

DISCOVERY OF THE HERD OF LATE PLEISTOCENE MAMMOTHS IN BELARUS

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In 2008 the burial place of the rests of mammoths (*Mammuthus primigenius* (Blumenbach)) was revealed on the territory of Minsk. The new site is unique for yielding remains of 19 individuals of mammoths. Morphological structure of teeth shows that buried animals were of at different individual age. Ten percents of the rests belong to calves in the age of 2–5 years, 16 % of all individuals in the age of 6–9 years, 32 % of animals were in the age of 10–20 years, and 16 % from all animals were in the age of 20–35 years. Old animals, ranging in age from 35 to 50 years, account for up 26 % from the general number of all individuals.

The samples of ribs of mammoths were ^{14}C dated as $20167 \pm 72 \pm 330$ yr BP (IGS-1370) which corresponds to the calendar age of 23400–21200 yr. According to the absolute date, these mammoths lived on the territory of present day Minsk during the advancing of the Poozerskiy glacier. The fossil material includes 10 tusks, and 31 premolars and molars. All material is stored in the Zoological Museum of the Biological faculty of the Belorussian State University. All measurements of morphological parameters are executed by the standard technique and shown in tables 1 and 2.

Table 1

Measurements of teeth of mammoths from the “Mashinostroiteley” site in Minsk

Measurements (mm), indexes (%)	Change of a teeth				
	P_3^*/P_3^{**}	P_4/P_4	M_1/M_1	M_2/M_2	M_3/M_3
Length of crown	<u>45</u> 42	<u>105–117</u> -	<u>145–150</u> 140	- 170–200	<u>220–260</u> 205
Width of crown	<u>31</u> 28	<u>57–62</u> -	<u>68–76</u> 62	<u>81–82</u> 71–77	<u>81–102</u> 74–77
Height of crown	- 22	<u>41–92</u> -	<u>120–132</u> 94–111	<u>115–120</u> 116–130	<u>132–160</u> -
Number of plates	<u>6?</u> 7	<u>11–13</u> -	<u>17</u> 14–15	<u>17–18</u> 16–19	<u>20–22</u> 19–20
Frequency of plates within 10 cm	- -	<u>5–6</u> *** -	<u>10–12</u> 9–10	<u>11–12</u> 9–10	<u>10–12</u> 8–10
Thickness of enamel	<u>1.0</u> 1.3	<u>1.2–1.5</u> -	<u>1.2–1.6</u> 1.4–1.7	<u>1.6–1.7</u> 1.5–1.7	<u>1.6–2.2</u> 1.8–2.0
Index of hypsodont (3:1)	- 52	<u>39–77</u> -	<u>83–88</u> 67–74	- 65–68	<u>60–61</u> -
Index of width (2:1)	<u>69</u> 67	<u>53–54</u> -	<u>47–51</u> 44	- 38–42	<u>37–39</u> 36–37
Index of width to height (2:3)	- 127	<u>67–139</u> -	<u>57–58</u> 56–66	<u>68–70</u> 59–61	<u>61–64</u> -

These measurements enable to establish changes of parameters of teeth in ontogenesis of mammoths. On the territory of Belarus it has been done for the first time, since no burial places of the rests of *Mammuthus primigenius* had been found before. The size of each subsequent change of teeth increases with the age of animals. The increase occurs not only in absolute sizes, but also in other separate parameters of teeth. E.g. with the age the chewing surface of a teeth becomes more narrow. The width of a tooth of baby-mammoths reaches 70 % from its length; young animals have this parameter decreased to 50 %, and old individuals, up to 40 %. The height of a tooth relatively to its length grows before the first molar starts functioning from 60 % at cubs up to 90 % at young mammoths and again decreases at old individuals to 60 %. Thus, the hypsodont parameter of teeth in ontogenesis varies. Approximately until the age of 15 years mammoths may have compensated teeth obliterating off due to increase of the hypsodont parameter. After that term duration of functioning of the second and third molars occurred due to increase in quantity of plates at a chewing surface and due to increase in length of corona dents. The number of plates on a chewing surface of teeth progressively grew with 6–7 at young animals up to 20–22 plates at adult animals. Thus frequency of

plates within 10 cm of length almost did not vary during the functioning of molars. It remained within the limits of 10–12 plates on the top teeth, and within the limits of 8–10 – on bottom, other words the chewing surface at the top molars had a little stronger surface for fraying through food, than at the bottom teeth. The important attribute during crushing food and for the duration of functioning of teeth was the thickness of enamel. At mammoths of the time of Poozerskiy glacier the thickness of enamel gradually increased about 1.0–1.3 mm at P₃ and P₃ till 2.0–2.2 – at last molars.

Comparison of teeth parameters of studied mammoths with those of Yurovichi location which absolute age is equal on ¹⁴C 26470±420, LU-125, shows that more ancient mammoths from Yurovichi were a little bit larger. So, the length of M₂ of the mammoth from Yurovichi was equaled 305-310 mm, and quantity of the teeth plates, – 23 while at investigated animals similar parameters for the second bottom molar were equaled according to 170–200 mm and 16–19 plates. The similar tendency is observed for the teeth of the baby-mammoth. The P₃ of the baby-mammoth from Yurovichi reached 70.5 mm at length, 42 mm at width and had 8 plates on a chewing surface. Baby-mammoths in Minsk had the corresponding sizes of a similar tooth – 42 mm, 28 mm and 7 plates in structure of a tooth. Besides Yurovichi mammoths had rather low frequency of plates on a chewing surface – 7.5 for M₂ while at studied animals this parameter was equal 9–10. Thickness of the teeth enamel is practically identical in animals of both populations. Teeth hypsodonty changes also coincide. Reduction of width of a chewing surface in ontogenesis is identical also. Noted parameters in morphology of teeth of mammoths were characteristic for mammoths of late type. Early mammoths which age was within the limits of 200–130 thousand years ago had other parameters of teeth. So, for M₃ of the early type *Mammuthus primigenius*, the length of a tooth is 240–260 mm, width – 75–104 mm, the hypsodont parameter of crown dents – 42–51 %, frequency of plates – 6–8, and thickness of enamel on teeth – 2.0–2.9 mm.

The noted features permit to infer a gradual, slow evolutionary processes towards smaller size in mammoths. Their teeth became more hypsodont and narrow. In structure of their teeth, the density of plates increased because of the mainly hard grassy vegetation food. Enamel thus becomes noticeably thinner.

Tusks available in the collection, which functionally played a role of the upper incisors (I₃), also belonged to animals of different age. Their morphometric characteristics are given in table 2.

Measurements of tusks (I₃) of *Mammuthus primigenius* (Blumenbach) from the “Mashinostroitelny” site in Minsk

Measurements (sm), indexes (%)	“Mashinostroitelny”			Yurovichi		
	young	adults	olds	young	adults	olds
Length of tusk along its curvature	40–44	56–61	170–175	50	107–117	203
Length of tusk, straight	36–39	52–54	100	43	84–87	126
Circumference of tusk at the alveolar part	12–18	17–18	38–39	-	34	40
Circumference of tusk in middle part	11–14	14–15	31–32	19	29	35
Index of curvature of tusk (2:1)	89–90	88–93	57–59	86	72–81	62