

Palaeobiology

Dmanisi (Georgia) – Site of Discovery of the Oldest Hominid in Eurasia

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ABSTRACT. By the end of September 1991 sensational news spread all over the scientific world: the mandible of the oldest man in Eurasia, whose age is possibly more than 1.5 million years, was found in Dmanisi, Georgia. Some researchers considered the scanty information from Georgia to be a newspaper gossip; some became seriously interested, but expressed doubts about the archaism and geological age of the early Dmanisi man. In what follows we try to shed light on the real history of these sensational finds. © 2010 Bull. Georg. Natl. Acad. Sci.

Key words: Dmanisi (Georgia), early hominid, Eurasia, Africa, homo ergaster, unique discovery, Homo Georgicus.

Introduction. Before the discovery of the mandible of Dmanisi hominid everything seemed to be clear and determined for anthropologists and paleoanthropologists – origin and formation of modern biological type of a human being had taken place 2.5 million years ago on the African continent. This hypothesis was widely accepted as an axiom and had a solid ground. The fossil bones of the oldest hominid called Homo habilis, i.e. “skilled man”, were found in Africa. He was the first to use the stone as a tool. Geological age of Homo habilis remains is 2.5 million years. Remains of Homo erectus, i.e. “erect man” standing on a biologically higher level the geological age of which is 1.7 million years, had been also found in Africa (Kenya, Ethiopia). Homo erectus is believed to have been the first to be able to obtain fire by friction.

Scientists think that migration of the oldest man from Africa to Eurasia took place about one million years or relatively later – 600 000-800 000 thousand years ago. But the unique discovery in Dmanisi has shattered the basis of the firmly established hypothesis on the initial origin and settlement of human beings. The mandible of Dmanisi hominid attracted the scientists’ attention and became the main topic of discussion. Specialists required convincing

evidence instead of information carried by newspapers. We were given this chance very soon.

Academicians Leo Gabunia and David Lordkipanidze made a report on the results of investigations carried out by Georgian scientists on Dmanisi hominid and presented its mandible to the participants of an international symposium dedicated to the centenary of the discovery of the remains of the first Pithecanthropus (Island of Java, 1891). The well-preserved mandible, its primitive morphological features made a great impression on specialists and they unanimously recognized indisputable similarity of Dmanisi man with early hominids of Africa. Scientists commented widely on the Dmanisi discovery after the symposium. Discussion concerning Dmanisi man, its primitiveness and geological archaism has not stopped and is still going on in special publications.

Some scientists challenged our assertion of the resemblance of Dmanisi and African hominids. The idea was launched that Dmanisi fossils were brought to the den by carnivores. That was a real fantasy, because its author was not aware of the site formation process in Dmanisi, besides carnivores, as saber-toothed cats could not bring their own skeletons to the den.

Finally the arguments based on facts convinced everyone of the rightness of the Georgian scientists and Dmanisi was recognized as the oldest hominid fossil bearing site in Eurasia.

Paleontological discoveries largely depend on chance, attended by regular purposeful hard work. Strata of earth crust are often called the chronicle of evolution, showing the main stages of development of the organic world. It is natural that every new paleontological discovery is one more line read in the endless chronicle of the development of living nature.

Dmanisi discovery is a deciphered line of one of the most important stages of hominid evolution, allowing us to interpret the time and ways and causes of spread of early hominids from Africa to Eurasia in a new manner.

The unique discovery of Dmanisi has a fairly long prehistory. The medieval settlement of Dmanisi is located to the south-east of Tbilisi, at the distance of about 90 km. Here the rivers Mashavera and Pinezauri cut canyon-like gorges in basaltic lava, resulting in the formation of an elongated cape – basaltic plateau of triangular shape. The plateau is approximately 90 m above the river surface and 900 m height above sea level.

In the Middle Ages (6th-14th cent.) a strategically and economically important big city was built on the plateau, which was located on a caravan route leading to Asia. The city was protected from the south by a well-fortified high and wide wall made of basalt stones, from the north it was naturally protected by the deep gorge of the river Mashavera and its slope. Remains of a castle wall and of dwellings, bell tower, basilica - Dmanisi Sioni and church of relatively later, feudal period are still to be found in the settlement [1].

Archeological excavations began in Dmanisi on the initiative of I. Javakhishvili in 1936. The archeologist L. Muskhelishvili directed the excavations and in spite of limited span of work made a very interesting discovery. In 1960 archeologists again visited Dmanisi settlement. The archeologist Vakhtang Japaridze directed the expedition, working there permanently until his death (1993). Afterwards the expedition was directed by J. Kopaliani, investigating medieval cultural layers.

In 1982 at one of the sectors of the site archeologists came across pits, cut in compact sandy clay, the depth of which was about 3 m, diameter 2-2.5 m. Archeologists supposed that they were intended for economic needs and were dug by the inhabitants of the Middle Ages. After cleaning them, numerous bones of fossilized animals were found on the walls and bottom of the pits. The Paleobiological Institute of the Academy of Sciences was immediately informed about it. It was impossible to

ignore such interesting news and we visited Dmanisi the following day. As a result of a detailed study of the pits and bones, we came to the conclusion that we were dealing in this case with the location of quite interesting and varied fossil fauna, whose geological age was possibly much earlier than a million years [2].

Systematic excavations of the Dmanisi paleontological site commenced in 1983 [3] and, owing to periodical financial problems, lasted down to 1991. A large amount of paleontological fossil material was gathered during this period and, which was more important, N. Mgeladze found some stone tools with bones. The archaism of the technique of their manufacture caused no doubt; later it was confirmed by well-known specialists of the Old Stone Age Professor D. Tushabramishvili and the German Professor G. Bosinski. In specialists' opinion, the stone tools found in Dmanisi essentially differ in terms of their archaism from those found to date in the South Caucasus and no analogy has been found on the territory of Eastern Europe. Hundreds of primitive stone tools, remains of fossil animals of more than thousand names were found in Dmanisi; from the Upper Pliocene to the Lower Pleistocene the age of these remains is confirmed biostratigraphically [4, 5].

According to paleontological material, it was demonstrated that the following animals – tortoise, lizard, hare, hamster, wolf, Etruscan bear, spotted jackal, saber-toothed tiger, jaguar, southern elephant, rhinoceros, Stenon horse, giraffe, giant deer, fossil cow, fallow deer, giant ostrich and others – inhabited Dmanisi area and its vicinity in the period of fossilization of fauna.

Since 1991 a new stage has started in excavations of Dmanisi site. A group of specialists of the Roman-German Archeological Museum consisting of Professor G. Bosinski and young archeologist A. Justus joined the expedition. It must be noted that the German side wholly financed Dmanisi excavations in 1991-99. The expedition was equipped with all necessities and excavations were carried out annually according to schedule.

The expedition season of 1991 turned out to be very productive. Well-preserved remains of rhinoceros, elephant, deer, gazelle and other animals were unearthed one after the other. The quantity of stone tools increased considerably. Very often stone tool and fossilized bone were found together in the rock, attesting to their contemporaneity. The field season was coming to an end, we were pleased with our rich gains and it seemed we were not expecting anything else (Fig. 1, right).

The sunny morning of the 25th September started as usual. A group of young specialists under the guidance of the archeologist M. Nioradze and A. Justus

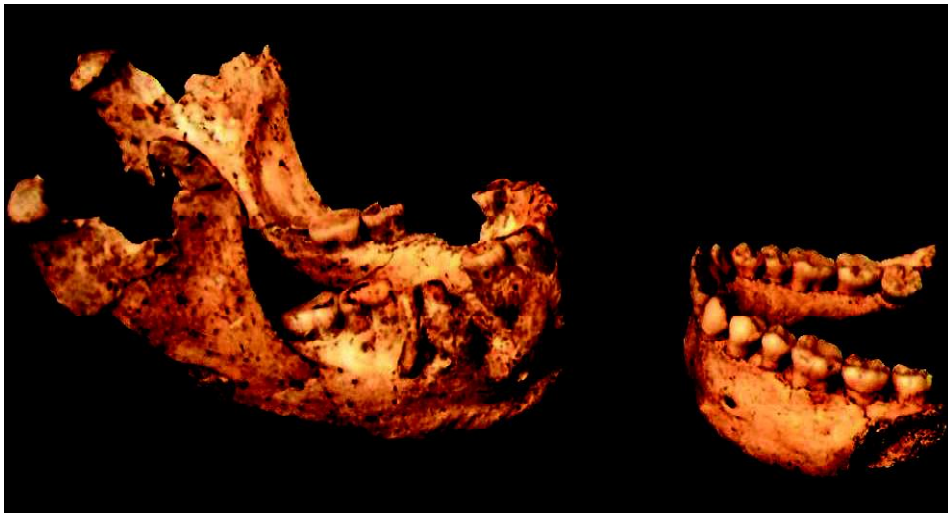


Fig. 1. Dmanisi. *Homo georgicus*, Mandible D2600 (left); *Homo ergaster*, Mandible D211 (right).

was finishing the digging of the next square. Suddenly, A. Justus gave a signal to stop and knelt in front of a bow-shaped bone. The unusual form of the bone alerted the archeologist and she intuitively guessed that it must be a mandible. After partial freeing of the bone from rock, the row of teeth appeared. It was a mandible, but of what animal?

The excavations were suspended immediately, as we, heads of the expedition, were in Tbilisi. Being informed of the unusual discovery, we hurried to Dmanisi. Unfortunately, when we reached the site it was already dark. All the staff of the expedition was present, campfire had been made and extraordinary excitement was felt. However, we did not know what was fossilized in the rock, as the masticating surface of the mandible was still covered with earth. We spent the rest of the night in thoughts and figuring out versions.

We started freeing the mandible from the rock in the morning of 26th September. We had to be very careful – fossilized bone often falls to pieces in the air. That is why we spent much time on cleaning the bone. Bones were clustered which complicated our work: bone of rhinoceros paw lay right on the mandible, and on the right and left sides skulls of sabre-toothed tigers were fossilized. It took us nearly all day to free the mandible from the rock and finally the unforgettable moment came - desirable for every paleontologist and scientifically unique mandible of a primate lay on my palm. It was slightly damaged – both ascending branches were broken, but what was most important for science, the complete row of teeth (16) were in evidence. The teeth were well-preserved with little sign of wear, pointing to the fact that it belonged to a 20-24 year old primate, but to which?

Upon returning to Tbilisi we started detailed study

of the mandible with Mr. Leo Gabunia, A. Vekua and D. Lordkipanidze. First, we had to determine to which stage of evolution of hominids the Dmanisi primate belonged. Some features characteristic of *Pithecanthropus* were observed on it, but those of *Homo* clearly prevailed.

Of the archaic features of the mandible the forward position of the ascending branch, lack of chin, archaic morphological signs of teeth, with which Dmanisi hominid manifested evident similarity with African contemporaneous forms, should be noted. After prolonged study and discussion, we came to the conclusion that Dmanisi hominid primarily belonged to the group of African *Homo erectus* and it was clear that Dmanisi Hominid was the oldest outside the African continent. Its significance was enhanced as the absolute age of the basalts lying directly under the sediments containing Dmanisi bones was determined as 1.8 million years by German specialists [6]. At the same time the group of J. Sologashvili and G. Maisuradze in Tbilisi determined that Dmanisi basalts corresponded to the geomagnetic episode of Olduvai (Africa) and could not be younger than 1.79 million years [7]. Later the American scientist K. Swisher tested again the Dmanisi dolerites by the Ar/Ar method and confirmed an earlier date – 1.85 million years [8].

Thus we should acknowledge that the oldest hominids started on a journey from Africa to Eurasia about 1.7 million years ago. They moved passing the Middle East and the South Caucasus.

Some foreign scientists did not share the views of Georgian scientists [9]. Their argument “It is impossible” was groundless, nobody wanted to deny the generally accepted hypothesis according to which migration of the first *Homo* from Africa to Eurasia could not take place earlier than 1 million years ago. There were

scientists who reasonably and critically approached the Dmanisi discovery and shared the views of Georgian specialists. Among them was the American paleontologist and writer Pat Shipman, who published a special letter about the Dmanisi discovery. He deals with the skepticism which existed towards Dmanisi man and his geological age in the scientific circles and how this skepticism changed into its complete recognition [10].

Excavations went on. Fresh paleontological and archeological material came to light, but relics of hominids were not seen. In 1997 at the end of fieldwork we prepared the excavated material for transporting to Tbilisi. One day Dr. Justus showed us bone fractures from the collection bags and at rechecking we suddenly found a hominid's right metatarsal bone (Mt3). It was from the same layer as the mandible. This find convinced us about future discoveries and our hopes were justified.

May of 1999 was very rainy in Eastern Georgia. The site of excavation had partially crumbled when the members of the expedition G. Kiladze and D. Zhvania arrived in Dmanisi. Kiladze found a thin bone of coin size in fallen rock; he noted the likeness of it with a fragment of skull and brought it to Tbilisi. The very first glance at it proved that it was a fragment of the cinciput of the skull of some primate. The second day we visited Dmanisi with the head of the expedition J. Kopaliani, archeologist K. Kakhiani and G. Kiladze. Rain had damaged the site more. We picked up broken off bones, dug out the supposed skull of primate with rock and brought it to Tbilisi. We worked on the reconstruction of the skull till morning, a place was found for every piece and, finally, we had the much coveted archaic man's skull with broken off upper jaw and teeth. The same year during the expedition D. Nioradze found one more

well-preserved skull. Now we had unique material, which gave us ground to express a reasoned supposition on Dmanisi man's nature and to determine its systematic place. We studied the fossil material for about a year and eventually established that Dmanisi hominid somehow differed from *Homo erectus* by skull and mandible and was closer to the so-called *Homo ergaster* which in scientists' opinion is acknowledged as a direct descendant of the family of *Homo habilis* (Fig. 2).

The scientific conclusions [8] were followed mainly by positive references. The scientific community finally shared Georgian scientists' point of view on the age and systematic place of Dmanisi man and acknowledged that Dmanisi man was the oldest not only in Europe but, generally, outside of Africa. Prestigious periodicals enthusiastically appraised the Dmanisi discovery and Georgian scientists' researches:

“Georgia is motherland of first Europeans and Georgian scientists' discoveries made the age of first European twice older”, . . . , “It isn't French, English or German, neither Spaniard nor Italian. The first European is Georgian” (*Le Monde*, 19/IV-2000).

“Two skulls, the price of which is more than a bar of gold, put on the bottom all the prehistorians of the world” (*Liberation*, 18/IV-2000).

“Georgian discoveries put an end to Spanish-Italian debates – who the first European was” (*Le Figaro*, 14/VIII-2000).

“This is a discovery which might completely change the view on the origin of mankind”, . . . , “It is a wonder, beginning of real revolution in man's evolution”, . . . , “Two fossil skulls found in Georgia belong to those hominids which first left Africa” (*Los Angeles Times*, 12/V-2000).

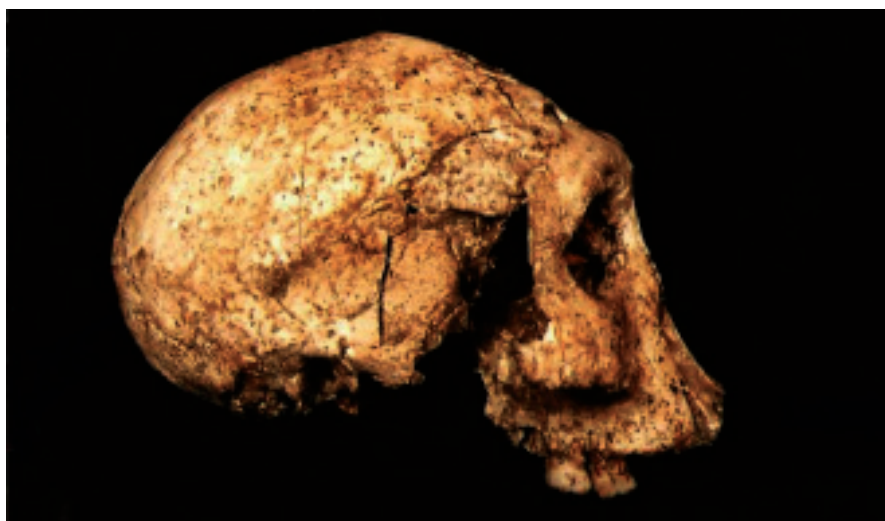


Fig. 2. Dmanisi. Cranium D.2700. *Homo ergaster*, lateral view.

“Dmanisi discovery demolished the spread theory, according to which settling the earth by hominids is connected to development of stone tools.” (*Scientific American*, 2000).

The American journal *Science* nominated the Dmanisi paleontological achievement among the ten most important discoveries in 2000. Dmanisi was in the third place and carried the reconstruction of Dmanisi hominid on the cover.

Study of the Dmanisi hominid to determine its place in the system of hominids was particularly difficult. Yet Georgian scientists succeeded in precisely defining the systematic stage of Dmanisi man [8].

Because of its morphological features, small size of skull and brain volume (600 cubic cm) Dmanisi hominid manifests similarity to the oldest *H. habilis*. It was relatively short (height – about 1.5 m) and had very narrow, sloped forehead with moderately developed shaft of eye socket, saliently manifested prognathism, slightly flat face, relatively narrow nose, noticeably wide cheek-bones, strong protruded canine, narrow V-like alveolar arcs, teeth of archaic structure and, which is especially important, evidently small volume of brain (600 cubic cm).

According to the listed features the Dmanisi hominid occupies an intermediate place between *Homo habilis* and *Homo erectus*. If we take into consideration that the geological age of Dmanisi man is the same as that of *Homo ergaster* (1.8 million years), we may suppose that their common ancestor might have been *Homo habilis* [8].

What made early humans leave Africa and seek dwelling space in Europe and Asia? Scientists answer this complicated question in different ways. In our opinion, American paleontologists are giving the most precise explanation. In their opinion, a group of hoof animals, looking for a new living territory, begins migration and man follows them as hoof animals are the main object of his hunting and sustenance. It seems that early man, starting to move once, relatively easily leaves his tropical habitat and enters a zone of mild climate. Its route might have passed the territory of present Israel and through the so-called Levantine corridor approached the South Caucasus. One branch of humans moves to the east and Asian *H. erectus* (*Pithecanthropus*) originates from it, the second branch moves to Europe and it might be the ancestor of the group of Heidelberg type men [5].

The process of migration cannot be considered as non-permanent. Numerous unsuccessful attempts may have been made before the first *Homo* settled in Dmanisi. If we take into account that the first *Homo* appeared in Africa about 2-2.5 million years ago, and early man

already inhabited Dmanisi 1.8 million years ago, we should suppose that the migration speed of hominids was rather high. In some researcher’s opinion after adaptation to the South Caucasus and some transformations, the hominids went back to the African tropical zone. This view is unacceptable, because the fauna, and especially hominids, never return to the left environment, if the one they are living in did not change radically to the worse, and that did not happen in South Caucasus. Besides, why would they go back to the same environment?

Series of discoveries followed the discovery of two skulls of the first hominids in Dmanisi. Today, the paleoanthropological collection of Dmanisi contains 5 skulls, 5 mandibles, 12 isolated teeth and about 50 parts of postcranial skeleton (vertebrae, bones of extremities). The skulls and mandibles represented in Dmanisi belong to men (22-25) and women (12-15) of various ages. The toothless mandible of an old man was also found. It is worth noting that the old man lived for a relatively long time after wearing out and losing the teeth, which is indicated by the fact that the sockets (alveoli) of these teeth roots are filled with bone tissue, which was only possible in the period of life. Supposedly, some of his fellows protected and looked after him. Remains of toothless man of such an early period have not been found anywhere else in the world.

The systematic place of the Dmanisi hominid was nearly clear for us before 2000, but the mandible found by G. Kiladze in 2000 in the 4th stratum gave us much food for thought. The newly found mandible (D.2600) proved to differ essentially by its noticeably large sizes, teeth proportions and morphological features not only from the mandibles found earlier in Dmanisi, but from all hominid mandibles found to date earlier in Africa. Archaic signs, characteristic of *Australopithecus* and African early *Homo* are so originally matched with some advanced signs of evolution on the new mandible, that it is difficult to assign it to any known family. The phylogenetic links of this hominid are so far not clear to us, and we do not see any possibility of its identification with any other species, for example with *Homo ergaster* that stands close to it. Presumably, these two forms (*Homo ergaster*, *Homo georgicus*) originated from some early common hominid, which belonged to the grade of *Homo habilis*. Having separated from this ancestor, which was close to *H. rudolfensis*, in the process of prolonged migration and adaptation with mild climate in the non-tropical zone, the Dmanisi branch underwent evolutionary changes, leading to the origin of new species, called by us *Homo georgicus* [11] (Fig. 1, left).

In Dmanisi area some thousands of fossilized bones of mammals, vegetative remains and stone tools together with hominid remains are found. A study of paleontological and paleobotanic material showed that in the period of inhabiting the territory of South Georgia by Dmanisi man, the landscape there was mosaic, along side savannah type spaces, forests were also to be found in watersheds and river valleys. The animals living in steppe and savannah type landscapes (horse, giraffe, ostrich and others) occupy the leading place in the fauna of Dmanisi vertebrates. At the same time, a great number of deer is observed in Dmanisi, pointing to the existence of sectors covered with forest.

Biogeographical analysis of Dmanisi fauna shows that various bio-provincial elements are represented in this fauna. Our studies confirmed that in the past geological era from time to time the South Caucasus was the connecting link between African and Eurasian bio-provinces.

The collection of stone tools found in Dmanisi counts more than 2000 items. Chips considerably exceed nucleuses and chopper-choppings in the complex of tools. Such types of tools are called pre-Acheoulian, i.e. Olduvai. Local stones, brought from river ravines, were used as raw material for tools in Dmanisi. Undoubtedly, Dmanisi stone industry is identical with the “Olduvai” industry discovered in Africa, and dated 2 million years [12].

The hitherto current idea which held that migration of man from Africa was connected to technological process and the hominid could migrate from Africa to Eurasia only after mastering Acheoulian technique, has been rejected.

To sum up the foregoing, we can conclude that remains of the oldest hominids in Eurasia are discovered in Dmanisi habitat, the, geological age of which - 1.8

million years - is confirmed by biostratigraphic, paleomagnetic and radiological methods of study. Dmanisi habitat is unique due to well-preserved hominid remains, like which have not been found even in Africa.

We presume that two populations of early hominids inhabited South Georgia 1.8 million years ago: *Homo ergaster* and *Homo georgicus*. But not everybody shares this view of Georgian scientists. Some foreign scientists think that only one population of early hominids has been found in Dmanisi. Professor J. Schwarz from Pittsburgh University shares our version and notes that hominid remains unearthed in Dmanisi undoubtedly belong to two or several species, which coexisted for a certain period of time. We realize that the view on the existence of two species in Dmanisi calls for more discoveries to be proved and we believe this will be the case (Fig. 3).

One more - the fifth - well-preserved skull was found in Dmanisi in 2005, whose detailed study is now under way. Preliminary observations do not exclude the probability that the new skull belongs to *Homo georgicus*. If our supposition comes true, the view offered by us about the existence of two populations of early hominids in Georgia 1.8 million years ago becomes seriously convincing.

The paleoanthropological discoveries in Dmanisi put on the agenda the need of revision of the systematization of well-known early fossil hominids. At the same time, the small volume (600 cubic cm) of the brain of Dmanisi man obliges us to question the ideas of foreign researchers, according to which only those hominids could migrate from Africa to Eurasia, whose brain volume corresponded to that of *Homo erectus* (900 cubic cm). Presumably, we should think that the first hominid leaving Africa must have been similar to *Homo habilis*

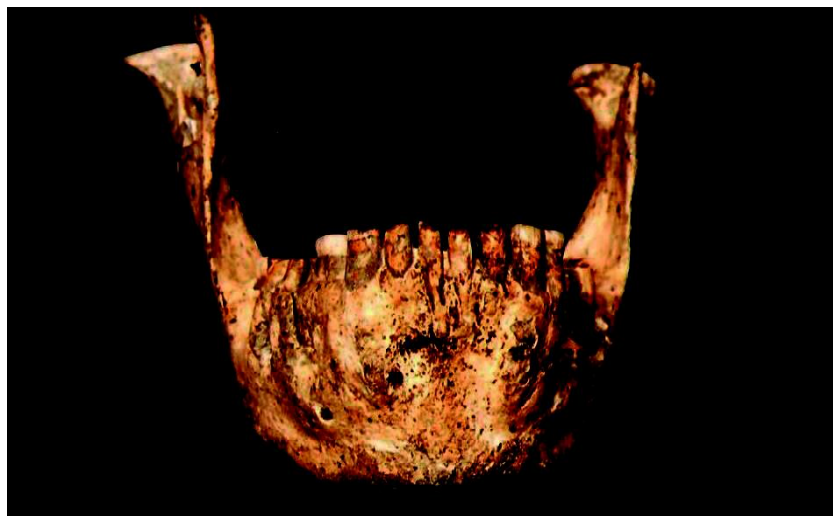


Fig. 3. Dmanisi. *Homo georgicus*, Mandible, symphyseal view, *georgicus*

and that the Dmanisi man originated precisely from this group of hominids.

The excavations in Dmanisi are continuing. New interesting discoveries are to be expected; we hope they

will allow us not only to reconstruct the complete skeleton of the Dmanisi hominid, but to form a complete and well-grounded idea on Dmanisi man, his activity and the environment in which he happened to exist.

პალეობიოლოგია

დმანისი — ვერაზიის უძველესი ჰომინიდის ადგილსაპოვებელი

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სტატია ეძღვნება დმანისის ნაქალაქარის ტერიტორიაზე უძველესი ჰომინიდის ქვედა ყბის უნიკალურ აღმოჩენას, რომლის აბსოლუტური ასაკი 1,8 მლნ წელია. ქართველი მკვლევარების აზრით დმანისელი ჰომინიდი ქვედა ყბისა და კბილების მორფოლოგიური ნიშნებით მსგავსებას ამჟღავნებს აფრიკის უძველეს ჰომინიდებთან.

REFERENCES

1. J. Kopalani (1996), Dmanisis tsitadeli, Tbilisi, 145 p. (in Georgian).
2. A. Vekua, Ts. Gabelaia, Z. Vekua (1985), Materialy nauchnoi sessii VTO, Tbilisi, 22-23 (in Russian).
3. A. Vekua, Z. Vekua (1985), In: Arkheologiya Kavkaza, Tbilisi, 13-14 (in Russian).
4. A. Vekua (1995), JRGZM, 42: 77-180.
5. L. Gabunia, A. Vekua, D. Lordkipanidze (1996), Izvestiya AN SSSR. Ser. Geogr., 6: 36-67 (in Russian).
6. H. Schmincke, P. Bogaard (1995), JRGZM, 42: 75-76.
7. D. Sologashvili et al. (1995), JRGZM, 42: 51-74.
8. L. Gabunia, A. Vekua, D. Lordkipanidze, C. Swisher III, et al. (2000), Science, **288**, 5468: 1019-1025.
9. L. Gabunia, A. Vekua (1993), Dmanisskii iskopaemyi chelovek i soputstvuyushchaya emu fauna pozvonochnykh. Tbilisi (in Russian).
10. P. Shipman (2000), American Scientist, 88: 491-494.
11. L. Gabunia, M. de Lumley, A. Vekua, D. Lordkipanidze (2002), Archeology, Ethnology and Anthropology of Eurasia, **4**(12): 145-153, Novosibirsk.
12. M. Nioradze, A. Justus (1998), Dmanisi, I: 140-159.

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