Human Skull Recovery: How Forensic Anthropology Solves the Case of St. Cristoforo Church (Ferrara)

V.S. Manzon[1], N. Onisto[1], C. Tassi[2], E. Gualdi-Russo[1]

[1] Dept. of Biology and Evolution, University of Ferrara. E-mail: mnzvss@unife.it -
[2] Dept. of Biomedical Science and Advanced Therapy, University of Ferrara

KEY WORDS: forensic anthropology, skull, 3D virtual model.

Introduction

A human skull was found inside a plastic bag on the altar of the Church of St. Cristoforo at the Monumental Certosa of Ferrara on November 23, 2008. As there were no associated items that allowed for personal identification, an expert report was required by the Prosecutor to reach an identification of the finding (by determining sex, age-at-death and population affinity), providing eventual evidence of skeletal trauma in order to testify any hypothesis of offences.

Materials and Methods

The analyzed specimen was a human skull in quite good state of preservation, but incomplete (mandible was missing). Only two upper molar teeth were preserved. The finding was submitted to direct and indirect morphometric analysis in order to assess **sex, age-at-death** and **population affinity**. Regarding indirect analysis, we made use of a **3D virtual model** of the cranium, created by remarkable precision by a laser scanner NextEngine Desktop Scanner (NextEngine Inc., California, USA) with software Scan Studio Core (NextEngine Inc., California, USA).
Sex determination was based on morphological characters of the cranium (WEA, 1980).

Age at death was determined using the method of tooth wear (Brothwell, 1981), the degree of ecto-cranial suture closure (Meindl and Lovejoy, 1985; Buikstra and Ubelaker, 1994) and the application of the regression equation proposed by Nawrocki (1998). Direct anthropometric examination were made using traditional methodology (a caliper and a slide compass).
A series of measurements was performed on the **neurocranium** (maximum cranial length gl-op; maximum cranial breadth eu-eu; basilo-bregmatic height ba-br) and on the **splanchnocranium** (nasion-prosthion line na-pr; bizygomathic breadth zy-zy; nasal length n-ns; nasal breadth eurhi-eurhi), calculating the following **indices of cranium and face**: length-breadth index, length-height index, superior facial index, nasal index.
The **population affinity** was made according to Biasutti' classification (Facchini, 1999) and the criteria proposed by Gill (1998).

Results

The finding skull (Figs. 1, 2) belongs to a male aged 35-52 years. The morphological features of the skull (low facial prognatism, parabolic shape of the palate, absence of platopia, indented palatine suture, curved zygomatico-maxillary suture, narrow shape of the nose, prominent nasal spine, distinct nasal sill) were consistent with Europoid / Caucasoid population. With regards to the most frequent human types in Italy, the morphometrics of the finding (large skull with a rounded occipital bone -brachycranial-, mesorrhine, mesene/ euryene face)

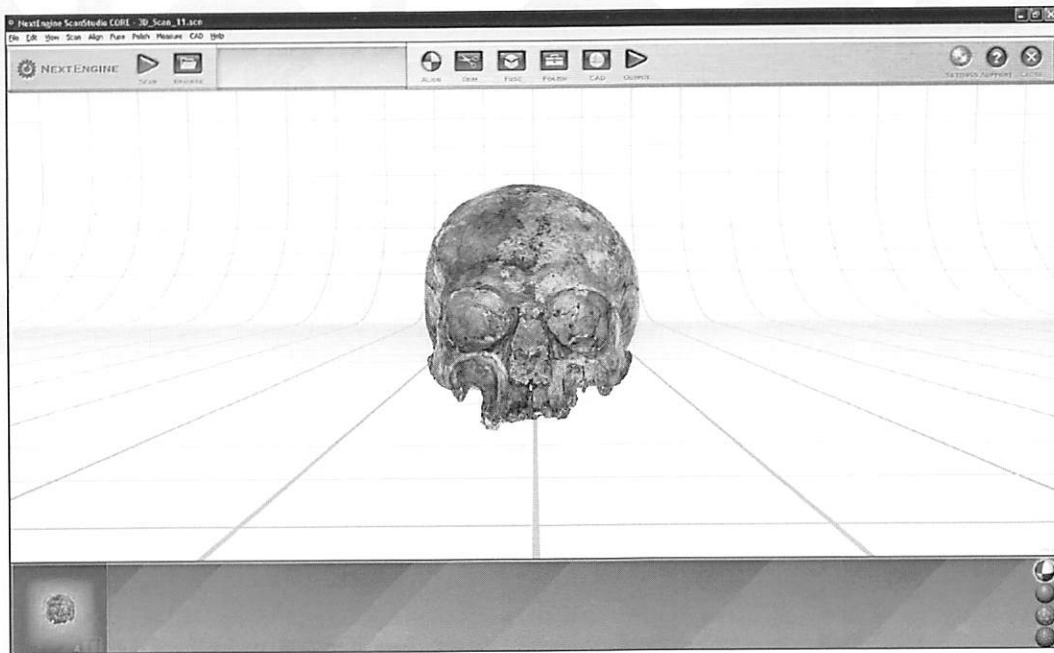Fig. 1. The skull in anterior, lateral, basal views.

Fig. 2. 3D *virtual model of the skull.*

appeared overall consistent with the "Alpine" type, who lives in the Emilia-Romagna region together with the "Adriatic" type.

Also if the examined skull preserved only two right upper molars, the absence of alveolar bone reabsorption indicates that the loss of the missing teeth occurred *post mortem*. We also observed a condition of plagiocephaly in association with a slight facial asymmetry (plagioprosopy) and partial persistence of metopism on glabellar region in the examined skull.

Conclusions

Without contextual elements or absolute dating, it is difficult to determine the period in which this individual lived. It is important to underline that there is no evidence of trauma and injuries on this skull. Moreover, the presence of polychromatic material on the skull surface (pink on the frontal b., blue on the maxillary, green on the temporal b., yellow on the parietal b.), with different distribution according to the various anatomical areas (Fig. 1) did however suggest that the skull was used in the past for educational purposes.

References

Brothwell D.R. 1981. *Digging up bones.* Oxford University Press.

Buikstra J.E., Ubelaker D.H. 1994. *Standards for data collection from human skeletal remains.* Arkansas Archaeological Survey Research, Series n° 44.

Facchini F. 1999. *Antropologia, Evoluzione, Uomo, Ambiente.* UTET.

Gill G.W. 1998. Craniofacial criteria in the skeletal attribution of race. In: Reichs K.J. (ed.), *Forensic Osteology.* Charles C Thomas Publisher LTD. Springfield, Illinois, USA: 293-317.

Meindl R.S., Lovejoy C.O. 1985. Ectocranial suture closure: a revised method for the determination of skeletal age at death based on the lateral-anterior sutures. *Am. J. Phys. Anthrop.,* 68: 57-66.

Nawrocki S.P. 1998. Regression formulae for estimating age at death from cranial suture closure. In: Reichs K.J. (ed.), *Forensic Osteology.* Charles C Thomas Publisher LTD. Springfield, Illinois, USA: 276-292.

WORKSHOP OF EUROPEAN ANTHROPOLOGISTS (WEA) 1980. Recommendation for Age and Sex Diagnoses of Skeletons. *J. Hum. Evol.,* 9: 517-549.