

Preliminary Analysis of Dermatoglyphs in Mummies: a Valid Recording Method

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Abstract

The aim of this work is to develop a methodology that will allow the identification and study of dermatoglyphics in ancient archaeological finds of biological nature. Dermatoglyphs are one of the many instruments used as a safe method of personal identification in forensics and in the study of human populations. Because living human groups are the direct descendants of ancient peoples, anthropological studies of mummified remains are of great importance in the reconstruction of the cultural and biological identity of the people of the past. Two feet and a hand of pre-Dynastic mummified remains belonging to the Egyptian Marro collection of the Museum of Anthropology and Ethnography of Turin have been evaluated. In order to recuperate papillary signs, the most recent techniques used in forensics have been used. Both qualitative and quantitative analyses have been performed. This work brings together anthropological and forensic knowledge, and opens the opportunity for a new field of studies in which it is possible to apply recent findings in dactiloscopia to ancient mummies.

Current human groups are the direct descendants of ancient peoples. Therefore, we cannot reconstruct human history if we do not consider the biological variability of past generations from both the genetic and environmental point of view.

The anthropological study of mummies is very important to reconstruct the cultural and biological identity of past populations.

Dermatoglyphs, the patterns of cutaneous ridges and depressions covering the fingertips, palm of the hand and sole of the foot, are an anthropological character used to analyse the genetic characteristics of ancient populations and to investigate their origins (Cummins et al., 1961). In fact,

because they are genetically determined, constant in time and immune from environmental actions, dermatoglyphs are one of the many «tools» used to study human populations, in addition to being a reliable means of personal identification. They have a valid role in the characterization of different human populations since they are not influenced by the environment and not subjected to external selective forces. The existence of a genetic basis affecting the conformation of the cutaneous ridges is important in establishing the genetic distances between different groups (Floris, 1974).

Innumerable results have been achieved thus far in dactyloscopic identification, in both judicial and forensic contexts (La Sala, 2002). However, the recording of papillary ridge patterns on the dehydrated skin of mummies is a fascinating scientific challenge, requiring the use of the most advanced technologies to assure the protection of a unique cultural and biological heritage.

The aim of the present study was to devise a method to record and analyse dermatoglyphs on ancient biological specimens without compromising their preservation. Because of their biological nature, mummified tissues are particularly delicate and easily ruptured or disintegrated, especially the most external components of the tegument (Giuliano, 2004). We examined two feet and a hand of pre-Dynastic mummies from the necropolises of Assiut and Gebelein in Upper Egypt. The material, in an excellent state of preservation, is part of the «Giovanni Marro» Egyptian anthropological collection housed in the Museum of Anthropology and Ethnography of Turin. This unique material is of inestimable scientific value. Therefore, it was necessary to define a valid analytical protocol, with the *a priori* aim of not further jeopardizing the biological status of the specimens during the recording phases (Giuliano, 2004). To record the papillary ridge patterns, we used the most recent methods employed in the crime-detection field (Grande et al., 2001).

Firstly, we made direct observations on the specimens, with the aid of a magnifying lens, to verify the presence of papillary ridges on the mummified remains.

Next, we photographed the most interesting cutaneous regions using a Kodak DCS FOR SLR-N digital camera (70-300 Nikkor lens, images 38 mb - RAV). The images were then enlarged by 4-6 diameters. All the recordings were performed with a metric reference to maintain homogeneity among the factors of enlargement.

It was possible to carry out both qualitative and quantitative analyses of the resulting data.

Having found high-quality papillary ridge patterns in the

specimens, we decided to make silicone elastomer replicas normally used in odontology (Porta et al., 2000). This technique raises fingerprints from irregular surfaces without using physico-chemical treatments whose application might damage the papillary ridges. It consists in the application of malleable plastic substances, such as silicone, to the fingertips; once removed and stretched, they provide a faithful reproduction of the dermatoglyphic patterns, which can then be photographed and analysed. This technique requires great caution during the preparation of the plastic substances and during their application, so as to prevent the loss or alteration of organic material (Giuliano, 2004). Before using this methodology on our mummified specimens, we performed preliminary examinations on reference samples to optimise the chemical components and application times used on the specimens in order to preserve their skin. The results were satisfactory in light of the difficulty of the recording method.

Conclusions

The method described above, based on current crime-detection methods, opens a new field of research on ancient biological specimens.

In fact, the combination of anthropological, forensic and police science knowledge in the study of dermatoglyphs represents a very important step forward in this type of

research. Nevertheless, we are dealing with a long road ahead, in view of the innumerable obstacles necessarily imposed by the primary objective of protecting the ancient specimens.

Therefore, further research is necessary to increase the sample size and to investigate new techniques to record the ridge patterns in greater detail without further jeopardizing the state of preservation of the specimens.

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