
New data on bird bone artefacts from Hungary and Romania

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This paper presents avian bone artefacts from settlements in Hungary and Romania, which fall into two categories: 1, new finds, never studied before; 2, previously known specimens that have not yet been thoroughly analysed from an archaeo-ornithological point of view. The age of these artefacts ranges from the Palaeolithic to the Turkish Period. The function of the objects was diverse: pipes, flutes, tubes, utensils, pendants and decorative items were made from the hollow long bones and talons of white pelican (*Pelecanus* cf. *onocrotalus*), stork (*Ciconia* sp. indet.), spoonbill (*Platalea leucorodia*), greylag goose (*Anser anser*) and domestic goose (*A. domesticus*), white-tailed eagle (*Haliaeetus albicilla*), golden eagle (*Aquila chrysaetos*), crane (*Grus grus*) and eagle owl (*Bubo bubo*).

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Introduction

In comparison with mammal and fish remains, bird bones are generally poorly represented in archaeological deposits, and even in the richest accumulations they make up only 1–2% of the total animal bones (Gál in preparation). Worked bird bones are even rarer among avian finds for several reasons. Bird skeleton parts are much smaller and thinner than mammal bones, and yield smaller quantities of raw material. Birds and their locomotor system are specialized to aquatic or aerial conditions, therefore the number of bones is reduced and many skeletal elements are pneumatized as the result of penetration of sinuses into the marrow cavity. Last but not least, the special shape and fine structure of bird bones also limits their use in handicrafts. On the other hand, the thin cortical wall of bird bones is very sharp after breaking or cutting and therefore suitable for a variety of activities. The particular form of some bird bones also may have been attractive for producing certain special objects.

Some types of artefacts made from animal bones are characteristic of certain periods. Many musical instruments, combs, hairpins and other objects are known from the Roman Period (Bíró 1994). Bird bone artefacts such as flutes, pipes, needle cases and pendants came to light from the Avar Period burials (Vida 2002). Among wind instruments, the double pipes from the Jánoshida burial 48 (Bartha 1934), from the Alattyán burials 285 and 477 (Kovrig 1963), and from the Szegvár–Szőlőkalja burial 109 (Kürti & Menghin 1985, Fig. 70) are especially well known. Other Avar Period double pipes are known from the Rácalmás–Rózsamajor burial 16, and Felgyő as well (Kozák 1997). In Serbia, a find considered a double pipe made from the long bone of a waterfowl was found in the Early Avar Period Bijelo brdo burial 16 (Ivaniček 1949). These bones, however, have been recently reevaluated by the musicologist J. Kozák as the broken parts of a simple pipe made from an avian tibiotarsus (Kozák 1997, Fig. 4). All the aforementioned flutes were reported to having been made from crane (*Grus grus*) bones (Bartha 1934; Kozák 1997).

Other bird bone artefacts in Hungary come from different periods. The Middle Bronze Age (Hatvan-Füzesabony culture) tell site of Tószeg–Laposhalom was excavated by L. Márton in 1906 (Jánossy 1985, 75). Excavations yielded a worked 105 mm long proximal tarsometatarsus of great bustard (*Otis tarda*) (Lambrecht 1964, 792). A pendant made from a distal right humerus of domestic goose was found in context 298 at the 16th century Bajcsa–Turkish Fortress, Hungary excavated by Gy. Kovács (Gál 2002a).

Two bird bones artefacts have been published in Romania. A tool made from the proximal tibiotarsus of great bustard was found in the Tisza culture settlement of Salca near Oradea. A crane tibiotarsus with its cut proximal end originates from the Ottomani culture at the site of Sălăcea (Jurcsák & Kessler 1973, Figs. 38, 40). In addition, L. Bejenaru reported the drilled talon of a diurnal bird of prey from the medieval settlement of Siret–Suceava excavated by V. Spinei in 1993 (Bejenaru 2003, 43), which has recently been studied by the author of this paper.

Description of the finds

The objects listed below are classified in accordance with their function. Within every category I follow the dating of the finds and the taxonomic status of bird taxa. I also provide the archaeological context, the dimensions and osteometrical sizes for each bird bone artefact. The settlements they come from are presented on the map of the Carpathian Basin (Fig. 1).

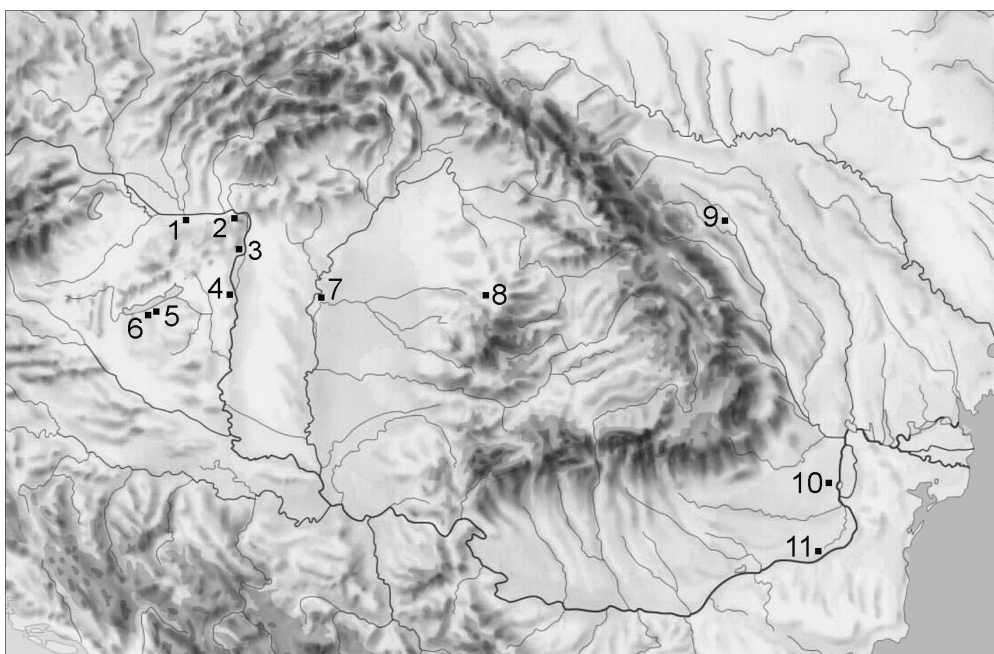


Fig. 1. Map showing the localities that yielded worked bird finds. 1 Szőny (H); 2 Visegrád (H); 3 Budapest (H); 4 Dunapentele (H); 5 Balatonlelle (H); 6 Balatonboglár (H); 7 Tiszaföldvár (H); 8 Sighiștel (R); 9 Suceava (R); 10 Însurăței (R); 11 Capidava (R). Abbreviations: H – Hungary, R – Romania.

Flutes and pipes

Several Roman Period flute fragments excavated in Hungary at the end of the 19th century and in the 20th century are deposited in the Roman Collection of the Hungarian National Museum. Some of them have been published as flutes and whistles made from hollowed out mammalian long bones (Alföldi 1957; Bíró 1987; 1994, 60–61, Pls. 76: 631–633; 88: 858). I have examined these artefacts and many of them were made from ulnae of large birds. The best preserved flute with 2 complete and 1 fragmented finger hole appears to be made from the ulna shaft of a

diurnal bird of prey (Fig. 2). Based on the flat dorsal surface and size of the bone it may have come from an eagle. The total length of the find is 109 mm, the width of diaphysis is 12.6 mm, the thickness of diaphysis is 11.6 mm and the thickness of wall is 1.4–1.8 mm. The distances between the finger holes are 27.4 mm and 31.0 mm respectively. The diameters of the holes are all 5.8 mm. Another 4 fragmented flutes and pipes were also made from ulnae of large birds, some of them decorated by fine cross-hatching.

The other large flute fragment was made from an avian tarsometatarsus shaft (Fig. 3). The straight and angled bone is either from a large terrestrial or wading bird. Based on its size it may have been a stork (larger than heron but smaller than crane). The total length of the find is 98.9 mm, the width of diaphysis is 8.3 mm, the thickness of diaphysis is 6.9 mm and the thickness of wall is 0.8–1.5 mm. The distance between the first complete finger hole (diameter: 4.8 mm) and the second broken one is 21.6 mm.

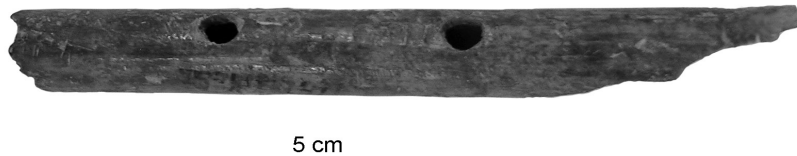


Fig. 2. Roman Period flute fragment made from the ulna of a large diurnal bird of prey and found at Dunapentele (Hungary).

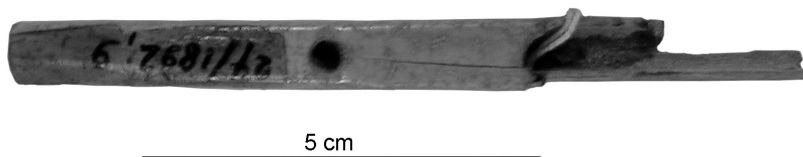


Fig. 3. Roman Period flute fragment made from a stork tarsometatarsus and found in Hungary.

An interesting decorative bone section was also made from a worked bird ulna fragment (Fig. 4). It may have been a part of a pin beater or the carved handle of another object. The length of the find is 24.1 mm, the width of the diaphysis ranges from 11.5 mm to 12.4 mm and the thickness of the wall is 2.4 mm. The distance between the triple ribbings is 6 mm, while the distances between the ribs ranges from 3.2–3.6 mm.

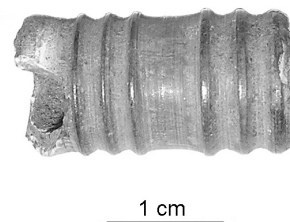


Fig. 4. Roman Period decorated handle(?) probably made from an ulna and found in Hungary.

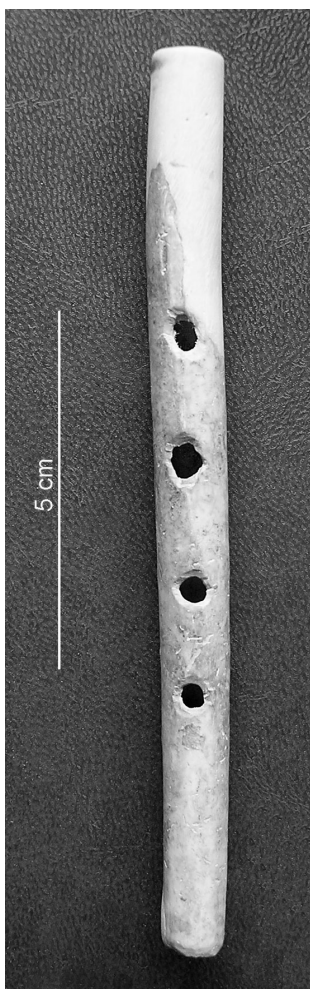


Fig. 5. Hun Period Sarmatian flute made from a goose ulna and found in Tiszaöldvár (Hungary).

A single flute (Fig. 5) was found in context 33 at the Hun Period Sarmatian site (early AD 5th century) at Tiszaöldvár–Téglagyár, Hungary excavated by A. Vaday in 1980. It was made from a left ulna diaphysis of a greylag goose (*Anser anser*) or domestic goose (*A. domesticus*). The flute was played by blowing across the straight cut end of the distal shaft. The total length of the bone is 106 mm while the restored, completed find is 121.6 mm. The width of diaphysis ranges between 8.9–9.9 mm and the thickness of the walls between 1.2–1.5 mm. The 4 finger openings were made on the cranial surface of the ulna along the *linea intermuscularis* (Baumel 1979, Fig. 9). The distances between them in a proximal direction are: 12.1 mm, 13.4 mm and 10.9 mm. Openings 1 and 2 are larger than openings 3 and 4, and their diameters range from 3.3 mm to 4.6 mm. The flute is so unused that even the *papillae remigiales* can be detected on the ulna. It may have not actually been played as a music instrument or it was abandoned.

The medieval – Early Modern Age (15th–18th century) single flute from Visegrád–Alsóvár context no. 8 was excavated by M. Héjj in 1959. It is presumed that the proximal part of the flute was first found, while the distal fragment found in 1968 by M. Szöke originates from the 16th century Alsóvár site (István Kováts, pers. comm.). The flute was made from the right ulna shaft of a large eagle, probably a golden eagle (*Aquila chrysaetos*). The mouth piece opening is sharply cut across the distal shaft. The proximal end of the duct is broken and it widens out towards the proximal epiphysis, therefore it may have been a partially stopped flute (Omerzel-Terlep 1997, 202). It has a central 4.4 mm diameter thumb hole on the cranial surface (Fig. 6: a), and 6 finger holes on the caudal surface (Fig. 6: b). The distances between these openings from the proximal direction are: 9.9 mm, 10.7 mm, 10.0 mm, 12.1 mm and 10.8 mm. The diameters of the openings are similar: 4.3–4.5 mm. The total length of the flute is 149 mm. The width of diaphysis is 9.9 mm, the thickness is 9.0 mm, and the thickness of the wall is 1.2–1.4 mm. The polished surface of the bone suggests this flute was actively used. It still can be played and produces at least 5 notes.

A second, more fragmented pipe from Visegrád–Alsóvár was also made from an eagle ulna shaft. The total length of the flute is 105 mm. The width of diaphysis is 11.1 mm, the thickness is 10 mm, and the thickness of the wall is 1.4 mm. The blowing opening is missing, but the 4.2 mm diameter thumb hole, and 5 finger holes are present (Fig. 7). The distances between these openings from the proximal direction are: 12.4 mm, 11.9 mm, 12.1 mm and 12.3 mm. The diameters of the openings vary between 4.1–4.7 mm. At least 5 notes can be played on this highly polished flute.

A pipe (Fig. 8) made from an ulna diaphysis of domestic goose was found in the Royal Palace in Visegrád (Hungary). This find dates back to the Late Middle Ages (14th–15th century), and was excavated by I. Kováts. The length of the pipe is 90.0 mm and its width is 7.0 mm. The

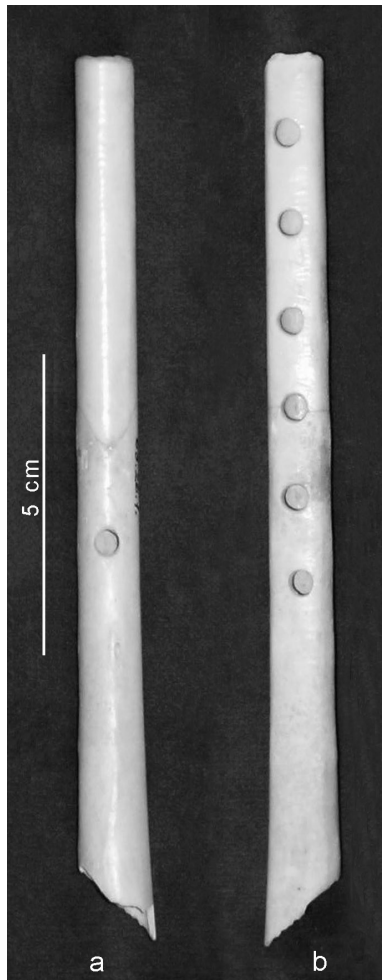


Fig. 6. Medieval flute probably made from an eagle ulna and found in Visegrád–Alsóvár (Hungary); a cranial view, b caudal view.

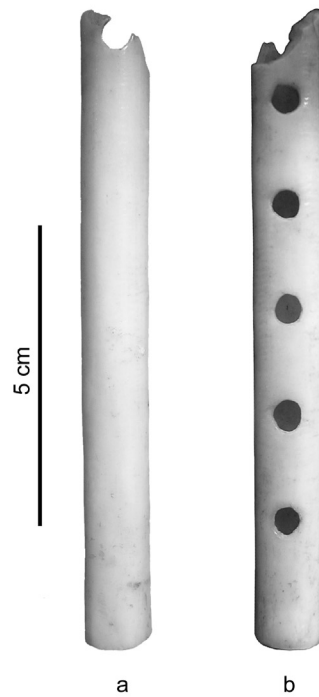


Fig. 7. Broken medieval flute probably made from an eagle ulna found in Visegrád–Alsóvár (Hungary); a cranial view, b caudal view.

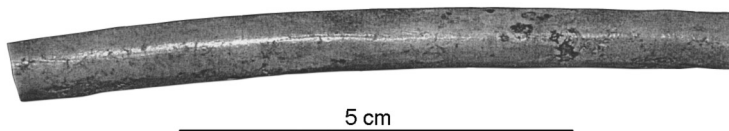


Fig. 8. Medieval bone pipe made from domestic goose and found in Visegrád–Royal Palace (Hungary).

exact function of the straight cut duct across both ends of the ulna is not known but based on the polished surface, worn from handling, it may have been part of a pan-pipe (MacGregor *et al.* 1999, 1977; Cornelia Becker, pers. comm.).

Three late medieval (15th–16th century) whistles from Buda Castle, excavated by L. Gerevich and L. Zolnay, come from the animal bone collection of the Budapest Historical Museum. A pipe with a cleanly cut 3.9 mm hole on its cranial surface was made from the ulna shaft of a goose-sized bird. The total length of the find is 47.7 mm, the width of the diaphysis is 8.2 mm, and the thickness of the wall is 1.1 mm. The tube has extra cut marks close to the ends and its surface is very polished.

The second piece also was made from a stork-sized ulna shaft. Its total length is 56.8 mm, the width and thickness of the diaphysis are 9.9 mm and 11.5 mm respectively, while the thickness of the wall is 1.6 mm. The pipe has two roughly carved openings of 4.8 mm diameter. Its surface was also carefully smoothed.

The next find was made from the right tibiotarsus shaft of a large bird. The bone section retains the distal end of the *crista fibularis* (Baumel 1979, Fig. 13). The total length of the find is 61.6 mm, the width of the diaphysis is 8.0 mm and the thickness of the wall is 1.7 mm. A 7.7 mm/3.0 mm slit was roughly cut in the medial surface of the shaft in line with the end of the *crista fibularis*. The artefact does not look very used.

Utensils

An interesting find of uncertain function was found at the Late Hallstatt settlement of Balatonboglár–Berekre-dűlő (M7 motorway S-25), excavated by Sz. Honti between 1994–1995. The cut beak of a spoonbill (*Platalea leucorodia*) came to light among other worked bone finds (Bondár *et al.* 2000, 95). As indicated on Fig. 9, this beak fragment was deliberately cut from the *os premaxillare*. The exact function of this unusual worked object is unclear although it may have been used as a spoon or spatula. The total length of the object is 141.5 mm, its smallest proximal width is 16.6 mm, and its greatest distal width is 44.4 mm.

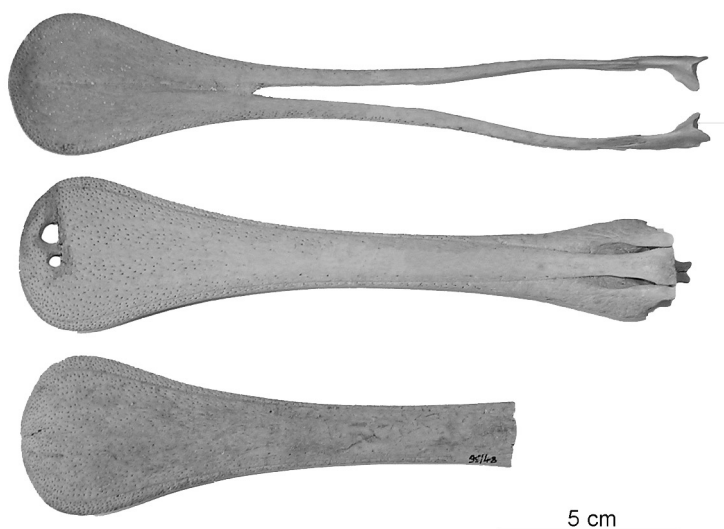


Fig. 9. Late Hallstatt spoon(?) made from the beak of a spoonbill and found at Balatonboglár–Berekre-dűlő (Hungary).

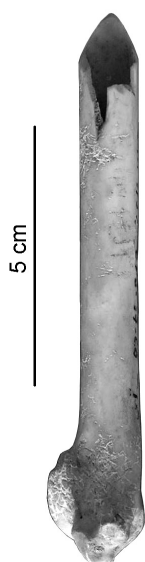


Fig. 10. Middle Byzantine period awl made from the ulna of golden eagle and found at Capidava (Romania).



Fig. 11. Middle Byzantine period awl made from the tibiotarsus of crane and found at Capidava (Romania).

Late R. Florescu excavated two awls in the Middle Byzantine period (9th–11th century) settlement of Capidava (Romania) in 1957. One of the awls was made from the left distal ulna of golden eagle (Fig. 10). Its total length is 103.3 mm, the width of the diaphysis is 10.4 mm, and the greatest width of the epiphysis is 19.4 mm, while the greatest thickness is 18.2 mm. The greatest length of the used edge (point) is 15.5 mm, while the thickness of the wall is 1.5 mm.

The other awl was made from the right distal tibiotarsus of crane (Fig. 11). Its total length is 83.3 mm. The width of the diaphysis is approximately 12.0 mm, the width of the epiphysis is 22.1 mm, and the thickness of the epiphysis is 20.7 mm. The greatest length of the used edge is 14.0 mm, while the thickness of the wall is 1.6 mm. Both points appear quite used and seem to having been curated. The tip of the distal tibiotarsus is broken.

Pendants and amulets

Two pendants or amulets were made from the drilled talons of birds of prey. The first find comes from the Palaeolithic levels at Tibocoia Cave (Romania), excavated by E. Terzea in 1960s. It was made from the *phalanx pedis* 4 *digiti* 3 of eagle owl, *Bubo bubo* (Gál 2002b). The length of the talon with the broken end is 24.1 mm, the width of the articular surface is 7.1 mm, and the height of the articular surface is 8.3 mm. The talon is drilled in a medio-lateral direction; the greatest diameter of the hole is 2.8 mm (Fig. 12).

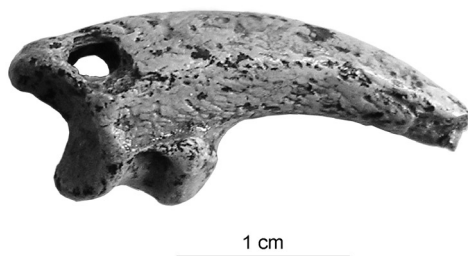


Fig. 12. Palaeolithic perforated talon of eagle owl from Tibocoia Cave (Romania).

The second perforated talon was found by L. Bejenaru at late medieval (14th–15th century) settlement 9 at Siret–Suceava (Romania) in 1993. This find is a *phalanx pedis 4 digiti 3* of golden eagle. Its length is 35.3 mm and the end of the talon is broken. The width of the articular surface is 11.0 mm, and its height is 14.2 mm. The articular surface of the talon was drilled from a dorso-plantar direction. The diameter of the hole is 4 mm (Fig. 13).

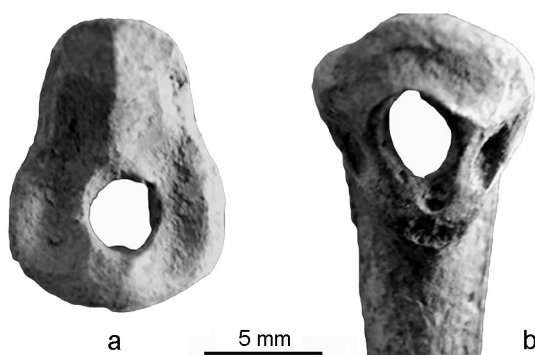


Fig. 13. Medieval perforated talon of golden eagle from Siret–Suceava (Romania); a view from the articular surface, b plantar view.

Plaques

A worked ulna diaphysis fragment with circle-dot decoration came to light from the above-mentioned Middle Byzantine period (9th–11th century) settlement of Capidava (Romania). The object was cut out from the ulna of (white) pelican (*Pelecanus* cf. *onocrotalus*). The length of the find is 72.5 mm and the thickness of the wall is 1.1 mm. The bone plaque has 6 circle-dots with 5.8 mm exterior and 2 mm interior diameters on its surface. The distances between the openings range from 7.9 to 9.0 mm (Fig. 14).

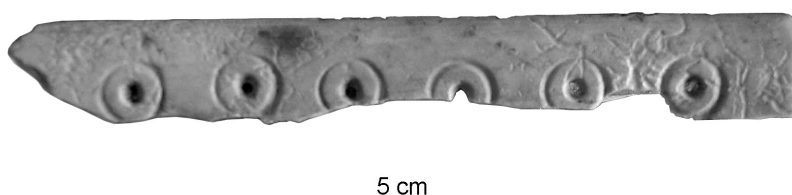


Fig. 14. Middle Byzantine period circle dot decorated bone plaque made from the ulna of white pelican and found at Capidava (Romania).

Blanks

Some bones have clear cut marks on them and the beginnings of working but were either never finished or abandoned. Therefore, the function of these objects remains uncertain.

A proximal right ulna fragment was found at Însurăței (Romania) (Fig. 15). S. Pandrea excavated the Gumelnița culture (Eneolithic) settlement in 1997. The total length of the find is 119.5 mm, the thickness of the wall is 1.0–1.4 mm, and it was made from (white) pelican. The osteometric

data of the proximal ulna are the following: the width of the epiphysis is 36.3 mm, height of the epiphysis is 28.8 mm, and the distance between the olecranon and the *processus cotylaris dorsalis* is 38.2 mm (Baumel 1979, Fig. 9). The diaphysis was clearly incised with a perpendicular cut, while the beginning of slight cut marks can be seen proximally to the epiphysis (see the arrows on Fig. 15). The aim of the toolmaker was probably to obtain a tube or a bone plaque similarly to the previous find, made from a pelican ulna as well.

Another half-made tool was found in context B-1101, 2002/626 of Balatonlelle–Kenderföldek (Hungary). The Celtic Period settlement was excavated by G. Serlegi in 2002. The tube-like object was cut out from a left humerus shaft of white-tailed eagle (*Haliaeetus albicilla*). Its total length is 81.3 mm, the width of the shaft is 16.1 mm, and the thickness of the wall is 1.1–1.9 mm (Fig. 16).

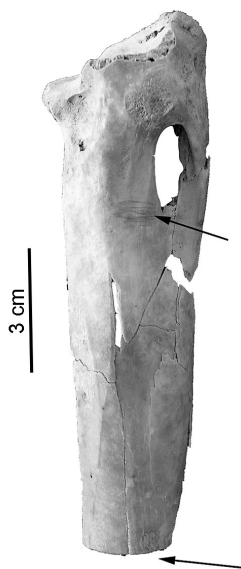


Fig. 15. Eneolithic blank made from the ulna of white pelican and found at Însurăței (Romania).

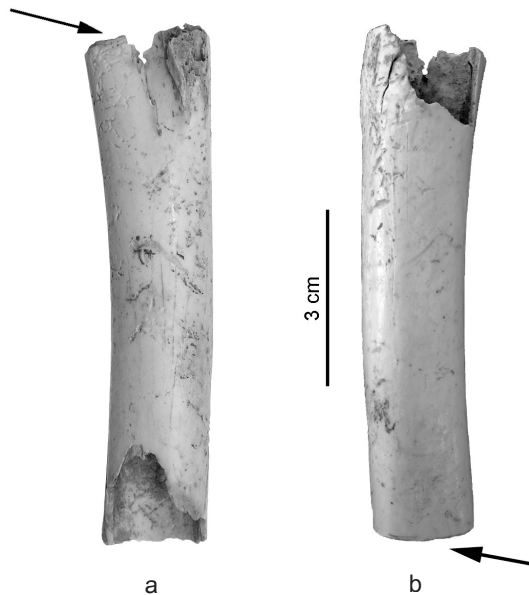


Fig. 16. Celtic Period blank made from the humerus of white-tailed eagle and found at Balatonlelle–Kenderföldek (Hungary); a cranial view, b caudal view.

Discussion

Although the number of avian remains in archaeological assemblages is not numerous at all, worked bird bones are known from every period all over Europe. The oldest objects date back to the Palaeolithic and consist mainly of flutes, pipes and whistles. The prehistoric music instruments made from bird and other animal bones have been nicely summarised by Mourer-Chauviré (1979), Fages & Mourer-Chauviré (1983), Omerzel-Terlep (1997) and Coumont (2002). Dutch scholars have presented a number of artefacts from different Neolithic settlements in the Netherlands (Wijngaarden-Bakker 1997; Bulten & Clason 2001). Burnt pieces of necklace and an awl made from hen bone (*Gallus gallus*), and bone pipes are reported from Poland, Belarus and Ukraine (Godula *et al.* 2002). Several bird bone artefacts made in historical times in Great Britain and Germany are listed by MacGregor (2001, 110, 150) and Schallmayer (1994, 73).

Worked bird bones from the late 19th century excavations at the early Bronze Age pile dwelling of Ig in the Ljubljana marshland (Slovenia) included 6 finely carved, delicate ulna diaphysis tubes. All of them were cut to size using flint blades, and are highly polished, possibly by handling. This polishing often obliterated the row of papillae. Four of these objects originated from a large species, probably crane. Two others originated from smaller, goose-sized birds. The way the bones were carefully cut to size shows that the manufacturer tried to maximize the useful length of the remaining diaphysis. A long, fine perforator was made from the proximal half of a radius from a large bird, probably also crane (László Bartosiewicz, pers. comm.).

The 21 worked bird bone finds described in this article originate from 11 sites in two Central European countries, Hungary and Romania (Fig. 1). Not only does the age of finds differ, but the settlement type, taxa and skeleton part that yielded the raw material for the objects is also various (Table). The most interesting bird bone finds perhaps are the flutes and pipes. Although music instruments were made from many animal bones – e.g. bear mandibles, sheep and goat long bones, etc. –, the long pneumatic bones of birds with their thin walls and hollow ducts were possibly always favoured for making fine wind instruments. Single flutes and pipes similar to these finds and their period come from the Roman Period Großsachsenheim (Schallmayer 1994, 73), and from Anglo-Scandinavian and medieval England (MacGregor *et al.* 1999, 1977; MacGregor 2001, 150). Simple polished tubes are known from the Neolithic in Netherlands as well (Wijngaarden-Bakker 1997, Fig. 5).

Chiefly awls and points were made among the wide range of tools produced from bird bones. The sharp edge of the thin bone wall was especially suitable for these kinds of objects. Similar awls to these finds have been made from the proximal carpometacarpus of white-tailed eagle and from the distal tarsometatarsus of crane from Aartswoud (Wijngaarden-Bakker 1997, Figs. 2–3), and from the distal radius of crane in Swifterbant (Bulten & Clason 2001, Fig. 35). I did not find parallel objects or reference to the spoonbill beak find from the Late Hallstatt site of Balatonboglár–Berekre-dűlő (Fig. 9).

Claws and other perforated bones, possibly worn as amulets, are not rare finds either. A terminal phalanx of white-tailed eagle was found in Alfriston, Sussex (MacGregor 2001, 110). A distally drilled radius (probably from domestic goose) was found in Burial 57 at the site of Szeged–Csengele, while 2 claws originate from the site of Mosčëvaja Balka, all dated to the Avar Period (Vida 2002, Table 4: 8; 14: 8–9). A perforated distal humerus from domestic goose was found at the Turkish Period Bajcsa fortress (Gál 2002a).

Many objects such as combs, bracelets and necklace ornaments from the Roman Period and Middle Ages (Bíró 1994, Pl. 10: 65–73; Luik 2001, Fig. 21) had circle-dot decorations similarly to the bone plaque find from the Middle Byzantine period from Capidava (Fig. 14). Ribbed knife handles, pin beaters and distaffs similar to the artefact in Fig. 4 also are well known from the Roman Period (Bíró 1994, Pl. 61: 527–530).

The species selected for artefact production are among the middle- and large sized birds. They include waterfowls, wading and terrestrial birds such as white pelican, stork, spoonbill, greylag or domestic goose, crane, diurnal birds of prey (golden eagle and white-tailed eagle) and eagle owl. These species bred or are still breeding in the area where they were hunted. Stork, greylag goose and spoonbill are still summer visitors in Hungary, and greylag goose is the only wild goose species that actually breeds in this country. Golden eagle and white-tailed eagle may be considered resident species although only vagrant individuals of golden eagle can be seen nowadays in Hungary. White-tailed eagle still breeds on the plain between the Danube River and the Tisza River (Peterson *et al.* 1977).

Table. General table including the most important data about the worked bird bone finds. Abbreviations: *H* – Hungary, *R* – Romania.

No.	Type of object	Bone type	Inventory number	Bird species	Age of the find	Origin
1.	Flute	Ulna	132/1872	Large bird	Roman Period	Hungary
2.	Flute	Tarsometatarsus	27.1892.9	Stork (aff. <i>Ciconia</i> sp.)	Roman Period	Hungary
3.	Pipe	Ulna	10.1903.124	Large bird	Roman Period	Dunapentele (H)
4.	Flute	Ulna	69.1907.10	Goose-like and sized bird	Roman Period	Szőny (H)
5.	Flute	Ulna	75.1911.241	Diurnal bird of prey	Roman Period	Dunapentele (H)
6.	Pipe	Ulna	52.3.4	Large wading (?) bird	Roman Period	Szőny (H)
7.	Handle (?)	Ulna (?)	54.66.41	Large bird	Roman Period	Hungary
8.	Flute	Ulna	–	Domestic (?) goose (<i>Anser domesticus</i>)	Hun Period Sarmatian (5 th c.)	Tiszaöldvár–Téglagyár (H)
9.	Flute	Ulna	63.26.1	(Golden) eagle (<i>Aquila</i> cf. <i>chrysaetos</i>)	Late Middle Ages (16 th c.)	Visegrád (H)
10.	Pipe	Ulna	–	Domestic goose (<i>Anser domesticus</i>)	Late Middle Ages (14 th –15 th c.)	Visegrád (H)
11.	Pipe	Ulna	1951/2643	Large bird	Late Middle Ages (15 th –16 th c.)	Budapest (H)
12.	Pipe	Ulna	79.104.1	Goose-like and sized bird	Late Middle Ages (15 th –16 th c.)	Budapest (H)
13.	Pipe	Tibiotarsus	–	Large bird	Late Middle Ages (15 th –16 th c.)	Budapest (H)
14.	Spoon (?)	Beak	99.48	Spoonbill (<i>Platalea leucorodia</i>)	Late Hallstatt	Balatonboglár–Berekre-dűlő (H)
15.	Awl	Ulna	1351	Golden eagle (<i>Aquila chrysaetos</i>)	Middle Byzantine (9 th –11 th c.)	Capidava (R)
16.	Awl	Tibiotarsus	1269	Crane (<i>Grus grus</i>)	Middle Byzantine (9 th –11 th c.)	Capidava (R)
17.	Pendant	Talon	T.I. 20/1960	Eagle owl (<i>Bubo bubo</i>)	Palaeolithic	Tibococia Cave, Sighiştel (R)
18.	Pendant	Talon	–	Golden eagle (<i>Aquila chrysaetos</i>)	Late Middle Ages (14 th –16 th c.)	Siret–Suceava (R)
19.	Plaque	Ulna	155	(White) pelican (<i>Pelecanus</i> cf. <i>onocrotalus</i>)	Middle Byzantine (9 th –11 th c.)	Capidava (R)
20.	Blank	Ulna	–	(White) pelican (<i>Pelecanus</i> cf. <i>onocrotalus</i>)	Neolithic (Gumelnita culture)	Insurăţei (R)
21.	Blank	Humerus	–	White-tailed eagle (<i>Haliaeetus albicilla</i>)	Celtic Period	Balatonlelle–Kenderföldek (H)

In Romania, the golden eagle is still present in small numbers in mountainous areas (Radu 1983, 132; Cramp 1998). The worked find from nearby in the East Carpathians (Suceava) and the Romanian lowland plains (Capidava) is thus not surprising from the point of view of availability. Eagle owl is resident in the mountainous forests. Crane recently is a passage species both in Hungary and Romania, but ornithological data support its earlier breeding in these countries (Peterson *et al.* 1977, 107; Radu 1983, 109; Cramp 1998). The breeding area of white pelican is now restricted to the Danube Delta in this region (Munteanu 2000, 487; Cramp 1998).

The only domestic fowl from whose bones were worked from the studied settlements was domestic goose. The AD 5th century goose find from Tiszaföldvár–Téglagyár may have belonged either to the wild ancestor or to the tamed form of this species. Based on archaeo-ornithological data, this species was known as early as the Roman Period in the present day territory of Hungary (Bartosiewicz 1994). Medieval finds were in all probability made from domestic goose, at a time when different breeds had already developed.

Conclusions

Despite the relatively small quantity of raw material available from bird skeletal parts, they were still preferred in all periods for making certain kinds of bone artefacts. The straight hollow long bones of ulna, humerus, tibiotarsus and tarsometatarsus were favoured for producing music instruments and tubes. Stronger bone fragments such as ulna and tibiotarsus with epiphysis were also made into awls and points. Thin-walled pelican ulnae and the delicate structured beak of spoonbill were suitable for carving fine bone plaques and objects. Talons of diurnal and nocturnal birds of prey were drilled in various ways and were probably worn as amulets.

The selected birds that furnished the raw material for the bone artefacts were among the species living around the settlements on the one hand and from local poultry on the other hand. Considering the generally low representation of bird remains in archaeological bone assemblages and the fact that big game birds appear repeatedly throughout human history as important symbols, it is very likely that these fowl were exploited for their symbolic rather than their economic value although they represent considerable quantities of meat as well. Nevertheless, the large wings of birds such as the white pelican, stork, spoonbill, golden eagle, white-tailed eagle and crane are sources of both decorative plumage and significant amounts of raw material for special objects that must have been of primary interest for people in the past.

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