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Paleontological Collections: Background and Fossil Aves,
Cercopithecidae, and Suidae

Edited by

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CONTENTS

Acknowledgements

Chapter 1. Introduction (Gen Suwa, Yonas Beyene, and Berhane Asfaw)	1
Chapter 2. The Konso Formation Paleontological Assemblages: Collecting and Documentation Methodologies (Gen Suwa, Hideo Nakaya, and Berhane Asfaw)	5
Chapter 3. Stratigraphic and Chronologic Context of the Konso Formation Paleontology (Shigehiro Katoh, Gen Suwa, Hideo Nakaya, and Yonas Beyene)	11
Chapter 4. Fossil Birds of the Konso Formation (Antoine Louchart)	25
Chapter 5. Fossil Cercopithecidae of the Konso Formation (Stephen R. Frost)	41
Chapter 6. Fossil Suidae of the Konso Formation (Gen Suwa, Antoine Souron, and Berhane Asfaw)	73
Appendix 1. Aves Referred Materials	89
Appendix 2. Cercopithecidae Referred Materials	91
Appendix 3. Suidae Referred Materials and Dental Metrics	97

Related Archival Materials: The KGA paleontological collection record plots (on file, available for viewing upon request)

CHAPTER 4

Fossil Birds of the Konso Formation

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Abstract

Fossil birds from the Konso Formation include a minimum of 12 different genera and species, represented by 36 fossils. The fossils come from the ~1.9 Ma and ~1.45 Ma to ~1.25 Ma stratigraphic intervals, and are rather homogeneous among localities and ages as judged from the available small samples. Most of the fossils represent aquatic birds, with the exceptions of the eagle cf. *Aquila* sp., the vulture *Aegyptius* (*Torgos*) cf. *tracheliotus*, the francolin cf. *Francolinus* s. l. sp., and the guineafowl *Numida* cf. *meleagris*. The mostly aquatic birds are either swimming and diving piscivores (mainly the grebes *Tachybaptus ruficollis*, *Podiceps* sp., the cormorant *Phalacrocorax* cf. *tanzaniae*, the darter *Anhinga* cf. *melanogaster*), shore predators of small vertebrates or invertebrates (the heron *Ardea* sp., the stork *Mycteria* cf. *ibis*, the ibis Threskiornithidae gen. et sp. indet.), or swimming herbivores (the Anserinae). Three of the bird species are either extinct or extirpated, among which the Anserinae is probably a swan (tribe Cygnini) whereas swans are now absent from sub-Saharan Africa. The mostly aquatic birds altogether indicate a calm freshwater course or a freshwater body.

4.1 INTRODUCTION

Thirty six bird fossils representing a minimum of twelve different genera and species have been recovered from the Konso Formation (summarized in Appendix Table A1.1). This material was collected from two stratigraphic intervals. Twelve specimens derive from the ~1.9 Ma levels of the Sorobo/Turoha Members, and the remaining material is from the upper part of the Kayle Member and Karat Member (~1.45 Ma to ~1.25 Ma) (Katoh et al., 2000; Suwa et al., 2003; Beyene et al., 2013, Chapter 3 of this volume). These levels correspond to stratigraphic intervals 1 and 4/5 of Suwa et al. (2003), respectively.

4.2 METHODS

The systematic order follows Unwin (1993) for convenience, then Del Hoyo et al. (1992, 1994) and updates deriving from important changes in taxonomy following Hackett et al. (2008), such as families Ardeidae and Threskiornithidae belonging in order Pelecaniformes. The osteological nomenclature follows Baumel and Witmer (1993).

4.3 SYSTEMATIC PALEONTOLOGY

Order Podicipediformes

Family Podicipedidae

Genus *Tachybaptus**Tachybaptus ruficollis***Referred Konso materials**

Upper part of Kayle Member: KGA4-2220 (left distal humerus) (~1.45 Ma).

Measurements

Distal width measured in the plane of the whole humerus 5.3 mm, distal depth perpendicular to the preceding 3.8 mm (estimation), minimal width of the shaft 2.25 mm, measure 'd' of the distal width sensu Bochenski (1994) 5.8 mm.

Remarks

This distal humerus is similar to extant *Tachybaptus ruficollis*, morphologically and in dimensions (Bochenski, 1994) (Fig. 4.1: 1). This species is widespread today in the Old World. The species is known in Africa as early as in the Early Pliocene of Langebaanweg (South Africa), where it is identifiable as the subspecies *T. r. capensis* of Africa and South Asia (Olson, 1994). *Tachybaptus ruficollis* indicates a water course or a water body, generally of freshwater. Its diet is composed mainly of invertebrates and small fish.

Genus *Podiceps**Podiceps* sp.**Referred Konso materials**

Karat Member: KGA17-54 and KGA17-60 (both left distal humeri) (~1.40 Ma).

Measurements

KGA17-54: distal width measured in the plane of the whole humerus 7.8 mm, minimal width of the shaft 3.6 mm, measure 'd' of the distal width sensu Bochenski (1994) 8.6 mm.

KGA17-60: distal width measured in the plane of the whole humerus 8.65 mm, distal depth perpendicular to the preceding 5.9 mm, minimal width of the shaft 3.85 mm, measure 'd' of the distal width sensu Bochenski (1994) 9.7 mm.

Remarks

These two distal humeri (Fig. 4.1: 2, 3) fit well in the sexual and individual size variation of a single medium-sized species of grebe. By their morphology, they are similar to humeri of recent grebes of the genus *Podiceps*. In size, they indicate a variation range intermediate between *P. auritus* and the larger *P. grisegena grisegena* (Bochenski, 1994). The two Konso humeri size range overlaps with both these living taxa: KGA17-54 is the size of large individuals of *P. a. arcticus*, and KGA17-60 is the size of small individuals of *P. g. grisegena*.

Therefore, the fossils differ in size from all the living species in the world, except perhaps *Podiceps gallardoi* (Bochenski, 1994). However, the latter is restricted to southern Argentina (Del Hoyo et al., 1992). A similar size to the species of Konso is thus a convergence.

An extinct undescribed grebe from the Lower Pleistocene of Dursunlu, Turkey (Louchart et al., 1998) also fits in this interval, but its humerus is unknown. Many extinct taxa have been described, especially in the Late Neogene of North America and Europe. Two of them lie in this size interval and are classified in the genus *Podiceps*: *P. pisanus* (PORTIS 1889) from the Pliocene of Italy (Regalia, 1902) has a humerus similar to KGA17-54. However, the identity of the Konso

fossils remains uncertain, awaiting more material. *Podiceps discors* MURRAY 1967 falls in the same interval (Chandler, 1990), but its humerus is unknown.

It is not possible to assign at present the two humeri of Konso to a living or extinct species, and it is preferable for now to leave them as *Podiceps* sp., keeping in mind a possible identity with the species of the Lower Pleistocene of Turkey, and possibly *P. pisanus*. Interestingly, Olson (1994) reports a probably extinct grebe, *Podiceps* sp., from the Early Pliocene of Langebaanweg. But the distal part of the two humeri show smaller dimensions than in the specimens of Konso, and more similar to *P. auritus* or *P. nigricollis*. There may thus be at least two extinct grebes in the African Plio-Pleistocene. A grebe *Podiceps* sp. was present in the Late Miocene of the Middle Awash, Ethiopia (Louchart et al., 2008).

Like all grebes, this species indicates open water, a slow water course or a water body. Grebes are swimmers, divers and their diet is mainly piscivorous.

Order Pelecaniformes
Family Phalacrocoracidae
Genus *Phalacrocorax*

***Phalacrocorax* cf. *tanzaniae* HARRISON AND WALKER 1979**

Referred Konso materials

Upper part of Kayle Member: KGA10-847 (left distal femur) (~1.44 Ma).

Measurements

Distal width 13.2 mm, distal depth 8.9 mm, minimal width of the shaft 5.0 mm.

Remarks

The fossil (Fig. 4.1: 4) is similar in morphology to that in extant cormorants *Phalacrocorax*. The species in this genus differ among themselves postcranially in relative intra- and inter-segment proportions, and in global size. The overall size of KGA10-847 lies in the range of living *Ph. (Stictocarbo) capensis*. It is smaller than in *Ph. (S.) aristotelis*, much smaller than in *Ph. (Phalacrocorax) carbo*, and larger than in all the species in the subgenus *Microcarbo* (Brodkorb and Mourer-Chauviré, 1984). All the other living species of cormorants are either different in size, or their range is remote from Africa, most being strictly marine, South American or Australasian (Del Hoyo et al., 1992), except *Ph. fuscicollis* (see below).

The Konso distal femur differs from that of *Phalacrocorax (Stictocarbo) owrei* BRODKORB AND MOURER-CHAUVIRÉ 1984 (from the Lower Pleistocene of Olduvai Gorge, Tanzania) in its absolutely and relatively wider epiphysis (Brodkorb and Mourer-Chauviré, 1984). The femur is unknown in *Ph. tanzaniae* HARRISON AND WALKER 1979 from the other localities of the Lower Pleistocene of Olduvai Gorge (Harrison and Walker, 1979; Brodkorb and Mourer-Chauviré, 1984). However, the width dimensions of its tarsometatarsus are slightly larger than in *Ph. owrei*. Therefore, hindlimb width dimensions suggest that *Ph. tanzaniae* is about the same size as the cormorant of Konso. Direct comparison with *Ph. tanzaniae* and appreciation of the proportions in KGA10-847 being so far impossible, the identification of the latter remains tentative. *Phalacrocorax tanzaniae* is equivalent in size to *Ph. capensis*, but the latter species is restricted to marine coasts of southern Africa. It seems more likely that KGA10-847 belongs to *Ph. tanzaniae*, which was certainly a relatively restricted freshwater species.

A further species, *Phalacrocorax kuehneanus* SCHLÜTER 1991 from the presumably Upper Pliocene of Minjingu, Tanzania (Schlüter, 1991), is close in size to *Ph. owrei*, actually in the lower half of the size range of the latter as indicated by the femur measurements. The affinities

of *Ph. kuehneanus* are unclear, because its inter-segment proportions (Brodkorb and Mourer-Chauviré, 1984) seem to be closer to the subgenus *Leucocarbo* than to *Phalacrocorax*, *Stictocarbo* or *Microcarbo*. The living species of *Leucocarbo* are all marine species of southern South America, Australasia or Antarctic. This similarity is thus probably not indicative of a close phylogenetic relationship. Given the dimensions of a distal humerus referred to *Ph. tanzaniae* (Harrison and Walker, 1979), similar to those in *Ph. owrei*, it can be inferred that the ratio tarsometatarsus/humerus is likely to be even higher in *Ph. tanzaniae* than in the latter. Such a ratio is indicative that *Ph. tanzaniae* as it is defined belongs most likely to *Stictocarbo*, like *Ph. owrei* and *Ph. capensis*. Therefore, *Ph. tanzaniae* seems to differ from *Ph. fuscicollis*, which belongs to the subgenus *Phalacrocorax* (Brodkorb and Mourer-Chauviré, 1984). The total lengths of some elements (Brodkorb and Mourer-Chauviré, 1984) show that both *Ph. owrei* and *Ph. kuehneanus* differ from *Ph. fuscicollis*.

To summarize, *Phalacrocorax tanzaniae*, *Ph. owrei* and *Ph. kuehneanus* seem to be distinct species. The latter two differ from *Ph. fuscicollis* and *Ph. capensis*. *Phalacrocorax tanzaniae* is known by fragmentary material, and seems to differ from *Ph. fuscicollis* but it is not clear whether it differs significantly from *Ph. capensis*. Given the inland eastern African situation of *Ph. tanzaniae*, it is assumed that *Ph. capensis* and it are different lineages. As for KGA10-847, it differs from both *Ph. owrei* and *Ph. kuehneanus*, and appears to be close to *Ph. tanzaniae* despite poor skeletal representation. The fossil of Konso must be compared to *Ph. capensis* and *Ph. fuscicollis*, even though these two extant species occur far from inland Tanzania (respectively southwestern Africa, and India and southeastern Asia). It is here tentatively referred to *Ph. tanzaniae*.

Other extinct Pliocene or Pleistocene species are known in the Old World (Harrison, 1979, Kurochkin, 1985; Tugarinov, 1940). The proximal tarsometatarsus of *Valenticarbo praetermissus* HARRISON 1979 (Late Pliocene of the Siwalik, India) is the size of *Phalacrocorax tanzaniae*, and perhaps also of *Ph. fuscicollis*. The morphological (discrete) differences given by Harrison (1979) between *Valenticarbo* HARRISON 1979 and *Phalacrocorax* seem invalid, as are the discrete differences that were initially proposed between *Ph. tanzaniae* and the other species of the genus (Brodkorb and Mourer-Chauviré, 1984). Therefore, *V. praetermissus* should be compared with both *Ph. tanzaniae* and *Ph. fuscicollis*, to examine the possibility of synonymies (see also Olson, 1985). *Pliocarbo longipes* TUGARINOV 1940 (Early Pliocene of Ukraine), with its very long tarsometatarsus, is doubtful even at the family level (Olson, 1985). Even if it is a cormorant, it is not smaller than *Ph. carbo*. Two extinct species are known from the Middle Pliocene of Mongolia: *Phalacrocorax reliquus* KUROCHKIN 1976 and *Ph. mongolicus* KUROCHKIN 1971 (Kurochkin, 1976, 1985). *Phalacrocorax destefani* REGALIA 1902 is from the Middle Pliocene of Italy (Bochenski, 1997). *Phalacrocorax reliquus* and *Ph. destefani* are large cormorants, close in size to *Ph. carbo* (Kurochkin, 1976). *Phalacrocorax mongolicus* has a distal femur that is the size of KGA10-847 (Kurochkin, 1976), but a possible identity needs further comparisons with the Siwalik species, *Ph. tanzaniae*, and *Ph. fuscicollis*.

The cormorant of Konso indicates open water body or slow water course. Cormorants of that size are mainly piscivorous.

Family Anhingidae

Genus *Anhinga*

Anhinga cf. *melanogaster*

Referred Konso materials

Sorobo/Turoha Members (~1.9 Ma): KGA4-1378 (left distal ulna), KGA4-1777 (right distal tibiotarsus), KGA4-2272a and b (possibly associated a, left proximal humerus; b, right distal ulna);

upper part of Kayle Member: KGA10-846 (right distal humerus) (~1.44 Ma), KGA11-190 (right distal ulna) (~1.45 Ma);

Karat Member: KGA12-1022 and KGA12-1163 (left distal humeri) (~1.25 Ma).

Measurements

Humeri:

KGA4-2272a: proximal width 19.7 mm.

KGA10-846: distal width 13.1 mm, minimal width of shaft 5.0 mm.

KGA12-1022: distal width 13.9 mm, distal depth 9.6 mm.

KGA12-1163: distal width 15.6 mm, distal depth 10.1 mm.

Ulnae:

KGA4-2272b: depth of the condylus dorsalis 8.1 mm.

KGA4-1378: maximal distal width from the condylus dorsalis to the tuberculum carpale 10.0 mm, minimal width of shaft 4.8 mm.

KGA11-190: maximal distal width from the condylus dorsalis to the tuberculum carpale 10.3 mm, minimal width of shaft 5.3 mm (estimated); depth of shaft just below level of penultimate tubercle of feather insertion 5.3 mm.

Tibiotarsus:

KGA4-1777: distal width 10.3 mm (estimated); depth of condylus medialis 10.0 mm, minimal width of shaft 6.0 mm.

Remarks

The fossils (Fig. 4.1: 5 to 9) are morphologically similar to the Old World *Anhinga* species *A. melanogaster*, and differ from the New World *A. anhinga* by characters of the ulna and the tibiotarsus (Harrison, 1978, Brodkorb and Mourer-Chauviré, 1982, Becker, 1987, Louchart et al., 2004). The tibiotarsus KGA4-1777 shows also the more slender distal epiphysis of *A. melanogaster*.

The fossils seem in a large part compatible in size with *Anhinga melanogaster*, but some are smaller than in the examined sample (up to seven individuals) of the living species. In recent *A. melanogaster*, the range of measurements is as follows: humerus: proximal width 18.5–20.5 mm (n=3), distal width 15.2–16.1 mm (n=4), distal depth 10.1–10.4 mm (n=3), minimal width of shaft 6.0–7.0 mm (n=4); ulna: depth of the condylus dorsalis 8.3–9.5 mm (n=7*), maximal distal width from the condylus dorsalis to the tuberculum carpale 10.7–11.5 mm (n=7*), minimal width of shaft 4.9–5.8 mm (n=7*); tibiotarsus: distal width 9.85–11.05 mm (n=7*), depth of condylus medialis 9.6–10.5 mm (n=7*), minimal width of shaft 5.2–5.75 mm (n=3) (* includes data from Brodkorb and Mourer-Chauviré, 1982).

The fossils of Konso differ in their proportions from *Anhinga badarensis* BRODKORB AND MOURER-CHAUVIRÉ 1982 (Plio-Pleistocene of Ethiopia and of Tanzania, Hadar, Omo, and Olduvai, on the whole from 3.5 Ma to 1.5 Ma). The distal ulnae and the distal tibiotarsus of Konso differ from those in *A. badarensis* in proportions, in that they are not so thick in depth. Many other extinct species of *Anhinga* have been described in the world, and all of them differ in size or morphology from *A. melanogaster*, most of them being larger (Louchart et al., 2004). The fossils of Konso represent either a noticeably small-sized population of *A. melanogaster*, perhaps ancestral to the recent one of Africa, or an extinct lineage. Pliocene fossils from Chad of

A. melanogaster (Louchart et al., 2004) lie in the smaller part of the recent variation range. It is most probable that the Konso representatives are also individuals of the direct ancestor to recent African *A. melanogaster*. They may be sufficiently smaller in average to be recognised as a new, chronological subspecies. A larger sample of recent specimens is needed for this, and the fossils are left here as *A. cf. melanogaster*. *Anhinga melanogaster* is known as early as in the Late Miocene of Lothagam, Kenya (Harris and Leakey, 2003), and from several Ethiopian and Chadian hominid localities too (Louchart et al., 2008).

This species indicates water bodies or slow water courses. It rarely frequents alkaline or brackish water, and almost always freshwater habitats. It feeds mainly on fish in rather shallow water.

Family Ardeidae

Genus *Ardea*

Ardea sp., size of *A. alba*

Referred Konso materials

Sorobo Member (~1.9 Ma): KGA4-856 (incomplete right coracoid), KGA4-855 (right distal tarsometatarsus);

upper part of Kayle Member: KGA10-2314 (left distal tibiotarsus) (~1.45 Ma).

Measurements

KGA4-856 coracoid: maximal distal thickness near the angulus medialis 5.5 mm, minimal width of the bone 5.4 mm.

Remarks

The herons Ardeidae are represented at Konso by these three remains (Fig. 4.1: 10 to 12), which all match morphologically the genus *Ardea*, after criteria exposed in Gruber (1990). Within the genus, the fossils are the size of *A. alba*, but several other living species are about the same size. The identification is thus better left as *Ardea* sp., the size of *A. alba*.

Herons of this kind indicate only a humid environment, from marsh or humid meadow to lake or river margins. They feed on small vertebrates and invertebrates.

Family Threskiornithidae

Threskiornithidae gen. et sp. indet.

Referred Konso materials

Karat Member: KGA12-913 (left distal ulna) (~1.25 Ma).

Measurements

Depth of condylus dorsalis 9.7 mm, maximal distal width between condylus dorsalis and tuberculum carpale 11.6 mm, minimal width of diaphysis 6.7 mm.

Remarks

This distal ulna (Fig. 4.2: 2) shows the morphology of ibises Threskiornithidae, by the poorly developed tuberculum carpale, the shape of the tendinal pit (sensu Howard, 1929), among others. It is more difficult to assign it to a particular genus, even if it matches well at least the genus *Geronticus*, and the species *G. eremita*. It is left here as Threskiornithidae gen. et sp. indet.

This family has a poor fossil record, and is indicative of some freshwater point in the vicinity of the site, except for species of *Geronticus*, which are less water-dependent.

Order Ciconiiformes
 Family Ciconiidae
 Genus *Mycteria*
Mycteria cf. ibis

Referred Konso materials

Sorobo/Turoha Members (~1.9 Ma): KGA4-1083 (proximal tarsometatarsus).

Measurements

Proximal width of the articular surfaces 14.9 mm, proximal depth of the articular surfaces 9.8 mm, proximal depth including the cristae hypotarsi 16.1 mm.

Remarks

This proximal tarsometatarsus (Fig. 4.2: 1) is identical in morphology to the genus *Mycteria*. It differs from *Ciconia* in that it lacks a deep depression between the proximal articulating surface and the cristae hypotarsi (Haarhoff, 1988). It matches in size the living African species *M. ibis*, as well as the South Asian *M. leucocephala*. The same measurements as on the fossil, when taken on four recent *M. ibis*, range respectively from 14.7–16.85 mm, 9.7–10.35 mm, and 14.5–17.5 mm.

This species indicates all kinds of wetland sites, from margins of rivers and lakes, to swamp; also alkaline or marine wetlands. It feeds on small vertebrates, mainly in shallow water.

Order Anseriformes
 Family Anatidae
 Subfamily Anserinae
Tribe cf. Cygnini

Referred Konso materials

Sorobo/Turoha Members (~1.9 Ma): KGA4-1667 (left distal ulna), KGA4-2102 (right distal ulna).

Measurements

KGA4-1667: depth of condylus dorsalis 18.7 mm, maximal distal width between condylus dorsalis and tuberculum carpal 22.3 mm, minimal width of diaphysis 10.1 mm.

KGA4-2102: depth of condylus dorsalis 15.9 mm (estimated), minimal width of diaphysis 8.1 mm.

Remarks

Both these distal ulnae are morphologically similar to those of Anserinae (Fig. 4.2: 3). Within the subfamily, they match closely the swans, tribe Cygnini, and differ from the geese, tribe Anserini, for example in the shape of the condylus dorsalis, extending laterally farther at its proximal extremity. But given the fragmentary nature of the fossils, they are only tentatively referred to the Cygnini. They are about the size of a small individual of extant *Cygnus olor* or *C. cygnus*, or of *C. columbianus*. Swans are today totally absent from sub-Saharan Africa, and only wintering in the northern Mediterranean fringe of northern Africa. However, it is most interesting to notice that they were represented in the Early Pleistocene of another Ethiopian locality, Melka Kunture (ca. 1.4 Ma–1.7 Ma), with a swan the size of extant *C. olor* or *C. cygnus* (Pichon, 1979). In addition, a distal ulna of a swan *C. cf. olor* was reported from the Early/Middle Pleistocene of Olduvai (Tanzania) (Harrison, 1980). The Konso fossil hence reinforces evidence for a swan population in northeastern Africa during the Early Pleistocene, perhaps wintering or even resident there as an effect of adverse cold climate at northern latitudes where they live today.

Another endemic and extinct genus and species of swan, *Afrocygnus chawvireae*, was identified

from much older localities in central and northern Africa at least (Louchart et al., 2005; Manegold et al., 2013).

As an Anserinae, and probably a swan, this taxon indicates a water body or slow water course. These birds are vegetarian.

Anatidae indet.

Referred Konso materials

Karat Member: KGA17-77 (pedal phalanx) (~1.40 Ma).

Measurements

Length 31.3 mm, proximal width 7.6 mm, proximal depth 7.1 mm, distal depth 5.0 mm.

Remarks

This phalanx (Fig. 4.2: 4) is identified as belonging to an Anatidae, but a more precise assignment remains hazardous. Anatidae indicate a water body or a water course.

Order Falconiformes
Family Accipitridae
Genus cf. *Aquila*
cf. *Aquila* sp.

Referred Konso materials

Upper part of Kayle Member (~1.4 Ma to ~1.45 Ma): KGA4-2219 (pedal phalanx 2 of digit II), KGA10-472 (pedal phalanx 1 of digit I), KGA10-1339 (pedal phalanx), KGA10-1405 (claw 4 of digit III), KGA10-1478 (fragmentary left coracoid).

Measurements

KGA4-2219 phalanx 2II: length 28.1 mm, proximal width 9.3 mm, distal width 7.8 mm, minimal width of corpus 6.4 mm.

KGA10-472 phalanx 1I: length 29.6 mm, proximal width 15.6 mm, distal width 8.4 mm, minimal width of corpus 7.35 mm.

KGA10-1339 phalanx: length 29.7 mm, proximal width 8.4 mm, distal width 6.3 mm, minimal width of corpus 6.8 mm.

KGA10-1405 claw 4III: height of proximal articular surface 9.4 mm, width of proximal articular surface 7.5 mm.

KGA10-1478 coracoid: minimal width of the bone 14.15 mm.

Remarks

The proportions and size of the phalanges are closer to *Aquila* than to other African genera of eagles, the smaller *Spizaetus* and *Lophoaetus*, or the larger *Stephanoaetus* or *Polemaetus* (the former having distinctive stout and the latter slender phalanges) (Figs. 4.2: 5; 4.3: 1, 2). In size, they indicate an eagle the stature of *A. heliaca*, a Palearctic migrant today. The generic identification remains however tentative.

Genus *Aegypius* (*Torgos*)
Aegypius* (*Torgos*) cf. *tracheliotus

Referred Konso materials

Karat Member: KGA7-378 (almost complete right humerus) (~1.40 Ma); KGA12-486 (left distal tibiotarsus) (~1.25 Ma).

Measurements

KGA7-378 humerus: length 250.0 mm (estimated), proximal width 46.0 mm, distal width 40.0 mm, minimal width of shaft 16.5 mm.

KGA12-486 tibiotarsus: distal width 22.4 mm, distal depth 18.3 mm, minimal width of shaft 12.1 mm.

Remarks

These fossils (Fig. 4.3: 3, 4) are identical in morphology with recent humeri and tibiotarsi of the vulture genus *Aegyptius* (s.l., including *Torgos*). In dimensions, they agree with *A. (Torgos) tracheliotus*, and are tentatively referred to this species. *Aegyptius (T.) tracheliotus* like other vultures feeds on carcasses, mainly of large mammals.

Order Galliformes
Family Phasianidae
Subfamily cf. Phasianinae
Genus cf. *Francolinus* s.l.
cf. *Francolinus* sp.

Referred Konso materials

Sorobo Member (~1.9 Ma): KGA4-2389 (left distal humerus);

Karat Member (~1.25 Ma to ~1.4 Ma): KGA12-806 (right proximal humerus).

Measurements

KGA4-2389: distal width 10.25 mm, distal depth 6.0 mm, minimal width of shaft 4.4 mm.

KGA12-806: proximal width 13.8 mm, depth of caput humeri 7.0 mm.

Remarks

These fragments of humeri (Fig. 4.3: 5, 6) agree perfectly in morphology with similar sized extant species of *Francolinus* s.l. But they are also virtually similar in morphology to the otherwise larger extant species of guineafowl, family Numididae. Therefore, it is mainly on size that they are tentatively attributed here to *Francolinus* sp. Francolins are well represented as fossils in the African Pleistocene and also earlier strata.

Francolins are birds of various dry landscapes, very widespread in Africa, and also present in southern parts of the Palearctic.

Family Numididae
Genus *Numida*
Numida* cf. *meleagris

Referred Konso materials

Upper part of Kayle Member: KGA10-898 (almost complete right tarsometatarsus), KGA10-2506 (left distal coracoid) (~1.44 Ma).

Measurements

KGA10-898 tarsometatarsus: total length 61.0 mm, distal width 13.75 mm, minimal width of shaft 6.1 mm.

KGA10-2506 coracoid: distal width of all the facies articularis sternalis 12.7 mm, total distal width including the processus lateralis 15.6 mm, maximal depth of the facies articularis sternalis 5.5 mm, minimal width of the bone 6.75 mm.

Remarks

The lack of spurs associated with the relative shortness of the tarsometatarsus (Fig. 4.3: 8), indicate that it belongs to a spurless Numididae, with which it also agrees in size. It matches

well the same bone in the species *Numida meleagris*, and is shorter and stouter than in *Acryllium vulturinum*, the two species of *Agelastes*, and the two species of *Guttera*. The coracoid (Fig. 4.3: 7) is larger than in *Guttera* spp. and *Agelastes* spp. It has a relatively deep facies articularis sternalis, and a wide corpus, like *N. meleagris* and unlike all the other genera. It seems in accordance in size with the only species *N. meleagris*. The two fossils thus belong to *Numida*, and are tentatively referred to the living species *N. meleagris*. This species is not rare among fossil galliform birds in the Pleistocene of Africa, and also earlier strata on the continent.

Numida cf. *meleagris* indicates various dry land types, and is very widespread in Africa.

Aves indet.

Referred Konso materials

Sorobo Member (~1.9 Ma): KGA4-415 (distal part of pedal phalanx), KGA4-1884 (pedal phalanx);

upper part of Kayle Member: KGA10-2171 (pedal phalanx) (~1.44 Ma), KGA10-2737 (distal part of pedal phalanx) (~1.44 Ma);

Karat Member: KGA8-495 (pedal phalanx) (~1.40 Ma).

Measurements

KGA4-415: distal width 3.9 mm, minimal width of corpus 3.2 mm.

KGA4-1884: length 22.2 mm, minimal width of corpus 3.1 mm.

KGA8-495: length 31.1 mm; minimal width of corpus 4.6 mm.

KGA10-2171: proximal width 4.1 mm, minimal width of corpus 2.1 mm.

KGA10-2737: distal width 4.25 mm, minimal width of corpus 2.8 mm.

Remarks

These phalanges are left here as Aves indet. Further investigation may allow assigning some of them to order.

4.4 DISCUSSION

Of the Konso bird assemblage, only one species of grebe *Podiceps* sp. is probably extinct, and two species are either extinct or disappeared locally: *Phalacrocorax* cf. *tanzaniae*, and the Anserinae indet. cf. Cygnini. Interestingly, the latter species might relate to an otherwise known swan species from the Early Pleistocene of another Ethiopian locality, Melka Kunture, as well as Olduvai (Tanzania), whereas swans are absent from sub-Saharan Africa today. All the other taxa are referable to living African birds, including of lowland Ethiopia, only *Anhinga* cf. *melanogaster* possibly representing an ancestral population slightly smaller in size than the extant ones.

Most of the fossils represent aquatic birds. The exceptions are the eagle cf. *Aquila* sp., the vulture *Aegypius* (*Torgos*) cf. *tracheliotus*, the francolin cf. *Francolinus* s.l. sp., and the guineafowl *Numida* cf. *meleagris*. These non-aquatic birds are not very informative in terms of vegetation cover.

The aquatic birds are either mainly the swimming and diving piscivores (the grebes *Tachybaptus ruficollis*, *Podiceps* sp., the cormorant *Phalacrocorax* cf. *tanzaniae*, the darter *Anhinga* cf. *melanogaster*), shore predators of small vertebrates or invertebrates (the heron *Ardea*, the stork *Mycteria* cf. *ibis*, the ibis Threskiornithidae gen. et sp. indet.), or swimming herbivores (the Anserinae). They altogether indicate a calm freshwater course or a freshwater body.

The taxonomic representation is rather homogeneous regarding the different localities and

the different ages.

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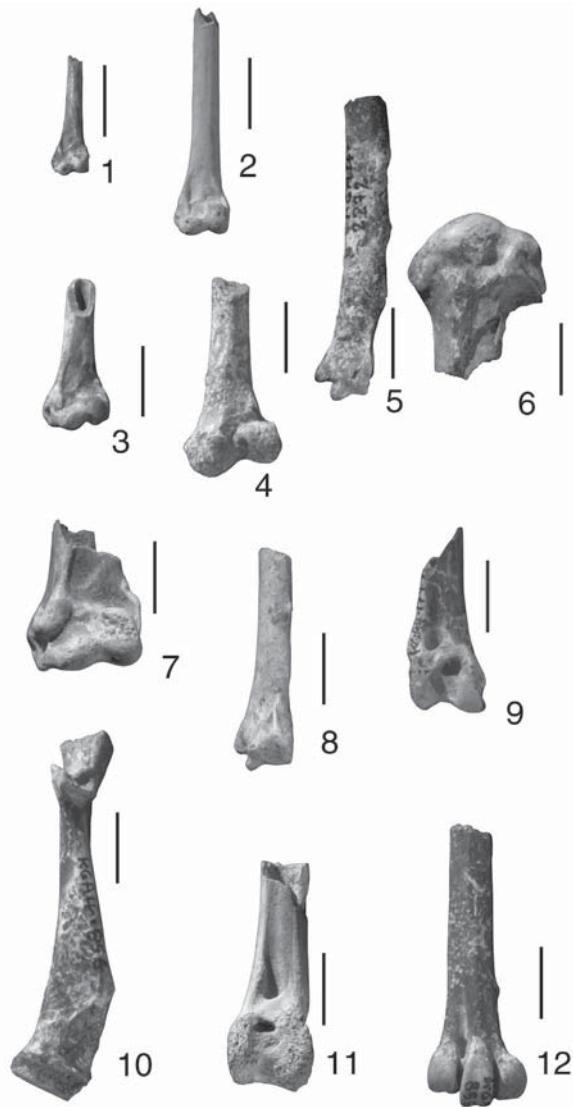


Fig. 4.1. (all scale bars are 10 mm).

- 1) Left distal humerus of *Tachybaptus ruficollis*, KGA4-2220, cranial view.
- 2) Left distal humerus of *Podiceps* sp., KGA17-54 (slightly eroded), cranial view.
- 3) Left distal humerus of *Podiceps* sp., KGA17-60, cranial view.
- 4) Left distal femur of *Phalacrocorax* cf. *tanzaniae*, KGA10-847, caudal view.
- 5) Right distal ulna of *Anhinga* cf. *melanogaster*, KGA4-2272b, ventral view.
- 6) Left proximal humerus of *Anhinga* cf. *melanogaster*, KGA4-2272a, caudal view.
- 7) Left distal humerus of *Anhinga* cf. *melanogaster*, KGA12-1163, cranial view.
- 8) Right distal ulna of *Anhinga* cf. *melanogaster*, KGA11-190, ventral view.
- 9) Right distal tibiotarsus of *Anhinga* cf. *melanogaster*, KGA4-1777, cranial view.
- 10) Incomplete right coracoid of *Ardea* sp., KGA4-856, dorsal view.
- 11) Left distal tibiotarsus of *Ardea* sp., KGA10-2314, cranial view.
- 12) Right distal tarsometatarsus *Ardea* sp., KGA4-855, dorsal view.

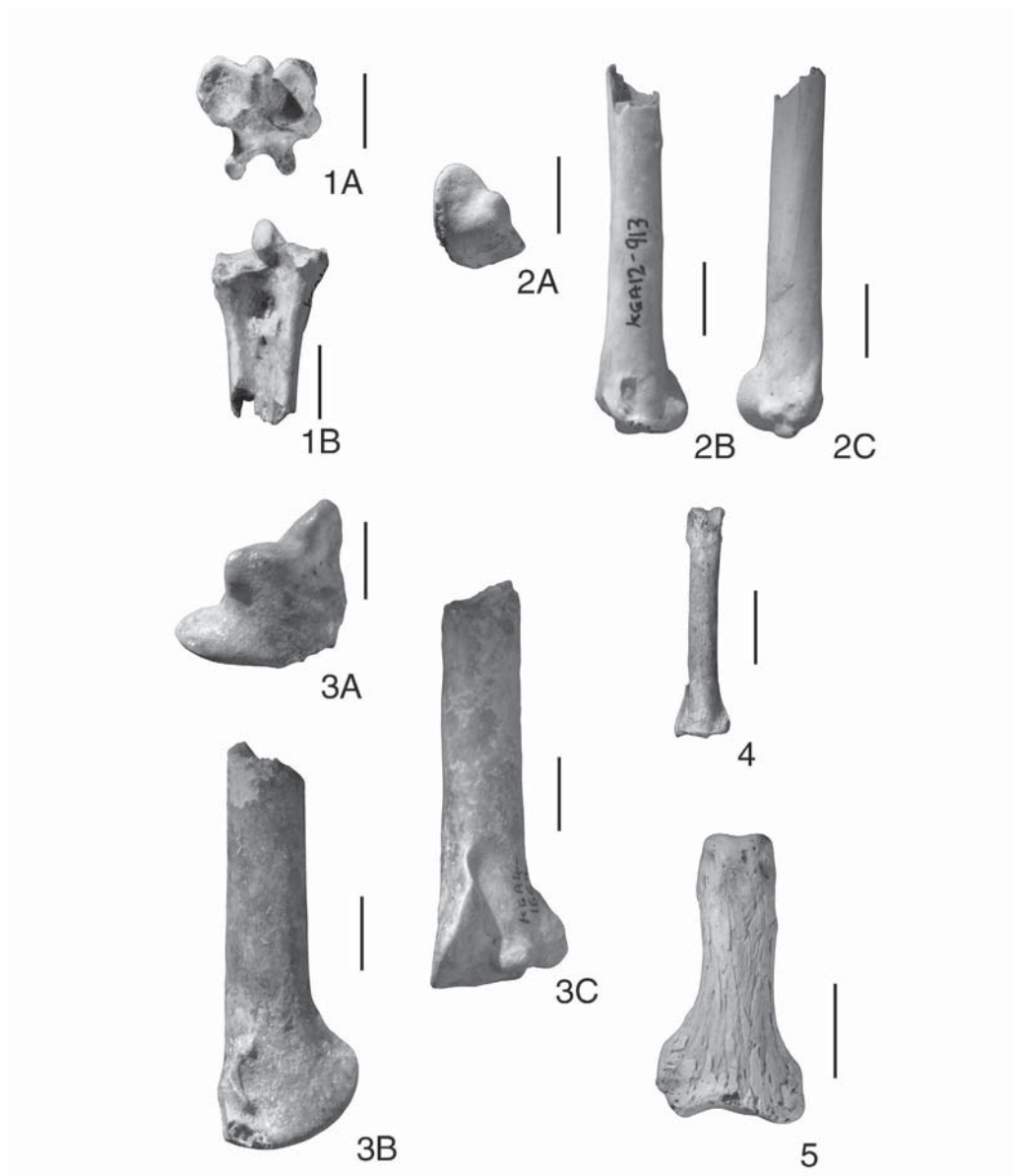


Fig. 4.2. (all scale bars are 10 mm).

- 1) Right proximal tarsometatarsus of *Mycteria* cf. *ibis*, KGA4-1083. A, proximal view; B, dorsal view.
- 2) Left distal ulna of Threskiornithidae gen. et sp. indet., KGA12-913. A, distal view; B, caudal view; C, cranial view.
- 3) Left distal ulna of cf. *Cygnini* gen. et sp. indet., KGA4-1667. A, distal view; B, caudal view; C, craniodorsal view.
- 4) Pedal phalanx of Anatidae indet., KGA17-77, dorsal view.
- 5) Pedal phalanx 1 of digit I of cf. *Aquila* sp., KGA10-472, dorsal view.

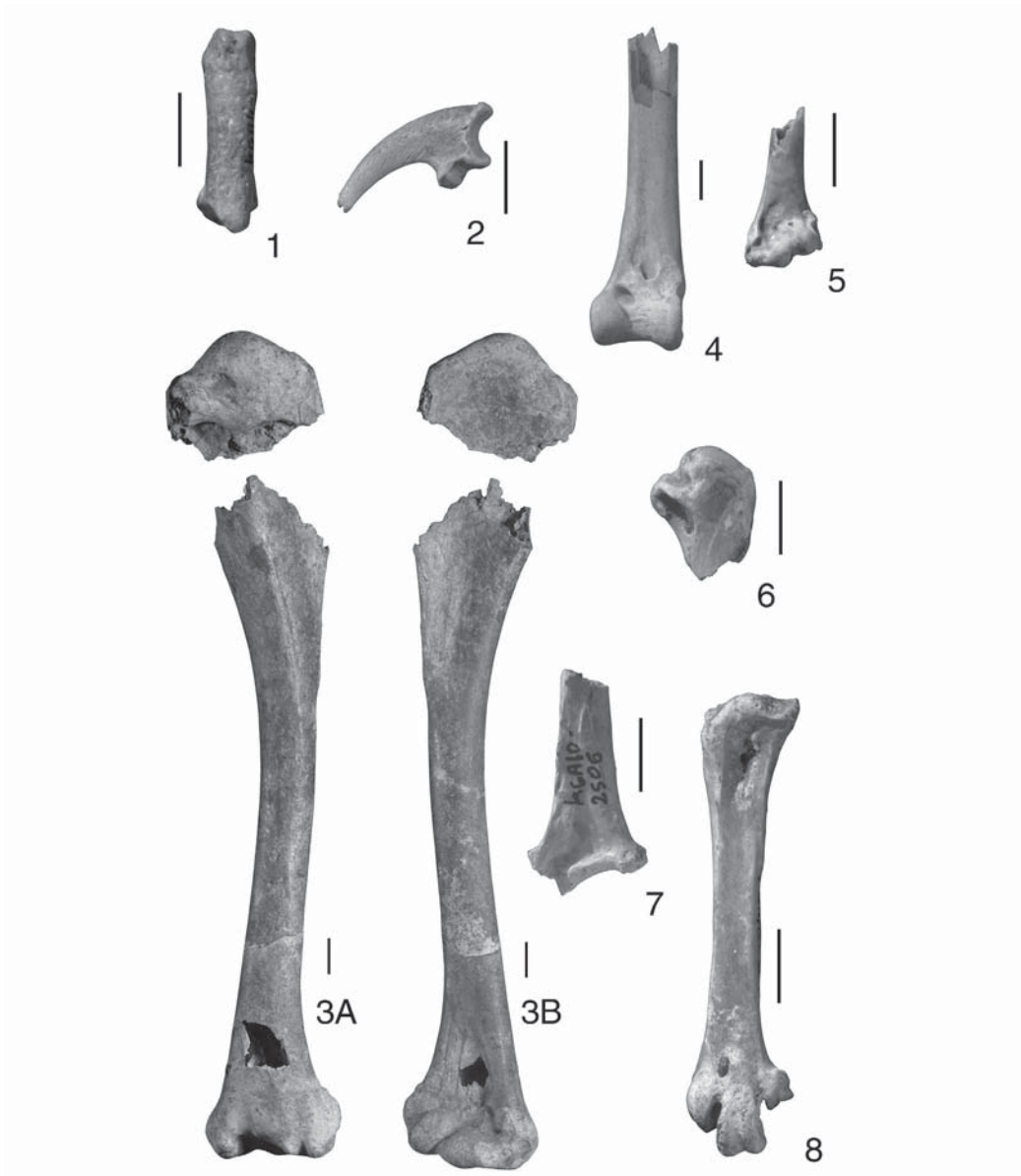


Fig. 4.3. (all scale bars are 10 mm).

- 1) Pedal phalanx 2 of digit II of cf. *Aquila* sp., KGA4-2219, dorsal view.
- 2) Claw 4 of digit III of cf. *Aquila* sp., KGA10-1405, medial view.
- 3) Almost complete right humerus of *Aegypius* (*Torgos*) cf. *tracheliotus*, KGA7-378. A, caudal view; B, cranial view.
- 4) Left distal tibiotarsus of *Aegypius* (*Torgos*) cf. *tracheliotus*, KGA12-486, cranial view.
- 5) Left distal humerus of cf. *Francolinus* sp., KGA4-2389, cranial view.
- 6) Right proximal humerus of cf. *Francolinus* sp., KGA12-806, caudal view.
- 7) Left distal coracoid of *Numida* cf. *meleagris*, KGA10-2506, dorsal view.
- 8) Almost complete right tarsometatarsus of *Numida* cf. *meleagris*, KGA10-898, dorsal view.