

Type sections for the latest deposits of the Chukchi Peninsula; the section of the Mayn River Valley; materials of the analytical investigation.

#### Analysis of a subfossil herd of walruses

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[p. 80] Analysis of a subfossil herd of walruses. Investigations of the ancient alluvium in the estuary of the Dionisia River disclosed a great number of bones of marine mammals, on the surface and in the thicker component sediments. Predominant among those were skulls and pieces of skulls of walruses, vertebrae of large whales, and occasional parts of [p. 81] skeletons of seals. The greatest quantity of skeletal remains was found in the southern part the alluvium, the more distant now from the current seashore. Here, in the gravel and pebbles at a depth of 0.1 to 0.3 m from the surface, was found the skull of a large male walrus (Fig. 25). The skull lay on its side, partially submerged in the underlying layer of wet peat. At a similar depth from the surface were the vertebrae of whales and broken skulls of walruses. The overall quantity of remains of walruses found in the ancient deposits was 70 specimens. Of those, about 20 were skulls in different stages

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of preservation. All of the bony remains of the walruses, whales, and seals were confined only to the ancient coastline. The finding of bones was localized on a narrow band of ancient coastal bluff, 15-20 m high and extending for several kilometers. Observations showed that the terrace below the ancient coastal bluff probably was utilized by walruses as a haulout area. Naturally, this raised the question of the causes of its extinction. Apparently there were several. One of them was the migration of the coastline to the east of the terrace and the ablation of the latter by the active, recent formation of the coast. Now the distance between the present beach and the ancient bluff amounts to 50 to 800-1000 m, which is a distance practically insurmountable by walruses. This part of the shore is developing by sedimentation from the Dionisia River. Consequently, one of the reasons why the walruses abandoned the described haulout was the change in relief of the coastal zone. Nevertheless, this probably was not the only reason.

[p. 82] It is known that in the end of the Pleistocene to the beginning of the Holocene, walruses inhabited even the middle part of the Okhotsk Sea (Borisiak, 1930). In particular, these animals served as objects of the hunt for the native Koryaks (Vasilevskii, 1971). Apparently, the population of walruses in Penzhin Bay of the Okhotsk Sea was isolated from the Pacific (Bering) population and had a relict character. It should be noted, however, that for a comparatively long ago time in the middle or beginning of the late Pleistocene, the Okhotsk and Pacific populations constituted a single population. Now it is difficult to imagine how walruses got to the coast of the Taigonos Peninsula. That is, did they go through the valley of the Anadyr, Pezhina, and Parapol'skoi or (more rapidly) to the south, going around the Kamchatka Peninsula? Apparently, the range of their distribution extended to the south considerably farther than nowadays, farther than to 60°N. Not long ago they were noted on the coast of Kamchatka (Sliunin, 1900), but now the most southern is the Rudder haulout, which is situated near Kresta Bay, *i.e.*, north of 66°N. Thus,

from middle-late Pleistocene until recent time, the southern boundary of distribution of walruses changed not more than 5-6°.

The subfossil haulout of walruses described here is located far to the south of the area of current haulouts. The bony remains on the ancient terrace at the mouth of the Dionisia River gives evidence of a more southern distribution of these animals in the not too distant past and their retreat northward. Still, 300 years ago, S. I. Deshnev noted the presence of a walrus herd on Russkaia Koshka spit. Taking that fact into account, we can conclude that the change in relief of the coastal zone was not the only cause of the specific shift in the range of the walruses. Apparently, they were not faced with active intervention by man. One of the main causes, probably, was the gradual warming in the eastern sector of the Arctic and North Pacific that took place in the Holocene. This brought a change in temperature, as well as in the ice regime of the Bering Sea. And the walruses, being the most narrowly specialized of the Pinnipedia, responded very acutely to the changes in the environment. Their presence on land in the period of reproduction constantly is restricted by the probability of overheating and death from heat stress, which is not uncommon for pinnipeds in general. Their winter migration closely depends on the zone of drifting ice. Thus, fossil and subfossil haulouts of walruses like that in the vicinity of Dionisia River, speak of lower summer temperatures in this part of the Beringian shore, possibly 3-4,000 years ago.

#### Literature Cited

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Fig. 25. Skull of a walrus from the ancient terrace of Cape Dionisia (view from the side). Drawn by A. K. Agadzhanian.