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LATE PLEISTOCENE BIRDS FROM BINAGADA (AZERBAIJAN) IN COLLECTION OF THE NATIONAL MUSEUM OF NATURAL HISTORY (KYIV, UKRAINE)

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Late Pleistocene Birds from Binagada (Azerbaijan) in Collection of the National Museum of Natural History (Kyiv, Ukraine). Gorobets, L. V., Yanenko, V. O. — Bird fossils from the Late Pleistocene locality Binagada, deposited kept in the National Museum of Natural History in Kyiv (Ukraine), are described in this paper. Twenty six bird species are identified, including five (Little Stint, Great snipe, Jack snipe, White-winged lark and Rosy Starling) which have not been previously known from this locality. The validity of extinct species *Calidris binagadensis* (Serebrovsky, 1940) is confirmed and the invalidity of subspecies *Anas platyrhynchos paleoboschas* Serebrovsky, 1940 is shown. The finding of Rosy Starling fossils in Transcaucasian region confirms the range reduction of this species at the end of Pleistocene.
Key words: asphalt lake, history of avifauna, Quaternary.

Introduction

The Late Pleistocene locality of vertebrate remains Binagada (in the vicinity of Baku, Azerbaijan) was discovered in 1938 and excavated during middle of the 20th century (1938–1942, 1947–1949, 1951–1954) (Dzhafarov, 1956; Boev, 2010). It is characterized by high species diversity and could be compared with famous site Rancho La Brea in USA (Boev, 2010). However, yet in 2000 the Binagada locality was mentioned as not fully explored (Panteleev & Burchak-Abramovich, 2000).

Until the present study, the bird fauna of Binagada included 109 species, including four extinct, and six others represented by extinct subspecies, deposited in five countries (Serebrovsky, 1940, 1941, 1948; Dzhafarov, 1943; Burchak-Abramovich, 1972; Panteleev & Burchak-Abramovich, 2000; Boev, 2010): Russian Federation (Saint-Petersburg), Azerbaijan (Baku), Georgia (Tbilisi), Hungary (Budapest) and Bulgaria (Sofia). However, a small sample of bird fossils from this unique locality is also deposited in the Department of Paleontology, National Museum of Natural History in Kyiv, Ukraine. As was emphasized by Boev (2010), all scientific collections from Binagada should be registered and considered as a national and world-wide scientific and cultural heritage. Although remains from NMNHU-P represent one of the smallest avian collections from Binagada, its study can enhance knowledge about this Late Pleistocene locality.

Description of the site. Binagada locality (40°30' N, 49°05' E) is situated in the centre of western part of the Absheron Peninsula and dated back to the Late Pleistocene (fig. 1). Different dates (in the range of 12'000–340'000 BP) were previously obtained for this site (Pantelev & Burchak-Abramovich, 2000). According to the most recent study, the age of Binagada fossils is approximately 120'000–96'000 BP (Zubakov, 1999). It is commonly assumed that the bones of animals drowned in asphalt (Burchak-Abramovich, 1972); however, apparently corpses of small animals (including birds) were transported by river and fell into alluvium (Gromov, 1952). The taphonomy of the site and complete faunal and floristic list of Binagada were recently summarized by Boev (2010).

Material and methods

In total, 134 bird remains are stored in the NMNHU-P collection. Thirty eight of them (NMNHU-P Av-290–Av-327) were obtained by I. Pidoplichko in 1939. Six bones belonging to Griffon vulture (*Gyps fulvus*) (NMNHU-P Av-210–Av-215) were found among the things of M. Voinstvensky. Probably it was given by N. Burchak-Abramovich. Voinstvensky (1960) mentioned remains from the Binagada, but only bones stored in Azerbaijan. Ninety bone remains (NMNHU-P Av-140–Av-209, Av-216–Av-223, Av-282–Av-289, Av-339, Av-361–Av-363), the largest quantity of collection of NMNHU-P were collected by Antonina Shevchenko in 1963. Numerous publications (e. g., Dzhaferov, 1956; Pantelev & Burchak-Abramovich, 2000; Boev, 2010) revealed that excavations of the Binagada were finalized in 1954. However, the vast majority of fossils from this locality in the NMNHU-P collection were excavated in 1963.

Table 1. Measurements of bones belonging to Mallard (*Anas platyrhynchos*) in comparison with those from Binagada locality

Bones	Specimens		Measurements, mm		
			Greatest length	Greatest width of the proximal end	Greatest width of the distal end
Ulna	Binagada, NMNHU-P Av-146		83.5	10.6	—
	Recent <i>Anas platyrhynchos</i>	minimum	72.2	8.5	—
		mean	79.0	9.8	—
		maximum	85.1	10.6	—
		n	16	17	—
Humerus	Binagada, NMNHU-P Av-143		96.7	—	14.9
	Binagada, NMNHU-P Av-144		91.9	21.4	14.5
	Binagada, NMNHU-P Av-145		—	—	14.9
	Recent <i>Anas platyrhynchos</i>	minimum	78.1	19.9	13.0
		mean	92.7	21.4	14.2
		maximum	97.5	23.0	15.3
		n	14	15	16
Femur	Binagada, NMNHU-P Av-142		53.4	11.4	11.1
	Recent <i>Anas platyrhynchos</i>	minimum	47.7	10.4	10.4
		mean	50.9	11.0	10.7
		maximum	53.2	11.4	11.5
		n	8	8	8



Fig. 1. Map of Azerbaijan showing the location of the Binagada asphalt lake.

For taxonomic identifications, comparative osteological collections of the NMNHU-P and Zoological Museum of the Taras Shevchenko National University (KNUZM) were used. Species names follow Dickinson & Remsen (2013), Dickinson & Christidis (2014). Measurements are given in millimetres, and osteological terminology follows von den Driesch (1976).

The bones of Recent *Anas crecca* and *Spatula querquedula* are very similar. Twelve bones of small dabbling ducks from Binagada are deposited in the NMNHU-P. Among them, small, resembling only *Anas crecca* and relatively large (corresponding to only *Spatula querquedula*) are represented, however the average variants are also present. Therefore, it is possible to confirm the presence of both species, but it is impossible to accurately determine the number of remains for each of these species.

The extinct subspecies of Mallard *Anas platyrhynchos paleoboschas* was described by Serebrovsky (1940) from Binagada. No morphological features were indicated except for larger size, which, however, greatly overlap with the Recent nominative subspecies *A. platyrhynchos platyrhynchos* (see Serebrovsky, 1948). Measurement of five well-preserved bones from the collection of NMNHU-P shows that the size of the mallard from Binagada is at the top of the reaction norm for extant representatives of this species (table 1). A slight increase in size may be a temporal feature in some populations. There is no certainty that this feature has strengthened, accordingly, there is no reason to assert the existence of a subspecies (see Zelenkov, 2013 for details). Therefore, mallard bones are defined simply as *Anas platyrhynchos* Linnaeus, 1758.

In NMNHU-P collection there are ulnae belonging to typical waders (*Calidris* Merrem, 1804). This is indicated by a short olecranon (especially well visible from the ventral side), oriented in the proximal-dorsal direction (in representatives of the family Charadriidae, as well as genera *Burhinus* and *Numenius*, it inclines ventrally). Also, the ulnar bones of these birds differ from other waders in massive expansion of the tuberculum ligaturae collateralis ventralis (especially notice-

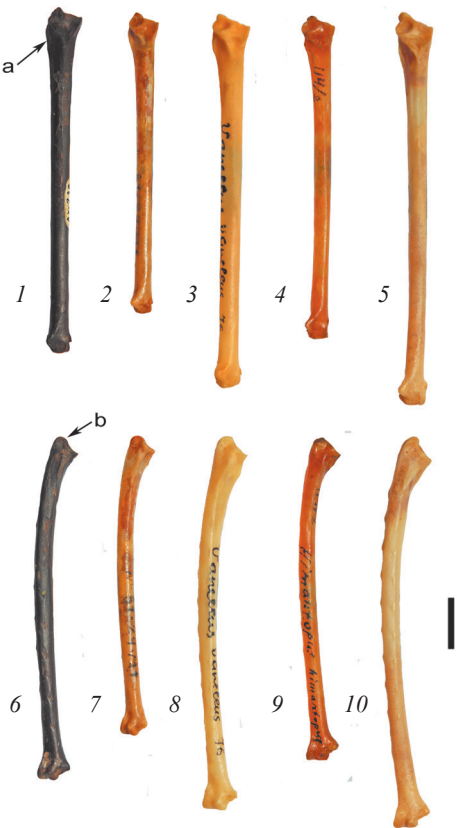


Fig. 2. *Calidris binagadensis* (left ulna NMNHU- P Av 218) from the Late Pleistocene of Binagada (Azerbaijan) compared with same bone of some Recent Eurasian waders: cranial (1–5) and ventro-caudal (5–10) views. Designations: a — massive expansion of the tuberculum ligaturae collateralis ventralis; b — short olecranon, oriented in the proximal-dorsal direction. Scale bar 1 cm.

Table 2. Measurements of ulna in Recent Roof (*Calidris pugnax*) in comparison with those in *Calidris pugnax* and *C. binagadensis* from Binagada

Age and locality	Species		Measurements, mm				
			GL	Bp	Dip	Did	SC
20th century, unknown locality	<i>Calidris pugnax</i>	minimum	46.2	4.7	5.0	4.2	2.2
		mean	51.5	5.4	5.8	4.8	2.7
		maximum	56.8	6.0	6.5	5.5	3.2
		n	10	12	11	13	12
Late Pleistocene, Binagada	<i>Calidris pugnax</i>	specimen NMNHU-P Av-169	53.3	5.5	5.6	5.0	2.9
		specimen NMNHU-P Av-170	48.0	4.8	5.2	4.3	2.6
		specimen NMNHU-P Av-200	–	–	–	5.4	3.1
	<i>Calidris binagadensis</i>	specimen NMNHU-P Av-218	65.7	8.8	12.0	9.3	4.2
		specimen NMNHU-P Av-219	66.7	6.8	7.0	6.5	3.7

Table 3. Species list of birds from the Binagada locality in the National Museum of Natural History NAS of Ukraine

Species	Collected by I. Pidoplichko		Collected by M. Voinstvensky		Collected by A. Shevchenko	
	NR	MNI	NR	MNI	NR	MNI
<i>Podiceps nigricollis</i> Brehm, 1831	–	–	–	–	1	1
<i>Mareca</i> cf. <i>M. penelope</i> (Linnaeus, 1758)	1	1	–	–	1	1
<i>Mareca</i> cf. <i>M. strepera</i> (Linnaeus, 1758)	1	1	–	–	–	–
<i>Anas crecca</i> Linnaeus, 1758	–	–	–	–	–	–
and <i>Spatula querquedula</i> (Linnaeus, 1758)	2	1	–	–	10	3
<i>Anas platyrhynchos</i> Linnaeus, 1758	–	–	–	–	8	3
<i>Anas acuta</i> Linnaeus, 1758	–	–	–	–	3	2
<i>Anas acuta</i> / <i>Mareca strepera</i>	–	–	–	–	1	1
Anatidae gen. indet.	–	–	–	–	1	1
<i>Perdix perdix</i> (Linnaeus, 1758)	–	–	–	–	1	1
<i>Haliaeetus albicilla</i> (Linnaeus, 1758)	–	–	–	–	5	2
<i>Gyps fulvus</i> (Hablitzl, 1783)	–	–	6	4	–	–
<i>Falco tinnunculus</i> Linnaeus, 1758	–	–	–	–	1	1
<i>Falco peregrinus</i> Tunstall, 1771	–	–	–	–	1	1
<i>Tringa erythropus</i> (Pallas, 1764)	1	1	–	–	2	1
<i>Tringa ochropus</i> Linnaeus, 1758	4	2	–	–	1	1
<i>Tringa glareola</i> (Linnaeus, 1758)	2	1	–	–	15	4
<i>Tringa</i> cf. <i>T. glareola</i> (Linnaeus, 1758)	–	–	–	–	2	1
<i>Actitis hypoleucos</i> (Linnaeus, 1758)	–	–	–	–	1	1
<i>Gallinago media</i> (Latham, 1787)	1	1	–	–	–	–
<i>Gallinago gallinago</i> (Linnaeus, 1758)	4	1	–	–	1	1
<i>Lymnocyptes minimus</i> (Brunnich, 1764)	–	–	–	–	1	1
<i>Calidris minuta</i> (Leisler, 1812)	–	–	–	–	1	1
<i>Calidris</i> cf. <i>C. minuta</i> (Leisler, 1812)	–	–	–	–	1	1
<i>Calidris pugnax</i> (Linnaeus, 1758)	–	–	–	–	7	3
<i>Calidris</i> cf. <i>C. pugnax</i> (Linnaeus, 1758)	–	–	–	–	4	1
<i>Calidris binagadensis</i> (Serebrovsky, 1940)	–	–	–	–	2	2
<i>Limicola falcinellus</i> (Pontoppidan, 1763)	3	1	–	–	1	1
<i>Larus cachinnans</i> Pallas, 1811	–	–	–	–	1	1
Charadriiformes indet.	2	1	–	–	3	1
<i>Alauda leucoptera</i> Pallas, 1811	1	1	–	–	–	–
<i>Alauda</i> cf. <i>A. leucoptera</i> Pallas, 1811	1	1	–	–	–	–
<i>Motacilla alba</i> Linnaeus, 1758	2	1	–	–	–	–
<i>Sturnus roseus</i> (Linnaeus, 1758)	1	1	–	–	–	–
Alaudidae gen. indet.	1	1	–	–	1	1
Fringillidae gen. indet.	–	–	–	–	1	1
Passeriformes indet.	3	1	–	–	–	–
TOTAL	36	17	6	4	92	40

able from the cranial side). In Recent *Calidris*, the length of the ulna does not exceed 30 mm, only in Ruff (*Calidris pugnax*) it is 46.2–56.8 mm (table 2). The ulnae from the Binagada belong to birds of two size groups: (1) the ulnar length about 55 mm, which corresponds to the Recent *Calidris pugnax* (NNHMu-P Av-169, Av-170, Av-221) and (2) the ulnar length about 66 mm, which is bigger than those in all extant representatives of the genus *Calidris* (NNHMu-P Av-218, Av-219). A large extinct species *Calidris binagadensis* (Serebrovsky, 1940) described from the Binagada was slightly larger than the Recent *Calidris pugnax* (see Serebrovsky, 1940). The species description is based on the skull bones. Also, the ulna is mentioned in the original description, but no morphological differences were indicated. Bones of the NNHMu-P Av-218 and Av-219 also differ from other *Calidris* only in size (table 2, fig. 2). Unlike mallard, the size range does not overlap with extant representatives. On the basis of size, we identify them as *Calidris binagadensis* (Serebrovsky, 1940).

Generally, 25 recent and one extinct species were identified (table 3).

Abbreviations used: Bp — greatest breadth of the proximal end; Did — greatest diagonal of the distal end; Dip — greatest diagonal of the proximal end; GL — greatest length; ka BP — thousand years before present; KNUZM — Zoological Museum, Taras Shevchenko National University of Kyiv; MNI — the minimum number of individuals; MNQ — Mammal Neogene/Quaternary; NMNHU-P — Department of Palaeontology, National Museum of Natural History NAS of Ukraine; NR — number of remains; SC — smallest breadth of the corpus; W — Würm glaciation.

Results and discussion

As was mentioned above, numerous bird fossils from the Binagada were known earlier. But even so, our study of the NMNHU-P collection significantly supplements previous results. Remains of five additional species were identified: Little Stint (*Calidris minuta*), Great snipe (*Gallinago media*), Jack snipe (*Lymnocyptes minimus*), White-winged lark (*Alauda leucoptera*) and Rosy Starling (*Sturnus roseus*) (fig. 3).

Binagada is the world-wide richest site of avian fossils. The NMNHU-P collection yielded just the smallest part of collected and described bones. But even such not numerous collection supplements the avifaunal list of the locality, initially formed based on larger samples. Probably, it can be explained by a high diversity of bird species in the Pleistocene, whereas the probability of preservation for bird fossils is lower than for other vertebrates (Zelenkov, 2013). This shows that in the paleornithology even not a numerous collection can add new data to results obtained from large samples.

Nowadays Little Stint, Great snipe and Jack snipe are common during the migration in the Caucasus (Sultanov et al., 2002; Tilba, 2007), White-winged lark is rarely wintering bird, Rosy Starling is common during the breeding season in valleys of Azerbaijan (Gambarov, 1941). The Great snipe is widely known from Late Pleistocene localities in the Palearctic (Tyrberg, 1998), whereas other four species are not so numerous. Moreover, findings from Binagada may be the first fossil-records for this three species. Remains of the Little Stint were mentioned from Spain (Cueva Negra del Estrecho del Río Quípar, ca. 40–75 ka BP) and Russia (Ust'-Kanskaya Peshchera, ca. 50 ka BP); remains of *Calidris minuta/temminckii* were found in France — Grotte Nord-Ouest de la Grotte de la Coscia (60–90 ka BP) (Tyrberg, 2008). Remains of Rosy Starling were mentioned from France: (Middle Paleolithic) Fontéchevade (MNQ 25), Baume a Gonvillars (Late Pleistocene — Early Holocene, "Mesolithic"); Italy: Arene Candide (Upper Paleolithic), Grotta dei Colombi (Upper Paleolithic), Grotta del Castello (Late Pleistocene); and Hungary — Pilisszántó 1 (W II–III) (Tyrberg, 1998). For the White-winged lark, only remains of *Alauda* (*Melanocorypha*) cf. *leucoptera* from Schafstallhöhle (W I; Germany) were mentioned earlier.

All the above-mentioned findings are dated back to Late Pleistocene. Binagada is located in the region, for which the fossil birds are poorly studied in comparison with Europe. So, based of earlier known findings, a conclusion about the longitudinal range shifts in the Late Pleistocene of some species, including *Sturnus roseus* was made (Holm & Svenning, 2014). Whereas the finding in Binagada shows that this species was more widespread in the Western Palearctic during the Late Pleistocene than nowadays. It is assumed that further study of other collections from Binagada can give valuable information about the range changes for many bird species.

Conclusions

Based on the study of bird fossils in the collection of National Museum of Natural History in Kyiv, faunal list of the Late Pleistocene Binagada locality was supplemented



Fig. 3. Remains of newly identified species from the Late Pleistocene of Binagada (Azerbaijan). 1 — *Calidris minuta* (left tarsometatarsus NMNHU-P Av 199); 2 — *Gallinago media* (left tarsometatarsus NMNHU-P Av 305); 3 — *Lymnocyptes minimus* (right coracoid NMNHU-P Av 305); 4 — *Alauda leucoptera* (left tarsometatarsus NMNHU-P Av 310); 5 — *Sturnus roseus* (left carpometacarpus NMNHU-P Av 314). Scale bar 1 cm.

by five species: Little Stint (*Calidris minuta*), Great snipe (*Gallinago media*), Jack snipe (*Lymnocyptes minimus*), White-winged lark (*Alauda leucoptera*), and Rosy Starling (*Sturnus roseus*).

Detailed morphological study of postcranial elements belonging to Mallard from Binagada pointed out the invalidity of the subspecies *Anas platyrhynchos paleoboschas* Serebrovsky, 1940.

Additional study of the bone remains of *Calidris binagadensis* (Serebrovsky, 1940) confirms the validity of this species. At the same time, morphological differences from Recent species *Calidris pugnax* (Linnaeus, 1758) is not revealed; in addition, the extinct species certainly differs from the recent one in bigger size.

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