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Cadaver Imitations used in Anatomical Demonstrations: Wax Modelling in the 18th Century.

Mesterséges holttestek az anatómiai oktatás szolgálatában: anatómiai viaszmodellezés a 18. században

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Abstract

The use of wax models has a long history associated with various connotations and practices. For centuries, models were predominantly of votive and devotional nature until the birth of anatomical wax modelling of the 18th century, when wax gained pre-eminently scientific connotations, parallel with all earlier practices. In this period, wax was found very suitable for scientific demonstrations by its plasticity through high level of naturalistic imitation. This is why it was chosen for manufacturing anatomical models, which showed contemporary knowledge about the human body in a comprehensive manner. The first centres of anatomical wax model production were established in Bologna, and then in Florence. Although such models were produced in other European countries, these two studios, especially the Florentine one, preserved its dominance, and exported models outside of Italy too. Yet there were general rules and manufactural techniques in some principles the studios showed different approaches in modelling. The Anatomical Venus, a specific genre of anatomical wax models, offered a valuable insight of reflections about contemporary ideas of female body, gender features and various connotations in a single wax object.

Keywords: anatomy, wax models, 18th century

Kulcsszavak: anatómia, viasz modell, 18. század

In the long history of the production of wax models, the material was initially used for votive and devotional purposes, and was associated with the cult of saints. In the 18th century, however, when the first centres for anatomical wax modelling were founded in Bologna and Florence, the medium became to be primarily associated with science and anatomy, as its malleability and its material properties made it extremely suitable for such subject matters, especially for achieving a high level of naturalism. (Dacome (2007:549)) The aim of these anatomical wax models was to show a generalized version of human anatomy and to serve as teaching tools for both medical students and lay people. (Dacome (2006: 29)) Besides their obvious purposes, however, due to the various practices which wax models had been associated with, and the nature of the process of making, the models are also reflections of the intersections between art, science, and devotional practices. Although there are several aspects of their making, which are general, the different production centres also differed from each other, even the first two centres, which acquired dominance in

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Europe in the field, Florence and Bologna. A specific genre of anatomical wax modelling is the so-called Anatomical Venus, which, alongside representing female anatomy, demonstrates connotations with art and devotion, and tells a lot about contemporary ideas about women and gender. This essay provides an overview of the production and characteristics of 18th-century anatomical wax models and Anatomical Venuses in Europe, especially in the pioneering Italian centres, Bologna and Florence.

Overview of the history of the use of wax

Wax models have a long and complex history, and they can be associated with various purposes, both in general and within the field of anatomical modelling. As for anatomical purposes, wax models were used for teaching students of both art and medicine, as well as lay people, for whom they served as both an object of curiosity and a demonstration of the recent developments of the anatomical science. (Dacome (2006:29)) The combination of the extreme level of realism in the figures and their presentation to the public made the act of showing and viewing these models similar to a theatrical performance. (Dacome (2006: 32)) Such presentation of knowledge was the norm in the early modern period, and in the 18th century anatomical models became important tools for showcasing anatomy, alongside the original practice of public anatomy lectures. (Dacome (2007: 526)) By choosing to view models instead of anatomy lessons, one could also inspect the models more closely than a real decaying cadaver. (Dacome (2007:526)) As for artistic practice, artists themselves often owned such anatomical figures for studying the human body, and many of them made wax figures themselves before creating their artwork in the finally chosen material. (Dacome 2007:525-526)) As for the original purposes of wax, before in the 18th century it started to be regarded as a medium suitable for depicting nature, wax was rather used for representing the "supernatural". (Dacome (2007): 529)) Wax models were used for effigies, and portraits of saints and patrons, thus, wax models contributed to popularizing the cult of deceased people, who died in odour of sanctity. (Dacome (2017: 156)) These wax portraits were also dressed up in the original personal clothing of the sitter, and sometimes they acted as reliquaries for their relics. (Dacome (2017:156)) This transition from votive to scientific connotation is also reflected by the fact that Pope Benedict XIV simultaneously founded his own public anatomy museum populated by wax models and stopped the votive practices related to wax models through edicts. (Ebenstein (2012:350)) This is also supported by the fact that the Pope showed a high level of commitment to the science of anatomy, which is also shown by the Bolognese institutions founded by him, such as the first anatomy museum in Italy and the first chair of surgery at the university. (Messbarger (2013:198)) He also encouraged people to offer their bodies for dissection carried out for the purposes of teaching and research. (Messbarger (2013:198)) Although a transition can certainly be observed, the various purposes for which wax models were used existed alongside each other, as well. (Dacome (2017): 145)) As Lucia Dacome says, this is well illustrated by the comparison of the two Bolognese women, who produced wax models, *Laura Chiarini* (nun) and *Anna Morandi*. (Dacome (2017): 145)) While Chiarini was believed to have created her wax models thanks to divine inspiration, Morandi was said to have achieved such results in anatomical modelling through scientific observation. (Dacome (2017): 145)) Furthermore, models created for devotional and scientific purposes shared a number of similarities, for example the gesticulation and postures of figures, or the use of drapery to frame the objects on display. (Dacome (2017:153)) Thus,

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in the history of the use of wax for modelling, the medium was used for various artistic, scientific, votive and devotional purposes; and although from the 18th century the scientific use dominated, the diverse connotations coexisted for a long time.

General introduction of wax as a material and its use for anatomical purposes

Wax itself as a material was very popular because of its properties, which made it exceptionally suitable for anatomical models. For anatomical modelling wax became a particularly suitable material, because its shape and consistency could be easily altered, thus it was a flexible and malleable material, which bore an extreme level of resemblance to the human body, especially the skin, which made it capable of balancing on the border between the natural and the artificial. (Dacome (2017:549)) Furthermore, it could be coloured easily and durably, which further enhanced the likeness wax was capable of achieving. (Ballestriero 2010:224)) The technique, the substances and their proportions used for colouring anatomical wax models largely derives from the experiments of *Gaetano Zumbo* (1656-1701). (Ballestriero 2010: 225)) In addition, it was easy to attach ornaments, jewels, or real hair, nails or teeth to this material. (Ballestriero (2010: 224)) Producing a model in wax was a long process, which involved various kinds of expertise. Usually prior to the process of making, dissections were carried out, based on which the organs of the wax figure could be modelled, and the makers discussed the pose they thought to be the most appropriate and suitable for a certain figure, which they typically chose from a renowned treatise by an acknowledged anatomist, for example Vesalius. (Riva et al. (2010: 215)) Due to the techniques and the properties of wax, these models could serve as substitutes for real dissections. The use of wax for the study of anatomy instead of real cadavers had two significant advantages. Firstly, with their help, the problems of deterioration of cadavers, such as bed smells and contamination, could be avoided. (Dacome (2006:30)) Secondly, in the 18th century male student midwives were not allowed to treat real women both because such a contact between young male students and women could potentially risk the students' good reputation, and because professionals were afraid that inexperienced students might potentially harm their patients. (Lieske 2011: 80)) With wax models, male students could learn without such risks. Therefore, both the material of wax and the use of wax models were beneficial for the study of anatomy in the 18th century.

18th-century anatomical models were generalized depictions, which lacked all traces of individualism. Their aim was to show anatomy in general, and thus the figures themselves were also images of a generalized and standardized body. (Schnalke (2004: 319)) The need for models depicting individual features and individual diseases is only typical for the period between 1850 and 1950. (Schnalke (2004: 312)) It was when the aim to show specific diseases through wax models was formulated, that wax models came to represent individual people and individual anatomical features. (Schnalke (2004: 318-319)) Although this need for representing diseases was satisfied by other media, which suited the task more, dermatological and ophthalmological diseases were easily represented in wax. (Schnalke (2004: 318)) However, there was a field, in which generalization of models was not so much preferred in the 18th century, obstetrical machines. These machines were made of various materials, among others wax, although its role in such devices was not outstanding. These obstetrical machines had moving parts, depicted the body of

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pregnant women and could imitate the process of labour and demonstrate specific difficulties, which might arise during labour. (Lieske (2011: 74-75)) Thus, these machines served as replicas of exact people and situations, especially for students, so that they could perform the learned procedures on real women. (Lieske (2011: 78)) Therefore, apart from some exceptions, such as obstetrical machines, 18th century models aimed at representing an idealized and standardized version of the human body.

The history of the emergence of anatomical wax models

The use of wax models for anatomical purposes spread through Europe from Italy, after the production of these models were initiated in Bologna and Florence in the 18th century. The first centre for the production of anatomical wax models was in Bologna. (Ballestriero (2010: 223)) An important step in the process of setting up the circumstances, among which this production could be initiated, was the foundation of the Academy of Sciences at the Institute of Sciences and Arts by *Luigi Fernando Marsili* (1658-1730) at the beginning of the 18th century. (Riva et al. (2010: 213)) The final crucial step was the establishment of the anatomy room of the academy, which was funded by *Pope Benedict* XIV, born *Prospero Lorenzo Lambertini* (1675-1758), and for which the anatomical wax models were commissioned from *Ercole Lelli* (1702-1766), (Dacome (2006: 29)) the successor of the first person to produce anatomical wax models in Bologna, *Gaetano Zumbo* (1656-1701). (Paluchowski et al. (2016: 213)) The most outstanding successors of Lelli, who were also the most prominent figures of the Bolognese workshop for anatomical wax modelling, included *Giovanni Manzolini* (1700-1755) and *Anna Morandi* (1714-1774). (Ballestriero (2010: 223)) Although Zumbo, after his Bolognese years, spent a significant amount of his life in Florence, and is considered to be the father of Florentine anatomical wax modelling, (De Ceglia (2011: 83)) the Florentine workshop acquired its leading role in the field after a Florentine surgeon, *Giuseppe Galletti* (1738-1819) took the Bolognese method to Florence in 1770. (Riva et al. (2010: 214))

The most prominent figures of the Florentine workshop were *Clemente Susini* (1754-1814) and *Felice Fontana* (1730-1805), whose works predominantly formed the anatomical wax model collection of the La Specola museum, founded in 1771. (Ballestriero 2010: 223)) By the end of the 18th century the Florentine workshop acquired unquestionable dominance in the production of anatomical wax models. (Ballestriero (2010: 225))

Italian models were also exported to other countries, for example to England by *Joseph Towne* (1806-1879), (Ballestriero (2010: 227)) or to today's Austria by the Habsburg Emperor, Joseph II (1741-1790). (Paluchowski et al. (2016: 213)) Thus, the use of wax for the purposes of anatomical modelling started in the 18th-century in Bologna and Florence, whose techniques and models served both as an example of anatomical wax modelling and as sources of actual models across Europe.

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Figure 1: Masters of wax modelling

Regional differences

Although there were several general rules and characteristics of the production of wax models, the approach to the making of models and of Anatomical Venuses specifically varied according to regions. The wax used for such purposes was made by melting the honeycombs acquired from the honey of the bee *Apis mellifica* in boiling water, and then filtering the mixture. (Maraldi et al. (2000: 9-10)) This technique was general in Europe, however, as the colour of the wax depended on the indigenous flowers, the colour of wax differed from region to region. (Maraldi et al. (2000: 9-10)) Furthermore, the comparison of English and Italian models also reveals a significant difference in their approach to their wax models. (Ballestriero (2010: 227))

Although in England the majority of wax figures were imported, there were some notable local modellers, for example *Joseph Towne* (1806-1879) or *Abraham Chovet* (1704-1790). (Ballestriero (2010: 227)) Apart from some exceptions, such as Chovet's famous model containing glass tubes filled with wine imitating the flow of blood during pregnancy, and the functioning of the heart and lungs, (Lieske (2011: 70)) which was chained to the table, and whose face expressed immense pain, (Ebenstein (2012: 350)) English models looked lifeless and emotionless, and appeared to be cadavers. (Ballestriero (2010: 228)) By contrast, in both of the major Italian centres, Florence and Bologna the approach to wax models was characterized by the aim to show the anatomy of a living person, therefore the models looked as if they were alive, especially in their colour and the form of their organs. (De Ceglia (2011: 86)) In addition, in Italy

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most reclining figures were placed on cushions in their cabinets, whereas English models were usually put directly on their support. (Ballestriero (2010: 228)) However, even the two most successful Italian centres, Bologna and Florence differed from each other. This is evident for example in the techniques of making. In the Florentine workshop, the process of making started with the artisans producing a prototype after both past illustrations from highly renowned treatises and cadavers - acquired from the hospital of the church Santa Maria Novella in the case of adult cadavers and from the Ospedale degli Innocenti in the case of children's cadavers (Riva et al. (2010: 213)) - according to the instructions of the anatomist. (Märker (2006: 299)) Then a plaster mould was taken from the different body parts of the prepared cadaver, after which these moulds were adjusted in order to have the desired shape and posture. (Märker (2006: 299)) Later these manipulated plaster moulds of individual body parts were painted in wax mixed with pigments from the inside, or were entirely filled by the material, (Riva et al. (2010: 213)) and then the individual parts were joined together. (Märker (2006: 299)) After the wax model was finished, some additional details were added, (Riva et al. (2010: 213)) and later it was covered with varnish to enhance the naturalistic appearance. (Märker (2006: 299)) In the case of some details, additional materials were used, for example metal or textile threads were employed to depict vessels and membranes, (Märker (2006: 299)) and the parts depicting tendons were coated with gold powder. (Maraldi et al. (2000: 10)) On the exhibition the models were accompanied by drawings depicting the model, on which the individual details were numbered, thus it could be identified with the help of a list providing the names for each detail; these drawings and lists were put either on the wall alongside the corresponding model or in a drawer under the case containing the wax figure. (Märker (2006: 299-300))

Bolognese wax models had real skeletons inside, therefore the wax was applied directly to the skeletons by the artists, who modelled the figures themselves. (Dacome (2006: 31)) Prior to this procedure the skeletons were with treated with hemp, so that the wax would stick to the bones on the long term, as well. (Maraldi et al. (2000: 9)) Therefore, in contrast to the Bolognese method, in the Florentine workshop the different stages of the process of making was completed by different people, and they relied more on casting than the Bolognese studio. (Dacome (2006: 34)) Consequently, the use of plaster moulds made it possible for the Florentine workshop to reuse the same moulds for several wax models, whereas in Bologna, in the absence of a mould, each model had to be modelled individually. (Maraldi et al. (2000: 9)) Differences between these two studios can also be noticed in the appearance of their models, which is very apparent in their Anatomical Venuses.

Florentine models, for example Susini's *Medici Venus* (c. 1780) (Fig. 2), are considered more didactic, and they seem to be alive and aware of their fate. (Schnalke (2004: 315-316)) The Florentine models are distinctively attractive, and their open eye-lids reveal the detailed depiction of the eyes, evident in the coloured irises, which results in a specific, graceful gaze. (Ballestriero (2010: 227-229)) By contrast, Bolognese models looked more unconscious of the fact that they are being dissected. (De Ceglia (2010: 437)) Therefore, while several general characteristics can be determined, the model makers from different places follow slightly dissimilar schemes with their figures.

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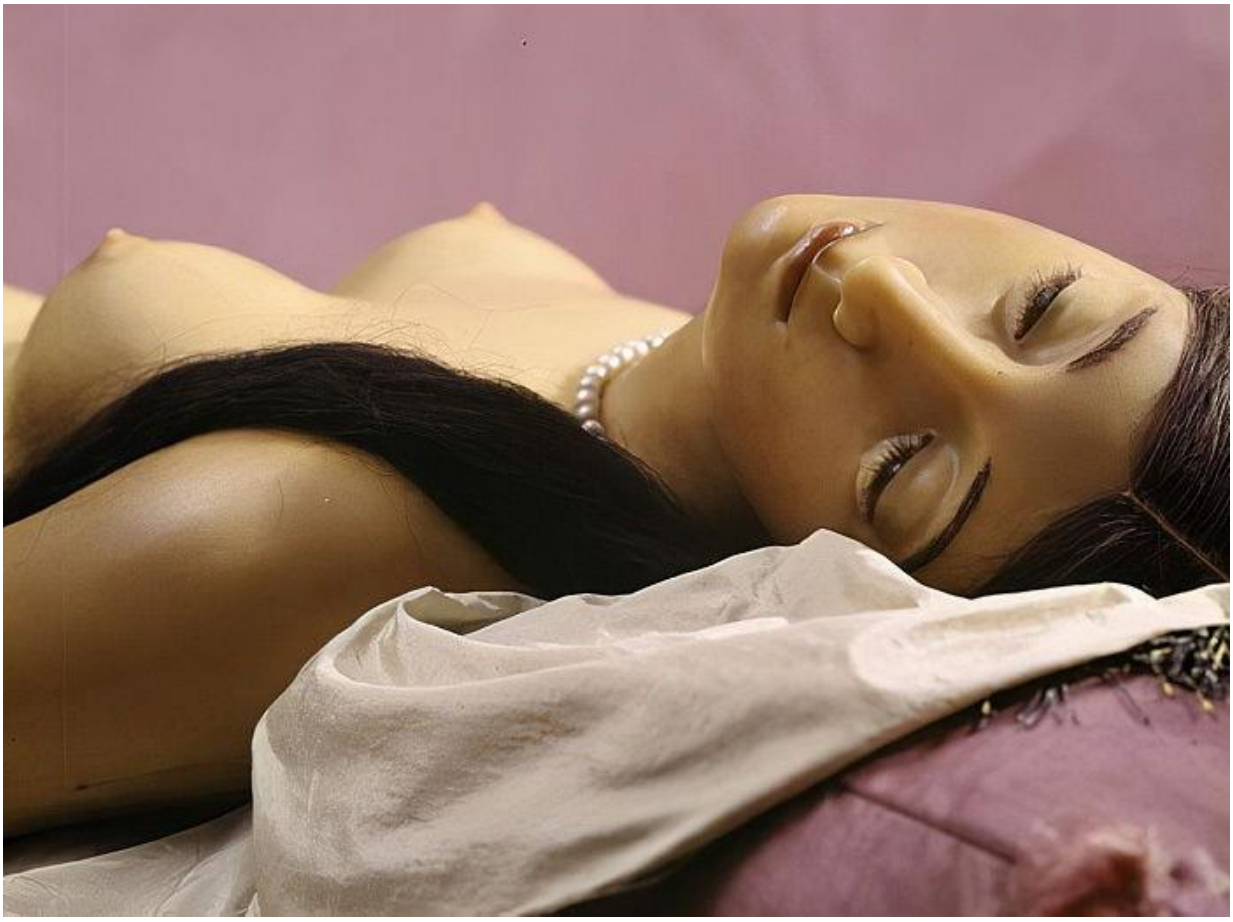

Figure 2: Susini, Clemente, and workshop. (1780-1782). Medici Venus [wax]. Florence: Museo di Storia Naturale Sezione di Zoologia "La Specola", Museo di Storia Naturale dell'Università di Firenze. Retrieved from: https://www.meisterdrucke.uk/kunstdrucke/Clemente-Susini/269347/Die-dismantable-Venus,-Anatomisches-Modell-(Wachs).html

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Figure 3: Susini, Clemente. (1782). Venerina [wax]. Bologna: Museo di Palazzo Poggi. Retrieved from: https://sma.unibo.it/it/il-sistema-museale/museo-di-palazzo-poggi/collezioni/gallery

The anatomical Venus

A specific genre of anatomical wax models is the so-called Anatomical Venus, which is a reclining idealized female model representing a generalized version of female anatomy. One of the most important physical characteristics of wax Venuses is that all of them have a foetus in their womb, while there are no other physical trace of pregnancy on their body. (De Ceglia (2010: 441)) This adds up to the aim of generalising the representation of anatomy, as the model aims to show the most general and typical version of female anatomy, and pregnancy is included because it is specific and important to the female body. (De Ceglia (2010: 441)) In addition, the depiction of female bodies at the early stages of pregnancy was problematic and less accurate also because it was difficult to acquire such cadavers. (Ballestriero (2010: 231)) The abdomen of these female models were often decomposable, however, only the more distinguished guests were allowed to demount them, not all visitors. (Märker (2006: 304)) Anatomical Venuses often had real human hair and wore jewels, most commonly pearl necklaces. (Schnalke (2004: 315)) Although such

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models aimed at representing female anatomy, the female external reproductive organs are not shown in elaborate details. The figures do not cover the area with their postures, nevertheless it is covered by pubic hair, or simply left completely unfinished and uncovered. These characteristics are all observable on the most famous Anatomical Venus, the *Medici Venus*, and Susini's other famous work, the *Venerina* (1782) (Fig. 3).

Furthermore, the Anatomical Venus is connected to various contemporary ideas about women. In the early modern period people thought that generation was a process, during which form was shaped from a soft and malleable material, which is reflected by the process of the making of the Anatomical Venus, and thus these representations show that the female body was viewed as a soft and malleable material, on which generation could be completed. (Dacome (2007: 530)) Furthermore, in the early modern period people thought that the unborn child was also still malleable, and thus a mother's imagination could influence the form, shape, and outlook of the child yet to be born. (Dacome (2007: 531)) Therefore, according to contemporary ideas, if the mother looked at beautiful paintings during the time of her pregnancy, the likeliness of the child becoming more beautiful increased. (Dacome (2007: 532))

The female body was also tied to various uncanny connotations. It was perceived to be the opposite of the perfect male body, and it was associated with characteristics thought to be usual for women, such as hysterical, nervous, passive. (Ebenstein (2012: 349)) The views about the differences between men and women also reflects in the comparison of Anatomical Venuses with male wax models. In contrast to male wax models, most female models are in a reclining position and have an intact skin in places not central to the anatomical demonstration, so that they can be seductive and sexually desirable. (Ebenstein (2012: 349)) Furthermore, male figures usually followed the systematic visual scheme, that is, male wax models depict one specific organ system, whereas female ones follow the topographical scheme, which means that they show one segment of the human body in its totality, which is, in most cases, the abdominal cavity. (De Ceglia (2006: 445-446)) In addition, female bodies usually represented soft tissues, while male ones were used to depict hard tissues. (De Ceglia (2006: 446)) Therefore, the Anatomical Venus is a useful demonstration of contemporary ideas about the body and nature of women, as well as about the differences between men and women.

The genre of the Anatomical Venus is also balancing on the boundaries between votive, artistic and scientific connotations. For instance, anatomical wax models offer an apparent example of the intersections between art and science. The iconography of such depictions of the female body often drew on artistic precursors. For example, the Florentine Venuses kept at La Specola are inspired by funerary sculpture, especially by that of Gianlorenzo Bernini. (Ballestriero (2010: 231)) With this segment of Bernini's sculpture, the La Specola Venuses not only share the similarity of their postures, but also the simultaneously agonizing and idealized gazes. (Ballestriero (2010: 231)) This parallel is eye-catching in the comparison between the *Medici Venus* at La Specola and Bernini's funerary monument for Ludovica Albertoni (Fig. 4). (De Ceglia (2006: 438)) Both figures slightly tilt their heads backwards and to the side, and have half-open eyes and mouths.

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Another point of intersection, which the Anatomical Venus might bring our attention to, is the way of seeing. In the 18th century the anatomical and the artistic way of seeing was intersected and inseparable, and this was the time, when anatomists only started to claim that their images should have been distinguished by their higher level of dependence on observation and experience. (Massey (2017: 69)) Furthermore, the most famous Anatomical Venus, the widely reproduced *Medici Venus*, the name reflecting both one of the most important artworks of the Medici collection, the antique sculpture, called the *Medici Venus*, and the very name of the family, which means doctors in Italian. (Ballestriero (2010: 230)) Therefore, its connotations are both artistic and scientific. In addition, even Anna Morandi based her works not only on experience and scientific observation, but also devotional iconography, for example in her self-portrait (Fig. 5). (Dacome (2007: 549)) Thus, Anatomical Venuses provide a good example for how the various connotations of a specific material and iconography can come together in one work.

Figure 4: Bernini, Gianlorenzo. (1671-1674). Blessed Ludovica Albertoni [marble]. Rome: Chiesa di San Francesco a Ripa. Retrieved from: https://commons.wikimedia.org/wiki/File:Cappella_palluzzi-albertoni_di_giacomo_mola_(1622-25),_con_beata_ludovica_alberoni_di_bernini_(1671-75)_e_pala_del_baciccio_(s._anna_e_la_vergine)_05.jpg

Self-fashioning

As most artists, artisans and scientists of the period, the makers of wax models also recognized the importance of self-fashioning and the need to leave their mark. One of the most prominent examples for this is the double portrait of Anna Morandi and her husband, *Giovanni Manzolini*, made by *Anna Morandi* after the death of her husband. Portrait-making in the medical field contributed to the transformation, which took place in the period, thanks to which anatomists came to be regarded as learned people, thus started to be

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associated with learning and not uncanny tasks, and Morandi's portrait fits into this elevation of status. (Dacome (2006: 32)) Whereas the models they made were generalized, their portraits were highly individualized and detailed. (Dacome (2010: 33)) Furthermore, the portrait captures the couple as anatomists in the middle of dissection, not in the process of modelling wax, which was rather connected to artisans. (Dacome (2007: 546)) In the portrait the couple also wear very eloquent clothing, which clearly serves the elevation of their status, as their clothing does not match the activity they are performing. (San Juan (2011: 440-441)) Fontana also paid attention to the appropriate promotion of his workshop. He invited people with high intellectual reputation from various parts of Europe, such as surgeons and physicians, from whom he could expect writings, whose production he could oversee, and which praised his workshop. (Märker (2006: 298)) Wax models themselves were also carriers of the proof for the maker's knowledge of nature. (Dacome (2017: 194)) Therefore, the appropriate level of social status was significant for the makers of anatomical wax models, as well.

Figure 5 (left) Anna Morandi (Mid-18th century). Self-Portrait [wax]. Bologna: Museo di Palazzo Poggi. Retrieved from: https://sma.unibo.it/it/agenda/icone-di-scienza-mostra

Figure 6 (right) Anna Morandi (Mid-18th century). Portrait of Giovanni Manzolini [wax]. Bologna: Museo di Palazzo Poggi. Retrieved from: http://himetop.wdfiles.com/local--files/giovanni-manzolini-s-wax-bust/Giovanni%20Manzolini%27s%20wax%20portrait%2C%20Bologna%20-%2001.JPG

Death rituals

The representation of dead people begs the question whether wax models were indebted to contemporary beliefs about death and the dead, and the customs and ceremonies related to burials. In Britain

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after dissection the cadavers had to be sewn up and dressed before being given back to the family and being buried, (Tarlow (2011: 91)) as the integrity of the body during burial was crucial according to contemporary beliefs. (Tarlow (2011: 92)) This is also supported by the contemporary idea that during dissection the person being dissected lost their personhood and individuality, whereas these were reobtained at burial. (Tarlow (2011: 92)) This resonates with the lack of individuality of wax models, who are represented in the process of being dissected. Furthermore, more man were dissected than women, (Tarlow (2011: 144)) and men's and women's bodies were prepared in a very similar way. (Tarlow (2011: 143)) The most notable difference was that men had caps, while women were buried in a headdress. (Tarlow (2011: 136)) The Italian approach to cadavers and the dead differed from these Northern European ideas. For Italians, the cadaver lost the soul and had no connection with it after death, thus the body itself lost significance for them. (Tarlow (2011: 192)) This also meant that they did not require closed coffins and were not a source of fear. (Tarlow (2011: 192)) The difference between funerary customs and the fact that people wanted the models to look alive makes it unlikely that the association of models with real corpses was close.

Conclusion

Anatomical wax models provide an intriguing example of 18th century thinking about anatomical and medical teaching, aims and taste in the field of anatomy, and about the intersections between various fields, which wax as a material was and had been associated with. The comparison of wax models from various regions and studios in Europe offers a valuable insight into different techniques and approaches, which highlight both the general procedures they had in common, and the diversity of the way of thinking about the production of anatomical wax models. Anatomical Venuses, characterized by a specific iconography, highlight further questions about contemporary ideas about gender, gender differences, and how these were put in line with the anatomical differences between men and women.

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