

## ENVIRONMENTAL FACTORS THAT INFLUENCE FORENSIC ANTHROPOLOGICAL IDENTIFICATION

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### Abstract:

*The environmental factors have a major importance, in these quick and essential identification methods, because they can change the aspect quickly and essentially. This paper highlights this aspects, and is a reminder of the importance of the study of the factors of the medium on the decomposition of the body.*

**Key words:** forensic anthropology, osteology, unknown bodies, non-scientific identification method, human remains.

### INTRODUCTION

Forensic anthropology is the application of physical (biological) anthropology for legal purposes. Its field of study is anatomy and osteology (skeletal biology), it strictly deals with human remains and bones and uses techniques only related to these two.

### MATERIAL AND METHOD

It is an interdisciplinary study involving osteologists, forensic pathologists and homicide investigators in order to determine *sex, gender, stature, age, and even the circumstances of death* (ABFA website 2007) of individual victims as well as victims of genocides and mass disasters. The collected data from the analysis is then used in trials and other legal proceedings. Forensic anthropology is very often the last resort in identifying unknown bodies.<sup>1</sup>

The activity of a forensic anthropologist includes:

- a. Assistance at the crime scene by collecting human remains
- b. Clean-up of the bones so that they may be looked at
- c. Analyze of skeletal remains to establish the profile of the individual
- d. Look for a trauma evidence on the bones to establish the pathway of a bullet or the number of stab wounds
- e. Work with a forensic odontologist (dentist) to match dental records
- f. Testify in court on the identity of the individual and/or the injuries that might be evident in the skeleton

## RESULTS AND DISCUSSIONS

### **Positive comparative radiography**

#### **a. Bone morphology- skull features**

Bones have proved to be an extraordinary source of information for the trained eye. Forensic anthropologists apply scientific techniques used by physical anthropologists. Measurement techniques of the skull have been developed for all ages and race groups. Every race group presents special characteristics of the skull e.g. the jaw length and distance between the eye sockets. Other features on the bone, like thickness, scratches and muscle attachments can reveal e.g. the gender, age and size. The bones may also indicate the profession the person had, e.g. a bony ridge on the wrist can indicate that the person was working hard with his hands. Skeletal anomalies, dental features, surgical features are examples of other areas of interest the anthropologists look into.<sup>2</sup>

#### **b. Bertillon method**

The Bertillon method<sup>3</sup> is based on the anthropometric technique /photography (mug shot); measurements and recording of different parts and components of the human body as well as documentation of individual markings like tattoos, scars which were well used in former days, especially in crime cases. The measurements were summarized in a formula which would not change and would be used only for one person. This method has been replaced by fingerprinting and its theory and applications have merged into modern forensic identification methods. It is still applied in situations where mug shot are used in police investigations.

#### **Presumptive method**

Facial reconstruction is a traditional and non-scientific identification method used since the 19<sup>th</sup> century. It is a recognized and invaluable method in modern forensic anthropology for legal and human reasons when no other method is possible in order to identify skeletal remains of unknown individuals.<sup>4</sup>

There are different sculpturing techniques to reconstruct a face on the skull, but all of them are based on the study of the thickness of the soft tissue of different anatomical sites of the skull and jaw in different races and groups of races. The measurement of the thickness is followed by duplication with modeling clay. Males and females of different races present different thickness of the soft tissue. (Phillips and Smuts 1996; Rhine and Campbell 1980; Rhine, Moore, and Weston 1982; Suzuki 1948).<sup>5</sup>

The facial reconstruction technique requires a fine balance between science and art. This traditional technique is now facing new actors, as e.g. high

technology imaging workstations and biomedical software making it possible to produce spiral computed tomography and 3-dimensional reconstructions.<sup>6</sup>

## CONCLUSIONS

Forensic identification is one of the juridical and legal problems that occur more and more frequently in the field of forensic pathology and criminology. Beside the modern DNA techniques, the classic and on-the-place methods are quick and have a rapidity that helps the work of the police and prosecutors giving them clues and starts. That is why these methods used in identification are still and will be still in use. In these quick and essential identification methods, the environmental factors have a major importance, because they can change the aspect quickly and essentially. This paper highlights this aspects, and is a reminder of the importance of the study of the factors of the medium on the decomposition of the body.

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## THE INFLUENCE OF ENVIRONMENTAL FACTORS IN A CASE OF FORENSIC IDENTIFICATION

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*ABSTRACT: In cases of forensic identification with delayed discovery of the body, the influence of environmental factors is essential. The importance of the environmental factors in cases of deaths that occur in the direct and intense action of the medium factors is statistically overwhelming in Romania. The existence of materials more resistant than the soft tissues is primordial, -clothes- also the existence of a chartered dental file, or a personal belonging easily recognizable.*

**Key words:** forensic anthropology, dementia, dental formula, ante-mortem dental records.

**Case history:** On 25.08.2009 a 82-old female suffering from known dementia disappeared from home. On 16.01.2010 bone fragments and clothing were found on the rocks at the riverside near the village Drăgești, Romania. Within a radius of about 4 m<sup>2</sup> in an underbrush -bones, clothes and a stick were discovered. The body was skeletonized.

### Autopsy examination

**Identification data:** examination of clothes <sup>Photos 3-</sup> white cotton shirt, green cotton blouse, gray-beige striped sweater, black knitting sweater, blue crochet vest, sleeved blue shorts, brown knitting trousers, black wide skirt, dark blue apron, black woolen scarf, blue plastic shoes, partially red

**b. Personal belongings:** walking stick.

The clothes were cold-frozen, they were lying next to the skeleton and they were covered with dry leaves, mud and maggots.



Photo 3.

Photo.4

Photo. 5

**c. The dental formula** of the subject was analysed, but unfortunately the deceased didn't have any ante-mortem dental records to compare it with.

1.1. old missing 1.2. old missing 1.3. old missing 1.4. old missing 1.5. old missing 1.6. old missing 1.7. old missing 1.8. rest coronary	2.1. old missing 2.2. old missing 2.3. old missing 2.4. old missing 2.5. old missing 2.6. old missing 2.7. old missing 2.8. old missing
3.1. rest coronary 3.2. rest coronary 3.3. rest root 3.4. old missing 3.5. old missing 3.6. old missing 3.7. old missing 3.8. old missing	4.1. rest coronary 4.2. rest coronary 4.3. old missing 4.4. old missing 4.5. old missing 4.6. old missing 4.7. old missing 4.8. old missing

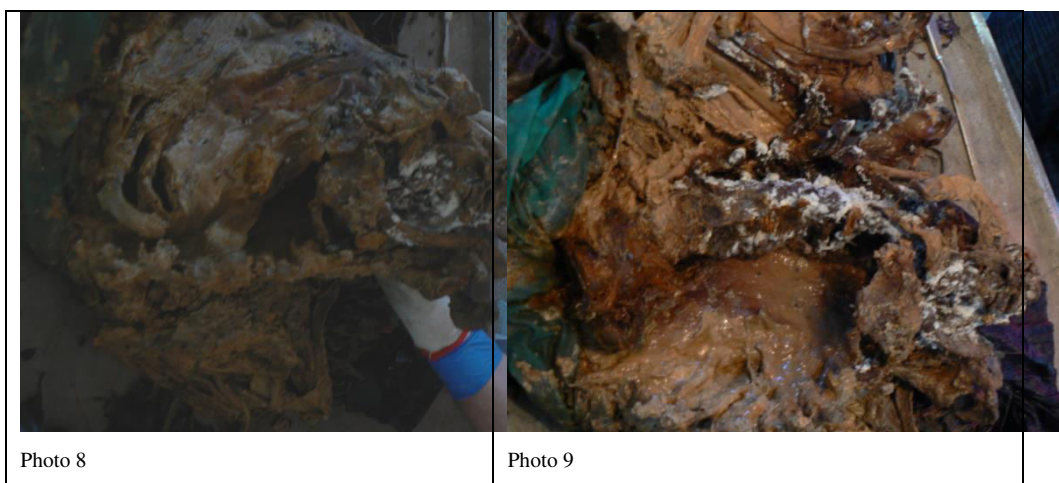
### **Internal examination**

**Head:** complete detachment of the head from the cervical column, which was covered with dry leaves and larvae up to 0.6 cm. Cranial bones and viscerocranium are integral, mandible is dislocated.



**The appearance of the skull**

**Neck:** soft tissue is missing. C1 vertebra is missing. C2-C7 vertebrae are present and of integrity, articulations between the vertebral bodies, covered with muscular debris at sites and white mold deposits.



**The appearance of the neck and the thoracic cavity**

**Thorax:** lack of soft tissues. Integrity of thoracic bones, articulations between the vertebral bodies (integrity of ribs, sternum incomplete - missing xiphoid appendix, the thoracic vertebral column persists at T1-T4 level, the rest is missing). Thoracic organs cannot be examined, the thoracic cavity contains a whitish-brown paste, covered with whitish mold deposit and larvae up to 0.6 cm; it gives off a foul smell of putrefaction and mold.

**Abdomen:** lack of soft tissues. Abdominal organs are missing. Basin with disarticulated bones, right hip bone and sacrum persist and are fully or partially covered by brown-blackish soft tissue. Left hip bone disarticulated.  
**Skeleton:** left upper limb - bones and soft tissues are missing, shoulder girdle (scapular) bones are present; right upper limb and bones totally disarticulated. The humerus, radius, ulna, carpal bones, metacarpal bones and phalanges are present and are complete or partially covered by blackish brown soft tissue; inferior limbs and bones disarticulated; femur, tibia, fibula and partially the tarsal bones, metatarsals and phalanges are complete or partially covered by blackish brown soft tissue.

Diagnosis based on macroscopical pathoanatomical analysis: advanced putrefaction with partial skeletonization.

Forensic autopsy conclusions:

1. Medical type and cause of death of A.A cannot be established precisely because of the advanced state of putrefaction and partial skeletonization.
2. According to the autopsy findings and the survey data, the death could be classified as nonviolent, and a possible cause is coronary myocardosclerosis
3. The death may have occurred approximately 4-6 months ago
4. Autopsy examination revealed no injuries in the skeleton and of the remaining soft tissues.
5. Actual signs of death (lividity, rigidity) can not highlighted
6. Signs of violence: No evidence

### **Identification**

The identification of the subject was done by the family members based on the recognition of the clothes and the walking stick

### **Alternative scientific identification methods:**

- An alternative identification method for this unknown body would have been a forensic anthropological approach, by constructing a biological profile with data on: age, gender, stature, race etc.
- Dental identification by comparison with ante mortem records. In this case there were no previous dental records to compare with.
- A DNA profile would be quite tricky to make in this case as the body has been lying for a long time, and DNA is degrading and adding artefacts.

### **CONCLUSION**

In cases of forensic identification with delayed discovery of the body, the influence of environmental factors is essential. In opposition with situations



when the body is preserved due to natural mummification, freezing or lignification, the importance of the environmental factors in cases of deaths that occur in the direct and intense action of the medium factors is statistically overwhelming in Romania. The existence of materials more resistant than the soft tissues is primordial, -clothes- also the existence of a chartered dental file, or a personal belonging easily recognizable. That is why the forensic specialists have to take into consideration all the factors that concur in the decomposition of the body, and to reconstruct and work backwards the environmental factors that caused the existing situation of the body of the deceased. The idea is to exert a scientific synergistic addition of all forensic methods of identification and of course mainly to consider the environment factors that led to the existing state of decomposition of the body.

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