

# Paleopathological Study of the Egyptian Mummies Collected in Italy: the Anubis Project

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## Abstract

**Eighty-five Egyptian mummies belonging to different dynastic periods and collected in a number of Italian museums, have been censused and submitted for paleopathological research.**

**In most cases the presence of bandages required the application of X-rays and computed axial tomography (CAT). Fifty-two mummies have been studied in situ with X-rays; twelve with CAT scanning. Technical problems kept us from investigating eleven of the censused mummies. In a few cases it was possible to perform autopsies, endoscopy, or histological studies. The mummies submitted for X-rays were divided into two groups: The first group thirty-six mummies studied by the team of Paleopathology-Egyptology of the University of Pisa were studied for the first time. The second group was composed of twenty-six mummies studied elsewhere in Italy. Those results also have been included in the Anubi Project database.**

## Introduction

The Anubis Project is a multidisciplinary project aimed at studying the illnesses, health and socioeconomic conditions of ancient Egypt (Ciranni et al, 2005). This "open project" is in constant progress as it contains various types of historical and cultural informations that can be updated and enriched with the recording of new results. The starting point of this project was a paleopathological study performed on the mummies and parts of mummies (currently 101) which are stored in a number of Italian museums. Our proposal is to extend the study to other museum collections in Italy and other parts of the world in order to achieve international paleopathological data.

## Materials and methods

The mummified museum findings listed in the project were divided into two groups (Tab.1): the former group includes those studied *ex novo* by the team of Paleopathology-Egyptology of the University of Pisa; the second group concerns those studied directly by the museums where the mummies are stored or by other researchers in Italy (Dolzani, 1952; Chiarelli et al., 1966; Lise, 1974; De Caro, 1989; Drusini et al, 1982; Guidotti, 1987; De Lorenzi, Grilletto, 1989; Leospo, 1994; Guidotti 2001; Vidulli Torlo, 1994)

A team of five to seven people travelled around Italy in a small van visiting previously identified museums where the majority of the unpublished Egyptian human remains had been collected. The van carried portable x-ray apparatus, several chassis and x-ray films of various size, chemical substances necessary to develop the films, endoscopy apparatus, photo-cameras, video-cameras and a complete set of surgical material (scissors, bistouries, clamps etc.) to take samples of mummified tissues.

Radiological studies were then performed *in situ*, using the portable X-ray apparatus and developing the films by hand *in extempore* dark rooms provided by the museums visited. At the end of this phase twenty-seven mummies, ten mummified heads, five arms, two legs and four feet (bandaged all together) belonging to different dynastic periods and archaeological sites were catalogued (in appropriate forms) and submitted to paleopathological investigation. Each schedule reported general information (when known) about the human remains: historical period, dynasty, name of mummy, year of discovery, archaeological site, current status and microclimatic conditions of the storage site. Specialised informations concerning mummy position, degree of soft tissue preservation, type of mummy (natural or artificial), embalming description of the artificial mummies, preservation of the internal organs in the case of natural mummies, external examination, imaging study, mummy description, teeth description and anthropometry, were recorded in the final database. The database also reports informations abouts, descriptions of sarcophagi, inscriptions, associated artefacts (jewels, textiles, masks, false eyes and other funerary equipment), and other historical details. The same procedure was used for the published specimens.

The total number of museum findings censused is 101. Eighty six were submitted to x-ray investigation, 12 of these were also studied by CAT (computer axial tomography), and two by endoscopy. The remaining fifteen museum findings were not investigated for several reasons, for example owing to their extreme fragility, to preservation under nitrogen atmosphere or because permission was not obtained in due time.

## Results

In most cases the presence of bandages avoided the application of methodologies different from X- ray and computed axial tomography (CAT). In two cases it was possible to perform endoscopy.

All the results are reported in table 2. All the pathologies are recorded, as well as the number of cases and sex of the individual in whom they were diagnosed. By the term "pathology", in this paper we intend all congenital or acquired forms, parasitosis, infectious and degenerative diseases and all abnormal situations. The most represented pathologies are spondyloarthritis, affecting different areas of the column, and gonarthrosis. Degenerative diseases are followed by fractures which involve clavicles, vertebrae, ribs etc. Two cases of DISH (diffuse idiopathic skeletal hyperostosis), one case of tuberculosis and another of probable osteochondroma of the femur were recorded. One mummy was affected by cysticercosis sustained by the parasite *Taeniam solium* which was diagnosed by histology and immunoistochemistry (Bruschi et al, 2003). One case of calculus, with a mixed bladder stone (cm. 2.5x1.5) in the small pelvis was also recorded.

The case of a hydrocephalic skull will be studied in further detail by the Paleopathology team in Pisa, in collaboration

| MUSEAL FINDINGS STUDIED BY PISA'S TEAM |                  | MUSEAL FINDINGS STUDIED BY OTHERS |                   |
|--|------------------|-----------------------------------|-------------------|
| Type and number of the findings        | Museum's town    | Type and number of the findings   | Museum's town     |
| 3 mummies, 5 heads, 2 legs, 3 arms     | Parma            | 26 mummies<br>14 mummies          | Turin<br>Florence |
| 1 mummy, 2 heads                       | Milan            | 2 mummies                         | Trieste           |
| 5 mummies                              | Florence         | 2 mummies                         | Rovigo            |
| 5 mummies, 1 head, four feet           | Neaples          | 2 mummies                         | Venedig           |
| 1 mummy, 2 heads                       | Pavia            | 1 mummy                           | Padua             |
| 2 mummies                              | Pisa             | 2 mummies                         | Bologna           |
| 2 mummies                              | Asti             | 1 mummy                           | Biella            |
| 2 mummies                              | Lucca            | 1 mummy                           | Bergamo           |
| 1 mummy                                | Narni (Perugia)  | 2 mummies                         | Roma              |
| 2 mummies, 2 arms                      | Cortona (Arezzo) | 1 mummy                           | Como              |
| 3 mummies                              | Genoa            | 2 mummies                         | Milan             |

Table 1- List of the published (56) and unpublished (45) Egyptian human remains kept in Italian museums.

with the Archaeological Museum of Parma.

Radiological examination made it possible to identify a number of "false mummies", suggesting the possible failure of the embalming procedure and one mummy whose absent feet have been replaced by very simple wood "prosthesis" in the form of a wedge fixed *in situ* with metallic pivots. Both the hydrocephalic skull and the mummy with the prosthesis will be studied in detail.

## Conclusions and prospects

Fulcheri et al. (1994) published a paper in Italian describing the number of collections of Egyptian human remains stored in Italian museums: 141 were entire mummies and

| PATHOLOGIES                                    | Number of cases | SEX |    |      |
|--|-----------------|-----|----|------|
|  |                 | ♀   | ♂  | N.D. |
| Fractures                                      | 11              | 6   | 5  | -    |
| Diastasis of the pubic symphysis               | 4               | -   | -  | -    |
| Spondyloarthritis 19                           | 19              | 8   | 11 | -    |
| Coxarthrosis                                   | 2               | -   | 2  | -    |
| Gonarthrosis                                   | 9               | 2   | 7  | -    |
| Calcification of the menisci                   | 3               | 1   | 2  | -    |
| DISH   | 2               | 2   | -  | -    |
| Kyphosis                                       | 2               | 2   | -  | -    |
| Scoliosis                                      | 5               | 2   | 2  | 1    |
| Osteoporosis                                   | 7               | 5   | 1  | 1    |
| Total edentulia                                | 4               | -   | 4  | -    |
| Abscesses                                      | 1               | -   | 1  | -    |
| Caries   | 4               | 2   | 2  | -    |
| Parodontitis                                   | 2               | -   | 2  | -    |
| Osteoma  | 1               | -   | 1  | -    |
| Osteochondroma/ aneurysmatic cyst              | 1               | -   | 1  | -    |
| Cysticercosis                                  | 1               | 1   | -  | -    |
| Helminthiasis                                  | 1               | 1   | -  | -    |
| Tuberculosis                                   | 1               | 1   | -  | -    |
| Hydrocephalus skull                            | 1               | -   | 1  | -    |
| Harris lines                                   | 7               | 4   | 3  | -    |
| Porotic hyperostosis                           | 1               | 1   | -  | -    |
| Vescical calculus                              | 1               | 1   | -  | -    |
| Cutaneous cyst                                 | 1               | -   | 1  | -    |
| Sacralization of the lumbar vertebrae          | 3               | 1   | 2  | -    |
| Anomaly of the number and/or shape of the ribs | 2               | 1   | 1  | -    |
| Sternal foramen                                | 1               | -   | 1  | -    |
| Cervical ribs                                  | 1               | 1   | -  | -    |

Table 2- Pathologies diagnosed on the mummies studied in the Anubis Project.

214 were parts of other ones (heads, legs, arms, hands and feet).

At present, the Anubis Project includes the paleopathological results obtained for 84 entire mummies and 17 significant parts of bodies.

The cases studied are often of uncertain derivation, dating is not always precise and the bodies are preserved differently. Therefore, a statistical and paleodemographic elaboration of the results is not possible: most of the investigations performed are X-rays which make it impossible to identify the presence of pathologies in the soft tissues and therefore are unable to provide a complete picture of the health conditions of an individual. For these reasons we think it is worth presenting the results without making any statistical evaluations.

The Anubis Project data, to be finished in the next few years, could be compared with those of similar projects already completed (Gray, 1966; Gray, 1968; Strouhal and Vyhnanek, 1979; David, 1979; Ziegelmayer, 1985), still underway (Figueiredo et al, 2002) or to be realized in the future in other countries so as to obtain an international inventory of the Egyptian mummies in the museums in the whole world.

This paleopathological study could provide more complete informations on the evolution of the illnesses identified in this ancient and fascinating population of the Nile Valley.

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