

SPECIAL ISSUE PAPER

Bird remains from ecclesiastical sites in medieval Hungary

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Abstract

This comprehensive paper, based on already published avian material, provides an overview of the exploitation of birds at ecclesiastical settlements in medieval Hungary, with an outlook on other European religious establishments. Owing also to the differences in excavation methods, sample size, and measurements used during the identification of bird remains, the seven discussed ecclesiastical sites in the Carpathian Basin, which was part of the Hungarian Kingdom during the Middle Ages, showed considerable variability from this point of view. It is certain that poultry constituted the lion's share of the bird meat consumed, even in the wealthiest religious houses, such as bishopric centers. The presence of sexed specimens in some of these bone collections made it possible to distinguish between a small and a large phenotype of domestic chicken based on biometric data. However, in cases when finds were not only collected by hand but the food refuse deposit was also screened, one finds that these assemblages are both quantitatively and qualitatively more varied in terms of the presence and frequency of certain taxa including small game, suggesting the value and special role of (wild) fowl at ecclesiastical establishments. The avian remains that suggest the use of trained birds, as well as the evidence for the use and curation of crossbows, contribute to our knowledge about the hunting and fowling customs at certain religious houses.

KEYWORDS

bird bones, Carpathian Basin, ecclesiastical sites, Hungary, Middle Ages

1 | INTRODUCTION

The number of medieval sites that are linked to religious institutions and yielded zooarchaeological finds is rather limited in Hungary, especially when compared with other high-status settlements such as royal residences, fortifications and military centers (Gál, 2021a, pp. 228–229, Appendix 3). Moreover, one of these few settlements had to be removed from the list of ecclesiastical sites available for study: excavations held in 2004 (Mészáros, 2009, p. 211) made it clear that the 1363 identifiable animal bones recovered during a rescue excavation by Miklós Héj in 1960 (Bökönyi, 1974, p. 428) at Visegrád-Rév street-Beneda garden, a site previously identified as the late medieval

(14th–16th century) Franciscan friary of the royal town of Visegrád, in fact, came to light from dwelling houses and are thus not linked to ecclesiastical institutions.

A recently published summary on the hunted and domestic animals in the medieval Carpathian Basin (Gál, 2021a) as well as case studies on the kitchen midden brought to light from the late medieval archbishop's palace in Esztergom, Northern Hungary (Gál, 2020b, 2021b) revealed the scarcity of avian data in most of these ecclesiastical centers. Even in the case of assemblages comprising over 500 identifiable animal bones, bird remains tend to be underrepresented and constitute 5–10% of the total quantity; and often only remains of poultry are identified (Gál, 2021a, p. 199, fig. 8). Information regarding the use of birds

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is further limited by the total absence of avian remains at some ecclesiastical sites. An example of this is the Franciscan friary at Kassa (Košice in Slovakian), which yielded a small assemblage of merely 77 bones from exclusively mammalian species (Miklíková, 2009, p. 148).

The exploitation of either poultry or both domestic and wild birds could be documented at seven religious houses based on zooarcheological finds. Four of the investigated sites are located on the territory of present-day Hungary (Figure 1) and include former capitals and political and ecclesiastical centers of the Hungarian Kingdom, such as Esztergom and Székesfehérvár (in the 10th–13th centuries), and Buda (early 14th century). The other three sites are located on the territory of present-day Slovakia and Romania, respectively. Nagyvárád (Oradea in Romanian) became home to one of the 10 bishoprics established by King (Saint) Stephan of Hungary around AD 1000, as the Bihar episcopate was moved here at the end of the 11th century (Laszlovsky & Romhányi, 2003, p. 372).

This paper aims to offer an overview of the presence of birds at religious sites in medieval Hungary by reviewing information from earlier publications as well as integrating avian data from recent excavations and sources. The results are placed in a historical, cultural and eco-geographical context in order to gain a better understanding of the exploitation of birds at various religious houses within the Carpathian Basin.

2 | MATERIALS AND METHODS

The avian finds discussed in this paper were already published in the last years or decades. From the seven assemblages, two—those from Marosvásárhely–Franciscan friary and Esztergom–Castle Hill–Quarry, respectively—were studied by the author of this paper (Gál, 2012a, 2021b). In these cases, the identification of the bones was aided by the comparative collection of the Hungarian Natural History Museum

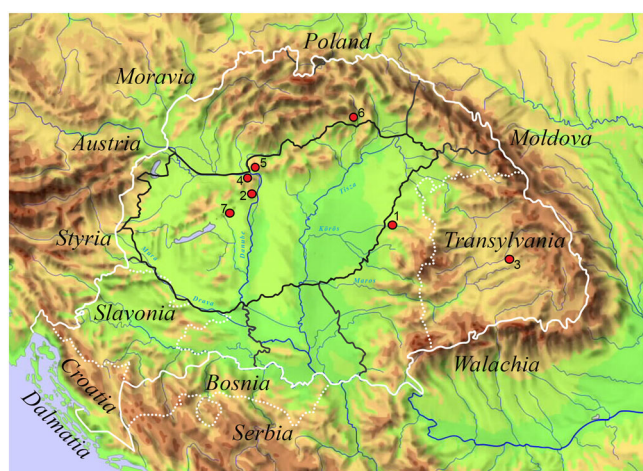


FIGURE 1 The location of ecclesiastical sites in medieval (white line) and present-day (black line) Hungary. 1: Nagyvárád/Oradea; 2: Buda; 3: Marosvásárhely/Târgu Mureș; 4: Esztergom; 5: Márianosztra; 6: Kassa/Košice; 7: Székesfehérvár. Drawing by Nóra Mészáros based on a map of the Carpathian Basin by László Zentai from 1996 [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1002/ajb.23152)]

and manuals such as the morphometric guides on Corvidae (Tomek & Bocheński, 2000), *Columba* (Tomek & Bocheński, 2009), and *Turdus* (Jánossy, 1983).

The Number of Identified Specimens (NISP) represents all skeletal elements and fragments identified to taxon (Lyman, 2008, p. 27). The Minimum Number of Individuals (MNI) was calculated based on the type of skeletal elements, the side of the body represented, and the age group of birds. The latter was identified according to the degree of ossification of the bones, such as “neonate,” “juvenile,” “subadult,” and “adult” (Serjeantson, 2009, p. 46, tab. 3.6).

The published avian assemblages show a high variability owing to the differences in recovery methods used at excavations, variations in sample size, different measurements taken during identification, and differences in the evaluation of datasets. In some cases, for example, the MNI was not calculated and therefore, this variable is missing for some of the sites in Table 1 that summarizes all the identified avian species and assigned remains.

For the ecological characteristics and biogeography of species, I used a manual of the avifauna of Europe (Hume, 2003) as well as various ornithological studies (e.g., Faragó, 1991).

3 | RESULTS

The total of seven ecclesiastical sites from medieval Hungary that yielded avian remains were two archepiscopal residences and five cloisters. The age of bone assemblages brought to light covers 500 years from the 12th to the 17th centuries. Nevertheless, successive deposits from such a long period were excavated only at a single settlement (the palace of the archbishop of Nagyvárád/Oradea; Bejenaru, 2003, pp. 49–51, tab. 10), while the other accumulations cover shorter periods. A concise description of all seven sites and the associated bone assemblages are given below.

1. Nagyvárád–Castle (Oradea, Cetatea Oradiei, Romania)

The zooarcheological assemblage was excavated from the area of the archbishop's palace under the direction of Adrian A. Rusu and Doru Marta in 1994, and the bones were identified by Luminița Bejenaru (Bejenaru, 2002; Rusu, 2002). A total of 1582 animal bones were deposited in several layers between the 12th and 17th centuries. Despite the extended period of deposition, the number of both avian remains and identified species are rather modest (65 bones and two species). Only the two main types of poultry, the domestic chicken (*Gallus domesticus* Linnaeus, 1758) and the domestic goose (*Anser domesticus* Linnaeus, 1758) were identified (Table 1). Several avian bones were tentatively attributed to wild species, but not identified at the taxon level. While the occupation of the locality by Ottoman soldiers in the 16th–17th centuries is reflected in the mammalian assemblage through the almost total absence of pig remains and an increase of caprine bones compared with the previous centuries, the frequency of fowl seems to have remained equally low throughout the periods of the settlement (Bejenaru, 2003, pp. 49–51, tab. 10).

TABLE 1 Comprehensive table of species identified at ecclesiastical sites in medieval Hungary (NISP/MNI)

Present-day country	Romania	Hungary	Romania	Hungary	Hungary	Slovakia	Hungary
Site	Nagyvárad-Castle (12th–17th c.) Archbishopric residence	Buda-Dominican cloister (13th–16th c.)	Marosvásárhely-Franciscan friary (14th c.)	Hill-Quarry (14th–15th c.) Archbishopric residence	Márianosztra-Toronyalja (14th–15th c.)	Kassa-Dominican cloister (15th c.)	Székesfehérvár-Island (15th–16th c.)
Taxon							
Domestic hen (<i>Gallus domesticus</i>)	46/9	22/?	167/12	1980/52	67/9	13/?	37/7
Domestic goose (<i>Anser domesticus</i>)	19/5		26/4				6/1
Domestic duck (<i>Anas domesticus</i>)			1				
Domestic pigeon (<i>Columba domestica</i>)			2/1	22/5			
Helmeted guineafowl (<i>Numida meleagris</i>)		1					
Domestic fowl total	65/14	23/?	196/18	2002/57	67/9	13/?	43/8
Glossy ibis (<i>Plegadis falcinellus</i>)				1			
Eurasian teal (<i>Anas crecca</i>)				1			
Gadwall (<i>A. strepera</i>)				2/1			
Garganey (<i>A. querquedula</i>)				1			
Tufted duck (<i>Aythya fuligula</i>)				1			
Greylag goose (<i>Anser anser</i>)		3/?					
Goshawk (<i>Accipiter gentilis</i>)				1			
Sparrow hawk (<i>Accipiter nisus</i>)				1			
Capercaillie (<i>Tetrao urogallus</i>)		2/?					
Black grouse (<i>Tetrao tetrix</i>)		1					
Grey partridge (<i>Perdix perdix</i>)			2/1	241/20			
Quail (<i>Coturnix coturnix</i>)				4/2			
Pheasant (<i>Phasianus colchicus</i>)		4/?		9/3			
Little bustard (<i>Tetrax tetrax</i>)				1			
Tawny owl (<i>Strix aluco</i>)			1				
Fieldfare (<i>Turdus pilaris</i>)				9/4			
Blackbird (<i>T. merula</i>)				3/2			
Redwing (<i>Turdus iliacus</i>)				2/1			
Song thrush (<i>Turdus philomelos</i>)				8/3			
Mistle thrush (<i>Turdus viscivorus</i>)				10/4			
Starling (<i>Sturnus vulgaris</i>)				1			
Jay (<i>Garrulus glandarius</i>)				1			
Spotted nutcracker (<i>Nucifraga caryocatactes</i>)				1			
Jackdaw (<i>Corvus monedula</i>)							11/1

(Continues)

TABLE 1 (Continued)

Present-day country	Romania	Hungary	Romania	Hungary	Hungary	Slovakia	Hungary
Site	Nagyvárad-Castle (12th–17th c.) Archbishopric residence	Buda-Dominican cloister (13th–16th c.)	Marosvásárhely-Franciscan friary (14th c.)	Esztergom-Castle Hill-Quarry (14th–15th c.) Archbishopric residence	Márianosztra-Toronyalla (14th–15th c.)	Kassa-Dominican cloister (15th c.)	Székesfehérvár-Island (15th–16th c.)
Taxon	Archbishopric residence	Cloister	Friary	Archbishopric residence	Cloister	Cloister	Cloister
Rook (<i>Corvus frugilegus</i>)				3/1			
Perching bird (Passeriformes sp. indet.)				11/?			
Wild fowl total	0	10/?	3	312	0	0	11/1
Domestic goose/Grey/lay goose (<i>Anser domesticus</i> / <i>Anser anser</i>)				100			
Domestic duck/Mallard (<i>Anas domestica</i> / <i>Anas platyrhynchos</i>)				17		1	
Galliform (Galliformes sp. indet.)				46			
Corvid (Corvidae sp. indet.)							2
Unidentified bird (Aves sp. indet.)	31	33	199	125	67/9	16	56
Total bird remains	96	33	199	2602	67/9	16	56

2. Buda-Dominican cloister

The archeological excavations in one of the oldest buildings of Buda were carried out by Katalin H. Gyürky between 1962 and 1976. The survey documented the 300-year-long existence of the cloister from the 13th to the 16th century, followed by its occupation by the Ottoman army from 1541 to 1686 (Gyürky, 1981). The bone assemblage, identified by János Matolcsi, comprised 820 animal bones. Avian remains were found only in the zooarcheological material that was associated with the presence of monks at the settlement. These few bones were identified as belonging to domestic hen, helmeted guineafowl (*Numida meleagris* Linnaeus, 1758), greylag goose (*Anser anser* Linnaeus, 1758), capercaillie (*Tetrao urogallus* Linnaeus, 1758), black grouse (*Tetrao tetrix* Linnaeus, 1758), and pheasant (*Phasianus colchicus* Linnaeus, 1758) (Matolcsi, 1981, p. 208, tab. 1).

3. Marosvásárhely-Franciscan friary (Târgu Mureș, Cetatea medievală, Zona Mănăstirii Franciscane, Romania)

The earliest Franciscan friary in Szeklerland, a part of Transylvania that was mostly inhabited by a subgroup of Hungarians named Szeklers (Figure 1), was founded in the first half of the 14th century, the period that also marks the foundation of the town of Marosvásárhely (called Novum Forum Sicularum and Székelyvásárhely in old documents) (Benkő, 2012, p. 271). Excavations conducted by archeologist Zoltán Soós from 1999 onwards brought to light hundreds of animal bones between 2005 and 2007. Some of them (mostly antler pieces) bore traces of manufacturing, and along with several bronze tools associated with the production of beads for rosaries, they pointed to the presence of a workshop (Soós, 2011, 315).

The animal bones representing butchery and food remains were identified by the author. Avian remains constituted 18% of the zooarcheological assemblage (total NISP = 1129), which was otherwise characterized by a high frequency of pig bones as well as remains from young individuals of both domestic and hunted animals (Gál, 2012a, p. 703, tab. 3). In addition to domestic chicken that was identified in the largest quantities, several bones of domestic goose, domestic duck (*Anas domestica* Linnaeus, 1758), and domestic pigeon (*Columba domestica* Gmelin, 1789), as well as grey partridge (*Perdix perdix* Linnaeus, 1758) and tawny owl (*Strix aluco* Linnaeus, 1758), were identified (Gál, 2012a, pp. 698–699, tab. 1).

4. Esztergom-Castle Hill-Quarry

This site yielded the first animal bone assemblage recovered from an archbishopric center on the territory of modern-day Hungary. It was unearthed under the direction of Balázs Major between 2014 and 2016. Butchery and food remains from the kitchens of the archbishop and of the personnel of the residence, situated above each other in the building, were deposited 4 m deep in several layers in the quarry at the bottom of the building during the 14th–15th centuries (Benkő et al., 2021, pp. 2–5, fig. 1 and 2). Based on several bone and antler artifacts as well as a considerable amount of workshop waste

mixed with the kitchen refuse, it has been suggested that there was a workshop in the palace that was mostly specialized in the reparation of crossbows (Gál, 2020a).

Owing to the advanced excavation technics including dry screening, a rather great amount of fish and bird bones were collected (Bartosiewicz, 2021; Gál, 2021b; Gál & Bartosiewicz, 2021). Not only the avian assemblage (Table 1) but also the entire bone accumulation (NISP = 7294) were marked by a significant representation of domestic chicken, whose remains formed 76% of the avian assemblage and 27% of all identifiable bones (Gál, 2021b, pp. 453–454, tab. 1). In addition to domestic chicken and domestic pigeon, goose, and duck (most probably both the domesticated forms and their wild counterparts) as well as various hunted species, such as the glossy ibis (*Plegadis falcinellus* Linnaeus, 1766), Eurasian teal (*Anas crecca* Linnaeus, 1758), gadwall (*Anas strepera* Linnaeus, 1758), garganey (*Anas querquedula* Linnaeus, 1758), tufted duck (*Aythya fuligula* Linnaeus, 1758), goshawk (*Accipiter gentilis* Linnaeus, 1758), sparrow hawk (*Accipiter nisus* Linnaeus, 1758), grey partridge, quail (*Coturnix coturnix* Linnaeus, 1758), pheasant, little bustard (*Tetrax tetrax* Linnaeus, 1758), fieldfare (*Turdus pilaris* Linnaeus, 1758), blackbird (*Turdus merula* Linnaeus, 1758), redwing (*Turdus iliacus* Linnaeus, 1766), song thrush (*Turdus philomelos* Brehm, 1831), mistle thrush (*Turdus viscivorus* Linnaeus, 1758), starling (*Sturnus vulgaris* Linnaeus, 1758), jay (*Garrulus glandarius* Linnaeus, 1758), spotted nutcracker (*Nucifraga caryocatactes* Linnaeus, 1758), and rook (*Corvus frugilegus* Linnaeus, 1758) were identified (Gál, 2021b, pp. 453–454, tab. 1). Amongst the total of 20 wild species discovered at this site, gadwall, little bustard, blackbird, redwing, song thrush and spotted nutcracker were found for the first time in a medieval bone assemblage from the Carpathian Basin (Gál, 2015; Kessler, 2013).

5. Márianosztra–Toronyalja

The animal bone assemblage found at the Pauline cloister of Márianosztra–Toronyalja during the excavation directed by Zsuzsa Miklós in 1985 and 1987, respectively (Miklós, 1997), can be divided into two groups. Kitchen refuse was recovered from all over the site, but several bones, also associated with the diet of the monks, had been deposited at the bottom of a well that was filled up with dirt and dog carcasses by the time of the Turkish occupation in the mid-16th century. Fowl was represented by a few dozens of domestic chickens from nine specimens including young, female and male birds alike (Bartosiewicz, 1997).

6. Kassa–Dominican cloister (Košice–Mäsiarska ul. 6, Slovakia)

Rescue excavations conducted in the area of the Dominican cloister by Rastislav Rusnák in 2006 yielded a total of 229 bones that were identified by Zora Miklíková (Miklíková, 2009; Rusnák & Lušíková, 2008). Despite the small size of the zooarcheological assemblage, 10 different species, including the domestic chicken and the domestic duck or mallard (*Anas platyrhynchos* Linnaeus, 1758) were identified. The most characteristic feature of the bone

accumulation, however, was the frequency of young specimens of domestic mammals, including even fetal bones of caprines and pigs, associated with the special dietary customs of monks (Miklíková, 2009, p. 148). As already mentioned before, the Franciscan friary at Kassa yielded only mammalian remains.

7. Székesfehérvár–Island

The medieval cloister of the Maltese Knights at Székesfehérvár was excavated by Gyula Siklósi in 1978 (Siklósi, 1983). Although several thousand animal bones were excavated from the site, only a small assemblage consisting of 162 remains was analyzed in detail and published by László Bartosiewicz (Bartosiewicz, 1983, 1984). These bones were deposited in a 1.6-m deep cesspool, which was built at the end of the 14th century and belonged to the convent hall. In addition to a few dozens of bones from domestic chicken and domestic goose, a partial skeleton of a jackdaw (*Corvus monedula* Linnaeus, 1758) was identified (Bartosiewicz, 1984, p. 248, tab. 2).

4 | DISCUSSION

Despite the modest number of medieval ecclesiastical sites that yielded avian remains, the size of assemblages shows considerable variety from only a few dozen bones (e.g., the Dominican cloisters in Buda and Kassa/Košice) to hundreds or thousands of remains. Considering the palace of the archbishop in Esztergom, screening undoubtedly contributed to the abundance of bone material including fish (Gál & Bartosiewicz, 2021). Although three of the seven assemblages contained bones from domestic fowl only, typically domestic chicken, sometimes even the small bone assemblages included a variety of wild species, such as the aforementioned Dominican cloister in Buda that consisted only of 33 bones (Table 1).

The importance of domestic chicken in the archbishop's court is clear: it was the predominant species both among fowl and other domesticated and wild animals, and comprised one-third of the total faunal assemblage (Figure 2). A total of 1980 chicken bones could be assigned to at least 52 individuals including 19 young and 33 adult birds. In addition to the age variety in domestic chicken, the presence of skeletal parts containing medullary bone tissue, indicative of hens in lay (Gál, 2021b, p. 428, fig. 7), suggests that eggs were also consumed at this religious house. According to a late 15th century account from the residence, eggs were frequently purchased (Kuffart, 2018, p. 139). Nevertheless, it is important to note that the huge amount of domestic chicken most probably represents the food remains of servants, too. According to the architectural history of the palace, the kitchens of the archbishop and his personnel, located above each other, had outlets that dumped waste in the same direction, which might have resulted in the mixing of food remains left behind by persons of high status and common people (Benkő et al., 2021, pp. 2–5, fig. 1 and 2).

Attempts at sexing the domestic chicken were made during most of the zooarcheological analyses. This was usually based on

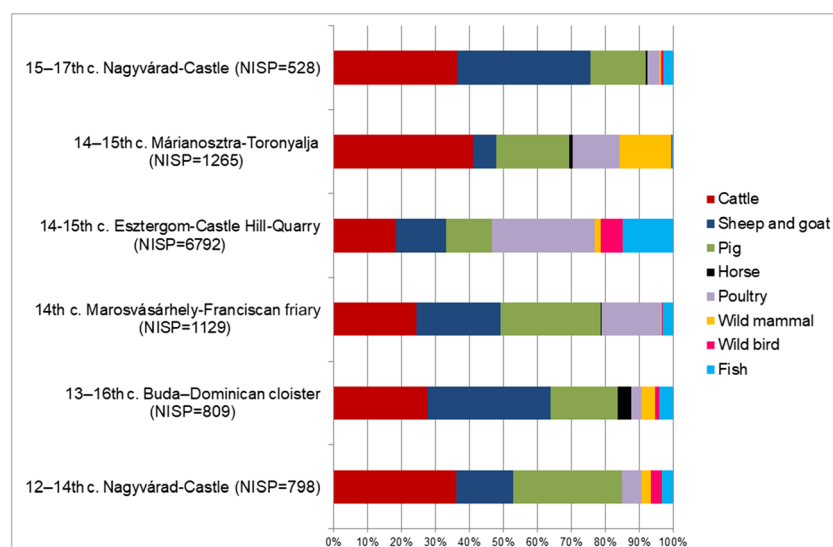


FIGURE 2 The composition of statistically representative (NISP ≥ 500) animal bone assemblages from ecclesiastical centers, showing the main species and taxonomic groups [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1002/oa.3152)]

the presence or absence of the cock spur on the tarsometatarsus (Figure 3), whereas medullary bone tissue was identified only in the material from Marosvásárhely/Târgu Mureș (Gál, 2012a, p. 671) and Esztergom (Gál, 2021b, p. 428, fig. 7). The presence of complete tarsometatarsi in several assemblages also allows the comparison of metrical sizes. Size measurements of hen bones from five settlements of the seven ecclesiastical sites, marked with circles in Figure 4, suggest a substantial homogeneity in the species. Only a single specimen from Esztergom falls between the cluster of female and male birds, based on its robust tarsometatarsus. On the other hand, the length of tarsometatarsi in cocks suggests that two types of domestic chicken were supplied to the kitchen of the archbishop at Esztergom. The dimensions of the smaller breed almost reached the size of male specimens from Marosvásárhely/Târgu Mureș. Since the latter site is located on the easternmost periphery of medieval Hungary (Figure 1), bones from here may represent a primitive form of domestic chicken. It is notable, however, that the dimensions of these small specimens still far exceed the size of modern dwarf chicken. This small breed was also identified from two medieval (mainly 10th–14th century) villages excavated in the outskirts of Debrecen in east Hungary (Gál et al., 2020, pp. 209–210, fig. 9) and in the 16th–17th century Ottoman castle of Barcs in south-west Hungary (Gál, 2021b, p. 429, fig. 8). The larger, more developed form was also present in the assemblages from the latter two rural sites, both located in the central part of the kingdom, in addition to Esztergom and Székesfehérvár (Figure 4).

The second most frequent bird species identified from religious houses was the domestic goose, which occurred at three localities: The archepiscopal residence at Nagyvárad/Oradea and the cloisters at Marosvásárhely/Târgu Mureș and Székesfehérvár. The huge avian assemblage from the palace of the archbishop in Esztergom also contained 100 goose bones that had most probably originated both from the domestic form and its wild counterpart, as poultry and hunted fowl were both outstandingly well represented at this site. According to the aforementioned house accounts, domestic geese were

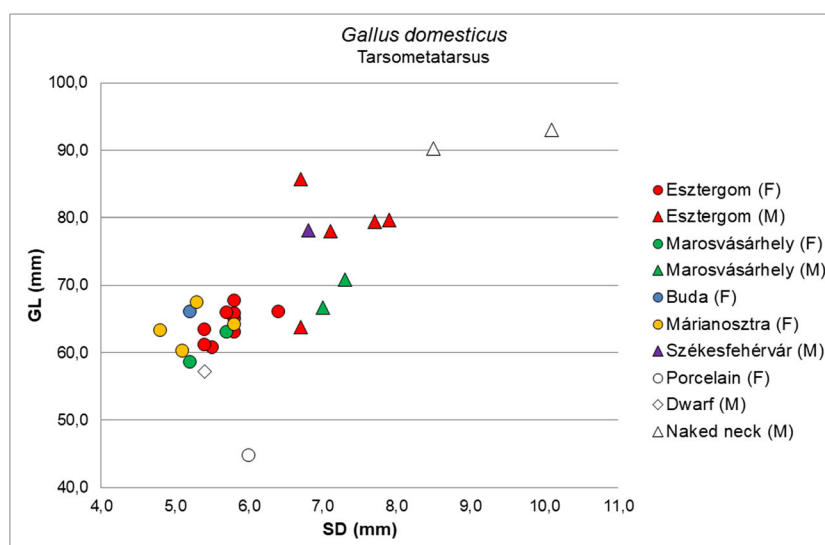


FIGURE 3 Left side tarsometatarsus of a small-size male domestic chicken from the Franciscan friary of Marosvásárhely/Târgu Mureș. Photo by Erika Gál [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1002/oa.3152)]

purchased by or paid as tax-in-kind to the archbishop of Esztergom (Kuffart, 2018, pp. 84, 167).

Domestic pigeon was also identified from Marosvásárhely/Târgu Mureș and Esztergom. While only two bones from a single individual were found at the former site (Gál, 2012a, p. 698, tab. 1), the kitchen midden of the archbishop's residence yielded 22 pigeon bones from two juvenile and three adult specimens. The frequency of pigeon remains and the presence of young specimens in the bone accumulation from Esztergom would point to the breeding of pigeons at this place, but it cannot be excluded either that specimens of this species

FIGURE 4 Scatterplot of the maximum length (GL) to the smallest width of the corpus (SD) of the tarsometatarsus in medieval domestic chicken compared with small and large-size modern breeds of this species. Abbreviations: F = female; M = male [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]



were acquired from elsewhere. According to the accounting book of the Esztergom archdiocese, dated to 1489, pigeon chicks were purchased in addition to beef, pork, mutton and pheasant (Kuffart, 2018, p. 139). While the Franciscan friary at Marosvásárhely/Târgu Mureş is the only site outside of the modern borders of Hungary where domestic pigeon was found (Gál, 2012a, 2021a), the recently excavated site of Esztergom–Castle Hill–Quarry is the eighth locality that yielded domestic pigeon remains on the territory of present-day Hungary (Gál, 2021b, p. 441, fig. 15).

Domestic duck and helmeted guinea fowl were both represented by a single fragment from Marosvásárhely/Târgu Mureş and Buda, respectively. In addition, several duck bones from a large *Anas* species—either mallard or its domesticated form—were also identified in the material from Esztergom (Table 1). Notably, however, domestic ducks are not mentioned in the accounting books of the archdiocese (Kuffart, 2018). The femur of a guinea fowl, recovered from the 13th-century layers of the cloister (Matolcsi, 1981, pp. 235–236, fig. 20), is one of the oldest medieval pieces of evidence for this species in Europe along with a 12th–13th-century skull found in Genoa, Italy (Serjeantson, 2009, p. 312, fig. 12.8). The other bone from medieval Hungary that was tentatively identified as guinea fowl originates from the 14th–15th-century layer of the royal palace in Visegrád (Visegrád–Palota; Bökönyi, 1974, p. 426). The occasional occurrence of this species in both royal centers (Buda and Visegrád) points to the rarity and special value of this kind of poultry.

Remains of wild birds, whose identification requires specialization in avian osteology as well as a comparative bone collection of various taxa, were rarely identified in the listed assemblages. Usually, the easily distinguishable groups of birds, such as galliforms and corvids were found (Bartosiewicz, 1984; Matolcsi, 1981). Among the wildfowl found in the cloister in Buda, the greylag goose and the pheasant could have been hunted in the immediate environment, since the town (the right side part of modern Budapest, capital of Hungary) was surrounded by the river Danube from the east and the Buda hills from west (Figure 5). While black grouse was identified at several medieval

sites (Gál, 2015), the capercaillie, adapted to pine woods, was found only in the mountainous region of Transylvania, in addition to Buda (Gál, 2012a). Taking into account, however, that this species used to breed in Hungary as late as in the 1970s, and was last detected in the Sopron mountains in west Hungary that has similar altitudes to the Buda hills (Faragó, 1991), one may assume that the capercaillie used to live in the Buda hills as suggested by János Matolcsi (Matolcsi, 1981, p. 242).

In addition to partridge, which is the most common game bird in medieval bone assemblages in Hungary (Gál, 2020b, p. 101), the tawny owl was also identified in the material from the cloister of Marosvásárhely/Târgu Mureş. So far, this species is the most frequent nocturnal bird of prey in medieval archeological assemblages from the Carpathian Basin, its remains were also discovered both in the 14th–15th-century and 16th–17th-century layers of Visegrád Palace, and in the 16th–17th-century castle of Ugod (Gál, 2015). Gardens, parks and cemeteries provided a suitable environment for the tawny owl in the urban landscape (Gál, 2003, p. 127), as it hunts small vertebrates such as rodents, birds and amphibians (Hume, 2003, p. 239).

The aforementioned wild birds represented mainly food, with the exception of the tawny owl that most probably died for natural reasons and ended up in the archeological layer. The almost complete skeleton of a jackdaw, however, found in a cloister at Székesfehérvár, is likely to have originated from a pet, as several species from the family of corvids are intelligent birds and are often tamed (Bartosiewicz, 1983, p. 171). Jackdaws can especially get attached to their owner if raised from a very young age (Gál, 2003, p. 129). Nevertheless, it cannot be excluded that it was consumed just like the poultry, because corvids used to be prepared both fried and for soup according to historical sources and ethnographic evidence (Bartosiewicz, 2004; Benda, 2014). Two additional radii from larger corvids in the same assemblage have been interpreted as an example for this phenomenon (Bartosiewicz, 1983, p. 171).

The only ecclesiastical site in medieval Hungary where evidence for the consumption of various types and sizes of wild birds was

resident or summer visitors in Hungary, the occurrence of the nonresident teal and redwing, present during the spring and autumn migrations, as well as the fieldfare and spotted nutcracker that are winter visitors, suggests that fowling was practiced all year round in the region (Gál, 2021b, pp. 438–439, fig. 14).

Moreover, the number of recovered crossbow parts, as well as an arrow bolt plane along with a considerable amount of workshop waste in the assemblage pointing to the curation of crossbows (Gál, 2020a; Gál, forthcoming), suggest that this type of weapon was used for hunting animals. Expenses in the account book of the archdiocese of Esztergom during the service of Ippolito d'Este, archbishop in 1486–1497, include the charge of his crossbow's reparation on the list of expenditures (Kuffart, 2018, p. 111). The bequest left by his preceptor, Sebastiano da Lugo, who died on the 4th of October 1490, included a crossbow made in Prague, among others (Kuffart, 2018, pp. 47–48).

Crossbow production at bishops' residences, even if linked only to an itinerant bone carver, seems to have been usual across Europe as suggested by the artifacts from Salzburg, Austria (Lang, 2010) and Trondheim, Norway (Holst Booth, 1996). The small bone tube carved from a goose ulna in the assemblage from Esztergom may have been part of a lure whistle used during hunting (Gál, 2021b, fig. 12/7).

Nevertheless, wildfowl also used to be a subject of trade at the archbishop's court according to historical sources. The already cited document from 1489 mentions that pheasant was bought in addition to poultry and other farm animals (Kuffart, 2018, p. 139). The record of purchases also mentions that cartloads of pheasants were sent to King Matthias and Queen Beatrix in Vienna during the autumn and winter of 1487 (Kuffart, 2018, p. 191). Both movements may explain the relatively small number of pheasant bones in the assemblage (Figure 7).



FIGURE 7 Left side coracoid and carpometacarpus from pheasant from the archbishop's castle in Esztergom [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1002/oa.3152)]

Pheasant remains and finds from other middle-size terrestrial birds, such as the little bustard, were sporadically found in Esztergom. Bones of waterfowl, including the glossy ibis and various species of ducks, were also brought to light in small numbers compared with the total avian assemblage. A possible explanation is that fish was a daily foodstuff on the table of the archbishop, as testified by both the records in the household accounting books (Kuffart, 2018, pp. 139–140) and the abundance of fish bones in the zooarcheological material (Bartosiewicz, 2021; Bartosiewicz & Gál, 2021). Consequently, other aquatic species (e.g., shellfish, waterfowl, and aquatic mammals) were not consumed as a substitute for fish like in several monasteries outside the Carpathian Basin.

For example, the remains of mollusks, turtles and tortoises were more abundant than those of fish in the 16th-century monastery of Trinita dei Monti in Rome (De Grossi & Minniti, 1999, p. 45, tab. 7). The 17th-century faunal material of the Carthusian monastery in Mauerbach, Lower Austria, revealed that the huge amount of fish was complemented by mollusks, chelonians, coot (*Fulica atra* Linnaeus, 1758) and beaver (*Castor fiber* Linnaeus, 1758) in the monks' diet (Galik & Kunst, 2004). Moreover, remains of otters (*Lutra lutra* Linnaeus, 1758) made up half of the zooarcheological assemblage found at the 16th–18th-century monastery of Santa Maria degli Angeli in Rome, and exceeded the number of bones from fish, domestic mammals, birds (including the domestic duck and coot), tortoises and turtles, as well as shellfish (De Grossi & Minniti, 1999, p. 34, tab. 1).

Nevertheless, it seems that it was allowed to consume mistle thrush and wild birds in general during fasts, too, both in Central Europe (Lakó, 1983, pp. 57–59) and England (Serjeantson, 2001, p. 263), at least for the elite. Results yielded by the analysis of avian bones and egg remains from a 17th-century female monastic community in Coimbra, Portugal also pointed to special circumstances in the life of the convent. Despite the dietary rules of the Poor Clares that prohibited the consumption of meat, eggs and dairy products alike at any time of the year, a rather abundant zooarcheological material including over 4000 avian remains (30% of the total assemblage) was brought to light at this site. Written sources reveal that sick nuns were exempted from fasting. Unhealthy living conditions due to successive flooding in the area of the convent as well as the pathological phenomena observed on human skeletons found at this site suggest that the nuns lived in highly unfavorable sanitary conditions, which is linked to the formation of this outstanding assemblage.

Interestingly, the bone collection from Coimbra showed remarkable resemblance to the avian assemblage from Esztergom in terms of the dominance of domestic chicken as well as the frequency of small game birds such as the (red-legged) partridge (*Alectoris rufa* Linnaeus, 1758), (rock) dove (*Columba livia* Gmelin, 1789), and thrushes (Moreno-García & Detry, 2010). On the other hand, zooarcheological assemblages from nine Belgian monastic sites (seven male and two female communities) showed similarities with the Esztergom material in terms of the absence of large game and the abundance of fish (in cases when sieving was applied during retrieving the remains) (Ervynck, 2004, pp. 216–217).

The glossy ibis, albeit not as large as the crane (*Grus grus* Linnaeus, 1758) and large Ardeiforms, might have made an impression on the tables of the aristocracy, especially if prepared and stuffed as advised in Anna Bornemisza's 17th-century cookbook (essentially a translation and slightly revised version of a book used at 16th-century royal courts in Central Europe): "The crane – fried as a whole, served either hot or cold, standing in a bowl with all his feathers – very noble bird ..." (Lakó, 1983, p. 140). Several other sources also confirm the importance of these sizable and attractive birds on festive occasions such as the funeral feast of a bishop (Woolgar, 1999, p. 114) or royal meetings (Esser & Verhagen, 2001, pp. 302–303). The grey heron was probably also consumed—in addition to domestic chicken, geese and ducks—in the Dominican monastery of Norden (north Germany) in the 15th century (Kuechelmann, 2012, p. 97, Appendix). The kitchen account of Ippolito d'Este in Esztergom mentions several delicacies, such as ox tongues and pheasants, which were bought for the kitchen when King Matthias and Queen Beatrix visited the archbishop in 1489 (Kuffart, 2018, p. 78).

The kitchen of the archbishop's palace yielded few bones of middle- and large-size fowl, however, there was a notable abundance of small game birds including quail and partridge, as well as passerines, represented by five different species of thrush (Figure 8) (Gál, 2020b). At this site, all the three main criteria that point to the abundance of small birds at a site, as described in the case of avian assemblages from medieval England (Baker, 2010; Serjeantson, 2001), are fulfilled. First, food purchased and served at the table of the archbishop was carefully selected, especially when high-status guests came to the palace as recorded in the account books. Secondly, the discarded food remains had a good chance to accumulate on the slope of the quarry at the bottom of the residence, and the bones were deposited in several layers. Finally, the archeological assemblage was recovered by systematic screening in addition to collection by hand.

Another observation concerning the faunal composition of late medieval assemblages from England, that the frequency of passerines

and other small birds is a better indicator of social status than fish (Serjeantson, 2001, p. 273), also seems to be true for medieval Hungary. While a few records of partridge, quail, corvids and thrush species were documented from rural and urban sites alike, the frequency of partridge bones as well as a higher diversity of songbirds (starling in addition to several thrush species) is typical of elite sites such as religious houses and royal residences (Gál, 2020b).

In the unique avian material from Esztergom, the 241 partridge bones, originating from at least 20 individuals including both young and adult specimens, are especially striking (Table 1). Although this species used to be kept along with poultry and piglets in medieval England (Woolgar, 1999, p. 114), there is neither written evidence nor medullary bone tissue of this species that would suggest partridge breeding in Hungary.

The large number of bones from this species as well as other small birds made it possible to study the share of skeletal parts that conveys information concerning the selective transportation and processing of carcasses. For example, the analysis of avian remains from wealthy religious and aristocratic houses in England (St Gregory's Priory and Little Pickle, respectively) suggested that the head, the distal end of the wing and the feet of passerines had been removed before delivering the carcasses to the kitchen (Serjeantson, 2001, p. 270, fig. 1–3). The distribution of bones in the assemblage from Esztergom revealed that the carcasses of both domestic and wildfowl were brought to the settlement as a whole, as all body parts were present (Figure 9). Articulated bones from pheasants, partridges and mistle thrushes also confirm this observation (Gál, 2020b, p. 103). Nevertheless, as the kitchen waste of both the archbishop and his servants had been deposited at the same spot, details regarding the butchery process and serving of birds, which could have revealed differences in the food distribution between the two social strata, are not perceptible.

Another peculiarity at Esztergom is the frequency of hare bones in the material, in which wild mammals are surprisingly underrepresented in general (only 1.6% of the total bone assemblage; Figure 2; Gál, 2021b, pp. 453–454, tab. 1). Hare was also the most common species among the few wild animals in the contemporaneous assemblage from Studenica Monastery in Serbia (Marković, 2015). Catching partridges and rabbits was part of game procurement on the estate of Joan de Valence, a noblewoman who kept hawks and falcons along with packs of dogs (Woolgar, 1999, p. 115). It cannot be excluded that the archbishop of Esztergom—or, rather, his bird catcher—used trained birds of prey for hunting, as remains of goshawk and sparrow hawk were identified in the bone assemblage (Figure 10; Table 1). Both species were common diurnal predators used in hawking, and they hunt small and medium-sized prey which fit most of the game animals identified in the Esztergom material (Gál, 2021b). The diversity of species including a wide range of waterfowl, game birds and thrushes was also interpreted as evidence for hawking at the 8th–12th-century abbeys of Eynsham and St Albans in England. In Eynsham, both sparrow hawk and goshawk were identified, while St Albans yielded a skeleton of a hawk (Serjeantson et al., 2018, p. 130–131).



FIGURE 8 Right side humerus and left side carpometacarpus from mistle thrush from the archbishop's castle in Esztergom [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1002/ajpa.24152)]

FIGURE 9 The distribution of skeletal elements of domestic and wild species in the assemblage from Esztergom–Castle Hill–Quarry, based on NISP (n). cr = cranium, md = mandible, vt = vertebra, cl = clavicle, st = sternum, ct = costa, co = coracoid, sc = scapula, hu = humerus, ul = ulna, ra = radius, mc = carpometacarpus, phm = phalanx manus, pe = pelvis, fe = femur, ti = tibiotarsus, fi = fibula, mt = tarsometatarsus, php = phalanx pedis [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1002/oa.3152)]

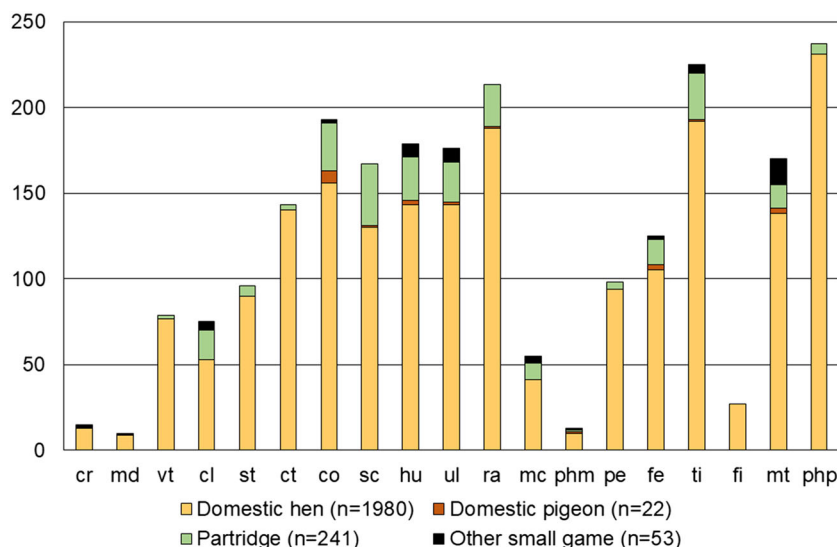


FIGURE 10 Hawk and songbirds (detail from Collaert, 1967)

Thrushes and other small birds, however, also used to be caught by nets and boughs smeared with viscin, the sticky substance from the European mistletoe, *Viscum album* Linnaeus, 1753 (Csőre, 2000, p. 32). The latter custom of catching fieldfare in the Northern Carpathians and selling the birds in Hungarian cities and Vienna was practiced by Slovaks as late as in the 20th century (Paládi-Kovács, 2001).

Differences between monastic and nonmonastic or rural and urban sites in medieval Hungary are hard to explore due to the variability in the number of sites and the species identified. While 48 different wild bird species were identified from 23 villages (Gál, 2021a, pp. 238–242, Appendix 7), information regarding urban settlements in the medieval Carpathian Basin is limited to 13 species from 10 settlements (Gál, 2021a, p. 243, Appendix 8). It is obvious, however, that people living in rural environments generally had more access to wild game in general than the urban inhabitants who mostly purchased their food from the market. Peasants also had to protect their crop and livestock from various pests including certain birds, which may be reflected in the presence of a variety of diurnal birds of prey and commensal species such as corvids and the house sparrow (*Passer*

domesticus, Linnaeus, 1758) in the archeological assemblages. Some of these birds, however, may have also been eaten by people, because hacking marks on a bone from a golden eagle (*Aquila chrysaetos* Linnaeus, 1758), found at Budapest–Kána (Gál et al., 2020, p. 210), as well as ethnographic analogies regarding the consumption of crows (Kardos, 1943) suggest the existence of such a custom.

In addition to the common game birds purchased from the market, rare species could also end up in urban assemblages if the place was inhabited, for example, by servants of the nobility. This is probably the case with a lanner (*Falco biarmicus* Temminck, 1825), a species imported to Hungary, whose two leg bones were found in a pit at the site of Buda–Teleki Palace in the Castle District, which accommodated the royal residence during the Middle Ages (Gál, 2015, p. 361, fig. 9). The possible presence of rare birds in the surroundings of high-status settlements is further evidenced by the number of crania from crested hen brought to light from the 16th–17th-century layers of Buda–Teleki Palace, from two other urban settlements in the Castle District, and from a site south of the royal palace, respectively (Gál et al., 2010).

As far as nonmonastic high-status settlements are concerned, the variety of hunted birds at Buda–Royal Castle, including several individuals of pheasants, partridges and the winter visitor bean goose (*Anser fabalis* Latham, 1787), is noteworthy (Matolcsi, 1977). The turkey (*Meleagris gallopavo* Linnaeus, 1758) and the peafowl (*Pavo cristatus* Linnaeus, 1758) were identified in assemblages from the royal centers of Buda–Palace (13th–17th century), Visegrád–Palace (14th–15th century), and Buda–Pasha's Palace (16th–17th century) (Bökönyi, 1958, 1974). In the case of military centers, the presence and possible use of various diurnal birds of prey is remarkable. The assemblage brought to light from the 16th-century Styrian Castle of Bajcsa yielded remains of goshawks and sparrows as well as a small bronze bell, which might have been part of a hawking equipment (Gál, 2012b). The steppe eagle (*Aquila rapax* Temminck, 1828) identified at this settlement represents an exotic species purchased or received as a gift by the high-ranking people living in the castle (Gál, 2005a, p. 123). The circulation of unusual goods in the border

zone of the Ottoman Empire at the time was further evidenced by a walrus-tusk belt plaque found at the Turkish castle of Barcs, erected in 1567 (Gál & Kovács, 2011). In addition to the use of predatory birds as trained birds and pets, they could also have been exploited for their feathers and bones. Two flutes made from golden eagle ulnae were found in the 16th-century Turkish castle of Visegrád–Alsóvár (Gál, 2005b, pp. 328–329, fig. 6 and 7).

5 | CONCLUSIONS

The number of zooarcheological assemblages from medieval Hungarian ecclesiastical sites that have been published is surprisingly small. In most cases, they included only a few dozens of avian bones, on the basis of which usually the major domestic bird species were identified. The abundance of finds and taxa seems to have depended on at least three factors: (1) The size of the unearthed site or studied sample generally defines the number of bones. (2) Excavation methods, and whether sieving or screening is employed in addition to collecting bones by hand, are also essential in this respect. Finally, (3) a specialist's experience in avian osteology and taxonomy, as well as access to comparative collections that cover a wide variety of species, would increase the number of identified bird bones and species.

The study of abundant and rich avian assemblages from ecclesiastical sites contributes to our understanding of the exploitation of birds by the clergy and other high-status members of society, especially if the results are interpreted in the light of historical written sources, such as household accountings, personal correspondence, and cookbooks. The presence of bones of certain species or larger taxonomic groups in a greater abundance makes further analyses possible, such as the analysis of food processing practices or biometric comparisons, especially if aged and sexed specimens are also available. However, conclusions even from outstandingly rich assemblages, such as the one representing the kitchen waste of the archbishop's residence in Esztergom, may have their limitations due to the architectural features or taphonomic characteristics of the given site.

Although the territory of medieval Hungary was large and geographic conditions were diverse in the Carpathian Basin (the two areas were virtually identical in the Middle Ages), a detailed reconstruction of seasonality or of paleo-ecological conditions around the sites proved impossible due to the uneven distribution of bird remains at the studied sites. Nevertheless, faunal remains that are not interpreted as food refuse, such as antler and bone artifacts indicative of crossbow curation, as well as skeletal parts from diurnal birds of prey often used in hawking, shed more light on fowling at the exceptional site of the archbishopric of Esztergom.

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CONFLICT OF INTEREST

There are no conflicts of interest connected to this paper.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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