

# Subfossil birds of Andrahomana, southeastern Madagascar

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## Summary

A rare collection of 61 subfossil bird bones from Andrahomana cave in southern Madagascar was described. The collection is housed in the Naturhistorisches Museum Wien, Austria. Together, 10 species from 8 families were identified. Two of the species (*Puffinus* sp. and *Coua* sp.) are probably extinct.

**Keywords:** Aves, Holocene, Madagascar.

## Zusammenfassung

Eine seltene Sammlung 61 subfossiler Vogelknochen aus der Andrahomana-Höhle in Süd-Madagaskar wurde beschrieben. Die Sammlung liegt im Naturhistorischen Museum Wien, Österreich. Insgesamt konnten 10 Arten aus 8 Familien identifiziert werden. Zwei von den Arten (*Puffinus* sp. und *Coua* sp.) sind wahrscheinlich ausgestorben.

**Schlüsselwörter:** Aves, Holozän, Madagaskar.

## Introduction

The island of Madagascar (589 500 km<sup>2</sup>) is inhabited by a diverse avian fauna, which includes numerous endemic taxa (MILON et al. 1973, BENSON 1984, LANGRAND 1990, GOODMAN et al. 1997, YAMAGISHI et al. 1997, SINCLAIR & LAMGRAND 1998). The historical past of the avifauna is less known (see DEWAR 1984). Most of the reports focused on the giant, flightless elephant birds from the endemic family Aepyornithidae (see MONNIER 1913, LAMBRECHT 1933, LAMBERTON 1934, WIMAN 1935, MLÍKOVSKÝ 2003). Bones of non-aepyornithid Quaternary birds of Madagascar were described only from very few sites thus far, including Belo (MILNE-EDWARDS and GRANDIDIER 1895), Antsirabé (ANDREWS 1897, see also HOWARD 1964, BRODKORB 1965, OLSON 1977), Ambolisatra (ANDREWS 1897, GRANDIDIER 1900), Anjohibe (GOODMAN & RAVOAVY 1993), and Ampasambazimba (GOODMAN 1994a.b, GOODMAN & RAKOTOZAFY 1995). In the present paper I report on a small collection of non-aepyornithid birds from a new locality: the Andrahomana cave in southern Madagascar.

The 61 avian bones reported on below were collected in the cave of Andrahomana near Taolanaro (then Port Dauphin; 25.01 S, 47.00 E), Toliary Province, southeastern Madagascar, by Franz SIKORA (1863–1902) in 1899. The Naturhistorisches Museum in Wien purchased Sikora's collection in 1902. In 1954 the collection was transferred from the

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Museum's Zoology Department in its Department of Geology and Paleontology, where it is still deposited.

The locality is undoubtedly Quaternary, most probably late Holocene in age. The latter date can be inferred: (1) from the state of preservation of the bones and (2) from the record of a domestic chicken. Chickens were probably brought to Madagascar by early colonizers which came from SE Asia some 2500 years B.C. (BOITEAU 1958), i.e. long after chickens were domesticated there (WEST & ZHOU 1989).

The bones were identified using comparative collection of avian skeletons in the Smithsonian Institution in Washington, D.C., when I was short-term fellow at the Institution in January-February 1997 (grant by the Smithsonian Institution).

### Systematic list

In the following list, the genera and species are arranged according to BENSON (1984). Minimum numbers of individuals (MNI) were determined as described by GRAYSON (1984).

#### *Puffinus* sp. (Shearwater)

Material: 3 humeri (1 sin., 2 dext.); MNI = 2.

Remarks: The three humeri agree in size with the same elements of Audubon's Shearwater *Puffinus lherminieri* LESSON, 1839 and Little Shearwater *Puffinus assimilis* GOULD, 1838. Classification of these small petrels is far from understood (see JOUANIN 1971, HARRISON 1985, LOUETTE & HERREMANS 1985, CARBONERAS 1992); sometimes they are even treated as a single species (e.g. VAURIE 1965, WOLTERS 1975). Shearwaters are pelagic birds, which come to the land only to breed, which indicates that a breeding colony existed at Andrahomana. No shearwaters currently breed on Madagascar (LANGRAND 1990). Nearest breeding places are on Comoro Islands (*Puffinus lherminieri temptator* LOUETTE & HERREMANS, 1985), on Seychelles (*Puffinus lherminieri nicolae* JOUANIN, 1971), on Mascarene Islands (*Puffinus lherminieri bailloni* BONAPARTE, 1857), and on St. Paul Island (*Puffinus assimilis* ssp.). Such taxonomic diversification makes it probable, that bones from Andrahomana belonged to an extinct form of a small shearwater from the *Puffinus lherminieri/assimilis* complex. However, in absence of sufficient comparative material, I hesitate to formally describe it.

#### *Falco newtoni* (GURNEY, 1863) (Madagascar Kestrel)

Material: 2 humeri (1 sin., 1 dext.), 2 tibiotarsi (1 sin., 1 dext.), 1 tarsometatarsus dext.; MNI = 1.

Remarks: Subfossil remains of this endemic kestrel were found also in the cave of Anjohibe (GOODMAN & RAVOAVY 1993).

#### *Accipiter francesii* SMITH, 1834 (Frances' Sparrowhawk)

Material: distal part of left tibiotarsus; MNI = 1.

Tab. 1: Late Holocene birds of Andrahomana, southern Madagascar. MNI = minimum number of individuals sensu GRAYSON (1984).

	Bones	MNI	% MNI
<i>Puffinus</i> sp.	3	2	9,5
<i>Falco newtoni</i>	5	1	4,8
<i>Accipiter francesii</i>	1	1	4,8
<i>Gallus gallus</i> f. <i>domestica</i>	2	1	4,8
<i>Gallinula chloropus</i>	17	3	14,3
<i>Fulica cristata</i>	1	1	4,8
<i>Coracopsis vasa</i>	17	5	23,8
<i>Coua</i> cf. <i>gigas</i>	2	2	9,5
<i>Coua</i> sp. 2	7	2	9,5
<i>Tyto alba</i>	6	3	14,3
Total (10 species)	61	21	100,0

#### *Gallus gallus* f. *domestica* (Domestic Chicken)

Material: left ulna (subadult), left carpometacarpus; MNI = 2.

#### *Gallinula chloropus* (LINNAEUS, 1758) (Moorhen)

Material: 3 humeri (2 sin., 1 dext.), 3 femora (1 sin., 2 dext.), 6 tibiotarsi (3 sin., 3 dext.), 5 tarsometatarsi (2 sin., 3 dext.); MNI = 3.

#### *Fulica cristata* GMELIN, 1789 (Red-knobbed Coot)

Material: right tibiotarsus; MNI = 1.

#### *Coracopsis vasa* (SHAW, 1812) (Greater Vasa Parrot)

Material: skull, right coracoid, 7 humeri (3 sin., 2 dext., 2 dext. juv.), left ulna, right carpometacarpus, 2 left femora, 4 tibiotarsi (2 sin., 2 dext.); MNI = 5.

Remarks: This endemic species was recorded also from subfossil deposits of Anjohibe (GOODMAN & RAVOAVY 1993).

#### *Coua* cf. *gigas* (BODDAERT, 1783) (Giant Coua)

Material: tibiotarsus dext., 2 tarsometatarsi (1 sin., 1 dext.); MNI = 1.

Remarks: These bones agree in size with the same elements of the Giant Coua, the largest living coua (see MILNE-EDWARDS & GRANDIDIER 1895, GOODMAN & RAVOAVY 1993).

#### *Coua* sp. (Coua)

Material: left ulna, left carpometacarpus, 4 tibiotarsi (2 sin., 1 dext. juv.), 2 tarsometatarsi (1 dext., 1 dext. juv.); MNI = 2.

Remarks: These bones are larger than the same elements of *Coua gigas*, and could thus belong to one of the two hitherto described extinct species of large Madagascar couas, i.e. *Coua primaeva* MILNE-EDWARDS & GRANDIDIER, 1895 and/or *Coua berthae* GOODMAN & RAVOAVY, 1993. Their proper identity can be determined only after a complete revision of *Coua* cuckoos (H. JAMES, in prep.).

#### *Tyto alba* (SCOPOLI, 1769) (Barn Owl)

Material: 4 humeri (3 sin. juv., 1 dext. juv.), left tibiotarsus (juv.), left tarsometatarsus (juv.); MNI = 3.

Remarks: Two similarly sized barn owls are known to occur in Madagascar: *Tyto alba* and *Tyto soumagnei* (MILNE-EDWARDS, 1878). No skeleton of the rare *Tyto soumagnei* was available for comparison, but tibiotarsi of this species have relatively long crista fibularis (NEWTON and GADOW 1893), which is not the case in the fossil tibiotarsus found in Andrahomana. I refer thus all these bones to the Barn Owl *Tyto alba*, which is common and widespread on Madagascar (LANGRAND 1990). Subfossil remains of this species were found also in the cave of Anjohibe (GOODMAN & RAVOAVY 1993).

#### Discussion

**Taphonomy:** The avian taphocenosis of Andrahomana seems to be a mixture of bones from naturally deceased individuals and those from individuals brought to the site by a predator. All the recovered bones of the Barn Owl are from rather young, probably not yet fledged individuals. It is thus probable that this owl bred in the Andrahomana cave. Also, *Falco newtoni* is known to breed in rock fissures (LANGRAND 1990, A. C. KEMP in WHITE et al. 1994). Together, these two species make out 15 % of MNI. None of the other avian species is a cave visitor, and all of them are too large to be prey of Barn Owls. Moreover, the prevalence of humeri, tibiotarsi and tarsometatarsi in the fossil sample contradicts the possibility that the assemblage originated from the food of another, larger owl species, where carpometacarpi and tarsometatarsi always outnumber other appendicular bones. Large raptors and/or mammalian predators, incl. Man, could have contributed to the accumulation of these bones, but no direct evidence is available.

**Ecology:** Most of the species recorded from Andrahomana are ecologically less diagnostic, although all avoid dense forests (LANGRAND 1990). Moorhens and Red-knobbed Coots require wet ground, and could inhabit nearby sea shore.

**Biogeography:** Most of the bones recorded from Andrahomana cave (52 % MNI) belong to species or even genera endemic to the island of Madagascar. They include *Falco newtoni*, *Accipiter francesii*, *Coracopsis vasa*, and *Coua* spp. This figure could even be higher, if we consider the possibility that *Puffinus* sp. (9.5 % MNI) was an extinct species. On the other hand, three species (*Gallinula chloropus*, *Fulica cristata*, and *Tyto alba*; 33 % MNI) are widespread.

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