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New records of Holocene polar bear and walrus (Carnivora) in the Russian Arctic

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ABSTRACT. This article discusses recent finds of Holocene polar bear and walrus from the northern regions of Russia. The ulna of a polar bear was found on Vaygach Island and radiocarbon dated to 1,971±25 BP (OxA-23631). This calibrates to 430–540 AD, taking into account the marine reservoir effect. The size of the bone is similar to that of a recent *Ursus maritimus.* The locality of the fossil bone is within the modern species range, which developed about two millennia ago. In 2014 a walrus tusk was found on the coast of New Siberia Island and is radiocarbon dated to 5,065±35 BP (GrA-62452). This calibrates to 3,510–3,370 BC, taking into account the marine reservoir effect. Its size and morphology are identical to that of an adult male of the subspecies *Odobenus rosmarus laptevi*. This subspecies populates the eastern parts of the Kara Sea, the entire Laptev Sea and the western parts of the East Siberian Sea. This new discovery could mean that populations of *O. rosmarus laptevi* inhabited the waters near the New Siberian Islands during the Middle Holocene, and that the present-day coastline of the Siberian Arctic Islands was already formed at that time.

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Новые голоценовые находки белого медведя и моржа (Carnivora) на севере России

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РЕЗЮМЕ. Статья содержит описание новых голоценовых находок белого медведя и моржа из северных регионов России. Локтевая кость белого медведя обнаружена на о-ве Вайгач и имеет радиоуглеродную дату 1,971±25 лет назад (OxA-23631). Эта дата калибруется в 430–540 лет нашей эры, учитывая морской резервуарный эффект. По размерам и строению она сходна с костью ныне живущего *Ursus maritimus*. Находка сделана в пределах современного видового ареала, который, вероятно, сформировался в начале нашей эры. Клык моржа был найден в 2014 г. на побережье о-ва Новая Сибирь (Новосибирские о-ва) и датирован средним голоценом: 5,065±35 л.н. (GR-62452). С учетом резервуарного эффекта, калиброванный возраст этой находки — 3,510–3,370 лет до нашей эры. По морфологии клык с о-ва Новая Сибирь идентичен клыку современного самца подвида

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Odobenus rosmarus laptevi. Этот подвид распространен в восточной части Карского моря, по всему морю Лаптевых и в западной части Восточно-Сибирского моря. Новая находка доказывает, что популяции *O. rosmarus laptevi* обитали в водах около о-ва Новая Сибирь в течение среднего голоцена и что в это время уже сформировалась современная береговая линия островов Сибирской Арктики.

КЛЮЧЕВЫЕ СЛОВА: *Ursus maritimus*, *Odobenus rosmarus*, голоцен, Арктика, Россия.

Introduction

Pleistocene finds of marine mammals in the Arctic Basin are quite rare considering that during the Ice Age dry land stretched further north, including regions of the contemporary oceanic shelf. Far northern Upper Paleolithic sites as Berelekh and Yanskaya in Yakutia (Russian Federation) do not contain any pinniped and polar bear bones, including those of walruses (Mochanov, 1977; Pitulko & Pavlova, 2010). At the end of the Pleistocene these sites were located far away from the seashore. Holocene bone remains of whales, pinnipeds and polar bears can provide us with crucial information about the polar water areas during prehistory, when marine transgression resulted in the gradual development of the present-day coastline and ranges of northern marine mammal species.

Material and Methods

The right ulna bone (ZIN 36421) of a polar bear from the Vaygach Island was measured using the methodology of von den Driesch (1976). It was compared with ulna bones of the modern polar bear from Svalbard Island (ZIN 30965) and Late Pleistocene one found near the mouth of Mordy-Yakhk River at the western shore of Yamal Peninsula (ZIN 25659). This territory of Yamal was the place of findings of Pleistocene bones of *Odobenus rosmarus* (Linnaeus, 1758), *Mammuthus primigenius* (Blumenbach, 1799), *Coelodonta antiquitatis* (Blumenbach, 1799), *Equus ferus* Boddaert, 1785, *Rangifer tarandus* (Linnaeus, 1758), *Delphinapterus leucas* (Pallas, 1776) and other whales (Vereshchagin, 1969). In the opinion by Vereshchagin, the type of preservation and fossilization of this polar bear ulna is similar to those of mammoth and rhino bones. He also notes that, according to the records of geologists, fossil bones were collected in this region on the slopes and at foots of outcrops formed by boreal transgression deposits, overlaid by sediments of the last glaciation as well as by postglacial lacustrine and peat bog deposits.

In the scientific literature, two or three variables are commonly measured for walrus tusks: the length of each tusk on its outer curve from the farthest point of the alveolus to the tip, the sagittal diameter near the entrance of the alveolus, and the circumference of the tusk at its base (Ognev, 1935; Chapsky, 1963; Heptner *et al*., 1976; Sokolov, 2001). For a more accurate comparison we used additional variables developed for tusks of the woolly mammoth (*Mammuthus primigenius*) (Vereshchagin & Tikhonov, 1987; Tab. 3). Nineteen tusks of adult male *Odobenus rosmarus* were measured in the collection of ZIN .

It has been speculated that the subfossil walrus tusk from the New Siberia Island served as a tool for humans. Therefore it has been inspected for traces of wear by trace evidence analysis (Semenov, 1957).

Radiocarbon analysis of the ulna bone of a polar bear from the Vaygach Island was carried out by the University of Oxford, United Kingdom, and of the walrus tusk from the New Siberia Island by the University of Groningen, the Netherlands. Both laboratories use AMS (Accelerator Mass Spectrometry) for measurements of the ^{14}C concentration. The radiocarbon dates are calculated and reported by convention in BP (Mook & van der Plicht, 1999). They require calibration in order to obtain absolute (calendar) dates. This is done using the calibration curve IntCal13 (Reimer *et al.*, 2013), taking into account the marine reservoir effect. Marine fauna shows an offset of 400 years relative to terrestrial organisms. This also applies to mammals (including polar bear and walrus) feeding on marine food resources (Tauber, 1979).

Institutional abbreviations: ZIN — Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia.

Radiocarbon dating terminology abbreviations: BP — ^{14}C years before present; calBP — calibrated ^{14}C dates (relative to AD 1950); AD — Anno Domini; BC — before Christ; BP — before Present; OxA — laboratory code of the University of Oxford, United Kingdom; GrA — laboratory code of the University of Groningen, the Netherlands; LU — laboratory code of the Leningrad (now St. Petersburg) University.

Results

Polar bear (*Ursus maritimus* Phipps, 1774). In 2010 on the western coastline of Vaygach Island, the Arkhangelsk Region of Russia, V. Sentyabov found a polar bear ulna bone with damaged distal end (ZIN 36421) (Fig. 1). It was found on a sea cliff at a distance of 150 m from the ancient Nenets people shrine, which contained the seven-faced idol. However, this polar bear bone does not seem to be connected to the shrine in any way and looks more ancient. Ceremonial sacrificial altars of the Nenets people are found in abundance from the White Sea coasts in the west to the Yenisei River in the east. There were many altars on the Vaygach Island, and the northern tip of the island was named Bolvansky Nos ("Blockheads Cape") because idols ("bolvans" in Russian, "blockheads" in English) were found regularly. In the past the Nenets people worshiped polar bear

Fig. 1. Ulna bones of the polar bear (*Ursus maritimus*): A — Mordy-Yakhk River, Yamal Peninsula, Late Pleistocene (ZIN 25659); B — Vaigach Island, Holocene (ZIN 36421).

skulls and frequently placed them on their altars (Uspensky & Kholodova, 1977). According to historical sources, the Nenets people colonized northern Cis-Uralian areas and the northern parts of Yamal Peninsula not earlier than the 18th century (Tishkov *et al*., 2008). The polar bear ulna bone appeared to be much older. It is dated by radiocarbon to 1,971±25 BP (OxA-23631). This calibrates to 430–540 AD, taking into account the marine reservoir effect.

Judging by its size and shape, the ulna bone from the Vaygach Island is not much different from modern *U. maritimus* (Tab. 1). Kurtén (1964) noted that the greatest length of polar bear ulnae for male and female specimens (n = 9) varies from 334 to 428 mm, the mean value being 374 mm, which is close to the Vaygach Island bone length. The anterior tubercle on the tuber olecrani has a significant distance from the trochlear notch (*incisura semilunaris*) which is specific for polar bear. It is the main difference between ulna bones of polar bear and brown bear (*U. arctos* Linnaeus, 1758) (Gromova, 1950).

Walrus (*Odobenus rosmarus* (Linnaeus, 1758). In the summer of 2014, a mineralized subfossil walrus tusk was found on the Blagoveshchensky Strait shore on the western coastline of the New Siberia Island (New Siberian Islands Archipelago) (Fig. 2). It was grayish-brown in color with a dented surface and showing a lot of structure, presumably caused by sea waves. The alveolar cone was almost entirely overgrown, indicating that it belonged to an adult or even an old male. Its form is almost straight, which is rare in modern walruses (Figs 2, 3). Adult walruses usually have arched tusks (Fig. 3, C–E). Similar shapes were found only in a few specimens among studied ZIN RAS collections (Fig. 3, B).

The sides of the tusk are flattened, which is typical for modern specimens. In addition, the tip part of the tusk is sharpened like a blade at one side, and there are traces similar to transverse grooves in the proximal part of the tusk. It has been speculated that this was done by ancient man in order to use the tusk as a weapon, attaching it to a wooden handle like an ice pick or a spearhead. But there are no similar weapons known among all known artifacts of ancient Arctic peoples, only one "spearhead (or arrow-head) made from walrus tusk" from the Tatyanino Lake site in the Indigirka River delta is mentioned by A.P. Okladnikov (1955: 123).

Game manager Mr. Semen I. Kavry (Wildlife Protection Centre in Chukotka Autonomous Region, Anadyr city), an expert on the culture of native peoples of Chukotka, testified that Chukotka peoples did not have such weapons. At the end of the 2nd millennium BC to

Table 1. Sizes (in mm) of the polar bear (*Ursus maritimus*) ulna bones.

Measurements (according to von den Driesch, 1976)	Mordy-Yakhk R., Yamal Peninsula, Late Pleistocene (?)	Vaygach Island, Late Holocene	Svalbard Island, modern
	ZIN 25659	ZIN 36421	ZIN 30965
Greatest length (GL)	>344	>369	384.6
Depth across the processus anconaeus (DPA)	>74.5	>73.5	77.2
Greatest width across the coronoid process (WPC)	63.8	62.6	70.3

Fig. 2. Tusk of the walrus (*Odobenus rosmarus*) from the New Siberia Island:
A — front view, B — left side view, C — right side view.

1st millennium AD ancient Chukotka and Kamchatka cultures used fully modified walrus tusks in their handiwork (Dikov, 1974, 1977; Arutyunov & Sergeev, 1975), but a modified tusk cannot be used for comparison. Trace evidence analysis carried out in Yakutsk showed that a walrus tusk from the New Siberia Island was not a human tool because there are no real traces of artificial treatment, and the proximal part is not modified to be attached to a handle. It is likely that the sharpened tip of the tusk and transverse grooves were not made by man, but were caused by sea ice which often occurs on a shore, also partly being destroyed by sea waves.

The walrus tusk from the New Siberia Island was dated by Radiocarbon to the Mid Holocene in Groningen, the Netherlands. The date is 5,065±35 BP (GrA-62452), which calibrates to 3,510-3,370 BC taking into account the marine reservoir effect (Tab. 2).

Fig. 3. Tusks of the walrus (*Odobenus rosmarus*):
A — subfossil, New Siberia Island; B–D — modern (collections of ZIN RAS).

Allen (1880) wrote that tusks of the Pacific Ocean walrus (*O. rosmarus divergens* (Illiger, 1815)) are longer and thicker than the ones of the Atlantic walrus. This was confirmed by Ognev (1935). These facts were used later while describing subspecies differences between walruses (Heptner *et al*., 1976; Aristov & Baryshnikov, 2001; Sokolov, 2001). Measuring the modern tusks from the ZIN RAS collection proved this tendency (Tab. 3). It was also observed that the subspecies *O. rosmarus laptevi* Chapsky, 1940 from the Laptev Sea is a bit larger than Atlantic subspecies *O. rosmarus rosmarus* (Linnaeus, 1758) (Heptner *et al*., 1976; Aristov & Baryshnikov, 2001), but our studies showed that *O. rosmarus laptevi* has shorter and thinner tusks than *O. rosmarus rosmarus* (Tab. 3).

The size of the tusk from the New Siberia Island is similar to that of present-day *O. rosmarus laptevi* adult males tusks. This subspecies now populates eastern parts of the Kara Sea, the entire Laptev Sea and the western parts of East Siberian Sea (Heptner *et al*., 1976; Sokolov, 2001). The new subfossil tusk discovery could mean that the *O. rosmarus laptevi* subspecies originated near the New Siberian Islands during the Middle Holocene. The time and place of its origin can possibly be determined by investigating DNA in the near future.

Table 2. Holocene finds of walrus (*Odobenus rosmarus*) remains in the north of Siberia.

Locality	Radiocarbon dates (BP) of bones, or cultural layers	Material used for dating	Source
East Siberian Sea, Zhokhov Island, Zhokhov site	9,000–7,800	cultural layer	Pitulko & Kasparov, 1996; Pitulko, 1998
East Siberian Sea, New Siberia Island	5,065±35 (GrA-62452)	walrus tusk (§)	This work
The Indigirka River mouth, Ularovskaya and Tatyanino lake sites	The sites of the Ymyakhtakh culture of the Late Neolithic (4,000-3,000 BP)	cultural layer	Okladnikov & Gurvich, 1957
Chukchi Sea, Wrangel Island, settlement Chertov Ovrag	3,265±65 (Ua-18085)	walrus bone (§)	Gerasimov *et al*., 2004
Bering Strait, Chukchi Peninsula, Dezhnevskoe ancient Eskimo settlement	2,630–2,480	cultural layer	Knyazev, 1995
Bering Strait, coast of the Chukchi Peninsula, the ancient Eskimo settlement of Ekven	2,111±67 (IEMEA-1027) (most ancient date selected)	walrus bone (§)	Dinesman *et al*., 1996
Chukchi Sea, the Chukchi Peninsula, the ancient Eskimo settlement of Vankarem	1,250–550	cultural layer	Dikov, 1977; Gorlova & Vasyukov, 2013

(*) numbers correspond to those in Fig. 3.
(§) ^{14}C date must be corrected for marine reservoir effect (see text).

Discussion

Fossil and subfossil finds of polar bear are quite rare, probably because of the semi-aquatic lifestyle of polar bears in coastal areas and ice drifting in the circumpolar basin. The vast areas of its former habitat are now deep under the seawater. Nevertheless some of the finds proved that during the Late Pleistocene the range of *U. maritimus* extended further down south in Europe, to the southern regions of Norway, Sweden, Denmark, North Germany (Hamburg), England and Ireland (Aaris-Sørensen & Petersen, 1984; Berglund *et al.*, 1992; Blystad *et al.*, 1983; Crockford, 2012; Edwards *et al.*, 2011; Erdbrink, 1953; Håkansson, 1976; Kurtén, 1964; Zimmermann, 1845) (Fig. 4, Tab. 4). During the Holocene *U. maritimus* also lived in the Baltic Sea area. A complete glaciation of the Arctic Basin during the Ice Age could explain this expansion to the south (Baryshnikov, 2007).

Other Holocene polar bear finds known from Greenland, the Svalbard Archipelago, Ireland and continental Europa (Kurtén, 1964; Ingólfsson & Wiig, 2008) show that during the Holocene *U. maritimus* inhabited the whole northern region of the Atlantic Ocean. To this day Holocene finds in northern European Russia are either Medieval or Modern age. The oldest Holocene polar bear fossils were found in the locality Tiutei-Sale-1 on the western coast of Yamal Peninsula, dating to the 6^{th} – 7^{th} centuries AD (Fedorova *et al*., 1998; Kosintsev, 2006).

The Vaygach Island find is located within the range of the modern species (Fig. 4), which presumably dates back to about 2,000 years.

Pleistocene walrus fossils have been found in the Eurasia arctic zone on the Yamal Peninsula (Mordy-Yakhk River) together with polar bear and beluga whale (*Delphinapterus leucas* (Pallas, 1776)) bones (Vereshchagin, 1969). Fragment of a walrus mandibular bone, presumably from the Late Pleistocene, was found on Kotelny Island (ZIN 4838, A.A. Bunge collection, 1886). To this day, this record remains the only one in the Russian Arctic.

During the Late Pleistocene, the range of the walrus in North America moved more to the south, spreading to South Carolina along the Atlantic Coast and to San Francisco along the Pacific Coast. The oldest walrus fossils on the North American coastline were found on Vancouver Island (British Columbia), with the date older than 40,000 years (Harington & Beard, 1992) and on Herschel Island (North-Western Canada territory), dated to 45,630±1580 BP (Morlan, 1999).

It is important to point out that walruses lived further south along the European coastline as well. The North Sea floor probably is the richest area in the world for the walrus fossils. Thousands of bone fragments and

Table 3. The sizes of the adult walrus (*Odobenus rosmarus*) males tusks.

Measurements, mm	Subfossil	Recent			
	New Siberia Island, the Laptev Sea	*O. rosmarus rosmarus*, Barents Sea, n=4	*O. rosmarus laptevi*, Laptev Sea		*O. rosmarus divergens*, Kamchatka, the Bering Sea, ZIN, n=10
		lim X±m	lim X±m	n	lim X±m
Full length on its outer curve from the farthest point of alveolus to the tip	603	630–801 712.8±38.23	584–638 612.3±15.66	3	650–880 767.7±20.76
Total length of the tusk along the chord	590	615–762 688.5±33.5	572–630 603.3±16.93	3	646–816 733.4±17.39
Length from the alveolar exit	433	460–620 541.3±37.99	420–508 458.0±20.04	4	450–696 564.5±24.5
Circumference at the base of the alveolar part	182	171–231 196.3±18.93	166–198 182.7±4.01	3	162–223 188.9±7.3
Circumference at the exit from the alveolus	184	185–236 207.5±15.75	182-207 198.8±6.17	5	188–255 208.0±6.28
Anterior-posterior diameter at the base of the alveolar part	64.6	60–72 68.5±14.08	59.5–73.3 66.1±6.56	4	58–81 68.57±2.48
The transverse diameter at the base of the alveolar part	47.2	41.2–53 47.3±13.0	39.4–47.4 44.5±6.24	4	36–55.5 43.91±2.1
Anterior-posterior diameter at the exit from the alveolus	67.7	75–88 77.7±12.21	66.5–77.4 70.9±6.0	4	69–91.7 75.59±2.21
Transverse diameter at the exit from the alveolus	45.7	48.6–55 51.6±11.6	46.6–50.6 49.1±5.72	4	42.4–58.5 49.84±1.78
The minimal depth of the tusk alveolus	25	34–48 40.8±11.1	29–35 32.0±6.36	3	23–42 33.4±1.77
The maximal depth of the tusk alveolus	38	38–56 47.5±10.68	36–58 46.0±6.15	3	32–112 52.7±6.93
Length of the alveolar part of the tusk	170	158–186 173.8±10.32	180–195 185.7±5.96	3	185–225 196.0±3.99

hundreds of skulls have been found in the North Sea, sometimes even completely intact, dating between 50,000 and 23,500 years (Aaris-Sorensen *et al*., 1990; Post, 1999). This indicates a long period of walrus presence in the North Sea, probably intermittently (Mol *et al*., 2003). It is likely that global climatic changes during the Late Pleistocene made the species move further south, closer to Atlantic Ocean and Pacific Ocean (Mol *et al*., 2003).

Following the glaciation, walrus appeared in the area of the Arctic Archipelago (Harington, 2008). Radiocarbon dates prove a nearly continuous walrus inhabitation of the East Canada Atlantic Coast from 12,800 years ago to the modern age (Harington, 2003).

After flooding of the shelf zone, solid ice cover destruction and disappearance of the land bridge between Asia and North America in the Holocene, walrus quickly inhabited the coastal waters of Yakutia (Boeskorov & Baryshnikov, 2013). In the early Holocene (about 9,000–8,000 years ago) the walrus was present near the Zhokhov Island with its bone remains found there in a Mesolithic site (Pitulko & Kasparov, 1996) (Fig. 5). The finds on Zhokhov include many reindeer (*Rangifer tarandus* (Linnaeus, 1758)) and polar bear bone remains, as they presumably were prey for inhabitants of the site, which was a hunting camp. A small number of seal (Phocidae gen. et sp. indet.) fossils was also found at this site. It seems that humans were hunting marine mammals like walrus and seal or simply taking the ones who were driven ashore (Pitulko, 1998; Pitulko & Kasparov, 1996). The two Late Neolithic sites (4,000–3,000 years old) Ularovskaya and Tatyanino, located in

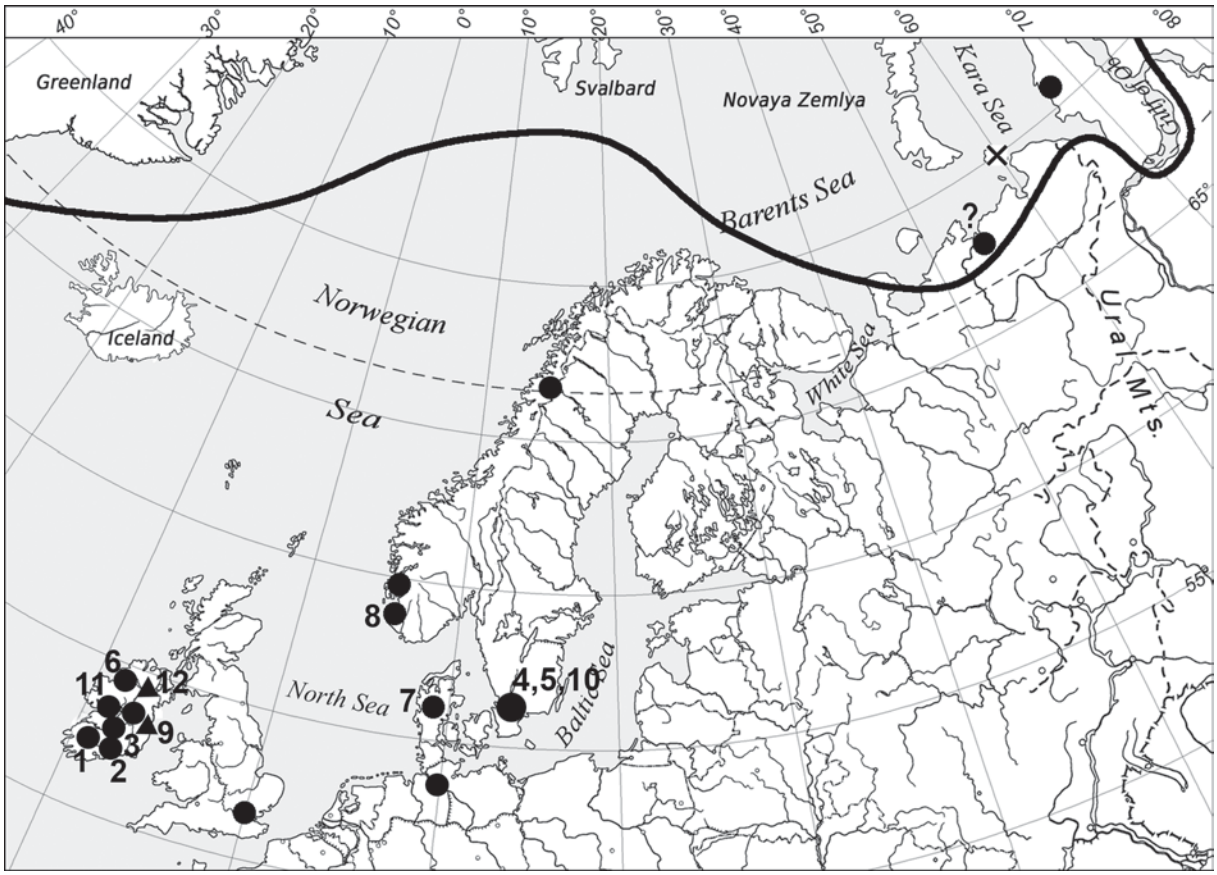

Fig. 4. Late Pleistocene (black circles) and Holocene (black triangles) fossil finds of a polar bear (*Ursus maritimus*) in Europe (except Svalbard). Numbering of radiocarbon dated finds is according to Tab. 4. The cross indicates a find on Vaigach Island; the continuous line is the southern boundary of the modern distribution of polar bears.

Table 4. Late Pleistocene and Holocene finds of polar bear (*Ursus maritimus*) remains in Europe.

No. (*)	Locality	Radiocarbon date (BP)	Source
	Late Pleistocene		
1	Castlepook Cave, Cork, Ireland	32,648-37,870	Edwards *et al*., 2011
2	Shandon Cave, Waterford, Ireland	28,390-32430	Edwards *et al*., 2011
3	Foley Cave, Cork, Ireland	26,340±320	Edwards *et al*., 2011
4	Kullaberg, Scania, Sweden	12,320±125; 12,480±185	Berglund *et al*., 1992
5	Östra Karup, Scania, Sweden	12,230±130	Berglund *et al*., 1992
6	Kesh Corran, Sligo, Ireland	11,920±85	Edwards *et al*., 2011
7	Asdal, Jutland, Denmark	11,100±160, 11,240±180	Aaris-Sørensen, Petersen, 1984; Kurtén, 1988
8	Finnøy, Norway	10,925±110	Blystad *et al*., 1983
9	Red Cellar Cave, Limerick, Ireland	10,650±100	Edwards *et al*., 2011
10	Kürod, Bohuslän, Sweden	10,430-10,620	Håkansson, 1976; Kurtén, 1988
11	Edenvale Cave, Clare, Ireland	10,495±51	Edwards *et al*., 2011
	Holocene		
11	Edenvale Cave, Clare, Ireland	9,946±53	Edwards *et al*., 2011
9	Red Cellar Cave, Limerick, Ireland	8719±48	Edwards *et al*., 2011
	Svenskøya, Svalbard, Norway	7,760±50	Ingolfsson & Wiig, 2008
12	Poll nam Béar Cave, Leitrim, Ireland	2,956–4,520	Edwards *et al*., 2011
	Vaygach Island, Russia	1,971±25	this work (OxA-23631)

The Pleistocene/Holocene boundary is taken as 11,650 calBP which (in ^{14}C years) corresponds to ca. 10,200 BP (Reimer et al., 2013).
(*) numbers correspond to those in Fig. 4.

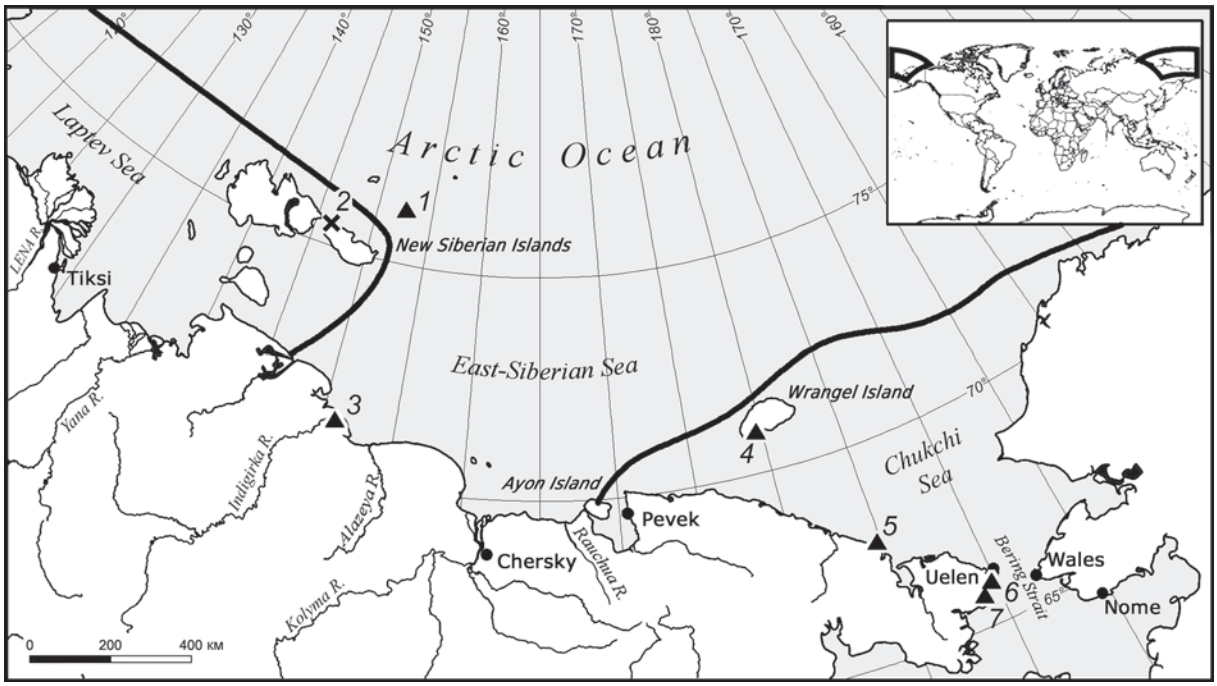

Fig. 5. Holocene (black triangles) walrus find (*Odobenus rosmarus*) in the Arctic zone of Siberia. The cross indicates a find on the New Siberia Island; the continuous line is the northern boundary of the modern spread of the walrus. Numbering of finds is according to Tab. 3.

the Indigirka River delta about 25 km apart, yielded valuable finds of different walrus bones (Okladnikov & Gurvich, 1957). The "Spearhead (or arrow-head) made from walrus tusk" mentioned above was found at the Tatyanino Lake settlement. Based on these finds A.P. Okladnikov presumed that inhabitants of Tatyanino Lake were "hunters on marine animals" (Okladnikov, 1955: 123). Fedoseeva (1980) believed that Ularovskaya and Tatyanino sites belonged to the Ymyyakhtakh culture, which was widely spread throughout the Yakutia territory during the Late Neolithic. Fedoseeva (1980: 209) did not rule out the possibility that Ymyyakhtakh people preyed on "...some kinds of pinnipeds that traveled several dozen kilometers from the sea up the rivers". Finds from the Indigirka River are known to be outside of the modern walrus species range (Fig. 5).

A walrus bone from the Chertov Ovrag (Devil's Gorge) settlement on the south end of Wrangel Island is nearly the same age (Gerassimov *et al*., 2004) (Tab. 4, Fig. 5). Later finds are from ancient Eskimo settlements on Chukotka Peninsula. Radiocarbon dates suggest that inhabitants of these settlements were hunting walruses since 2,700 years ago (Knyazev, 1995).

Archaeological excavations of the Medieval Eskimo settlement on Chetyrekhstolbovoy Island by Y.A. Mochanov provided some pinniped fossils, but not a single walrus bone was found there (Boeskorov & Baryshnikov, 2013). It is likely that in medieval times walruses were not living permanently in the central areas of the East Siberian Sea.

Mitochondrial DNA analysis showed that Laptev Sea subspecies *O. rosmarus laptevi* and Pacific Ocean walrus subspecies *O. r. divergens* (Illiger, 1815) are similar in many ways, which led us to believe that walrus expansion in the Yakutia Arctic waters took place from the east, to be more specific, from the Pacific Ocean regions (Lindqvist *et al*., 2009).

It is known that in the early Holocene the sea level of the Laptev Sea and East Siberian Sea were 20-25 meters lower than today. Consequently, the larger part of the New Siberian Islands, including Vilkitsky Island, Zhokhov Island, and New Siberia Island, were connected to the Siberian mainland (Andreev *et al*., 2008; Pitulko, 1998; Pitulko & Kasparov, 1996). A Radiocarbon date 3,940±40 (LU-2518) of driftwood found at higher parts of the laida (low-lying seashore with flooded meadows) (2.5–3 meters high) on Zhokhov Island shows that the ocean level reached its peak about 4,000–4,500 years ago. It was assumed that by this time, or perhaps a bit earlier (5,000–6,000 years ago), the New Siberian Islands Archipelago was separated from the mainland (Makeev *et al*., 1992). The ca. 5,000 years old walrus tusk find from the New Siberia Island can be considered a proof of the theory that the coastline of New Siberian Islands as we know it today was formed during the Middle Holocene.

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