

## A Case Report: Skeletal Remains Of John Doe: The Man In Blue

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**ABSTRACT:** Case studies are ideal to test anthropological techniques because they give us the opportunity to apply them on real cases to individual skeletal remains. The role that forensic anthropologists have played in forensic sciences has aided the medico-legal disciplines in a number of ways. For example, identification of skeletal remains is now more accurate than ever before. Many of these cases have brought perpetrators to court for justice and imprison them. The purpose of this paper is to describe the last forensic anthropological techniques to analyze skeletal remains to determine sex, race, stature, age, and to make a positive identification of a man who disappeared more than 14 years ago. According with a complaint at the beginning of September, 2015, several human skeletal remains were exhumed from the backyard of a house in a poor district of Montevideo City, and later carried to the Central Judicial Morgue to be analyzed. These analysis indicated that the victim was a white man of about 50 years old and about 167 cm tall. The cause of death could not be determinate. Based on preliminary evidence it was suspected what the victim might be John Doe, a man who disappeared more than 14 years ago when he was 49 years old. Therefore, It is a cold case now opened. Based in actual evidences and the confession of his wife it knows that he really was murdered by her and later buried in the backyard at home, where all the family still lives, so his body remained there for more than 14 years until that a complaint was made by one of his daughters, who did not live with her mother in that house. Digital comparison were made using two victim's frontal view photograph of different ages, and the unknown skull. This examination revealed that the skull corresponded consistently with the individual in the photographs. Later, these results were supported by a DNA profile. Therefore, this case shows how Forensic Anthropology techniques can be successfully used in medico-legal investigations linked with cold cases of more than 14 years ago.

**Keywords:** Forensic Anthropology; Cold Case; Digital Skull-Photo Comparison; Identification; Uruguay.

### I. INTRODUCTION

Forensic anthropologists have developed numerous demographic techniques to understand the biology of people around the world. Many of these techniques derived from skeletal remains of known identity. For this reason case studies are ideal to test the validity of this techniques and Forensic Anthropology may function as a testing ground for this aspect of Biological Anthropology (1).

For almost three decades, Forensic Anthropology has been an active part of the coroner system in Uruguay and the number of cases has increased considerably since the inclusion of a resident forensic anthropologist to the medico-legal team and judicial system (2). This eventually led to a higher rate of positive identification of unknown human skeletal remains (3,4).

On September 2nd, 2015, several human skeletal remains were found buried in the backyard of a modest home located in a poor neighborhood of Montevideo City, into Montevideo 14<sup>th</sup> District Police Department jurisdiction. After preliminary observations in situ, the remains were transported to the Central Judicial Morgue for an in-depth analysis by the local resident forensic anthropologist, especially to determine sex, race, stature, age at death, cause of death, and eventually its identity. Once placed the skeletal remains on the autopsy's table in anatomical position to be analyzed (**figures 1-4**), the author notes that all the human skeletal remains corresponding to a single individual. The victim was not wearing any clothing and no bullets were found with the skeletal remains. The skeleton is almost complete, in good stage of preservation and there was not any injuries evidence. The body was found 4 feet deep blanket wrapped in a light color and a dark curtain. Three intact wires that form bonds at the level of the neck, wrists and legs are observed, they were probably used for transporting the body until the site of buried. It was suspected that skeletal remains could correspond to the missing husband of a woman who inhabits the humble home, she is 57 years old and lives there with five of his six children, four women and a boy. The skeletal

remains could be found according with a complaint made by one of the woman's daughters, who on the occasion of attending a party, was able to see her

only brother dressed in the blue suit what his father allegedly wore when he went to Italy, 14 years ago for labor reasons.



Figure 1



Figure 2



Figure 3



Figure 4

This according with his wife's version gave to his family and the neighbors, after he disappeared, when he was 49 years old. However, at the time her husband disappeared 14 years ago, there was suspected in the neighborhood that this woman had killed him, but no evidence had and therefore, no specific complaint was made and eventually the issue forgotten and the case was cold. This until September 2015, through a search warrant the macabre discovery was made. Once, being found John Doe skeletal remains, his wife confesses what 14 years ago she killed him using a

big knife in self-defense as they fought in the bedroom and later, she had buried him in her home's backyard. Apparently, his children ignored the fact and thought that his father had indeed, traveled to Italy for work, but he never come back. It is noteworthy that the couple had a long history of abuse by the husband, which were corroborated by their children, neighbors and relatives to family. The purpose of this work is to display the details of this rare cold case as an example of fatal domestic violence, and how through anthropological

technical can get to identify the skeletal remains of missing people disappeared many years ago.

## II. MATERIALS AND METHODS

### a) Osteological Analysis

A set of anthropological procedures was followed to analyze the remains. The first was follow a correct chain of custody and the inventory of bones. Once inventory was finished, I noted that only very few bones were missing and the skeleton was almost complete. Several dental pieces were extracted for DNA analysis. Further examinations revealed no evidence that the remains had been attacked, damaged by predator or scavenging animals, nor insect were found and not disturbed by any other agent. The first sets of anthropological analysis dealt with the determination of sex, race, stature and age at death. Diagnosis of sex was made using skull and pelvis both morphological and metric features (5). As is typical for males, the skull was large and rugged with well-developed supraorbital ridges and mastoid processes. The occipital bone showed pronounced nuchal lines and protuberance, small frontal and parietal eminences, and a sloped forehead. The pelvis was also of a male type with a narrow subpubic angle, large acetabulum and narrow, deep greater sciatic notch (6). In addition to morphological analysis, determination of sex was made by discriminant function analysis of the skull, these formulae tested indicated the victim was a male (7). About racial affinity since a morphological point the victim showed a number of white characteristics such as deep nasal depression, a narrow nasal aperture, sharp sills, and a round and high skull (5). To confirm this, cranial and mandibular dimensions were put into discriminant function formulae derived from an American white sample (8). Stature estimation is another way to determine if the victim's body size was within the range of the reported missing people and also to rule it out if there is a large discrepancy. There are very few standards to estimate height from the skeleton. The most reliable is obtained from the long bones of the lower and, to a lesser degree, of the upper extremities. The given standard error of estimate can cover a safety range around the mean. In this case the estimation of stature was made using lengths of the femur and tibia and applying them to Trotter's regression equations for white males (9). The average stature was found to be 167 cm with about  $\pm 3,27$  cms standard error of estimate. Age at death may be estimated from several methods.

One of the most reliable morphological age estimations is the assessment of the costochondral junction of the ribs (10). When applied to this case for white male, it was observed that pit noticeably deep with a wide U-shape. The walls are thin with sharp edges. The rim is irregular and exhibits some rather long bony projections that are frequently more pronounced at the superior and inferior borders. The bone is noticeably lighter in weight, thinner and more porous, especially inside the pit. These characteristics correspond to phase VI, an age between 43 and 55 years old at time of death (10). Ectocranial suture closure was one of the oldest techniques developed to estimate age at death (11). In this case the technique development by the author (12) using a Uruguayan sample. It is calculated from the total score of each section of suture and applying it to the regression equation:  $Y = 0:950468x - 2:63467$ . The total score was obtained using the traditional 0 (open) to 5 (closed) scale patterns and added up to a maximum score of 95. In this case the total score was 55 points which made the age about 49,65 years old, with a range of  $49,65 \pm 5$  years. Evaluation of the male pubic symphysis pattern was based on Todd's (13) studies. Ventral margin croded at a greater or lesser extend of its length, continuing somewhat onto the symphyseal face. Rarefaction of face and irregular ossification. Disfigurement increases with age. This correspond to Todd's X phase analysis, this is an average age of 50 years old. Age estimation was also made from the size of the medullary canal of the proximal epiphysis of the humerus (14), results indicated that the victim was about 50 years with a range of 45 to 55 years old using the formula:  $Y = 58:08 + 1.47(x-6:03)$ , where x refers to the medullary canal size. This technique was derived on a Cuban sample of 94 males and females. The humerus was first sagittally sectioned in its upper third to determine how far the medullary cavity was advancing into the epiphyseal region. The surgical neck of the bone is taken as a reference point. If the cavity has not reached this point, the metric value is negative suggesting a young person. If the canal has advanced into the neck and even to the head, the person is in an older age category. Therefore, it is clear that the rib phase analysis, ectocranial suture closure pattern, pubic symphyseal metamorphosis and medullary canal enlargement suggested a lower range of 45 and gave an upper range of 55 years old at time of death. Then, a mean age of about 50 years was estimated for the skeletal remains. All the

osteological analysis of the skeleton have shown that these were the remains of an approximately 50 years old white male and about 167 cm tall.

#### b) Interval Since Death

Postmortem interval of time since death is one of the most difficult aspects of forensic assessment (15). In general, the time interval since death is determined by analyzing the remains through external observation, chemical-physical testing and estimating the deterioration time of artifacts like clothing, shoes, etc. External observation includes factors like temperature, scavenging by animals and insect invasion (16,17). The second method includes chronological dating techniques, deterioration of various chemical elements and compounds like nitrogen, amino acid and fats (5). The third technique deals with the assessment of deterioration of fabrics, plastics, nylon and the like (18). In general the decomposition process in Uruguay is slow and may take as long as 2 or 3 years, when the remains were buried in a coffin. But the process of decomposition should proceed at a faster rate in cases like this where the body was not buried in a coffin. So, in this case the body is totally skeletonized and there was not any clothing to determine the rate of deterioration. Therefore, we determined the interval of time since death according to our forensic experience, the general aspect of the remains and any chemical-physical methods. Bones showed good aspect and consistency, they were not crisps, showing very little porosity, there was not adipocere remains and the medullar cavity of long bones was empty, these indicating an interval since death of at least 10 years ago. Chemical-physical method of the test for carbonate was also used, this is when a piece of bone is exposed to a few drops of 20 percent hydrochloric acid and produce a foam, this indicates the presence of dolomite-petrification. Younger specimens show a weaker reaction to the hydrochloric acid like in this case, this also is indicating a time since death of at least 10 years (5). Based on the evaluation of these facts, it was estimated that death might have occurred at the time John Doe's disappeared, this is 14 years ago. I could not find any contradiction neither skeletal examination nor the data submitted by the authorities and relatives.

#### c) Cause of Death

It was obvious that the skull did not show any injuries. In general all the bones are in good stage of preservation and only several ribs are broken, but due to the excavation process and did not show any discernible ante-mortem health problems. Dental health was not good suggesting a person of low socioeconomic status. All these findings could be congruent with the fact that John Doe was killed with a big knife that penetrated into his abdomen not damaging any bone but only damaged soft tissue and abdominal organs causing suddenly his death as was later confessed by his wife.

#### d) Identification

A complete forensic anthropological report on age, sex, race, stature, cause of death, and time since death was made by the author and sent to the judge in charge. As showed the analysis of the skeletal remains the victim was a white male of about 50 years old and approximately 167 tall, who died at least more than 10 years ago. As a positive identification was needed a number of anthropological procedures were put together to make it. These included skeletal characteristics, skull-photo comparison, and if it is possible to find any dental evidence. It was suspected that skeletal remains might have belonged to John Doe, a white man who was 49 years old at the time of his disappearance. Upon the suspicion that the victim was John Doe, it was decided that positive identification could be made comparing the skull with two pictures using superimposition techniques and a personal computer to aid in the identification.

The apparatus utilized was standard equipment and consisted of a Sony Digital Video Recorder Camera HD Model HXR MC-50P, personal computer, Panasonic Digital Mixer Model WJ AVES, Adobe Photoshop CS version 8.0.1 and Pinnacle Studio HD version 14.1 software. The photographs as well as skull were placed under the digital video recorder camera and illuminated by white fluorescent lamps. Then, the skull had been correctly oriented and adjusted so that it was as close as possible to that of the individual in the photographs, both images (skull and photographs), were then superimposed using the digital mixer for a detailed comparison. After, these images were digitized and stored into the PC using Pinnacle software. In the next step, several key anatomical landmarks were marked as a guide on skull and photograph using Adobe Photoshop software (**figure 5**). Adobe Photoshop software allows any

desired combinations of photo-skull comparison, including removing the soft tissue to view the underlying skeletal structures.

The analysis showed that conformity was found between skull image and all recognizable proportions of head, face, eyes, nose and mouth on the photographs submitted for comparison. Also, the outline of the soft tissue on the skull was

congruent with the facial contours lying in the photographs.

The comparison revealed a full match of photograph and underlying skeletal structures (figures 6-11). Later, a complete report was elaborated indicating without any doubts that the remains analyzed belonged to John Doe.

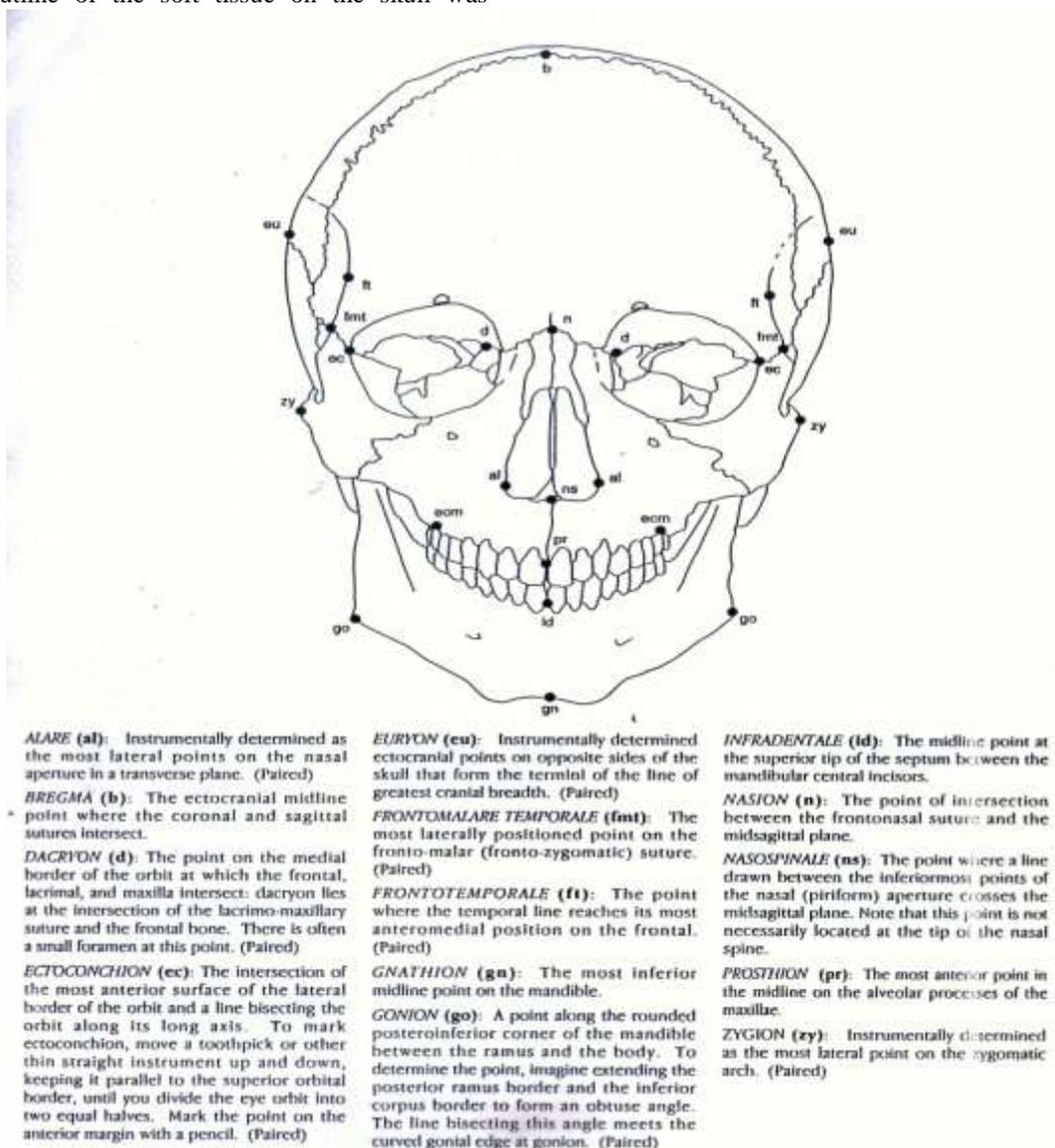
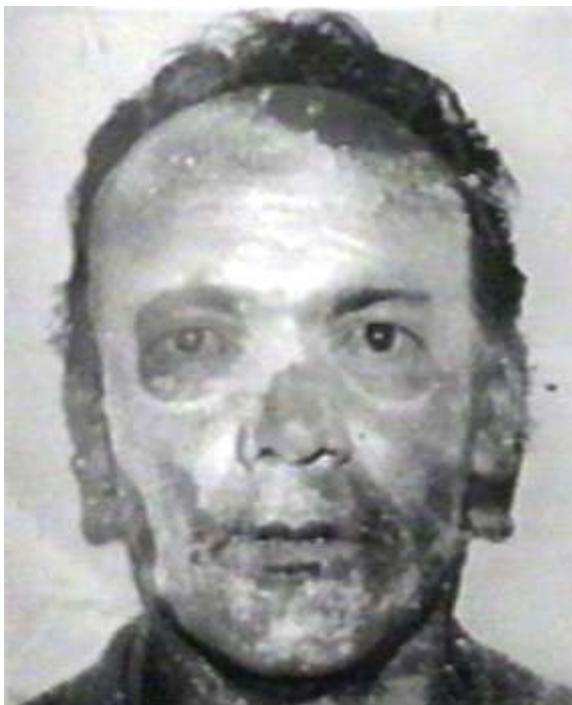


Figure 5



**Figure 6**



**Figure 7**



**Figure 8**



**Figure 9**



**Figure 10**



**Figure 11**

Dental comparisons could not be made because there was not any dental records to be compared. Regardless this proof of identification, the Uruguayan judge in charge of the case wanted further evidence to support identification. Therefore, at the end of 2016 a DNA analysis was requested using several dental pieces. DNA evidence supported the original identification made by skull-photo comparison that, indeed, the skeletal remains belonged without any doubt to John Doe. Finally, the judge in charge of the case accepted that the remains were those of John Doe, who was killed by his wife using a big knife more than 14 years ago. But, his wife was not convicted, because the judge taken account the history of mistreatment by her husband for many years and considered what she kill him by self-defense and this cold case was then officially closed.

### III. RESULTS AND DISCUSSION

One of the most challenging aspects of the forensic sciences is the identification of the victim from the remains. As long as the anthropological characteristics do not exclude the victim, factors of individualization are needed to make a positive identification (5). The aim of individualization is to make sure that the victim can only match one individual. Then, a very important aspect is to test scientific standards based on a large sample

(19,21). Tests as such can only come from case studies as presented in this paper. Identification of skeletal remains are complex and require careful assessment of both skeletal remains and personal belongings. If possible, additional techniques should be incorporated in the final decision. As was done in this case, a DNA analysis added further assurance that the deceased person was John Doe. The investigation started with the initial observation about sex, age, race and stature, cause of death and time since death. These techniques seemed to have worked well in this case. It was confirmed that the remains belong to a white man, who was about 50 years and 167 cm tall. It was estimated that the time of death was at least, more than 10 years ago before the remains were exhumed, at the beginning of September 2016. Then, they were carried out to the Central Judicial Morgue to be analyzed. As we known later, the victim was murdered by his wife with a big knife that damage his abdominal organs and caused his death suddenly. To obtain a positive identification, skull-photo comparison techniques were designed by the author.

The skull-photo comparison techniques as a method of identification has a long history (22). First, comparisons were made using only photographic equipment (23,25), later they were made by video superimposition techniques (26,31).

But, now the use of a computer has a number of advantages as well, one of which is that the whole process can be accomplished by one person and there is also less equipment failure.(32,40). Digital video superimposition have proven to be very successful in the investigation of identities. This technique procedure has been a commonly used to assist in identification and has been accepted in courts around the world (41,57). With the availability of current technology, the whole process takes about one hour, and demonstrates effectively consistencies, between the skull and the facial photographs of the victim. However, success in identification depends upon the quality of the submitted photographs, as well as correct orientation and articulation of the skull and mandible. Although, the remains were identified by skull-photo comparison, another available evidence was also incorporated, as DNA analysis. In conclusion, this study shows that a positive identification can be made using traditional anthropological techniques and skull-photo comparison assisted by a computer. However, when it is possible, other complementary identification techniques can be used, as in this case DNA profiles comparison. It is, therefore, highly recommended that coroners and law enforcement agents obtain anthropological opinions when they are dealing with human skeletal remains of cold cases to analyzed and eventually identified them.

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