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Presentation of so far undetermined bird remains from the Pliocene of Beremend 26 and Csarnóta 2 and 4 (Baranya county, South Hungary)

Jenő (Eugen) Kessler[1] & Ida Horváth[2*]

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Abstract The authors have defined at the order, subfamily, family or genus level the very fragmentary and small-size bird bone material from the three Pliocene-age sites in southern Hungary (Beremend 26, Csarnóta 2 and 4), which is in the collection of the Museum of the Hungarian Institute of Geology and Geophysics. The non-catalogued bone fragments remaining from the already examined material were identified. The number of taxa identified is 26, of which one species is new to science. The new species (*Pliogallus csarnotanus* n. sp.) belongs to a hitherto disputed genus, which is thus recognised through the newly defined material. Of the rest of the material, only *Paleocryptonix hungaricus* Jánossy, 1991 and *Glaucidium baranensis* Kessler, 2010 have been identified to species level, the *Gallinula, Porzana, Merops, Garrulus, Nucifraga* finds to genus level, while the other 18 taxa have been identified only to subfamily or family level (Perdicinae, Columbidae, Alaudidae, Hirundinidae, Panuridae, Paridae, Sittidae, Certhiidae, Muscicapidae, Turdidae, Sylviidae, Motacillidae, Prunellidae, Laniidae, Sturnidae and Fringillidae), or only to order level (Charadriiformes, Coraciiformes).

Keywords: Beremend, Csarnóta, Pliocene, Hungary, birds, fossils

Összefoglalás Jelen tanulmányban három pliocén korú (Beremend 26, Csarnóta 2 és 4) dél-magyarországi lelőhelyről származó, a Magyar Geológiai és Geofizikai Intézet múzeumának gyűjteményében található igen töredékes és apró méretű madárcsont anyagot dolgozták fel és határozták meg a szerzők legalább rend, alcsalád, család vagy genus szintig. A már vizsgált anyagokból visszamaradt, nem katalogizált csonttöredékek meghatározásával jelentősen bővült ismeretünk. Az azonosított taxonok száma 26, amelyekből egy faj új a tudomány számára. Az új faj (*Pliogallus csarnotanus* n. sp.) egy eddig vitatott genusba tartozik, amely ezáltal elismerésre kerül, az újonnan meghatározott anyag révén. Az anyag többi részéből csak a *Paleocryptonix hungaricus* Jánossy, 1991 és a *Glaucidium baranensis* Kessler, 2010 fajokat sikerült azonosítani, a *Gallinula*, *Porzana*, *Merops*, *Garrulus*, *Nucifraga* leleteket genusz szintig, míg a többi 18 taxont csak alcsalád vagy család szintig (Perdicinae, Columbidae, Alaudidae, Hirundinidae, Panuridae, Paridae, Sittidae, Certhiidae, Muscicapidae, Turdidae, Sylviidae, Motacillidae, Prunellidae, Laniidae, Sturnidae és Fringillidae), vagy csak rend szintig (Charadriiformes, Coraciiformes).

Kulcsszavak: Beremend, Csarnóta, Pliocén, Magyarország, madarak, fossziliák

[1] Department of Paleontology, Eötvös Loránd University, 1117 Budapest, Pázmány Péter sétány 1/c, Hungary
[2] University of Sopron, Faculty of Forestry, Institute of Wildlife Management and Biology, 9400 Sopron, Bajcsy-Zsilinszky utca 4., Hungary
**corresponding author, e-mail: idahorvath03@gmail.com*

Introduction

A number of Pliocene-age vertebrate remains have been recovered from the splits of low mountain ranges built up from Mesozoic limestone in the southernmost part of Hungary. These have been collected, studied and published since the mid-19th century, including bird material. The undetermined, mostly very small and fragmentary bones from the Hungarian Institute of Geology and Geophysics (HIGG) collection of the Csarnóta 2 material (uncatalogued) and the „Beszélő Kövek Alapitvány" Harkány (BKAH) collection of Beremend 26 and Csarnóta 4 (uncatalogued) have been identified and are reported in this paper. As most of the material is highly fragmentary and not previously identified by Kessler J. (Kessler 2013a, 2013b), the present study could only identify a few bones or bone fragments to species level, the rest could only be identified to order, family or genus level. They can be compared with the characters and sizes of the species already reported from the sites and their affiliation can be assumed.

Beremend sites: about 9 km south of the Villány Mountains and the village of Villány lies the flat, loess-covered, 174 m high Szőlő Hill by Beremend, which is made of Lower Cretaceous limestone (Nagyharsány Limestone Formation). The limestone has been quarried for more than a hundred years, and almost year after year new karst cavities and splits with bone have been discovered in the quarry. Already in 1847, Salamon János Petényi, accompanied by Ágoston Kubinyi, had collected from Beremend (sites 1–3), and thanks to the excavations of Miklós Kretzoi, which began in 1956, the number of sites had increased to ten. Dénes Jánossy continued the excavations with Endre Krolopp (sites 11–17) from 1973. László Pongrácz has then followed the discovery of new sites as a result of quarrying (sites 17–39). The age of the sites covers a large time interval. Some of the vertebrate faunas of the investigated sites belong to the Pliocene MN Zones 15–16, the Csarnóta and Beremend biochronological units. Their age is between 3.2 to 1.8 million years old and follow the chronological order (Csarnóta 2 and 4 at the same time as Beremend 26) with interruptions, moving from older to younger (Jánossy 1979a, 1979b, Kordos 1992, 2001, Kessler 2009a, 2009b, 2010, 2013a, 2013b, Pongrácz oral communication).

Beremend (26): the Beremend 26 site is the 100 m (deepest) mining level of a 30 m wide and 20–25 m high red-clay fissure filled with lithic crushed rock, from which HIGG has carried out a detailed geological investigation („base section"). The site was largely demolished after the collection, but László Pongrácz continued to collect from the site as long as it was possible. The mammal fauna was processed by László Kordos (2001a). The bird material identified and published are: *Podiceps* sp. (*ruficollis* size), *Egretta* sp. (*garzetta* size), *Accipiter* sp. (*nisus* size), *Falco tinnunculus atavus* Jánossy, 1972; *Falco* sp. (*peregrinus* size) *Tetrao praeurogallus* Jánossy, 1969; *Tetrao partium* Kretzoi, 1962; *Gallus beremendensis* Jánossy, 1976; *Francolinus capeki* Lambrecht, 1933; *Palaeocryptonix hungaricus* Jánossy, 1991; *Perdix perdix jurcsak* Kretzoi, 1962; *Rallus polgardensis* Jánossy, 1991; *Miorallus major* Milne-Edwards, 1869–1871; *Porzana* sp. (*Porzana porzana* size), *Otis kalmani* Jánossy, 1972; *O. lambrechti* Kretzoi, 1941; *Chlidonias* sp., *Tringa* sp. (*glareola – ochropus* size), *Columba* sp., *Glaucidium baranensis* Kessler, 2010; *Athene noctua veta* Jánossy, 1992; *Strix intermedia* Jánossy, 1972; *Picus pliocaenicus* Kessler,

2013; *Dendrocopos praemedius* Jánossy, 1974; *Melanocorypha minor* Kessler, 2013; *Galerida pannonica* Kessler, 2013; *Lullula parva* Kessler, 2013; *Lullula minuscula* Kessler, 2013; *Delichon major* Kessler, 2013; *Parus robustus* Kessler, 2013; *Parus medius* Kessler, 2013; *Sitta villanyensis* Kessler, 2013; *Luscinia pliocaenica* Kessler, 2013; *Phoenicurus baranensis* Kessler, 2013; *Oenanthe pongraczi* Kessler, 2013; *Saxicola baranensis* Kessler, 2013; *Saxicola magna* Kessler, 2013; *Erithacus minor* Kessler, 2013; *Monticola pongraczi* Kessler, 2013; *Turdus major* Kessler, 2013; *Turdus medius* Kessler, 2013; *Turdus praeminor* Kessler, 2013; *Oriolus beremendensis* Kessler, 2013; *Acrocephalus kretzoii* Kessler, 2013; *Sylvia pusilla* Kessler, 2013; *Locustella magna* Kessler, 2013; *Locustella janossyi* Kessler, 2013; *Regulus plioceanicus* Kessler, 2013; *Motacilla minor* Kessler, 2013; *Motacilla robusta* Kessler, 2013; *Bombycilla kubinyii* Kessler, 2013; *Prunella kormosi* Kessler, 2013; *Lanius major* Kessler, 2013; *Lanius intermedius* Kessler, 2013; *Sturnus pliocaenicus* Kessler, 2013; *Sturnus baranensis* Kessler, 2013; *Passer pannonicus* Kessler, 2013; *Coccothraustes major* Kessler, 2013; *Loxia csarnotanus* Kessler, 2013; *Emberiza gaspariki* Kessler, 2013 (Kessler 2009a, 2009b, 2010, 2013a, 2013b).

Csarnóta (2, 4): in the western part of the Villány Hills, on the border of the village of Csarnóta, on the flat top of Cserhegy. Bone material found in the red clay columns filling the crevices of abandoned quarries was first collected by Tivadar Kormos (according to information from M. Pálfy) from 1910 to 1930 (marking the site as „upper quarries"), then Miklós Kretzoi and Dénes Jánossy collected here regularly. Of the four sites, sites 2 and 4 also provided bird material. The latter is not quite the same age as the other three. Site 1 was destroyed following the construction of the road. The species list of site 2 is as follows: *Tetrao praeurogallus* Jánossy, 1969; *Francolinus capeki* Lambrecht, 1933; *Rallus aquaticus*, *Gallinago veterior, Cuculus csarnotanus* Kessler, 2010; *Bubo bubo, Aegolius* sp., *Hirundo* sp., *Garrulus glandarius*, *Pyrrhocorax graculus vetus* Kretzoi, 1962; *Sitta* sp., *Turdus viscivorus*, *Turdoides borealis* Jánossy, 1979 (Kretzoi, 1962, Jánossy 1976a, 1976b, 1977, 1979a, 1979b, 1979c). The remaining and undetermined material has been identified by J. Kessler over the years and the following species have been defined: *Podiceps csarnotanus* Kessler, 2009; *Anas albae* Jánossy, 1979; *Falco tinnunculus atavus* Jánossy, 1972; *Palaeortyx brevipes* Milne-Edwards, 1869; *Gallus beremendensis* Jánossy, 1976; *Tetrao praeurogallus* Jánossy, 1969; *Tetrao partium* Kretzoi, 1962; *Francolinus capeki* Lambrecht, 1933; *Otis kalmani* Jánossy, 1980; *Rallicrex polgardensis* Jánossy, 1991; *Porzana kretzoii* Kessler, 2009; *Rallus aquaticus*, *Gallinago veterior* Jánossy, 1979; *Cuculus csarnotanus* Jánossy, 1979; *Bubo bubo*, *Aegolius* sp., *Glaucidium baranensis* Kessler, 2009; *Athene noctua veta* Jánossy, 1992; *Apus baranensis* Jánossy, 1977; *Pyrrhocorax graculus vetus* Kretzoi 1962; *Corvus harkanyensis* Kessler, 2009; *Miocorvus larteti* Milne-Edwards, 1871; *Pica pica major* Jánossy, 1979; *Turdoides borealis* Jánossy, 1979; Passeriformes indet, Aves indet (Kessler 2009a, 2009b, 2010a), while from Csarnóta 4 (collected by L. Pongrácz): *Tetrao partium* (by Kessler 2009a). Following these new determinations, the following new extinct songbird species have been identified and described: *Galerida pannonica* Kessler, 2013; *Lullula parva* Kessler, 2013; *Hirundo major* Kessler, 2013; *Delichon pusillus* Kessler, 2013; *Aegithalos congruis* Kessler, 2013; *Parus robustus* Kessler, 2013; *Parus parvulus* Kessler, 2013; *Sitta pusilla* Kessler, 2013; *Certhia immensa* Kessler, 2013; *Saxicola baranensis*

Kessler, 2013; *Saxicola parva* Kessler, 2013; *Phoenicurus erikai* Kessler, 2013; *Oenanthe pongraczi* Kessler, 2013; *Turdus major* Kessler, 2013; *Turdus medius* Kessler, 2013; *Turdus praeminor* Kessler, 2013; *Cettia kalmani* Kessler, 2013; *Acrocephalus kretzoii* Kessler, 2013; *Acrocephalus kordosi* Kessler, 2013; *Sylvia pusilla* Kessler, 2013; *Locustella janossyi* Kessler, 2013; *Phylloscopus pliocaenicus* Kessler, 2013; *Anthus baranensis* Kessler, 2013; *Cinclus minor* Kessler, 2013; *Prunella kormosi* Kessler, 2013; *Lanius hungaricus* Kessler, 2013; *Passer minusculus* Kessler, 2013; *Carduelis parvulus* Kessler, 2013; *Carduelis medius* Kessler, 2013; *Pyrrhula minor* Kessler, 2013; *Fringilla petényii* Kessler, 2013; *Loxia csarnotanus* Kessler, 2013; *Pinicola kubinyii* Kessler, 2013; *Emberiza media* Kessler, 2013; *Emberiza parva* Kessler, 2013 (Kessler 2013a, 2013b).

Abrevations: Q1-Q2-Lower Pleistocene; Q3 (Q3/I-Q3/II)-Middle Pleistocene; Q4 (Q4/I-Q4/II)-Upper Pleistocene; †-extinct/fossil species-subspecies. A-total lengths; B-partial lengths; C-breadth of proximal epiphysis; C1-partial breadth of proximal epiphysis; D-thickness of proximal epiphysis; E-breadth of diaphysis; E1-partial breadth of diaphysis; F-breadth of distal epiphysis; G-thickness of distal epiphysis; H-height of distal epiphysis. Hungarian Institute of Geology and Geophysics (HIGG); „Beszélő Kövek Alapítvány" Harkány (BKAH)
(Note: Q3/I = Upper Bihar stage; Q3/II = Pilis stage – Solymar substage; Q4/I= Pilis stage – Szanto substage; Q4/II = Holocen)

Anatomical terminology: after Lambrecht (1933), Baumel *et al.* (1979), Gilbert *et al.* (1981), Kessler (2013a)

Method of measurement: after von den Driesch (1976), Kessler (2013b)

Systematics

Ord. Galliformes (Temminck, 1820)
Fam. Phasianidae (Vigors, 1825)
***Pliogallus* Gaillard, 1939**
***Pliogallus csarnotanus* n. sp.** *(Figure 1/1–4, 2/5–6)*

Locus typicus and stratum typicum: Csarnóta 4 (Hungary), Pliocene (MN15)

Material: *carpometacarpus* (holotype), 4 *phalanga pedis*, 2 *phalanx ungualis* (paratypes).

Dimensions (in mm): *carpometacarpus*: A-33.47; B-29.88; C-11.51; D-7.15; E-9.63; E1-3.99; F-6.81; G-3.72; *phalanga pedis* (4): A-7.78, 14, 18; *phalanx ungualis* (2): A-10.61 and 12.03.

Derivatio nominis: „*csarnotanus*" from the name of locality.

Diagnosis of species: A big Phasianidae species, bigger than *Gallus beremendensis* identified by D. Jánossy in 1997 from the Early Pleistocene of Beremend 5. The *metacarpus* differs from the recens *Gallus gallus domesticus* in the following:
– the proximal edge of the *trochlea carpalis* less outstanding *(Figure 1/1a)*;
– the *processus extensorius* is narrowed and the end is curved upwards *(Figure 1/1b)*;

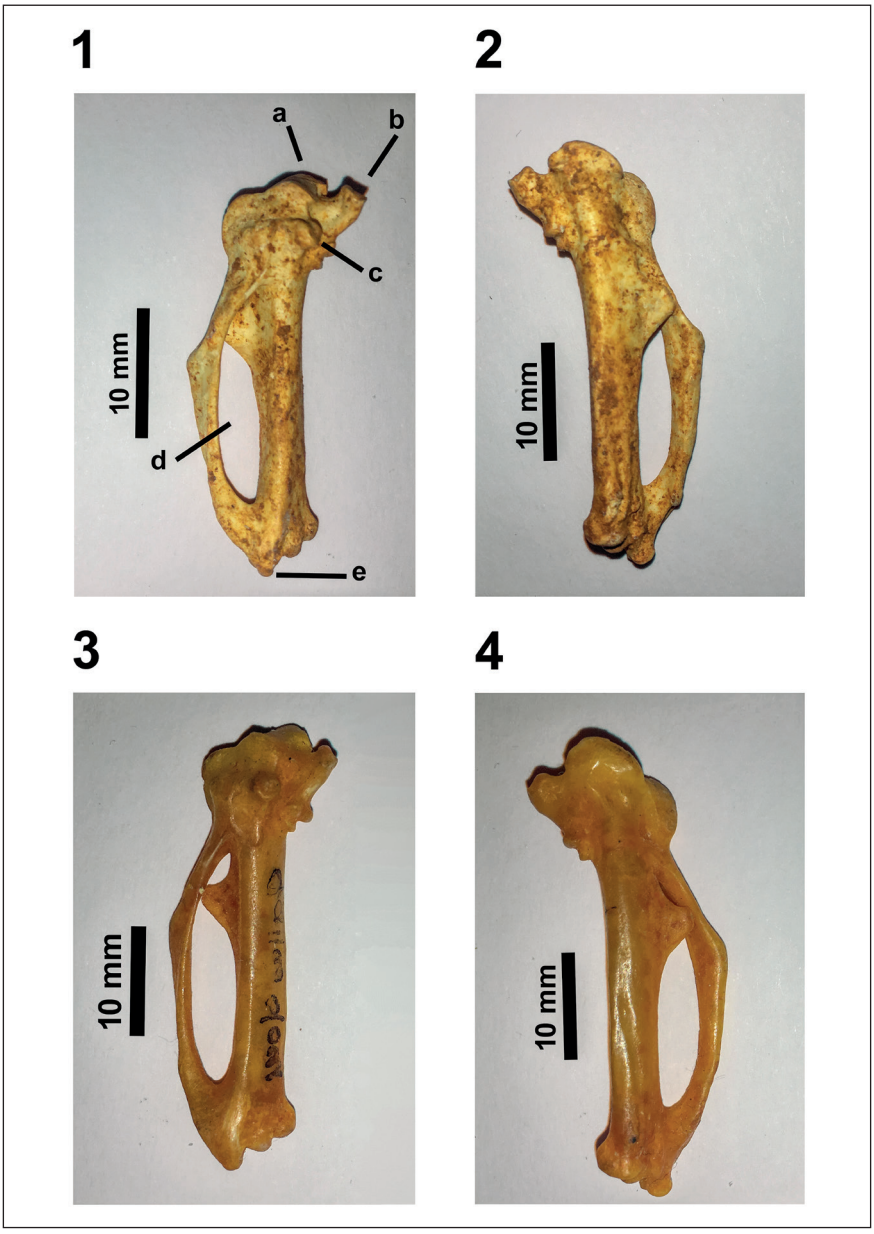
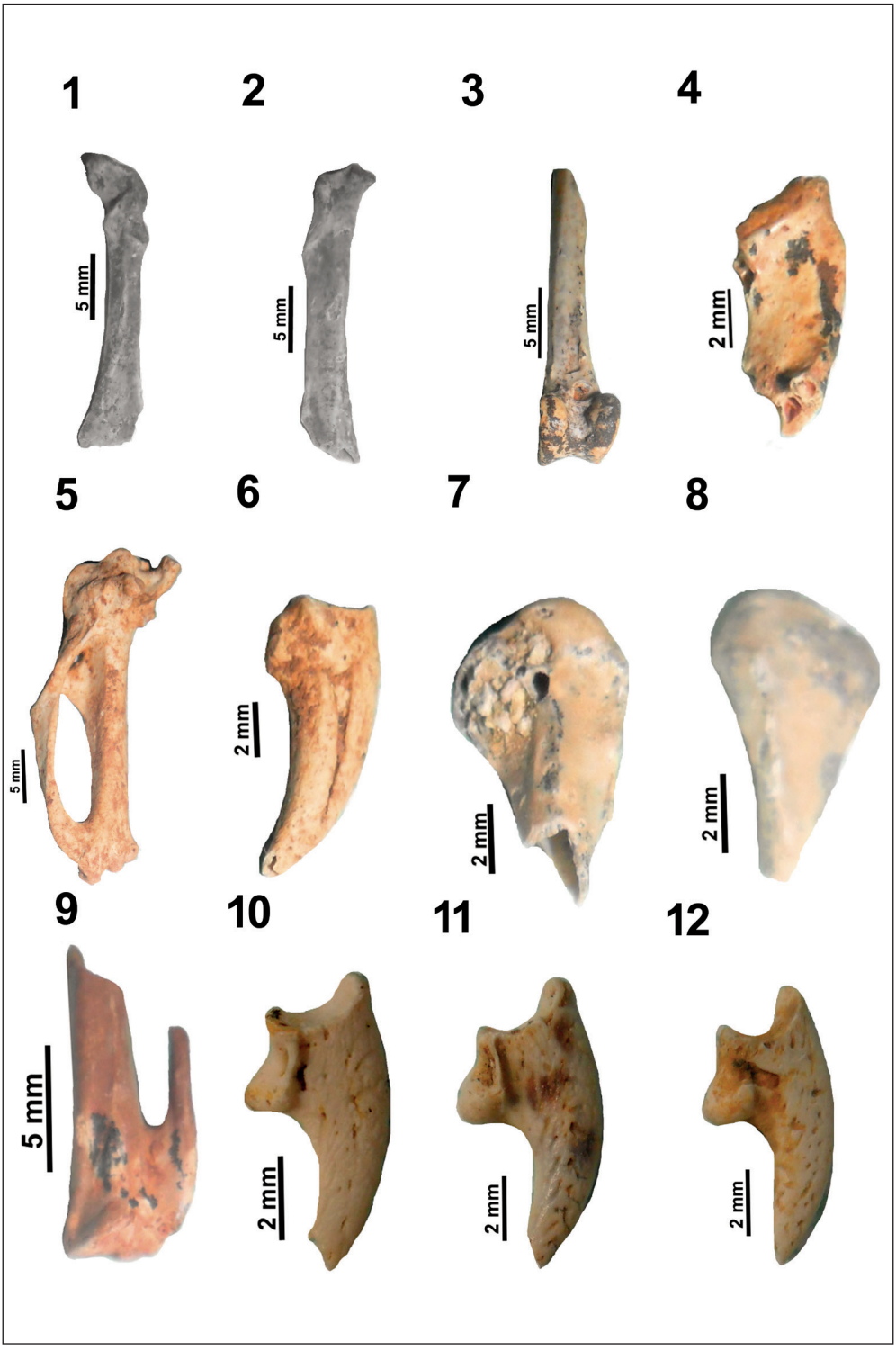


Figure 1. 1. *Pliogallus csarnotanus* n. sp. – Csarnóta 4. *carpometacarpus* (left side, ventral aspect); 2. *Pliogallus csarnotanus* n. sp. – Csarnóta 4. *carpometacarpus* (left side, dorsal aspect); 3. *Gallus gallus domesticus* (L. 1758) extant (left side, ventral aspect); 4. *Gallus gallus domesticus* (L. 1758) extant (left side, dorsal aspect); a – proximal edge of the *trochlea carpalis*; b – the end of the *processus extensorius*; c – the form of *processus pisiformis*; d – the form of *spatium intermetacarpalis*; e – the protruding end of *os metacarpale majus*

1. ábra 1. *Pliogallus csarnotanus* n. sp. – Csarnóta 4, kézközépcsont (baloldali, ventrális nézet); 2. *Pliogallus csarnotanus* n. sp. – Csarnóta 4, kézközépcsont (baloldali, dorzális nézet); 3. *Gallus gallus domesticus* (L. 1758) recens kézközépcsont (baloldali, ventrális nézet); 4. *Gallus gallus domesticus* (L. 1758) recens kézközépcsont (baloldali, dorzális nézet); a – *trochlea carpalis* proximális éle; b – a *processus extensorius* hegye; c – a *processus pisiformis* alakja; d – a *spatium intermetacarpalis* alakja; e – *os metacarpale majus* kiugró vége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– the *processus pisiformis* is more prominent *(Figure 1/1c)*;
– the *spatium intermetacarpalis* is narrower *(Figure 1/1d)*;
– the protruding end of *os metacarpale majus* is longer *(Figure 1/1e)*.

Description: robust skeletal part of the same size as the extant Domestic Hen (*Gallus gallus domesticus* L. 1758), differing in a few morphological features. This is presumably related to its better flight abilities. The character of the claw bone indicates clinging to wood.

The genus was established in 1939 by C. Gaillard on the basis of two *tarsometatarsus* from Csarnóta, Hungary, describing the species as *Pliogallus crassipes* and *P. kormosi*. In 1975, D. Jánossy examined the material in the collection of the University of Lyon and concluded that the bones of extant hen *tarsometatarsus* were treated with chemicals (Jánossy 1976b, Mlíkovskỳ 2002). In the early 2000s, L. Pongrácz re-excavated Csarnóta 4 and found some bird bones, which he gave to J. Kessler for identification. Among them were a *carpometacarpus* and some foot toes and claw bones. They show typical chicken characteristics, both morphologically and in size. They are yellowish brown in colour, which is quite typical of the fossil remains of the site. We do not take a position on Jánossy's opinion of the original material but accept the genus name with the new species name. The genus is not known from sites in Europe outside the Carpathian Basin.

***Palaeocryptonix* (Depéret, 1892)**

***Palaeocryptonix hungaricus* Jánossy, 1991 (syn: *Eurobambusicola turolicus* Zelenkov, 2016)** *(Figure 2/1–3)*

Site and era: Beremend 26 (Hungary). Pliocene (MN15)

Material: damaged *coracoideum*, distal fragment of *tibiotarsus* (Beremend 26)

Dimensions (in mm): *coracoideum*: B-ab. 23.50, C-5.11, E-2.89; *tibiotarsus*: E-2.37, F-5.13, G-5.41.

Figure 2. 1. *Palaeocryptonix hungaricus* (Jánossy, 1991) – Beremened 26, *coracoideum* (right side, dorsal surface); 2. *Palaeocryptonix hungaricus* (Jánossy, 1991) – Beremend 26. *coracoideum* (right side, medial aspect); 3. *Palaeocryptonix hungaricus* (Jánossy,1991) – Csarnóta 2. *tibiotarsus* (fragment distal, right side, cranial aspect); 4. Perdicidae indet. – Csarnóta 2. *coracoideum* (fragment proximal, right side, dorsal surface); 5. *Pliogallus csarnotanus* n. sp. – Csarnóta 4. *carpometacarpus* (left side, ventral aspect); 6. *Pliogallus csarnotanus* n. sp. – Csarnóta 4. *phalanx ungualis* (lateral aspect); 7. *Porzana* sp. – Csarnóta 2. *humerus* (fragment proximal, right side, caudal surface); 8. *Porzana* sp. – Csarnóta 2. *humerus* (fragment proximal, right side, cranial surface); 9. *Galinulla* sp. – Csarnóta 2. *carpometacarpus* (fragment distal, right side, ventral aspect); 10–12. *Glaucidium baranensis* (Kessler, 2010) – Csarnóta 2. *phalanges ungualis* (lateral aspect)

2. ábra 1. *Palaeocryptonix hungaricus* (Jánossy, 1991) – Beremened 26. hollócsőrcsont (jobboldali, dorzális nézet); 2. *Palaeocryptonix hungaricus* (Jánossy, 1991) – Beremend 26. hollócsőrcsont (jobboldali, mediális nézet); 3. *Palaeocryptonix hungaricus* (Jánossy, 1991) – Csarnóta 2. lábszárcsont (jobboldali, disztális töredék, dorzális nézet); 4. Perdicidae indet. – Csarnóta 2. hollócsőrcsont (jobboldali, proximális töredék, mediális nézet); 5. *Pliogallus csarnotanus* n. sp. – Csarnóta 4. kézközépcsont (baloldali, ventrális nézet); 6. *Pliogallus csarnotanus* n. sp. – Csarnóta 4. karomcsont (oldalnézet); 7. *Porzana* sp. – Csarnóta 2. felkarcsont (jobboldali, proximális töredék, caudális nézet); 8. *Porzana* sp. – Csarnóta 2. felkarcsont (jobboldali, proximális töredék, craniális nézet); 9. *Galinulla* sp. – Csarnóta 2. hollócsőrcsont (jobboldali, disztális töredék, ventrális nézet); 10–12. *Glaucidium baranensis* (Kessler, 2010) – Csarnóta 2. karomcsontok (oldalnézet)

A species of larger quail-sized hen, quite common in the Late Miocene and Early Pliocene sites of the Carpathian Basin. The only almost complete skeleton in Hungary was also provided by this species in the Upper Miocene from Northern Hungary (Rátka, in the Encsi private museum from Tállya). Mlíkovskỳ assigns the genus and the species to *Alectoris donnezani* (Depéret, 1892), while in 2016, N. Zelenkov establishes a new genus and species *Eurobambusicola turolicus* based on material in the collection of the Museum of the HIGG. For our part, both attempts are met with scepticism (Jánossy 1991, Mlíkovskỳ 2002, Kessler 2009b, 2013a, Zelenkov 2016).

Subfam. Perdicinae (Horsfield, 1821)

Perdicinae gen. *et* sp. indet. *(Figure 2/4)*

Site and era: Csarnóta 2 (Hungary), Pliocene (MN15)

Material: proximal fragment of *coracoideum*

Dimension (in mm): C-ab. 3.10

Description: the very fragmentary *coracoidum* remains undoubtedly belong to the Phasianidae family, but nothing more can be determined. It is probably from a quail-sized species.

Rallidae (Vigors, 1825)

***Gallinula* (Brisson, 1860)**

***Gallinula* sp.** *(Figure 2/9)*

Site and era: Csarnóta 2 (Hungary), Pliocene (MN15)

Material: distal fragment of *carpometacarpus*

Dimensions (in mm): E-4.69, E1-2.64, F-3.60, G-3.16

The fragmentary material does not allow a species identification, as only one fossil species from the European Neogene is known in the literature: the species *Gallinula balcanica* Boev, 1999 from the Late Pliocene of Bulgaria (Varshets, MN17), identified from an *ulna* (Boev 1999, Mlíkovskỳ 2002). The presence of the genus in Csarnóta is of considerable value.

***Porzana* (Vieillot, 1826)**

***Porzana* sp.** *(Figure 2/7–8)*

Site and era: Csarnóta 2 (Hungary), Pliocene (MN15)

Material: proximal fragment of *humerus*

Dimension (in mm): C-5.53

Its features suggest the crakes, and its size the smaller species of the genus. Crakes are very rarely found in the European Neogene. Three of the oldest species are known from the Middle and the Late Miocene and the Early Pliocene in Hungary: *Porzana matraensis* Kessler, 2009; *P. kretzoii* Kessler, 2009; *P. estramosi* Jánossy, 1979 (from Mátraszőlős, Polgárdi and Osztramos). From European sites outside the Carpathian Basin, species of the genus have been reported only from the Late Pliocene – Early Pleistocene sites in Spain (Mallorca), Bulgaria (Varshets) and Czech Republic (Stránská skála) (Jánossy 1979b, Mlíkovskỳ 2002, Kessler 2009b).

Ord. Charadriiformes (Huxley, 1867)
Charadriiformes fam, gen. *et* sp. indet. *(Figure 3/9)*
Site and era: Csarnóta 2 (Hungary), Pliocene (MN15)
Material: proximal fragment of *humerus*
Dimension (in mm): C-6.20

A remain from a small species (*Charadrius – Calidris* size), which is compatible with the order but not suitable for a closer taxonomic classification because of its worn markings.

Representatives of this order are not very common in the European Neogene. From the Carpathian Basin, *Gallinago veterior* Jánossy, 1979 (Polgárdi, MN13; Csarnóta 2, MN15); *Tringa* sp. (Polgárdi, MN13; Beremend 26, MN15); *Scolopax baranensis* Jánossy, 1979 (Csarnóta 2, MN15); *Charadrius lambrechti* Kessler, 2009 (Polgárdi, MN13); *Calidris janossyi* Kessler, 2009 (Polgárdi, MN13); *Chlidonias* sp. (Beremend 26, MN15) are known (Jánossy 1979a, Mlíkovskỳ 2002, Kessler 2009b).

As the *humerus* is not included in the listed finds, no comparison is possible.

Ord. Columbiformes (Latham, 1790)
Fam. Columbidae (Illiger, 1811)
Columbidae sp. indet. *(Figure 3/1)*
Site and era: Csarnóta 2 (Hungary), Pliocene (MN15)
Material: distal fragment of *humerus*
Dimensions (in mm): F-6.67; G-4.37

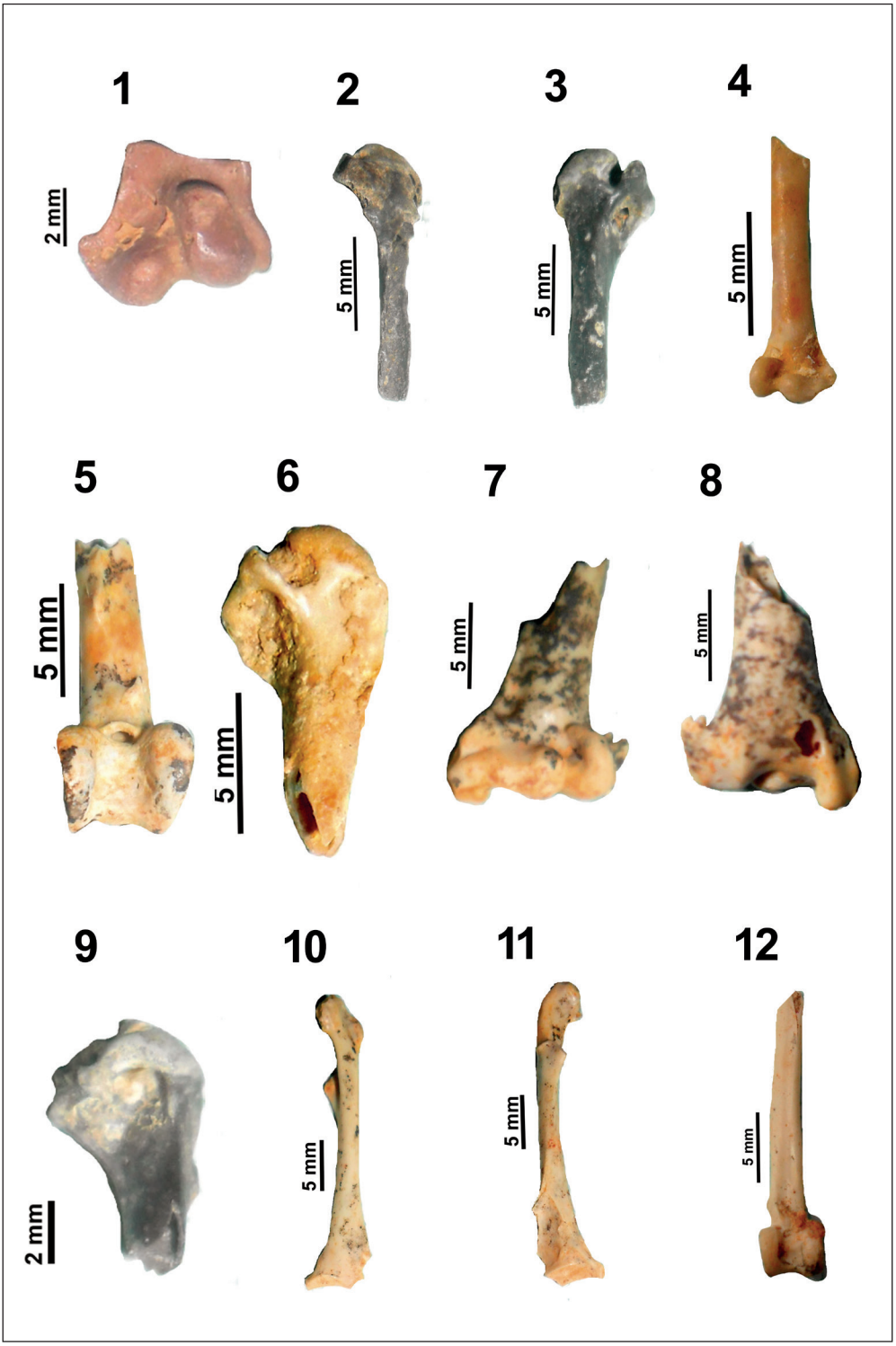
A remain from a small (dove-sized) species of the family.

The pigeons are known only at the level of the recurrent genus from the Neogene of Europe: *Columba* sp. from Bulgaria (Varshets, M17) and from Croatia (Sandalja, MN17) (Mlíkovskỳ 2002). From the Carpathian Basin, it has been identified to the family level from the Middle Miocene of Mátraszőlős 2 (MN7–8) on the basis of a distal fragment of a *tibiotarsus* (Kessler & Hír 2012a).

Ord. Strigiformes (Wagler, 1830)
Fam. Strigidae (Vigors, 1825)
***Glaucidium* (Boie, 1826)**
***Glaucidium baranensis* Kessler, 2010** *(Figure 2/10–12)*
Site and era: Csarnóta 2 (Hungary), Pliocene (MN15)
Material: 3 *phalanx ungualis*
Dimensions (in mm): A- 6.65, 7.99 and 9.52; C-3.35, 3.50 and 4.35

A species of owl that largely matches the size and character of the extant European Pygmy Owl, which may have been the ancestor of the extant species in Europe and thus, in the Carpathian Basin. From the Early Pliocene of Csarnóta 2 and Beremend 26, the distal end of a *humerus*, the sternal fragment of a *coracoideum* (Csarnóta 2, MN15) and the proximal half of a *humerus* (Beremend 26, MN15) have been described (Kessler 2010).

Considering that the claw bones are from a small owl, it is reasonable to assume that they are the remains of fossil Pygmy Owls (*Glaucidium passerinum* (L.1758)) described from the same site.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Jánossy (1974) reports another find of *Glaucidium* sp. from the Late Pliocene of Poland (Rebielice, MN16), otherwise only the extant species is known in fossil material from the Early Pleistocene onwards. The genus is known from only one Late Pliocene site in Florida (USA) (Inglis, Cytrus County, Florida) with one described species: *G. explorator* Emslie, 1998, with numerous skeletal parts but only a fragmentary proximal *humerus*, corresponding to the size of the extant *G. brasilianum*. A *tibiotarsus* is also reported from the same material, with dimensions similar to those of extant *G. minutissimum* but defined only to genus level. An extinct species described from the Pleistocene of the Bahamas as *G. dickinsoni* Brodkorb, 1959, by a *tibiotarsus*, was subsequently (Olson 1985) synonymised with the extant species *Speotyto cunicularia* (Molina, 1782). The ancestor of the Pygmy Owl was already present in the Eocene. It has been described from the Middle Eocene of Germany (Geiseltal and Messel) from several *humerus* specimens under the name *Eoglaucidium pallas* Fischer, 1987 (Fischer 1987, Mlíkovskỳ 2002).

Ord. Coraciiformes (Forbes, 1884)
Fam. Meropidae (Vigors, 1825)
***Merops* (Linnaeus, 1758)**
***Merops* sp.** *(Figure 3/6)*
Site and era: Csarnóta 2 (Hungary), Pliocene (MN15)
Material: proximal fragment of *humerus*
Dimensions (in mm): C-5.55; E-1.64

Figure 3. 1. Columbidae gen. *et* sp. indet. – Csarnóta 2. *humerus* (fragment distal, left side, caudal surface); 2. Coraciiformes fam, gen. *et* sp. indet. – Csarnóta 2. *humerus* (fragment proximal, left side, caudal surface); 3. Coraciiformes fam, gen. *et* sp. indet. – Csarnóta 2. *humerus* (fragment proximal, left side, cranial surface); 4. Coraciiformes fam, gen. *et* sp. indet. – Csarnóta 2. *ulna* (fragment distal, left side, dorsal aspect); 5. Coraciiformes fam, gen. *et* sp. indet. – Csarnóta 2. *tibiotarsus* (fragment distal, right side, cranial aspect); 6. Meropidae gen. *et* sp. indet. – Csarnóta 2. *humerus* (fragment proximal, right side, caudal surface); 7. *Nucifraga* sp. – Beremend 26. *humerus* (fragment distal, left side, caudal surface); 8. *Nucifraga* sp. – Beremend 26. *humerus* (fragment distal, left side, cranial surface); 9. Charadriiformes fam, gen. *et* sp. indet. – Csarnóta 2. *humerus* (fragment proximal, right side, caudal surface); 10 *Garrulus* sp. – Beremend 26. *coracoideum* (right side, medial aspect); 11. *Garrulus* sp. – Beremend 26. *coracoideum* (right side, dorsal surface); 12. *Garrulus* sp. – Csarnóta 2. *tibiotarsus* (distal fragment, right side, cranial aspect)

3. ábra 1. Columbidae gen. *et* sp. indet. – Csarnóta 2. felkarcsont (baloldali, disztális töredék, caudális nézet); 2. Coraciiformes fam, gen. *et* sp. indet. – Csarnóta 2. felkarcsont (baloldali, proximális töredék, caudális nézet); 3. Coraciiformes fam, gen. *et* sp. indet. – Csarnóta 2. felkarcsont (baloldali, proximális töredék, craniális nézet); 4. Coraciiformes fam, gen. *et* sp. indet. – Csarnóta 2. singcsont (baloldali, disztális töredék, dorzális nézet); 5. Coraciiformes fam, gen. *et* sp. indet. – Csarnóta 2. lábszárcsont (jobboldali, disztális töredék, craniális nézet); 6. Meropidae gen. *et* sp. indet. – Csarnóta 2. felkarcsont (jobboldali, proximális töredék, caudális nézet); 7. *Nucifraga* sp. – Beremend 26. felkarcsont (baloldali, disztális töredék, caudális nézet); 8. *Nucifraga* sp. – Beremend 26. felkarcsont (baloldali, disztális töredék, craniális nézet); 9. Charadriiformes fam, gen. *et* sp. indet. – Csarnóta 2. felkarcsont (jobboldali, disztális töredék, caudális nézet); 10. *Garrulus* sp. – Beremend 26. hollócsőrcsont (jobboldali, mediális nézet); 11. *Garrulus* sp. – Beremend 26. hollócsőrcsont (jobboldali, dorzális nézet); 12. *Garrulus* sp. – Csarnóta 2. lábszárcsont (jobboldali, disztális töredék, craniális nézet)

The genus is not known from the Tertiary period of Europe. From the Carpathian Basin, it is known only in the Middle Miocene of Croatia (Radoboj, MN7) (von Meyer 1865, Mlíkovskỳ 1997); in the Late Miocene of Hungary (Rudabánya, MN9) (Kessler 2010a) and in the Early Pleistocene of Romania (Betfia 9) (Gál 2002). In addition, it is known from Europe only from the Late Pleistocene of France (Combe Grenal, Salpétre a Pompignan, Q4/I) (Mourer-Chauviré 1975, Tyrberg 1998).

Coraciiformes fam, gen *et* sp. indet. *(Figure 3/2–5)*
Site and era: Csarnóta 2 (Hungary), Pliocene (MN15)
Material: proximal and distal fragment of *humerus*; distal fragment of *tibiotarsus*
Dimensions (in mm): *humerus*: C-5.18; E-1.77 and 1.80; F-3.20; *tibiotarsus*: E-1.94, F-3.23, G-2.95

Because of their conservation status, only their membership of the order can be established.

The distal fragment of *humerus* is a bone from a species with typical Coraciiform features, but differing in both size and morphology from species of known European families.

Ord. Passeriformes (Linnaeus, 1758)
Fam. Corvidae (Vigors, 1825)
***Garrulus* (Vieillot, 1816)**
***Garrulus* sp.** *(Figure 3/10–12)*
Site and era: Beremend 26 (Hungary), Pliocene (MN15)
Material: damaged distal fragment of *coracoideum*, distal fragment of *tibiotarsus*
Dimensions (in mm): *coracoideum*: B-about 28.08, C-5.50, E-1.75; *tibiotarsus*: E-5.48, F-5.40, G-5.06

The extant species of jay (*Garrulus glandarius* (L. 1758)) and the earliest record of the genus is from the Late Pliocene of France (Mountoussé) (Clot *et al*. 1976a, 1976b). It is much younger than the Beremend find. The other dates are from the Pleistocene (UK, Austria, Czech Republic, Croatia, Romania, Germany, etc.) (Tyrberg 1998, Mlíkovskỳ 2002, Kessler 2013b, 2020).

***Nucifraga* (Vieillot, 1816)**
***Nucifraga* sp.** *(Figure 3/7–8)*
Site and era: Beremend 26 (Hungary), Pliocene (MN15)
Material: distal fragment of *humerus*
Dimensions (in mm): F-9.06, G-4.34

The earliest European records of the modern species (*Nucifraga caryocatactes* (L. 1758)) is from the Late Pliocene of Bulgaria (Varshets) and of Spain (S'Onix in Mallorca) and from the Early Pleistocene of Czech Republic (Stránská skála) (Soondar *et al*. 1995, Mlíkovskỳ 1995, Boev 2000, Kessler 2020).

Fam. Alaudidae (Vigors, 1825)
Alaudidae gen. *et* sp. indet. *(Figure 4/1–3)*
Site and era: Csarnóta 2 (Hungary), Pliocene (MN15)
Material: proximal fragment of *coracoidum*; 5 distal fragment of *ulna*; 2 distal fragment of *tibiotarsus*; distal fragment of *tarsometatarsus.*

Dimensions (in mm): *coracoideum*: C-2,50, D-2.50, E-2.00; *ulna*: E-1.40–2.00, F-2.20 and 3.50; *tibiotarsus*: E-1.70–1.90; *tarsometatarsus*: E-1.70, F-2.10

The family is very well represented by fossil species in the Neogene and Quaternary of the Carpathian Basin: *Galerida cserhatensis* Kessler *et* Hír, 2012 (Litke, MN5); *Praealauda hevesensis* Kessler *et* Hír, 2012 (Felsőtárkány, MN7–8); *Lullula neogradensis* Kessler *et* Hír, 2012 (Mátraszőlős 1, MN7–8); *Alauda tivadari* Kessler, 2013; *Lullula minor* Kessler, 2013; *Calandrella gali* Kessler, 2013 (Polgárdi, MN13); *Lullula parva* Kessler, 2013; *Galerida pannonica* Kessler, 2013 (Csarnóta 2, MN15); *Lullula minuscula* Kessler, 2013; *Lullula parva* Kessler, 2013; *Galerida pannonica* Kessler, 2013; *Melanocorypha minor* Kessler, 2013 (Beremend 26, MN15, Kessler 2020).

From areas outside the Carpathian Basin: the *Galerida* genus was reported outside the Carpathian Basin from the Upper Pliocene of Bulgaria (Varshets, MN17) as *Galerida bulgarica* Boev, 2012 (Boev 2012), the *Melanocorypha* genus was reported from the Upper Miocene and Upper Pliocene of Bulgaria: *Melanocorypha serdicensis* Boev, 2012 (Hrabarsko) and *Melanocorypha donchevi* Boev, 2012 (Varshets) (Boev 2012), the *Alauda* genus was reported from the Upper Pliocene of Bulgaria (Varshets, MN17) as *Alauda xerarvensis* Boev, 2012 (Boev 1996, 2012), the *Lululla* genus was reported from the Late Miocene of Bulgaria (Chrabarsko) as *Lullula* sp. (Boev 2000), and from the Late Pliocene-Early Pleistocene as *Lullula slivnicensis* Boev, 2012 (Slivnica, MN17) and *L. balcanica* Boev, 2012 (Varshets, MN18) based on other skeletal types (Boev 1996, 2012), the *Eremophila* genus was reported from the Late Miocene of Bulgaria Chrabarsko as *Lullula* sp. (Boev 2000), and from the Late Pliocene – Early Pleistocene as *Lullula slivnicensis* Boev, 2012 (Slivnica, MN17) and *L. balcanica* Boev, 2012 (Varshets, MN18) based on other skeletal types (Boev 1996, 2012). Several Pliocene finds are reported as extant species from the Czech Republic, France, Spain and Russia (Kessler 2020).

Fam. Hirundinidae (Vigors, 1825)

Hirundinidae gen. *et* sp. indet. *(Figure 4/4)*

Site and era: MN15: Csarnóta 2 (Hungary)

Material: distal, fragment of *ulna*; proximal fragment of *carpometacarpus*; *phalanx ungualis*

Dimensions (in mm): *ulna*: E-2.06, F-3.36, G-2.56; *carpometacarpus*: C-4.32; *phalanx ungualis*: A-3.44

The earliest described representatives of this family from the Carpathian Basin are from the late Miocene of Polgárdi (MN13): *Hirundo gracilis* Kessler, 2013; *Delichon polgardiensis* Kessler, 2013; *Riparia minor* Kessler, 2013; and from the Pliocene of Csarnóta 2: *Hirundo major* Kessler, 2013; *Delichon pusillus* Kessler, 2013; and from Beremend 26; *Delichon major* Kessler, 2013 (Kessler 2020).

From the area outside the Carpathian Basin they are known only from the Early Pleistocene through modern species.

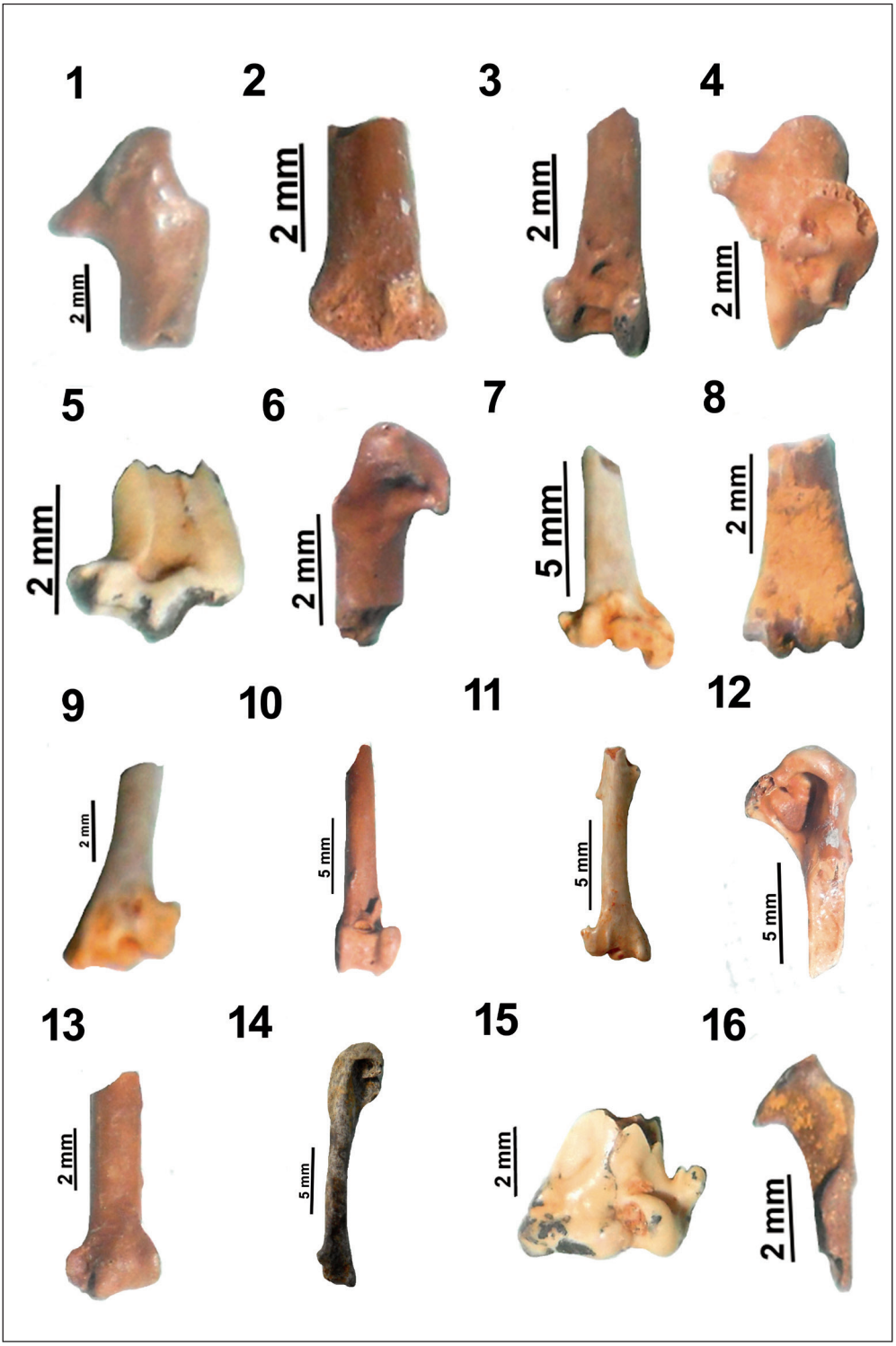
Fam. Panuridae (Des Murs, 1860)

Panuridae gen. *et* sp. indet. *(Figure 4/5)*

Site and era: MN15: Csarnóta 2 (Hungary)

Material: distal fragment of *ulna*

Dimension (in mm): F-3.41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It is the only fossil representative of the family in Europe. Modern species from European sites outside the Carpathian Basin have been reported from the Late Pleistocene of Germany (Scythenloch-Bayern) (Tyrberg 1998).

Fam. Paridae (Vogors, 1825)

Paridae gen. *et* sp. indet.

Site and era: MN15: Csarnóta 2 (Hungary)

Material: distal fragment of *ulna*

Dimension (in mm): F-2.00

From the Carpathian Basin, the family is earliest known from the Late Miocene of Polgárdi (MN13) as *Aegithalos gaspariki* Kessler, 2013; and from the Pliocene (MN15) from Csarnóta 2 as *Aegithalos congruis* Kessler, 2013; *Parus robustus* Kessler, 2013; and *Parus parvulus* Kessler, 2013; and from Beremend 26 as *Parus medius* Kessler, 2013 (Kessler 2020).

Figure 4. 1. Alaudidae gen. *et* sp. indet. – Csarnóta 2. *coracoideum* (fragment proximal, left side, medial aspect); 2. Alaudidae gen. *et* sp. indet. – Csarnóta 2. *ulna* (fragment distal, left side, dorsal aspect); 3. Alaudidae gen. *et* sp. indet. – Csarnóta 2. *tibiotarsus* (fragment distal, left side, cranial aspect); 4. Hirundinidae gen. *et* sp. indet – Csarnóta 2. *carpometacarpus* (fragment, proximal, right side, ventral aspect); 5. Panuridae gen. *et* sp. indet. – Csarnóta 2. *ulna* (fragment distal, right side, dorsal aspect); 6. Muscicapidae gen. *et* sp. indet. – Csarnóta 2. *coracoideum* (fragment proximal, right side, dorsal aspect); 7. Muscicapidae gen. *et* sp. indet. – Csarnóta 2. *humerus* (fragment distal, right side, cranial surface); 8. Muscicapidae gen. *et* sp. indet. – Csarnóta 2. *tarsometatarsus* (fragment distal, left side, dorsal aspect); 9. Turdidae gen. *et* sp. indet. – Csarnóta 2. *humerus* (fragment distal, left side, cranial surface); 10. Turdidae gen. *et* sp. indet. – Csarnóta 2. *tibiotarsus* (fragment distal, right side, cranial surface); 11. Sylviidae gen. *et* sp. indet. – Csarnóta 2. *humerus* (fragment distal, right side, cranial surface); 12. Motacillidae gen. *et* sp. indet. – Csarnóta 2. *humerus* (fragment proximal, right side, caudal surface); 13. Motacillidae gen. *et* sp. indet. – Csarnóta 2. *ulna* (fragment distal, right side, dorsal aspect); 14. Sittidae gen. *et* sp. indet. – Csarnóta 2. *humerus* (left side, caudal surface); 15. Laniidae gen. *et* sp. indet. – Csarnóta 2. *humerus* (fragment distal, left side, cranial surface); 16. Fringillidae gen. *et* sp. indet. – Csarnóta 2. *coracoideum* (fragment proximal, rights ide, dorsal surface)

4. ábra 1. Alaudidae gen. *et* sp. indet. – Csarnóta 2. hollócsőrcsont (baloldali, proximális töredék, dorzális nézet); 2. Alaudidae gen. *et* sp. indet. – Csarnóta 2. singcsont (baloldali, disztális töredék, dorzális nézet); 3. Alaudidae gen. *et* sp. indet. – Csarnóta 2. singcsont (baloldali, disztális töredék, craniális nézet); 4. Hirundinidae gen. *et* sp. indet – Csarnóta 2. kézközépcsont (jobboldali, proximális töredék, ventrális nézet); 5. Panuridae gen. *et* sp. indet. – Csarnóta 2, singcsont (jobboldali, disztális töredék, dorzális nézet); 6. Muscicapidae gen. *et* sp. indet. – Csarnóta 2. hollócsőrcsont (jobboldali, proximális töredék, dorzális nézet); 7. Muscicapidae gen. *et* sp. indet. – Csarnóta 2. felkarcsont (jobboldali, disztális töredék, craniális nézet); 8. Muscicapidae gen. *et* sp. indet. – Csarnóta 2. csüd (jobboldali, disztális töredék, dorzális nézet); 9. Turdidae gen. *et* sp. indet. – Csarnóta 2. felkarcsont (baloldali, disztális töredék, craniális nézet); 10. Turdidae gen. *et* sp. indet. – Csarnóta 2. lábszárcsont (jobboldali, disztális töredék, craniális nézet); 11. Sylviidae gen. *et* sp. indet. – Csarnóta 2. felkarcsont (jobboldali, disztális töredék, craniális nézet); 12. Motacillidae gen. *et* sp. indet. – Csarnóta 2. felkarcsont (jobboldali, proximális töredék, caudális nézet); 13. Motacillidae gen. *et* sp. indet. – Csarnóta 2. singcsont (jobboldali, disztális töredék, dorzális nézet); 14. Sittidae gen. *et* sp. indet. – Csarnóta 2. felkarcsont (jobboldali, caudális nézet); 15. Laniidae gen. *et* sp. indet. – Csarnóta 2. felkarcsont (baloldali, disztális töredék, caudális nézet); 16. Fringillidae gen. *et* sp. indet. – Csarnóta 2. hollócsőrcsont (jobboldali, proximális töredék, dorzális nézet)

The family is known outside the Carpathian Basin only from the Late Pliocene of Bulgaria (Varshets, MN17) as *Parus* sp. (Boev 2000, Kessler 2020).

Fam. Sittidae (Bonaparte, 1831)

Sittidae gen. *et* sp. indet. *(Figure 4/14)*

Site and era: MN15: Csarnóta 2 (Hungary)

Material: damaged distal of *humerus*

Dimensions (in mm): A-ap.19.30, C-4.08, E-1.35

From the Carpathian Basin, the representative of the family is known only from the Late Miocene of Polgárdi (MN13), as *Sitta gracilis* Kessler, 2013; then from the Pliocene of Csarnóta 2 (MN15) as *Sitta pusilla* Kessler, 2013; and the modern species from several Pleistocene sites (Kessler 2020).

The family is known outside the Carpathian Basin only from the Early Pliocene (MN16) of Poland (Rebielice Królowskie I.) as *Sitta* sp. (Jánossy 1974) and from the Late Pliocene of Bulgaria (Varshets, MN17) (Boev 1996, 2000, Kessler 2020), and the modern species as *Sitta europaea* from the Pleistocene.

Fam. Certhiidae (Vigors, 1825)

Certhiidae gen. *et* sp. indet.

Site and era: MN15: Csarnóta 2 (Hungary)

Material: distal fragment of *tarsometatarsus*

Dimensions (in mm): E-1.00, F-1.70

On the distal epiphysis of the third finger trochlea (*trochlea metatarsi* III) of the snout is uniquely deep, which is unique to this genus.

The genus and the family are known from the late Miocene in the Carpathian Basin, from which *Certhia janossyi* Kessler *et* Hír, 2012 was described from Rudabánya (MN9), while *Certhia immensa* Kessler, 2012 was described from Pliocene of Csarnóta 2 (Kessler 2020). The modern species is reported from the Pleistocene in Europe.

Fam. Muscicapidae (Vigors, 1825)

Muscicapidae gen. *et* sp. indet. *(Figure 4/6–8)*

Site and era: MN15: Csarnóta 2 (Hungary)

Material: proximal fragment of *coracoideum*, distal fragment of *humerus*, distal fragment of *ulna*, distal fragment of *tarsometatarsus*, 4 *phalanx ungualis*

Dimensions (in mm): *coracoideum*: C-2.40, D-2.00, E-0.80; *humerus*: E-1.30, F-3.80; *ulna*: F-3.21; *tarsometatarsus*: E-1.20, F-2.50; *phalanx ungualis*: A-4.25 and 5.28

Their earliest representatives are known from the Early Miocene from sites in the Carpathian Basin. Thus, the *Luscinia praeluscinia* Kessler *et* Hír, 2012 (Litke, MN5), *Luscinia jurcsaki* Kessler *et* Venczel, 2011 (Kőalja/Subpiatra, Romania, MN6), *Muscicapa leganyii* Kessler *et* Hír, 2012 (Felsőtárkány, Felnémet, MN7–8), *Erithacus horusitskyi* Kessler *et* Hír, 2012 (Mátraszőlős 1, MN7–8), then a *Muscicapa miklosi* Kessler, 2013; *Luscinia denesi* Kessler, 2013; *Saxicola lambrechti* Kessler, 2013; *Oenanthe kormosi* Kessler, 2013 (Polgárdi, MN13), *Muscicapa petényii* Kessler, 2013; *Erithacus minor* Kessler, 2013; *Luscinia pliocaenica* Kessler, 2013; *Saxicola magna* Kessler, 2013; *Monticola pongraczi* Kessler, 2013; *Phoenicurus baranensis* Kessler, 2013 (Beremend 26, MN15); *Saxicola baranensis* Kessler, 2013; *S. parva* Kessler, 2013; *Phoenicurus*

erikai Kessler, 2013; *Oenanthe pongraczi* Kessler, 2013 (Csarnóta 2, MN15) (Kessler 2020).

The fossil representatives of the family are not known outside the Carpathian Basin. The modern species in Europa is known only from Early Pleistocene (Austria, Bulgaria, Croatia, Cyprus, Czech Republic, France, Germany, Italy, Poland, Spain (Tyrberg 1998)).

Fam. Turdidae (Rafinesque, 1815)

Turdidae gen. *et* sp. indet. *(Figure 4/9–10)*

Site and era: MN15: Beremend 26, Csarnóta 2 (Hungary)

Material: Beremend: distal fragment of *humerus*; distal fragment of *tibiotarsus*; Csarnóta: distal fragment of *tibiotarsus*; 3 *phalanx ungualis*

Dimensions (in mm): Beremend: *humerus*: F-6.40, G-2.66; *tibiotarsus*: E-1.96, F-4.05, G-3.86; Csarnóta 2: *tibiotarsus*: E-1.67, F-3.57, G-3.48; *phalanx ungualis*: A-6.10 and 7.60, C-3.15 and 3.54.

The earliest Carpathian Basin thrush finds date from the Middle Miocene, such as the: *Turdicus matraensis* Kessler *et* Hír, 2012 (Mátraszőlős 3, MN7–8), then a *Turdicus pannonicus* Kessler, 2013; *Turdus miocaenicus* Kessler, 2013 (Polgárdi, MN13); *Turdus major* Kessler, 2013; *T. medius* Kessler, 2013; *T. praeminor* Kessler, 2019 (Csarnóta, MN15), *Turdicus tenuis* Kretzoi, 1962 (Betfia-Romania, Early Pleistocene) (Kessler 2020).

The family is known outside of the Carpathian Basin from the Middle Miocene of Romania (Credinta, MN8) as *Turdus* sp. (Gál & Kessler 2006), while from the Late Pliocene from of Poland (Rebielice Królowskie I.), (Jánossy 1974), Bulgaria (Varshets), (Boev 1996, 2000), Croatia (Sandalja I.) (V. Malez-Bacic 1979, Kessler 2020).

Fam. Sylviidae (Vigors, 1825)

Sylviidae gen. *et* sp. indet. *(Figure 4/11)*

Site and era: MN15: Beremend 26 (Hungary).

Material: Beremend 26: damaged distal fragment of *humerus*; Csarnóta 2: distal fragment of *ulna*

Dimensions (in mm): Beremend: *humerus*: A-ap. 15.20, E-1.62, F-3.81, G-1.78 and F-3.15, G-1.72; Csarnóta 2: *ulna*: E-2.06, F-3.36, G-2.56

The family is richly represented by fossil finds in the Neogene of the Carpathian Basin. Earliest reports are: *Sylvia* sp. (Kőalja/Subpiatra, Romania, MN6), *Phylloscopus miocaenicus* Kessler *et* Hír, 2012 (Felsőtárkány, MN7–8), *Acrocephalus major* Kessler, 2013; *Acrocephalus minor* Kessler, 2013; *Cettia janossyi* Kessler, 2013; *Hippolais veterior* Kessler, 2013; *Sylvia intermedia* Kessler, 2013; *Locustella kordosi* Kessler, 2013; *Phylloscopus venczeli* Kessler, 2013 (Polgárdi, MN13); *Acrocephalus kretzoii* Kessler, 2013; *Acrocephalus kordosi* Kessler, 2013; *Cettia kalmani* Kessler, 2013; *Sylvia pusilla* Kessler, 2013; *Locustella janossyi* Kessler, 2013; *Phylloscopus pliocaenicus* Kessler, 2013 (Csarnóta 2, MN15); *Sylvia pusilla* Kessler, 2013; *Locustella janossyi* Kessler, 2013; *Locustella magna* Kessler, 2013; *Regulus plioceanicus* Kessler, 2013 (Beremend 26, MN15) (Kessler 2020).

Outside of Carpathian Basin the family is known from the Late Pliocene from Bulgaria (Varshets, MN17) as *Phylloscopus* sp. (Boev 1996, 2000); and as *Regulus bulgaricus* Boev, 1999 (Boev 1999). The modern species is known in Europa from Early Pleistocene (Kessler 2020).

Fam. Motacillidae (Vigors, 1825)

Motacillidae gen. *et* sp. indet. *(Figure 4/12–13)*

Site and era: MN15: Csarnóta 2 (Hungary).

Material: 2 proximal and distal fragment of *humerus*, proximal fragment of *carpometacarpus*, *phalanx ungualis*

Dimensions (in mm): *humerus*: C-5.48, E-2.00, and E-2.14, F-5.47, G-2.48; *carpometacarpus*: C-3.75, E1-1.75; *phalanx ungualis*: A-4.64, C-2.24

The earliest presence of species of the family in the Carpathian Basin is known from the Middle Miocene, as: *Anthus antecedens* Kessler *et* Hír, 2012 (Felsőtárkány, MN7–8); then as: *Anthus híri* Kessler, 2013; *Motacilla intermedia* Kessler, 2013; (Polgárdi, MN13), *Anthus baranensis* Kessler, 2013 (Csarnóta 2, MN15); *Motacilla minor* Kessler, 2013; *M. robusta* Kessler, 2013a, 2013b (Beremend 26, MN15) (Kessler 2020).

Outside the Carpathian Basin, the *Anthus* genus is known from the Upper Pliocene of Poland (Rebielice Królowskie 1, MN16) (Jánossy 1974); Bulgaria (Varshets, MN16, MN17) (Boev 1996, 2000); and the *Motacilla* genus was described from the Upper Pliocene of Bulgaria (Varshets, MN17) by Boev (1996, 2000, Kessler 2020).

Fam. Prunellidae (Richmond, 1907)

Prunellidae gen. *et* sp. indet.

Site and era: MN15: Csarnóta 2 (Hungary).

Material: *phalanx ungualis*

Dimension (in mm): A-4.60

Prunella freudenthali Kessler, 2013 is known from the late Miocene of Polgárdi (MN13); while *Prunella kormosi* Kessler, 2013 is known from the Pliocene of Csarnóta 2 (MN15). The genus is not known outside the Carpathian Basin with fossil species (Kessler 2020).

Fam. Laniidae (Swainson, 1834)

Laniidae gen. *et* sp. indet. *(Figure 4/15)*

Site and era: MN15: Csarnóta 2 (Hungary).

Material: distal fragment of *humerus*, *phalanx ungualis*

Dimensions (in mm): *humerus*: F-4.00; *phalanx ungualis*: A-5.24, C-1.64

The earliest Carpathian Basin record of the family is from the Early Miocene as *Lanius* sp. (Kőalja/Subpiatra, Romania, MN6), then from the Middle Miocene as *Lanius schreteri* Kessler *et* Hír, 2012 (Felsőtárkány, MN7–8), from the Late Miocene as *Lanius capeki* Kessler, 2013 (Polgárdi, MN13), from the Pliocene as *Lanius hungaricus* Kessler, 2013 (Csarnóta 2, MN15); *Lanius major* Kessler, 2013; *L. intermedius* Kessler, 2013 (Beremend 26, MN15); (Kessler 2020).

The family and genus are known outside the Carpathian Basin only from the Late Pliocene of Bulgaria (Varshets, MN17) as *Lanius* sp. (Boev 1996, 2000, Kessler 2020).

Fam. Sturnidae (Vigors, 1825)

Sturnidae gen. *et* sp. indet.

Site and era: MN15: Csarnóta 2 (Hungary).

Material: *phalanx ungualis*

Dimensions (in mm): A-8.27, C-3.47

The family appears first in the Early Miocene in the Carpathian Basin: *Sturnus kretzoii* Kessler *et* Hír, 2012 (Rudabánya, MN9), then in the Late Miocene: *Sturnus brevis* Kessler, 2013 (Polgárdi, MN13), and in the Pliocene: *Sturnus pliocaenicus* Kessler, 2013; *Sturnus baranensis* Kessler, 2013 (Beremend 26, MN15) (Kessler 2020).

The family and genus were described outside the Carpathian Basin as *Sturnus* sp. from the Late-Pliocene and the Early-Pleistocene localities of Bulgaria (Varshets, MN17–MQ1) by Boev (1996, 2000), England (West Runton and Boxgrove, Harrison 1979, Harrison & Stewart 1999) and Czech Republic (Prezletice, Čapek 1917, Jánossy 1983, 1992, Kessler 2020).

Fam. Fringillidae (Leach, 1820)

Fringillidae gen. *et* sp. indet. *(Figure 4/16)*

Site and era: MN15: Csarnóta 2 (Hungary)

Material: 2 proximal fragment of *coracoideum*; *phalanx ungualis*

Dimensions (in mm): *coracoideum*: C-3.10 and 3.50, D-2.70–2.80, E-1.20; *phalanx ungualis*: A-4.59, C-2.80

The family is very well represented by fossil remains in the Carpathian Basin. From the earliest Miocene as: *Carduelis kretzoii* Kessler, 2013; *C. lambrechti* Kessler, 2013; *Pyrrhula gali* Kessler, 2013; *Fringilla kormosi* Kessler, 2013 (Polgárdi, MN13); *Carduelis parvulus* Kessler, 2013; *C. medius* Kessler, 2013; *Pinicola kubinyii* Kessler, 2013; *Pyrrhula minor* Kessler, 2013; *Fringilla petenyii* Kessler, 2013; *Loxia csarnotanus* Kessler, 2013 (Csarnóta 2, MN15); *Coccothraustes major* Kessler, 2013; *Loxia csarnotanus* Kessler, 2013 (Beremend 26, MN15) (Kessler 2020).

The family was described outside of the Carpathian Basin from the Late Pliocene-Early Pleistocene of Bulgaria (Varshets and Cerzenica, MN17–MQ1) by Boev (1996, 2000), Spain (Quibas and S'Onix) by Montoya (1999) and Sondaar *et al*. (1995); France (Mas Ramboult), by Mourer-Chauviré (1995) and Czech Republic (Stránská skála) by Jánossy (1972). The *Coccothraustes* genus was reported with extinct species only from the Upper Pliocene-Early Pleistocene of Bulgaria (Varshets and Slivnita, MN17–Q1) as *Coccothraustes simeonovi* Boev 1998 and *C. balcanicus* Boev, 1998 (Boev 1998). The *Fringilla* genus is known outside of the Carpathian Basin from the Lower Pliocene of Spain (Hostalets de Pierola, MN16) as *Fringilla* sp. (Villalta 1963), from the Late Pliocene-Early Pleistocene of Bulgaria (Varshets, MN17–MQ1), (Boev 1996); Spain (S'Onix-Mallorca) (Sondaar *et al*. 1995) and Ukraine (Tarchankut) (Vojinstvens'kyj 1967) as *F. cf. coelebs* Linnaeus, 1758. (Kessler 2020).

Conclusions

In accordance with the nature of the fossil material, it was possible to identify about half of the bone fragments to at least the order level. Only three taxa were identified to species level, of which one new species (*Pliogallus csarnotanus* n. sp.) and two species already known from the sites (*Palaeocryptonix hungaricus* Jánossy, 1991 and *Glaucidium baranensis*

Kessler, 2010) were identified. Five taxa were identified down to genus level (*Galinulla* sp., *Porzana* sp., *Merops* sp., *Garrulus* sp., *Nucifraga* sp.) while the other 18 were identified only to order or family level.

The three sites in question are close to each other both in age and geographic location. The vast majority of the bones are ochre-yellow, in keeping with the medium, but there are also some very light and almost black specimens. There are few completely intact skeletal parts, and most of these are from the *phalanges pedis* and claw bones.

Beremend 26 is located a few kilometres east of the other two sites, in the vicinity of the Villány Hills, on the Lower Cretaceous limestone of Szőlő Hill, and like the other sites there, its bone material comes from the filling of a karst split. There are currently 39 known former sites from the quarry, which is still in operation, but these sites were destroyed by mining.

The two Csarnóta sites are located in former quarries on the flat surface of Cserhegy, near the namesake settlement. Site 1 was destroyed by road construction and site 3 did not provide bird material.

The faunal assemblage is consistent from a palaeoecological point of view with that reported in previous studies. The bird fauna of both wetlands, open and wooded areas and rock faces is represented in the fossil material.

As the majority of species are small in size, with only Grouse, Hen Harriers and Bustards represented alongside small-medium sized predators, this is an indication of the size of the predators. The remains of Pygmy Owls, Goshawks, Little Owls, Tawny Owls and Eagle Owls also indicate these birds of prey. Of the diurnal predators, only the Sparrow-Hawk, which is also a prey species, is included in the faunistics.

In conclusion, the Pliocene finds from Beremend and Csarnóta reflect the bird life of the southern edge of the Carpathian Basin.

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