

## *Foreword*

### **The Importance of Hard Osseo-Dental Tissues in Human identification**

We are living in the beginning of a new millennium, in which the frequency of catastrophes (floods, fires, collective disasters) is clearly increasing. Forensic medical experts, anthropologists and archaeologists use more and more frequently **the hard osseo-dental tissues** to identify the age, sex and/or lifestyle of the victims. After the discovery of X-rays and their use in radiology, the detailed dental examination became one of the most efficient methods for identifying individual human remains following various disasters.

A method for determining human sex was developed in the 80s. This method uses a protein that belongs to the human dental enamel **the amelogenin**. This kind of identification is based on a method for multiplying tiny amounts of DNA. In this way, the identity of the victims following a disaster that happened 100 years ago can be very accurately identified.

The traditional dental examination uses **32 teeth, with 160 restorable surfaces**. In addition to these, incorrectly positioned teeth and supernumeraries can be used and the radiological examination can increase the accuracy of the identification. Unfortunately, dental records are not standardized. They differ from a country to another and even inside the borders of a certain country. In the countries neighbouring the Black Sea, dental records are often incomplete or even missing, because each dentist has his own method for examining and treating the patients. Therefore, identification becomes frequently uncertain.

The possibility of analyzing the **DNA** and the human identification method based on it has revolutionized dental and forensic medicine two decades ago.

Small amounts of **DNA** can be found, properly preserved, in mummies, fossils and various **remnants of human dental and osseous hard tissues**. Modern investigation methods can multiply small quantities of **genomic DNA** as well as **mitochondrial DNA** (exclusively inherited from the mother). In that way, **50-60 pgms** are sufficient for performing a highly accurate **DNA** analysis.

The best method for verifying the relationship between ancestors and descendants is the one that uses mitochondrial **DNA**. This type of analysis has permitted the extension of the time gap between the death moment and the identification

moment. The remnants of the Romanov family have been identified using this method. In 1991, nine skeletons were found buried in a grave in the Ural Mountains. They were assumed as belonging to the Romanovs, who ruled Russia for 300 years. In 1918, the lasts of the Romanovs were murdered by the Bolsheviks, together with three servants and the Tsar's doctor. The results of the tests showed that only two adult and three child skeletons were related, without any genetical connection with the other remains. The comparison of the mitochondrial **DNA** made possible the discovery that there is a genetical relatedness with a known descendant of the Romanovs (prince Philippe, Duke of Edinburgh, great-grandson of princess Alice mother of tsarina Alexandra). The tsars identity was similarly identified.

The victims of an airplane crash can be identified using the same method. In 1996, after an airplane crash, 139 of 141 victims were identified. However, this method requires a long period to process approximately 22 days, comparing with the traditional methods, based on the dental records, which are much faster. Using dental and medical records, 59 victims were identified in only two hours and the other seven by the next morning, after an air crash in Nevada.

Dental record-based identification is a person-specific method and there are situations (as in the case of the passengers of the plane that crashed in 1996, who were Russians and Ukrainians, or the case of the Romanovs) in which the dental records are not applicable, therefore requiring **DNA** analysis. Nevertheless, general medical and dental examinations before and after the unfortunate event are still the most efficient investigation methods of forensic medicine.

Concluding, I believe that it would be remarkable if the practitioners in the countries neighbouring the Black Sea would embrace a unique system of patient registering and observing, that would help us to better communicate among ourselves and that could be successfully used for identification purposes.

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