INTRODUCTION

In August of 1982 some bones of large *Deinotherium* were excavated in the Obuhovka sand pit (Fig. 1). That locality is situated on the high terrace of the Paleo-Don in 1.5 km west from Yanov khutor (Rostov region, Russia) on the right bank of the Grushevka River (the confluent of the Tuzlov River). The excavations were realized by collaborators of Azov local museum. Most part of bones was laid in anatomical sequence (Fig. 2). Skeleton was destroyed partly during its extracting. This find is important because of well preserved teeth were discovered jointly with the most part of the postcranial elements. There were some short publications about this finding (BAGUSHEVA & TISHKOV, 1998; BAGUSHEVA, 1998). Nowadays all remains were restored and the specimen is exhibiting in Azov local museum (Northeast Sea of Azov Region, Russia).

GEOLOGY AND STRATIGRAPHY OF THE LOCALITY

*Deinotherium*’s remains were discovered in the sand thickness under the Upper Miocene Lower Pontian limestone on the depth 5.4 – 7.1 m. Those beds were considered to Meotian stage of Eastern Paratethys on the base of their stratigraphic location between Lower Pontian and Sarma-tian deposits (ZHIZHCHENKO et al., 1940). V.V. BOGATCHEV

ABSTRACT: Teeth and lower jaws of a partial skeleton of *Deinotherium* from the Lower Don region (south of Russia) are described. The skeleton was discovered in Late Miocene alluvial sands which age was determined as terminal Meotian – Lower Pontian. The sample was attributed to *Deinotherium giganteum* which is typical for Late Miocene basing on dental characteristics and teeth size. It is shown that findings of *D. giganteum* from Eastern Europe are slightly bigger than other known representatives of that species from Western Europe.

Key-words: Eastern Paratethys, *Deinotherium giganteum*, Late Miocene, dental characteristics.

ΠΕΡΙΛΗΨΗ: Τα δόντια και η κάτω σιαγώνα ενός τμήματος του σκελετού του *Deinotherium* από την περιοχή Lower Don (νότια Ρωσία) περιγράφονται. Ο σκελετός βρέθηκε μέσα σε αλλουβιακές άμμους του Ανωτέρου Μειόκαινου και χρονολογήθηκε ως Ανωτέρο Μειότιο – Κατώτερο Πόντιο. Το δείγµα αποδόθηκε στο *Deinotherium giganteum* το οποίο είναι τυπικό για το Ανωτέρο Μειόκαινο βάσει των οδοντικών χαρακτηριστικών και του μεγέθους των δοντιών. Αποδεικνύεται ότι τα ευρήµατα του *D. giganteum* από την Ανατολική Ευρώπη είναι ελαφρώς µεγαλύτερα από άλλους γνωστούς αντιπροσώπους αυτού του είδους από τη νοτιοανατολική Ευρώπη.

Λέξεις-κλειδιά: Ανατολική Παρατηθύς, *Deinotherium giganteum*, Ανωτέρο Μειόκαινο, οδοντικά χαρακτηριστικά.
(1941) determined remains of *Mammut borsoni*, "Palaeoryx longicephalus" and *Deinotherium gigantissimum* from those sands and dated them by the same age. These alluvium layers were attributed to the Upper Sarmatian-Meotian Yanov formation of Lower Don Region by G.N. RODZIANKO (1986). Not far from this place near Aksay town (Rostov Region, Russia) in the similar stratigraphic position in arenaceous limestone which are situated between Upper Sarmatian and Lower Pontian limestone the Lower Meotian mollusk’s fauna was discovered. V.S. BAJGUSHEVA determined some specimens from these beds which were collected earlier and now they are kept in the collection of Novocherkassk museum of Don Cossacks History (NMDCH). There teeth of *Mammut borsoni* are prevailed (NMDCH, No. 89, 103, 314, 317, 326). There are remains of *Deinotherium* (NMDCH, No. 310) and *Diceros cf. pachignatus* (NMDCH, No. 225).

It seems that the animal association from Yanov sand formation refers to Late Meotian-Pontian Tavrian Faunal Unit of Northern Black Sea Region (by KOTORTEVICH, 1988). In this complex the first appearance of *Mammut borsoni* is recorded. According to E.L. KOTORTEVICH (1988), in earlier associations remains of *Turicius turicensis* (= *Zygolophodon turicensis*) and *Tetralophodont longirostris* were typical (in Novoelizavetovsky and Belkinsky Faunal subcomplexes of Early and Middle Meotian) or mastodon’s finds were rare and unrepresentative (Cherevichansky mammal subcomplex of Meotian). Unfortunately Tavrian Faunal Unit is insufficiently studied. There are no representative localities of that age in Northern Black Sea Region. Few finds are known from Lower Pontian limestone only.

Based on biostratigraphy data we suppose the age of Yanov formation sands as pre-Pontian or terminal Meotian. According to M.A. PEVZNER et al. (2003) these deposits are correlated with the upper part of the Tortonian and with an upper part of Zone MN12.

**PALEONTOLOGY**

Order PROBOSCIDEA ILLIGER, 1811
Family Deinotheriidae BONAPARTE, 1845
Genus *Deinotherium* KAUP, 1829
*Deinotherium giganteum* KAUP, 1829

**Material:**
Cranium’s fragments with 2 upper teeth M² and M³, lower jaws with teeth without tusks, 4 cervical, 12 tail vertebrae, sacrum, costae fragments, and a part of right scapula, entire pelvis, and almost all bones of extremities. Collection of Azov historical-archeological and paleontological museum (AMZ, No. KP-26579).

**Description**

**Upper jaw:**
The left maxilla with M² and M³, lower jaws with teeth without tusks, 4 cervical, 12 tail vertebrae, sacrum, costae fragments, and a part of right scapula, entire pelvis, and almost all bones of extremities. Collection of Azov historical-archeological and paleontological museum (AMZ, No. KP-26579).

Fig. 2. The scheme of the disposition of *Deinotherium giganteum* remains at the excavated area of Obuhovka sand pit in 1982.
up backward a little. A wide anterior cingulum proceeds to lingual side of the crown. There is the roughness between lophs. On the posterior loph the roughness joins with the cingulum of the back side of the crown. The talon is pronounced weakly.

**Lower jaw:**

Symphysis and processus coronoideus are broken (Plate 2). The right mandible is more informative — it has teeth P3-M2 and roots of M3. The left mandible has roots of P3, P4, M2 and teeth M1 and M3. The height of right horizontal ramus mandibulae between P4 and M1 is 240.0, between M1 and M2 – 190.0 mm. Minimal width of the jaw is under M1 – 142.0 mm. It becomes thicker to M2, and under M3 its width reached 207.0 mm.

The anterior foramen mentale on the right branch of the jaw is damaged. The posterior one is situated on the level of P3-P4 boundary and has dimensions 22.0 x 31.4 mm. On the left branch of lower jaw the anterior foramen mentale is situated under P3 and the posterior one – between P3-P4. The exposed canal is very big. The processus coronoideus begins on the level of anterior lophid of M3. The length of premolars is 167.8 mm, and the length of the row of molars – 305.0 mm. The ratio of premolar row’s length to molar one is 35.7%. On the external upper part of the left branch of the jaw the rugosity is well presented. It stretches from symphysis part to the level of P3-P4. The degree of teeth obliterating in the tooth row is different. It decreases from P3 to M3, but premolars are erased less than two first lophids of M3. Tops of M3 lophids have narrow fascia of naked dentine only.

P3 dex: The tooth is triangular in occlusial surface, which is tilted labially. Two anterior conids — proto- and metaconids are erased. Protoconid is connected with the hypoconid by a worn ectolophid that is low in the middle. The entoconid is separated from hypoconid by a deep depression. The cingulum presents on the anterior labial part of the crown. It is less pronounced than the posterior one which is presented on labial and caudal walls. The largest labial height of the crown is 60.0 mm and the lingual one – 46.2 mm. Roots are less bared on the outside than inside. Enamel thickness is changing from 5.0 to 6.2 mm.

P4 dex: The tooth is bilophodont subquadrate and is narrower anteriorly than posteriorly. The anterior lophid (protolophid) is larger than the posterior one (hypolophid) and is more erased. Lateral conids have anteriorly extending cristids. The anterior protocristid connects with the anterior cingulum. Low hypoconid’s cristid joins the protoconid with hypoconid and carries out the function of an ectolophid. The posterior cingulum is well developed and on the back side unites with the hypoconid. Anterior roots are more bared inside (37.0 mm) than outside (15.0 mm). The enamel thickness is 5.0 mm on the posterior lophid.

M1 dex: The tooth with three transverse lophids and only last one is weakly touched by an abrasion. Protocristids are weakly developed. Cingula feebly marked on the front and back sides of the crown in places of contact with adjacent
teeth. It is better marked on the outside. The tooth is oriented in such way that its anterior part is situated higher and labial conids are lower than lingual ones. Left M₁ has a similar structure but differs from the right one by higher inner wall of the crown (39.0 mm on the first lophid against to 21.2 mm in the M₁ dex). The third lophid is narrower than two others.

M₂ dex: The tooth has two transverse lophids which crests are splaying backward. It is wider than previous tooth. The anterior lophid is more erased. The metalophid has two developed protocristids that extend medially and the labial one ends on the anterior cingulum. A cingulum well presented on anterior and posterior walls. The ratio of posterior cingulum’s width to the width of hypolophid is 75.5%. The maximal lingual height of the crown is on the posterior lophid – 54.2 mm.

M₃ sin: The tooth narrows posteriorly slightly. Transverse lophids are inclined backwards, but not so much as in M₂. The anterior cingulum is weak and outlines the lingual part of the anterior lophid. Posterior cingulum is well marked and forms a small talonid; its length is 10.0 mm and width – 61.2 mm. Enamel thickness – 2.2 mm.

COMPARISON AND CONCLUSIONS

There are some similarities and differences of Deinotherium from Obuchovka sand pit with D. giganteum from Western Europe. On the cast of D. giganteum cranium from Eppelsheim (collection of Azov historical-archeological and paleontological museum) the anterior edge of the choana is situated more caudally — on the level of the posterior lophid of M². On the Obuhovka sample M² and M³ are situated at an angle to each other in contrast to Eppelsheim’s cranium, where molars are situated aligned. Upper teeth of Deinotherium from the Sea of Azov Region differ from the same from Eppelsheim by wider lophs (Tab. 1). Lengths of upper molars from Obuhovka are larger than the same of D. giganteum from Western Europe and are smaller than teeth of Deinotherium gigantissimum STEFANESCU (BELOKRYS, 1960). The length of M² from the skeleton from Kadrianka (Moldova) is 103.0 mm and is similar with AMZ, No. KP-26579. This Moldavian sample was determined as D. gigantissimum (DAVID & SHUSHPA-NOV, 1972).

The length of the toothrow P₃-M₃ of describing finding is similar with D. giganteum (Tab. 2). P₂-M₁ length is equal with the same of D. giganteum “race major” from Bulgaria (BAKALOV, 1950) and is 420.0 mm.

Teeth measurements of Deinotherium from Eastern Europe exceed that from Western Europe (Tab. 3). D. giganteum from Eastern Europe have similar or slightly smaller lower teeth in comparison with forms which were described as D. gigantissimum. Unfortunately, the limit of variability of D. gigantissimum parameters is discovered insufficiently; they are basing on few samples.

B.A. TARABUKN (1974) who studied remains of Deinotherium’s skeletons from museums of Moldova alleged that in the Meotian age D. levius and D. giganteum existed simultaneously. Later, in the Pontian stage, these two species lived together with D. gigantissimum. D. giganteum was the ancestor taxon for D. gigantissimum according to his opinion. This author established not only b o d y size increasing but morphology changes of teeth, lower jaw

<table>
<thead>
<tr>
<th>Upper teeth</th>
<th>Locality</th>
<th>L</th>
<th>W₁</th>
<th>W₂</th>
<th>L</th>
<th>W₁</th>
<th>W₂</th>
<th>L-M²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deinotherium giganteum</td>
<td>Eppelsheim, cast, mm</td>
<td>104.0</td>
<td>90.4</td>
<td>67.0</td>
<td>102.8</td>
<td>91.2</td>
<td>82.6</td>
<td>210.0</td>
</tr>
<tr>
<td></td>
<td>Obuchovka sand pit, mm</td>
<td>104.0</td>
<td>114.6</td>
<td>114.4</td>
<td>104.8</td>
<td>114.0</td>
<td>104.0</td>
<td>206.0</td>
</tr>
<tr>
<td>Western Europe (BELOKRYS, 1960, mm)</td>
<td>Deinotherium gigantissimum</td>
<td>81.0-92.0</td>
<td>-</td>
<td>-</td>
<td>78.9-94.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Western Europe (BELAKOV, 1960, mm)</td>
<td>Deinotherium gigantissimum</td>
<td>108.0-116.0</td>
<td>-</td>
<td>-</td>
<td>107.0-115.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length of P₂-M₃</th>
<th>Locality</th>
<th>Author</th>
<th>Measurement, mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deinotherium giganteum</td>
<td>Obuhovka, Russia</td>
<td>originali sin</td>
<td>470.0</td>
</tr>
<tr>
<td></td>
<td>Krivoje Rog, Ukraine</td>
<td>BELOKRYS, 1960</td>
<td>470.0</td>
</tr>
<tr>
<td></td>
<td>Eppelsheim, Switzerland</td>
<td>STEFANESCU, 1899</td>
<td>455.0</td>
</tr>
<tr>
<td>Deinotherium levius</td>
<td>Ousiai, Ukraine</td>
<td>SVISTR, 1974</td>
<td>409.0</td>
</tr>
<tr>
<td>Deinotherium gigantissimum</td>
<td>Mance, Romania</td>
<td>STEFANESCU, 1899</td>
<td>540.0</td>
</tr>
</tbody>
</table>
and skull’s distinctions in deinotherium lineage evolution (TARABUKIN, 1974). There is the statement about the coexisting of two Deinotherium species in Rumania and Moldova in N.N. MOROSAN (1935). But there are no real paleontological confirmations for such conclusions.

L.S. BELOKRYS (1960) considered that Deinotherium’s teeth have a wide morphological variability except size variation. So he concluded that there are no serious evidences of species independence of D. gigantissimum. It corroborates by the finding of giant forms with mixed morphological features of D. levius and D. giganteum, which had similar dimensions with D. gigantissimum in Upper Sarmatian as in Lower and Middle Sarmatian deposits. Thus gigantissimum-like forms are D. giganteum (BELOKRYS, 1960). According to this author, morphology and measures fluctuation of teeth and jaws may be considered as the result of individual, sexual, age and population intraspecific changes. We agree with this opinion and relate the sample from Obuhovka sand pit to D. giganteum.

ACKNOWLEDGEMENTS

We are very thankful for E.S. Tsoukala from Aristotle University of Thessalonici Faculty of Sciences for the sending of papers about Deinotherium. The restoration of the Deinotherium skeleton was realized by supporting of Federal special program “The culture of Russia” No. 868-1015/25.

REFERENCES


