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Bird fossils from Ankilitelo Cave: Inference about Holocene environmental changes in Southwestern Madagascar

STEVEN M. GOODMAN^{1,2,6}, MARIE JEANNE RAHERILALAO^{2,3} & KATHLEEN MULDOON^{4,5}

¹Science and Education, Field Museum of Natural History, 1400 South Lake Shore Drive, Chicago, Illinois 60605, USA.

E-mail: sgoodman@fieldmuseum.org

²Association Vahatra, BP 3972, Antananarivo 101, Madagascar. E-mail: jraherilalao@vahatra.mg, sgoodman@vahatra.mg

³Département de Biologie Animale, Université d'Antananarivo, BP 906, Antananarivo 101, Madagascar

⁴Department of Anatomy, The Geisel School of Medicine, Hanover, New Hampshire 03755, USA

E-mail: Kathleen.M.Muldoon@dartmouth.edu

⁵Department of Anthropology, Dartmouth College, Hanover, New Hampshire 03755, USA

⁶Corresponding author

Abstract

The identifications of non-permineralized fossil bird bones recovered from Ankilitelo Cave in southwestern Madagascar are presented. Among the more than 560 elements recovered, 29 different taxa were identified, the vast majority being species that still occur in this region of the island. Eggshell remains from the extinct elephant bird (Family Aepyornithidae) and assigned to *Aepyornis* sp. were found at the site. Two identified extant taxa, *Scopus umbretta* and *Monias benschi*, no longer occur in the area immediately surrounding the cave. The available radiocarbon measurements of collagen from fossil bird bones and avian eggshell carbonate of recovered from the cave range from 13,270 Cal yr BP to modern times. Hence, the presumed ecological shifts that took place resulting in the disappearance or range contractions of these three taxa is within the Holocene and are presumed to be associated with natural climatic change and in more recent centuries associated human pressures. Information is also presented on the origin of guinea fowl (*Numida*) and inference on the period of colonization of *Corvus albus* on Madagascar.

Key words: Ankilitelo Cave, birds, *Aepyornis*, *Monias benschi*, *Numida meleagris*, fauna, environmental shifts, C14 dates

Résumé

Les identifications des os d'oiseaux fossiles récupérés dans la Grotte d'Ankilitelo dans le Sud-ouest de Madagascar sont présentées ici. Parmi les 560 éléments et plus récupérés, 29 taxa différentes ont été identifiées dont la majorité sont des espèces qui se trouvent encore dans cette région de l'île. Des restes de coquilles d'œuf de l'oiseau-éléphant éteint (famille des Aepyornithidae) et affecté à *Aepyornis* sp. ont été trouvés sur le site. Par ailleurs, deux taxa actuels, *Scopus umbretta* et *Monias benschi*, ont été identifiés mais ne se rencontrent plus à proximité de la grotte. Sur la base des mesures disponibles de radiocarbone de fossiles d'oiseaux récupérés dans la grotte, le matériel le plus ancien est daté à $11\,310 \pm 40$ ¹⁴C BP et le plus récent à l'époque moderne. Par conséquent, les changements écologiques présumés, ayant entraîné la disparition ou la restriction de la zone de répartition de ces trois taxons, ont eu lieu dans l'histoire récente. Ces changements sont probablement associés à perturbations climatiques naturelles et aux pressions humaines ultérieures. Des informations sont aussi présentées sur l'origine de la pintade (*Numida*) et l'inférence sur la période de la colonisation de *Corvus albus* à Madagascar.

Introduction

There is good evidence to suggest that since the start of the Holocene some rather dramatic environmental changes have taken place on Madagascar (Burney *et al.* 2004). These vicissitudes have had considerable impact on the

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APPENDIX 1. Listing of bird fossils studied from Ankilitelo Cave and separated by year of field excavations. See Methods section for description of catalog system. In parentheses after each taxon is presented MNI/NE.

1994 excavations

94M-136 (DLC 13686) *Coracopsis vasa* (1/3); 94M-228 (DLC 13732) *C. vasa* (1/4); 94M-228 (DLC 13732) unidentified bird (0/2); 94M-292 (DLC 13764) *C. vasa* (1/1), (DLC 1376) *Lophotibis cristata* (1/2).

1997 excavations

97M-118 (DLC 17208) *Coracopsis vasa* (1/3), radius fractured and healing; 97M-124 (DLC 17211) *C. vasa* (1/9); 97M-134 (DLC 17216) cf. *Tyto alba* (2/5), *T. alba* (1/1), *C. vasa* (2/5), 1 adult and 1 subadult; 97M-194 (DLC 17246) *Buteo brachypterus* (1/1), cf. *T. alba* (1/1), *C. vasa* (1/2); 97M-212 (DLC 17255) *C. vasa* (3/8), cf. young *Tyto* or *Asio madagascariensis* (1/5), unidentified bird (0/1); 97M-232 (DLC 17265) cf. *Milvus aegyptius* (1/1), cf. *T. alba* subadult (1/3), *T. alba* (1/2), *Corvus albus* [radiocarbon dated] (1/1); 97M-238 (DLC 17268) cf. *Coracopsis vasa* (1/3), *C. vasa* (4/8), *Coua ruficeps* (1/1), *Turnix nigricollis* (1/1), *Tyto alba* (2/2); 97M-246 (DLC 17272) *Coracopsis vasa* (2/3), *T. alba* (1/1); 97M-268 (DLC 17283) *Monias benschi* (1/1), *A. madagascariensis* (1/1), *C. vasa* (3/5); 97M-296 (DLC 17297) *C. vasa* (1/1); 97M-298 (DLC 17298) *C. vasa* (1/4), *Treron australis* (1/1), *Turnix nigricollis* (1/3), *Tyto alba* (1/1), unidentified bird (1/1); 97M-302 (DLC 17300) *Asio madagascariensis* (1/2), *C. vasa* (3/8), *Scopus umbretta* (1/1), *Tyto alba*, subadult (1/1), unidentified nestling raptor (1/1); 97M-43 (DLC 17170) *Asio madagascariensis* (1/1), *C. vasa* (1/1), unidentified bird (0/1); 97M-76 (DLC 17187D) *T. alba* (1/1); 97M-80 (DLC 17189) *Lophotibis cristata* (1/1), *Turnix nigricollis* (1/3), *Treron australis* (1/1), *C. vasa* (3/14), *Tyto alba* (2/4), unidentified bird (0/3).

1998 excavations

98M-1 (DLC 18041) *Coua gigas* (1/1), *Coracopsis vasa* (3/18); 98M-5 (DLC 18043) *Asio madagascariensis* (1/1), *C. vasa*, includes distal tibiotarsus notably larger than typical for this species (4/13); 98M-115 (DLC 18098) *Turnix nigricollis* (1/1), *Pterocles personatus* (1/2), *Coua cristata* (1/1), *C. gigas* (1/1), *Coracopsis vasa* (4/17), unidentified bird (0/6); 98M-117 (DLC 18099) *P. personatus* (1/1), *C. vasa* (3/16), *Tyto alba* (2/2); 98M-119 (DLC 18100) *Asio madagascariensis* (1/3), *C. vasa* (1/5), unidentified bird (0/3); 98M-121 (DLC 18101) *P. personatus* (1/1), *C. vasa* (2/10); 98M-123 (DLC 18102) *C. vasa* including at least one subadult (2/11), *T. alba* including at least one subadult (2/3), unidentified young raptor (1/1), unidentified bird (0/5); 98M-125 (DLC 18103) *Accipiter madagascariensis* (1/1), *Buteo brachypterus* (1/1), *Turnix nigricollis* (1/1), *T. alba* at least one young (2/8), *Asio madagascariensis* (1/1), *Ninox superciliosus* (1/1), cf. *C. vasa* probably nestling (1/1), *C. vasa* (2/14), *Upupa marginata* (1/1), *Phedina borbonica* (1/1); 98M-129 (DLC 18105) *Oena capensis* (1/1), *C. vasa* (1/5), *T. alba* (1/1), unidentified bird (0/5); 98M-180 (DLC 18131) *Turnix nigricollis* (1/1), *Pterocles personatus* (1/1), *C. vasa* (2/10), unidentified bird (0/2); 98M-224 (DLC 18157) *T. nigricollis* (1/3), *Numida meleagris* [radiocarbon dated] (1/1), *Coua* cf. *cristata* (1/1), *Coracopsis vasa* (2/7), *Tyto alba* (1/3), unidentified bird (0/3); 98M-226 (DLC 18758) *T. alba* (1/1), *C. vasa* (1/20); 98M-260 (DLC 18775) *C. vasa* (1/2); 98M-270 (DLC 18780) *Coua gigas* (1/3), *Coracopsis vasa* (3/10); 98M-276 (DLC 18783) *Buteo brachypterus* (1/2); 98M-3 (DLC 18042) *C. vasa*, at least one subadult (4/9), *Otus rutilus* (1/1), *Leptosomus discolor* (1/1), unidentified bird (1/1); 98M-305 (DLC 18797) *Coua gigas* (1/2), *C. cf. gigas* (1/1), *C. cf. cristata* (1/1), *C. ruficeps* (1/1), *Coracopsis vasa* (3/19), unidentified bird (0/2)