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UNIQUE GEOSITES OF THE SOUTHERN CAUCASUS: THE LOCALITIES OF THE UPPER MIOCENE-PLEISTOCENE VERTEBRATE FAUNA IN THE VICINITY OF THE MINGACHEVIR RESERVOIR

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Territory of Azerbaijan Republic is rich in various species of fossil vertebrates found among Eopleistocene and Pleistocene marine and continental sediments. One of the richest accumulations of the petrified remains of these animals have been detected in the western part of the country, where unique Eldar, Gushguna and Bozdagh-Garaja localities of vertebrates have been detected in the vicinities of Mingachevir reservoir. The cited deposits represent unique geosites, which together with early man's stone implements detected in their surrounding areas, indicate that the region was part of the formation area of the most ancient humans and their earliest material culture. As identified by the studies, surroundings of Mingachevir reservoir are the world's unparalleled and longest (more than 100 km) burial site of the vertebrate fossils.

Keywords: Mingachevir reservoir, geosite, Miocene-Pliocene sedimentary complex, vertebrate fauna localities, mammals, reptiles, birds, insects, hipparion fauna

Introduction

Active palaeozoological search and exploration of sites containing vertebrate fossils detected among Miocene-Pleistocene coastal and continental sedimentary strata of Mingachevir reservoir's vicinities have been carried out since 1930-s. In different years, the area had been covered by research activities implemented by K.A. Alizadeh, F.M. Akhundov, V.V. Bogachev, N.I. Burchak-Abramovich, D.V. Hajiyeve, J.D. Jafarova, R.D. Jafarov, B.S. Dombrovsky, I.A. Dubrov, S.A. Kovalevsky, V.I. Kulikov, N.A. Lebedeva, I.A. Melikov, A.L. Putkaradze and others. The research results were presented in a number of publications [1-4, 6, 7, 10, 11, 13, 15, etc.].

As a result of these studies, rich osteological material of vertebrate fossils was collected from Eldar, Gushguna, Duzdagh, Bozdagh, Hojashenm Guzguntapa, Palantokan, Kudbarekdagh and other localities, including the richest and the most diverse **Eldar** and **Gushguna** localities. It was established that the study area is the only place in the Caucasus where remains of the Pleistocene elephants have been ever discovered [3, 4, 14]. Moreover, in 1960 N.I. Burchak-Abramovich and

F.M. Akhundov discovered remains of a giant camel from the Upper Absheron series of Bozdagh [6]. So far, the discovery is known as the most ancient camel remain found on the territory of former USSR.

In the beginning of the current century, systematic research in the area was recommenced by the researchers of the ANAS Natural-Historical Museum. Having covered mainly southern shore of the reservoir, the new studies resulted in the identification of **Bozdagh-Garaja locality of Eopleistocene-Lower Pleistocene mammals**, distinguished for a rich variety of the bone remains of various vertebrate species.

Ancient vertebrate localities

Eldar locality of the Upper Sarmatian vertebrates (hipparionic fauna) was discovered in the 1950's [5, 9-11] on the right bank of Gabyrry River (Iori) on the slopes of the Ellar-Oyughu ridge. The locality is distinguished by an exceptional richness of fossil discoveries represented by bone remains of hipparion, chalicotheres, hyena, gazelle, proboscideans, seal, turtle and various birds [12]. It was established that typical hipparionic fauna of Azerbaijan had been formed on the border between Middle and

Upper Sarmatian periods (10 Age Ma). At that time, major geological events occurred in the Caucasus to change the region's paleogeographic environment. Due to the regression of Black and Caspian seas, the Caucasus Island became connected to the Western Asian land. Connection occurred via Dzirula isthmus, through which the hipparion fauna had penetrated the Caucasus. In the early stages of this invasion (beginning of Middle Sarmatian), when the anchitheres coexisted with the early hipparions, transitional complex of mammals was formed. Gradually, other genres were replaced with formation of the nucleus of a new theriocomplex. This is evidenced by the presence of mammalian bone occurrences on the territory of Iran and especially Turkey, where the transition between anchitheres, mixed and hittarion faunas can be traced in the multi-age Paratethys deposits.

Gushguna locality of the Upper Pliocene-Eopleistocene mammals is confined to the Akchagylia marine (3.4-1.8 Age Ma) and Absheronian (1.8-0.7 Age Ma) continental facies deposits, and detected in the interfluvium of Kur and Gabyrry. Composition of this transitional (from hipparion to equids) fauna is characterized by the coexistence of hipparion (three-toed horse) and a primitive one-toed horse – *Equus stenonis*. Among the other types of vertebral fauna it deserves mentioning eggshells of ostriches, beaver-trogontheres, flat-faced and southern elephants, Etruscan bears, leptobos, gazelles (*gazella borbonica*), ancient camels of the genus of *Paracamelus*, several species of rhinos, including *Elasmotheres*. Also interesting is the discovery of a skull belonging to a new genus and species of bulls (*Adjiderebos gen. Nov*, *Adjiderebos cantabiles sp. Nov.*) [7].

Bozdagh-Garaja locality of the Eopleistocene-Lower Pleistocene mammals (0.7-0.3 Age Ma). In 2000, specialists of the Natural-Historical Museum of ANAS discovered remains of three skulls, skeleton of a southern elephant, and fragments of deer antlers among Absheron series on the northern foothill of the Bozdagh range. Unfortunately, due to the sharp rise in the water level of Mingachevir reservoir, remains could be recovered just partially. But in

2001, specialists managed to extract an almost complete skull of a southern elephant without a lower jaw (Fig. 1). The skull belonged to an adult with the second large molar of the upper jaw (molar M2), which started to be replaced with the third large molar of the upper jaw (molar M3). Measurements showed that the teeth belonged to a late form of the southern elephant with the signs of the trogontheres elephant (*Mammuthus trogontherii*). Therefore, it can be assumed that the discovery belongs to a transitional form of proboscideans.

Starting from 2012, joint expeditions of the specialists of Archeological and Ethnographical Institutes of ANAS, stone implements of the Acheulian people and huge accumulations of fossil remains of the large mammals (proboscis, deer, horses and rhinos) have discovered all along the northern slope of Bozdagh and Garaja ranges. In 2015, a large fragment of an elephant's skull with molars was excavated on the beach in Boro-Boro Bay (deposits of Baku regiosstage of the northern slope of the Garaja ridge). At the same time, rhinoceros' skull without lower jaw (presumably *Merka rhino*) was discovered and extracted from sandstone 80 meters north of the elephant. In addition, various material was collected from the bone fragments of a postcranial skeleton of a rhinoceros, a bull, a red deer, horse, and fragments of tooth plates of the southern elephant.

M² teeth of the elephant have narrow coronas and well distinguished sinuses. According to these and other characteristics (e.g. dental plate frequency and length, enamel thickness), discovered elephant was characterized as a forest elephant *Palaeoloxodon antiquus* (Fig. 2), which was the first fossil remain of this kind ever discovered in the territory of Azerbaijan. On the other hand, morphological and morphometrical characteristics of its' teeth, the rhino was characterized as a species of *Stephanorhinus cf. Hundsheimensis*. Discovered remains, including plenty of fossilized wood allowed reconstructing a forest-steppe landscape which used to prevail on the ancient seashore characterized by vast forested spaces.



Fig.1. Skull of the southern elephant



Fig.2. Skull fragment of elephant *Palaeoloxodon antiquus* from Garaja

In 2017-2019 on the entire southern coast of the Mingachevir reservoir, on the northern spurs of the Bozdag and Garadzhi ridges, a large number of bones of various species of vertebrates were found in Absheron and Baku deposits [8].

In the fall of 2018, following fossil remains were found on the northern slopes of Bozdagh among the area's Absheron series:

1. Incomplete skull of a southern mammoth *Archidiskodon meridionalis meridionalis* with M^1 to M^2 transition of teeth;
2. Isolated mammoth teeth;
3. Complete skull of rhino with lower jawbone;
4. Separate fragments of *Equus* sp., Cervidae gen.

According to dp^4 , M^1 , M^2 , M^3 signs, teeth of the mammoth are similar to those of *Archidiskodon meridionalis meridionalis*, typical for late Villafranchian stage of the Europe and the Western Siberia.

At first, remains of the rhino were deemed to belong to the *Diceros Merki*, but later it was identified that its' skull parameters are similar to those of *Stephanorhinus hundsheimensis* from the end of the Europe's Early Pleistocene. These species used to be quite typical in the Western Europe during late Villafranchian - Early Galerian stages (analogues of Tamanian faunistic complex). Stratigraphic spread of this taxon in the Eastern Europe is yet unclear due to a fragmentary nature of discovered Early Pleistocene rhino remains. Large amounts of fossil tree and shrub remains speak to a presence of forest-steppe landscapes with prevailing steppes.

Particularly noteworthy are the remains of a large bull from Garaja (*Garajabos*), the bones of the postcranial and cranial skeleton of a horse, as well as a red deer (Fig. 3-4).



Fig.3. A very large bull from Garaja (field expedition 2018)



Fig.4. Skull of an elephant from Bozdagh

A large number of tools of the ancient (Lower Paleolithic) man were also found (Fig. 5), which indirectly indicates the existence of camps and hunting grounds here.



Fig.5. Bozdagh and Garaja. Tools of man from the Lower Paleolithic (Lower Pleistocene, Baku deposits)

Conclusion

Outcomes of the many years of scientific research demonstrate that in the eastern part of the South Caucasus region, paleogeographic conditions during Miocene-Pleistocene had been significantly different from the current ones. Multiple discoveries of bone remains of the various vertebrate species and the trunks of different trees and shrubs, are the indicatives of a prevalence of semi-open forest-steppe landscapes in that period, characterized by predominance of steppe areas interspersed with wood and shrubs.

As identified by the studies, surroundings

of Mingachevir reservoir are the world's unparalleled and longest (more than 100 km) burial site of the vertebrate fossils. Moreover, the area is regarded as the only place in the Caucasus where remains of the Pleistocene elephant species (Elephantidae) had been ever discovered.

The area around the reservoir is also known for the multiple discoveries of various stone implements. Together with Palaeolithic man's sites discovered in the mountainous zone of the Western Azerbaijan (Azykh, Taghlar, Dashsalakhly and other caves), these findings do indicate that the region was part of the formation area of the oldest man and his earliest

material culture.

Exclusive material based on the latest researches was first reported on INQUA IFG 1709 POCAS Third Plenary Meeting "Ponto-Caspian Stratigraphy and Geochronology" (2017-2020), 11-18.10.2019, Tehran, IRI and aroused great interest of the event's participants [8]. Given the uniqueness of the localities of the Upper Miocene-Pleistocene vertebrate fauna in the vicinity of the Mingachevir reservoir and their compliance with the criteria of UNESCO and ProGeo, it is advisable to consider giving the area the status of a global geopark.

REFERENCES

1. Bogachov V.V. 1933. Problems of Azerbaijan geology. Papers of the Geological Exploration Office of Azneft, issue I: 21 (in Russian)
2. Bogachov V.V. 1938. Paleontological Notes. Publishing house of the Azerbaijani Branch of USSR Academy of Sciences, vol. 9/39: 56 (in Russian)
3. Burchak-Abramovich N.I. 1950. Study Materials of Upper Tertiary *Proboscidae* of Transcaucasia. «News of the Academy of Sciences of Azerbaijan SSR, № 2: 6-18 (in Russian)
4. Burchak-Abramovich N.I. 1952. Early Elephant (*Elephas planifrons Falc.*) and its proximity to the forms in Trans-Caucasia. News of the Academy of Sciences of Azerbaijan SSR, № 2: 7-11 (in Russian)
5. Burchak-Abramovich N.I. 1954. Eldar Reconnaissance Paleontological Expedition. Papers of Nature-Historical Museum, Publishing house of the Academy of Sciences of Azerbaijan SSR, issue VIII: 78 (in Russian)
6. Burchak-Abramovich N.I., Akhundov F.M., 1960. *Paracamelus* (*Paracamelus gigas Slosser*) in Azerbaijan.

News of the Academy of Sciences of Azerbaijan SSR, Series of geologic-geographic sciences and oil, № 6: 8-16 (in Russian)

7. Dubrovo I.A., Burchak-Abramovich N.I. 1984. New Genus of Pliocene Bull (*Adjiderebos* gen. nov) from Transcaucasia. Reports of USSR Academy of Sciences, vol. 276, № 3: 717-720 (in Russian)
8. Eybatov T.M., Titov V.V., Kangarli T.N. 2019. Unique Mingachevir Occurrence of Pleistocene Vertebrates among Baku and Absheron Deposits of Bozdagh and Garaja. Proceeding of INQUA IFG 1709 POCAS "Ponto-Caspian Stratigraphy and Geochronology" (2017-2020), IRI, Tehran: 51-56 (in English)
9. Hajiyev D.V. 1959. New Data on Eldar Hipparion Fauna. News of the Academy of Sciences of Azerbaijan SSR, Series of geologic-geographic sciences and oil, № 4 (in Russian)
10. Hajiyev D.V. 1964. *Equus stenonis* of Upper Pliocene Deposits. Geological Essays of Azerbaijan (dedicated to XXII International Geological Congress in India), Baku (in Russian)
11. Hajiyev D.V. 1996. Eldar Upper Saratian Hipparion Fauna. Baku: Elm, 344 (in Russian)
12. Hajiyev D.V. 1999. Study Results of Fossil Vertebrates in Azerbaijan. Collected Papers of Joint Scientific Session Dedicated to XL-year Anniversary of Azerbaijan Paleontological Society. Baku: 61-69 (in Russian)
13. Hajiyev D.V., Akhundov F.M. 1976. Brief overview of location of vertebrates in sediments of the Absheronian stage in Azerbaijan. Issues of palaeontology and stratigraphy of Azerbaijan, Baku: Elm, 173-180 (in Russian)
14. Jafarova J.D. 1961. *Elephas* (*Archidiscodon*) *meridionalis* in Caucasus. Reports of the Academy of Sciences of Azerbaijan SSR, vol. XVII: 18-24 (in Russian)
15. Lebedeva N.A. 1971. Stratigraphic position of the complexes of mammals in the Eopleistocene and Pleistocene. Proceedings of the Academy of Sciences of Azerbaijan SSR, geology series. #9: 122-133 (in Russian)

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CƏNUBİ QAFQAZIN UNİKAL GEOSAYTLARI: MİNGƏÇEVİR SU ANBARI ƏTRAFINDA ÜST MİOSEN-PLEYSTOSEN YAŞLI ONURĞALILAR FAUNASININ TAPINTI YERLƏRİ

T.M.Eybətov, T.N.Kəngərli

Azərbaycan Respublikası ərazisi Üst Miosen-Pleystosen yaşlı dəniz və qitə çöküntü qatlarında müxtəlif növ onurğalılar qalıqlarının zəngin tapıntıları ilə səciyyələnir. O cümlədən, ölkənin qərbində Mingəçevir su anbarı ətrafında basdırılmış qədim onurğalılardan Eldar, Quşquna və Bozdağ-Qaraca tapıntı yerləri aşkar edilmişdir. Ərazidə tapılmış daş alətləri ilə birlikdə bu unikal geoloji abidələr (geosaytlar) bölgənin ibtidai insanın və onun ən erkən maddi mədəniyyətinin formalaşdığı areala daxil olmasına dəlalət edir. Aparılmış araşdırmalar nəticəsində məlum olub ki, Mingəçevir su anbarının ətrafı dünyada misilsizdir və uzunluğu bənzərsiz olan (100 km-dən artıq) qədim onurğalılar qəbiristanlığına uyğun gəlir.

Açar sözlər: Mingəçevir su anbarı, geosayt, Üst Miosen-Pleystosen yaşlı çöküntü kompleksi, onurğalılar fauna-

sının tapıntı yerləri, məməlilər, sürünənlər, quşlar, böcəklər, hipparion faunası

УНИКАЛЬНЫЕ ГЕОСАЙТЫ ЮЖНОГО КAVKAZA: МЕСТОНАХОЖДЕНИЯ ВЕРХНЕМИОЦЕН-ПЛЕЙСТОЦЕНОВОЙ ПОЗВОНОЧНОЙ ФАУНЫ В ОКРЕСТНОСТЯХ МИНГЯЧЕВИРСКОГО ВОДОХРАНИЛИЩА

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Территория Азербайджанской Республики богата находками разнообразных видов ископаемых позвоночных в миоцен-плейстоценовых морских и континентальных отложениях. В том числе на западе страны, в окрестностях Мингячевирского водохранилища установлены Эльдарское, Гушгунинское, Боздаг-Гараджинское захоронения позвоночных – уникальные геологические памятники (геосайты), которые в сочетании с найденными каменными орудиями труда свидетельствуют о том, что регион входил в ареал формирования древнейшего человека и его наиболее ранней материальной культуры. В результате проведенных исследований установлено, что окрестности Мингячевирского водохранилища являются не имеющим аналогов в мире и уникальным по протяженности (более 100 км) кладбищем древних позвоночных ископаемых.

Ключевые слова: *Мингячевирское водохранилище, геосайт, миоцен-плиоценовый осадочный комплекс, местонахождения позвоночной фауны, млекопитающие, рептилии, пернатые, насекомые, гиппарионовая фауна*