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Prof. Nikolay Burchak-Abramovich's private collection of Late Pleistocene birds from Binagada (Azerbaijan) – a lost treasure of avian paleontology: general review of the exploration of the site and its scientific value

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Abstract

The site of Binagada (in the vicinity of Baku, Azerbaijan) was discovered in 1938 and the exploration of its fossil avifauna started in the same year. Excavations were carried out in 1938–1942, 1947–1949 and 1951–1954. First published data on the avian remains (659 specimens) appeared in 1945. Until present its bird fauna includes 109 species, 4 of them extinct, and 6 other represented by extinct subspecies. The accumulated fossils are dated 120,000–96,000 BP and the site has been estimated the richest avian site of the world.

Major part of the avian fossils collected from the site remained unexamined, uninventoried, unphotographed and subsequently got definitively lost after the death of Prof. Nikolay Burchak-Abramovich in 1997. This collection was built by him personally after 1939. Half a century later, in December 1988 it was still kept at Prof. Burchak-Abramovich's home in Tbilisi (Georgia) and numbered 20,271 fossil bones and bone fragments of at least 1,983 individuals. By that time it was not yet examined and we started just its preliminary distribution by anatomical units (and higher taxonomical groups). Skeletal elements representation (December 1988): cranium – 741, sternum – 259, synsacrum – 285, coracoid – 2,423, scapula – 626, humerus – 3,812, ulna – 2,706, radius – 1,503, carpometacarpus – 1,835, femur – 680, tibiotarsus – 1,952, tarsometatarsus – 1,257, etc. A total of 45 separate skeletal elements was represented in the collection. The present paper provides a detailed history of Binagada site, the collection and its fate, including a complete list of zoological and botanical taxa recorded so far from Binagada site (appendix).

Keywords: Late Pleistocene avifauna, Binagada, avian collections, Azerbaijan Quaternary, osteological collections.

Zusammenfassung

Der Fundkomplex Binagada (bei Baku, Aserbaidschan) wurde 1938 entdeckt und im gleichen Jahr begann die wissenschaftliche Erforschung seiner fossilen Avifauna. Ausgrabungen erfolgten 1938–1942, 1947–1949 und 1951–1954. Nach derzeitigem Stand wurden 109 Vogeltaxa nachgewiesen, darunter 4 Arten und 6 Unterarten, die nur fossil bekannt geworden sind. Die fossile Fauna wird mit rd. 120000–96000 BP datiert und gilt als eine der reichsten Fundstätten fossiler Vogelreste weltweit. Der weitaus größte Teil der Funde ist nach dem Tod von Prof. Nikolay Burchak-Abramovich im Jahr 1997 verloren gegangen oder verschollen. In der vorliegenden Arbeit wird eine detaillierte Darstellung des Fundortes, der Forschungsgeschichte und des Schicksals der Aufsammlungen gegeben. Der Appendix listet alle bisher aus Binagada bekannt gewordenen zoologischen und botanischen Taxa auf.

Introduction

The site of Binagada was discovered in the vicinity of Baku (Azerbaijan) in 1938 and the exploration of its fossil avifauna started in the same year. Excavations were carried

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out in 1938–1942, 1947–1949 and 1951–1954. First published data on the avian remains (659 specimens) appeared in 1945. Until present its bird fauna includes 109 species, 4 of them extinct, and 6 others represented by extinct subspecies. The accumulated fossils are dated 120,000–96,000 BP and the site has been estimated the richest avian site of the World. After ARGIROPULO & BOGACHEV (1939) the locality Binagada (or Binagady) could only be compared with the asphalt localities Rancho La Brea in the present Los Angeles City (California) and Starun' in the Ukraine[1].

Possibly, Binagada can be accepted as a kind of Palearctic equivalent of Rancho La Brea. The approximate age and taphonomy of both sites are quite similar, despite of numerous specific differences. While the Rancho La Brea locality is world-wide known, the exciting Azerbaijanian locality of Binagada is still known mainly within the region of the former Soviet Union. With few exceptions, almost all of the relevant publications appeared in rather difficult to access sources in the former Azerbaijan and Georgian Socialist Republics and the former Russian Federation of the USSR and appeared in Russian. We consider that fact a sufficient reason to choose Binagada and the collection of fossil birds of the late Professor Nikolay Burchak-Abramovich (figure 1) from this site for the topic of the present contribution. The remains of the vast paleontological material, collected from Binagada is at present kept in at least five countries, Russia (Sankt-Petersburg), Azerbaijan (Baku), Georgia (Tbilisi), Hungary (Budapest) and Bulgaria (Sofia). Some fossil bird material has been preserved in Sankt-Petersburg, Budapest and Sofia, while in Baku and Tbilisi are kept mainly mammalian, invertebrate and plant fossil remains. The present paper aims to present all available data on Prof. Nikolay Burchak-Abramovich's former private collection of Binagadian fossil birds, as well as to summarize the numerous scattered data from Azerbaijanian, Georgian or Russian sources, the great majority of them, unknown so far to the English-speaking scientific community.

History of the site exploration

The first discovery of the site was in the beginning of the 20th century by an unknown local inhabitant, who extracted kir (bitumen) for his house roof's repair. By chance he found the gigantic bones of an unknown animal and informed the municipal administration. The remains of some prehistoric animals were discovered as a result of a subsequently undertaken excavation. Unfortunately, the site was forgotten very soon. In February 1938 the geologist A. S. Mastanzade (ANONYMOUS 2007) collected teeth of *Ursus spelaeus* and *Hyaena crocuta spelaea* (BOGACHEV 1939a) as well as bones of *Aegypius monachus*, which he delivered for examination to Prof. Bogachev (Institute of Geology of the Academy of Sciences of the former Azerbaijan Soviet Socialist Republic in Baku). Still in 1938 first systematically planned excavations started under the leadership of R. D. Dzhafarov, Director of the Natural History Museum in Baku. Until their removal to the Natural History Museum in Baku in 1945 all collected bones had been stored in the village of Binagada. After cleaning from the bitumen all bones were submerged in kerosene and benzine and were finally boiled in a potash solution.

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[1] The authors obviously erroneously placed the site "Staruni" in Galicia, i.e. in Spain. TYRBERG (1998) correctly lists the site Staruni in the Ukraine (former Polish Malopolska Region). The correct spelling of the name of the site, however, is "Starun'" (PANTELEYEV & BURCHAK-ABRAMOVICH 2000b).

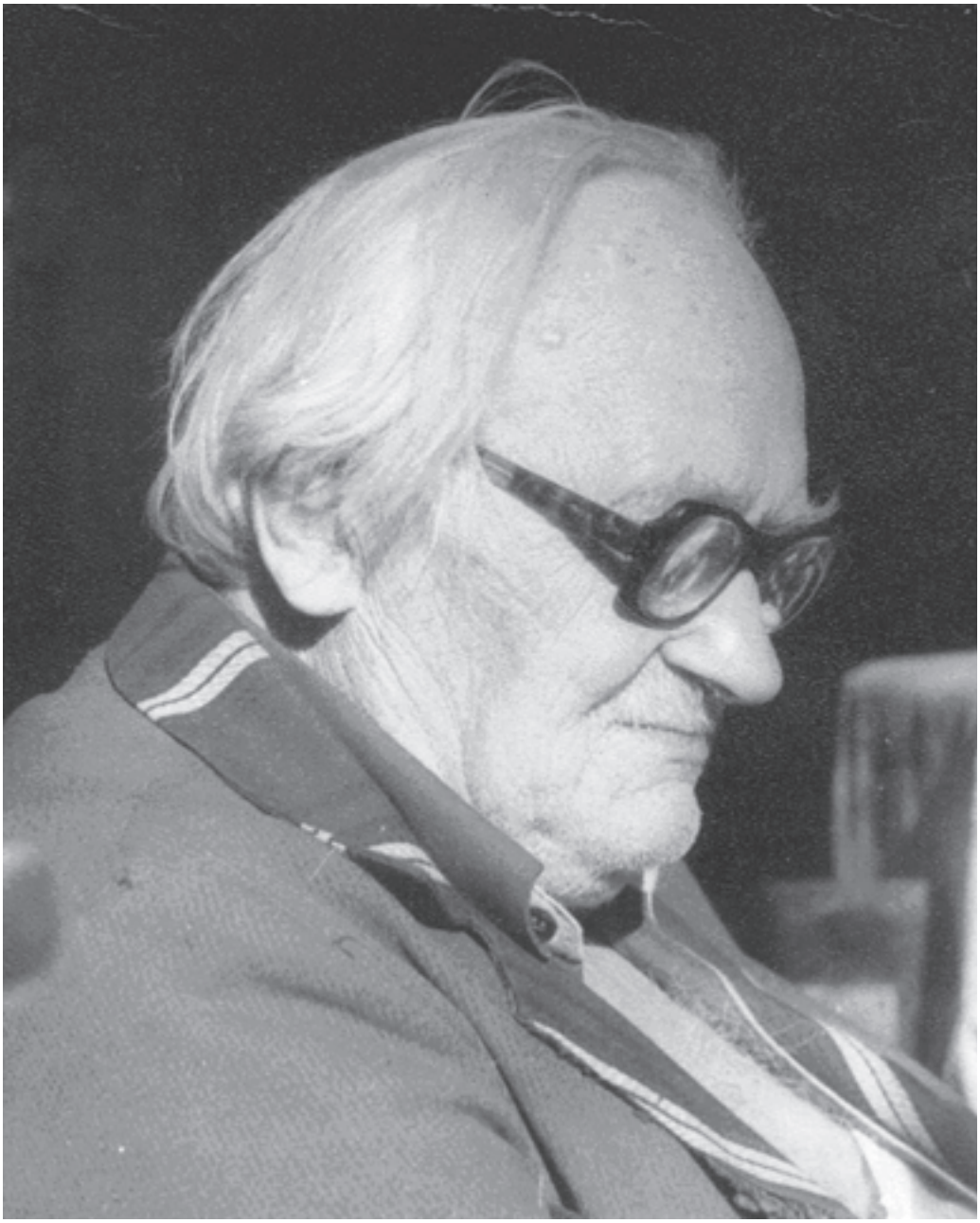

Figure 1: Portrait of Prof. Nikolay Yosifovich Burchak-Abramovich (26.09.1900–25.10.1997) – Photograph: Z. Boev (22 December 1988).

With interruptions, excavations at the site continued for many years by different paleontologists (Dzhafarov 1947). Bogachev (1938a, b, c) provided the first scientific description of Binagada, the first popular publication about the site was published eight

years later (Anonymous 1946). It contained a short review of Serebrovsky's data on the immense number of avian Quaternary bones of "Lamellirostres" (i.e. anseriforms) and other water birds, which had perished in the asphalt swamp. The Museum in Baku organized excavation campaigns in 1939–1942 and 1947–1953, all of them headed by R. D. Dzhafarov (Burchak-Abramovich 1972a). By 1956 "… almost all groups of animals from Binagada have been examined monographically" (Dzhafarov 1957: 233). Until the middle of 1938 excavations covered 8 oil pits. In 1939 the avian remains were transferred to the Zoological Institute in the former Leningrad (now Sankt-Petersburg) for examination by Serebrovsky. Unfortunately the lack of a comparative skeletal collection caused numerous misidentifications, many of them published in scientific papers (Burchak-Abramovich & Dzhafarov 1955).

Most of the collected material (bird bones and bone fragments) originated from a lot of 2,000–2,500 m^2, where some excavations had been carried out in 1939–1942. Later, in 1948–1949 the excavations had been continued on a new lot, situated 30 m NE of the former one, first excavated in 1947. But avian fossil bones are extremely abundant beyond these excavated areas as well. According to Dzhafarov (1947) the collection of fossil remnants of Quaternary animals and plants of the s. c. "Binagada kir deposits" represented the most outstanding exhibits of the G. Zardaby Natural History Museum in Baku (p. 81). Until 1957 the G. Zardabi Museum published a total of 87 scientific articles and monographs on Binagada locality and its fossil record.

Geographical location and geology of the site of Binagada

The site is located 8 km N of Baku City and 1 km SE of the village of Binagada (40°30'N / 49°05'E; Burchak-Abramovich 1959)[2], in the center of the western part of the Apsheron Peninsula, the easternmost part of the Caucasus projection into the Caspian Sea (figure 2).

In its western part are located the Kichik-Dag and Beyuk-Dag mud volcanoes. These hills are surrounded from north to the south by flat solonchac soils and salt lakes Beyukshar, Bastanarshar, Masazyr, and Binagada (Alizade 1955).

The region is built up by Tertiary and Quaternary deposits. There are thick clay layers up to 85 m at the SW end of the site, while ca. 800 m SE of Binagada village large diatomite limestone deposits are spread. Outcrops of Pontian occur in the S and NE of the site. Sand and clay layers are spread up to 218 m depth. All Tertiary and Quaternary deposits from the Cuon to Khazar suite are well represented in Binagada (Alizade 1955). In the region of the site runs the asymmetric Binagadian anticlinal (Burchak-Abramovich 1968). The bottom of the asphalt lake was layed with mazut, above it were stratified layers of water and oil (Burchak-Abramovich 1972b). The thickness of the layers with bones is 1.5 to 2.5 m (Burchak-Abramovich 1968).

Landscape and taphonomy of the site of the Binagada

A lot of water basins existed in the surroundings of the site (Alova 1948; Argiropulo & Bogachev 1939). A system of salt lakes, named Mirdorabi, is situated in the N, lake Masazar-Gyol in the W, lake Beyukshar in the S and SE and two former

[2] Slightly different geographical coordinates for Binagada (40.4758333° N; 49.8222222° E) have been found on an Internet site (30.07.2007).

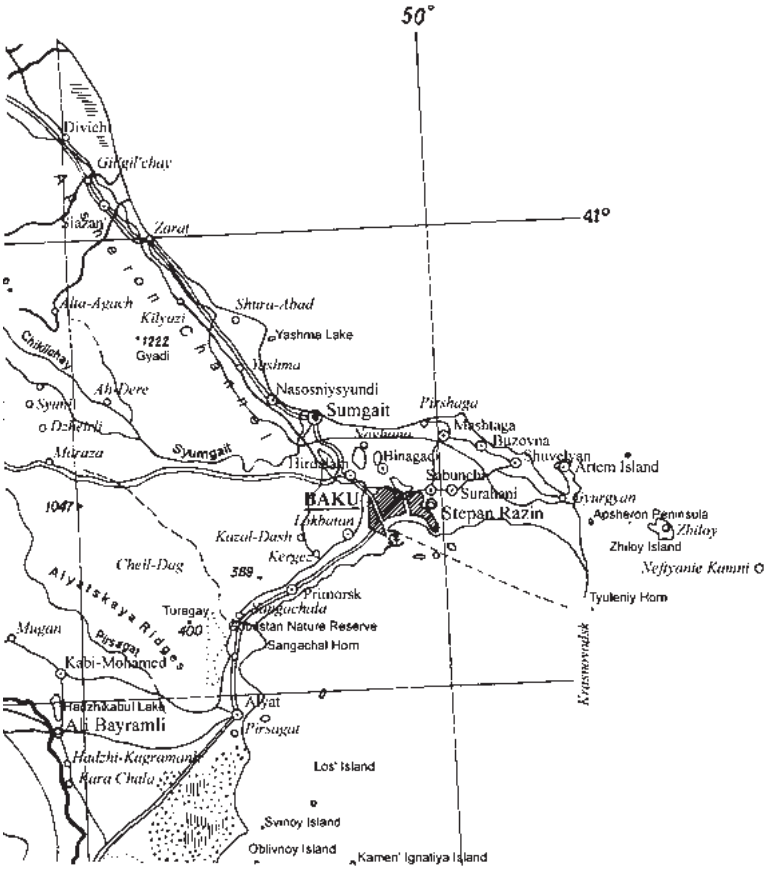

Figure 2: Geographical location of the Late Pleistocene site of Binagada (E Azerbaijan).

volcanoes, Beyukdag and Kyoyrekidag, are situated towards the W (BURCHAK-ABRAMOVICH 1968). The springing petroleum has flown into these water bodies. The local river Sumgait also existed in that time, and numerous vertebrates regularly visited its banks for water. During time the petroleum oxydised and became more solid turning into asphalt. Even in the first days after the discovery of the site, many remnants of Gypaetinae, Aquilinae, Laridae and water birds were found. Soon after its discovery, the site was protected and proclaimed a state reserve (ALOVA 1948). VINOGRADOV & STAL'MAKOVA (1938), BOGACHEV (1939b, d, e, f). PIDOPLICHKO (1954) and DZHAFAROV (1957) state, that a system of fresh-water basins and marshy areas collected oil streams in Binagada. According to SEREBROVSKY (1940a, 1948) the site consisted of a swampy mud that was mixed by the feet of ungulates visiting it for watering-places, as well as by the shore wawes. VERESHCHAGIN (1946) characterized oil floods as disastrous for migratory water birds. Until 1947 every year numerous wintering species perished in Lake Atbatan ("The Duck's death"), about 6 km from Hurdalan in the NW Apsheron. BURCHAK-ABRAMOVICH (1968) described "The site of Binagada was a chain of swampy small lakes with muddy shores …, an insidious oil trap (p. 77). The Binagada "Lake of

Death" was trapping animals, causing their mass doom in terms of several millennia" (p. 78). According to the local people the so called oil "kir" (bitumen) was used as fuel as late as the 1970ies. The site is situated in open, treeless landscape with scarce bushes of camelthorn (*Alhagi* spp.) and some dry grass species (Burchak-Abramovich & Dzhafarov 1955). That enormous trap had been acting all year during several millennia. The fossilized fruits, blossoms, insects and juvenile birds clearly confirm such a hypothesis (Burchak-Abramovich 1972a, b). Dzhafarov (1943a) accepted that the former Binagada oil lake appeared during the elevation of the Apsheron Peninsula, combined with the contemporary lowering of the level of the Caspian Sea. The small, mud bottomed freshwater lake was contaminated by oil leaking out along the folds of the relief. In the time of the accumulation of fossils, most of the Apsheron Peninsula represented a hilly area covered by semiarid steppe-landscape, similar to dry savanna. The lake shore was covered by aquatic vegetation attractive for many waders as feeding ground (Dzhafarov 1943a, Burchak-Abramovich 1951).

Main characteristics of the site are: (1) numerous, almost complete skulls have been found; (2) the preservation of bones is excellent; (3) the bones are black, oiled and all features on the bone surface are preserved. Some complete carcasses had been found and "traces of teeth of carnivores are completely absent" (Serebrovsky 1948: 68). Further results show that such a statement must not be generalized. In 1988 we found many bones that bore theeth marks and traces of gnawing (see also Serebrovsky 1948). Sultanov (1947) suggested that animals found in the site died by poisonous gase exhalations caused by eruptions of the mud volcano Beyukdag. Such a hypothesis seems rather unsatisfactory because birds had been involved as well, which should have been less vulnerable due to their high mobility.

Five distinct layers have been observed in the site: (1) limestone-clay sands up to 1,0 m; (2) fine sands, impregnated with oil, up to 0.75–1.5 m; (3) bitumen, up to 0.6 m (containing small avian bones, plant and insects fossils, as well as some skulls of large mammals); (4) bone-fossiliferous layer, slightly impregnated with oil, up to 0.35–0.9 m; (5) sands of the oil-productive zone. Bones of the large diurnal raptors have often been excavated below together with the heavy bones of rhinocerosses. Within the skull cavity of large mammals many bones of small birds have been found which means that the small birds had died after the death of the large mammals. There is another similar paleontologial site in the region, the site of Kirmaki.

Argiropulo & Bogachev (1939) supposed the local climate at the end of the Pleistocene to have been colder and more humid than at present, with a glacier covering the northern slopes. On the other hand, the vegetation was rich and highly diversified, sufficient to feed the also very varied fauna of herbivores. Besides large water basins, the landscape consisted of steppe and some "island woods and shrubs" scattered in the open land. Also some deserts, similar to present ones in Dagestan, existed in the region. Subsequent melting of the glaciers caused soil saltification and reduced the vegetational diversity. In its turn, the large terrestrial mammalian megafauna of plant-eaters and carnivores also became poorer. Such a drastic change of environment caused an intensive process of desertification (Argiropulo & Bogachev 1939). A recent general representation of the site concludes that a "savanna landscape with scattered trees of *Juniperus* spp., *Pyrus salicifolia* and *Pistacia* spp. existed in the region of Binagada" (Anonymous 2007).

Dating of the site

Soon after its discovery, Serebrovsky (1941a) dated the site as "Pleistocene" and later, as 2nd half of Pleistocene (Serebrovsky 1948), nevertheless Bogachev (1939a, b) had already dated the site as Riss (-stadial). Absolute dates of 40,000 to 35,000 BP (Alova 1948), or 35,000 BP (Anonymous 1952) have been suggested. According to Vereshchagin (1949) the remains' accumulation occured in the Riss-Würm. Some elements of the Glacial (s. c. Hazarian) fauna of the South-Russian Plane, as well as elements of southern (Middle-East and African) fauna were established in Binagada, dating the site between 60,000–20,000 BP (Vereshchagin 1951a). "The occurrence of tiger-lion, small semi-ass, … and rhinoceros date these layers at least of Pleistocene age (Vereshchagin 1951a: 118). In general, until 1955, there were quite different datings of the site: Mindel-Riss interglacial to post-glacial time, but most datings tended to Würm (Burchak-Abramovich & Dzhafarov 1955). Bogachev (1938a, b) dated the site as "Kalin (-ian) stage", i.e. the middle of the Quaternary, or Mindell-Riss. Later Bogachev (1939a, b, c, d, e) dated the bone-bearing layer directly above the sea-bed of *Didacna surahanica* Andrews, as Mindell-Riss or Riss (Bogachev 1939g). The species composition of Coleoptera suggests a colder climate and the outflow of petroleum probably occurred in the Kalin (-ian) stage, corresponding to the s. c. Novo-Valachian orogenesis of the Alps-system. Burchak-Abramovich (1959) dated the site as Riss-Wurm interglacial, but later (Burchak-Abramovich 1973) stated that the site appeared in the beginning of the Riss-Würm interglacial, a suggestion, first formulated by Serebrovsky (1948). The presence of some bird species adapted to a warmer climate (*Nycticorax nycticorax*, *Ardea purpurea*, *Plegadis falcinellus*, *Platalea leucorodia* and *Bubulcus ibis*) confirms such an assumption. After Burchak-Abramovich (1972a, b) most data suggest Middle Pleistocene – the 2nd half of Riss, while the ocurrence of some large mammals as "Mastodont" and "rhinoceros" also indicate middle Pleistocene age. The species mentioned above, as well as *Egretta garzetta*, strongly confirm the date of the site as Riss-Würm interglacial (Burchak-Abramovich (1968).

Dzhafarov (1943a) stated that accumulation of the deposits should have occurred in the interglacial or even in post-glacial time. Many of the species documented were "northern inhabitants" and they only visited the region of Binagada as wintering grounds. Burchak-Abramovich (1959) considered the eggshells of ostriches "… a reliable stratigraphic criterion for deposits of the boundary between the Neogene and the anthropogene [i.e. the Quaternary]" and later suggested (Burchak-Abramovich 1973) that only the eggshells of struthionids among the avian remains could be accepted as a guiding fossil for the "Eopleistocene" and the Early Pleistocene of Western Azerbaijan, Southern Ukraine, Middle Asia and Transbaykalia. As remains of Struthionidae have not been uncovered in the Binagada deposits, the site could be once again referred to the Late Pleistocene. Tyrberg (1998) gave a Middle to Late Pleistocene dating. Probably most exact is the statement of Panteleyev & Burchak-Abramovich (2000a) for a wider time interval of 120,000–96,000 BP.

Taxonomic composition of the fossil fauna and flora of Binagada

Avian fauna

Based on the excellent preservation of the material and the high bird-species diversity Binagada obviously represents a locality of world importance for studying the Quaternary fauna, comparable to Rancho la Brea, the Odessa catacombs (Middle Pliocene caves) and the Indian Siwalik fauna (Argiropulo 1941, Dzhafarov 1957, Anonymous 2007). First data on the taxonomic composition (and the taphonomy as well) of the findings were provided by Bogachev (1938a, b, 1939b, c, d, e, f, g) and Serebrovsky (1940b). Dzhafarov (1943a) reported about 62 species and subspecies and by 1950 a total of 98 species of birds had been established by Alekperova (1951).

Bogachev (1938a, 1939b, c, e, f, 1944) reported numerous bone remains of ducks, waders, eagles, vultures, golden eagles, black vultures, and griffon vultures. In another paper, Bogachev (1940a) mentioned a cranial fragment of "*Bubo maximus*", as well as remnants of *Aegypius monachus, Aquila chrysaetos, Phalacrocorax* spp., Accipitridae gen., Anatidae gen., *Larus* spp., etc. Later Bogachev (1948) enlarged the list of birds of Binagada up to 107 species, seven of them fossil and 27 percent no longer extant in the Apsheron Peninsula. By 1954 a total of 100 species of birds and 3 new fossil species (*Philomachus binagadensis*, *Leucogeranus bogachevi*, *Anser azarbaydzanicus*) and 4 new subspecies (*Anas platyrhynchos palaeoboschas*, *Aythya nyroca asphaltica*, *Cygnus olor bergmanni*, *Pelecanus crispus palaeocrispus*) had been recorded from the site (Burchak-Abramovich & Dzhafarov 1955). By 1962 a total of 103 bird species had been identified (Burchak-Abramovich 1962), and in 1970 their number reached 108 species, 98 of them recent taxa (Burchak-Abramovich 1972a, Burchak-Abramovich 1965a) and 8 fossil. Tyrberg (1998), citing 5 publications of Burchak-Abramovich (and none of P. Serebrovsky) listed 106 avian taxa. According to Dzhafarov (1943a) the number of flesh and carrion-eating birds (duirnal and nocturnal raptors) was very high and the occurrence of magpie (*Pica pica*) suggested the presence of scattered trees in the surroundings (supporting likewise our suggestion for the tree-nesting of some large raptors in the region). *Nyctea scandiaca* (considered a "boreal" species) was also recorded, while true mountain species of birds and mammals are not represented. The composition of water birds confirms the former existence of seasonal migration in the present form (Burchak-Abramovich 1972a). Vereshchagin (1946) first published data on *Asio flammeus* from Binagada. One fossil species (*Bubo binagadensis*) and 4 recent species of owls (*Nyctea scandiaca*, *Asio flammeus*, *Athene noctua* and *Otus scops*) have been recorded by tarsometatarsi (Burchak-Abramovich 1952). Burchak-Abramovich & Dzhafarov (1955) listed 6 species of owls in Binagada, and later Burchzak-Abramowichz (1968) listed 8 species of Strigiformes.

Serebrovsky (1948) compared the Binagada avifauna to the recent wintering avifauna of Talish and found a high similarity, as the habitat is rather similar too. The photographs Nos. 32–44 of Serebrovsky (1948) represent avian finds, but some of them have probably been misidentified (e.g. rostrum maxillae considered to represent *Bubulcus ibis*, a cranium of *Ardea purpurea*, mandibles of *Egretta alba* and *Nycticorax nycticorax*).

Voinstvenskiy (1960) listed a total of 97 bird species, 10 of them ciconiiform (8 species of Ardeidae, *Platalea leucorodia* and *Ciconia nigra*), and 7 gruiform (among them

Fulica atra, *Gallinula chloropus*, *Otis tarda*, *O. tetrax*, and *Leucogeranus bogachevi*) Among charadriiforms were *Burhinus oedicnemus* and ?*Pluvialis squatarola*.

Up to 1992 a total of 109 species had ben found, including 4 fossil species (*Philomachus binagadensis*, *Leucogeranus bogatchevi*, *Anser azerbaijanicus* and *Bubo binagadensis*) and 4 fossil subspecies (*Aythya marila asphaltica*, *Anas platyrhynchos paleoboschas*, *Cygnus olor bergmanni*, *Pelecanus crispus paleocrispus*; cf. SAPE 1993).

Serebrovsky (1948) listed a total of 62 bird species and concluded that the water of the lake was fresh and geese, ducks, storks and herons (*Leucogeranus bogatchevi*, *Platalea leucorodia*, *Ardea cinerea*, ?*Egretta alba*, *Egretta garzetta* ssp. n.?, *Bubulcus ibis*, *Nycticorax nycticorax*, *Ixobrychus minutus*, and *Botaurus stellaris*) regularly visited the lake. He did not separate the Binagada Little Egrett *Egretta garzetta* as a distinct subspecies (although it is evidently larger than the recent taxon), comparing the Binagada avifauna with that of Kumbashi (in Talish) after Tugarinov & Kozlova's (1935) data and stating a high similarity with the recent avifauna of Kumbashi. At least 25 per cent (15–16 species) of migratory birds were common, implying an important conclusion: At that time, the northern avian complex did not reach Azerbaijan, so seasonal migrations should have existed similar to present-day bird migration.

In 1949 Burchak-Abramovich (1949) reported on 62 avian species, 3 of them fossilized. Subsequently, based on 1,800 tarsometatarsi (collected between 1938–1942) Burchak-Abramovich (1953a) identified 80 species, 33 of them formerly not recorded from Binagada (among them *Fulica atra*, *Branta ruficollis*, *Branta leucopsis*, *Netta rufina*, *Aythya nyroca*, *Ciconia nigra*, *Podiceps auritus*, *Phalacrocorax carbo*, *Perdix perdix*, *Alectoris graeca*, *Circus aeruginosus*, *Circus cyaneus*, *Circus macrourus*, *Buteo buteo*, *Neophron percnopterus*, *Asio flammeus*, *Athene noctua*, *Otus scops* and *Corvus corone*). Especially interesting is the presence of *Nyctea scandiaca*, also recorded from the Late Pleistocene in Bulgaria (Boev 1998).

Burchak-Abramovich (1950) for the first time pointed out the characteristics of the taphocoenosys by the number of Falconiformes represented: Only four species of ducks (*Anas plathyrhynchos*, *Anas strepera*, *Anas crecca* and *Anas querquedula*) outnumbered diurnal raptors, the most numerous order in the site. *Haliaaetus albicilla* was represented by 166 specimens, *Aegypius monachus* by 62, and *Gyps fulvus* by 18, while *Neophron percnopterus* was represented by a single specimen only (note that Egyptian Vulture is the only migratory vulture in the Palearctic). *Ardea cinerea* was represented by 33 tarsometatarsi, *Egretta garzetta* (17), *Botaurus stellaris* (12), *Numenius arquatus* (25), *Corvus corone* by 17. It seems that Binagada played an important role as a wintering ground for migrating birds as well. The author concluded (Burchak-Abramovich 1950: 325): "It is quite probable, that some extinct and still undescribed forms or species of diurnal raptors existed in Binagada". Already Dzhafarov (1943a: 75) had discovered that among birds "There are some more forms that could be new to science" and Serebrovsky (1948) recorded that *Haliaeetus albicilla*, *Aquila chrysaetos* and *Aegypius monachus* had been represented by specimens of unusual large size and concluded: "The systematic value of these peculiarities is still unclear." However, dimensional comparison of the long bones of *A. monachus* from Binagada (collection of the NMNHS) with the homologous elements of specimens from Spain and Bulgaria showed considerable dimensional similarity (Boev unpubl.). Later Burchak-Abramovich (1968), confirmed

the suggestion of Serebrovsky (1948), that *Egretta garzetta*, *Numenius arquata*, *Xenus cinereus*, *Corvus cornix*, *Anser anser* and *Anser fabalis* were represented by subspecies new to science. Our work in 1988 on a sample of 271 bones also confirmed the reasonability of that statement (Boev & Burchak-Abramovich unpubl.).

In Transcaucasia *Bubulcus ibis* reaches the northern limit of its range (obviously the savanna-like habitat inhabited by numerous ungulates and grasshoppers provides suitable conditions for this species, which seems primarily adapted to warmer climates). Dzhafarov (1943a) defined "northern inhabitants" *Anser albifrons*, *Philomachus pugnax*, *Numenius arquatus*, *Aythya marila*, *Bucephala clangula* etc., who only visited the region of Binagada for wintering. A total of 1/4 of the recorded bird taxa are migratory.

Associated non-avian fauna

Until recently (Anonymous 2007) remains of over 50,000 animals (43 mammalian, 109 avian, 2 reptilian, 1 amphibian, 107 insect taxa) have been collected. Most interesting among them were the "numerous skeletons of rhinocerosses (Vereshchagin 1953, 1959; Gadjiev 1977; Anonymous 2007). Already Dzhafarov (1947) had recorded *Bos* spp., *Rhinoceros* sp. *Equus caballus*, *Equus hidruntinus,* Binagada red deer, Hyena, Binagada wild boar, *Canis lupus*, *Vulpes vulpes*, *Acynonyx jubatus*, *Histryx vinogradovi*, *Pitimys apsheronicus*, *Alactaga bogatchevi*, as well as 12 recent species of rodents and insectivores. Later Dzhafarov (1957) listed 39 mammals (among them *Rhinoceros binagadensis*, *Bos nomadicus*, *Megaceros* sp., *Canis lupus*, *Panthera spelaea*). In addition, the richest and best preserved collection of fossil Pleistocene marbled polecats (*Vormela peregusna*) also originated from Binagada (Vereshchagin 1951a; Spassov & Spiridonov 1993). Bats had formerly not been recorded (Dzhafarov 1957) but during our work on the Binagada material in 1988 we found numerous bone remains of Chiroptera, referring to several different species (Burchak-Abramovic & Boev unpubl.). Together with bones fragments of skin, tendons, and feathers have sometimes been reported (SAPE 1993). Fishes are not represented among the fossil taxa of the Binagada basin so far (Serebrovsky 1941b). Insects included 107 species of Coleoptera, many Hemiptera, Diptera, Formicidae, Lepidoptera, Orthoptera (Katydidae, Tettigoniidae). Of higher plants 22 species have been recorded, among them *Pirus salicifolia*, *Pistacia mutica*, *Punica granatum* and *Juniperus oxycarpa* (Burchak-Abramovich 1972a). In fact it is still disputable whether any forest existed in the vicinity, although the occurrence of *Driomys nitedula* evidently suggests the former distribution of at least small wooded lots among the vast savanna habitat.

Prof. Nikolay Burchak-Abramovich's private collection of fossil birds of Binagada

In 1939 all hitherto collected avian bones had been transferred to P. V. Serebrovsky at the Zoological Institute in Leningrad (now Sankt-Petersburg) for examination. In 1945 all bird material collected in the meantime was moved to the Natural History Museum in Baku (Burchak-Abramovich & Dzhafarov 1955).

In 1947–1949 and from 1951–1954 Prof. Burchak-Abramovich, as a research fellow of the Natural History Museum in Baku, regularly took part in the field work in Binagada. Paralelly he cleaned and prepared specimens, arranged and examined them. In 1951 he obtained a professoral degree in the famous Institute of Paleobiology of the Academy of

Sciences of Georgia. In 1961 he moved his home again and settled in Tbilisi. He lived there (in a flat on the "Vazha Pshavela" Prospekt [i.e. boulevard], No 51. In the same quarter of the city, until 2000, the Laboratory of Vertebrate Animals of the Institute of Paleobiology (LVA-IP) had been situated. In the basement of the underground floor of its building, Prof. Burchak-Abramovich stored his vast collection of Binagadian birds. In December 1988 the collection was kept in many (ca. 20) large wood boxes (chests), containing uncleaned and unprepared animal bones (mainly avian remains and those of small to middle-sized mammals). The number of avian bones could not be estimated even approximately, but obviously there were thousands of them. The other part of Prof. Nikolay Burchak-Abramovich's private collection, also numerous, was kept at his home on the "Vazha Pshavela" Prospekt. It contained only roughly cleaned bird bones, stored in 12 large carton boxes with covers, without any related information on date, exact place and depth of collecting, collector(s), etc. We worked mainly on this part of the collection during our visit in Tbilisi, lasting a month in December 1988 (SAPE 1989). At the end of this visit, Prof. Nikolay Burchak-Abramovich donated some material (52 bones) to the NMNHS. We have chosen only bones of *Aegypius monachus*, representing a combined sample of skeletal elements of various specimens (possibly over 15 individuals (Boev 2005; figures 3 & 4). Some of the small bones had been preserved articulated, fore example some pedal phalanges.

In 1961 further continuation of the research on the Binagadian paleornithologial material was the formal reason for transferring them from Baku (Azerbaijan) to Tbilisi (Georgia). All mammalian (and other) finds were left and remained in the G. Zardabi Natural History Museum in Baku. Best specimens of them were shown in the exhibition halls of the museum (Dzhafarov 1943b, Anonymous 2007).

Besides his avian paleontological collection, Nikolay Burchak-Abramovich held also a large comparative osteological collection comprising more than 500 recent species (represented in more than 1,000 specimens), among them (in 1988) *Haliaeetus pelagicus*, *Grus leucogeranus*, *Ketupa zeylonensis*, *Larus relictus*, *Larus tridactyla*, *Tetrao mlokosiewiczi* were represented (Boev 1997a). That collection was his private holding too and he kept it at his home in Tbilisi. Some specimens had been obtained by private exchange e.g., from Prof. Pierce Brodkorb (Gainesville, USA), Prof. Zygmunt Bochenski (Cracow, Poland) or Prof. Denes Janossy (Budapest, Hungary). In the basement of the LVA-IP Burchak-Abramovich furthermore kept a collection of thousands of bird mummies, collected during many years in Kazakhstan, where in 1941 he had joined the Scientific Paleontological Expedition (Boev 1997a). Another part of this enormous collection had been collected in the Kazul-Agach Nature Reserve on the W coast of the Caspian Sea in Azerbaijan[3]. It also contained many rarities, among them *Anthropoides virgo*, *Grus grus*, *Chlamydotis undulata*, *Porphyrio porphyrio*, *Burhinus oedicnemus*. None of the specimens examined in 1988 had labels including locality data, but N. Burchak-Abramovich surprisingly remembered the origin of most specimens, at least, by countries, i.e. "Kazakhstan", "Kazul-Agach" (i.e. Azerbaijan), etc. Obviously, Prof. Burchak-Abramovich considered the collection of cleaned Binagadian bird bones which he kept at home the most valuable. However, the bird mummies collection, and the uncleaned bird bones from Binagada were donated by him to the Institute of Paleobiology (more exactly, to the LVA-IP) and stored there.

[3] This reserve in the middle of 1950s hosted in the winter about 10,000,000 water birds (Tuaev 1970).


a
5 cm
b
2 cm
c
10 cm
d
10 cm
e
10 cm
f
10 cm
g
10 cm
h
10 cm
i
5 cm
j
20 cm

The major part of the cleaned Binagadian bird bones remained unexamined, uninventoried, and unphotographed until 1988. The material consisted of 20,271 fossil bones and bone fragments of at least 1983 individuals. Hence, approximatively 10.2 separarte finds (bones and bone fragments) had been preserved from every bird recorded in the sample of the examined collection. In 1988 the bones were only separated by anatomical units and (by some) higher taxonomical groups. Representation of skeletal elements (December 1988) is shown in table 1.

The collection contained a total of 45 separate skeletal elements and the great majority of finds was of excellent preservation. Because of the petroleum impregnation they were coloured very dark-brown. The bone surface of most finds was glossy.

It is interesting to note, that in 1992 N. Burchak-Abravovich declared that the Binagadian bird bone collection "… belongs to Museum of Natural History of the Academy of Sciences of Azerbaijan …" (SAPE 1993: 4). In the same publication he listed the names of the persons that had been involved in field work in Binagada: R. Dzhafarov, N. Burchak-Abramovich, N. Alekperova, D. V. Gadzhiev, and G. V. Gadzhiev and others. Unfortunately the complete material was definitively lost after the death of Prof. Nikolay Burchak-Abramovich in 1997.

In 2002 died Prof. Burchak-Abramovich's son, the paleomammalio-neurologist Dr. David Burchak, who was his only descendent and the only person interested in the preservation of his father's private scientific collection. Since 1999 a joint British-Bulgarian-Georgian project on the examination of this collection was discussed with Prof. Robert Prys-Jones (NHM-Tring, U.K.). Later our numerous attempts to restore, or to establish some new, contacts with the Georgian colleagues in order to obtain some information on the collection, remained unsuccessful. That did not leave many hopes for its safety state. Unfortunately, in June 2007 the worst suspections have been completely confirmed firstly, by Dr. Andrey Panteleyev, who cited information from Prof. Nikolay Vereschagin, Dr. Olga Potapova, etc. They unanimously stated that all private collections (bird skeletons and books) of Burchak-Abramovich were lost. Finally we succeeded to contact Dr. Guram Mchedlidze, the former Director of the Institute of Paleobiology of the Georgian Academy of Sciences by telephone. Dr. Mchedlidze confirmed that all bird bones were missing. They had obviously been removed from the flat and most probably been thrown away or otherwise destroyed – the possibility to examine this exiting and numerous sample of avian fossils has been for ever lost. At present the only preserved items of that spectacular collection at the NMNHS are the 52 bones of various specimens of *Aegypius monachus*, donated in 1988 by Prof. Burchak-Abramovich. After Andrey V. Panteleyev (Zoological Institute of the RAS, St. Petersburg, Russia), the only preserved Binagadian specimens in the former Soviet Union are the holotypes of species described

Figure 3: *Aegypius monachus* (Binagada, Late Pleistocene – collection of the NMNHS (Photos: Asen Ignatov): **(a)** Corpus ossis praemaxillaris (left lateral view); **(b)** Os quadratum dex. (caudal view); **(c)** Ramus mandibulae, pars intermedia and pars symphysialis (dorsal view, above and ventral view, below); **(d)** Sternum (frontal view); **(e)** Coracoid sin. (caudo-medial view, above) and coracoid dex. (cranio-lateral view, below); **(f)** Furcula (cranial view, left) and furcula (caudal view, right); **(g)** Scapula dex. (lateral view, above) and scapula sin. (medial view, below); **(h)** Carpometacarpus sin. (lateral view, above) and carpometacarpus dex. (medial view, below); **(i)** Phalanx proximalis digiti majoris sin. (lateral view, above) and phalanx proximalis digiti majoris dex. (medial view. below); **(j)** Ulna dex. (medial view, above) and ulna sin. (lateral view, below).


a
20 cm
b
10 cm
c
10 cm
d
15 cm
e
5 cm
f
10 cm
g
3 cm
h
3 cm

by P. V. Serebrovsky (7 fossil taxa; see appendix I.) and kept in the Zoological Institute of RAS in St. Petersburg (A. Panteleyev, pers. comm.). The collection of "uncleaned" Binagadian bird bones and the bird mummies collection, formerly kept in the LVA-IP (in Tbilisi) could not be traced, because of the change of owners of the building. It was presumably destroyed and a new block of flats was built on the spot.

Tracing the survival parts of the Binagada collection of fossil birds

1. Holdings of the Hungarian Natural History Museum – Budapest

After reading the abstract of present paper, Dr. Jiri Mlíkovský (Department of Zoology, National Museum – Prague) shared a completely unexpected assumption: In 1980, during a research visit in the Hungarian Natural History Museum (Budapest) the late Prof. Dr. Denes Janossy, has shown to him two (?) boxes of avian bones from Binagada. He told him these bones were given to him by Prof. Dr. Nikolay Burchak-Abramovich as a gift (a similar detail as for the Sofia collection of the NMNHS). Dr. Mlíkovský stated their number was at least several dozens of a variety of species. Hence, he assummed that "this might be the largest surviving collection of avian bones from Binagada" (in litt., 27.10.2007).

Later we tried to check this information, through the help of Dr. Erika Gál (Archaeological Institute of the Hungarian Academy of Sciences – Budapest). She was very kind to trace the present fate of the presumably preserved Binagadian bird fossils in Budapest and reported that there were "37 coracoidei, 15 dex. and 22 sin. present, the year of receipt is not known. The bones had been labelled *Anas platyrhynchos palaeoboschas*, but not all of the remains actually belonged to this species" (in litt, 05.11.2007). In December in reply of our query, Dr. Gál checked all the preserved material. Her identifications are as follows: *Anas crecca* (1 sin., 1 dex.), *Anas querquedula* (1 sin.), *Anas penelope* (4 sin.), *Ardea cinerea* (1 sin.), *Nyctycorax nyctycorax* (1 dex.). All the rest (26) coracoids "meet the morphological and size characteristics of *Anas platyrhynchos*" (in litt, 06.12.2007).

2. Holdings of the Zoological Instute and Museum – Sankt Petersburg

Meanwhile Dr. Andrey Panteleyev (Zoological Institute, RAS – S. Petersburg, Russia) reported that in the Zoological Institute in S. Petersburg are kept "five type specimens of taxa described by Serebrovsky and Panteleyev: *Philomachus binagadensis* Serebrovsky – 2 skulls (typus and cotypus), *Anas platyrhynchos palaeoboschas* Serebrovsky – 2 skulls (typus and cotypus), *Garrulus glandarius assiduus* Panteleyev – 1 coracoid (holotypus) and about 1,000–2,000 bird bones, mainly of Passeriforms" (in litt., 02.12.2007). Subsequently (11.12.2007), he was so kind to provide the following summarized data on that part of the Binagada avian collection:

Figure 4: *Aegypius monachus* (Binagada, Late Pleistocene – collection of the NMNHS (Photos: Asen Ignatov): **(a)** Radius sin. (medial view, above) and radius dex. (lateral view, below); **(b)** Synsacrum (left lateral view); **(c)** Femur sin. (caudal view, above) and femur dex. (cranial view, below); **(d)** Tibiotarsus dex. (caudal view, above) and tibiotarsus sin. (cranial view, below); **(e)** Fibula dex. (lateral view, above) and fibula sin. (medial view, below); **(f)** Tarsometatarsus sin. (cranial view, above) and tarsometatarsus dex. (caudal view, below); **(g)** Phalanx prox. dig. 1 pedis sin. (cranial view); **(h)** Phalanx dist. dig. 1 pedis (left lateral view).

Table 1: Assembly of the avian bone material from the Late Pleistocene site of Binagada (Eastern Azerbaijan) by anatomical units (data completed December 22, 1988).

Skeletal element					**Total**
Cranium	(neuro-cranial fragm.) 183	(splanchno-cranial fragm.) 93	(mandibular fragm.) 361	(indet. cranial fragm.) 104	741
	Anatomical side	**Number of whole bones**	**Number of almost whole bones** (preserved more than 1/2)	**Number of bone fragments** (preserved less than 1/3)	
Quadratum	dex.+sin.	10	3	1	14
Vertebrae		1,171	23	10	1,204
Os cardii		4	–	–	4
Costae	dex.+sin.	23	55	–	78
Clavicula	dex.	–	–	(medial fragment) 23	92
		–	–	(distal fragment) 69	
	sin.	–	–	(medial fragment) 25	83
		–	–	(distal fragment) 58	
	dex.+sin.	–	20	(medial fragment) 60	80
Sternum		1	–	(tabula + crista fragm.) 162	259
		–	–	(rostral fragm.) 96	
Scapula[1]	dex.	98	186	16	300
	sin.	102	207	17	326
Coracoid	dex.	978	116	43	1,137
	sin	1,125	80	81	1,286
Humerus	dex.	1,203	300	326	1,829
	sin.	1,281	364	338	1,983
Radius	dex.+sin.	565	583	355	1,503
Ulna	dex.	1,037	226	148	1,411
	sin.	944	197	154	1,295

[1] We considered scapulae "complete" either when actually intact or only apical distal ending (apex scapulae) missing.

Table 1: Continued.

Skeletal element	**Anatomical side**	**Number of whole bones**	**Number of almost whole bones** (preserved more than 1/2)	**Number of bone fragments** (preserved less than 1/3)	
Carpometacarpus[2]	dex.	725	57	72	854
	sin.	758	121	102	981
Ulnare	dex.+sin.	1	–	–	1
Radiale	dex.+sin.	–	1	–	1
Synsacrum				(corp. vert.) 213	285
				(ilium fragm.) 72	
Femur	dex.	164	100	100	364
	sin.	157	90	69	316
Tibiotarsus	dex.	142	537	341	1,020
	sin.	143	476	313	932
Tarsometatarsus	dex.	362	131	99	592
	sin.	455	114	96	665
Phalanx prox. digitus 2	dex.	49	7	–	56
	sin.	48	9	–	57
Phalanx dist. digitus 2	dex.	5	1	–	6
	sin.	4	–	–	4
Phalanx distalis digitorum 1–4 pedis	dex.+sin.	147	–	–	147
Phalanx distalis hallucis	dex.+sin.	9	–	–	9
Phalanges I, II, III et IV digitorum 1–4 pedis	dex.+sin.	353	3	–	356
Total	**203**	**12,497**	**4,564**	**3,007**	**20,271**

[2] We considered carpometacarpus "complete" either when actually intact or only os metacarpale minus missing.

1) Identifications by P. V. Serebrovsky (19 taxa): *Anas acuta*: 6 crania (No PO 6951–6956); 2 praemaxillae (No PO 6957–6958); 4 humeri (No PO 6959–6962); *Anas crecca*: 4 crania (No 6963–6965, 6968); 2 humeri (No PO 6966–6967); *Anas querquedula*: 2 crania (No PO 6969–6970); 2 humeri (No PO 6971–6972); 2 ulnae (No PO 6973–6974); *Larus argentatus*: 1 cranium (No PO 6975); *Burhinus oedicnemus*: 1 cranium (No PO 6976); *Limosa* sp.: 1 humerus (No PO 6977); *Numenius arquata*: 2 crania (No PO 6978–6979); *Philomachus binagadensis* sp. n.: 2 crania (cotypus; No PO 6980–6981); *Ardea cinerea*: 1 cranium (No PO 6982); 1 praemaxilla (No PO 6983); 2 unspecified bones (No PO 6984–6985); *Botaurus stellaris*: 2 unspecified bones (No PO 6986–6987); *Anas platyrhynchos palaeoboschus* ssp. n.: 2 crania (cotypus; No PO 6990; 6993); 1 praemaxilla (No PO 6994); 2 claviculae (No PO 6995–6996); *Gyps fulvus*: 1 tarsometatarsus (No PO 6997); 1 cranium (No PO 6998); 2 praemaxillae (No PO 6999–7000); Uninventoried material: Ardeidae gen. indet.: 4 crania; *Anas* sp. (*crecca* aut *querquedula*): 17 crania; *Anser* sp. (*anser* aut *fabalis*) : 1 cranium; Limicolae gen. indet.: 2 crania; *Aquila chrysaetos*: 4 crania, 1 tibiotatrsus; *Haliaeetus albicilla*: 2 crania; 2 mandibulae; 2 coracoids; 2 humeri; *Aegypius monachus*: 5 crania; 2 mandibulae, 1 tarsometatarsus, 1 carpometacarpus.

2) Identifications by N. Burchak-Abramovich; uninventoried material (8 taxa): *Anser* sp. (*anser* or *fabalis*): 2 femora; *Perdix perdix*: 1 femur; *Pterocles orientalis* (received from and possibly identified by N. Burchak-Abramovich): 1 humerus; *Falco peregrinus*: 2 femora; *Aquila nipalensis*: 2 femora; *Aquila chrysaetos*: 3 femora; *Haliaeetus albicilla*: 3 femora; *Gyps fulvus*: 4 femora.

3) Identifications by A. Panteleyev (4 taxa): *Garrulus glandarius assiduous* ssp. n.: 1 coracoid (holotypus; No PO 5499); uninventoried material: 1 coracoid; 1 humerus; 3 ulnae; *Pica pica*: 1 praemaxilla; 6 coracoids; 18 humeri; 13 ulnae; 2 radii; 2 carpometacarpi; 5 femora; 7 tibiotarsi; 7 tarsometatarsi; *Corvus monedula*: 2 coracoids, 3 humeri, 2 radii, 1 femur, 4 tibiotarsi, 1 tarsometatarsus; Alaudidae gen. indet.: ca. 300 bones.

Besides the material listed above (numbering at least 494 bones), according to A. Panteleyev in the collections of the Zoological Instute and Museum in Sankt Petersburg are also kept "many partly identified (of Passeriformes) [i.e. of Oscines – Z. B.], and unsorted (of Non-Passeriformes) bird bones".

The scientific value of the Binagada collection of Prof. Nikolay Burchak-Abramovich

As Prof. Burchak-Abramovich himself evaluated, the scientific importance of the collection of the Binagadian birds, is considerable especially for the examination of variability phenomena (Burchak-Abramovich 1965b, 1968) and also for pathological and traumatic bone malformations (Burchak-Abramovich 1948, 1953b). He found a pre-mortem rupture of a humerus dex. of a specimen of *Anas plathyrhynchos*, later healed up. The fore-arm (radius et ulna) had been torn by a carnivore mammal. The author concluded that possibly a dense marsh vegetation occurred along the shores of the water bodies, that allowed the heavily injured bird to survive (Burchak-Abramovich 1949). Four other bone abnormalities of *Aquila nipalensis* (left femur), *Aegypius*

monachus (left humerus), *Gyps fulvus* (right tarsometatarsus), and *Haliaeetus albicilla* (right tarsometatarsus) have been also examined by Burchak-Abramovich (1953b). Among more than 20,000 avian bones examined by Burchak-Abramovich (1953a) there were only 5 bones with morphological abnormalities: *A. platyrhynchos paleoboschas* (humerus dex.), *Aquila nipalensis* (femur sin.), *Aegypius monachus* (humerus sin.), *Gyps fulvus* (tarsometatarsus dex.), *Haliaeetus albicilla* (tarsometatarsus dex.).

In fact our knowledge about Quaternary avian taxa has been considerably enhanced by the material from Binagadia and several taxa new to science have been found: 4 new species (*Anser azerbaidzhanicus*, *Leucogeranus bogatschevi* and *Bubo binagadensis* (Burchak-Abramovich 1965c), *Philomachus binagadensis*), 5 new subspecies (*Anas platyrhynchos palaeoboschas*, *Aythya marila asphaltica*, *Cyrnus olor bergmanni*, *Pelecanus crispus palaeocrispus*., *Garrulus glandarius assiduus*), and 4 still undescribed fossil subspecies (*Xenus cinereus* ssp. n., *Numenius arquata* ssp. n., *Egretta garzetta* ssp. n. and *Pica pica* ssp. n., the latter designated by Panteleyev & Burchak-Abramovich 2000a).

Binagadian avian collections have also been indispensable for research in paleozoogeography (Burchak-Abramovich 1959), paleoecology (Bogachev 1940a; Voinstvenskiy 1960; Vereshchagin 1946; 1951b; Burchak-Abramovich 1959, 1966a, 1981), biochronology (Vereshchagin 1951a, c; Burchak-Abramovich 1972b) and taphonomy (Sultanov 1947; Serebrovsky 1940a; 1941a, 1948; Dzhafarov 1943a, 1956, 1957; Alekperova 1951; Mamedaliev & Kaplan 1948).

Personal contribution of Prof. Nikolay Burchak-Abramovich towards the exploration of avian fossils from the site

During 1947–1949 and 1951–1954, Prof. Burchak-Abramovich regularly took part in the field works for excavation and collecting fossils in Binagada as a research fellow of the Natural History Museum in Baku. Paralelly he cleaned and prepared specimens, arranged and examined them. After World War II, in the 1940ies, Prof. Nicolay Yosifovich Burchak-Abramovich moved his home to Azerbaijan and lived there until 1961. For more than a decade he worked at the Natural History Museum in Baku, where he mainly examined the avian fossil fauna of the site of Binagada (Boev 1997a, b).

There is no other scientist, whose life was so directly related to the exploration of Binagada's paleontological record. During that period N. Burchak-Abramovich worked very intensively. A series of publications appeared in the local (Azerbaijan) and in the state's (Moscow) scientific journals. The first paper by Burchak-Abramovich on Binagada fossils was published in 1948 and the total of his publications, especially based on the Binagadian fossil birds, numbers at least 27. As birds are best represented in Binagada, both in remains and taxa, their exploration contributes in a higher degree to the overall exploration of the fossil record of the site.

In 1947 some new avian fossil remains were discovered in other regions of the Apsheron peninsula – near Hurdalani, Artema Island, Kirmak, Babazanan near the town of Salyani, and Kirkishlak. All these avian sites yielded also many mammalian and other remains. In the locality near Babazan bone remnants of large Falconiformes were collected. In the same year (1947) the Square No 1 in Binagada (surface 8 m^2)

was sealed and preserved. The excavation works were stopped, because … (!) it contained extraordinary numerous bird and mammal bones (Burchak-Abramovich & Dzhafarov 1955). In 1948 Prof. Burchak-Abramovich continued the field work in Binagada, started first by P. V. Serebrovsky. Only the finds of ungulates, collected and examined in that year numbered app. 8,000. Most abundant were *Equus* aff. *cabalus*, *Equus* aff. *hidruntinus*, *Rhinoceros* aff. *merckii*, *Cervus elaphus binagadensis*, *Saiga tatarica* (*S. t. binagadensis*), *Bos mastanzadei*, *Bos primigenius*, *Sus apsheronicus*, *Ovis* cf. *ammon*, and *Megaceros* sp. In 1948 a new 10 m^2 of Square No 2 were digged up and some new taxa (of pelecans, falconiforms, waders, etc.) were added to the Binagada faunal list. As Burchak-Abramovich & Dzhafarov (1955: 115) mentioned "… in 1949 quite many remains of birds were discovered". In 1951 a scientific-popular documentary film, entitled "30,000 years ago" was created. In 1953 two new squares (No 4, surface 24 m^2) and Square No 5 were excavated (Burchak-Abramovich & Dzhafarov 1955). In 1950 Burchak-Abramovich completed the identification of the tarsometatarsal bones from the material collected between 1939 and 1942.

Four decades later, in 1992 Prof. Burchak-Abramovich started to gather a team of specialists for examination of his collection in order to prepare and publish by the Academy of Sciences of Azerbaijan a collective monograph in Russian "with a detailed summary in Azerbaijanian and in English" (SAPE 1993). In this collective work he planned to involve Dr. Andrey Panteleyev (Zoological Institute, RAS – St. Petersburg, Russia) for examination of Passeriformes, Dr. Olga Potapova (The Hot Springs Mammoth Site – Hot Springs, USA) for Galliformes, and Dr. Zlatozar Boev (National Museum of Natural History, BAS – Sofia, Bulgaria, NMNHS) for Ciconiiformes and Gruiformes. He also intended to associate other scientists to this team (SAPE 1993). Instead of a monograph, after 1968 (when the last publication of Binagada avifauna has been published), only two papers appeared. One provided some general information on the site (Panteleyev & Burchak-Abramovich 2000b), while the other presented results on small corvids (Panteleyev & Burchak-Abramovich 2000a). Both represent most recent and updated information.

Conclusions

Seventy years after the discovery of the site of Binagada, one of the world's richest sites of fossil birds, less than 10 percent of the collected avian material is preserved for the avian palaeontology. The great majority of it (ca. 61 percent) remained unexamined, while almost all of material of the published avian taxa of the site is definitely lost to science.

From the unlucky fate of Burchak-Abramovic's collection it must be concluded that all scientific collections, including private collections, should be registered and considered a national and world-wide scientific and cultural heritage. Responsibility clearly rests with national authorities and the state should provide a kind of care (and control) for the guaranteed preservation of scientific material.

Although almost completely built-up at present, the site of Binagada and other similar sites in the neighbourhood deserve special attention of the international paleontologists' community. Their exploration could be continued through some international paleontological projects, including the involvement of local Azerbaijanian specialists.

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References

Alekperova N.A., 1951: Flora and fauna of Binagada in the epoch of the formation of the Binagadian bitumen deposits. – Izvestiya Akademii nauk Azerbaydzhanskoy SSR, Baku, 8: 35-50. [In Russian]

Alizade K.A., 1955: Geological structure of the Binagadian localiy of fossil bones. – In: Binagadinskoe mestonahozhdenie chetvertichnoy fauni I flori. Part. 4. Trudi Estestvenno-istoricheskogo muzeya imeni G. Zardabi, Publ. house of the Acad. of Sci. of the Azerbaijan SSR, Baku, 10: 5–9. [In Russian]

Alova G., 1948: A reserve of fossil [organisms]. – Vokrug Sveta, 4: 45–47. [In Russian]

Anonymous, 1946: Paleontological activities in the USSR (From a letter to E. H. Colbert). – Society of Vertebrate Paleontology. News Bulletin, December, 19: 6–9.

Anonymous, 1952: Exploration of the remains of fossil animals. – "Bakinskiy rabochiy" newspaper, Baku, 302 (9626) / 24.12.1952. [In Russian]

Anonymous, 2007: The paleontological fauna of Apsheron. – http://www.window2baku. com/Ancient/binagadi.htm (30.07.2007).

Argiropulo A.I. & Bogachev V.V., 1939: Quaternary fauna of the Apsheron bitumen ("kir") deposits. – Priroda, Moscow, 6: 76–78. [In Russian]

Argiropulo A.I., 1941: Quaternary fauna of rodents and insectivores of the Binagadas (Apsheron Peninsula) – Priroda, Moscow, 3: 88–91. [In Russian]

Boev Z., 1997a: 1997. In memoriam. Prof. Dr. Nikolay Burchak-Abramovich has died. – Priroda, Sofia, 3–4: 163–166.

Boev Z., 1997b: Prof. Dr. Nikolay Yosifovich Burchak-Abramovich (26.09.1900 – 15.10.1997). – Historia naturalis bulgarica, 8: 126. [in Bulgarian]

Boev Z., 1998: First fossil record of the Snowy Owl *Nyctea scandiaca* (L., 1758) (Aves: Strigidae) from Bulgaria. – Historia naturalis bulgarica, 9: 79–86.

Boev Z. N., 2005: Fossil birds in the National Museum of Natural History, Sofia: composition, development and scientific value. – Zool. Med. Leiden 79, 3 (4): 35–44.

Bogachev V.V., 1938a: A find of post-Tertiary fauna of mammals in the surroundings of the Baku. – Izvestiya Azerbaydzhanskogo filiala Akademii nauk SSSR, Baku, 3. [In Russian]

Bogachev V.V., 1938b: A find of post-Tertiary fauna of mammals in the surroundings of the Baku. – Priroda, Moscow, 7–8: 150. [In Russian]

Bogachev V.V., 1938c: Paleontological notes. – Trudi Azerbaidzhanskogo filiala Akademii nauk SSSR, Geological Series, 9 (39). [In Russian]

Bogachev V.V., 1939a: Quaternary (interglacial) fauna of the Apsheron Peninsula. – Comptes Rendus Acad. Sci. USSR, 23 (3): 315–318. [In Russian]

Bogachev V.V., 1939b: Binagadas – a graveyard of the Quaternary fauna of the Apsheron Peninsula. – Publ. house of the Azerbaijan subsidiary of the Acad. of Sci of the SSSR, Baku. [In Russian]

Bogachev V.V., 1939c: [Some new data] on the bone-bearing layers in the surroundings of Baku. – Priroda, Moscow, 1: 83. [In Russian]

Bogachev V.V., 1939d: New data on the fauna and flora of the Binagadian bitumen locality. – Izvestiya Azerbaydzhanskogo filiala Akademii nauk SSSR, Baku, 6: 91–99. [In Russian]

Bogachev V. V., 1939e: Excavations of the Quaternary fauna in the vicinities of Binagada village. – Izvestiya Azerbaydzhanskogo filiala Akademii nauk SSSR, Baku, 3: 81–83. [In Russian]

Bogachev V.V., 1939f: On the finding of bone-bearing layers in the surroundings of Baku. – Priroda, Moscow, 1: 83. [In Russian]

Bogachev V.V., 1939g: Fauna of the Binagadian bitumen layers. – Izvestiya Azerbaydzhanskogo filiala Akademii nauk SSSR, Baku, 1–2. [In Russian]

Bogachev V.V., 1940a: Pictures of the primitive nature of the Apsheron (Binagadas). – Dokladi Azerbaydzhanskogo filiala Akademii nauk, Baku, 1–114. [In Russian]

Bogachev V.V., 1940b: Exploration of the Quaternary Binagadian fauna of the Apsheron Peninsula. – Izvestiya Azerbaydzhanskogo filiala Akademii nauk SSSR, Baku, 5. [In Russian]

Bogachev V.V., 1944: New finds of Quaternary fauna of Apsheron. – Priroda, 2: 68-71. [In Russian]

Bogachev V.V., 1948: Fauna of the Binagadian bitumen layers. Beetles (Coleoptera). – Trudi Estestvenno-istoricheskogo muzeya im. G. Zardabi, Publ. house of the Acad. of Sci. of the Azerbaijan SSR, 1–2. [In Russian]

Burchak-Abramovich N.Y., 1948: A fossil pond duck-invalid in the Binagadian ornithofauna. – Dokladi Akademii Nauk Azerbaydzhanskoy SSR, Baku, 5 (7): 272–276. [In Russian]

Burchak-Abramovich N.Y., 1949: New data on the fossil birds of the Binagadian locality of bitumens. – Dokladi Akademii Nauk Azerbaydzhanskoy SSR, Baku, 5 (6): 224–229. [In Russian]

Burchak-Abramovich N.Y., 1950: New data on Binagadian birds. Second Article. – Dokladi. Akademii Nauk Azerbaydzhanskoy SSR, Baku, 6 (2): 87–91. [In Russian]

Burchak-Abramovich N.Y., 1951: Towards the history of the terrestrial vertebrates of Azerbaijan. – In: The Wildlife of Azerbaijan., Baku. Inst. of Zool. of the Acad. of Sci. of the Azerbaijan SSR, pp. 7–33. [In Russian]

Burchak-Abramovich N.Y., 1952: Nocturnal raptorial birds (owls) of the Binagadian bitumens. – Dokladi Akademii Nauk Azerbaydzhanskoy SSR, 8 (1): 25–29. [In Russian]

Burchak-Abramovich N.Y., 1953a: Materials to the studiyng of the large duirnal raptorial birds of the Binagadian bitumens (Identification of the tarsometatarsal bones). – In: Binagadinskoye mestonahozhdeniye chetvertichnoy fauni I flori. Part 3. Trudi Estestvenno-Istoricheskogo muzeya imeni G. Zardabi. Publ. House of the Acad. of Sci of the Azerbaijan SSR, Baku, 6: 324–334. [In Russian]

Burchak-Abramovich N.Y., 1953b: Materials to the studying of the morbid and traumatic bone formations of the Binagadian fossil birds. – In: Binagadinskoye mestonahozhdeniye chetvertichnoy fauni I flori. Part 3. Trudi Estestvenno-Istoricheskogo muzeya imeni G. Zardabi. Publ. House of the Acad. of Sci of the Azerbaijan SSR, Baku, 6: 310–323. [In Russian]

Burchak-Abramovich N.Y., 1959: Binagadian birds and their zoogeographical significance. – In: Vtoraya Vsesoyuznaya ornitologicheskaya konferentsiya, 18–25 avgusta 1959, Tezisi dokladov, Publ. house of the Moscow State Univ., 1: 18–20. [In Russian]

Burchak-Abramovich N.Y., 1962: New data on the Binagadian birds. – Ornitologiya, Moscow, Moscow State Univ. Press. 4: 458–464. [In Russian]

Burchak-Abramovich N.Y., 1965a: History of the Quaternary avifauna of the Caucasus. – [Proceed. of the 4th All-Soviet-Union Ornithol Conf. 1–7 Sept. 1965] – Novosti Ornitologii, Al'ma-Ata, 50–52. [In Russian]

Burchak-Abramovich N.Y., 1965b: Towards the examination of the intraspecific variability after materials of the Pleistocene Binagadian birds. – In: Devyataya nauchnaya sesiya Instituta paleobiologii Akademii nauk Gruzinskoy SSR, 17–19 sentyabrya 1965, Tbilisi, 22–23. [In Russian]

Burchak-Abramovich N.Y., 1965c: New species of fossil Eagle Owl from Binagada. – Ornitologiya, Moscow, Moscow State Univ. Press. 7: 452–454 [In Russian]

Burchak-Abramovich N.Y., 1966a: Towards the exploration of the Pleistocene fauna of the Caucasus (fossil birds). – Izvestiya Akademii nauk Azerbaidzhanskoy SSR, Seriya nauk o Zemle, Baku, 6. [In Russian]

Burchak-Abramovich N.Y., 1966b: Binagada birds (some conclusions of their exploration). – Byulletin Moskovskogo obshchestva ispitateley prirodi, Otdelenie Biologii, Moscow, 71 (3): 129–133. [In Russian]

Burchak-Abramovich N.Y., 1968: Towards the knowledge of the variability phenomena among the Pleistocene birds of Binagada. – In: Obshchie voprosi evolyutsionnoy paleobiologii, Metsniereba Publ. House, Tbilisi, 4: 75–97. [In Russian]

Burchak-Abramovich N.Y., 1972a: Binagadian fauna and flora. – In: Sessiya, posveshchenoy 100-letiyu so dnya rozhdeniya akad. A. A. Borisyaka, Paleontological Institute of the Acad. of Sci. of the USSSR, Moscow, pp. 73–76. [In Russian]

Burchak-Abramovich N.Y., 1972b: Class of birds and its importance to the geochronological charts. – In: Obshchie voprosi evolyutsionnoy paleobiologii. Metsniereba publ. house, Tbilisi, 7: 62–78. [In Russian]

Burchak-Abramovich N.Y., 1973: Towards the exploration of the ornithofauna of the Pleistocene deposits of the USSR. – In: Tezisi dokladov k Chetvyortogo Vsesoyuznogo soveshchaniya po izichenii chetvertichnogo perioda. Academy of Sciences of the USSR, Erevan, pp. 1–63. [In Russian]

Burchak-Abramovich N.Y., 1975: Die pleistozäne Vogelfauna der Ud SSR. – Quartarpaläontologie. Berlin, 1: 87–195.

Burchak-Abramovich N.Y., 1981: The well-being of the waterfowl and the preservation of the water bodies in the present times and in the geological past. – In: Ohrana prirodi Gruzii. Tbilisi, 9: 91–131. [In Russian]

Burczak-Abramowicz N.Y., 1968: Szatki puchacza *Aegolius funereus* (L.) w plejstocenskich pokladach bitumicznych w Binagadach na Polwyspie Apszeronskim (ZSRRO. – Przeglad Zoologiczny, Warsaw, 12 (3): 321–327.

Burchak-Abramovich N.Y. & Dzhafarov R. D., 1955: Binagadian site of Upper Quaternary fauna and flora of the Apsheron Peninsula. Geographical location. History of exploration. List of animals and plants. Bibliography. – In: Binagadinskoye mestonahozhdeniye chetvertichnoy fauni I flori. Part 4. Trudi Estestvenno-istoricheskogo muzeya imeni G. Zardabi, Publ. house of the Acad. of Sci of the Azerbaijan SSR, Baku, 10: 89–146. [In Russian]

del Hoyo J., Elliot A. & J. Sargatal (eds.), 1992–2002: Handbook of the Birds of the World, Vols. 1–7. – Lynx Edicions, Barcelona.

Dzhafarov R.D., 1943a: Birds of the Binagadian excavations. – Izvestiya Azerbaydzhanskogo filiala Akademii nauk SSSR, Baku, 7: 73–76. [In Russian]

Dzhafarov R.D., 1943b: The Natural History Museum [of Baku]. – Izvestiya Azerbaydzhanskogo filiala Akademii nauk SSSR, Baku, 6. [In Russian]

Dzhafarov R.D., 1947: The G. Zardabi Natural History Museum of the Academy of Sciences of the Azerbaijan SSR. – In: Izvestiya Akademii nauk Azerbaydzhanskoy SSR, Baku, 10: 79–83. [In Russian]

Dzhafarov R.D., 1956: The Quaternay fauna of Binagadas. – Priroda, Moscow, 2: 108–109. [In Russian]

Dzhafarov R.D., 1957: The Pleistocene fauna and flora of Binagada. – In: Desyat' let Akademii nauk Azerbaydzhanskoy SSR. Nauchnaya sessiya, Baku. Publ. house of the Acad. of Sci of the Azerbaijan SSR, pp. 232–237. [In Russian]

Gadjiev D.V., 1977: Change of the species composition of ungulate mammals of the Azerbaijan fauna during Quaternary period under the influence of the anthropogenic factors. – Works of Azerbaijan Reserves, Baku, Azerneshr. 4: 108–128.

Gromov I.M., Baranov G.I. (eds), 1981: A Catalogue of the Mammals of the USSR. – Nauka Publ. House, Leningrad Subsidiary, Leningrad, 1–456. [In Russian]

Mamedaliev Yu. G. & Kaplan S. Z., 1948: Examination of the bitumen of the Binagadian graveyard of Quaternary fauna and flora. – Izvestiya Akademii nauk Azerbaydzhanskoy SSR, Baku, 6. [In Russian]

Panteleev A.V. & Burchak-Abramovich N.Y., 2000a: Pesserine birds from Binagady Pleistocene asphalts. II. Small corvids. – The Russian Journal of Ornithology. Express-issue. 2000, 115: 3–17. [In Russian]

Panteleev A.V. & Burchak-Abramovich N.Y., 2000b: Pesserine birds from Binagady Pleistocene asphalts. I. Introduction. – The Russian Journal of Ornithology. Express-issue. 2000, 112: 3–8. [In Russian]

Pidoplichko I.G., 1954: The importance of the Binagadian locality and the excavations of the archaeological monuments for the knowledge of the history of the fauna of the Caucasus. – In: O lednikovom periode. Istoriya chetvertichnoy fauni of the European part of the USSR. Publ. house of the Acad. of Sci. of the Ukrainian SSR, 3: 33–36. [In Russian]

SAPE (Society of the Avian Paleontology and Evolution), 1989: Bulgaria. – In: Information Letter. Society of Avian Paleontology and Evolution, 3: 2.

SAPE (Society of the Avian Paleontology and Evolution), 1993: Georgia. – In: Information Letter. Society of Avian Paleontology and Evolution, 7: 4.

Serebrovsky P.V., 1940a: On the birds of the Binagadian bitumen layers. – Izvestiya Azerbaydzhanskogo filiala Akadamii nauk SSSR, Baku, 3: 71–75. [In Russian]

Serebrovsky P.V., 1940b: New species of birds from Binagady beds. – Comptes Rendus Acad. Sci. USSR, Moscow, 27 (7): 766–768. [In Russian]

Serebrovsky P.V., 1941a: Conclusions of the work on the identification of the Pleistocene birds of the Binagadian beds. – Comptes Rendus Acad. Sci. USSR, Moscow. [In Russian]

Serebrovsky P.V., 1941b: Remains of the Pleistocene birds of the Binagadian beds. – Comptes Rendus Acad. Sci. USSR, Moscow, 33 (7–8): 473–475. [In Russian]

Serebrovsky P. V., 1948: Birds of the Binagadian bitumen beds. – Trudi Estestvenno-istoricheskogo muzeya imeni G. Zardabi, Baku, 1–2: 21–85. [In Russian]

Spassov N. & Spiridonov G., 1993. *Vormela peregusna* Guld., 1770. – Tigeriltis. In: Handbuch der Saugetiere Europas. Aula Verlag GmbH, Wiesbaden. Band 5/II (Carnivora), pp. 817–854.

Sultanov R.G., 1947: The geological conditions of the accumulation of the bone-bearing layers in the Binagadian and Kirmakinian graveyards. – Izvestiya Akademii nauk Azerbaydzhanskoy SSR, 6: 60–68. [In Russian]

Tuaev D.G. 1970: Prospects of the existence of the waterfowl wintering and nesting grounds in Azerbaijan and proposals for their conservation ant rational exploitation. – Thansactions of the 9th Internat. Congr. of Game Biologists, Moscow, pp. 888–890.

Tugarinov A. Ya. & Kozlova-Pushkarova E. V., 1935: The wintering of the birds in the Talish. – Trudi Azerbaydzhanskogo filiala Akademii nauk SSSR, Baku, 23: 124. [In Russian]

Tyrberg T., 1998: Pleistocene birds of the Palearctic: a catalogue. – Publ. of the Nuttall Ornithol. Club, No 27, Cambridge, Massatchusetts, pp. 1–720.

Vereshchagin N.K., 1946: Oil doom of birds in Azerbaijan. – Zoologicheskiy zhurnal, 25 (1): 69–80.

Vereshchagin N.K., 1949: Pleistocene relics of Kabristan and the Apsheron peninsula. – Bulletin Moskovskogo obshchestva ispitateley prirodi, Biology Series, Moscow, 59 (4): 3–14. [In Russian]

Vereshchagin N.K., 1951a: Mammals (Carnivora) from the Binagada asphalt [beds]. The Binagada location of the Quaternary fauna and flora. – Works of the Natural History Museum. Acad. of Sci. of Azerbaijan SSR, 4: 28–126.

Vereshchagin N.K., 1951b: Probable causes of animal doom and the origin of the Binagadian burial. – In: Binagadinskoye mestonahozhdeniye chetvertichnoy fauni I flori. Part 1. Trudi Estestvenno-istoricheskogo muzeya imeni G. Zardabi, Publ. house of the Acad. of Sci of the Azerbaijan SSR, Baku 6: 113–115. [In Russian]

Vereshchagin N.K., 1951c: Age of the Binagadian fauna. – In: Binagadinskoye mestonahozhdeniye chetvertichnoy fauni i flori. Part 1. Trudi Estestvenno-istoricheskogo muzeya imeni G. Zardabi, Publ. house of the Acad. of Sci of the Azerbaijan SSR, Baku, 6: 115–119. [In Russian]

Vereshchagin N.K., 1953: Mammals of the Caucasus (history of formation of the fauna). – Autoreferat of the D. Sci. thesis. Institute of Zoology of the Academy of Sciences of the USSR, Leningrad, pp. 1–XX.

Vereshchagin N.K., 1959: Mammals of the Caucasus (History of the fauna formation). Moskow – Leningrad. Acad. of Sci. of the USSR. pp. 1–703. [In Russian]

Vinogradov B.S. & Stal'makova V., 1938: On the animal concentration in the oil meadows. – Priroda, Moscow. [In Russian]

Voinstvenskiy M.A., 1960: History of the ornithofauna of the steppe zone of the European Part of the USSR. – In: The Birds of the Steepe zone of the European Part of the USSR. Publ. House of the Acad. of Sci. of the Ukrainian SSR, Kiev, pp. 233–283. [In Russian]

Appendix 1.

Taxonomic composition of the fauna and flora of Binagada[1].

Mammalia[2]

INSECTIVORA
1. *Hemiechinus auritus* (Gmelin, 1770)
2. *Erinaceus europaeus* L., 1758
3. *Erinaceus rumanicus transcaucasicus* (Satunin, 1907)
4. *Crocidura russula* Hermann, 1780.

CARNIVORA
5. *Canis aureus* L., 1758
6. *Canis lupus apsheronicus* Vereschagin, 1951
7. *Vulpes corsac* L., 1758
8. *Crocuta crocuta spelaea* Goldfuss, 1823
9. *Hyaena hyaena* L., 1758
10. *Meles meles* aff. *minor* Satunin, 1905
11. *Vormela peregusna* Güldenstädt, 1770
12. *Ursus arctos binagadensis* Vereschagin, 1946
13. *Felis ocreata* Gmelin, 1791
14. *Panthera spelaea* Goldfuss, 1810
15. *Acinonyx jubatus* Scherber, 1776

PERRISODACTYLA
16. *Dicerorhinus binagadensis* Dzafarov, 1955
17. *Rhinoceros merkii* Jaeger, 1841
18. *Equus* aff. *cabalus* L., 1758
19. *Equus hydruntinus* Regalia, 1907
20. *Equus* ?*onager* Boddaert, 1785

ARTYODACTYLA
21. *Megaceros* sp.
22. *Cervus elaphus binagadensis* Alekperova, 1950
23. *Bos mastanzadei* Burchak-Abramovich, 1952
24. *Bos primigenius* Bojanus, 1827
25. *Ovis* cf. *ammon* L., 1758
26. *Saiga binagadensis* Alekperova, 1953
27. *Sus apsheronicus* Burchak-Abramovich & Dzjafarov, 1946
28. *Gazella subgutturosa* Güldenstaedt, 1780

RODENTIA
29. *Hystrix vinogradovi* Argyropulo, 1941
30. *Alactaga jaculus bogatschevi* Argyropulo, 1941

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[1] After Burchak-Abramovich & Dzhafarov (1955), revised and completed. Fossil taxa underlined.

[2] Taxonomy updated after Gromov & Baranov (1981).

31. *Alactaga williamsi djafarovi* I. Gromov, 1952
32. *Allactaga* sp.
33. *Apodemus sylvaticus* L., 1758
34. *Cricetulus migratorius argyropuloi* I. Gromov, 1952
35. *Mesocricetus raddei planicola* Argyropulo, 1941
36. *Dryomys nitedula* Pallas, 1778
37. *Ellobius* aff. *lutescens* Thomas, 1897
38. *Meriones erythrourus intermedius* I. Gromov, 1952
39. *Microtus apscheronicus* Argyropulo, 1941
40. *Microtus arvalis* Pallas, 1779
41. *Microtus socialis* Pallas, 1773
42. *Mus musculus* L., 1758

LAGOMORPHA
43. *Lepus europaeus gureevi* Gromov, 1952

Aves[3]

PODICIPEDIFORMES
1. *Podiceps auritus* (L., 1758)

PELECANIFORMES
2. *Pelecanus crispus palaeocrispus* Serebrovsky, 1941
3. *Phalacrocorax carbo* L., 1758

CICONIIFORMES
4. *Botaurus stellaris* (L., 1758)
5. *Ixobrychus minutus* (L., 1766)
6. *Nycticorax nycticorax* L., 1758
7. *Egretta alba* (L., 1758)
8. *Egretta garzetta* ssp. n.
9. *Ardea cinerea* L., 1758
10. *Ardea purpurea* (L., 1766)
11. *Bubulcus ibis* L., 1758
12. *Ciconia nigra* (L., 1758)
13. *Platalea leucorodia* L., 1758
14. *Plegadis falcinellus* L., 1766

ANSERIFORMES
15. *Cyrnus olor bergmanni* Serebrovsky, 1941
16. *Anas acuta* L., 1758
17. *Anas clypeata* L., 1758
18. *Anas crecca* (L.)
19. *Anas penelope* L., 1758
20. *Anas platyrhynchos palaeoboschas* Serebrovsky, 1940

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[3] Taxonomy updated after del Hoyo et al. (1992–2002).

21. *Anas querquedula* L., 1758
22. *Anas strepera* L., 1758
23. *Branta leucopsis* (Bechstein, 1803)
24. *Branta ruficollis* (Pallas, 1769)
25. *Anser albifrons* (Scopoli, 1769)
26. *Anser azerbaidzanicus* Serebrovsky
27. *Anser* cf. *anser* L. / *A.* cf. *fabalis* Latham, 1787
28. *Tadorna ferruginea* (Pallas, 1764)
29. *Tadorna tadorna* (L., 1758)
30. *Aythya ferina* (L., 1758)
31. *Aythya marila asphaltica* Serebrovsky, 1941
32. *Aythya nyroca* (Güldenstädt, 1770)
33. *Netta rufina* (Pallas, 1773)
34. *Clangula hyemalis* (L., 1758)
35. *Bucephala clangula* (L., 1758)
36. *Melanita fusca* (L., 1758)
37. *Mergus albellus* (L., 1758)

ACCIPITRIFORMES

38. *Neophron percnopterus* (L., 1758)
39. *Aegypiuys monachus* (L., 1766)
40. *Gyps fulvus* (Hablizl, 1783)
41. *Haliaeetus albicilla* (L., 1758)
42. *Aquila chrysaetos* (L., 1758)
43. *Aquila clanga* Pallas, 1811
44. *Aquila heliaca* Savigni, 1809
45. *Aquila nipalensis* (Hodgson, 1833)
46. *Accipiter gentilis* (L., 1758)
47. *Buteo buteo* (L., 1758)
48. *Buteo rufinus* (Cretzschmar, 1829)
49. *Circus aeruginosus* (L., 1758)
50. *Circus macrourus* S. G. Gmelin, 1770
51. *Circus cyaneus* (L., 1766)
52. *Milvus milvus* Lacepede, 1799

FALCONIFORMES

53. *Falco peregrinus* Tunstall, 1771
54. *Falco tinnunculus* L., 1758

GALLIFORMES

55. *Alectoris graeca* (Meisner, 1804)
56. *Perdix perdix* L., 1758

GRUIFORMES

57. *Anthropoides virgo* L., 1758
58. *Grus grus* L., 1758

59. *Grus leucogeranus* PALLAS, 1773
60. *Leucogeranus bogatschevi* SEREBROVSKY, 1941
61. *Porzana parva* (SCOPOLI, 1769) / ? *P. pussilla* (PALLAS, 1776)
62. *Fulica atra* L., 1758
63. *Otis tarda* L., 1758
64. *Tetrax tetrax* (L., 1758)

CHARADRIIFORMES

65. *Actitis hypoleucos* (L., 1758)
66. *Burrhinus oedicnemus* (L., 1758)
67. *Calidris ferruginea* Pontoppodian, 1763 / *C. alpina* (L., 1758)
68. *Charadrius dubius* SCOPOLI, 1786
69. *Eudromias morinellus* (L., 1758)
70. *Tringa erythropus* (PALLAS, 1764)
71. *Tringa glareola* L., 1758
72. *Tringa nebularia* (GUNNERUS, 1767)
73. *Tringa ochropus* L., 1758
74. *Tringa stagnatilis* (BECHSTEIN, 1803)
75. *Tringa totanus* (L., 1758)
76. *Vanellus vanellus* (L., 1758)
77. *Philomachus binagadensis* (SEREBROVSKY, 1940)
78. *Philomachus pugnax* (L., 1758)
79. *Pluvialis fulva* (GMELIN, 1789)
80. *Pluvialis squatarola* (L., 1758)
81. *Xenus cinereus* ssp. n.
82. *Limosa* sp. (cf. *L. limosa*) (L., 1758)
83. *Gallinago gallinago* (L., 1758)
84. *Numenius arquata* ssp. n.
85. *Numenius phaeopus* (L., 1758)
86. *Numenius tenuirostris* VIEILLIOT, 1817
87. *Larus cachinnans* PALLAS, 1811
88. *Larus hyperboreus* GUNNERUS, 1767

PTEROCLIDIFORMES

89. *Pterocles orientalis arenarius* (PALLAS, 1775)

COLUMBIFORMES

90. *Columba livia* GMELIN, 1789

STRIGIFORMES

91. *Aegolius funereus* (L., 1758)
92. *Asio flammeus* (PONTOPPIDAN, 1763)
93. *Asio otus* (L., 1758)
94. *Athene noctua* (SCOPOLI, 1769)
95. *Nyctea scandiaca* (L., 1758)
96. *Bubo binagadensis* BURCHAK-ABRAMOVICH, 1965

97. *Bubo bubo* (L., 1758)
98. *Otus scops* (L., 1758)

PASSERIFORMES
99. *Turdus merula* L., 1758
100. *Turdus philomelos* Brehm, 1831
101. *Pica pica* ssp. n.
102. *Corvus corax* L., 1758
103. *Corvus cornix* L., 1758
104. *Corvus frugilegus* L., 1758
105. *Corvus monedula* (L., 1758)
106. *Corvus* cf. *ruficollis* Lesson, 1830
107. *Garrulus glandarius assiduous* Panteleyev & Burchak, 2000
108. *Calandrella rufescens* (Vieillot, 1820)
109. *Melanocorypha bimaculata* (Menetries, 1832) / *M. calandra* (L., 1766)

Plants[4]

1. *Scirpus* sp.
2. *Phragmites* sp.
3. *Artemisia* sp.
4. *Tamarix* sp.
5. *Ulmus* sp.
6. *Salsola* sp.
7. *Alhagi maurorum* Medikus, 1787
8. *Prunus microcarpa* C. A. Meyer, 1831
9. *Zozimia* sp.
10. *Equizetum* sp.
11. *Vitis* cf. *sylvestris* Blume, 1825
12. *Punica granatum* L. 1753
13. *Astragalus* sp.
14. *Allium* sp.
15. *Ferula* sp.
16. *Cardium* sp.
17. *Isatis* sp.
18. *Carex* sp.
19. Poaceae gen.
20. *Juniperus polycarpos* K. Koch, 1849
21. *Pyrus salicifolia* Pallas, 1776
22. *Pistacia* cf. *mutica* Fisch. et C. A. Mey, 1838

[4] After Bogachev (1939b), revised and completed.