The wing phalanges (*phalanx proximalis digiti majoris*) of Gaviiformes, Podicipediformes, Pelecaniformes, Ardeiformes, Anseriformes, Gruiformes, Ralliformes, Charadriiformes and Galliformes

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Abstract The authors compared the first phalanx of the second wing-finger of 93 species belong to 9 order (Gaviiformes – 2 species, Podicipediformes – 4 species, Pelecaniformes – 4 species, Ardeiformes – 12 species, Anseriformes – 27 species, Gruiformes – 4 species, Ralliformes – 6 species, Charadriiformes – 25 species and Galliformes – 9 species). The importance of studying this bone lies in the fact that, although it has diagnosable characteristics, it was practically neglected by osteologists and paleontologists. Thus, fossil materials can be identified through them, as well as those from owl pellets. The comparison was made possible by the comparative avian skeleton collection of the Hungarian Natural History Museum. The text is supplemented by 10 figures and 1 table.

Keywords: Europe, waterfowl, Galliformes, *phalanx proximalis digiti majoris*, osteology

Összefoglalás A szerzők 9 rendbe tartozó, összesen 93 madárfaj szárnyának második ujj első ujjpercét vetették összehasonlító vizsgálat alá (Gaviiformes – 2 faj, Podicipediformes – 4 faj, Pelecaniformes – 4 faj, Ardeiformes – 12 faj, Anseriformes – 27 faj, Gruiformes – 4 faj, Ralliformes – 6 faj, Charadriiformes – 25 faj, Galliformes – 9 faj). A vázrész tanulmányozásának jelentősége abban áll, hogy bár jól meghatározható jellegekkel rendelkezik, gyakorlatilag elhanyagolták a csonttannal és őslénytannal foglalkozók. Általuk mind recens, mind fosszilis anyagok jól meghatározhatóak. A vizsgálatot a Magyar Természettudományi Múzeum összehasonlító madárcsont gyűjtemény anyaga tette lehetővé. A szöveget 10 ábra és 1 táblázat egészíti ki.

Kulcsszavak: Európa, vízimadarak, tyúkalakúak, *phalanx proximalis digiti majoris*, csonttan

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Introduction

The current study discusses a less known part of the avian skeleton used for description. The bone is rather small (even in the case of the largest avian species it is only 6–7 centimeters long) and relatively simple in appearance. The first phalanx of the second wing-finger bears excellent diagnostic characteristics.

Out of the four wing phalanges, only this has such morphological characteristics that can be used for comparative anatomical, paleontological, archeological, taxonomical or ornithological examinations of owl pellets.

In this investigation the bird order Ardeiformes has traditionally been handled as distinct order from other bird groups due to their bone characters (Brodkorb 1963, Feduccia 1967). Recently, this classification has been used in the non-taxonomic sense because more recent studies suggested that herons are belonging to the order Pelecaniformes (Hackett *et al.* 2008, Smith 2010).

The morphological terminology and measurement method of the skeletal part was used based on the works of Baumel *et al.* 1979 and Kessler 2013 (*Figure 1/1–2*). Depictions and discussions regarding the wing phalanx can only rarely be found within the literature, e.g. in the works of Milne-Edwards 1867–1868, Solti 1980, 1981a, 1981b, 1996, Gilbert *et al.* 1981, Cohen & Serjeantson 1996, Kessler 2015, 2016a, 2016b, 2019, 2020.

The sizes given in *Table 1* are for information purposes only. The measurement data are derived, on the one hand, from the weighing of specimens from the Natural History Museum of Hungary Budapest comparative bone collection and, on the other hand, from the dimensions of the wing span in the ornithological literature of the species concerned.

Abbreviations

MTM/NHMUS: Natural History Museum of Hungary Budapest, Department of Paleontology and Geology

A – total length

C – the width of the proximal end

E – the largest width of the middle phalanx

F – the width of the distal end

New genus, sp. name – Gill *et al.* 2020

We used the following anatomical terminology (*Figure 1*):

Facies articularis metacarpalis – this is the proximal end

Margo dorsalis – this is the largest width of the middle phalanx

Facies articularis phalangealis – this is the distal end

Osteological description

In the case of loons, grebes, pelicans and cormorants (*Figure 2/1–10*):

a). *Facies articularis metacarpalis*:

– strongly protuberant: *Podiceps auritus*, *P. grisegena*;

Figure 1. *Pelecanus onocrotalus* (Linnaeus, 1758)

1. *Phalanx proximalis digiti majoris* osteology characteristics:

a. proximal end – *facies articularis metacarpalis*; b. the dorsal side – *margo dorsalis*; c. distal end – *facies articularis phalangealis*;

2. Measurements methods of bone:

A. total length; C. breadth of the proximal end; E. breadth of the *corpus*; F. breadth of the distal end;

1. ábra *Pelecanus onocrotalus* (Linnaeus, 1758)

1. A nagy (középső) kézujj első ujjperce csonttani jellegei: a. proximális vég – *facies articularis metacarpalis*; b. dorzális oldal – *margo dorsalis*; c. disztális vég – *facies articularis phalangealis*;

2. A csont mérési mintái:

A. teljes hossz; C. proximális vég szélessége; E. a test szélessége; F. a disztális vég szélessége

- strongly protuberant, with a pointed cone shaped dorsal projection: *Gavia stellata*;
 - slightly protuberant: *Gavia arctica*;
 - with two bulges: *Phalacrocorax carbo*;
 - obliquely cut, lifting from the ventral end towards the dorsal, ending in a pointed cone: *Pelecanus crispus*, *P. onocrotalus*, *Podiceps nigricollis*;
 - obliquely cut, lifting from the ventral end towards the dorsal, ending in a blunt cone: *Phalacrocorax pygmaeus*;
 - concave with a dorsal and a ventral pointed projection: *Podiceps cristatus*;
- b). *Margo dorsalis*:
- forms a regular arc: *Gavia stellata*, *Phalacrocorax carbo*;
 - the arc is strongly protuberant and is asymmetrical: *Pelecanus crispus*, *P. onocrotalus*;
 - has a regular arc, is slightly protuberant: *Podiceps cristatus*, *P. grisegena*, *P. nigricollis*;
 - the middle of the arc is cut straight: *Gavia arctica*, *Podiceps auritus*;
 - the slightly protuberant arc is wavy: *Phalacrocorax pygmaeus*;

Figure 2. Left phalanx proximalis digiti majoris (ventral aspect)

2. ábra Bal oldali kézujjperc (1. ujjperc, II. ujj, hasi nézet)

1. *Gavia arctica* (Linnaeus, 1758); 2. *Gavia stellata* (Pontoppidan, 1753); 3. *Podiceps auritus* (Linnaeus, 1758); 4. *Podiceps cristatus* (Linnaeus, 1758); 5. *Podiceps grisegena* (Boddaert, 1783); 6. *Podiceps nigricollis* (Brehm, 1831); 7. *Pelecanus crispus* (Bruch, 1832); 8. *Pelecanus onocrotalus* (Linnaeus, 1758); 9. *Phalacrocorax carbo* (Shaw et Nodder, 1801); 10. *Phalacrocorax pygmaeus* (Pallas, 1773); 11. *Phoenicopterus ruber* (Pallas, 1811)

c). *Facies articularis phalangealis*:

- oblique, with a strongly protruding dorsal projection: *Pelecanus onocrotalus*;
- straight, strongly protuberant, with a small dorsal projection: *Gavia stellata*, *Pelecanus crispus*;
- wavy, with a strongly protruding dorsal and ventral projection: *Phalacrocorax carbo*;
- wavy, with a slightly protruding dorsal projection: *Gavia arctica*, *Phalacrocorax pygmeus*, *Podiceps auritus*, *P. cristatus*, *P. grisegena*, *P. nigricollis*;

In the case of herons, ibises, flamingos (Figure 2/11, Figure 3/1–11):

a). *Facies articularis metacarpalis*:

- strongly protuberant: *Bubulcus* spp., *Ciconia nigra*;
- strongly protuberant, pointed, with a small dorsal projection pointing upward: *Ardeola* spp.;
- slightly protuberant, with a rounded ventral end: *Phoenicopterus* spp., *Plegadis* spp.;
- a straight, protuberant ventral and a small pointed projection pointing upward: *Botaurus* spp.;
- obliquely cut, lifting from the ventral end towards the dorsal: *Ciconia ciconia*, *Platalea* spp.;
- straight and wavy: *Ardea purpurea*;
- oblique and wavy: *Ardea cinerea*, *Egretta* spp.;
- oblique and wavy, with a strongly protruding pointed dorsal and ventral projection: *Nycticorax*;

b). *Margo dorsalis*:

- forms a regular, strongly protuberant arc: *Bubulcus* spp., *Botaurus* spp., *Plegadis* spp.;
- the arc is slightly protuberant: *Platalea* spp.;
- asymmetrically protuberant: *Ciconia nigra*;
- the middle of the arc is cut straight: *Ardea cinerea*, *A. purpurea*, *Ardeola* spp., *Ciconia ciconia*, *Egretta* spp., *Nycticorax* spp., *Phoenicopterus* spp.;

c). *Facies articularis phalangealis*:

- oblique, with a strongly protruding dorsal projection: *Bubulcus* spp., *Ciconia ciconia*, *C. nigra*;
- straight wavy, with a slightly protruding dorsal projection: *Ardea cinerea*, *A. purpurea*, *Ardeola* spp., *Botaurus* spp., *Egretta* spp., *Nycticorax* spp., *Platalea* spp.;
- straight wavy, with a strongly protruding dorsal projection: *Phoenicopterus* spp.;
- concave, with a strongly protruding dorsal projection: *Plegadis* spp.;

In the case of geese, swans, shelducks (Figure 4/1–9):

a). Shape of *facies articularis metacarpalis*:

- oblique and wavy: *Anser albifrons*;
- cut straight with an oblique, strongly protruding dorsal tip: *Anser erythropus*, *A. fabalis*, *Branta ruficollis*;
- cut straight with an oblique, slightly protruding dorsal tip: *Anser anser*, *Cygnus cygnus*;
- protuberant, with a strongly protruding dorsal projection: *Tadorna* spp.;
- slightly protuberant, with a small dorsal projection pointing upward: *Branta bernicla*;
- slightly concave: *Cygnus olor*;

Figure 3. Left phalanx proximalis digiti majoris (ventral aspect)

3. ábra Bal oldali kézujjperc (1. ujjperc, II. ujj, hasi nézet)

1. *Ardea cinerea* (Linnaeus, 1758); 2. *Ardea purpurea* (Linnaeus, 1758); 3. *Ardeola ralloides* (Scopoli, 1769); 4. *Bubulcus ibis* (Linnaeus, 1758); 5. *Botaurus stellaris* (Linnaeus, 1758); 6. *Egretta garzetta* (Linnaeus, 1766); 7. *Nycticorax nycticorax* (Linnaeus, 1758); 8. *Ciconia ciconia* (Linnaeus, 1758); 9. *Ciconia nigra* (Linnaeus, 1758); 10. *Platalea leucorodia* (Linnaeus, 1758); 11. *Plegadis falcinellus* (Linnaeus, 1766)

Figure 4. Left phalanx proximalis digiti majoris (ventral aspect)

4. ábra Bal oldali kézujjperc (1. ujjperc, II. ujj, hasi nézet)

1. *Anser albifrons* (Scopoli, 1769); 2. *Anser anser* (Linnaeus, 1758); 3. *Anser erythropus* (Linnaeus, 1758); 4. *Anser fabalis* (Latham, 1790); 5. *Branta bernicla* (Linnaeus, 1758); 6. *Branta ruficollis* (Pallas, 1769); 7. *Tadorna tadorna* (Linnaeus, 1758); 8. *Cygnus cygnus* (Linnaeus, 1758); 9. *Cygnus olor* (Gmelin, 1789)

b). The arc of the *margo dorsalis*:

- strongly protuberant: *Anser erythropus*, *Branta bernicla*, *B. ruficollis*, *Tadorna* spp.;
- moderately protuberant: *Anser albifrons*, *A. anser*, *A. fabalis*, *Cygnus cygnus*;
- slightly protuberant: *Cygnus olor*;

c). The shape of the *facies articularis phalangealis*:

- symmetrically wavy, with a slightly protruding dorsal projection: *Anser albifrons*, *A. anser*, *A. erythropus*, *A. fabalis*, *Branta ruficollis*, *Cygnus cygnus*, *C. olor*;
- symmetrically wavy, with a strongly protruding dorsal projection: *Branta bernicla*;
- asymmetrically wavy: *Tadorna* spp.;

In the case of diving ducks, tumblers (Figure 5/1–11):

a). Shape of *facies articularis metacarpalis*:

- slightly obliquely cut: *Anas acuta*, *A. platyrhynchos*;
- strongly obliquely cut, with a small pointed ventral and well-developed blunt dorsal projection: *Anas clypeata*;
- strongly obliquely cut, with a well-developed pointed dorsal projection: *Anas strepera*;
- slightly protuberant and obliquely cut, with a well-developed pointed dorsal projection: *Aythya ferina*;
- straight, with a small, pointed conelike projection: *Anas querquedula*, *Aythya nyroca*;
- strongly protuberant: *Aythya fuligula*;
- slightly protuberant: *Aythya marila*;
- concave: *Anas crecca*, *A. penelope*;

b). The arc of the *margo dorsalis*:

- the bulge is cut: *Anas crecca*;
- strongly protuberant, slightly wavy: *Anas clypeata*, *A. penelope*, *A. querquedula*, *A. strepera*;
- moderately and regularly protuberant: *Anas acuta*, *Aythya ferina*, *A. nyroca*;
- slightly protuberant: *Anas platyrhynchos*, *Aythya fuligula*, *A. marila*;

c). The shape of the *facies articularis phalangealis*:

- cut straight, slightly wavy, with a well-developed dorsal projection: *Anas acuta*, *A. clypeata*, *A. crecca*, *A. penelope*, *A. platyrhynchos*, *A. querquedula*, *A. strepera*, *Aythya ferina*, *A. fuligula*;
- cut straight, slightly wavy, with an underdeveloped dorsal projection: *Aythya marila*, *A. nyroca*;

In the case of sea ducks, mergansers (Figure 6/1–7):

a). Shape of *facies articularis metacarpalis*:

- slightly obliquely cut with a rounded dorsal projection: *Mergellus albellus*;
- strongly obliquely cut, with a rounded ventral and well-developed pointed dorsal projection: *Bucephala* spp.;
- strongly obliquely cut, with a weakly-developed pointed dorsal projection: *Melanitta* spp.;
- slightly protuberant and obliquely cut, with a well-developed pointed dorsal projection: *Clangula* spp.;

Figure 5. Left phalanx proximalis digiti majoris (ventral aspect)

5. ábra Bal oldali kézujjperc (1. ujjperc, II. ujj, hasi nézet)

1. *Anas acuta* (Linnaeus, 1758); 2. *Anas clypeata* (Linnaeus, 1758); 3. *Anas crecca* (Linnaeus, 1758); 4. *Anas penelope* (Linnaeus, 1758); 5. *Anas platyrhynchos* (Linnaeus, 1758); 6. *Anas strepera* (Linnaeus, 1758); 7. *Anas querquedula* (Linnaeus, 1758); 8. *Aythya ferina* (Linnaeus, 1758); 9. *Aythya fuligula* (Linnaeus, 1758); 10. *Aythya marila* (Linnaeus, 1761); 11. *Aythya nyroca* (Güldenstadt, 1769)

Figure 6. Left phalanx proximalis digiti majoris (ventral aspect)

6. ábra Bal oldali kézujjperc (1. ujjperc, II. ujj, hasi nézet)

1. *Bucephala clangula* (Linnaeus, 1758); 2. *Clangula hyemalis* (Linnaeus, 1758); 3. *Melanitta nigra* (Linnaeus, 1758); 4. *Mergus albellus* (Linnaeus, 1758); 5. *Mergus merganser* (Linnaeus, 1758); 6. *Mergus serrator* (Linnaeus, 1758); 7. *Somateria mollissima* (Linnaeus, 1758)

- straight, with a pointed conelike projection: *Mergus merganser*, *Somateria* spp.;
- concave: *Mergus serrator*;

b). The arc of the *margo dorsalis*:

- the bulge cut obliquely: *Mergus serrator*;
- strongly and regularly protuberant: *Bucephala* spp., *Clangula* spp., *Melanitta* spp., *Mergus merganser*, *Somateria* spp.;
- slightly protuberant: *Mergellus albellus*;

c). The shape of the *facies articularis phalangealis*:

- cut straight, wavy, with a well-developed dorsal projection: *Bucephala* spp., *Clangula* spp.;
- cut straight, slightly wavy, with an underdeveloped dorsal projection: *Melanitta*, *Mergellus albellus*, *M. merganser*, *M. serrator*, *Somateria* spp.;

In the case of cranes, bustards, coots, rails (Figure 7/1–10):

a). Shape of *facies articularis metacarpalis*:

- obliquely cut, with a well-developed dorsal pointed tip: *Otis tarda*, *O. tetrax*;
- obliquely cut, with a slightly developed dorsal pointed tip: *Porzana parva*, *P. porzana*;
- obliquely cut, with a blunt dorsal tip: *Anthropoides* spp.;
- slightly obliquely cut, with a slight bulge, with a pointed dorsal tip: *Grus* spp.;
- small, pointed tip in the middle: *Fulica* spp., *Gallinula* spp., *Rallus* spp.;
- large, pointed tip in the middle: *Crex* spp.;

b). The arc of the *margo dorsalis*:

- the strong bulge is cut: *Crex* spp.;
- the slight bulge is cut: *Fulica* spp., *Gallinula* spp.;
- wide, regular bulge: *Porzana parva*, *P. porzana*, *Rallus aquaticus*;
- moderate, regular bulge: *Anthropoides* spp., *Grus*, *Otis tarda*, *O. tetrax*;

c). The shape of the *facies articularis phalangealis*:

- slightly wavy and oblique, with a protruding dorsal projection: *Anthropoides* spp., *Grus* spp., *Otis tarda*, *O. tetrax*;
- straight and wavy: *Crex* spp., *Gallinula* spp., *Porzana parva*, *Rallus* spp.;
- slightly protuberant, with a small pointed ventral tip: *Fulica* spp.;
- strongly protuberant, with an unrounded protruding ventral end: *Porzana parva*;

In the case of plovers, shanks, sandpipers, terns, marsh terns, and auks (Figure 7/11, Figure 8/1–12, Figure 9/1–6):

a). Shape of *facies articularis metacarpalis*:

- strongly protuberant, with a large and pointed dorsal projection: *Calidris* spp., *Charadrius* spp.;
- strongly protuberant, with a small and pointed dorsal projection: *Lymnocyptes* spp.;
- slightly protuberant, with a small and pointed dorsal projection: *Arenaria* spp., *Gallinago* spp., *Himantopus* spp.;
- slightly protuberant: *Tringa erythropus*, *T. totanus*;
- strongly oblique, with a well-developed and pointed dorsal projection: *Glareola* spp., *Philomachus* spp., *Pluvialis* spp., *Recurvirostra* spp.;
- oblique and slightly protuberant, with a protruding dorsal projection: *Tringa hypoleucos*;

Figure 7. Left phalanx proximalis digiti majoris (ventral aspect)

7. ábra Bal oldali kézujjperc (1. ujjperc, II. ujj, hasi nézet)

1. *Anthropoides virgo* (Linnaeus, 1758); 2. *Grus grus* (Linnaeus, 1758); 3. *Otis tarda* (Linnaeus, 1758); 4. *Otis tetrax* (Linnaeus, 1758); 5. *Crex crex* (Linnaeus, 1758); 6. *Fulica atra* (Linnaeus, 1758); 7. *Gallinula chloropus* (Linnaeus, 1758); 8. *Porzana parva* (Scopoli, 1769); 9. *Porzana porzana* (Linnaeus, 1758); 10. *Rallus aquaticus* (Linnaeus, 1758); 11. *Uria aalge* (Pontoppidan, 1763)

Figure 8. Left phalanx proximalis digiti majoris (ventral aspect)

8. ábra Bal oldali kézujjperc (1. ujjperc, II. ujj, hasi nézet)

1. *Glareola pratincola* (Linnaeus, 1766); 2. *Arenaria interpres* (Linnaeus, 1758); 3. *Calidris alpina* (Brehm, 1822); 4. *Charadrius alexandrinus* (Linnaeus, 1758); 5. *Gallinago gallinago* (Linnaeus, 1758); 6. *Himantopus himantopus* (Linnaeus, 1758); 7. *Limosa limosa* (Linnaeus, 1758); 8. *Lymnocyrtus minimus* (Brünnich, 1764); 9. *Numenius arquatus* (Linnaeus, 1758); 10. *Phylomachus pugnax* (Linnaeus, 1758); 11. *Pluvialis squatarola* (Linnaeus, 1758); 12. *Recurvirostra avosetta* (Linnaeus, 1758)

- oblique, with a well-developed and blunt dorsal projection: *Scolopax* spp.;
- slightly obliquely cut, with a straight ventral end and a small dorsal tip: *Numenius* spp.;
- concave: *Limosa* spp., *Tringa nebularis*;
- with a strongly protruding pointed conelike tip on the ventral side: *Vanellus* spp.;
- straight, with a dorsally protruding small pointed projection: *Uria* spp.;
- b). The arc of the *margo dorsalis*:
 - the bulge is cut: *Glareola* spp., *Arenaria* spp., *Himantopus* spp., *Vanellus* spp.;
 - the arc of the bulge is symmetrical: *Calidris* spp., *Charadrius* spp., *Gallinago* spp., *Lymnocyptes* spp., *Limosa* spp., *Numenius* spp., *Philomachus* spp., *Pluvialis* spp., *Recurvirostra* spp., *Scolopax* spp., *Tringa erythropus*, *T. hypoleucos*, *T. nebularia*, *T. totanus*, *Uria* spp.;
- c). The shape of the *facies articularis phalangealis*:
 - wavy, with a slightly protruding dorsal projection: *Calidris* spp.;
 - wavy, with a strongly protruding, blunt dorsal projection: *Glareola* spp., *Arenaria* spp., *Charadrius* spp., *Gallinago* spp., *Himantopus* spp., *Lymnocyptes* spp., *Limosa* spp., *Numenius* spp., *Philomachus* spp., *Pluvialis* spp., *Recurvirostra* spp., *Scolopax* spp., *Vanellus* spp., *Tringa erythropus*, *T. hypoleucos*, *T. nebularia*, *T. totanus*;
 - convex, with a protuberant ventral and bluntly protruding dorsal projection: *Uria* spp.;

In the case of seagulls and skuas (Figure 9/7–12):

- a). Shape of *facies articularis metacarpalis*:
 - oblique and slightly protuberant, with a protruding dorsal projection: *Larus minutus*, *L. ridibundus*, *Stercorarius* spp.;
 - oblique, with a well-developed and pointed dorsal projection: *Chlidonias* spp., *Larus canus*;
 - asymmetrically protruding in the middle: *Sterna* spp.;
- b). The arc of the *margo dorsalis*:
 - the bulge is cut: *Larus minutus*, *Sterna* spp.;
 - the bulge has a symmetrical arc: *Chlidonias* spp., *Larus canus*, *L. ridibundus*, *Stercorarius* spp.;
- c). The shape of the *facies articularis phalangealis*:
 - slightly obliquely convex, with a well-developed and blunt ventral and dorsal projection: *Chlidonias* spp., *Larus canus*, *L. minutus*, *L. ridibundus*, *Stercorarius* spp., *Sterna* spp.;

In the case of partridges, quails and junglefowls (Figure 10/1–4):

- a). Shape of *facies articularis metacarpalis*:
 - concave: *Gallus* spp.;
 - straight line: *Alectoris* spp.;
 - obliquely wavy, lifting from the ventral end towards the dorsal: *Coturnix* spp.;
 - straight wavy: *Perdix* spp.;
- b). The arc of the *margo dorsalis*:
 - slightly protuberant and forms a regular arc: *Alectoris* spp.;
 - the arc is regularly and strongly protuberant: *Gallus* spp.;

Figure 9. Left phalanx proximalis digiti majoris (ventral aspect)

9. ábra Bal oldali kézujjperc (1. ujjperc, II. ujj, hasi nézet)

1. *Scolopax rusticola* (Linnaeus, 1758); 2. *Tringa erythropus* (Pallas, 1764); 3. *Tringa hypoleucos* (Linnaeus, 1758); 4. *Tringa nebularia* (Gunnerus, 1767); 5. *Tringa totanus* (Linnaeus, 1758); 6. *Vanellus vanellus* (Linnaeus, 1758); 7. *Chlidonias niger* (Linnaeus, 1758); 8. *Larus canus* (Linnaeus, 1758); 9. *Larus minutus* (Pallas, 1766); 10. *Larus ridibundus* (Linnaeus, 1758); 11. *Stercorarius pomarinus* (Temminck, 1815); 12. *Sterna hirundo* (Linnaeus, 1758)

Figure 10. Left phalanx proximalis digit majoris (ventral aspect)

10. ábra Bal oldali kézujjperc (1. ujjperc, II. ujj, hasi nézet)

1. *Alectoris graeca* (Meisner, 1804); 2. *Coturnix coturnix* (Linnaeus, 1758); 3. *Gallus gallus domesticus* (Linnaeus, 1758); 4. *Perdix perdix* (Linnaeus, 1758); 5. *Lagopus lagopus* (Linnaeus, 1758); 6. *Lagopus mutus* (Montin, 1776); 7. *Tetrao urogallus* (Linnaeus, 1758); 8. *Tetrao tetrix* (Linnaeus, 1758); 9. *Tetrastes bonasia* (Linnaeus, 1758)

- the slightly and irregularly protuberant arc is wavy: *Coturnix* spp.;
- the strongly and irregularly protuberant arc is wavy: *Perdix* spp.;
- c). The shape of the *facies articularis phalangealis*:
 - obliquely wavy, with a strongly protruding dorsal projection: *Perdix* spp.;
 - obliquely wavy, with a slightly protruding dorsal projection: *Alectoris* spp., *Gallus* spp.;
 - obliquely straight, with a slightly protruding dorsal projection: *Coturnix* spp.;

In the case of grouse (*Figure 10/5–9*):

- a). Shape of *facies articularis metacarpalis*:
 - obliquely and slightly protuberant, with a strongly protruding ventral tip: *Tetrao* spp.;
 - strongly protuberant, with an slightly protruding ventral projection: *Tetrastes* spp.;
 - obliquely cut straight, with a slightly protruding ventral projection: *Lagopus* spp.;
- b). The arc of the *margo dorsalis*:
 - forms a strongly protuberant and regular arc: *Tetrastes* spp.;
 - strongly protuberant, with an obliquely cut edge: *Lagopus* spp.;
 - strongly protuberant with a slightly oblique and flattened edge: *Tetrao* spp.;
- c). Shape of *facies articularis phalangealis*:
 - obliquely wavy, with a strongly protruding conelike dorsal projection: *Lagopus* spp.;
 - obliquely wavy, with a strongly protruding blunt conelike dorsal projection: *Tetrao* spp.;
 - obliquely wavy, with a rounded protruding dorsal projection: *Tetrastes* spp.;

Conclusions

In the case of examined waterbird species, the shape and size of the *phalanx* is quite diverse. We can examine significant cases of sexual dimorphism (*Otis*) in certain species. This greatly favors male specimen. It may be expedient to compare the changes in form of the examined characteristics with the differences in size, since there can be significant differences within families or even genera. Similarities in form can occur in species of different families or genera.

The first *phalanx* of the second wing-finger of Galliformes is typically short and wide, with the exception of the *Coturnix* wing phalanx, which is longer and slimmer. In the case of Phasianidae, the shape proximal end is diverse, while the dorsal edge forms a strongly protuberant arc. The distal end obliquely descends to the dorsal projection, which is more or less strongly protruding. The proximal end in the case of Tetraonidae has a diverse form. The dorsal edge is strongly protuberant but different, while the distal end is descending in an oblique and wavy fashion to the dorsal projection, which is quite strongly protuberant but differs in shape.

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Table 1. Size table of *phalanx proximalis digiti majoris*

A – total length of bone (mm); C – breadth of proximal end; E – breadth of corpus; F – breadth of distal end. New name (Gill *et al.* 2020)

1. táblázat *A phalanx proximalis digiti majoris* mérettáblázata

A – teljes hossz (mm); C – proximális vég szélessége; E – a test szélessége; F – disztális vég szélessége. Új név – New name (Gill *et al.* 2020)

Species	New genus name	A	C	E	F
	Gill <i>et al.</i> 2019				
Gaviiformes					
<i>Gavia arctica</i>		26.50	5.50	8.00	7.00
<i>Gavia stellata</i>		22.50	6.00	7.00	5.50
Podicipediformes					
<i>Podiceps auritus</i>		14.20	2.50	3.00	2.50
<i>Podiceps cristatus</i>		20.00	3.50	4.50	3.70
<i>Podiceps grisegena</i>		19.00	3.00	4.00	3.00
<i>Podiceps nigricollis</i>		15.00	2.50	3.00	2.50
Pelecaniformes					
<i>Pelecanus crispus</i>		68.00	17.00	26.00	16.00
<i>Pelecanus onocrotalus</i>		71.00	18.00	26.00	18.00
<i>Phalacrocorax carbo</i>		33.00	6.00	9.00	6.50
<i>Phalacrocorax pygmaeus</i>	<i>Microcarbo</i>	19.50	3.50	6.00	4.00
Ardeiformes					
<i>Ardea cinerea</i>		35.00	6.50	11.00	8.00
<i>Ardea purpurea</i>		28.00	4.50	9.00	7.00
<i>Ardeola ralloides</i>		16.00	3.00	5.00	3.50
<i>Bubulcus ibis</i>		31.00	6.00	10.00	8.00
<i>Botaurus stellaris</i>		27.00	4.50	7.50	6.00
<i>Egretta garzetta</i>		20.50	5.00	6.00	5.00
<i>Nycticorax nycticorax</i>		20.00	3.00	10.50	5.00
<i>Ciconia ciconia</i>		46.00	11.00	11.50	11.00
<i>Ciconia nigra</i>		50.00	8.00	13.00	12.00
<i>Platalea leucorodia</i>		39.00	8.00	10.50	8.00
<i>Plegadis falcinellus</i>		22.00	3.50	7.50	5.00
<i>Phoenicopterus ruber</i>		36.00	5.00	8.00	6.00
Anseriformes					
<i>Anser albifrons</i>		40.00	7.00	11.50	11.00
<i>Anser anser</i>		46.00	9.50	10.50	10.00

Species	New genus name	A	C	E	F
<i>Anser erythropus</i>		33.00	6.00	10.00	7.00
<i>Anser fabalis</i>		41.00	7.50	11.50	10.00
<i>Branta bernicla</i>		29.00	5.00	9.00	7.00
<i>Branta ruficollis</i>		25.00	6.50	7.50	5.50
<i>Tadorna tadorna</i>		34.00	6.00	10.50	8.00
<i>Cygnus cygnus</i>		61.00	10.50	15.00	11.00
<i>Cygnus olor</i>		59.00	11.00	12.00	11.00
<i>Anas acuta</i>		22.00	3.50	6.50	6.00
<i>Anas clypeata</i>	<i>Spatula</i>	20.50	5.00	5.50	5.00
<i>Anas crecca</i>		15.00	3.00	5.00	4.00
<i>Anas penelope</i>	<i>Mareca</i>	20.00	4.00	6.50	4.00
<i>Anas platyrhynchos</i>		23.00	4.50	7.00	5.00
<i>Anas querquedula</i>	<i>Spatula</i>	15.00	4.00	6.00	4.50
<i>Anas strepera</i>	<i>Mareca</i>	21.00	4.50	6.50	5.00
<i>Aythya ferina</i>		19.50	4.00	5.50	4.50
<i>Aythya fuligula</i>		18.00	3.50	5.00	4.50
<i>Aythya marila</i>		20.00	3.50	6.00	5.00
<i>Aythya nyroca</i>		15.50	3.50	4.50	3.50
<i>Bucephala clangula</i>		21.00	4.50	5.50	4.00
<i>Clangula hyemalis</i>		19.50	4.50	7.00	4.50
<i>Melanitta nigra</i>		24.00	4.00	6.00	5.00
<i>Mergus albellus</i>	<i>Mergellus</i>	18.00	3.50	5.00	5.00
<i>Mergus merganser</i>		25.00	4.00	7.00	6.50
<i>Mergus serrator</i>		20.50	4.00	5.50	5.00
<i>Somateria mollissima</i>		29.00	6.50	10.00	7.00
Gruiformes					
<i>Anthropoides virgo</i>	<i>Grus</i>	42.50	7.50	17.00	11.00
<i>Grus grus</i>		51.00	11.00	13.00	10.00
<i>Otis tarda</i>		56.00	10.00	15.00	13.00
<i>Otis tetrax</i>	<i>Tetrax</i>	20.00	4.20	6.00	6.00
Ralliformes					
<i>Crex crex</i>		9.50	2.50	3.50	3.00
<i>Fulica atra</i>		18.00	4.00	5.50	5.00
<i>Gallinula chloropus</i>		12.50	3.20	4.00	3.00
<i>Porzana parva</i>	<i>Zapornia</i>	6.00	1.50	2.00	2.50
<i>Porzana porzana</i>		8.00	2.50	3.00	2.50
<i>Rallus aquaticus</i>		8.50	2.50	3.50	2.50

Species	New genus name	A	C	E	F
Charadriiformes					
<i>Uria aalge</i>		20.00	4.00	6.00	6.50
<i>Glareola pratincola</i>		15.20	3.00	4.50	5.00
<i>Arenaria interpres</i>		12.20	2.00	4.00	3.50
<i>Calidris alpina</i>		9.00	2.20	2.70	2.30
<i>Charadrius alexandrinus</i>		8.00	3.00	3.50	3.50
<i>Gallinago gallinago</i>		13.50	2.30	3.80	3.00
<i>Himantopus himantopus</i>		17.00	3.00	5.00	4.80
<i>Limosa limosa</i>		15.50	3.80	5.00	3.50
<i>Lymnocyptes minimus</i>		8.00	2.00	2.70	2.00
<i>Numenius arquata</i>		26.50	5.00	8.00	5.00
<i>Philomachus pugnax</i>		15.00	3.00	5.00	4.50
<i>Pluvialis squatarola</i>		17.00	4.00	5.20	5.00
<i>Recurvirostra avosetta</i>		20.00	4.00	6.20	5.00
<i>Scolopax rusticola</i>		19.50	3.00	6.00	4.50
<i>Tringa erythropus</i>		21.20	2.50	3.60	3.00
<i>Tringa hypoleucos</i>		8.80	1.70	2.50	2.00
<i>Tringa nebularia</i>		26.50	4.00	5.30	5.00
<i>Tringa totanus</i>		13.00	2.80	4.50	3.00
<i>Vanellus vanellus</i>		16.00	3.50	5.20	4.00
<i>Chlidonias niger</i>		17.50	3.50	5.50	3.00
<i>Larus canus</i>		28.00	6.50	7.50	7.50
<i>Larus minutus</i>	<i>Hidrocoloëus</i>	8.30	2.00	3.00	3.00
<i>Larus ridibundus</i>	<i>Chroicocephalus</i>	24.00	5.00	8.50	5.50
<i>Stercorarius pomarinus</i>		32.00	6.00	8.00	5.00
<i>Sterna hirundo</i>		22.00	4.00	6.50	5.50
Galliformes					
<i>Alectoris graeca</i>		12.50	4.00	5.20	3.50
<i>Coturnis coturnix</i>		7.50	2.00	3.20	2.80
<i>Gallus domesticus</i>		15.00	5.00	7.50	5.50
<i>Perdix perdix</i>		11.50	3.50	5.50	4.50
<i>Lagopus lagopus</i>		15.50	4.50	7.50	5.50
<i>Lagopus mutus</i>	<i>L. mute</i>	15.50	4.50	6.00	4.50
<i>Tetrao tetrix</i>		20-00	6.00	11.00	6.00
<i>Tetrao urogallus</i>		32.00	12.50	14.00	10.50
<i>Tetrastes bonasia</i>		21.00	6.00	8.50	6.20

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