

## A FOSSIL OF THE GREAT AUK *PINGUINUS IMPENNIS* FROM MIDDLE PLEISTOCENE DEPOSITS IN BERMUDA

STORRS L. OLSON<sup>1</sup>

Olson S.L. 2003. A fossil of the Great Auk *Pinguinus impennis* from Middle Pleistocene deposits in Bermuda. *Atlantic Seabirds* 5(2): 81-84. *A partial premaxilla of a Great Auk Pinguinus impennis was recovered from Middle Pleistocene deposits on Green Island, Bermuda. These deposits formed during the interglacial sea-level rise of Marine Isotope Stage 11 and are about 400 000 years old. This constitutes the first record of Great Auk for Bermuda and probably represents a bird that died at sea and was washed ashore.*

<sup>1</sup>Division of Birds, National Museum of Natural History, Smithsonian Institution, Washington, D.C., 20560, USA. E-mail: [olson.storrs@nsmnh.si.edu](mailto:olson.storrs@nsmnh.si.edu)

The Great Auk *Pinguinus impennis*, exterminated by humans in the 19<sup>th</sup> century, was known historically from both sides of the North Atlantic. Archaeological and fossil records indicate that the wintering range may have extended as far south as Florida and the Mediterranean (Greenway 1958, Brodkorb 1967, Fuller 1999, Mourer-Chauviré 1999). The species was never documented historically from Bermuda, although Amos (1991) and Fuller (1999: 347) mention Bermuda in the range of the species based on word-of-mouth reports of the specimen described here.

By sheer coincidence, the first fossil collected from a bone bed in extremely indurated carbonate sandstone on Green Island, directly south of Nonsuch Island on the southeast shore of Bermuda, on 28 August 1981, turned out to be part of the premaxilla of a Great Auk, the tip of which remained in the rock. This was one of only a few fragments that could be extracted using only a chisel and hammer. Three years later, the tip was recovered on 8 August 1984 using a gas-powered saw that allowed the collection of dozens more specimens of bird bones. The two portions fit together nearly perfectly (Fig. 1), so there was relatively little erosion of the exposed portion that remained in rock for an additional three years.

All other bird bones recovered at this site belonged to embryos, juveniles, and adults of Short-tailed Albatross *Phoebastria albatrus*, which, with fossil eggs recovered nearby, showed that this was once a breeding area for this



*Figure 1. Right lateral view of the fossil tip of a premaxilla (USNM 523861) of a Great Auk from the middle Pleistocene of Bermuda (above) compared with a modern specimen (USNM uncataloged) from Funk Island (below). Scalebar = 2 cm.*

*Figuur 1. Rechterzijaanzicht van een fossiele punt van een premaxilla (USNM 523861) van een Reuzenalk uit Bermuda uit het Midden Pleistoceen (boven) vergeleken met een modern specimen (USNM ongecatalogiseerd) van Funk Island (onder). Schaalbalk = 2 cm.*

species (Olson & Hearty 2003). Not one additional bone of Great Auk has ever been recovered here.

The Green Island deposits have been correlated with the Middle Pleistocene Lower Town Hill Formation, which formed during the interglacial

period equivalent to Marine Isotope Stage 11. They were deposited rapidly during a massive storm at the onset of that interglacial, as sea levels began to rise, and are therefore about 400 000 years old (Olson & Hearty 2003). During this interglacial, sea levels continued to rise until reaching more than 21 m (70 feet) above present (Hearty *et al.* 1999), thus nearly obliterating Bermuda and causing the extirpation of the albatross colony (Olson & Hearty 2003). Seabird biologists should be made more aware of that catastrophic event, which would have caused dramatic restructuring of seabird breeding colonies on low-lying islands at the time.

The Great Auk fossil from Bermuda consists of most of the premaxilla anterior to the osseous nostril (Fig. 1). It falls within the considerable variation in size and shape of this element seen in a large series of remains collected on Funk Island, Newfoundland (USNM uncataloged). The extinct species *Pinguinus alfrednewtoni* from the Pliocene of North Carolina (Olson 1977), was postulated as possibly being a western Atlantic counterpart of the Great Auk that may have been replaced by the historic species after the early Pliocene (Olson & Rasmussen 2000). The premaxilla of *P. alfrednewtoni* is unknown, however, and the Bermuda fossil is too similar to *P. impennis* to be referred to anything else.

There is no way to know how frequently wintering Great Auks may have approached Bermuda in the past. However, there is no reason for thinking that the single fossil reported here originated in anything other than an individual that either died at sea and was washed ashore or concerned a sick or weakened bird that came ashore and died. In an instance that is probably similar, the sternum of a Great Auk was found in latest Pleistocene deposits on the island of Porto Santo in the Madeiran archipelago, the southernmost record for the eastern Atlantic (Pieper 1985).

I thank David Wingate for calling my attention to the Green Island deposits and doing everything possible to make the collection of fossils possible. Frederick V. Grady, Department of Paleobiology, Smithsonian Institution, assisted in collection and prepared the fossil out of its indurated matrix. Comparisons were made with the avian skeleton collection in the Division of Birds, National Museum of Natural History, Smithsonian Institution (USNM). Paul Hearty, James Cook University, Townsville, Australia, was responsible for geological interpretations of the site. The photograph is by John Steiner, Smithsonian Center for Scientific Imaging and Photography, and the figure was arranged by Brian Schmidt, Division of Birds, Smithsonian Institution. This is contribution #65, Bermuda Biodiversity Project, Bermuda Aquarium, Natural History Museum and Zoo.

EEN FOSSIEL VAN EEN REUZENALK *PINGUINUS IMPENNIS*  
IN MIDDEN PLEISTOCENE AFZETTINGEN OP BERMUDA

Op Green Island Bermuda werd in Midden Pleistocene afzettingen een deel van een premaxilla van een Reuzenalk *Pinguinus impennis* gevonden (figuur 1). Deze afzettingen zijn ca 400,000 jaar oud

en zijn ontstaan tijdens de interglaciale zeespiegelstijging in de zogenaamde Marine Isotope Stage 11. Deze vondst is het eerste geval van een Reuzenalk voor Bermuda. Waarschijnlijk is de vogel op zee gestorven en op het strand aangespoeld.

## REFERENCES

- Amos E.J.R. 1991. A guide to the birds of Bermuda. Warwick, Bermuda.
- Brodkorb P. 1967. Catalogue of fossil birds: Part 3 (Ralliformes, Ichthyornithiformes, Charadriiformes). Bulletin of the Florida State Museum, Biological Sciences 11: 99-220.
- Fuller E. 1999. The Great Auk. Published by author: Southborough, England.
- Greenway J.C. 1958. Extinct and Vanishing Birds of the World. American Committee for International Wild Life Protection, New York, New York.
- Hearty P.J., Kindler P., Cheng H. & Edwards R.L. 1999. Evidence for a +20 m middle Pleistocene sea-level highstand (Bermuda and Bahamas) and partial collapse of Antarctic ice. *Geology* 27: 375-378.
- Mourer-Chauviré, C. 1999. Influence de l'homme préhistorique sur la répartition de certains oiseaux marins: l'exemple du Grand Pingouin *Pinguinus impennis*. *Alauda* 67: 273-279.
- Olson S.L. 1977. A great auk, *Pinguinis* [sic], from the Pliocene of North Carolina (Aves: Alcidae). *Proceedings of the Biological Society of Washington*, 90: 690-697.
- Olson S.L. & Hearty P.J. 2003. Extirpation of a breeding colony of Short-tailed Albatross (*Phoebastria albatrus*) on Bermuda by Pleistocene sea-level rise. *Proceedings of the National Academy of Sciences USA*. 100: 12825-12829.
- Olson S.L. & Rasmussen P.C. 2001. Miocene and Pliocene birds from the Lee Creek Mine, North Carolina. Pp. 233-365 in C.E. Ray & Bohaska D.J. (eds.) *Geology and paleontology of the Lee Creek mine, North Carolina, III*. *Smithsonian Contributions to Paleobiology*, 90.
- Pieper H. 1985. The fossil land birds of Madeira and Porto Santo. *Bocagiana* 88: 1-6.