908.

¹¹ Hasse, *loc. cit.*

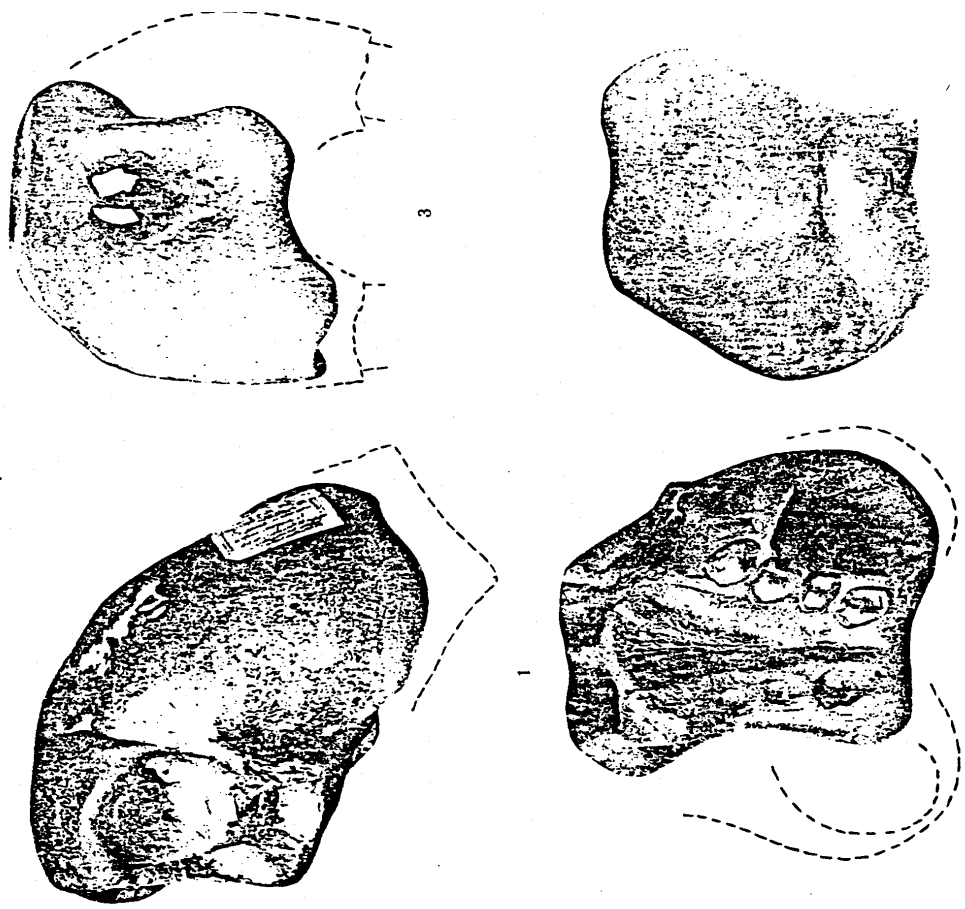
¹² Rutten, *loc. cit.*

¹³ One of the criteria of *Tr. huxleyi*, according to Rutten, is the presence of fluting on the inner side of the (right?) tusk. In the right alveolus of our fossil, there are ridges that could correspond to such fluting. But how much taxonomic value can this feature have?

¹⁴ Hasse (*loc. cit.*) considers that, of the fossils, only *Tr. huxleyi* and *Alachtherium cresti* are established; besides that, he describes *Al. antwerpenense*.

(e.g., the comparative dimensions of the anterior and posterior parts of the skull) distinguish the latter from the Recent Atlantic *Tr. rosmarus*, one is permitted to express the hypothesis that they (those characters) were inherited from some more ancient form of general ancestor of the Quaternary and Recent Atlantic and Pacific walruses.

If the Sakhalin form is considered as late Quaternary, then the Okhotsk possibly may be referred to some more ancient but probably Quaternary time. We still know too little (small part of a broken skull) to create a separate species for it, as has been done for the Atlantic Quaternary walruses. Therefore, for the present, it can be considered as *Trichechus obesus* var. *ochoticus*.



Explanation of plate I.

Tritichechus obtusus var. *ochotkensis* n. var.

- Fig. 1. Fragment of the anterior portion of the skull. Side view. Dotted line showing probable outlines of canine alveole.
 - Fig. 2. Same as before. Seen from the palatal side.
 - Fig. 3. Same as before. Seen from front.
 - Fig. 4. Same as before. Seen from above.
- All the figures are $\frac{1}{4}$ natur. size.