GENERAL BIOLOGY

New Data on Avifauna of the Ustyurt Plateau in the Holocene

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Abstract—Bone remains of birds from a location of the middle Subboreal period and from three locations of the early Subatlantic period were studied on the Ustyurt plateau (Kazakhstan). Three out of 17 avian species that have been identified (*Phalacrocorax pygmaeus, Falco peregrinus,* and *Nyctea scandiaca*) proved to be absent in the modern fauna of the region. Our data on the bird fauna of the Ustyurt Plateau in the second half of the Middle Holocene and at the beginning of the Late Holocene indicate that, in that time, the migration routes of the little cormorant, peregrine, and snowy owl passed across the Ustyurt territory and the wintering sites of peregrine and snowy owl were more extensive and were also situated in Ustyurt. In the second half of the Late Holocene, the number of wintering sites of these species diminished and their migration routes have been altered.

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The current state of a region depends not only on the natural conditions, but also on the history of the region formation. The avifauna history of various Eurasian regions has been studied to different extents [1]. So far, there have been virtually no data on the bird fauna of the desert zone in the Holocene [2-4]. In recent years, due to an archaeological survey of the Ustyurt plateau situated in the modern desert area, we were the first to obtain the bone remains samples of the Holocene-age birds; the study of these samples was the subject of this report. The avian bones have been derived from four archaeological localities. They were dug up from the cultural layer by scoops. The Toksanbai settlement is situated in Mangistausk oblast, Kazakhstan (45°51' N, 56°33' E). According to archaeological data, the locality was dated to the Late Bronze Age, and, on the basis of carbon from the cultural layer, the radiocarbon dating was 3780 ± 80 , GIN-7979 and 3240 ± 40 , GIN-8093 [5]. Hence, the settlement existed probably in the Middle Holocene Subboreal period (SB2). In the Toksanbai settlement, we have found eight avian bones (table) and about 35000 mammalian bones, 19% of which have been attributed to domestic animals (cattle, sheep, goat, horse, camel, and dog) and 81%, to the wild mammals (tolai-hare, rodents, wolf, red fox, corsac fox, steppe polecat, asiatic wild ass, saiga, goitered gazelle, and moufflon). The Kyzyluik sanctuary is situated in Baiganinski raion of Aktyubinsk oblast, Kazakhstan $(46^{\circ}20' \text{ N}, 56^{\circ}30' \text{ E})$. According to the archeological materials, the locality was dated to the Early Iron Age (the fourth to second centuries BC); on the basis of animal bones, the radiocarbon dating was 2070 ± 90 , Ki-13755 and 1420 \pm 60, Ki-13756 [6]. This suggests the locality existence during the first phase of the Holocene Subatlantic period (SA1). In the Kyzyluik sanctuary, we have found 44 avian bones (table) and 107 mammalian bones, 46% of which were attributed to domestic animals (sheep, horse, and dog) and 54%, to wild mammals (wolf, corsac fox, and saiga). The Akpan sanctuary is situated in Beineuski raion of Mangistausk oblast, Kazakhstan (46°20′ S, 56° 30′ E). According to the archaeological materials, the locality was dated to the Early Iron Age (the fifth to fourth centuries BC) [7]. Hence, the time of its existence falls, probably, within the first phase of the Holocene Subatlantic period (SA1). In the Akpan sanctuary, we have found four avian bones (table) and 1111 mammalian bones, 14% of which were attributed to the domestic animals (cattle, sheep, goat, horse, and camel) and 86%, to wild mammals (wolf, red fox, corsac fox, asiatic wild ass, saiga, and goitered gazelle) [8]. The Baite III sanctuary situated in Mangistausk raion of Mangistausk oblast, Kazakhstan (44°33' N, 54°21' E) was dated to the Early Iron Age on the basis of archaeological materials (the third to first centuries BC) [9]. Hence, the existence of this locality was dated to the first phase of the Holocene Subatlantic period (SA1). Here, we have found 31 avian bone (table) and 245 mammalian bones, 67% of which were attributed to the domestic animals (cattle, sheep, goat, horse, and dog) and 33%, to wild mammals (hedgehog,

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NEW DATA ON AVIFAUNA

1 1					
Species	Localities ¹				Madama timaa
	12	2	3	4	wodern unles
Little cormorant, Phalacrocorax pygmaeus	0	2/1	0	0	
Greylag, Anser anser	1/1	0	0	0	+
Roughleg, Buteo lagopus	1/1	0	0	0	+
Spotted eagle, Aquila clanga	0	8/2	0	0	+
Imperial eagle, Aquila heliaca	0	2/1	0	0	+
Golden eagle, Aquila chrysaetos	0	6/1	0	0	+
Eagle, Aquila sp.	0	1	1	0	
White-tailed eagle, Haliaeetus albicilla	1/1	7/2	0	0	+
Black vulture, Aegypius monachus	0	5/1	0	0	+
Perigine, Falco peregrinus	0	3/1	0	0	_
Little bustard, Tetrax tetrax	0	0	0	1/1	+
Houbara, Chlamydotis undulata	0	1/1	0	0	+
Snowy owl, Nyctea scandiaca	0	1/1	0	0	_
Eagle owl, Bubo bubo	3/1	4/1	0	21/3	+
Marsh owl, Asio flammeus	0	0	1/1	0	+
Little owl, Athene noctua	0	1/1	0	0	+
Corbie, Corvus corax	0	2/1	2/2	0	+
Brown-necked raven, Corvus ruficollis	0	1/1	0	0	+
Aves indet.	2	0	0	9	

Species composition of the bone remains of birds from Holocene localities of the Ustyurt Plateau

¹Localities: (1) Toksanbai, (2) Kyzyluik, (3) Akpan, (4) Baite III.

²The numerator, the number of bones; the denominator, eventual number of birds.

rodents, wolf, red fox, steppe polecat, asiatic wild ass, saiga, goitered gazelle, and moufflon) [4]

The surveyed localities belong to two chronological periods: the Middle Subboreal of the Middle Holocene and the beginning of the Late-Holocene Subatlantic period. The Toksanbai locality is an ancient settlement that was inhabited by people engaged in cattle breeding and hunting [5]. The Kyzyluik, Akpan, and Baite III localities were ancient sanctuaries where people administered their rites [6, 7, 9]. Taphonomic analysis of the complex of bone remains suggests that the avian bones proved to be in these localities due to human activity and natural factors. Three of the four localities, Kyzyluik, Akpan, and Baite III, were in ancient times high stone buildings [6, 7, 9] that rose up above the flat surface of the Ustyurt Plateau. In these high constructions, birds of prey had their nests and perches, and some of them perished here. Later, the bones of dead birds proved to be bombarded under the decayed buildings, as well as the bones of their prey. The avian bone complexes have formed by this way in the Baite III [4] and Akpan localities. In the Kyzyluik locality, a portion of avian bones has been accumulated similarly, but another portion of bones proved to be in the place because the ancient people performed their rites in this sanctuary [6]. In the Toksanbai locality, accumulation of avian bones was a result of hunting.

The current avifauna of the Ustyurt Plateau includes 195 species, 15 of which are sedentary birds, 57 species are nested, four species are wintered, 108 species migrate across the area, and 11 species are the birds of passage [10, 11]. The Ustyurt avifauna is not abundant because of an insignificant diversity of the biotopes and the region in general have been studied insufficiently [10].

In the Middle Holocene locality (SB2), we have identified four species that inhabit Ustyurt at present (table).

In the Late Holocene localities (SA1), 15 species have been identified (table). Among them, the little cormorant (*Phalacrocorax pypmaeus*), peregrine (*Falco peregrinus*), and snowy owl (*Nyctea scandiaca*) have not been identified so far in the Ustyurt area [10-13].

In total, we have found 75 bone remains of 17 avian species from seven orders: Pelecaniformes (1 species), Anseriformes (1 species), Accipitriformes (6 species), Falconiformes (1 species), Gruiformes (2 species), Strigiformes (4 species), and Passeriformes (2 species). The remains of the birds of prey predominated in both the number of species (11 species) and the number of bone remains (66 bones). Such a predomination can be explained by two factors. First, the birds died in nests and perches; second, the ancient people used the birds of prey in their rites.

In the second half of the Middle Holocene and Late Holocene, the little cormorant, peregrine, and snowy owl contributed into the Ustyurt avifauna, though they are absent in the modern fauna. At present, these species overwinter on the neighboring Mangyschlak peninsula and their migration routes pass across the Ustyurt Plateau [10–13]. One of these species, the little cormorant, could not overwinter on Unstyurt, in the Kyzyluik locality, which lacks wetland biotopes necessary for this bird that is dwelling in this area during migrations. The remaining species could be here to spend the winter and during migration.

Our data on avifauna of the Ustyurt Plateau in the second half of the Middle Holocene and at the beginning of the Late Holocene suggest that, in that time, the migration routes of the little cormorant, peregrine, and snowy owl crossed the Ustyurt area and the wintering sites of peregrine and snowy owl were larger and were also present on this territory. Later, in the second half of the Late Holocene, the overall size of wintering sites diminished and the migration routes of these species changed.

Thus, the study of osteological material obtained during archaeological survey of the Ustyurt Plateau showed that some avian species inhabited this area in the second half of Holocene, but they are absent in its modern fauna.

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