



EVA VANÍČKOVÁ, ONDŘEJ BÍLEK

ANTHROPOLOGICAL FACIAL RECONSTRUCTION OF THE SO CALLED "PRINCESS" OF BÝČÍ SKÁLA

ABSTRACT: Peculiar situation with the skull of the so-called Princess of Býčí skála, which played a mysterious and still unclear role in the history of knowledge of the rare Early Iron Age find from Býčí skála Cave, made us choose this particular skull for skull-based anthropological reconstruction of human face.

KEY WORDS: Býčí skála - Facial reconstruction - Anthropometrical points - Two-dimensional method - Three-dimensional method - Thickness of soft tissues

INTRODUCTION

Anthropological reconstruction of human face is a method, with the help of which we try to recreate the original appearance of humans. The history of reconstruction dates back to as early as the 7th century BC (Neave, Prag 1997, Iscan, Helmer 1993), but it was not put on a really scientific base until the 1970s, when the study of the relationship between the shape of the skull and the face was significantly enriched and made more accurate by using the ultrasound (Aulsebrook 2000, Novotný *et al.* 2003, Balueva *et al.* 2008). Accurate definition of thickness of soft tissues at anthropometrical points in living males and females of various populations enabled the standardization of empirical data and considerable development of methods. Besides standard methods of reconstruction

(Gerasimov 1975, Lebedinskaya 1998, Balueva *et al.* 1991, 1993, Taylor 2001, Neave, Prag 1997, Iscan, Helmer 1993, Ullrich, Stephan 2016), computer-aided modelling began to be used with increasing intensity (Wilkinson 2004, Clement 2005, Quatrehomme, Iscan 2000, Jurda, Urbanová 2016).

MATERIAL

For facial reconstruction we chose one of the skulls found by J. Wankel in Býčí skála Cave in 1872. The cave was already known at the end of the Stone Age, but a phenomenon which made Býčí skála truly famous is the Hallstatt Age finds. The spectrum of objects, their luxury and mainly their amount still surpass all the other cave finds from the Moravian Karst (Golec

Received 25 April 2016; accepted 26 August 2016.

© 2016 Moravian Museum, Anthropos Institute, Brno. All rights reserved.

2015). The excavations at Býčí skála in 1872 yielded thousands of archaeological finds and many pieces of anthropological evidence as well. Among the most significant finds are torsos of four-wheeled wagons, mining and smithing tools, casting moulds for bronze artefacts, bronze brooches, pins, bracelets, female chain belts, golden bracelets and anklets, an iron ring, glass beads, ceramic vessels, spindle whorls and many others. Among the finds also was a bronze bull with iron inlays (Stloukal, Nekvasil 2015). The figurine was discovered in 1869 by brothers Felkl who gave it to J. Wankel three years later (Golec 2015).

Anthropological material comprised a very interesting assemblage of forty male, female and children's skulls (one date from human femur Oxa-33452: 2,600±29 uncal BP; Oliva *et al.* 2015). Eleven years after the discovery, Jindřich Wankel sold his entire voluminous collection to Vienna where it soon became part of permanent exhibition of the Natural History Museum. Wankel retained possession (from all his excavations) of only three objects – in two of them (part of a cave bear skull and an iron ring) we are sure that it was due to their scientific value. The third object, which remained possession of the finder, was the so-called Princess skull. It ended up among the possessions of Wankel's grandson Karel Absolon and became part of collections of the Moravian Museum many years after Wankel's death. The skull is among the bequests of Absolon, which in early 1990s got under the administration of the Anthropos Institute of the Moravian Museum (Oliva *et al.* 2015).

METHODS

Technically seen, the methods of facial reconstruction can be divided into two groups – two-dimensional drawing methods and three-dimensional relief methods. The latter ones are further divided, according to the way of realisation, into sculptural and computer-aided methods. Sculptural approach, which also is the output of our work, involves the use of as much as three different methods. They are currently classified as follows: (1) anatomical method (Russian method) reconstructs the muscles of mastication according to the character of attachment points on the skull, which form at most the shape of the face (Gerasimov 1975, Lebedinskaya 1998, Balueva *et al.* 1991, 1993, Iscan, Helmer 1993); (2) method of thickness of soft facial tissues (American method) uses average values of thickness of soft facial tissues at anthropometrical points (Taylor 2001); and (3)

combined (British) method unifies the advantages of both of the above methods (Neave 1997, George 1993, Iscan, Helmer 1993).

No matter which visualization method is chosen, facial reconstruction always demands a thorough analysis of the skull, which is mainly focused on basic characteristics of the skull, its morphology and dimensions. All these investigations provide information on age, sex, ethnic affiliation, and we also can discover rare features on the skull, such as asymmetries, pathologies, cultural modifications of the head or individual customs (Novotný *et al.* 1993, Stloukal 1999, Drozdová 2006, Iscan, Helmer 1993). This all is then included in the final appearance of the reconstructed face.

For the purpose of visualisation and reconstruction of the skull we used the sculptural approach. It observes the prediction rules created by Galina Lebedinskaya (1998), which follow up the work by M. M. Gerasimov. I learned the principles of this method in a training course at the Academy of Sciences in Moscow.

RESULTS

The first phase of the method of reconstruction of facial relief consists in creation of an outline of the skull with all necessary details, with the help of which the face contour is made according to standard thickness of soft facial tissues (*Table 1, Figure 1*) To the points: nasion, glabella, vertex, opisthocranium and to the most prominent point of the external occipital protuberance we apply plasticine coils, whose height equals the thickness of soft tissues in given regions. The coils are connected through stripes about 1 cm wide, which merge into a single sagittal crest. Another longitudinal stripe is laid along the upper temporal line, proceeds to the mastoid process and ends at its point. Both stripes are connected through transversal stripes, which continue to as far as the rear margin of the zygomatic process of the frontal bone and to the upper margin of zygomatic arches. The last stripe is placed on the surface of the large temporal muscle. The distance between stripes should not exceed 2–3 cm (*Figure 2*). The area between the longitudinal and transversal stripes is filled in with plasticine. Possible unevenness is levelled so that the desired thickness of soft cranial tissues is not disturbed. Soft tissues in the area of eyebrows, glabella and upper orbital margin must be reconstructed with particular thoroughness to maintain

TABLE 1. Standards of the thickness of soft facial tissues.

Landmarks	mm
Metopion	46
Superciliary	53
Glabella	55
Nasion	50
Rhinion	31
Lat. nasal point	32
Maxillary	135
Malare	117
Zygion	49
Supracanine	96
Philtrum	106
Labrale superior	110
Labrale inferior	122
Sulcus mentale	105
Pogonion	111
Gnathion	62
Mandibular body	146
Margin of mandible	60
Mandibular branch	175
Gonion	47

their complicated individual relief (Lebedinskaya 1998). In practice, it turned out that it is more advantageous to first finish one half of the skull and then go to the other. Also important is the position of the head towards the neck. Its position and inclination are different in each individual and are often determined by age, occupation, state of health, etc. (Taylor 2001).

CONCLUSION

The attractiveness of the skull find from Býčí skála Cave as well as the disputes which have been held by experts, especially as regards the interpretation of the Býčí skála find, made us choose this particular skull for reconstruction. The cooperation between an anthropologist and a sculptor enables to gradually elaborate the reconstruction method chosen. The

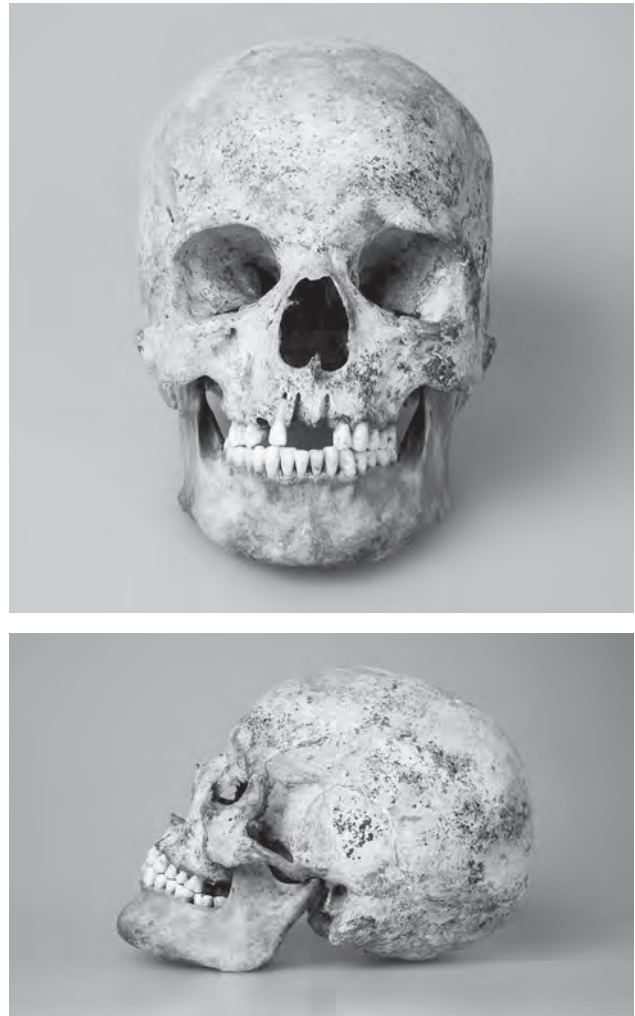


FIGURE 1. Original skull, frontal view (a) and lateral view (b). Photo J. Čága, MZM.



FIGURE 2. Original skull and a copy of the skull with a layer of soft tissue. Photo J. Čága, MZM.



FIGURE 3. Reconstruction: bust in frontal view. Photo J. Vermouzek.



FIGURE 4. Reconstruction: bust in left lateral view. Photo J. Vermouzek.

result of reconstruction was an initial plasticine model, from which first a silicone mould and then the final model of the face were made. The total time necessary to make the reconstruction, inclusive of creation of a skull copy and the final cast, is estimated by us to about 600 hours (*Figures 3-5*).

Current state of development of methods of facial reconstruction does not allow to make a reconstruction with 100% accuracy. However, it is possible to reconstruct the main characteristics of human face on the basis of the skull (Iskan, Helmer 1993, Neave, Prag 1997). The whole process of reconstruction involves many uncontrollable sources of mistakes, which naturally leads to contradictory views on the value of this method. Nevertheless, all types of visualisation methods presently find wide use mainly in historic,

prehistoric and forensic anthropology. In criminology they often represent the only means of identification of skeletal remains of unknown origin. Historical reconstruction can display the appearance of a well-known personality or a typical representative of some of the past populations. This area functions as a meeting point of several different approaches from the fields of archaeology, anthropology, museology and art (Novotný *et al.* 2003).

ACKNOWLEDGEMENT

In memory of Tatiana Balueva.

Herewith we would like to express our deep gratitude to Elizaveta Veselovská, Ph.D. and doc.



FIGURE 5. Reconstruction: bust in right lateral view. Photo J. Vermouzek.

RNDr. Eva Drozdová, Ph.D. for their kind help and valuable advices. The authors was encouraged by the Centre for Cultural Anthropology. This paper was financially supported by the Ministry of Culture of the Czech Republic by institutional financing of long-term conceptual development of the research institution (the Moravian Museum, MK000094862).

REFERENCES

- AULSEBROOK W. A., 2000: Facial Tissue Thickness in Facial Reconstruction. In: J. A. Siegel, P. J. Sauko, G. C. Knupfer (Eds.): *Encyclopedia of Forensic Science*. Pp. 779–788. Academic press. A Harcourt Science and Economic Company, USA.
- BALUEVA T. S., LEBEDINSKAYA G. V., VESELOVSKAYA E. V., 1993: Principles of Facial Reconstruction. In: M. Y. Iscan, R. P. Helmer (Eds.): *Forensic analysis of the skull*. Pp. 183–198. Wiley – Liss, New York.
- BALUEVA T. S., LEBEDINSKAYA G. V., 1991: *Antropologičeskaja rekonstrukcija*. Izdat. Akademii Nauk SSSR, Moskva.
- BALUEVA T. S., VESELOVSKAYA E. V., KOBLYANSKY, E., 2008: Cranio-facial Reconstruction by Applying the Ultrasound Method in Live Human Populations. Izdat. Akademii Nauk SSSR, Moskva.
- CLEMENT J. G., MARKS M. K., 2005: Computer – graphic Facial Reconstruction. Elsevier Academic Press. USA.
- ČIHÁK R., 1998: *Anatomie II*. Grada Publishing, Praha.
- ČIHÁK R., 2001: *Anatomie I*. Grada Publishing, Praha.
- DROZDOVÁ E., 2004: *Základy osteometrie*. In: J. Malina (Ed.): *Panoráma biologické a sociokulturní antropologie: Modulové učební texty pro studenty antropologie a „příbuzných oborů“*, 18. svazek. Masarykova univerzita, Brno.
- DROZDOVÁ E., 2006: Antropologická rekonstrukce podoby člověka podle lebky. *Živá archeologie* 6: 17–18.
- ENLOW D. H., HANS M. G., 1996: *Essentials of Facial Growth*. W. B. Saunders Company. Oxford.
- FEDOSYUTKIN B. A., NAINYS J. V., 1993: The Relationship of Skull Morphology to Facial Features. In: M. Y. Iscan, R. P. Helmer (Eds.): *Forensic analysis of the skull*. Pp. 199–213. Wiley – Liss, New York.
- FETTER V., PROKOPEC M., SUCHÝ J., TITLBACHOVÁ S., MALÁ H., NOVOTNÝ V., PAVLÍK Z., STLOUKAL M., TRONÍČEK CH., 1967: *Antropologie*. Academia. Praha.
- GEORGE R. M., 1993: Anatomical and Artistic Guidelines for Forensic Facial Reconstruction. In: M. Y. Iscan, R. P. Helmer (Eds.): *Forensic analysis of the skull*. Pp. 215–227. Wiley – Liss, New York.
- GERASIMOV M. M., 1975: *Osnovy vosstanovlenija lica po čerepu*. Izdat. Akademii Nauk SSSR, Moskva.
- GOLEC M., 2015: Prehistorie a historie jeskyně Býčí skály a blízkého okolí od neolitu po současnost. In: M. Oliva, M. Golec, R. Kratochvíl, P. Kostrhun (Eds.): *Jeskyně Býčí skála ve svých dějích a pradějích*. Pp. 115–153. Anthropos 39 (N.S. 31) Moravské zemské muzeum, Brno.
- HELMER R. P., PETERSON, D., RÖHRICHT, S., 1993: Assessment of the Reliability of Facial reconstruction. In: M. Y. Iscan, R. P. Helmer (eds.): *Forensic analysis of the skull*. Pp. 229–246. Wiley – Liss, New York.
- JURDA M., URBANOVÁ P., 2016: Three-dimensional documentation of Dolní Věstonice skeletal remains: can photogrammetry substitute laser scanning? *Anthropologie* 54, 2: 109–118.
- KASATKIN M. V., 2007: *Antropologičeskije skulpturnyje rekonstrukcii*. Izdat. Akademii Nauk SSSR, Moskva.
- KNUSSMAN R., 1988: *Antropologie; Handbuch der Vergleichenden Biologie des Menschen*. Gustav Fischer Verlag. Stuttgart – New York.
- KROGMAN W. M., 1973: *Human Skeleton in Forensic Medicine*. Charles C. Thomas publisher Ltd. Springfield.
- LEBEDINSKAYA G. V., 1998: *Rekonstrukcija lica po čerepu*. Moskva: Staryj Sad.

- NEAVE R., PRAG J., 1997: *Making faces: Using Forensic and Archeological Evidence*. British Museum Press. London.
- NOVOTNÝ V., ISCAN M. Y., LOTH S. R., 1993: Morphologic and Osteometric Assessment of Age, Sex, and Race From the Skull. In: M. Y. Iscan, R. P. Helmer (Eds.), *Forensic analysis of the skull*. Pp. 71-88. Wiley - Liss, New York.
- NOVOTNÝ V., KRÁLÍK M., MALÁ P., KOTRLA J., 2003: Tváří v tvář našim předkům. (*Re*)konstrukce a experiment v archeologii 4: 53-69.
- QUATREHOMME G., ISCAN M. Y., 2000: Computerized Facial Reconstruction. In: J. A. Siegel, P. J. Sauko, G. C. Knupfer (Eds): *Encyklopedia of Forensic Science*. Pp. 773-779. Academic press A Harcourt Science and Economic Company, USA.
- OLIVA M., GOLEC, M., KRATOCHVÍL R., KOSTRHUN P., 2015: *Jeskyně Býčí skála ve svých dějích a pradějích*. Anthropos 39 (N.S. 31). Moravské zemské muzeum, Brno.
- STLOUKAL M., 1999: *Antropologie. Příručka pro studium kostry*. Národní muzeum. Praha.
- STLOUKAL M., NEKVASIL J., 2015: *Věčné tajemství Býčí skály*. Academia. Praha.
- TAYLOR K. T., 2001: *Forensic art and illustration*. Boca Raton - London - New York - Washington D. C.: CRC Press.
- ULLRICH H., STEPHAN C. N., 2016: Mikhail Mikhaylovich Gerasimov's Authentic Approach to Plastic Facial Reconstruction. *Anthropologie* 54, 2: 97-107.
- WILKINSON C., 2004: *Forensic Facial Reconstruction*. Cambridge University Press. Cambridge.

Eva Vaničková
Moravian Museum
Historical Museum
Centre for Cultural Anthropology
Zelný trh 6
659 37 Brno
Czech Republic
E-mail: evanickova@mzm.cz

Ondřej Bílek
Na Drážce 353
530 03 Pardubice
Czech Republic
E-mail: ondrej88@centrum.cz