

ГЕОГРАФИЯ – GEOGRAPHY

UDC 599.61 (574 1)

IRSTI 38.31.23

DOI 10.37238/1680-0761.2023.90(2).42

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ABOUT THE DISCOVERY OF TEETH OF AN EXTINCT SPECIES OF THE ELEPHANT FAMILY ARCHIDISKODON MERIDIONALIS GROMOVI IN WESTERN KAZAKHSTAN

Annotation. *Molars of an extinct species of mammals of the elephant family (Elephantidae) were found in Pleistocene deposits near Uralsk (West Kazakhstan region, Republic of Kazakhstan). In the proposed work, generally accepted paleontological methods of field and desk research were used: methods of working with paleontological material to extract material from waste rock; morphological and morphometric analysis of fossils in species diagnostics. A series of teeth of M3/m3 shifts were described, where the subspecies of Archidiskodon meridionalis chronologically replace each other from Paleopleistocene (Middle Villafrank) localities of Western Kazakhstan. The description of the teeth indicators (frequency of plates, length of one plate, number of plates, enamel thickness, hypsodont index, crown proportion index) showed that the described indicators approach the indicators inherent in Archidiskodon [Elaphas] meridionalis gromovi.*

For the examined teeth, the indicator of the length of one plate turned out to be very recognizable. The limits of variability in the size of the crown of teeth in different subspecies largely coincide.

Keywords: *elephant; extinct; mammoth; quaternary deposits; Neopleistocene; tooth; Archidiskodon meridionalis; mammals; Khvalyn transgression; Western Kazakhstan; floodplain of the Zhaiyk river (Ural)*

Introduction

The first reports on the remains of fossil elephants from the limits of the modern territory of the republic belong to the period of expeditions of the Russian Academy of Sciences in the second half of the XVIII century. Scientist P.S. Pallas reports on the findings of bones of extinct elephants: "... ivory both above Karasun and above the Ishim River is sometimes found on the banks, washed out by spring water." Also, "a huge molar elephant tooth was brought to Borovoye Selo."

In 1901, Professor of Kazan University A.A. Shtukenberg in the article "Remains of post-Pliocene animals of the Museum of the Orenburg Scientific Archival Commission" pointed to the discovery of bones of *Elephas* sp. and further reported well-preserved molars, several tusks, vertebrae and fragments of the skull of *Elephas primigenius* (Blum). The remains of elephants were found in various places in the Orenburg region, Ural and Turgai regions of Kazakhstan. The collections are currently almost entirely located in the Central State Museum of Kazakhstan in Almaty.



L.S. Berg in the monograph "The Aral Sea" (1908) reports on the weathered remains of teeth: by definition, I.P. Tolmachev belong to the mammoth *Elephas primigenius* (Blum).

A.N. Ryabinin (1933), reporting on the finds of bones from Quaternary deposits of Western Siberia, indicated that in 1928 on the right bank of the Ishim River in The remains of *Elephas primigenius*, *Equus caballus fossilis* were found in the blue clays of the Kyzyl-Aigyr river near the village of Selim-Dzhevar, Akmola region.

N.G. Kassin (1947) mentions the findings of *Elephas primigenius*, *Bos sp.* and other fossil mammals of the Riess and Riess-Wurm epochs in the deposition of the third terrace of Quaternary formations near Almaty, consisting of pebbles, sands, loams and the upper part of loess loams. In the west of Kazakhstan, bones of *Elephas antiquus*, *Equus caballus* are found in the deposits of the Khvalyn transgression [1].

In Central and Northern Kazakhstan (south of the West Siberian Plain), the remains of fossil elephants are quite numerous. B.S. Kozhamkulova [3] notes 30 locations of the Early Pleistocene.

Remains of *Elasmotherium sibiricum*, *Mammuthus ex gr. trogontherii-chosaricus*, *Bison sp* were found in alluvial deposits of Tobolsk age near Kozhamzhar settlement of Pavlodar region of the Republic of Kazakhstan. Separately, *Mammuthus primigenius* teeth were found in Late Pleistocene sediments. The skull of the Siberian elasmotherium is larger than the skulls from Eastern Europe. The lower jaw of an elephant is very close to those of *Mammuthus trogontherii chosaricus* in size and morphology of the teeth of the last shift [4].

Based on the study of the variability of the characteristics of teeth M3/m3, as well as the skulls of southern elephants *Archidiskodon meridionalis s.l.* for the Early Pleistocene of southern Eastern Europe, three taxa were identified: *A. m. gromovi* Garutt et Alexejeva, 1964 (Khaprov faunal complex, middle Villafrank); *A. m. meridionalis* (Nesti, 1825) (psekupsky faunistic complex, late Villafrank); *A. M. tamanensis* Dubrovo, 1964 (Taman faunistic complex, the end of the late Villafrank – the beginning of Galeria) [5, 6]. According to the work of Baigusheva V.S. At the moment, the teeth of elephants DP2/dp2–M1/m1 are practically not used for taxonomic definitions. Due to the available transgression of digital indicators, as well as due to insufficient knowledge, the diagnosis of teeth in elephants of these shifts is difficult. Nevertheless, information about the structure and variability of such teeth belonging to various species of elephants of the mammoth line of Eurasia is of scientific interest [7].

The good preservation of the teeth of fossil elephants and their sufficient study make it possible to establish the systematic position of fossil elephants. There is a large number of works devoted to elephants of the mammoth line of Eurasia, including the analysis of the dental system and morphometric features of teeth [8-15].

Materials and methods of research

During exploration work in quarries of sand-gravel mixture at the village of Zhelaevo near Uralsk and on the floodplain of the river Zhaiyk (Ural) at the village of Yaik in 2019-2020, osteological materials in the form of molars were found (Fig. 1, 2). The area is represented by river, grain-swamp formations. According to the lithological composition, these are alluvial and Aeolian pebbles, sandy loams and loams.

The sections have the following geographical coordinates: at the village of Zhelaevo – N 51°15'21" E 51°29'37", at the village of Yaik – N 51°14'68" E 51°29'61", respectively.

For morphological descriptions and absolute measurements of teeth, the technique described in the works of V.E. Garutta (1976), K.Zh. Zhylkibaev (1975) was used [1, 2]. Morphometric indicators were performed with a caliper with an accuracy of 0.1 mm.

Important signs of elephant teeth are the length, width, height of the crown, the number of plates, the thickness of the enamel, the erasure figures, the degree of erasure.



Figure 1 - Tooth of the southern elephant m3 Archidiskodon [Elephas] meridionalis from locations on the left bank of the river Zhaiyk (Ural) near the village of Zhelaevo (scale 1:2).



Figure 2 - Tooth of the southern elephant m3 Archidiskodon [Elephas] meridionalis from the localities of the floodplain of the Zhaiyk River (Ural) near the Yaik settlement of Western Kazakhstan (scale 1:3).

Also analyzed were 2 teeth stored in the MPiE, the Museum of Nature and Ecology, a branch of the West Kazakhstan Museum of Local History (Uralsk, Kazakhstan).

Research results

Measurements of the molars of m3 Archidiskodon [Elaphas] meridionalis gromovi from locations on the left bank of the Zhaiyk River (Ural) near the village of Zhelaevo and the floodplain of the Zhaiyk River (Ural)

Table 1 - Measurements of molars m3 Archidiskodon [Elephas] meridionalis gromovi

Measurements	MPi E No. 87	MPi E No. 131B	the left bank of the Ural River near the village of Zhilaevo	floodplain of the Ural River, near the village of Yaik
Crown length, mm	198	140	210	143
Maximum crown width, mm	97	74	92	74
Maximum crown height, mm	160	57	148	162
Total number of plates, pcs	10	8	10	8
Average length of one	8,1	7	8,1	7

plate, mm				
Frequency of plates per 10 cm, pcs	5	8	6	9
Enamel thickness, mm	4	3	3	4
Degree of erasure	3	2	1	2
Hypsodon index, (H/W), %	160/97	57/74	148/92	162/74
Crown Proportion Index (W/L), %	97/197	74/140	92/210	74/143

The surface of the teeth is colored dark brown. The individual age of the tooth is determined by the degree of abrasion (wear) of its crown. To express this feature, according to the method of V.I. Gromov (1937), the degree of erasure of the crown of the tooth under study is 1, i.e. the crown is slightly affected by erasure.

The crowns are curved in the horizontal plane, the crowns of the teeth are concave from the outside and convex from the inside. The teeth of the lower jaw have a slightly concave chewing surface. According to the shape of the crown, the tooth belongs to the left side of the jaw. The plates are wide with puffs in the middle part.

In the process of chewing food, the plates are gradually erased: their cross-sections forming various shapes are visible on the chewing surface. According to the type of plate erasure, the tooth under study belongs to the first type of erasure - meridionaloid (-.-). The enamel is moderately thick with wavy folds of 3-4 mm. The values for the number of plates, the length of one plate, the frequency of plates, the thickness of the enamel are well comparable with the parameters of teeth in specimens stored in the museum.

The second tooth was found on the left bank of the river Zhaiyk (Ural) near the village of Zhelaevo.

Less than half of the total number of plates has been erased, i.e. the coefficient of erasure of the tooth under study is 2. The crowns have a curvature in the horizontal plane, the crowns of the teeth are concave from the outside and convex from the inside. The teeth of the lower jaw have a slightly concave chewing surface. According to the shape of the crown, the tooth belongs to the left side of the jaw.



Figure 3 - Molar (ex. MPi E No.87) (scale 1:3).
No.131 In) (scale 1:3).



Figure 4 - Molar (ex. MPi E

Table 1 also shows measurements of molars, which are stored in the Museum of Nature and Ecology under the numbers E No. 87 and MPi E No. 131B (Fig. 3, 4). According to many indicators (frequency of plates, length of one plate, number of plates, enamel thickness, hypsodont index, crown proportion index), these samples of molars are comparable to *Archidiskodon [Elaphas] meridionalis gromovi*.

Conclusion



The studied dental indicators are well comparable with the dental indicators described in the work of A.V. Shpansky et al. [4].

Comparison of teeth found in Western Kazakhstan with elephant teeth from other localities showed that the indicative characteristics – the length of crowns, the frequency of plates by 10 cm and the thickness of the enamel – are close to those characteristic of *Archidiskodon [Elaphas] meridionalis gromovi* (middle villafrank).

The authors express their gratitude to the staff of the Museum of Nature and Ecology, a branch of the West Kazakhstan Museum of Local Lore for providing collectible materials for study and to the researcher of the Research laboratory of Humanities and Natural Sciences of the M. Utemisov ZKU E.E. Klyshev for providing a find of one tooth of a southern elephant.

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О НАХОДКЕ ЗУБОВ ВЫМЕРШЕГО ВИДА СЕМЕЙСТВА СЛОНОВЫХ ARCHIDISKODON MERIDIONALIS GROMOVI В ЗАПАДНОМ КАЗАХСТАНЕ

Аннотация. В отложениях плейстоцена близ г. Уральск (Западно-Казахстанская область, Республика Казахстан) были найдены коренные зубы вымершего вида млекопитающих семейства слоновых (*Elephantidae*). В предложенной работе были использованы общепринятые палеонтологические методы полевых и камеральных исследований: методика работы с палеонтологическим материалом для извлечения материала от пустой породы; морфологический и морфометрический анализ фоссилий при видовой диагностике. Были описаны серии зубов смен М3/м3, где подвиды *Archidiskodon meridionalis*, хронологически сменяют друг друга из палеоплейстоценовых (средний виллафранк) местонахождений Западного Казахстана. Описание показателей зубов (частота пластин, длина одной пластины, количество пластин, толщина эмали, индекс гипсодонтности, индекс пропорции коронки) показал, что описываемые показатели приближаются к показателям, присущие для *Archidiskodon [Elaphas] meridionalis gromovi*.

Для исследованных зубов весьма распознаваемым оказался показатель длины одной пластины. Пределы изменчивости размеров коронки зубов у разных подвидов в значительной степени совпадают.

Ключевые слова: слоновые; вымершие; мамонт; четвертичные отложения; неоплейстоцен; зуб; *Archidiskodon meridionalis*; млекопитающие; хвалынская трансгрессия; Западный Казахстан; пойма р. Жайык (Урал)

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БАТЫС ҚАЗАҚСТАНДА ОҢТҮСТІК ПІЛІНІҢ ARCHIDISKODON MERIDIONALIS GROMOVI ТІСТЕРІН ТАБУ ТУРАЛЫ

Аңдатпа. Орал қ. (Батыс Қазақстан облысы, Қазақстан Республикасы) маңындағы плейстоцен шөгінділерінен пілдер тұқымдасының (*Elephantidae*) жойылып кеткен сүтқоректілер түрінің азу тістері табылды. Ұсынылған жұмыста далалық және камералдық зерттеулердің жалпы қабылданған палеонтологиялық әдістері қолданылды: палеонтологиялық материалмен жұмыс істеу әдістемесі, бос жыныстардан материал алу; морфологиялық және түрлерді диагностикалау кезінде фоссилияны морфометриялық талдау. *Archidiskodon meridionalis* кіші түрлері бір-бірін Батыс Қазақстанның палеоплейстоценодік (орта виллафранк) жерлерінен хронологиялық түрде алмастыратын М3/м3 ауысым тістерінің сериясы сипатталған. Тіс көрсеткіштерінің сипаттамасы (пластиналардың жиілігі, бір пластинаның ұзындығы, пластиналардың саны, эмальдың қалыңдығы, гипсодонтия индексі, тәж пропорциясының индексі) сипатталған көрсеткіштер *Archidiskodon [Elaphas] meridionalis gromovi*-ге тән көрсеткіштерге жақындағанын көрсетті.

Зерттелген тістер үшін бір пластинаның ұзындығының көрсеткіші өте танымал болды. Әр түрлі кіші түрлердегі тіс тәжінің мөлшерінің өзгергіштік шектері негізінен сәйкес келеді.

Кілт сөздер: пілдер тұқымдасы; жойылып кеткендер; мамонт; төрттік шөгінділер; неоплейстоцен; тіс; *Archidiskodon meridionalis*; сүтқоректілер; Хвалын трансгрессиясы; Батыс Қазақстан; Жайық өзенінің жайылмасы (Орал).