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## ОБНАРУЖЕНИЕ ЯИЦ АСКАРИД У МАМОНТА

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### Аннотация

Изучение паразитов мамонта (*Mammuthus primigenius* Blumenbach, 1799) в настоящее время проводятся по морфологическим характеристикам остатков паразитов ввиду отсутствия установленных генетических маркеров для выполнения генетических тестов. Проведено паразитологическое исследование содержимого кишечника двух мамонтов – Монгоченского (Гыданский полуостров) и Тадибе (полуостров Ямал). Работу проводили по общепринятой в палеопаразитологии методике с применением регидратации остатков и последующим использованием комбинированного и седиментационного метода. При паразитологическом исследовании содержимого кишечника Монгоченского мамонта паразитов обнаружено не было, тогда как, анализ материала от мамонта из Тадибе позволил выявить два яйца нематод. Количество обнаруженных яиц было невелико 1,5 яйца на 1 г фекалий. Крупные размеры, округлая форма, наличие толстой слоистой оболочки позволили идентифицировать данные объекты как яйца представителей семейства Ascarididae Baird, 1853. Более всего по строению они напоминают яйца современных параскарид лошадей. Диаметр яиц составил  $78,68 \pm 1,19$  и  $87,94 \pm 0,47$  мкм, толщина стенки –  $4,14 \pm 0,29$  и  $4,48 \pm 0,34$  мкм, что сопоставимо с аналогичными показателями современных представителей. Это первое сообщение об обнаружении данных нематод у мамонтов.

**Ключевые слова:** мамонт, *Mammuthus primigenius*, яйца, нематоды, аскариды

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## FINDING OF ASCARID EGGS IN MAMMOTH

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### Abstract

Mammoth parasites (*Mammuthus primigenius* Blumenbach, 1799) are currently being studied according to the morphological characteristics of parasite residues due to the lack of established genetic markers for performing genetic tests. A parasitological study of the intestinal contents of two mammoths was carried out – Mongochensky (Gydan Peninsula) and Tadibe (Yamal Peninsula). We conducted a parasitological study of the remains of the intestines of two mammoths - Mongochensky and Tadibe, provided by employees of the Institute of Plant and Animal Ecology of the Ural Branch of the Russian Academy of Sciences. The work was carried out according to the generally accepted in paleoparasitology method with the use of residue rehydration and the subsequent use of the combined and sedimentation method. In a parasitological study of the intestinal contents of the Mongochensky mammoth, no parasites were found, while analysis of the material from the mammoth from Tadibe revealed two nematode eggs. The number of eggs found was small 1.5 eggs per 1 g of feces. Large sizes, rounded shape, the presence of a thick layered shell made it possible to identify these objects as eggs of representatives of the family Ascarididae Baird, 1853. The structure of the eggs was similar to ones from modern horse parascarids. The diameter of the eggs was  $78.68 \pm 1.19$  and  $87.94 \pm 0.47$  mkm, the wall thickness was  $4.14 \pm 0.29$  and  $4.48 \pm 0.34$  microns, which is comparable to similar indicators of modern representatives. This is the first report of the detection of Ascarididae nematode in mammoths.

**Keywords:** mammoth, *Mammuthus primigenius*, eggs, nematodes, ascarids

**Introduction.** The study of fossil remains of mammoths (*Mammuthus primigenius* Blumenbach, 1799) is of great scientific interest, since it allows not only to study the structure of these animals, but also to obtain information

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about their diet, time and cause of death, migrations, as well as the state of the environment during their life. Invasion by various species of parasites can currently be detected only using morphological methods (structure of eggs, larvae, adults), while molecular diagnostics are unsuitable for these purposes due to the lack of established genetic markers. However, until now, findings of parasites in the study of mammoth residues remain rare and random, which determines the relevance of targeted parasitological research in this area.

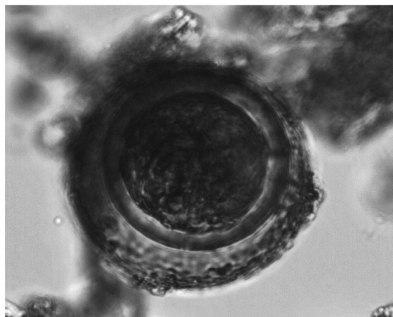
**Materials and methods.** The material was the contents of the large intestines of two mammoths – Mongochensky, found on the Gydan Peninsula [3] and Tadibe, found on the Yamal Peninsula. The geological age of mammoths is the late Pleistocene. The biological age of the Mongochensky mammoth is 30–35 years, the mammoth Tadibe is about 15 years. The samples were stored at a temperature of  $-18^{\circ}\text{C}$  at the Institute of Plant and Animal Ecology of the Ural Branch of the Russian Academy of Sciences. The study was carried out in the parasitology laboratory of the Faculty of Veterinary Medicine of Perm State Agro-Technological University. Each sample was weighed on a BW-500 scale, Model ML-A01, max. 100 g,  $d = 0.01$  (China), ground in a mortar, rehydrated with 0.5% sodium phosphate solution for a week at  $+4^{\circ}\text{C}$ , followed by the combined method of G. A. Kotelnikov – V. M. Khrenov and the method of sequential washing. The preparations were viewed on a Meiji microscope (Japan) with magnification of X100 and X400 and photographed using a Vision camera (Canada). Egg morphometry was performed using a PhotoM 1.21 computer program (Russia), measuring egg diameter and wall thickness.

**Results.** In a parasitological study of the intestinal contents of the Mongochensky mammoth, no parasites were found, while analysis of the material from the mammoth from Tadibe revealed two nematode eggs. The number of eggs found was small 1.5 eggs per 1 g of feces.

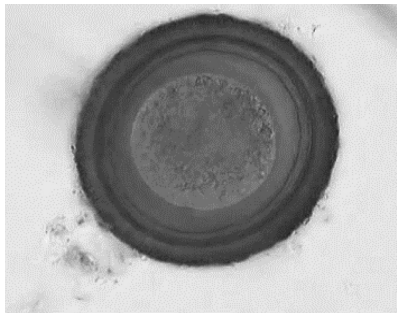
The large size, rounded shape, the presence of a thick layered shell made it possible to identify these objects as eggs of representatives of the family Ascarididae Baird, 1853 (Fig. 1). Most of all, in terms of structure, they resemble eggs of parascarids of horses (Fig. 2).

The morphometry of the dimensional parameters of the identified eggs is presented in Table. For comparison, information on the size of eggs of modern ascarids is given.

Now there is little information about parasites in mammoths. As a result of studying the finds of mammoth mummies (Berezovsky, Shandrinsky, Kirgilyakhsky, Sopkarginsky), the presence of ectoparasites of the order



**Figure 1.** Ascarid-type egg in intestinal contents of mammoth from Tadibe.  
X400



**Figure 2.** The egg of modern *Parascaris equorum* from a horse.  
X400

Table

**Comparison of morphometric indices of ascaridate eggs from mammoth and modern species**

Measurement	Species				
	mammoth from Tadibe		<i>Parascaris equorum</i>	<i>Toxascaris leonina</i>	<i>Baylisascaris transfuga</i>
Diameter, $\mu\text{m}$ (n=5)	78.68 $\pm$ 1.19	87.94 $\pm$ 0.47	80-100X80-90	75-85	73-79X53-65
Wall thickness, $\mu\text{m}$ (n=5)	4.14 $\pm$ 0.29	4.48 $\pm$ 0.34	5-6	7.5	6-7

Diptera: *Cobboldia (Mamontia) rusanovi* Grunin, 1973 and *Protophormia terraenovae* Robineau-Desvoidy, 1830. Also, helminths of the Nematoda and Cestoda classes were found in mammoth mummies, while the systematic belonging of the detected helminths by morphological signs could not be established [1, 2].

**Conclusions.** When examining the intestines of two mammoths, eggs of ascaridate were found in mammoth Tadibe. The degree of infection of an individual indicates a low level of infection of mammoths in the north of Western Siberia with helminths. This is the first report of the detection of Ascarididae nematode in mammoths.

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