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Picidae in the European fossil, subfossil and recent bird faunas and their osteological characteristics

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Abstract This paper presents the European fossil, subfossil and recent representatives of the Picidae family. Following the list of fossil and subfossil remains, the author analyzes and presents images of the osteological characteristics of the order's 10 recent European species.
Skeletal parts that are usually present both in the fossil and subfossil material were examined (*mandibula, coracoideum, scapula*, *humerus*, *ulna*, *metacarpus*, the first phalanx of the second finger of the wing, *femur*, *tibiotarsus*, *tarsometatarsus* and *distal phalanx*). The text is complemented with the bibliography concerning the fossilized material, tables and figures and a size chart.

Keywords: paleornithology, osteology, Paleogene, Neogene

Összefoglalás A dolgozatban a harkályok rendjének európai fosszilis, szubfosszilis és recens képviselőit mutatja be a szerző. A fosszilis és szubfosszilis maradványok felsorolását követően a szerző a rend 10 európai recens fajának csonttani jellegeit elemzi és mutatja be képeken is. A vázrészek közül azok kerülnek vizsgálatra, amelyek a fosszilis és szubfosszilis anyagban is rendszerint jelen vannak (alsó állkapocs, hollócsőrcsont, lapocka, felkarcsont, singcsont, kézközépcsont, a szárny II. ujjának első ujjperce, combcsont, lábszárcsont, csüd és karomcsont). A szöveget kiegészíti a fosszilis anyagot felölelő könyvészeti jegyzék, 8 táblakép és egy mérettáblázat.

Kulcsszavak: paleornitológia, csonttan, paleogén, neogén

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Introduction

Representatives of the order Picidae were present in Europe already in the beginning of the Paleogene, represented by species of the presently exclusively tropical family (Capitonidae) or the now extinct family (Zygodactylidae). These are, for example, the *Primozygodactylus eunjoae* Mayr and Zelenkov, 2009 (Mayr 2005c, 2006, Mayr & Zelenkov 2009), from the Middle Eocene of Messel Grube, Germany, the *Zygodactylus luberonensis* Mayr, 2008, from the Lower Ogliocene of France (Mayr 2005b, 2008) and multiple findings from the Miocene of France and Germany (*Zygodactylus ignotus* Ballmann, 1966, and *Capitonides europaeus* Ballmann, 1966, from the Middle Miocene of Wintershof (West) bei Eicstätt, *Z. grivensis* Ballmann, 1969, and *Z. gaudryi* (Depéret 1887), from the Middle Miocene of La Grive-Saint-Alban) (Ballmann 1966, 1969a, 1969b). The small *Rupelramphastoides kopfi* Mayr, 2005 from the Lower Oligocene site of Freuenweiler, Germany, is thought to belong to the Ramphastidae family (Mayr

2005a). *Picavus litencicensis* Mayr and Gregorova (2012) described from the Litenčice site of the Czech Republic also comes from the Lower Oligocene (Mayr & Gregorova 2012).

The recent Picidae, however, are only known from the Neogene of Europe in quite scarce numbers and without exception represented by modern genera:

– *Picus peregrinabundus* Umans'ka, 1981 from the Upper Miocene of Novoelisavetovka, Ukraine (MN 11-12) (Umanska 1981, Mlikovský 2002)

– *Picus pliocaenicus* Kessler, 2013 from the Lower Pliocene of Beremend 26, Hungary (MN 15) (Kessler 2013)

– *Dendrocopos praemedius* Jánossy, 1974 from the Upper Pliocene of Villány 3, Hungary (MN 16-17) (Jánossy 1974) and subsequently from site Beremend 26 (Kessler 2009, 2013)

– the extinct *Dendrocopos submajor* Jánossy, 1974 was described by Dénes Jánossy (1974) from the Upper Pleistocene of Hundsheim, Austria, but Mlikovský (2002) synonymized the latter with the species *D. major* as he did the former with the recent *D. medius*. Given that the author identified both species from the much older site of Beremend 26, we are on the opinion that according to the sizes and characteristics, the former should be viewed as a valid species, while the latter as a subspecies *(D. major submajor)*.

The marking of the recent *Pogoniulus* genus belonging to the Ramphastidae family by Mlikovský (2002) from the Upper Miocene of Austria is also worth mentioning (Kohfidisch – Gyepüfüzes).

Recent species of the Picidae family are only specific to the Pleistocene and Holocene of Europe:

– *Jynx torquilla* Linnaeus, 1758
Known from the Lower Pleistocene: Betfia 2 (Kormos 1913, Čapek 1917) and Upper Pleistocene of the Carpathian Basin: the shelter cave of Hámor-Puskaporos (Lambrecht 1912, 1916, 1933, Jánossy 1977, 1986), as well as the Middle Pleistocene of France and the Upper Pleistocene of Austria, the Czech Republic, France, Croatia, Germany, Switzerland and Romania (Tyrberg 1997).

– *Picus viridis* Linnaeus, 1758
Known from the Lower Pleistocene: Betfia 9 (Gál 2002), Somssich Hill 2 (Jánossy 1981a, 1982b, 1983, 1986), Middle Pleistocene: Tarkő 1-16 (Jánossy 1977) and Upper Pleistocene: Varbó-Lambrecht Kálmán Cave (Jánossy 1977), the Holocene: Kazánszoros-Töröklik Cave (Kessler 1974), Körösbánlaka Cave (Kessler 1982), Vársonkolyos-Izbîndiş Cave, (Kessler 1977, Gál 2002), the caves of Vársonkolyos (Kessler 1982), as well as the Middle Pleistocene of France, Italy, Spain and the Upper Pleistocene of England, Austria, the Czech Republic, France, Croatia, Germany, Italy and Spain (Tyrberg 1997).

– *Picus canus* Linnaeus, 1758
Known from the Upper Pleistocene of the Carpathian Basin: Felsőtárkány-Peskő Cave (Lambrecht 1912, 1933, Jánossy 1977), Nándor-Nándori Cave (Jánossy 1965, Fischer & Stephan 1977, Kessler 1985, Jurcsák & Kessler 1988, Gál 2002, 2003), Óruzsin-Antal Cave (Nehring 1880, Róth 1881, Lambrecht 1912, 1933), shelter cave I. of Pilisszántó (Lambrecht 1915, 1933,

Jánossy 1977, 1986), Répáshuta-Balla Cave (Lambrecht 1912, 1933), Varbó-Lambrecht Kálmán Cave (Jánossy 1977), Velika Pecina (V. Malez 1975, 1984, 1988), Velika pec na Lipi (V. Malez 1975, 1984, 1993, V. Malez-Bačić 1975), the Holocene: Felsőtárkány-Petény Cave (Jánossy 1977), as well as the Middle Pleistocene of the Czech Republic, France and the Upper Pleistocene of Austria, the Czech Republic, France, Germany, Italy and Switzerland (Tyrberg 1997).

– *Picus* sp.
Known from the Upper Pleistocene of the Carpathian Basin: the shelter cave of Hámor-Puskaporos (Lambrecht 1912, 1916, 1933, Jánossy 1977, 1986), as well as the Upper Pleistocene of Luxemburg and Germany (Tyrberg 1997).

– *Dryocopus martius* (Linnaeus, 1758)
Known from the Upper Pleistocene of Georgia, France and Poland (Tyrberg 1997).

– *Dendrocopos major* (Linnaeus, 1758)
Known from the Middle Pleistocene: Vindija (M. Malez 1961, V. Malez 1973, 1988, 1991), and Upper Pleistocene: Bajót-Jankovich Cave (Lambrecht 1933, Jánossy 1977), Budapest-Remetehegy Shelter Cave (Kormos & Lambrecht 1914, Lambrecht 1933, Jánossy 1977, 1986), the shelter cave of Hámor-Puskaporos (Lambrecht 1912, 1916, 1933, Jánossy 1977, 1986), Hámor-Herman Ottó Cave (Lambrecht 1915, 1933), Merkenstein (Wettstein & Mühlhofer 1938), shelter cave I. of Pilisszántó (Lambrecht 1915, 1933, Jánossy 1977, 1986), Szegyestel-Măgura Cave (Kessler 1982, 1985, Gál 2002), Szilvásvárad-Istállóskő Cave (Lambrecht 1912, 1933, Jánossy 1952, 1955, 1977), Tatabánya-Szelim Cave (Jánossy 1977), Velika Pecina (V. Malez 1975, 1984, 1988) and from the Holocene of Ecsegfalva n. 23 (Pike-Tay *et al.* 2004, Gál 2007b), Felsőtárkány-Petény Cave (Jánossy 1977), Legény Cave (Lambrecht 1914), the shelter cave of Répáshuta-Rejtek (Jánossy 1977), Teufelslucken (Soergel 1966), as well as the Lower Pleistocene of France and Spain, the Middle Pleistocene of the Czech Republic, France, Croatia, Germany, Italy, Spain, and the Upper Pleistocene of England, Bosnia and Herzegovina, the Czech Republic, France, Ireland, Poland, Germany, Italy, Spain, Switzerland and Ukraine (Tyrberg 1997).

– *Dendrocopos medius* (Linnaeus, 1758)
Known from the Lower Pleistocene: Betfia 2, 9 (Kormos 1913, Čapek 1917, Lambrecht 1933, Kessler 1975, Jánossy 1977, Gál 2002), Middle Pleistocene: Hundsheim (Jánossy 1974), Tarkő 4, 11 (Jánossy 1977) and Upper Pleistocene, Óruzsin-Antal Cave (Nehring 1880, Róth 1881, Lambrecht 1912, 1933), Velika Pecina (V. Malez 1975, 1984, 1988), as well as the Lower Pleistocene of Ukraine, the Middle Pleistocene of France, the Upper Pleistocene of France, Germany, Italy and Ukraine (Tyrberg 1997).

– *Dendrocopos minor* (Linnaeus, 1758)
Known from the Lower Pleistocene of the Carpathian Basin: Betfia 9 (Gál 2002), as well as the Lower Pleistocene of England, middle Pleistocene of France, and Upper Pleistocene of England, France and Croatia (Tyrberg 1997).

– *Dendrocopos leucotos* (Bechstein 1803)
Known from the Holocene of the Carpathian Basin: Felsőtárkány-Petény Cave (Jánossy 1977), as well as the Middle Pleistocene of France, Italy, and the Upper Pleistocene of Austria, Belgium, France, Greece and Italy (Tyrberg 1997).

– *Picoides tridactylus* (Linnaeus, 1758)
Known from the Middle Pleistocene of France and the Upper Pleistocene of Germany (Tyrberg 1997).

Palaeoecological conclusions

The changes in climate across Europe by the end of the Miocene, seasonal cooling and warming were not favorable for fruit-eating types (Coliiformes, Musophagiformes, Psitaciformes, beside Trogoniformes from among the families of Piciformes (the representatives of Capitonidae, Ramphastidae and Zygodactylidae) – thus, these receded back to tropical areas. Members of the Picidae family in the Piciformes order were able to withstand the seasonal changes in temperature as insectivores, mostly specializing on invertebrates living under tree bark. The sole exception is the less specialized Eurasian wryneck with beaks incapable of carving, which is the only migrating species of the family and not only does it not show any specialization in its skull, but also its flight capabilities and tail feathers are unlike those of other species.

For the latter, the thickening of the parietal bones, the rather strong lower and upper jaws, the remarkably long tongue, the flight feathers capable of weight support all had significant effects on flight capabilities, and consequently the shape and size of the wings. The distinctively wavelike trajectory and low flight speed would not allow for longer migration at this point, which they do not need in their woodland habitats, however, it serves perfectly well motion in this environment. The geographic spread of the approximately 300 species of the family supports the above statement, since they were unable to reach Oceania, Madagascar, Australia and New-Zealand. An extremely complex, data-rich study appeared recently (Winkler 2015), which perfectly complements this work.

Osteological characteristics of Picidae

From an osteological perspective, their skeletal parts can easily be identified, but the current paper only takes into account those that easily remain, fossilize and can be identified up to species level. These are the mandible, the coracoid bone of the pectoral girdle, the scapula, bones of the upper and lower limbs (apart from the radial bone, fibula and certain phalanges), so we do not examine neither the otherwise typical skull, sternum and pelvis, nor the vertebrae, ribs and furcula *(Plate 1)*.

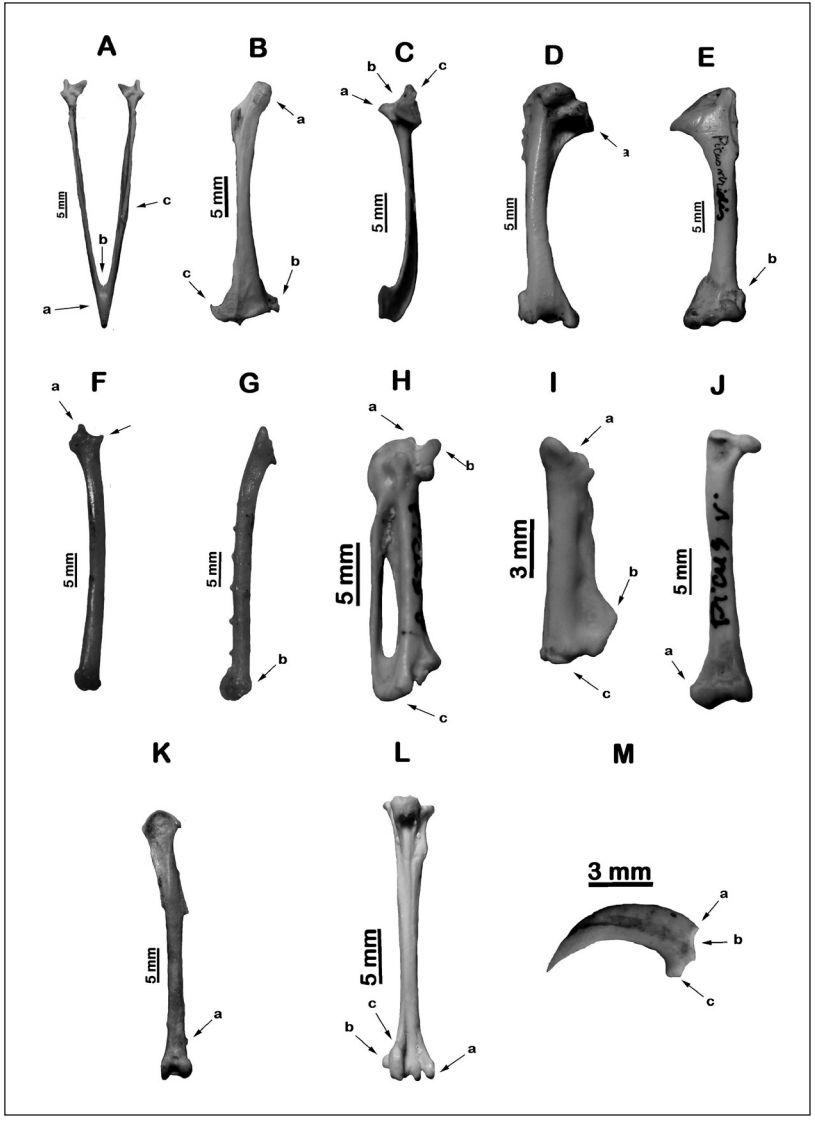

Plate I. *Picus viridis* Linnaeus, 1758 osteology characters: A. Mandible – a. te end of the beak; b. the recess between the stems; c. the stems. B. Coracoideum – a. the *processus acrocoracoidalis*; b. the medial part of the sternal end; c. the lateral part of the sternal end. C. Scapula – a. the lateral projection; b. the dorsal projection. D,E. Humerus – a. the *crista biccipitalis*; b. the *processus supracondylaris dorsalis*. F,G. Ulna – a. *oleocranon*; b. *cotyla dorsalis*; c. *tuberculum carpale*. H. Carpometacarpus – a. the *trochlea carpalis*; b. the *processus extensorius*; c. the distal end of the *metacarpus major*. I. Phalanx proximalis digiti majoris – a. the proximal end; b. the distal end; c. the distal end of the dorsal side. J. Femur – a. the *condylus lateralis*. K. Tibiotarsus – a. the *tuberositas retinaculi*. L. Tarsometatarsus – a. *trochlea metatarsi* II.; b. *trochlea metatarsi* IV.; c. *trochlea metatarsi* I. M. Distal phalanx – claw – a. the *tuberculum extensorium*; b. the *cotyla articularis*; c. the *tuberculum flexorium*.

Táblakép I. *Picus viridis* Linnaeus, 1758 csonttani jellegek: A. Alsó állkapocs – a. a csőr vége; b. a csőr szárai közti mélyedés; c. a csőr szárai. B. Hollócsőrcsont – a. *processus acrocoracoidalis*; b. a mellcsonti rész mediális vége; c. a mellcsonti rész laterális vége. C. Lapocka – a. oldalsó nyúlvány; b. dorsális nyúlvány. D,E. Felkarcsont – a. *crista biccipitalis*; b. *processus supracondylaris dorsalis*. F,G. Singcsont – a. *oleocranon*; b. *cotyla dorsalis*; c. *tuberculum carpale*. H. Kézközépcsont – a. *trochlea carpalis*; b. *processus extensorius*; c. a *metacarpus major* disztális vége. I. A nagy kézujj első ujjperce – a. proximális vég; b. disztális vég; c. a disztális vég dorsális része. J. Combcsont – a. *condylus lateralis*. K. Lábszárcsont – a. *tuberositas retinaculi*. L. Csüd – a. *trochlea metatarsi* II.; b. *trochlea metatarsi* IV.; c. *trochlea metatarsi* I. M. Karomcsont – a. *tuberculum extensorium*; b. *cotyla articularis*; c. *tuberculum flexorium*.

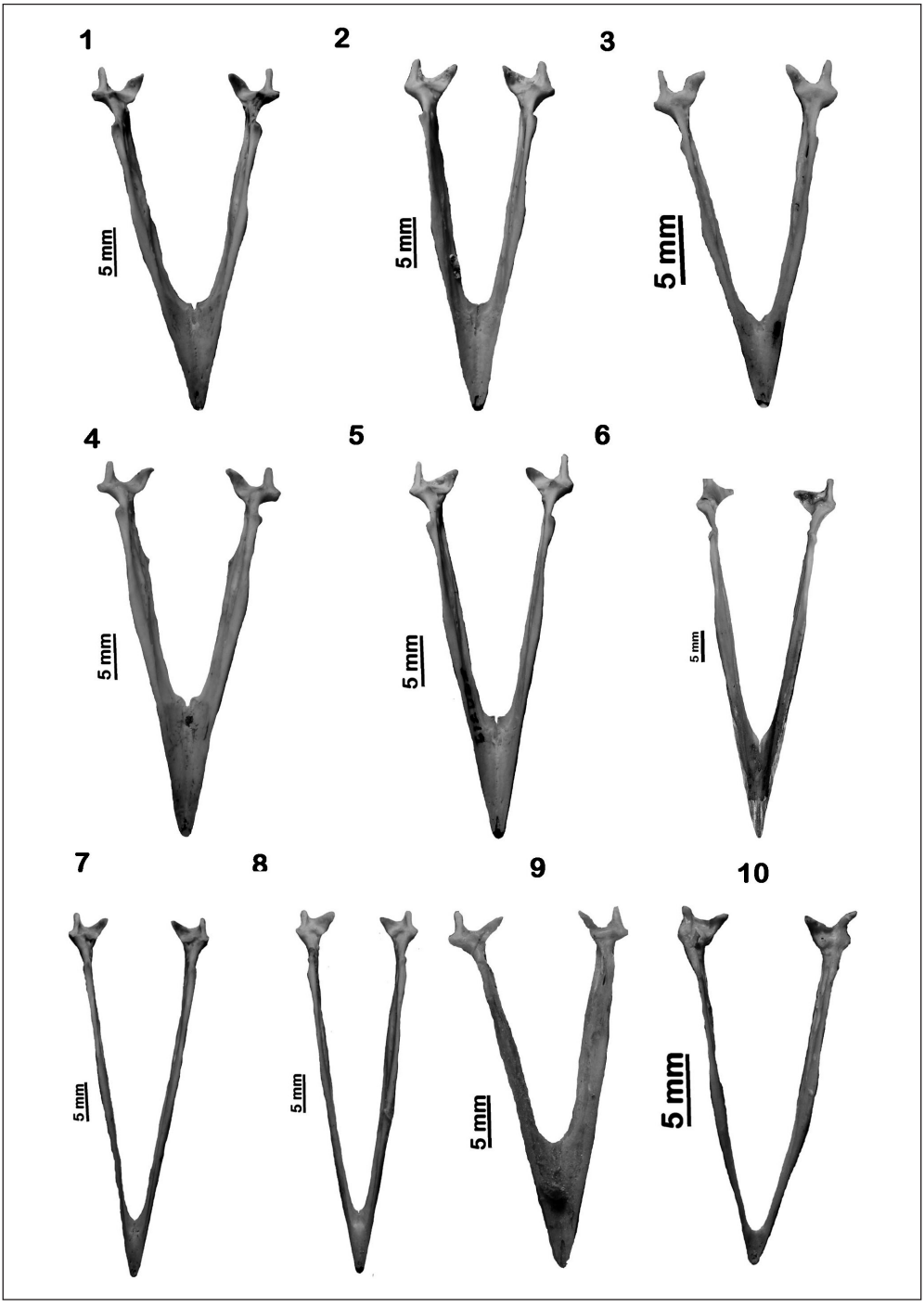

Plate 2. *Mandibula*, dorsal aspect: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*

Táblakép 2. Alsó állkapocs, dorsális nézet: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*

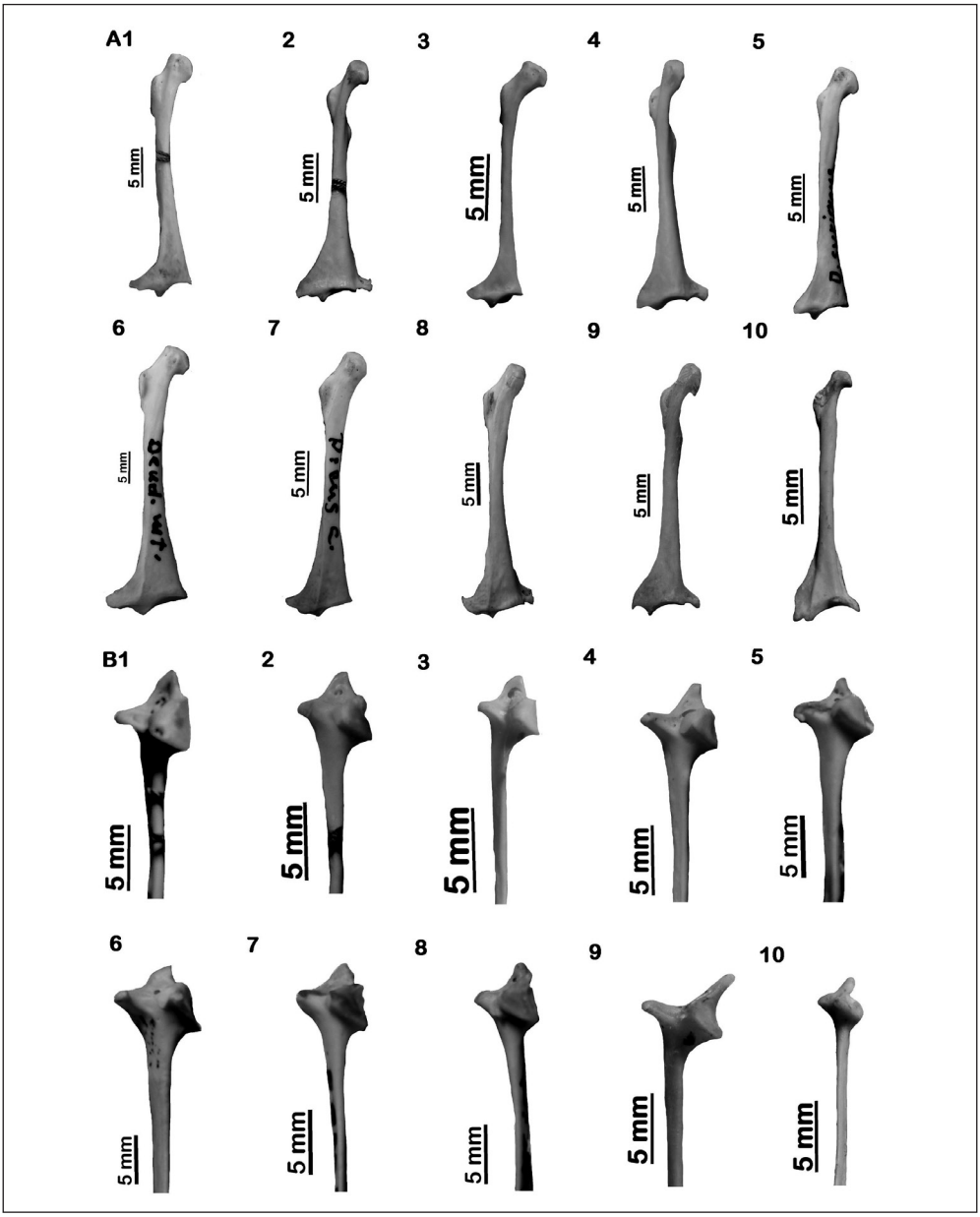

Plate 3. A. *Coracoideum*, right side, ventral surface: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*
B. *Scapula*, left side, medial surface: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*

Táblakép 3. A. Hollócsőrcsont, jobboldali, ventrális nézet: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*.
B. Lapocka, baloldali, mediális nézet: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*

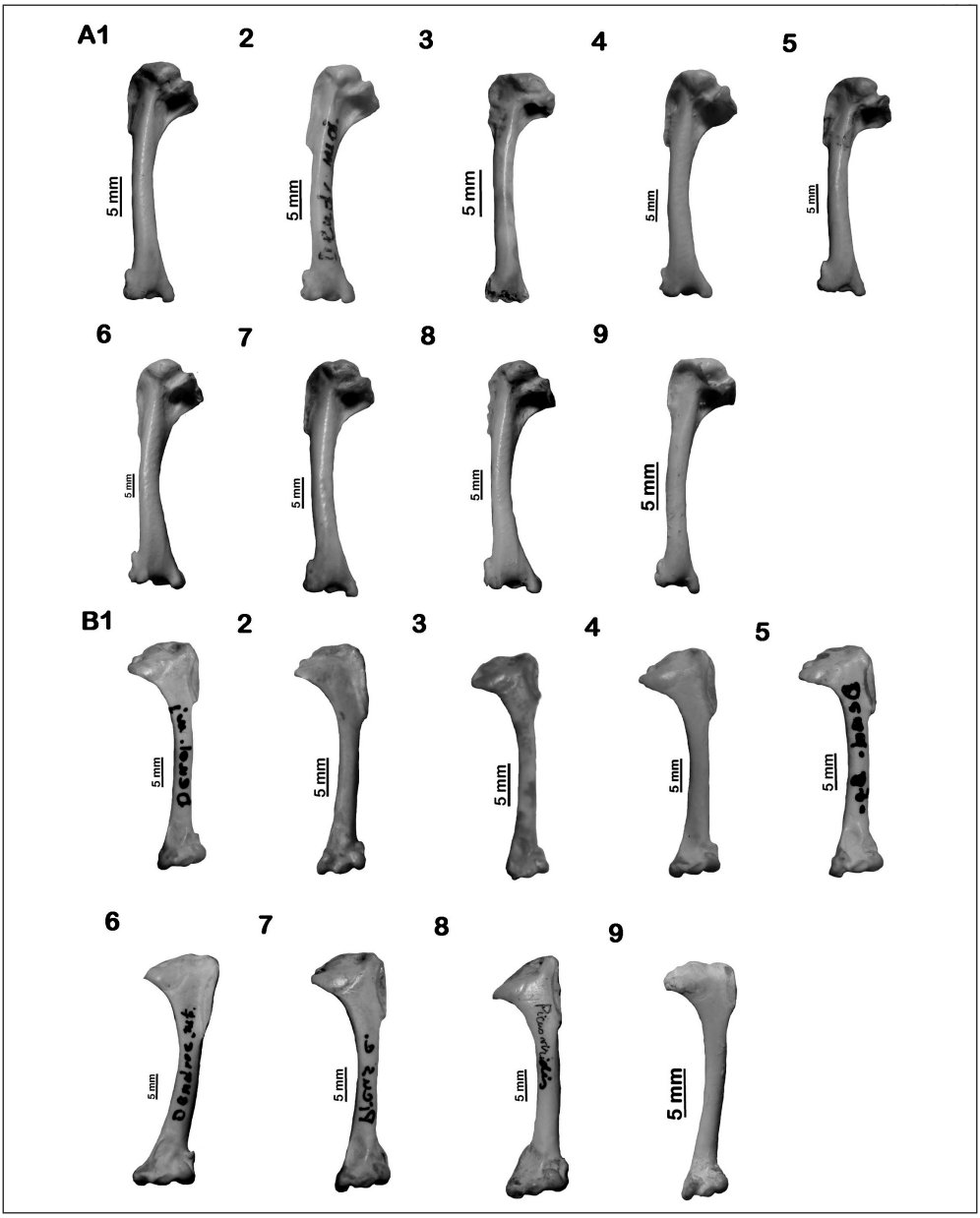

Plate 4. A. *Humerus*, left side, caudal surface: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Jynx torquilla*.
B. *Humerus*, left side, cranial surface: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Jynx torquilla*

Táblakép 4. A. Felkarcsont, baloldali, caudális nézet: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Jynx torquilla*.
B. Felkarcsont, baloldali, craniális nézet: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Jynx torquilla*

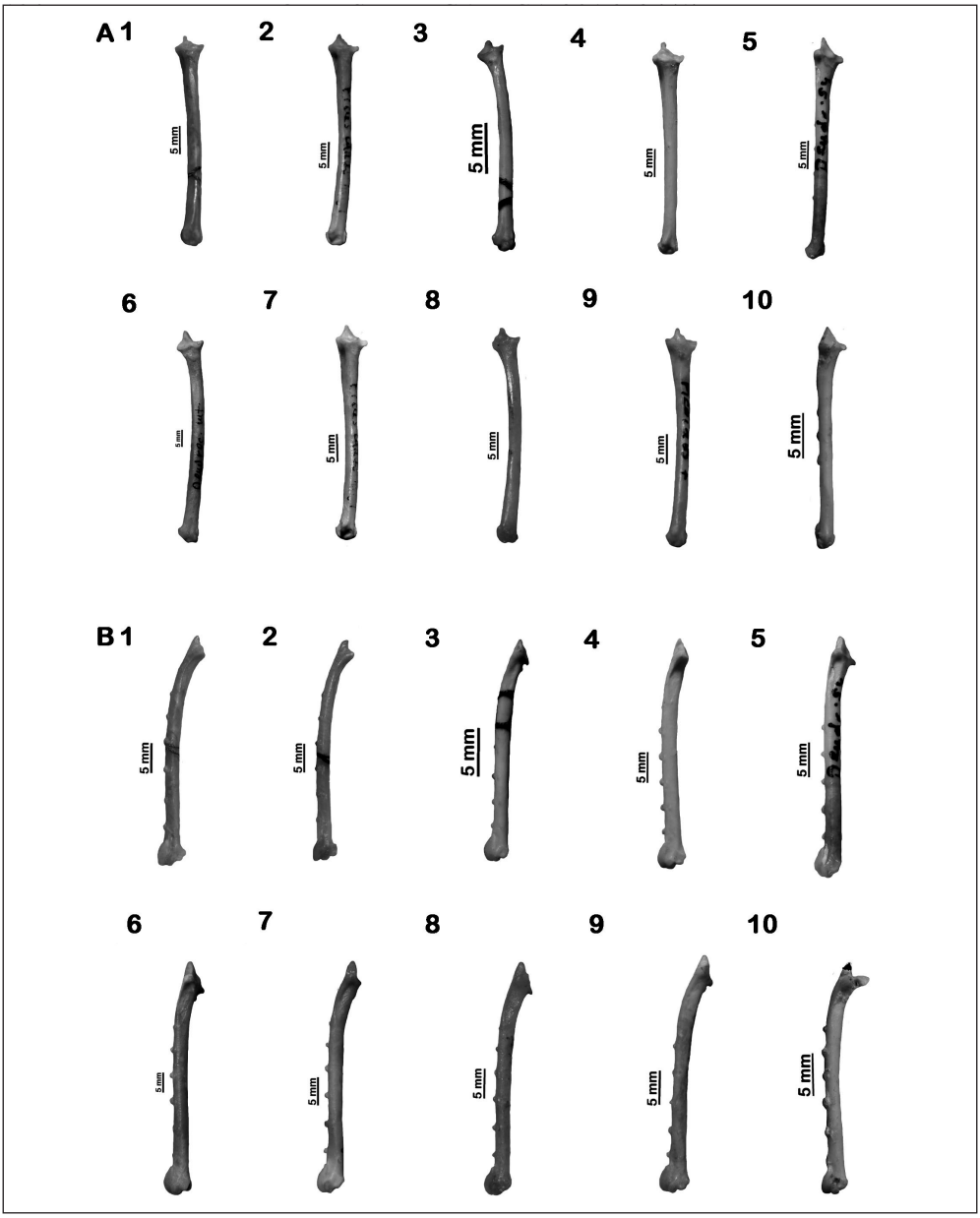

Plate 5. A. *Ulna*, right side, dorsal surface: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*
B. *Ulna*, right side, medial surface: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*

Táblakép 5. A. Singcsont, jobboldali, dorsális nézet: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*
B. Singcsont, jobboldali, mediális nézet: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*

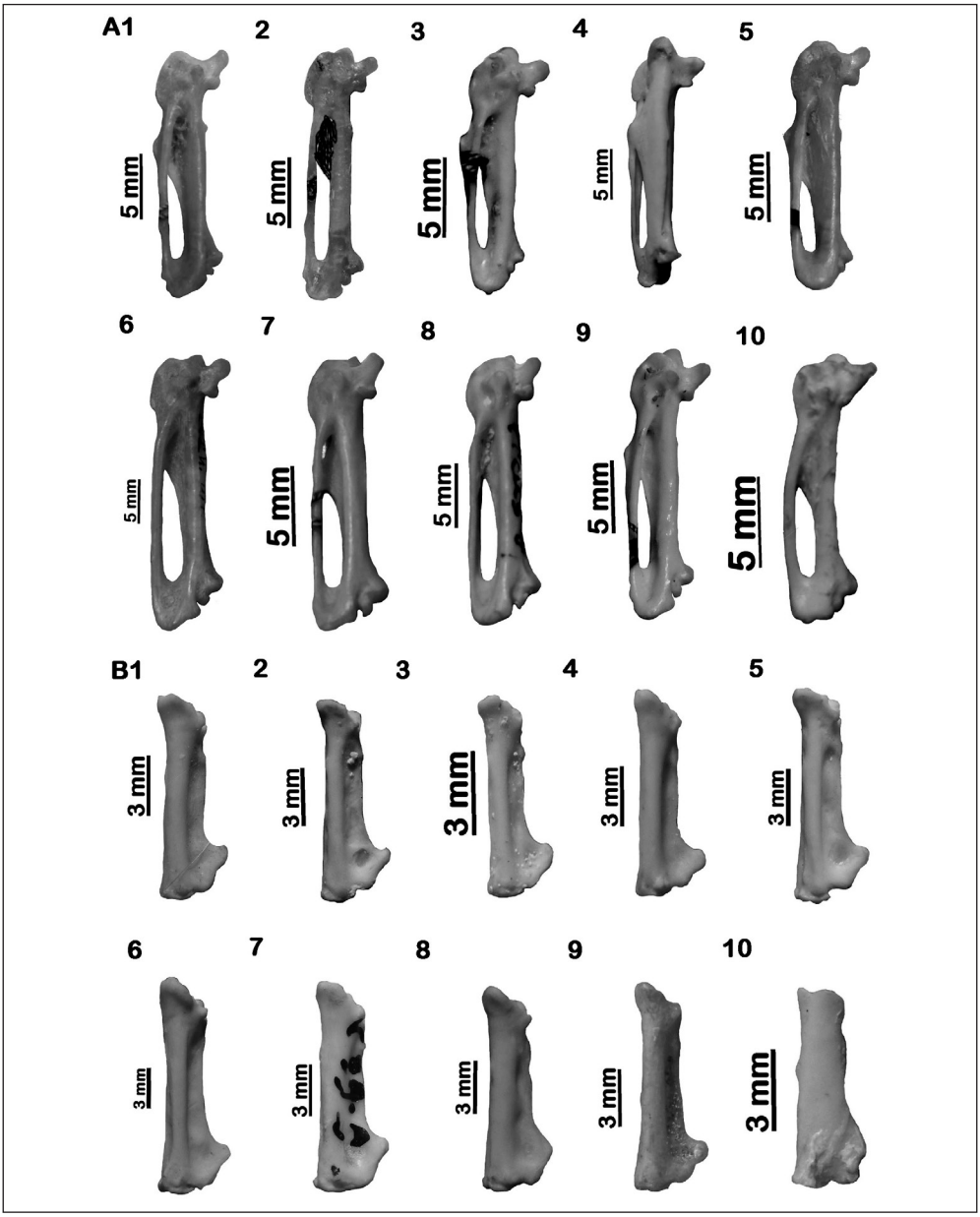

Plate 6. A. *Carpometacarpus*, left side, ventral aspect: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*.
B. *Phalanx proximalis digiti majoris*, left side, dorsal aspect: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*

Táblakép 6. A. Kézközépcsont, baloldali, ventrális nézet: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*.
B. II. jj, 1.ujjperc, baloldali, dorsális nézet: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*

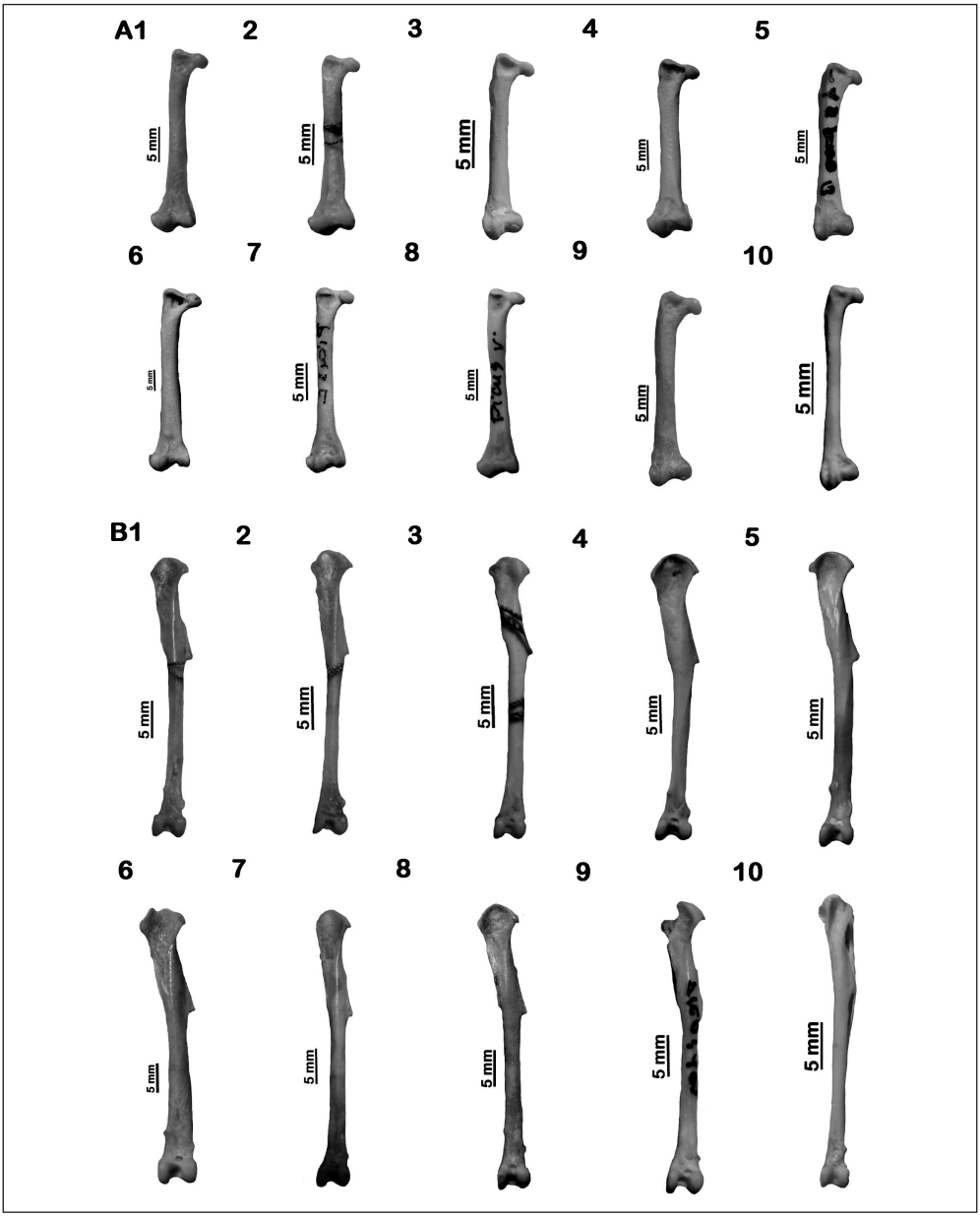

Plate 7. A. *Femur*, left side, caudal aspect: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*
B. *Tibiotarsus*, left side, cranial aspect: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*

Táblakép 7. A. Combcsont, baloldali, caudális nézet: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*
B. Lábszárcsont, baloldali, craniális nézet: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*

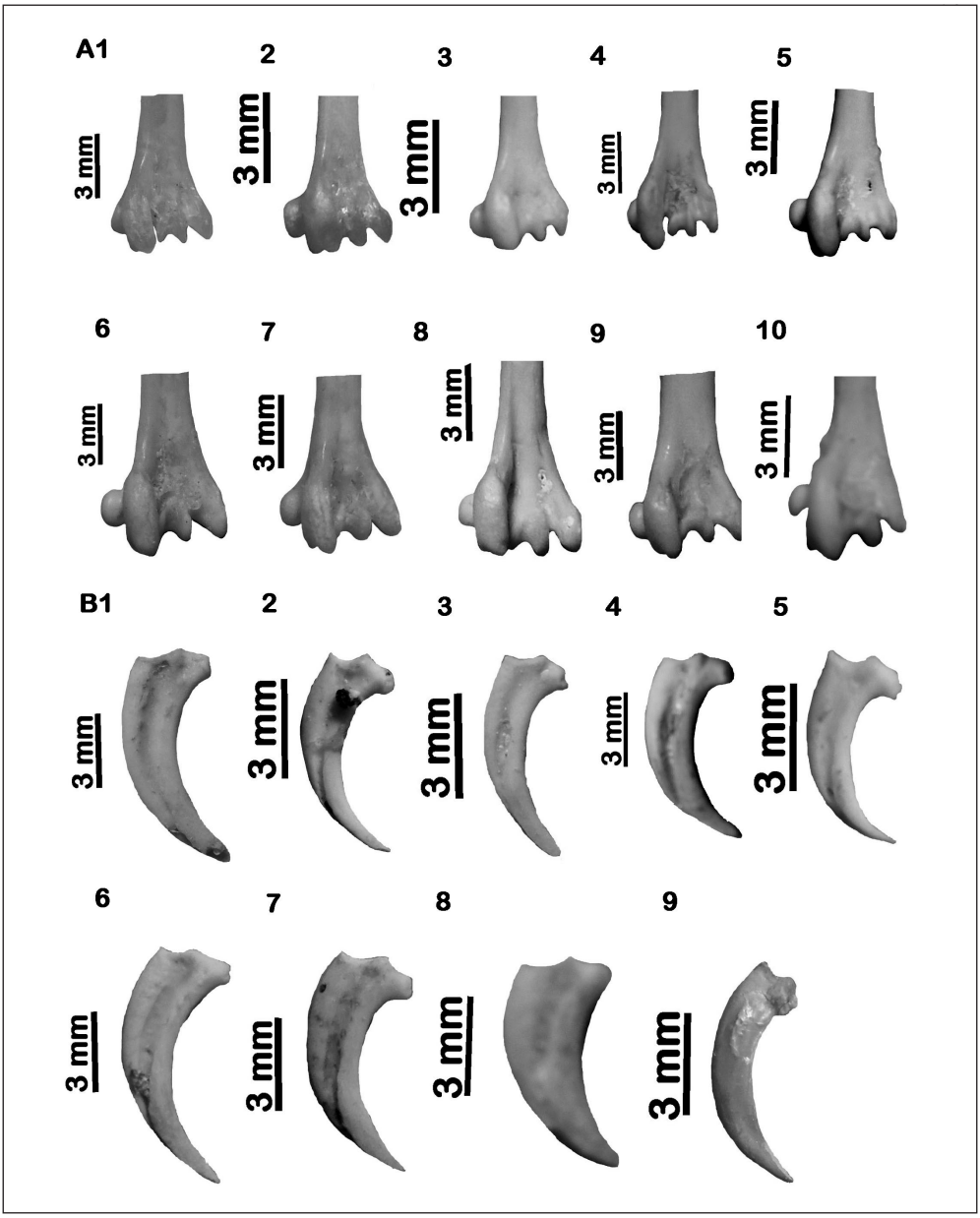

Plate 8. A. *Tarsometatarsus*, left side, dorsal aspect: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*
B. Claw, lateral aspect: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Picus canus*; 7. *Picus viridis*; 8. *Picoides tridactylus*; 9. *Jynx torquilla*

Táblakép 8. A. Csüd, baloldali, dorsális nézet: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Dryobates martius*; 7. *Picus canus*; 8. *Picus viridis*; 9. *Picoides tridactylus*; 10. *Jynx torquilla*
B. Karomcsont, oldalsó nézet: 1. *Dendrocopos major*; 2. *Dendrocopos medius*; 3. *Dendrocopos minor*; 4. *Dendrocopos leucotos*; 5. *Dendrocopos syriacus*; 6. *Picus canus*; 7. *Picus viridis*; 8. *Picoides tridactylus*; 9. *Jynx torquilla*

Respectively to skeletal parts, their characteristics are the following:

1. Mandibula (Plate 2):
- – a. the tip of the beak is:
  - – very short: *Jynx*
  - – short: *Picus*
  - – long: *Dendrocopos, Dryobates, Picoides*
- – b. the recess between the stems is:
  - – ovoid: *Jynx, Picoides, Picus*
  - – ovoid, with recess in the middle: *Dendrocopos, Dryobates*
- – c. the stem is:
  - – very long: *Jynx*
  - – long: *Picus*
  - – short: *Dendrocopos, Dryobates, Picoides*

2. *Coracoideum (Plate 3A)*:
- – a. the processus acrocoracoidalis is:
  - – straight, clublike: *Picus*
  - – medially protuberant: *Dendrocopos, Dryobates*
  - – medially pointening in a hook shape: *Jynx, Picoides*
- – b. the medial part of the sternal end is:
  - – short and pointed: *Dendrocopos major*, *D. minor*, *D. syriacus, Dryobates*
  - – shortly protrusive: *Picus*
  - – protractedly protrusive: *Dendrocopos leucotos*, *D. medius*, *Jynx, Picoides*
- – c. the lateral part of the sternal end:
  - – curves downward sharply: *Picoides*
  - – curves upward sharply: *Picus*
  - – curves downward bluntly: *Dendrocopos leucotos*, *D. medius, Jynx*
  - – straight: *Dendrocopos major, D. minor, D. syriacus, Dryobates*

3. Scapula (Plate 3B):
- – a. the lateral projection is:
  - – cone-shaped: *Dendrocopos*
  - – curved, sharp: *Dryobates*
  - – thick, with a cut-off end: *Picus*
  - – narrow, long: *Jynx, Picoides*
- – b. the dorsal projection is:
  - – cone-shaped: *Dendrocopos, Dryobates, Jynx, Picus*
  - – long, narrow: *Picoides*

4. Humerus (Plate 4):
- – a. the crista biccipitalis is:
  - – rounded: *Dendrocopos*

– cone-shaped: *Dryobates, Jynx, Picus*
– b. the processus supracondylaris dorsalis is:
– rounded: *Jynx, Picus*
– slightly protruding cone shape: *Dendrocopos*
– strongly protruding cone shape: *Dryobates*

5. Ulna (Plate 5):
– a. olecranon:
– pointed cone: *Dendrocopos medius, D. syriacus, Jynx*
– blunt cone: *Dendrocopos minor, Dryobates, Picoides, Picus*
– straight: *Dendrocopos major, D. leucotos*
– b. cotyla dorsalis:
– pointed cone: *Dendrocopos, Dryobates, Picoides, Picus*
– straight: *Jynx*
– c. the tuberculum carpale is:
– rounded: *Dendrocopos minor, D. syriacus, Picus*
– strongly protruding: *Dendrocopos major, D. medius*
– slightly protruding: *Dendrocopos leucotos, Dryobates, Jynx, Picoides*

6. Carpometacarpus (Plate 6A):
– a. the trochlea carpalis is:
– simple: *Dendrocopos*
– double: *Dryobates, Jynx, Picoides, Picus*
– b. the processus extensorius is:
– straight, with a rounded end: *Dendrocopos leucotos*
– straight blunt cone: *Jynx*
– oblique with a cut-off end: *Picus*
– oblique with a rounded end: *Dendrocopos major, D. medius, D. minor, D. syriacus, Dryobates, Picoides*
– c. the distal end of the metacarpus major is:
– straight, wavy*: Dendrocopos leucotos, Jynx*
– rounded: *Dendrocopos major, D. medius, D. minor, D. syriacus*
– oblique: *Dryobates, Picoides, Picus*

7. Phalanx proximalis digiti majoris (Plate 6B):
– a. the proximal end is:
– straight, wavy: *Jynx*
– oblique: *Dendrocopos, Dryobates, Picoides, Picus*
– b. the distal end is:
– straight: *Picus canus*
– protruding: *Dendrocopos, Dryobates, Jynx, Picoides, Picus viridis*
– c. the distal end of the dorsal side is:
– rounded: *Jynx*

– cone-shaped: *Picus viridis*
– straight: *Dendrocopos leucotor, D. syriacus, Dryobates, Picoides, Picus canus*
– oblique: *Dendrocopos major, D. medius, D. minor*

8. Femur (Plate 7A):
– a. the condylus lateralis is
– laterally rounded: *Dendrocopos minor, D. syriacus, Jynx, Picoides*
– laterally protruding: *Dendrocopos leucotos, D. major, D. medius, Dryobates, Picus canus, P. viridis*

The morphological homogeneity is significant in the case of this skeletal part. What differs is the relative length of the diaphysis: it is long and slim in the *Jynx*, medium length in the *Picus*, while shorter in other genera.

9. Tibiotarsus (Plate 7B):
– a. the tuberositas retinaculi is:
– well-developed: *Dendrocopos leucotos, D. major, D. medius*
– moderately developed: *Dryobates, Jynx, Picoides, Picus*
– undeveloped: *Dendrocopos minor, D. syriacus*

Homogeneity is significant in the case of this skeletal part. In case of *Dendrocopos syriacus* and the *Dryobates,* a protrusion can be located above the epicondylus medialis. The diaphysis of the *Jynx* is long and slim, that of the *Dryobates,* however, is relatively short and thickset, whereas in case of the other genera, it is medium-size.

10. Tarsometatarsus (Plate 8A):
– a. trochlea metatarsi II:
– pointed: *Dendrocopos major, D. medius, D. minor, Dryobates, Picoides*
– rounded: *Dendrocopos leucotos, D. syriacus, Jynx, Picus*
– b. trochlea metatarsi IV.:
– semicircular: *Dendrocopos minor, D. leucotos, Picoides, Picus*
– ovoidal: *Dendrocopos major, D. medius, D. syriacus, Dryobates, Jynx*

This bone is the most typical skeletal part of the Picidae, i.e. on the distal end of the caudal side of the tarsometatarsus and on the medial side of the trochlea, a well-developed, spur-like rowel can be found. This is none other than the trochlea metatarsi I. (c). In case of other bird species, the I. metatarsus holding the first finger is not grown to the tarsometatarsus, while for the Picidae, it is, and its trochea leans forward between trochlea metatarsi II. and III. This is also valid for the *Picoides* and the *Jynx*, even though the *Picoides* have three fingers.

11. Distal phalanx (Plate 8B):
– a. the tuberculum extensorium:

– leans toward the apex: *Dendrocopos major, D. minor, D. leucotos*. *Picoides*
– leans forward: *Dendrocopos medius, D. syriacus, Picus, Jynx*
– b. the cotyla articularis is:
– symmetrically concave: *Dendrocopos medius, D. minor, D. leucotos, D. syriacus, Picus, Jynx*
– asymmetrically concave: *Dendrocopos major, Picoides*
– c. the tuberculum flexorium is
– cone-shaped: *Picoides*
– protruding, rounded: *Dendrocopos leucotos, D. medius*
– protruding, prismatic: *Dendrocopos major, D. minor, D. syriacus, Picus*
– flattened: *Jynx*

The fact that the distal phalanges of the 4 toes can differ in size and somewhat in appearance has to be taken into account. Thus, the characteristics presented here are provided for information purposes only, as well as their lengths in the size chart. The *Picoides* only has 3 distal phalanges respectively to the three toes. We did not have the opportunity to examine the distal phalanges of the *Dryobates*, since they were not present on the single skeleton found in the collection.

Name	TL-mand.	TL-corac.	TL-scap.	TL-hum.	TL-ulna	TL-cmcp.	TL-ppdm.	TL-fem.	TL-tibts.	TL-tmts.	TL-p.ung.
Dryobates martius	71.12	40.41	32.41	53.81	62.51	31.41	18.52	42.51	51.31	35.31	
Dendrocopos major	35.65	27.21	22.51	33.51	40.31	20.31	10.94	25.61	38.61	25.51	6.44
Dendrocopos medius	34.11	21.01	19.41	28.81	34.21	18.31	10.56	20.21	32.31	21.06	6.61
Dendrocopos minor	20.47	17.06	13.53	20.01	24.01	11.41	6.77	16.06	24.31	15.01	5.05
Dendrocopos syriacus	35.88	27.24	22.48	32.57	40.69	18.51	9.94	23.59	35.84	24.01	5.23
Dendrocopos leucotos	39.58	31.81	25.91	38.65	43.81	22.58	10.53	29.29	40.66	27.55	6.82
Picus viridis	55.21	31.21	27.01	35.71	44.06	21.51	12.96	28.81	41.71	26.31	9.64
Picus canus	51.03	30.21	27.02	36.21	42.41	20.42	11.06	28.51	41.21	26.51	9.31
Picoides tridactylus	36.41	25.96	20.71	30.01	35.61	18.53	9.98	24.63	33.89	22.71	7.66
Jynx torquilla	25.84	20.81	24.31	23.21	26.08	16.12	9.07	19.88	31.63	19.73	6.65

Table 1. Size table of recent woodpeckers
Abbreviations: TL-mand. – total lenght of mandible in mm; TL-corac. – total lenght of coracoid; TL-scap. – total lenght of scapula; TL-hum. – total lenght of humerus; TL-uln. – total lenght of ulna; TL-cmcp. – total lenght of carpometacarp; TL-ppdm. – total lenght of *phalanx proximalis digiti majoris*; TL-fem. – total lenght of femur; TL-tibts. – total lenght of tibiotars; TL-tmts. – total lenght of tarsometatars; TL-p.ung. – total lenght of *phalanx ungularis*
1. táblázat A recens harkályok mérettáblázata
Rövidítések: TL-mand. – állkapocs teljes hossza mm-ben; TL-corac. – hollócsőrcsont teljes hossza; TL-scap. – lapocka teljes hossza; TL-hum. – felkarcsont teljes hossza; TL-uln. – singcsont teljes hossza; TL-cmcp. – kézközépcsont teljes hossza; TL-ppdm. – II. kézujj, 1 ujjpercének teljes hossza; TL-fem. – combcsont teljes hossza; TL-tibts. – lábszárcsont teljes hossza; TL-tmts. – csüd teljes hossza; TL-p. ung. – karomcsont teljes hossza

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