

Ethical Approaches to the Conservation and Restoration of Human Anatomical Preparations

Jakob Fuchs

Dresden University of Fine Arts: Güntzstraße 34 – 01307 Dresden, fuchs@hfbk-dresden.de

Abstract Working with human anatomical and pathological preparations can be a particular challenge for conservator/restorers. The very limited expertise currently available on the restoration of human biological tissue, as well as the partially limited knowledge of various historical manufacturing and preparation techniques, are only some reasons for this. Accordingly, it is not easy to find particular literature in this field. Professional conservation and restoration of human anatomical and pathological preparations requires more than the exact knowledge of “material properties” and manufacturing techniques. Like working with any other art and cultural heritage, the international ethical guidelines for conservator/restorers must be considered. In addition, the principles for correct ethical handling of human remains, which have meanwhile been written down in numerous recommendations, should be respected. The following article describes the conservation and restoration of four historical natural skeletons, manufactured in the first half of the 19th century, from the Dresden University of Fine Arts Anatomical Collection. Moreover, it illustrates the difficulties of following the ethical guidelines for conservation/restoration upon handling human remains and suggests new approaches.

An appropriate ethical handling of human remains has been proposed in numerous recommendations and guidelines.¹ For instance, these recommendations postulate the responsibility of the respective institution regarding investigations of provenance of the human remains stored or exhibited in their collections. Likewise, they outline how to deal with human remains that originate from a context of injustice like the National Socialist era, the GDR era and the colonial era. References for communication with descendants or to the communities of origin are also included in these guidelines. However, most guidelines give very limited answers concerning the state of preservation and how human remains should be stored and presented.² In concrete terms, it remains unclear which state of preservation of human remains is defined as poor enough to remove them from an exhibition or restore them and what regulations should apply in the depots on this issue.³ Most recommendations only suggest an optimal state of preservation and a dignified presentation of human remains in exhibitions. – How many collections are known that comply with this requirement without restrictions?

Next to the recommendations mentioned, the professional guidelines for conservator/restorers must be considered. These guidelines precisely define the responsibility concerning the appropriate conservation and restoration of art and cultural heritage and include the fundamental rules for measures of conservation and restoration.⁴ Measures of restoration can represent a far-reaching intervention in the object. In contrast, measures of conservation are only intended to fix the current state of preservation and prevent deterioration due to (environmental) conditions. The reconstruction of lost original substance is a well-known measure of restoration. It usually changes the visual appearance of the work of art. For this reason, very strict requirements rule these interventions. In summary, they suggest that these measures should not be based on speculative assumptions and that the historical situation (i.e. historical restorations or repairs) must be respected. The latter applies in particular if subsequent (possibly historical) restorations or repairs do not have a negative influence on the original work of art – i.e. they do not provoke any chemical reactions or physical or biological damage. If it is unknown how the work of art exactly looked before it was damaged, its reconstruction should be rejected in general, or only carried out as far as its original appearance is known. For instance, it is possible to reconstruct missing parts schematically, by using historical illustrations or other pieces of evidence.

1 E.g.: German Medical Association (Ed.) 2003; DCMS (Ed.) 2005; German Museums Association (Ed.) 2021; Coordination Centre for Scientific University Collections in Germany (Ed.) 2021.

2 The German Museums Association amplified its 2013 recommendations in 2021. See German Museums Association (Ed.) 2021.

3 Several authors published a guideline on this subject in 2020 (first version) and in 2021 (second version). See Coordination Centre for Scientific University Collections in Germany (Ed.) 2021.

4 E.g.: The Venice Charter 1964; ICOM 1984; E.C.C.O. 2002; E.C.C.O. 2003; E.C.C.O. 2004; Berufsordnung der Mitglieder des Verbandes der Restauratoren e.V. 2017.

However, we must ask if these established methods applied to paintings, sculptures, etc. can be transferred to human anatomical preparations. In particular, it must be considered to what extent missing parts of the body or schematic reconstructions of these missing parts have an influence on the dignified presentation of a human anatomical preparation. These questions will be discussed below using four natural skeletons as examples. The skeletons were prepared in the postures of the antique statues *Venus Medici*, *Borghesian Fighter*, *Boy with the Thorn* and *Dancing Faun with Cymbals* in the first half of the 19th century (Fig. 1). They were personally restored by the author at Dresden University of Fine Arts (HfBK Dresden) between March 2019 and November



Fig. 1 Four natural skeletons from HfBK Dresden Anatomical Collection; before (top) and after (bottom) conservation and restoration; © Kerstin Riße, Jakob Fuchs, HfBK Dresden

2020.⁵ The four natural skeletons showed severe damage, mainly caused by the use for teaching purposes or their inadequate storage until 2003.⁶ These included heavy soiling, intensified by leaked endogenous fat, bone fractures and cracks in the articular capsules and ligaments (**Fig.2**). A general destabilization of the preparations is an additional consequence of this damage. To counteract this process, several repairs



Fig.2 Left foot skeleton, Borghesian Fighter, before conservation and restoration; © Jakob Fuchs, HfBK Dresden



Fig.3 Right shoulder joint, Venus Medici, before conservation and restoration; © Jakob Fuchs, HfBK Dresden

were carried out until 1999.⁷ These repairs included inserting base metals such as wires and nails into the bones, mostly at the joints, to fix their position (**Fig.3**). Since the bones could not be sufficiently degreased during the special manufacturing process of natural skeletons,⁸ fatty acids, as a result of their ageing, caused an acidic environment

5 Initial research (2011 to 2013) obtained essential findings on the state of preservation of the natural skeletons. They were used for the 2019 to 2020 restoration campaign. See Frank et al. 2018.

6 In 2003, the collection was stored in the current building. Frank et al. 2018, p. 72.

7 In 1999, the skeletons were scientifically examined and documented. The repairs can be seen in photographs. See Mühelnberend 2007.

8 In contrary to mounted skeletons, not metal wires but the natural ligaments fix the bones in position.

Protokoll REM/EDX

25.07.19

Probe: BMBF_Fuchs_P009_Korr, hist. Bänderskelett, Korrosionsprodukt Datierung: 1. Hälfte 19. Jhd.

Fragestellung: Metallaufgabe/Korrosionsprodukt (Probe an Metallstab entnommen)

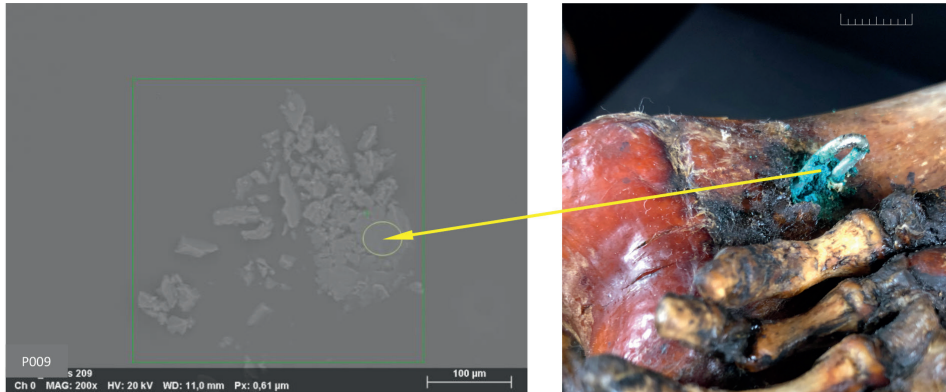


Abbildung 1. REM-Aufnahme mit EDX-Map-Bereich (grüner Rahmen).

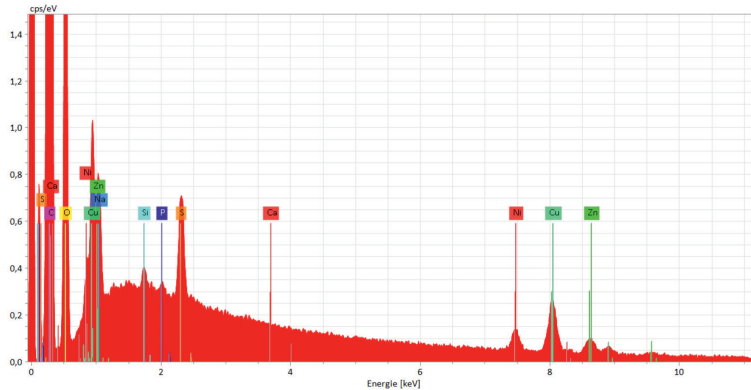


Abbildung 2. EDX-Spektrum über gesamten Bereich (grüner Rahmen in REM-Aufnahme).

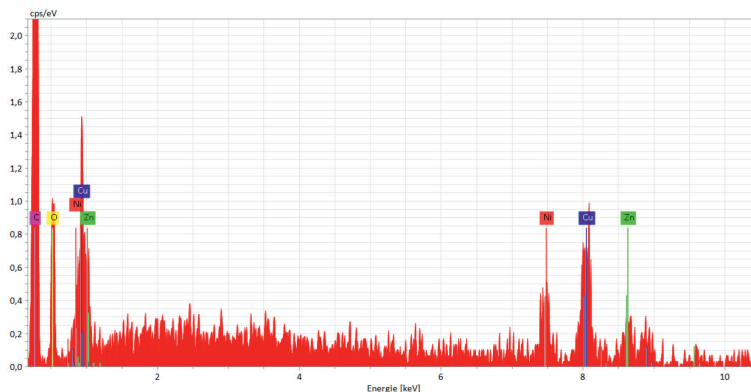


Abbildung 3. EDX-Spektrum zu Kreis 1 (siehe REM-Aufnahme, gelber Kreis)

Fig. 4 Fig. 4a (top, right): Knee joint with metal wire and corrosion products, Boy with Thorn, before conservation and restoration; © Jakob Fuchs, HfBK Dresden; Fig. 4b: Report HfBK Dresden 35/19, REM/EDX analyses: Dr. Janine Kaden, Prof. Dr. Christoph Herm; © HfBK Dresden

at the corresponding parts. The chemical reaction between fatty acids and metals partially generates green-blue corrosion products (**Fig. 4a**). An analysis carried out in the Laboratory for Archaeometry at HfBK Dresden detected one of the corrosion products as copper carboxylate (**Fig. 4b**).⁹ All corrosion products have already led to irreversible discoloration of the adjacent bones and ligaments/capsules. Some of the wires and nails were stuck deep inside the bones and could only be localized by X-rays taken from the Department of Art Technology, Radiation Examination and Photography of Works of Art at HfBK Dresden (**Fig. 5**).¹⁰ The previously mentioned damage of the



Fig. 5 X-ray; pelvic bone, hip and elbow joint, Venus Medici; © Prof. Ivo Mohrmann, Kerstin Riße, HfBK Dresden

preparations urgently required conservation interventions, as otherwise a continuous deterioration of the state of preservation could have been expected. The first measure was to clean the surfaces. In a second step, all base metals were replaced with corrosion resistant A4 stainless steel elements (**Fig. 6**) and visible parts of these metals were re-

⁹ Report HfBK 35/19. FTIR spectroscopy, REM/EDX analyses: Dr. Janine Kaden, Prof. Dr. Christoph Herm.

¹⁰ X-ray examinations: Prof. Ivo Mohrmann, Kerstin Riße.



Fig. 6 Right shoulder joint, Venus Medici, measures of stabilisation; © Jakob Fuchs, HfBK Dresden



Fig. 7 Shoulder belt and chest, *Venus Medici*, after conservation and restoration; © Kerstin Riße, HfBK Dresden

touched (**Fig. 7**). In some cases, especially concerning the broken bones, adhesives were (additionally) used for stabilization.

However, these were not the only damage patterns that have been located on the preparations. Some bones (mostly phalanxes) have been lost at all four specimens. In the case of *Venus Medici* and the *Borghesian Fighter*, next to the phalanxes, the left leg (*Venus Medici*) and the left forearm with hand (*Borghesian Fighter*) is missing (**Fig. 8, 9**). How to deal with these missing bones from an ethical and conservation point of view? This question must be preceded by the assumption that all specimens are anatomical and not pathological, i.e. that the bones on each half of the body developed axisymmetrically. If bones of anatomical skeletons have been lost on only one half of the body, it is possible to reconstruct them exactly in shape, size and colour by using the bones on the other half of the body as a template. For this reason, a naturalistic reconstruction of the missing bones was carried out to achieve the most aesthetically and anatomically correct representation. Historical photographs that were taken before the preparations were damaged (**Fig. 10**) as well as the marble sculptures of the antique statues gave important evidence to find the correct position of the reconstructed extremities. A third indication was given by the broken and cracked edges of the capsules and ligaments at the joints. It must be mentioned that these reconstructions were thus carried out according to all applicable rules of restoration ethics as the original shape, colour and position of the reconstructed bones could be precisely verified. The aesthetic and anatomical appearance was also considerably improved, which helped to present the specimens in a dignified manner (**Fig. 11–13**).



Fig. 8 Borghesian Fighter before conservation and restoration; © Jakob Fuchs, HfBK Dresden



Fig. 9 Venus Medici before conservation and restoration; © Jakob Fuchs, HfBK Dresden

Another damage pattern on *Venus Medici* and *Borghesian Fighter* was discussed more controversially. Specific preparation marks as well as proportion measurements indicated that the mounted skulls probably could not be the original ones (Fig. 8, 9). The age at death of the adolescent individuals prepared in the 19th century was dated to 16 to 17 years by Prof. May (Professor of Anatomy at the Dresden Technical University). However, according to Prof. May's expertise, the skulls of *Venus Medici* and *Borghesian Fighter* belonged to adults of advanced age and could therefore definitely not belong to the skeletons. Therefore, the appearance of the preparations was not only anatomically incorrect, but also aesthetically contradictory and very problematic from an ethical point of view as one human specimen had been assembled from several individuals.¹¹

¹¹ Fuchs 2018, pp. 198, 199.

For these reasons, it has been decided to remove the non-original human skulls from the skeletons. However, this measure could be interpreted as contradicting the ethical guidelines of conservation/restoration. The non-original skulls neither threatened any danger (chemical, physical or biological) to the skeletons, nor was there sufficient data to reconstruct the original skulls in detail regarding the poor quality of the historical photographs (Fig. 10). Hence, it was considered to present the skeletons with-



Fig. 10 Historical photograph from HfBK Dresden Anatomical Collection with natural skeletons, around 1930s; © HfBK Dresden: archive

out any skulls or to reconstruct them only schematically. Both options were discussed but ultimately rejected. The dignified and anatomically correct presentation of the preparations, which had a very high priority in this restoration campaign, could only have been realised to a limited extent with the two alternatives mentioned. For these reasons, the human skulls were replaced by very detailed plastic casts of skulls of adolescents. These plastic skulls were visually adapted to the aged skeletons by using different colours and varnishes. In this way, an aesthetically as well as anatomically correct presentation of the preparations was achieved, without using human “material” (Fig. 1, 12, 13). However, it needs to be mentioned that the two plastic skulls, with a very high guarantee, do not correspond to the appearance of the original skulls due to the individual characteristics of human skulls – a rather unusual measure with respect to the conservation and restoration guidelines.

The measures and solutions presented in this article represent only one of many possible approaches. However, restoration measures on human remains should be always open for discussions as well as interdisciplinary approaches. Interdisciplinary cooperation between respective expertise, such as restorers, anatomists, preparators, medical historians, chemists, etc. is crucial to reach this goal. It is also essential to involve relatives and descendant communities in these measures whenever possible.



Fig. 11 Reconstruction of left forearm skeleton, Borghesian Fighter; © Jakob Fuchs, HfBK Dresden

On a closer look, the discussed problem of a conflict of interest between ethical guidelines dealing with human remains and the ethical guidelines for conservation/restoration comes to light when dealing with a large number of human anatomical and pathological preparations. It demands an honest debate on how to deal with, for instance (injection) preparations with overpainted parts of the body (mostly caused by soiling), wet specimens of different individuals that have been brought together in one glass for capacity reasons, wet specimens with twines looped around the neck to fix foetuses and newborns inside the glasses, dry specimens with removed pedestals. All of these examples could be historical repairs that could certainly be left in place from a restoration ethics point of view. From an ethical point of view they are classified as highly problematic with regard to a dignified and reverent handling of human remains. In conclusion, it seems reasonable to reconsider and refine the conservation guidelines with regard to the special requirements of anatomical and pathological preparations or human remains in general.



Fig. 12 Borghesian Fighter after conservation and restoration; © Kerstin Riße, HfBK Dresden



Fig. 13 Venus Medici after conservation and restoration; © Kerstin Riße, HfBK Dresden

References

Berufsordnung der Mitglieder des Verbandes der Restauratoren e.V. vom 25. 11. 2017.

URL: https://www.restauratoren.de/wp-content/uploads/2017/12/2017-11-25_Berufsordnung_verabschiedet.pdf (15. 02. 2022).

Coordination Centre for Scientific University Collections in Germany (Ed.) 2021.

Menschliche Überreste im Depot. Empfehlungen für Betreuung und Nutzung, 2nd version. Berlin. URL: https://wissenschaftliche-sammlungen.de/files/4416/2140/5696/Menschliche_berreste_im_Depot_V2.pdf (15. 02. 2022).

- DCMS (Ed.) 2005. *Guidance for the Care of Human Remains in Museums*. London. URL: <https://www.britishmuseum.org/sites/default/files/2019-11/DCMS-Guidance-for-the-care-of-human-remains-in-museum.pdf> (15. 02. 2022).
- E.C.C.O. 2002. *Professional Guidelines (I)*. Brussels. URL: https://www.ecco-eu.org/wp-content/uploads/2021/03/ECCO_professional_guidelines_I.pdf (15. 02. 2022).
- E.C.C.O. 2003. *Professional Guidelines (II)*. Brussels. URL: https://www.ecco-eu.org/wp-content/uploads/2021/03/ECCO_professional_guidelines_II.pdf (15. 02. 2022).
- E.C.C.O. 2004. *Professional Guidelines (III)*. Brussels. URL: https://www.ecco-eu.org/wp-content/uploads/2021/01/ECCO_professional_guidelines_III.pdf (15. 02. 2022).
- Frank, S. K.; Meyer, I.; Herm, C; Botfeldt, K. B. 2018. Status Report, Conservation and Exhibition Proposal for 14 natural Skeletons from the Anatomical Collection at the University of Fine Arts in Dresden. In: *VDR Beiträge zur Erhaltung von Kunst- und Kulturgut*. Heft 1, Bonn 2018, p. 71–86.
- Fuchs, J. 2018. Umgang mit fehlenden Körperteilen an historischen Skelettaufstellungen. In: Mühlenberend, S.; Fuchs, J.; Marušić, V. (Ed.). *Unmittelbarer Umgang mit menschlichen Überresten in Museen und Universitätssammlungen*. Statements und Fallbeispiele. HfBK Dresden, pp. 192–200. URL: <https://wissenschaftliche-sammlungen.de/files/1815/4469/5645/Unmittelbarer-Umgang-mit-menschlichen-berresten-in-Museen-und-Universittssammlungen.pdf> (15. 02. 2022).
- German Medical Association (Ed.) 2003. *Empfehlungen zum Umgang mit Präparaten aus menschlichem Gewebe in Sammlungen, Museen und öffentlichen Räumen*. *Deutsches Ärzteblatt*, 8/2003, 378–383, <https://www.aerzteblatt.de/pdf.asp?id=38021> (15. 02. 2022).
- German Museums Association (Ed.) 2021. *Guidelines. Care of Human Remains in Museums and Collections*. Berlin. URL: <https://www.museumbund.de/wp-content/uploads/2021/07/dmb-leitfaden-umgang-menschl-ueberr-en-web-20210625.pdf> (15. 02. 2022).
- ICOM 1984. *The Conservator-Restorer: a Definition of the Profession*. Copenhagen. URL: <https://www.restauratoren.de/wp-content/uploads/2017/03/ICOM-CC-Definition-of-profession-1984.pdf> (15. 02. 2022).
- Mühlenberend, S. 2007. *Surrogate der Natur. Die historische Anatomiesammlung der Kunstakademie Dresden*. Munich.
- The Venice Charter 1964. *International Charter for the Conservation and Restoration of Monuments and Sites*. Venice. URL: https://www.icomos.org/charters/venice_e.pdf (15. 02. 2022).