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MARIA BITIRI

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BIRD REMAINS FROM THE STARČEVO AND LENGYEL CULTURE SETTLEMENTS OF THE SITE ALSÓNYÉK-BÁTASZÉK (SOUTH-WESTERN HUNGARY)

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***Keywords**: bird bones, palaeo-environment, bird exploitation, Early and Late Neolithic, Alsónyék-Bátaszék, south-western Hungary*
***Abstract:** In this paper, the first Starčevo (Early Neolithic) and Lengyel culture (Late Neolithic) avian assemblages from Hungary are presented. The abundance of remains and identified wetland species in the Starčevo period sample of Alsónyék-Bátaszék located in south-western Hungary fits into the stereotype of the Körös culture localities from the eastern part of country indicating the frequent exploitation of aquatic resources by fowling, fishing and gathering. Golden eagle (Aquila chrysaetos) is first identified for the Neolithic avifauna of Hungary. Its presence in both the Starčevo and Lengyel period samples suggest that this species may have nested in the Mecsek or Villány Mountains during the 6th–5th millennia BC. Interest in fowling at Alsónyék-Bátaszék seems to have declined towards the Late Neolithic according to the drop both in the quantity and diversity of birds. Nevertheless, wings, feathers and bones of diurnal birds of prey and owls proved to have been selected both for raw material and ornaments, and ritual purposes during the Lengyel Period.*

***Cuvinte cheie**: oase de pasăre, paleo-mediu, exploatarea păsărilor, neolitic timpuriu și târziu, Alsónyék-Bátaszék, sud-vestul Ungariei*
***Rezumat**: Articolul de față prezintă studiul primelor colecții de oase de pasăre atribuite culturilor Starčevo (neolitic timpuriu) și Lengyel (neolitic târziu) din Ungaria. Abundența resturilor de pasăre provenind din situl neolitic timpuriu de la Alsónyék-Bátaszék în sud-vestul Ungariei, și a speciilor de apă identificate aici, se potrivește imaginii tipice a așezărilor de tip Körös din estul țării, indicând exploatarea frecventă a resurselor acvatice prin vânătoarea de păsări, pescuit și cules. Acvila de munte (Aquila chrysaetos) a fost acum identificată pentru prima dată în avifauna neolitică din Ungaria. Prezența sa atât în nivelurile Starčevo cât și Lengyel sugerează că pe durata mileniilor VI-V î. Hr. aceste păsări își făceau cuibul în munții Mecsek sau Villány. Interesul pentru vânătoarea păsărilor pare să fi intrat în declin pe durata neoliticului târziu, așa cum o indică atât scăderea în cantitate a resturilor zoo-arheologice, cât și diminuarea diversității speciilor. Cu toate acestea, aripile, penele și oasele unor păsări de pradă diurne, precum și ale bufnițelor par să fi fost selectate atât ca materie primă și ornamente, cât și pentru scopuri rituale pe durata culturii Lengyel.*

INTRODUCTION

1. THE SITE

The multi-period site of Alsónyék-Bátaszék (latitude: 46° 12′ N; longitude: 18° 42′ E) is located in south-east Transdanubia, between the alluvial plains of the Danube palaeochannel system (86–87 m a.s.l) and the foothill zone (92–94 m a.s.l.) of the Szekszárd Hills (Fig. 1). Within the site, five sub-sites on seven excavation areas have been unearthed by four teams during the rescue excavations preceding the construction of the M6 motorway between 2006 and 2009[1].

A rather large area of about 25 ha was opened that brought to light ca. 15,000 archaeological features[2]. The site covers almost the entire Neolithic period spanning from the first third of the 6th millennium to the middle of 5th millennium cal BC. Of these, the Starčevo (ca. 5800–5500 calBC), the *Linearbandkeramik* (ca. 5360–4860 calBC) and the Lengyel period (ca. 4800–4300 calBC) were the best represented, while intermediate Sopot (ca. 5200–4680 calBC)

[1] Osztás *et alii* 2016a, p. 11, Fig. 3.
[2] Osztás et alii 2016a, p. 11.

period settlements seem to have had a smaller expansion. While the Neolithic period covers more than 70% of the site, the later periods such as the Bronze Age, the Iron Age, the Roman Age, and the Postmedieval Period were only poorly represented[3].

Most of the archaeological studies and publications have been so far concerned with the sub-sites Alsónyék-Kanizsa-dűlő (M6 TO 10B) as well as Bátaszék-Mérnökségi telep and Bátaszék-56-os út (M6 TO 5603/1) that were excavated under the direction of Anett Osztás and István Zalai-Gaál (between 2006 and 2008) and Anett Osztás (2008 and 2009), respectively, from the Institute of Archaeology, Research Centre for Humanities (formal Institute of Archaeology of the Hungarian Academy of Science). The first investigations concerned the Starčevo and the Lengyel period settlements, respectively.

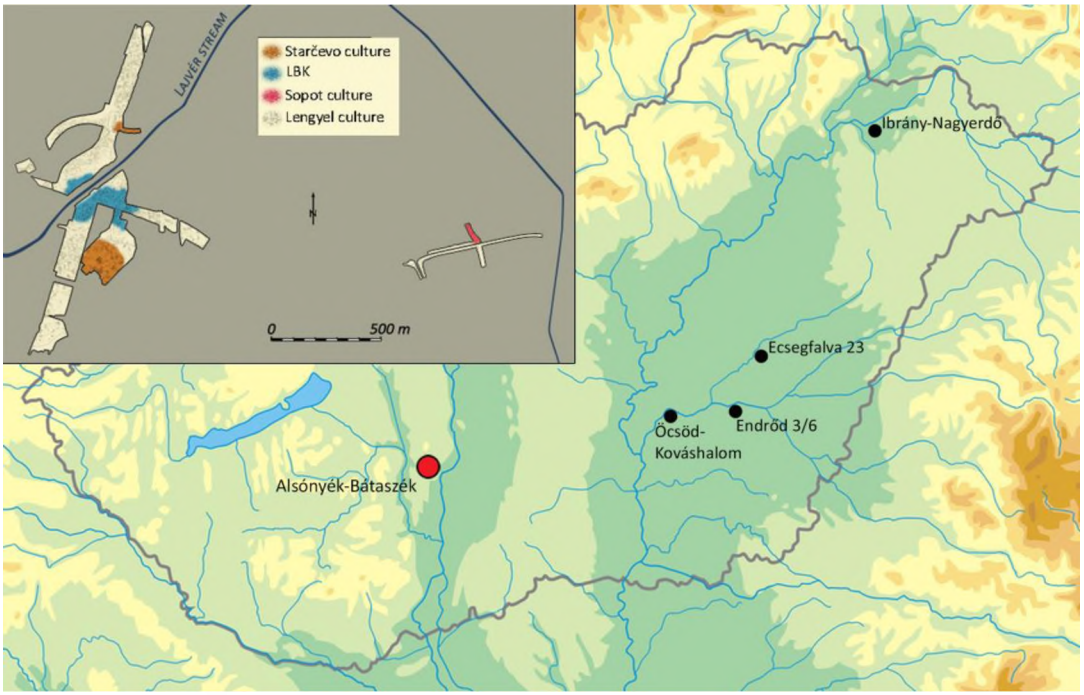

Figure 1. Location of Alsónyék-Bátaszék and other important sites mentioned in the paper, and outline plan of the excavation (in the square).

1.1. The Starčevo period settlement

Alsónyék-Bátaszék yielded a unique Starčevo complex in Hungary that represents the most extended and intensively inhabited Early Neolithic locality in Transdanubia. Most of the features, about 500, were to be found in the southern part of the site (subsite 5603). Majority of them represented pits and pit complexes with traces of ovens and hearths suggesting open-air manufacturing and other economic activities[4]. The number of burials is also outstanding at this settlement area. Isotopic and genetic analyses of the so far identified 25 skeletons, of which some had been buried into ovens without any burning trace, suggest that the Starčevo people were highly mobile and the community has had a patrilocal organisation[5].

In addition, ca. 65 Starčevo features including ovens and pits were also unearthed by Anett Osztás's team in subsite 10B in the northern part of the site (Fig. 2). According to the documentation of the parallel running excavation campaigns at the site, however, the number of Starčevo features can be estimated to be some 100 in the southern part of the subsite 10B. Moreover, geomagnetic surveys have indicated the extension of the Early Neolithic settlement into the unexcavated area[6].

[3] Osztás *et alii* 2016a, p. 11–12.
[4] Osztás *et alii* 2016a, p. 12; Oross *et alii* 2016, p. 94–95.
[5] Szécsényi-Nagy *et alii* 2015; Oross *et alii* 2016, p. 95–97; Depaermentier *et alii* 2020.
[6] Gallina *et alii* 2010, p. 10; Osztás *et alii* 2016a, p. 12; Rassmann *et alii* 2020

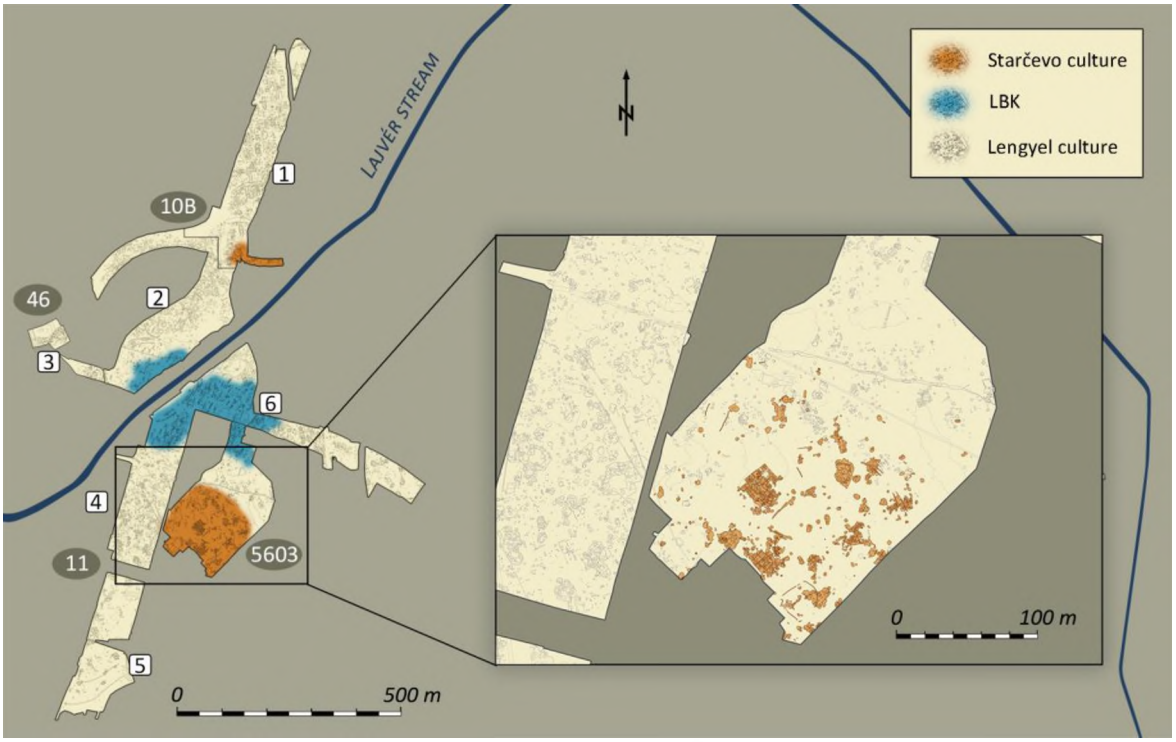

Figure 2. Spatial distribution of the Starčevo culture features.

1.2. The Lengyel period settlement

It was even larger than the Starčevo complex, covering the entire excavated area (Fig. 3). Its complete extension is estimated to about 80 ha. Of the ca 15,000 unearthed features, nearly 9,000 could be associated with the Lengyel culture. They included a rather great number of pits and pit complexes, as well as approximately 2300 burials and postholes associated with 122 houses. These surface-level, timber-framed houses unearthed in large numbers here represent a novelty for the Late Neolithic of Western Hungary[7].

While there is some overlapping with the Starčevo settlement in subsite 5603, most of the Lengyel period features accumulated in the northern part of subsite 10B (Fig. 2–3). In spite of the total duration of the Lengyel period settlement estimated to ca. 400–500 years, the most densely populated subsite 10B seems to have been occupied for only one or two generations at around 4700 cal BC according to radiocarbon models[8].

The majority of burials were grouped into clusters formed by 25–30 to ca. 100 graves. Similar to other Lengyel period cemeteries, female graves were better represented than male graves. The uneven ratio of the two sexes may be the result of polygamy, the selective mortuary practices and the death of males far from the settlement alike. Rectangular graves with postholes, first described for the Lengyel period, seem to have been better furnished than the common, oval-shaped graves[9].

[7] Osztás *et alii* 2016a, p. 15–17.
[8] Osztás et alii 2016b, p. 220–224; Osztás 2021.
[9] Osztás *et alii* 2016b.

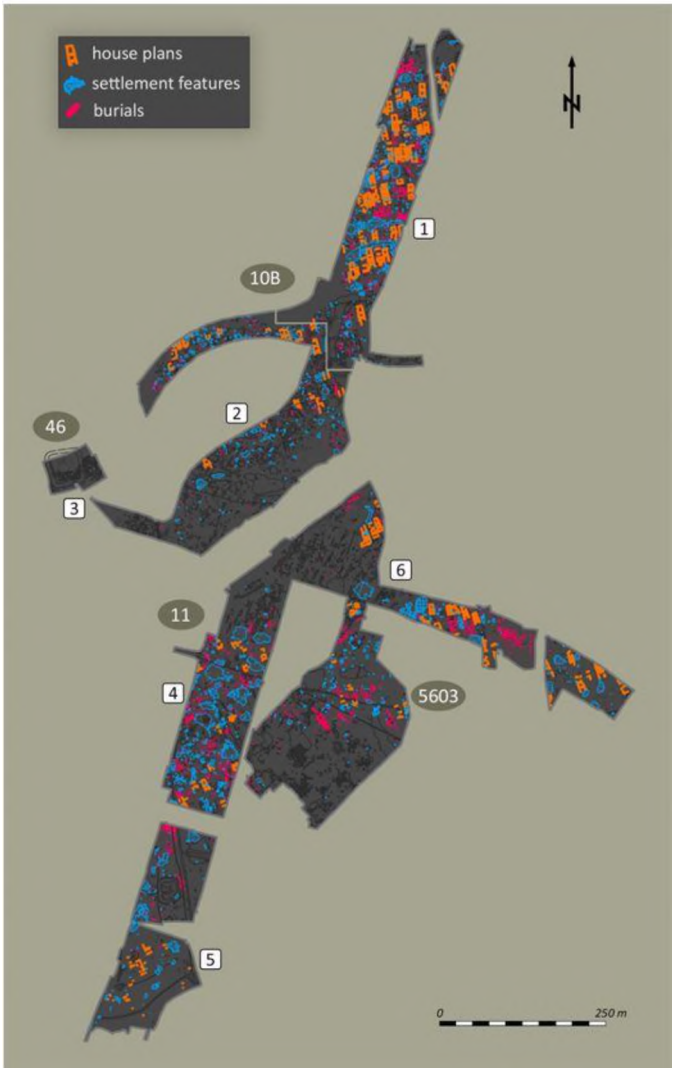

Figure 3. Spatial distribution of the Lengyel culture features.

2. ZOOARCHAEOLOGICAL RESULTS

The detailed analysis of two abundantly furnished graves among the aforementioned burials also provided the earliest zooarchaeological studies regarding Alsónyék-Bátaszék. Grave 3060 (situated in subsite 10B) is considered the richest male burial from the Late Neolithic of Eastern-Central Europe. The socially highly ranked, ca. 40–49 years old man has been donated numerous vessels and weapons as well as a necklace composed of *Dentalium* and copper beads, and a very rich assemblage of *Spondylus* ornaments. In addition, a number of selected animal bones were found behind the skeleton. Here, a large aurochs (*Bos primigenius*) trophy faced a fragment of carpometacarpus from a griffon vulture (*Gyps fulvius*) and a polished antler stick from red deer (*Cervus elaphus*) placed to an aurochs scapula fragment. The latter two utensils were also found in a similar position behind the skeleton of the ca. 50–59 years old man buried into Grave 927 (subsite 5603). It has been suggested that these peculiar grave finds represented a set of tools with symbolic and ritual meaning linked to the social status of the owners within their community[10].

[10] Zalai-Gaál *et alii* 2011a; Zalai-Gaál *et alii* 2012; Osztás *et alii* 2016b.

Other earlier papers with focus on the zooarchaeological finds from Alsónyék-Bátaszék also targeted the Lengyel period burial practices when analysing the symbolic and ritual significance of tusk pendants from wild boar (*Sus scrofa*) and boar/pig jaws as grave furniture as well as dog (*Canis familiaris*) offerings and dog burials[11].

First results on animal remains from settlement depositions also concerned the Late Neolithic period[12]. The analysis of bone assemblages unearthed from Features 49 and 113 (total NISP=3,440), located in the vicinity of two timber-framed houses in the northernmost part of subsite 10B indicated the dominance of domestic species with a strong emphasize on cattle (*Bos taurus*) husbandry (20.0%) and the occasional contribution of caprine and pig (Caprinae and *Sus domesticus*; 4.6%–5.7%). Wild animals were under-represented by only 20% of the total assemblage, and the ratio of aurochs bones (11.2%) in contrast with red deer (4.8%) and wild boar (2.7%) remains suggested that hunting more often took place in the open areas that in the forest.

The most interesting zooarchaeological finds from this assemblage, however, represented the rather great number of bone artefacts (37=1.1%) including 13 so-called hide-beamers[13]. These peculiar Late Neolithic tools – spread over Central and Eastern Europe, but missing from the western part of the continent – had been usually shaped from the metapodials of large ungulates by scraping the middle part of the diaphysis by chipped stones. Obviously manufactured for a special activity and linked to hide process based on ethnographic parallels, the role of this tool type is still unclear in the complete absence of use-wear[14].

Further zooarchaeological works involved the study of animal exploitation on all four periods of the Hungarian Neolithic at Alsónyék-Bátaszék, but so far only results concerning the Starčevo and the Lengyel period have been statistically relevant and published[15]. The aforementioned faunal composition characterised by the dominance of cattle among domestic species and the frequency of aurochs among hunted animals is also applicable for the large Lengyel culture assemblage (NISP=11,785) originating from 198 features, the ratio of remains from wild animals (47%) very much approached the abundance of domesticates (53%)[16]. In contrast to the very first results from two Lengyel period features[17], the contribution of aurochs and wild boar has doubled to 42% and 6%, respectively, while the impact of red deer has increased to 18% (17% bones and 1% antler)[18].

The Starčevo period accumulations showed significant differences. During the Early Neolithic, raising sheep and goat proved to have been (almost) as important as cattle husbandry, while pigs seemed to have been kept in minimal numbers both at the subsite 10B (NISP=428) and subsite 5603 (NISP=16,235). The dominance of red deer, roe deer and wild boar remains over aurochs bones, on the other hand, indicated the exploitation of wild resources in the forest and wooded marshland. Fishing also played a major role in the protein supply of the Starčevo community evidenced by dozens of fish remains (over 2% of the total assemblage) and skeletal parts from 2–3 m long catfishes (*Silurus glanis*)[19].

The exploitation of aquatic sources seems to have had a smaller role during the Lengyel period as shown by the decreasing number of fish remains (0.1%) that mainly originated from small and medium size exemplars of carp and pike. Nevertheless, the occurrence of large fish is indirectly proved by the presence of numerous big size hooks and harpoons in this period of the site as well. The Lengyel features also provided a much smaller number of mollusc (Unionidae sp. indet.) remains than the Starčevo features[20].

Owing to the collection of bones by hand during the excavations, however, we generally may only have a glimpse into the fishing activity of people at Alsónyék-Bátaszék. The lack of screening has also affected the amount of avian remains recovered from the site resulting in a low contribution of bird bones (0.1%–0.3%) to all of the aforementioned assemblages[21]. A number of these have been already identified, mostly to order or family level, and indicated the presence of several avian groups such as geese (Anseridae), ducks (Anatidae), diurnal birds of prey (Accipitridae), galliforms and corvids[22]. Their revision and holistic interpretation has promised to provide valuable information regarding the exploitation of birds both as food resources and symbolic creatures especially in the light of

[11] Zalai-Gaál *et alii* 2009; Zalai-Gaál *et alii* 2011b.
[12] Gál *et alii* 2013.
[13] Gál *et alii* 2013.
[14] Tóth 2013.
[15] Nyerges 2013, 2015; Nyerges, Biller 2015.
[16] Nyerges 2015, p. 258, Table 1.
[17] Gál *et alii* 2013.
[18] Nyerges 2015, p. 259; Nyerges, Biller 2015, p. 4–5.
[19] Nyerges 2013, 2015; Nyerges, Biller 2015, p. 2, Fig. 3; Biller forthcoming.
[20] Nyerges 2015, p. 260, Figs. 2–3; Nyerges, Biller 2015, p. 6, Fig. 6.
[21] Gál *et alii* 2013; Nyerges 2013, 2015; Nyerges, Biller 2015; Biller forthcoming.
[22] Nyerges 2015, p. 260; Nyerges, Biller 2015, p. 2; Biller forthcoming.

their contribution to the ritual life of the Lengyel culture people already becoming apparent from the study of Grave 3060[23].

Material and methods

The total amount of avian bones recovered during the zooarchaeological analyses targeting the domestic features of the settlements was 72 in the Starčevo period assemblage and 30 in the Lengyel period assemblage, making up 0.3% and 0.2% of the total animal bone material, respectively. They originated from 250 Starčevo period and 203 Lengyel period features including pits and pit complexes, infill, debris and surface covered by mollusc shells and burnt daub fragments. As already mentioned above, all the avian bones – similarly to the other animal remains – were collected by hand.

Of the total 102 bird bones, 77 (57 from the Starčevo period and 20 from the Lengyel period) were available for revision whose results are presented in this study (Table 1). They were identified by using the recent comparative bird bone collection housed in the Department of Geology and Palaeontology of the Hungarian Natural History Museum. This collection includes several specimens, usually from both sexes, of the identified species. In addition, manuals including osteological descriptions and measurements regarding geese, ducks, diurnal birds of prey, large galliforms and corvids were also used for checking personal results[24]. The measuring of bones was carried out by a digital calliper (0.1 mm) according to the standard published by Angela von den Driesch (Appendix)[25].

Results

1. The Starčevo period assemblage

The oldest avian assemblage from Alsónyék-Bátaszék comprises 57 remains. They belong to 16 species and at least 26 individuals. The best represented species are the greylag goose (*Anser anser*) by 12 remains from four individuals, and the mallard (*Anas platyrhychos*) by nine bones that also originate from four individuals. In addition to these two species, five other species belonging to the order of Anseriformes were identified. They include the mute swan (*Cygnus olor*), the white-fronted goose (*Anser albifrons*), the Eurasian wigeon (*Anas penelope*; Fig. 4), the tufted duck (*Aythya fuligula*), and the goosander (*Mergus merganser*). Although the last species are represented by one to three bones from one or two individuals each, the total contribution of Anseriforms to the assemblage is 58% both in terms of remains and individuals (Table 1).

Two wading birds were also identified. The purple heron (*Ardea purpurea*) belongs to the order of Ardeiforms, while crane (*Grus grus*) belongs to Gruiforms. In addition, the great bustard (*Otis tarda*; Fig. 5) was also recognised from the latter order. According to the sizes of three remains assigned to a single specimen, a female great bustard had been captured (Appendix). Raptors are represented by the buzzard (*Buteo buteo*) and the golden eagle, as well as the short-eared owl (*Asio flammeus*), yielding four remains in all. In addition, the wood pigeon (*Columba palumbus*) and the hooded crow (*Corvus cornix*) were identified, each by a single individual (Table 1).

The ecological characteristics of birds indicate that fowling mostly took place in the marshland, where the majority of the identified species live (Graphic 1). Either breeding in the reed-bed (the purple heron, the grey-lag goose, the mallard, and the crane) or in the undergrowth (the black grouse, the crane and the short-eared owl), or wintering on the islands of rivers and lakes (the other geese and ducks), these birds mark the presence of the aquatic environment.

Bird hunting in open, grassy areas is indicated by the great bustard whose habitat is the treeless plain and croplands. The woodpigeon and the hooded crow, however, breed on bushes and trees. The latter species lives in the margin of marshland, crop-field and forest, where scattered trees are available for nesting. Nevertheless, the hooded crow is also rather attached to human environments as an omnivorous bird that may feed on rodents, new born animals and grain in addition to fruits, eggs and invertebrates, therefore being an often persecuted bird up to the present.

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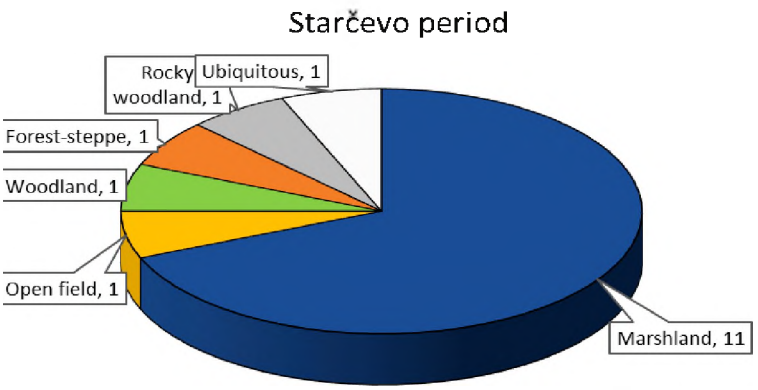
[23] Zalai-Gaál *et alii* 2011a.
[24] Bacher 1967; Woelfle 1967; Erbersdobler 1968; Tomek, Bocheński 2000.
[25] von den Driesch 1976.

Figure 4. Femora of a wigeon (photo by Erika Gál).

Figure 5. Proximal fragment of left side carpometacarpus from great bustard (photo by Erika Gál).

Species		Starčevo culture		Lengyel culture		Note
Scientific name	English name	NISP	MNI	NISP	MNI	
Ardea purpurea	Purple heron	1	1			
Cygnus olor	Mute swan	3*	1	1	1	*Traces of manufacture on the ulna
Anser anser	Greylag goose	12	4	2	1	Males and females
Anser albifrons	White-fronted goose	1	1			Female
Anas platyrhychos	Mallard	9	4			At least one male
Anas penelope	Eurasian wigeon	2	1			
Anas sp. indet. (Large size)	Large size duck	1	1	1	1	Subadult (from the Lengyel culture material)
Anas sp. indet.	Duck	1	1			
Aythya fuligula	Tufted duck	1	1			
Mergus merganser	Goosander	3	2			
Accipiter gentilis	Goshawk			2	2	Male and female
Buteo buteo	Buzzard	1	1			Female
Aquila chrysaetos	Golden eagle	2	2	3	1	
Tetrao tetrix	Black grouse	1	1	3	1	Males
Grus grus	Crane	3	2			
Otis tarda	Great bustard	3	1			Female
Columba palumbus	Wood pigeon	2	1			
Bubo bubo	Eagle owl			1	1	
Asio flammeus	Short-eared owl	1	1			
Corvus cornix	Hooded crow	1	1	1	1	
Aves sp. indet. (Eagle size)	Eagle-size bird			2		Traces of manufacture on both humeri
Aves sp. indet. (Duck size)	Duck-size bird	6				
Aves sp. indet.	Unidentifiable bird	3		4		
Total		**57**	**27**	**20**	**9**	

Table 1. List of the identified species and their distribution by the number of identified specimens (NISP) and the minimum number of individuals (MNI) at the Starčevo and Lengyel culture settlements.

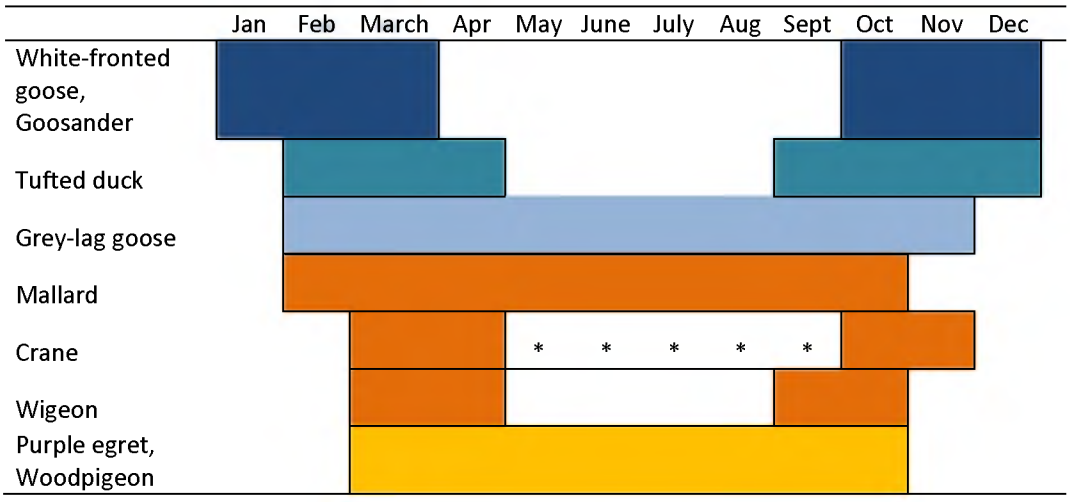


Graphic 1. Ecological characteristics of the bird taxa identified from the Starčevo period assemblage.

The ecological characteristics of buzzard unify all the aforementioned habitats. This species may occur over open areas such as wetlands, croplands and meadows, and woodlands alike. The scale of its prey is rather wide including small mammals, birds, but even bugs and carrions as well[26]. The remains of golden eagle at Alsónyék-Bátaszék represent unique finds as this species is a rarely occurring, large bird of prey (Fig. 6). It lives in undisturbed mountainous areas building its large nest either to a cliff ledge or a high tree, but hunting on a rather extended area including plains. Old birds are sedentary, while the young individuals are vagrants[27].

Figure 6. Golden eagle (drawing by Anna Zs. Biller).

Out of the 16 species identified in the Starčevo period assemblage, the buzzard, the black grouse, the great bustard, the short-eared owl and the hooded crow are sedentary birds in Hungary. The other species are summer visitors (coming to our country in the breeding season), migratory species (that fly over during the spring and autumn migrations), winter visitors or vagrants. The calendar compiled in Graphic 2 summarises the period when these birds could have been hunted at Alsónyék-Bátaszék. Mute swan nowadays is an occasionally occurring winter visitor, and it is hardly known if these birds represent wild or semi-domesticated specimens. Nevertheless, it is worth mentioning that the mute swan used to breed in Hungary until the 19th century according to ornithological data[28].



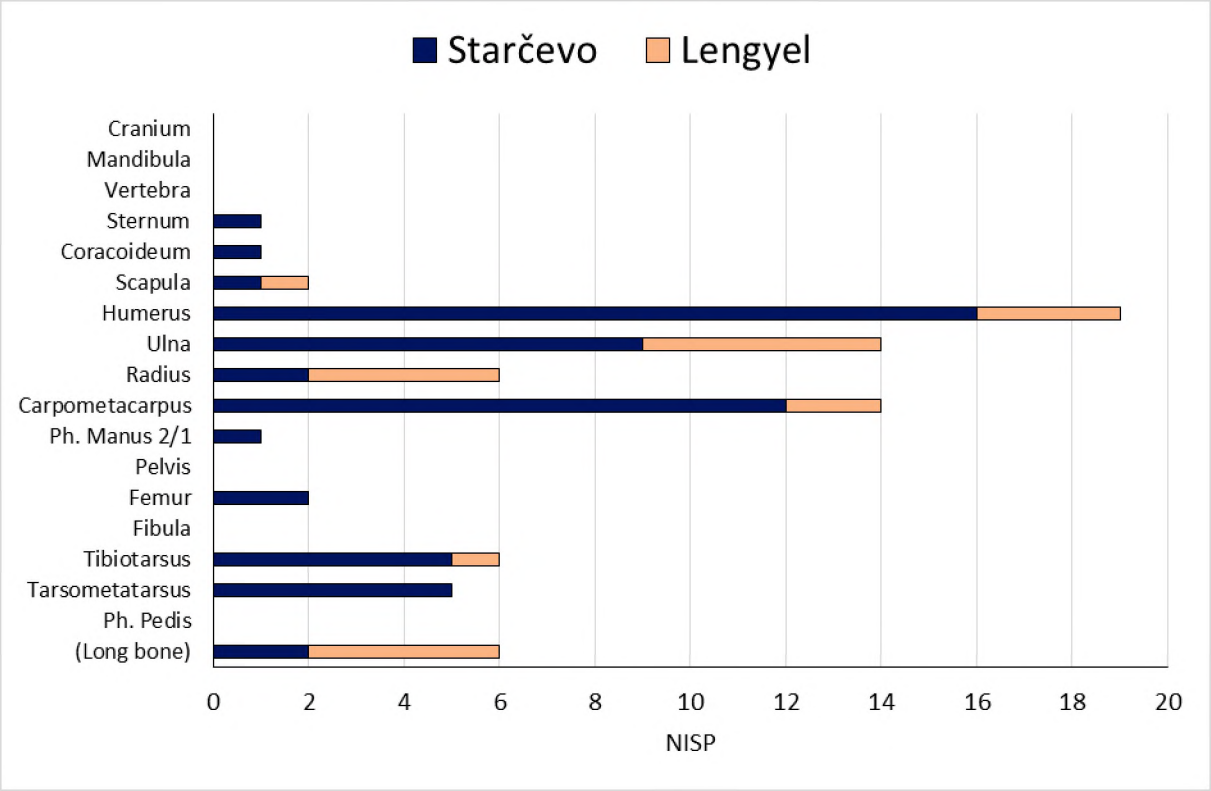
Graphic 2. Calendar illustrating the presence of non-resident species in Hungary
(the asterisk means that this species used to breed

[26] Hume 2003, p. 136.
[27] Peterson *et alii* 1977, p. 87; Hume 2003, p. 126.
[28] Peterson *et alii* 1977, p. 55–56; Hume 2003, p. 90.

in Hungary until the near recent).

The latter is true with the crane that recently occurs during the migration period only[29]. Some populations of the mallard, otherwise a breeding species in Hungary, may come to our country as winter visitors[30], while the short-eared owl is also a facultative winter visitor during the years with rodent infestation[31].

In the Starčevo period assemblage, humeri were the best represented skeletal part by 16 remains that represent 28% of the assemblage (NISP=57). As the humerus is one of the meatiest parts of the avian body, we may assume that birds were one of the food resources at the settlement. It is surprisingly, however, that other meat-bearing long bones such as the femur and the tibiotarsus (forming the upper and the lower thigh in fowl) were poorly represented in the assemblage by two and five remains, respectively (Graphic 3).



Graphic 3. The distribution of skeletal parts in the Starčevo and Lengyel period assemblages.

The under-representation or complete absence of elements with significant amount or muscle such as the sternum and pelvis can be assigned to the taphonomic features (e.g. fragility) of these bones on the one hand, and the recovery methods (e.g. overlooking during the hand-collection of finds) at the excavation on the other. The absence of cranial elements and small bones such as vertebrae and phalanges may be due to the same reason, although it cannot be excluded that birds used to be decapitated at the hunting site. Nevertheless, the number of tarsometatarsi, the most distally located long bone in the leg without economic value, indicate that the legs were not cut off outside the settlement, but (almost) complete carcasses were brought to the village.

The second best represented bone type in the assemblage was the carpometacarpus by 12 remains (21%). This skeletal element from the distal end of the wing, similarly to the tarsometatarsus, does not hold meat, but the longest – the so-called primary – feathers are attached to it.

[29] Hume 2003, p. 160.
[30] Hume 2003, p. 101.
[31] Peterson *et alii* 1977, p. 166.

Out of the three remains from mute swan, the distal ulna fragment showed traces of manufacture. This remain had been cut off above the epiphysis (Fig. 7, left side), suggesting that the rest of bone – or only the diaphysis – was modified into an artefact.

Figure 7. Bones displaying cut marks (left: distal part of right side ulna from mute swan in the Starčevo period assemblage; middle and right: long bone diaphyses from eagle-size birds in the Lengyel period assemblage).

2. The Lengyel period assemblage

The Late Neolithic avian bone assemblage is only one-third of the Starčevo period assemblage in its size: 20 remains could be assigned to eight taxa and at least nine individuals. Six of the eight taxa are common on both lists, only the goshawk (*Accipiter gentilis*) and the eagle owl (*Bubo bubo*) being new avifaunal elements in the Lengyel period assemblages (Table 1). These two species are resident in Hungary.

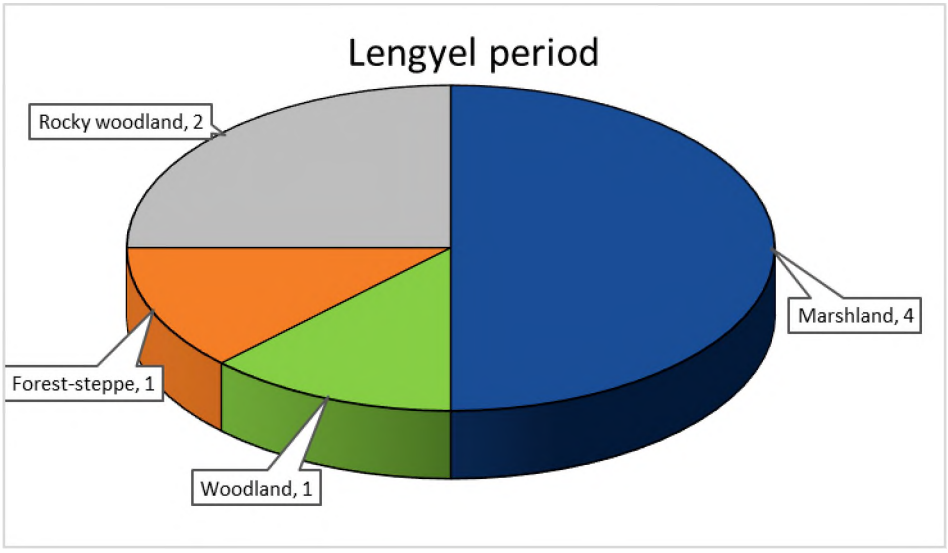
Besides the apparent decreased role of birds, the most striking feature is the reduced number of Anseriforms. Accordingly, the contribution of birds living in the marshland also dropped from 69% to 50% (Graphic 4). Predatory birds are equally well represented compared to the Starčevo period assemblage. Both a male and a female individual from the goshawk could be recognised among the diurnal birds of prey, in addition to the golden eagle, represented by a humerus and two ulnae in this assemblage (Fig. 8). The eagle owl (Fig. 9) shares the same habitat with the latter species. The prey of both species extends to the size of grouse and hare[32].

Contrary to the Starčevo period assemblage, ulnae are the best represented skeletal parts in the Lengyel period bone collection, but their number is closely followed by the amount of other bones of the anterior extremity, such as the radius and the humerus (four and three remains, respectively). Skeletal elements from the other parts of the body, e.g. the shoulder girdle and legs, were hardly found in this assemblage (Graphic 3).

Besides their frequency, the likely focus on wing bones in the Lengyel period is also suggested by the two fragments of ulnae from golden eagle displaying cut marks indicative of their involvement in bone manufacture (Fig. 7).

[32] Peterson *et alii*, 1977; Hume 2003, p. 240.

Figure 8. Ulnae from the golden eagle in the Lengyel period assemblage
(left: diaphysis from the right side specimen; right: distal part from a left side specimen). Photo by Erika Gál.



Graphic 4. Ecological characteristics of the bird taxa identified from the Lengyel period assemblage.

Figure 9. Fragment of right side carpometacarpus from eagle owl (photo by Erika Gál)

DISCUSSION

Avian remains found at Neolithic sites in Hungary have been well documented for decades[33]. Due to systematic excavations on the Great Hungarian Plain, both before and after World War II, on the one hand, and Sándor Bökönyi's interest in the domestication of mammals on the other, a rather great number of animal bones have been identified from the Körös culture settlements[34]. Although these assemblages usually contained only a few or, in the best case, a few dozens of bird bones owing to the collection of remains by hand[35], their identification provided a wide range of information concerning the palaeo-ecological reconstruction of environments around the sites, the seasonal characteristics of fowling, as well as economic and cultural aspects of bird exploitation[36]. In the case of the sites of Ecsegfalva 23 (Eastern Hungary) and Ibrány-Nagyerdő (North-Eastern Hungary), where water-sieving and flotation of soil samples had been carried out during the excavation, an outstandingly great number of avian (and fish) bones and taxa was recovered[37].

The distribution of Neolithic avian bone assemblages shows a rather characteristic pattern in a geographical sense. Out of the so far published 13 Early Neolithic, 10 Middle Neolithic and five Late Neolithic assemblages, only three were excavated from the western part of the country (i.e., Transdanubia), the rest of settlements being found in

[33] Bökönyi, Jánossy 1965; Jánossy 1985.
[34] Bökönyi 1974; 1989.
[35] Gál 2004; 2007a.
[36] Gál 2006; Serjeantson 2009.
[37] Gál 2007b; Kovács *et alii* 2010.

the eastern part of Hungary[38]. Among the mentioned three sites, two are located in the northernmost part of Transdanubia, while so far a single settlement from the shore of Lake Balaton yielded Neolithic bird bones[39]. The only previously published Starčevo culture animal bone assemblage from the southern part of Transdanubia, Lánycsók-Égettmalom (NISP=1070), included a single avian remain that was not studied by a bird bone specialist[40]. The very few animal remains published from early Neolithic contexts in Transdanubia is a fact partly due to the much lower number of known Starčevo sites compared to coeval Körös culture sites. In addition, these sites were only investigated by small-scale or rescue excavations and field surveys[41]. The destructive soil conditions also affected the preservation of animal bones in certain part of western Transdanubia.

Therefore, earlier information concerning the role of birds in the subsistence of the Starčevo people originate only from the Serbian sites of Padina and Starčevo within the Carpathian Basin[42]. Out of the six identified species from Padina, two represent large diurnal birds of prey. Both the vulture (*Gypaetus/Aegypius/Gyps*) and the white-tailed eagle (*Haliaeetus albicilla*) yielded wing bones, i.e. a humerus and an ulna, respectively[43]. The bird bone collection from Starčevo included 10 species, most of them living in the wetland. In addition, the crane, the great bustard and an eagle (*Aquila* sp.) were also identified. The latter species furnished a radius[44]. In addition, a few avian bones assigned to three species (the great bustard, tawny owl and rook or hooded crow) were published from the Starčevo-Criş culture site of Măgura–Buduiasca in southern Romania[45].

Concerning the Late Neolithic, Alsónyék-Bátaszék also yielded the first Lengyel culture avian assemblage, the last period of the Neolithic having been so far represented in Hungary by four Tisza culture and two Csőszhalom-Herpály culture bird bone samples in the Great Hungarian Plain[46].

The Starčevo period assemblage from Alsónyék-Bátaszék is one of the most abundant and richest avian samples both among the Early Neolithic and generally the prehistoric bird bone assemblages from Hungary, so far only the Körös culture settlements of Ecsegfalva 23 (43 species, NISP=217) and Endrőd 119 (20 species, NISP=62), and the Tisza culture settlement of Öcsöd 23 (21 species, NISP=86) providing more abundant and diverse bird bone collections[47]. By 16 species identified from 48 remains (identified to taxon level; Table 1), Alsónyék falls well above the trend line of the plot diagram illustrating how diversity increases along with the number of identifiable bones (Graphic 5). The original regression analysis showing the relationship between assemblage size (NISP) and the number of taxa identified (taxonomic richness: R) has been carried out based on data from 29 avian and 35 mammalian assemblages from the Prehistoric period of Hungary[48]. The plot diagram also demonstrates how taxonomic richness becomes 'exhausted' in large mammalian samples: new species are not likely to be identified from assemblages including more than about 10,000 identified remains ($\log_{10}=4$).

As for the avifaunal composition, the Early Neolithic sample from Alsónyék-Bátaszék resembles the other coeval assemblages by the dominance of marshland birds with special regard to the frequency of ducks and other aquatic birds, and the under-representation of steppe-, forest-steppe and woodland species (Graphic 1, Table 1). It has been demonstrated that the exploitation of richness of aquatic resources for food and raw material by gathering, fishing and fowling was characteristic of major Körös culture sites[49]. The best example for specialized bird hunting in aquatic habitats has been described from Ibrány-Nagyerdő in the Upper Tisza region, where all the ten identified species represent wetland birds. This focus on a single habitat resulted in the overwhelming dominance of mallard (56% of total bird bones) and the relative poorness in species diversity in spite of the outstanding number of recovered avian remains (NISP=302)[50], placing this sample right to the trend-line on Graphic 5. By a smaller and more diverse assemblage (16 species from 113 bones), results from the site of Endrőd 3/6 also pointed to exclusive fowling in marshlands[51].

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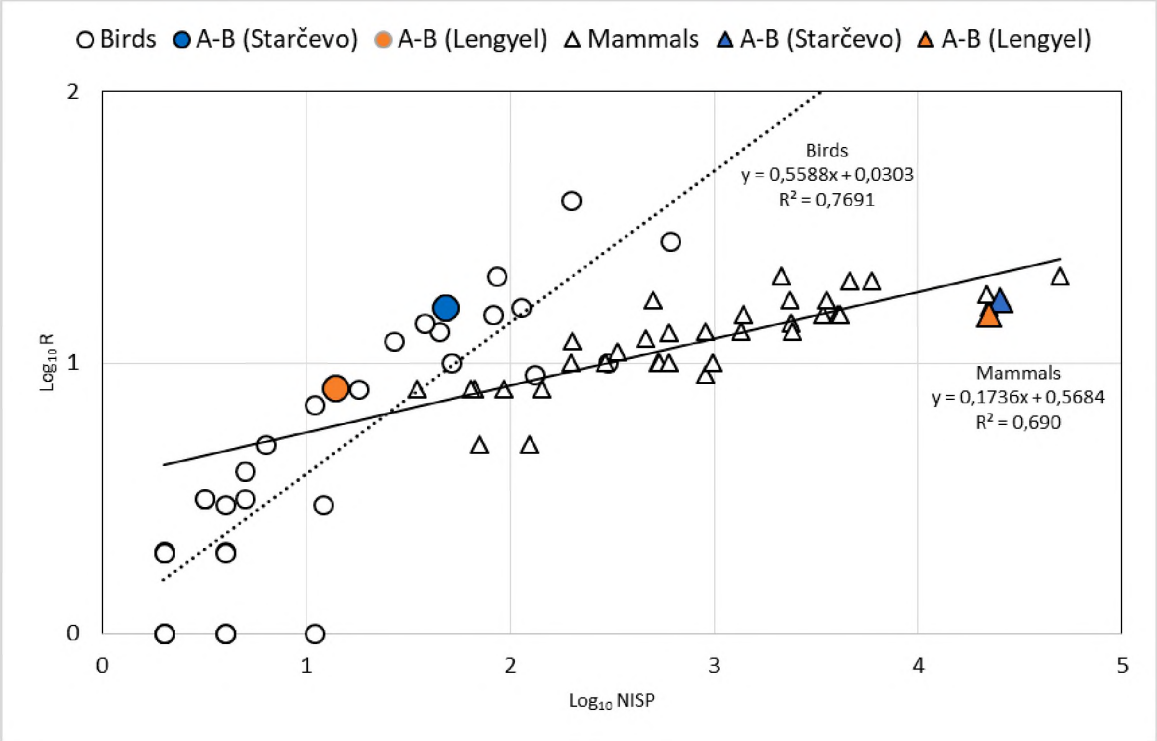
[38] Gál 2004; 2009; Kovács, Gál 2009; Kovács *et alii* 2010.
[39] Gál 2004, p. 274, Fig. 1.
[40] Bökönyi 1981.
[41] Kalicz 2011.
[42] Clason 1980.
[43] Clason 1980, p. 164–166, Figs. 24/e–25.
[44] Clason 1980, p. 166.
[45] Gál 2007, p. 23.
[46] Gál 2004; Kovács, Gál 2009.
[47] Gál 2004; 2007b; Kovács, Gál 2009.
[48] Bartosiewicz, Gál 2007; Bartosiewicz *et alii* 2013.
[49] Bartosiewicz 2007; Gál 2007a; 2007b; Raczky *et alii* 2010, p. 157.
[50] Kovács *et alii* 2010.
[51] Gál 2009.



Graphic 5. Differences between the trends by which the number of taxa (R) increases as a function of assemblage size (NISP) in birds and mammals (Abbreviation: A-B=Alsónyék-Bátaszék).

Since most of the identified species are either resident or summer visitors in our country (Graphic 2), and build their nest into the reed beds and on the ground, collecting eggs was likely part of the seasonal exploitation of floodplains, in addition to bird hunting and fishing. The importance of the latter activity during the Early Neolithic period at Alsónyék-Bátaszék is proven by the quantitative and qualitative aspects of remains from this group of vertebrates[52].

The distribution of skeletal elements indicates some patterns in avian carcass processing (Graphic 3). The lack of certain elements such as the bones of the head in un-sieved deposits may be the result of collecting bias. Nevertheless, skull and mandible remains were also absent in the most abundant Körös culture avian assemblage found at Ecsegfalva 23 whose collection involved wet and dry screening during the excavation. Analyses regarding this bird bone sample suggested the removal of bird heads off-site as well as wing and feather curation based on the statistically significant high number of wing bones[53].

Bone manufacture at the Starčevo settlement is only indirectly indicated by avian bones as the distal ulna with cut mark from the mute swan represents a workshop debitage, not a finished tool (Fig. 7, left). Generally little data is known in this respect regarding the Neolithic period of Hungary, as so far only a single pipe carved from a goose ulna has been published from the Middle Neolithic (Zseliz culture) site of Karancsság-Alsó-rét in Northern Hungary[54]. The swan ulna from Alsónyék may have been also modified into a similar artefact used as a drinking pipe or a bone case or a wind instrument[55], but numerous parallels described from the Neolithic period of the Netherlands show how the fine pneumatic long bones from the bird skeleton could have been modified into awls and other objects[56].

Compared to the majority of coeval avian samples from Hungary, the most interesting feature of the Starčevo period assemblage from Alsónyék-Bátaszék is perhaps the presence of raptors. All the three species identified from this sample represent rare animals both for the (Early) Neolithic of Hungary and the Carpathian Basin[57]. Although

[52] Biller forthcoming.
[53] Gál 2007b.
[54] Gál 2005; 2010.
[55] Gál 2010, p. 44, Fig. 6.
[56] Wijngaarden-Bakker 1997.
[57] Gál 2004.

buzzard nowadays is a common diurnal bird of prey occurring in marshlands, forests, mountainsides and croplands alike[58], so far it has been only identified from the Körös culture settlement at Ecsegfalva 23 by a single specimen (a proximal fragment of tarsometatarsus)[59]. Interestingly enough, this species is also missing from the Copper and Bronze Age avifauna of the Carpathian Basin[60].

Golden eagle seems to have been first identified both for the Early Neolithic of Hungary and the Carpathian Basin as a previously described *Aquila* specimen (a radius from a young individual) from Starčevo could be recognised to genus level only[61]. While the nesting habitat of this large raptor is narrower than the buzzard's and it is a very sensitive species against disturbances, it explores rather large areas by wandering. The current number and breeding area of the golden eagle is restricted to three-four pairs in the Zemplén Mouintains (Northern Hungary)[62], but ornithological observations from the last decades evidence its occurrence on the Great Hungarian Plain (Eastern Hungary)[63]. Nevertheless, the breeding habitat of the golden eagle fits into the landscape around Alsónyék by the vicinity of the Mecsek and Villány Mountains, the highest elevations in Southern Transdanubia. Being a facultative scavenger species, especially during the winter[64], it could have also been hunted around the settlement, if attracted by carrions.

Finally, the short-eared eagle is also first identified from the Early Neolithic of Hungary and the Carpathian Basin alike, its remains (a tarsometatarsus) having been so far found only at the Late Neolithic (phase Vinča C) site of Parţa-tell II[65].

The Lengyel culture assemblage from Alsónyék-Bátaszék, though much scarcer in number of remains and species than the Starčevo culture sample, is also notable due to the presence of the golden eagle and eagle owl. The single Late Neolithic counterparts of these species have been described from an Eastern Hungarian and Romanian site within the Carpathian Basin, respectively. The Foeni Group site of Foeni-Cimitirul Ortodox in Romania yielded three leg bones (a femur, a tibiotarsus and a tarsometatarsus) of golden eagle, most possibly a single specimen[66]. The Csőszhalom-Herpály culture site of Tiszapolgár-Csőszhalom furnished a fragment of tarsometatarsus from the eagle owl[67].

Both diurnal birds of prey and owls have been reported as symbols of power. Burials of such kind of birds as well as the selected feathers and bones for ornaments and tools all evidence the special role of these birds in the human cosmology and ritual life of people[68]. This observation seems to be proven by the bone types originating both from the golden eagle and the eagle owl as the humerus, ulna and carpometacarpus form the skeleton of wing, while the longest feathers – the so-called primaries and secondaries – are attached to the latter two elements (and the digits)[69]. Moreover, the traces of manufacture displayed on the ulnae from golden eagle in the Lengyel culture assemblage evidence the use of bones from this bird as raw material in addition to the exploitation of wings or/and feathers of predators (Fig. 7).

The best evidence for the employment of birds of prey in the symbolism and ritual life of the Lengyel people at Alsónyék-Bátaszék, however, comes from Grave 3060 excavated at subsite 10B. As already presented in the introduction of this paper, the rather exceptional male burial assigned to a leader of the community included a fragment of carpometacarpus from a griffon vulture in addition to a modified antler from red deer and an aurochs trophy[70]. The symbolic meaning of large, powerful animals, most probably associated with (male) power and protection from danger, has been demonstrated even earlier by the presence of aurochs horn cores and a lion canine in the cemetery of Zengővárkony nearby Alsónyék[71]. Actually, transmitting cultic or social messages by body parts of fearful animals may have had other scenes than graveyards in Lengyel culture settlements, as demonstrated by the trophy of the huge aurochs bull found in Pit 1 at Mórágy-Tűzkődomb, closely located to the aforementioned sites[72].

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[58] Peterson *et alii*, p. 82.
[59] Gál 2007b.
[60] Gál 2007a; 2013; 2020.
[61] Clason 1980, p.166.
[62] Firmánszky, Frank 2000. p. 29.
[63] Peterson *et alii*, p. 86–87.
[64] Hume 2003, p. 126.
[65] Kessler, Gál 1997, p. 142.
[66] El Susi 2004; Gál 2004, p. 282–283, Table 2.
[67] Bökönyi, Jánossy 1965, p. 91.
[68] Gál 2005; Serjeantson 2009; Zalai-Gaál *et alii* 2011a.
[69] Serjeantson 2009, p. 192, Fig. 8.4.
[70] Zalai-Gaál *et alii* 2011a.
[71] Vörös 1983.
[72] Bartosiewicz 2005.

CONCLUSIONS

Although recovered by hand-collecting only, the avian remains found at Alsónyék-Bátaszék yielded more than the usual amount of bird bones in comparison with other Early and Late Neolithic sites in the Carpathian Basin, and offer the very first information regarding the fowling habits and use of birds of both the Starčevo and Lengyel culture people on the region of present-day Hungary.

During the Starčevo period, bird hunting seems to have been mainly taken place in and around aquatic environments, similarly to the Körös culture sites in the country. The head of birds was most probably cut off prior to the transport of carcasses to the settlement. They represented tender meat in food supply, and the thin-walled pneumatic bones served as raw material for fine artefacts. According to the frequency of distal bones from the forelimb, wing or feather curation at the settlement is also suggested.

The exploitation of diurnal and nocturnal birds of prey for their feathers (and wings) and bones seems to have been the main objective in fowling during the Lengyel period at Alsónyék-Bátaszék. The use of these birds as symbols of transcendence has been demonstrated in an earlier paper by the identification of griffon vulture among the grave donations at the settlement[73]. Following the earliest sign of this very rare vagrant species for the Late Neolithic period of Hungary, herewith the presence of golden eagle and the indication of Mecsek and Villány Mountains as its possible breeding region during both the Early and Late Neolithic is first introduced.

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Appendix. Measurements (mm) of avian bones according to the standard published by Angela von den Driesch.[74] Abbreviations: GL=greatest length; L(m)=(medial) length; Bp=proximal breadth; Dp= proximal depth; SC=smallest breadth of the corpus; Bd=distal breadth; D(i)d=distal dept (or diagonal); F=female; M=male.

Species	Bone	Side	Sex	GL	L(m)	Bp	Dp	SC	Bd	D(i)d	Period	No. Feature	Type of feature
Cygnus olor	ulna	dex						10.4		23.5	Starčevo	1512	Pit
Anser anser	humerus	dex				35.4					Lengyel	272	Pit
Anser anser	humerus	sin	M					12.0			Starčevo	1460	Pit
Anser anser	ulna	sin				15.8	19.8	8.4			Starčevo	631	Pit
Anser anser	radius	dex	M					5.2	11.1		Starčevo	1460	Pit
Anser anser	carpometacarpus	sin	F	93.7	92.7					10.8	Starčevo	1007	Debris
Anser anser	carpometacarpus	dex	M	94,6		21,8				11,7	Starčevo		
Anser anser	carpometacarpus	sin				20.5					Starčevo	601	Pit
Anser anser	carpometacarpus	sin	F							10.8	Starčevo	758	Pit
Anser anser	carpometacarpus	sin	M							11.7	Starčevo	1107	Surface covered by mollusc shells
Anser albifrons	coracoideum	sin	F		57.0						Starčevo	1100	Pit complex
Anas platyrhynchos	ulna	dex	M			9.7		5.3		9.7	Starčevo	666	Pit
Anas platyrhynchos	ulna	sin	M					5.5		10.1	Starčevo	631	Pit
Anas platyrhynchos	carpometacarpus	sin	M	58,7		12,7				7,1	Starčevo		
Anas platyrhynchos	tibiotarsus	dex						4.4	8.4	7.7	Starčevo		

[74] von den Driesch 1976.

Anas platyrhynchos	tarsometatarsus	sin	M			10.2	9.6	4.4			Starčevo	666	Pit
Anas penelope	femur	sin		41.6	39.6	9.6	6.4	3.8	9.2	7.4	Starčevo	1373	Pit
Anas penelope	femur	dex		41.8	40.0	9.7	6.4	3.6	9.1	7.4	Starčevo	1373	Pit
Aythya fuligula	tarsometatarsus	dex		33.5		7.9		3.8	8.6	7.1	Starčevo	1373	Pit
Mergus merganser	humerus	dex				23.8					Starčevo	691	Pit
Mergus merganser	carpometacarpus	dex				13.3					Starčevo	1460	Pit
Mergus merganser	carpometacarpus	dex								8.0	Starčevo	1372-1501	Fill
Buteo buteo	humerus	sin	F			22.4		8.7	19.6		Starčevo	758	Pit
Aquila chrysaetos	ulna	sin						10.5			Lengyel	395	Pit
Aquila chrysaetos	ulna	dex						10.5			Lengyel	441	Clay pit
Tetrao tetrix	humerus	dex	M			20.4					Lengyel	349	Pit
Tetrao tetrix	radius	sin	M					3.5	7.6		Lengyel	1931	Clay pit
Tetrao tetrix	tibiotarsus	dex	M					5.3	10.1	10.1	Starčevo	708	Pit
Grus grus	carpometacarpus	dex		113,0		13.3					Starčevo		
Grus grus	carpometacarpus	dex			22,6						Starčevo		
Grus grus	phalanx I digiti II	dex		51.6	50.6						Starčevo	1417	Pit
Otis tarda	carpometacarpus	sin	F			23.8					Starčevo	620	Pit
Otis tarda	carpometacarpus	sin	F							14.6	Starčevo	1107	Surface covered by mollusc shells
Bubo bubo	carpometacarpus	dex				18.9					Lengyel	754	Pit
Asio flammeus	tarsometatarsus	sin						4.9	10.6		Starčevo	1107	Surface covered by mollusc shells
Columba palumbus	ulna	dex						3.9		8.0	Starčevo	616	Pit
Corvus cornix	humerus	sin		71.1		19.7		6.4	15.1		Starčevo	1526	Pit
Corvus cornix	carpometacarpus	sin		50.2	43.2	12.0				10.0	Lengyel	1931	Clay pit