Ancient egyptian sacred ibis mummies : mitogenomics resolves the history of ancient farming.

Sally Wasef[*†1,2], Salima Ikram[*3], Sankar Subramanian[*1], Eske Willerslev[*4], Barbara Holland[*5], and David Lambert[*1]

[1]Griffith University – Australie
[2]Ancient DNA Laboratory, Egyptian Ministry of Antiquities – Egyptian Ministry of Antiquities, Égypte
[3]American University in Cairo (AUC) – Égypte
[4]University of Copenhagen – Danemark
[5]University of Tasmania (AUSTRALIA) – Australie

Résumé

Animal mummies were extremely important to the people of ancient Egypt. The extraordinary number of different animal species that were mummified is evidence of this importance. The vast majority of these mummies served as ritual offerings by pilgrims to please the gods. These are known as "votive offerings", and are thought to have flourished from the Twenty-Sixth Dynasty (664-525 BC) to the Graeco-Roman Period (30 BC–300 AD). Of these, none are found in quantities as great as the Sacred Ibis (*Threskiornis aethiopicus*) that were offered to the God of Wisdom and Writing, Thoth. It is estimated that 4 million Sacred Ibis mummies were deposited in dedicated catacombs throughout Egypt, with approximately 10,000 mummies interred each year. Such massive numbers suggest that ancient Egyptians perhaps kept and reared Ibis on an industrial-scale. However, there is limited evidence in ancient writings that support this suggestion. Sacred Ibis were once prevalent in Egypt but were driven to extinction as early as the mid 1800's.
Mummified Sacred Ibis specimens were collected from the main Sacred Ibis catacombs at Saqqara, Tuna el Gebel, Abydos and Thebes, as well as other mummified samples collected from worldwide museums. The aim of this research was to determine if there was evidence that Sacred Ibises were farmed for mummification purposes. If so, is there evidence for the existence of large central farm(s) from which mummies were distributed to the different catacombs by pilgrims? Alternatively, Sacred Ibises may have been reared in smaller enclosures adjacent to each of the main Thoth worshipping temples. Another possibility is that locals and / or priests may have caught wild Sacred Ibises each year from migrating populations? Alternatively, did the mummification industry source Sacred Ibis from a mix of both farmed and wild Sacred Ibises in order to meet the extraordinary demand?

We 14C radiocarbon dated bone, wrapping and resin samples from six Sacred Ibis mummies. These were shown to be from the Late Period or slightly earlier to the Ptolemaic Period. Interestingly, none of the samples were dated to the Roman era. This might, of course, be due to the particular samples chosen for dating. Though, it is possible that the need for Sacred Ibis reduced prior this period, as suggested by archaeologists. However, it is quite possible that the habit of mummifying Sacred Ibis and offering them to deities had

[*]Intervenant
[†]Auteur correspondant: sally.wasef@griffithuni.edu.au

ceased by the 2nd or 3rd centuries AD.
We constructed a number of DNA libraries from ancient Egyptian Sacred Ibis tissue including bone and feather. Using second-generation shotgun sequencing of 30 ancient Sacred Ibis libraries yielded very low mitochondrial DNA content, so we enriched Sacred Ibis mitochondrial sequences using DNA capture methods. Consequently, using targeted hybridisation we were able to reconstruct the first complete mitochondrial genomes from ancient Egyptian sub-fossil material. Additionally, we were able to recover 26 modern complete mitochondrial genomes, obtained from blood and feather samples obtained from Sacred Ibis populations across Africa. These samples were used to estimate the genetic diversity of Sacred Ibis across the African continent and this diversity was compared with that of ancient Sacred Ibis populations. Rearing Sacred Ibises in a large centralised farm as has been suggested, might result in a low genetic variation between the mummified Sacred Ibises collected from the various catacombs. Remarkably, our results suggest that the ancient Egyptians employed an intelligent farming system designed to maintain the diversity of Sacred Ibis populations through the introduction of migrating wild individuals each year. The additions of migrating birds to the farms likely maintained the health of these populations and facilitated the high production levels necessary to meet the considerable demands of mummification on such a vast scale.