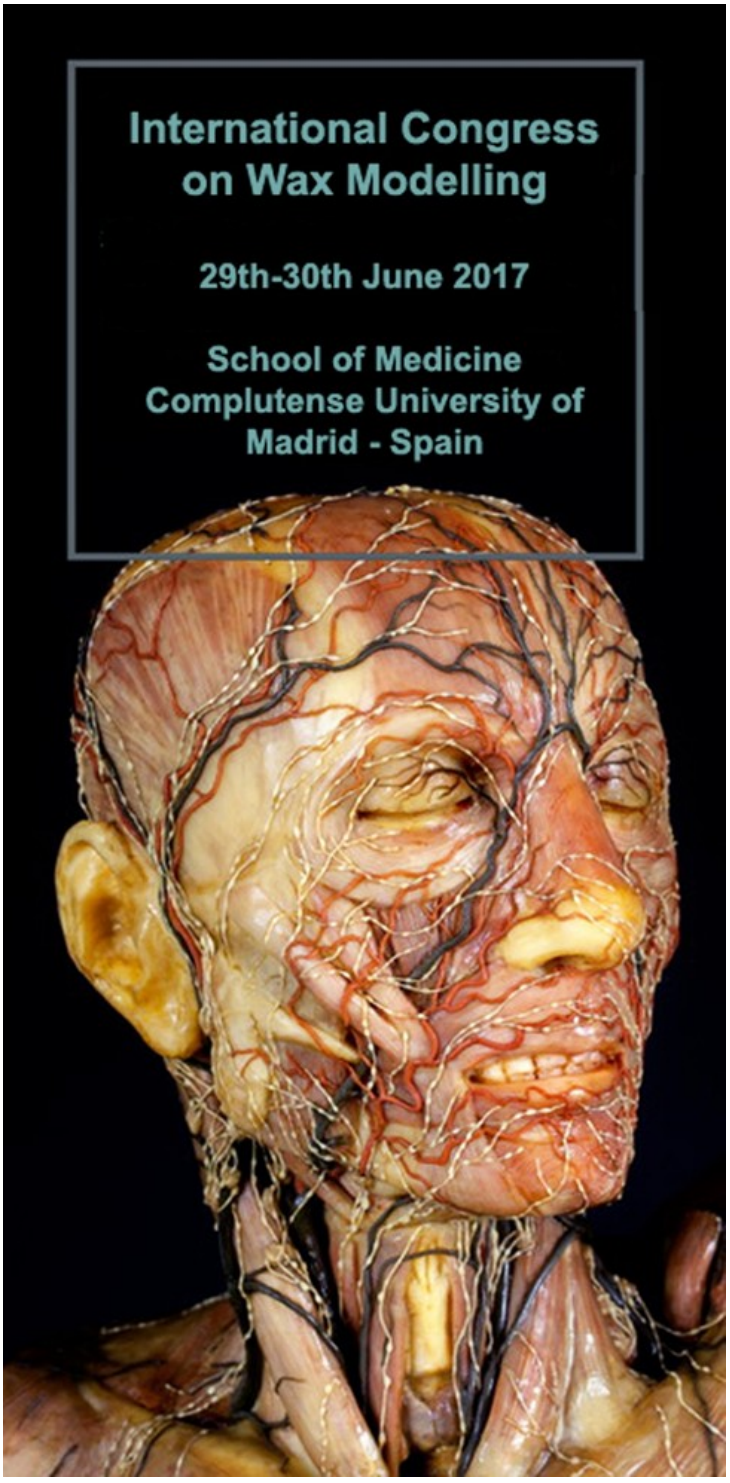
Eur. J. Anat. 21 (3): 241-260 (2017)

ABSTRACTS of the International Congress on Wax Modelling

Madrid, June 29th-30th, 2017
School of Medicine. Complutense University
Madrid, Spain



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INVITED CONFERENCES

1. HISTORY

BODIES, WAXES, EXHIBITIONS AND THE FATE OF THE SPANISH MEDICAL HERITAGE

Alfons Zarzoso

Curator of the Museum of the History of Medicine of Catalonia. Barcelona, Spain.

Nowadays, the body is in fashion. The human body and also the animal body are the object of attention of a large number of scholars from a wide range of disciplinary fields through a great variety of publications, exhibitions and other media products. Perhaps one of the reasons of this growing interest lies in the driving force of the human image in the present-public-hyperbolic-and-iconic Western society. This preliminary reflection wants to put the idea of a human body in a perpetual public display against the background of our need to build and situate our own body in contemporary society and to understand it or not in a framework of rules, names and discipline, in order to understand how do we look at and how do we appropriate, adapt and rebuild ourselves in that very act of seeing.

In order to go further in this understanding I propose a Spanish journey from the end of the 18th century to the beginning of the 21st century through some wax anatomical models. By looking at some actors, spaces, objects and audiences I will try to focus my interest in the visual politics of modern Spanish human anatomy. I mainly use the case of Barcelona, and to a lesser extent that of other Spanish cities, as a place where the public and private display of the human body can shed light on how specific regimes of production, exhibition and reception of anatomical knowledge were built. Actually, an important aim here is to show that Spanish cities did completely participate in what was not a weird or peripheral case, but a European issue that was entirely incardinated in the transatlantic market of travelling exhibitions based on anatomical models. From this perspective, the modern city became a space where there was a growing and diverse demand of anatomical models due to several reasons ranging from the training of the medical gaze to the formation of a public medico-moral regime, or from the standardisation of a historical genealogy of liberalism to the commercial profitability of interclass's and low-cost shows.

The rise of wax sculpture coincided with a growing demand in the public sphere for this kind of models for different reasons. This was to reveal the complexity of the wax sculptor's workshop, who was capable of performing works for various purposes: religious, political, medical. The emergence of different spaces for the exhibition of public spectacles with a clear intention to discipline audiences also raised and consolidated in this period. Actually, this process took place in the context of the construction of some ways of knowing based on particular ways of seeing that allowed the development of an observer and an observed object. In this process, the medical gaze was to be identified with a masculinity that embodies science and rationality, while nature will be represented trough the naked female body. So, metaphorically, undressing the female body informed a scientific culture in search of truth. Wax sculptures played a fundamental role in the making of the masculine gaze and in the reification of the female body. In this way, the success of public shows based on the exhibition of the eroticized female body went beyond the mere promotion of visual pleasure. There was also committed to the formation of a new medico-moral regime.

The exhibition of wax models representing the anatomy or pathological female body and mainly the anatomical Venus had to compete throughout the 19th century both with the propensity of the visual arts to represent the naked female body and the blossoming of urban public spectacles addressed to a massive audience where the exhibition of the female body was central. All of them could be understood as the different parts of the exhibitionary complex where objects circulated between closed and open and public spaces becoming new ways of communicating messages of power in society. Certainly, it was the time of the incipient development of a culture of the exhibition. The concept of spectacle was to become a central category in the cultural experience of the urban population in the 19th century. In fact, since the 1860s Barcelona has witnessed the appearance of commercial spectacles, in which the predominance of women as objects of exhibition was central. That was a process that grew in the last decades of the 19th century and ended up exploding in the first decades of the 20th century. Thus, travelling anatomical exhibitions went hand in hand and competed with various forms of staging, ranging from the commercial theatre to the concert-cafés, cabarets and music halls.

Despite the good public reception and favourable artistic critics in the general press, it is surprising to note the critical fate of those sculptors, wax sculptures, show-businessmen, exhibition spaces, and the public who welcomed them. There are no remains of those wax-works in art museums in Spain. Actually, its fall of the artistic canons due to his work in wax was a fact that we can verify in the writings of the history of the Spanish contemporary sculpture since the 1930s. However, the process of wax abandonment in the hands of art sculptors

was a fact since mid-19th century and anatomical sculptors took the cast as work material, leaving and confining wax to the representation of diseased skin. The fate of medical collections, whether they belonged to museums of medical schools or were central objects in the popular anatomical museums, has been complicated. This is clearly a fact for the case of Barcelona. That world suddenly ended with the Spanish Civil War and the new moral framework imposed by Franco's regime (1939-1975). On one hand, changes in medical education schemes, a persistent problem of space and the lack of interest in the heritage and material culture of medicine led to a progressive abandonment of medical museums and its contents. In contrast to other European countries and universities, even with some Spanish ones, most medical heritage from the Barcelona medical school disappeared and just a small part of those collections remains now in the premises of the Museu d'Història de la Medicina de Catalunya in Barcelona. On the other hand, the Museo Roca, the epigone of a great number of popular anatomical museum in early 20th century Barcelona, remained concealed and away from the public since 1939. It reappeared in the 1980s, in the hands of a locale antiquarian who split the collection into two parts, the "theatrical" part was sold to the city of Barcelona and the "medical" part was acquired by Leo Coolen, a Belgian collector.

By revising those works and sculptors, those businessmen and travelling exhibitions, those sites of exhibition and its audiences this research tries to shed new light on an activity neglected by the canons of the history of art, by the lack of interest in the slits opened by popular culture and by a history of medicine with little interest in opening the focus to different forms of creation of scientific knowledge.

This presentation is part of the Spanish Administration funded Project "Del gabinete de maravillas al museo anatómico popular: regímenes de exhibición y cultura material de la medicina" (HAR2015-64313-P). I would like to thank Chloe Sharpe, Maribel Morente and José Pardo-Tomás for their helpful comments.

2. Collections and Museology

PRECIOUS OBJECTS. THE ANATOMICAL WAX MODELS OF THE JOSEPHINUM IN VIENNA

Christiane Druml

UNESCO Chair on Bioethics at the Medical University of Vienna. Josephinum - Ethics, Collections and History of Medicine of the Medical University of Vienna. Vienna, Austria.

The "Josephinum" in Vienna has been founded 1784 by Emperor Joseph II as Academy of Medicine and Surgery to train military surgeons and thus revolutionized medicine in the 18th century. The building reflects its significance and serves now as gate to the historic collections of the Medical University of Vienna. It houses the world-famous anatomical wax models from Florence, as well as surgical instruments, valuable books, important estates and other documents in the field of the history of medicine. The Medical University of Vienna is one of the few medical institutions worldwide with such an eminent cultural heritage. The Josephinum with the permanent collection of anatomic and obstetric wax models as well as with temporary exhibitions is open to the public and can be visited.

The Josephinum was an innovative institution, especially in regard to the various teaching aids used in the training of the students. The most important part of these teaching aids and still today of unique bearing are the anatomical and obstetric wax models which were ordered by Joseph while visiting his brother the Grand Duke of Tuscany Peter Leopold in Florence. All models – 1.192 single pieces - were carried across the Alps by a convoy of men and mules to Linz and then travelled upstream via the Danube to Vienna.

Art and science of wax modeling was not possible without dissection of cadavers. The idea behind the wax models was that once the whole body could be looked at and studied on a model, it would not be necessary anymore to perform dissections in order to learn the anatomy and further medical sciences. An idea which also prompted the Grand Duke to finance the wax modeling workshop in the observatory "La Specola". To know the human body was necessary for physicians, but also a prerequisite to artistic creation. Great artists like Leonardo da Vinci, Michelangelo or Raphael are known to have studied anatomy. Wax was an easy matter to work on and used since the ancient times.

HOW DO WAXES WORK? NEW MEANINGS FOR OLD EXHIBITS

Ken Arnold

Creative Director of Medical Museion, University of Copenhagen & Wellcome Collection. London, UK.

The histories of museums and of waxes have largely gone hand in hand. Many models were produced, or at least have spent much of their 'lives' – both on and off show – in galleries and museum storerooms; and most that survive today are now kept in museum collections.

In the world of museums, curators have become increasingly conscious of the importance of con-

text – believing that **where** an object is can be just as significant as **what** it is. An exhibit is part made by its matter, and part by its place. My presentation will be principally concerned with the relationship between these fascinating exhibits and the contexts in which they have been used and gained meaning. I am especially interested in how museums can get the most from them today. How can we rework these waxes?

From their early development, medical wax models have simultaneously existed in a number of overlapping realms: used as research instruments (visual evidence of the laws of nature); as tools for the instruction of medical students and practitioners; as a means to stimulate public appreciation of science and the composition of the human body; and finally, as focus points for delight (but also shock) within the broader realms of public culture and entertainment.

Drawing on examples from the collections of the Medical Museion in Copenhagen, the Gordon Museum of Pathology in London, the Grant Museum of Zoology in London, and other material shown at Wellcome Collection's "Exquisite Bodies" exhibition, I will start by delving into the types of collaborative knowledge (scientists working in partnership with modellers and sometimes patients) that they represented within the disciplines of anatomy and dermatology. I will then shift focus to the vital role they played in medical education, where (for a while at least) they provided a vigorous form of 'plastic publishing' alongside printed alternatives, and where they channelled an enthusiasm for information and ideas that could be comprehended through being handled and manipulated. Finally, I will follow other wax models into the realms of popular engagement and entertainment (in showrooms like Dr Joseph Kahn's Museum in London and Roca's museum in Barcelona), becoming important ingredients in efforts both to inform, but also to titillate and excite the public.

Turning to contemporary museums, I will end by speculating about the potential for innovative and effective exhibition making that is inherent in these charged objects. How can today's museums work with the layers of contextual knowledge wax models embody; and at the same time make the most of their inherent aesthetic delight and ability to touch visitors on personal and emotional levels? And how can we make the most of their powerful aura of materiality in an age that's trying to cope with digital overload?

THE WAX ANATOMICAL MODELS IN THE ANATOMY MUSEUM OF THE UNIVERSITY OF VALLADOLID

Juan Francisco Pastor Vázquez

Director of the Anatomical Museum of Valladolid. Department of Human Anatomy and Radiology. University of Valladolid. Valladolid, Spain.

Nothing is a more realistic imitation of any part of the human body than the wax anatomical models created by a good craftsman

The first report of the existence of wax anatomical models in Valladolid is in 1861, when the dean of the Faculty of Medicine, don Andrés de Laorden, acquires for the College of Medicine, situated in the Hospital de la Resurrección, a collection of paintings in wax representing eye diseases. However, the expansion of the department of anatomy, in terms of its provision with models and installations, is the work of the professor of anatomical technique and dean of the Faculty, don Salvino Sierra y Val.

Don Salvino Sierra (1847-1939), after travelling to the most prestigious anatomy departments in Europe, wanted our University to be just as good; so he began to obtain teaching material and prepare natural pieces using different methods of conservation. This work benefited greatly with the creation in 1916 of the Sierra Anatomical Institute, at the request of the Vth Congress of the Spanish Association for Scientific Progress.

The technique of wax anatomical modelling reached its heyday in Italy during the XVIIIth century, as a result of successful collaboration between sculptors and anatomists. This soon spread to other countries and prestigious schools appeared in England, France, Spain and Austria.

During the XIXth century, Paris replaced Italy as the main producer of wax anatomical models. The workshop of Vasseur-Tramond was founded in the mid XIXth century by Pierre Vasseur, at 9, Rue de l'École de Médecine, located in the building adjacent to the old anatomy amphitheatre. In 1878, he joined his son-in-law, Gustave Tramond (1846-1905), whose work received recognition with the Chevalier de la Légion d'Honneur award.

This workshop began to sell waxes to the European Faculties of Medicine and Schools of Surgery around 1880.

The wax models in the Anatomy Museum of the Valladolid Faculty of Medicine are a magnificent reproduction of dissections carried out by French anatomists. Almost all come from the house of Tramond, founded in Paris in the mid XIXth century, and whose workshops were responsible for outstanding models thanks to the collaboration of wax modellers and anatomists.

The realism of these pieces is still impressive nowadays, although, according to Tramond, these models "are not useful for studying anatomy, but rather for remembering it once it has been learnt; sometimes they are worse and other times better than real ones; they are exact when representing

well-established hard elements which do not change their intrinsic relations, since these can be copied well; for example, bones, large injected arteries, nerves or muscles. They are inexact when these conditions do not apply; generally speaking, then, copies of splanchnology preparations are erroneous, due to the fact that to produce a good original in the human body there should be resistance when the cuts are made, and in order to create such resistance injections are required; these destroy the normal relations between the parts and give wrong dimensions, making it impossible to regulate the number of injections for all the specific tortuous channels. As a consequence, some splanchnology preparations are to a certain extent representative".

In all there are 122 pieces and most of them are not dated, although we do know that they belong to the last third of the XIXth century. The oldest, the date of which we know, 1868, appearing on the shoulder, represents the torso of a lying man and shows the right half of his organism.

The state of conservation of the sculptures differs a great deal, as the models were used until 1986 for teaching anatomy in the Medicine Faculty. Deterioration is more visible among those pieces displaying vascular and nervous system elements independently.

We do not know the exact process of making the models as this was considered a professional secret. We might surmise that each artist had their own technique, which was not revealed in case others learnt about it. Yet we do know that they were devised by two specialists: firstly, the doctor or surgeon with their knowledge of anatomy and responsibility for dissection; and secondly, the modeller or sculptor, who would reproduce the dissected body parts in the new material. First, from an exact copy in low-quality wax a plaster mould was made. The cast would be the matrix of the final substance, which required plenty of experience in handling and preparing waxes, which were melted in a water bath and to which were added colourings and natural solvents to ensure a certain degree of elasticity. This preparation was applied on plaster moulds that represented the figure of the bodies, until gradually this layering of coloured waxes started to thicken and fill the mould, creating the particular range of colours and textures required depending on the type of tissues represented.

In the large majority of Tramond's models the technique involved the use of wax glazings; that is, on the plaster mould of the required figure several fine translucent layers of a wax known as "Izmir wax" were applied; this was coloured with natural pigments dissolved in animal oils.

Filiform structures, such as vessels and nerves, are formed by bundles of thread impregnated with coloured wax.

THE RECUPERATION OF THE OLAVIDE MUSEUM: CHALLENGES AND COMMITMENTS WITHIN THE MEDICAL AND ARTISTIC HERITAGE

David Aranda D, Luis Conde-Salazar, Amaya Maruri

Olavide Museum. Madrid, Spain.

The cultural heritage is constituted by all of things we want to recognize, estimate and wish to keep. At the same time, it means the critical select of cultural things. During last decades the concept of "civil cultural heritage" was spread and its knowledge was gone beyond that Art or Historic field. Scientist Heritage is been a example. The moulages, or scientific wax models were used for teaching in Schools and Medicin Department last century. They have used value but also historic and artistic values too. Olavide Museum was discovered 10 years ago in a basement that would be demolished. It is constituted by more of 600 dermatologic moulages, that they are dated at the end of 19th century. In addition, Olavide Museum has lithographs, drawings, plasters, medical records and many documents. The main value is that Olavide Museum was found like "time capsule" and it keeps its authenticity over the ages. It is a unique example of Medical- Historic and Artistic Heritage. However, the "rescue" of this museum was been difficult and has been had many problems. This report will be presented the challenges that Olavide Museum is faced, and the same time the need of institutional commitment to preserver this cultural heritage and many others for the purpose to avoid the lost of historic memory and cultural identity.

THE ANATOMICAL WAX COLLECTION OF THE COMPLUTENSE VETERINARY MUSEUM, THE COMPARATIVE AND VERSATILE PURPOSE OF ITS MODELS

Joaquín Sánchez de Lollano Prieto

Director of Veterinary Museum. History of Veterinary Medicine. Department of Toxicology and Pharmacology. School of Veterinary. Complutense University. Madrid, Spain.

In this presentation the Veterinary Museum's Ceroplastic Collection of the Madrid Complutensis

University is described showing the pieces that have arrived to our days and data on its origin and evolution from the initial collection in the early 19th century. Some pieces, due to their complexity, technical or artistic values, are analyze providing data about the authors and some of the later interventions. The pieces were built for the teaching of veterinarians in many fields and at the same time they were exposed for decades in the former School's Anatomical Cabinet. For this reason, they were also visited by the general public as exponents of the science's advances and as a reason for pride of the Veterinary School, hence its versatile intention. At present, they are under restoration process and the current set consists of 42 pieces of various formats. The archival documentation notes that originally there was a much wider collection with a clear comparative aim because since its inception included animals from zoological collections as well as domestic species and those of veterinary interest. The great majority of remaining pieces focus on the equine species and allow to illustrate the anatomy of the animals, their reproduction, diseases, the resolution of surgical problems or to know the evolution of the teeth to determine the age of the animals. It is an heritage that adds to the historical values on the evolution of the Veterinary, as a science and profession, those aesthetic and cultural ones.

Publication made within the National I+D Plan Project, reference HAR2013-42460-P, Spanish State Program for the Promotion of Scientific and Technical Research of Excellence, Ministry of Economy and Competitiveness.

3. Sculpture

ANATOMY AND FORM

José Ramón Sañudo

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Since the classical period, sculptors have very well represented the form of the human body. Many Schools and books teach how is the anatomy of the external and internal form of the human body. They also teach the technical procedures for transforming a simple block of marble or, any other material, in a recognizable human form. Three are the basic principles to get a sculpture: 1) a previous idea, 2) a plan and 3) a technical procedure.

In the human development to get a form, the biology, like a sculptor, needs to follow these three main principles: 1) the idea, represented by the genetics, 2) the plan, represented by three main phases (fertilization, gastrulation and morphogenesis) and 3) the technical procedure or performance represented by the cell activity: cell multiplication, cell mobility and cell differentiation.

The fertilization is characterized by the determination of sex and the creation of an egg or zygote that represents the "block of marble" to build a new form. The process is characterized by a crazy activity or cleavage of the zygote (cell division and multiplication) until the third week of development (no human form is possible to recognize).

Along the third week, a process named gastrulation takes place. During the gastrulation the body plan establishes (axis, symmetry and cardinal references) and the origin of the three germinal layers (ectoderm, mesoderm, and endoderm) and still no human form is recognizable. A notorious embryologist, Lewis Wolpert, considers that gastrulation is the real born of humans because, during this period, the germinal layers appear and, from them, the whole organs and systems of the human body will origin.

The next step is the morphogenesis that happens from the third week to the eighth week of development, period named as, embryonic period. At the end of the morphogenesis is when the embryo gets the human form. The endoderm will give origin to the digestive and respiratory systems, the mesoderm to the locomotor (muscles, joints and bones) and the urogenital systems and the ectoderm to the nervous system and a part of the epidermis of the skin. The nervous and the locomotor system will not finish their morphogenetic period until the end of the fifth month.

After the embryonic or morphogenetic period the fetal period begins. It is characterized by the cells tissues and organs growth and maturation. It ends with the delivery of the fetus and his transformation in a newborn.

After birth, the cells loose most of their potentiality but preserve their capacity to continuing the adaptation to new functional requirements that the form suffers along life until death. This process is known like remodelation, as a sculptor that would like to adapt the form of its sculpture to new requirements.

Therefore, the human form (external and internal) is developing like a sculpture made from inside to outside by the existence of a previous idea, a plan and the cellular activity.

APPLICATIONS OF LIFECASTING TECHNIQUES IN WAXWORKS

Javier Martínez Pérez

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Lifecasting is the art term by which we denominate the process of creating a three-dimensional copy of an object through the use of cast and moulding techniques. The copy thus obtained is a three-dimensional accurate reproduction, both vol-

ume- and texture-wise, of any element in nature, be it living or lifeless, organic or inorganic.

This technique has been used throughout history with a variety of objectives, not only of ritual nature (as it is the case of funerary masks), but also of procedural nature, for instance the production of sculptures and other three-dimensional works. Its use can be traced back to ancient Egypt, Greek, or Rome. From there onwards, the technique continued to evolve and perfect, becoming the base of a thriving business over the Italian Renaissance.

While in ancient Rome wax was already a casting material, it is not until the Renaissance —when it was used to create anthropomorphic elements central to religious rites in Florentine churches— that the techniques involved in the manipulation of wax were gradually perfected, leading to the first anatomical waxworks in the 17th century. Considerations of practical nature made sculptors model many of the elements pertaining to these anatomical waxworks, whereas those characteristics inherent to lifecasting, namely its suitability for reproducing accurately and faithfully the volumes and textures of the real element, have contributed to lifecasting playing so essential a role in the creation of waxworks.

Considerations of practical nature intimately linked to wax lifecasting determined the suitability of this technique to reproduce rigid elements such as bones, thus being modelling the technique of choice when it came to creating soft moist elements (for instance, intestines). Delicate elements such as nerves or the lymphatic system required that artisans resorted to direct creation. These professionals' zeal difficults to the utmost assessing to what extent lifecasting was used in the creation of waxworks, introducing an element of doubt in the analysis of certain models. There are circumstances, however, in which the use of lifecasting provides an objectiveness that science seizes. In particular, prior to the dawn of photography, waxworks became an indispensable tool for Medical schools when the subject of study was the morphology of disease, or all types of disorders of the anatomical structure. Skin conditions, tumours, or congenital deformities were registered by means of moulds and then reproduced in pigmented waxes. The realism achieved allowed students to grasp the circumstances under study while avoiding inconveniences such as the decomposition of cadavers or the lack of the appropriate patients.

Lifecasting techniques have evolved, in particular from the Industrial Revolution onwards, conditioned by the advances that the discovery of new materials has granted. Basically, the process consists of applying a fluid substance on the original model so the fluid adapts to the shape of the model. Once the fluid sets, it hardens and registers a negative copy of the volumes and textures of the original model. A mould release agent is the used to wipe the interior of the negative mould so the moulding material used to create the positive will not stick. In this step, a fluid material is used to fill up the negative mould with the purpose of obtaining a positive copy of its volumes and textures once the fluid sets. The materials the most widely used in the process of creating anatomical lifecasts are gypsum (negative moulds) and wax (reproductions). Wax characteristics in terms of softness and malleability together with the fact that it is translucent make it the preferred choice to reproduce skin and its features. Wax melts by heat and sets at room temperature. By simply saturating with water gypsum moulds, wax adherence is prevented and wax positives can be easily removed from the negative moulds.

Moreover, wax allows for the use of pigments, different layers and glaze, all of which contributes to an extremely faithful reproduction of the original model. More innovative materials such as resins and silicones appeared too late: the period in which this type of casting was mostly used ranges from the 17th century until the birth of colour photography, this latter replacing casting due to economic and practical (speed) reasons.

The simplicity by which the process can be described may lead to the wrong idea that lifecasting is a simple process. It is not. This is an extremely complex technique, in which many variables can be present depending on the model, and that requires the completion of a very demanding training process and a great amount of experience so an individual can accomplish a lifecast correctly. Consequently, execution time and cost are high, characteristics that lead, eventually, to these models being replaced by photography definitely.

4. Restoration and Conservation

THE RESTORATION OF THE ITALIAN ANATOMICAL WAX IN THE EXPERIENCE OF THE OPIFICIO DELLE PIETRE DURE DI FIRENZE.

Laura Speranza[1] and Francesca Rossi[2]

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The Opificio delle Pietre Dure in Florence, was founded in 1588 by Grand Duke Ferdinando I de' Medici, but only in the second half of the 19th Century it started the conservation and restoration of the monuments alongside the manufacture. The greatest experience in restoration was acquired after the great flood of the river Arno in 1966. The

flood was a great drama for the town of Florence and the emergency led to the formation of 12 restoration areas relating to all types of materials. In 1975, with the creation of the Ministero della Cultura, the Opificio has been officially recognized. The modern Opificio get together restoration and research alongside with the regular high school education (as the italian university) in the term of five years. Together with Istituto Superiore per la Conservazione ed il Restauro in Rome, the Opificio delle Pietre Dure is internationally recognized as one of the most important institutions in the field of conservation.

The sector that deals with the restoration of ceramic materials, plastics and glass - inside Opificio delle Pietre Dure - has been always engaged in the recovery of artifacts made of wax. Such as devotional objects, preparatory sketches made by Renaissance artists, botanical and anatomical teaching models still preserved in many famous university collections in Europe. Among these restoration projects, we point out the constant monitoring that Opificio take place at the Museum of Natural History in Florence - "La Specola" - that led to the restoration of many works made in wax. "La Specola", as well as a museum, in fact, it's an historic Florentine manufacture, which was active from 1771 until the second half of the 19th century, and can boast the construction of c.a. 1,400 wax models, themed anatomical, pathological and botanist.

The experience gained by our Institute in the conservation of the works in wax modeling has allowed us to refine the research and operation in this area by developing intervention techniques using increasingly sophisticated equipement and having the less invasive impact as possible. Over the years the Opificio has dealt with many issues related to the storage, handling and intervention techniques, always accompanied by scientific investigations to face in the best way the challenges encountered and comply the basic criteria of modern restoration.

We'll expose some case studies about artistic models in wax (Giambologna, Cellini, Medardo Rosso) and about anatomical and pathological wax models. We'll especially present how we have solved serious structural problems on large waxworks.

WAX BODIES – CONSERVATION AND RESTORATION AT THE VIENNESE JOSEPHINUM

Martina Peters

Josephinum Collections of the Medical University of Vienna. Vienna, Austria.

Uniting art, science, and exquisite handcraft, the anatomical wax-model collection at Vienna's Josephinum is an ensemble of nearly a thousand pieces, created in and around 1785 at the request of Emperor Joseph II for the then-groundbreaking medico-surgical military academy to be named after him.

The wax models – crafted by sculptors, modelers and anatomists at the Florentine atelier of "La Specola" before being transported to Vienna – remain housed in their original neo-classical environment and displayed in their original cases of veneered rosewood and mouth-blown glass. While this milieu doubtlessly enhances the impression of this unique collection, it also creates specific challenges for its preservation.

The main priority in the collection's preservation is preventive conservation. Regular climate and insect monitoring, as well as the upkeep of a clean environment, goes some way to ensuring the collection remains in a stable condition. Furthermore, the objects are regularly checked to minimize the risk of additional deterioration. Conservation treatments are regularly applied to the objects following their categorization to one of three groups, ranked according to priority. New approaches have also been developed to minimize mechanical stresses on the models, enhance their visibility and accessibility, and improve the environmental conditions within the exhibition rooms.

EFFLORESCENCE ON THE SURFACE OF BEESWAX OBJECTS

Bartl B[1], Zapletal M[2], Trejbal J[2]

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Introduction: On the surface of objects made of beeswax-based mixtures, a whitish crystallic efflorescence tends to develop under specific conditions.

Objectives: A: Characterization of the chemical composition and basic physicochemical properties of the efflorescence on pure beeswax. B: Elucidation of the causes of the phenomenon and the determination of the most important factors, which affect the rate of the process. C: Verification of the effectiveness of several methods suggested for the "wax bloom" prevention.

Material and methods: For the designated purpose, following analytical methods were employed: GC-MS, GC-FTIR, DSC, ssNMR, FTIR. For the preparation of samples, pure and modified beeswax, dammar resin, propolis, microcrystalline wax and paraffin were used.

Results: A: In cases of objects made of pure

beeswax, the efflorescence is typically formed by the mixture of unsaturated and saturated hydrocarbons, naturally contained in beeswax. B: A primary cause of the phenomenon is a limited miscibility of these compounds with the remaining components of beeswax. The process is generally faster at lower temperatures and in the presence of surface defects. C: In order to reduce the efflorescence development, several kinds of measures can be adopted, including temperature control, surface treatment using appropriate finish and the addition of specific admixtures to beeswax used for conservation purposes.

Conclusions: The causes of the phenomenon were outlined and several possibilities of preventive conservation discussed.

Acknowledgement: This work was supported by the Ministry of Culture, Czech Republic under grant NAKI II DG16P02R040.

A FASCINATING CHALLENGE: ABOUT THE CONSERVATION OF THE OVERSIZE WAX-MODEL "PHRENOLOGICAL HEAD" OF THE COLLECTION AT THE DEUTSCHES HISTORISCHES MUSEUM IN BERLIN

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Introduction: The German Historical Museum in Berlin houses a larger-than-life-size wax model of a so-called Phrenological Head being the only one of its kind known so-far. Dating back to the beginning of the 20th century it was made by a modeler with unknown name residing in Zurich/Switzerland. For most of its past, the model was in the property of travelling showmen, who presented it on fairgrounds all over Europe. In 2008, the Phrenological Head was acquired by the museum where it is since then part of the Everyday Culture Collection.

Objectives: Due to its agitated past and in consequence of a disadvantageous technological and material composition, the model has suffered severe damage. Unfavorable former repairs promoted its decline and altered its original appearance to a great extent. Further survival of this unique testimonial for the future was hence seriously endangered and its need for an in-depth conservation treatment was immense.

Methods, materials and results: The biggest challenge hereby was the reconnection of the manifold fractures in the wax. Following an X-ray examination of the model's structure and some empirical adhesive-testing, the aqueous poly (alkyl acrylate) dispersion Lascaux® 498 HV was chosen for reattachment. In case of some deformed loose wax fragments a backfilling was necessary in order to provide a solid joint on the wooden interior of the head. Therefore, the acrylic dispersion was mixed with the hydrophobic fumed silica Aerosil® R 972. Filling of missing areas was also needed for a stable bond. This was undertaken by introducing accurately-fitting intarsia made of a mixture of beeswax and dammar resin.

Acknowledgements: Deutsches Historisches Museum Berlin, namely Martina Homolka (Head of Conservation) and Elke Kiffe (Conservator for Glass and Ceramics) as well as Dr. Marc Fehlmann FRSA (Director of Collection, since May 2017 director of the Historical Museum Basel/ Switzerland) and Prof. Dr. Rosmarie Beier-de Haan (Head of Collection for Everyday Culture).

CONSERVATION-RESTORATION OF A SINGULAR HERITAGE. THE ANATOMICAL CEROPLASTICS COLLECTIONS OF THE UNIVERSIDAD COMPLUTENSE DE MADRID

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Introduction: Universidad Complutense de Madrid treasures two large collections of ceroplastics, both human and animal anatomy, elaborated during the XVIII-XIX centuries, the first one in the cabinet of the Real Colegio de Medicina de San Carlos (and which is exposed in the Museo de Anatomía "Javier Puerta" of the Faculty of Medicine) and the second one, in the Real Escuela de Veterinaria (Museo Veterinario Complutense), institutions founded in 1787 and 1793 respectively. Surprisingly, despite the high artistic quality and documentary value of both collections, they had not arouse enought interest among the scientific community, who did not specific studies and the collection were in a seriously threatened state of conservation to their transmission to future generations.

Objetive: In order to put into value this extraordinary and unknown heritage, from 2009 until the moment of writing these lines, an interdisciplinary team led by Dr. Alicia Sánchez Ortiz has managed through different competitive projects, carry out various protocols of action in conservation-restoration matter.

Methodology: The information obtained through different diagnostic techniques (macro and microphotography, UV fluorescence, X-ray, computed tomography) and the physical-chemical analysis of a representative sculptures selection of each collection and chosen according to their typologies, of the manufacture technical peculiarities, or due to a special conservation problem, has been contrasted with the collected data through the documentary search in archives and in the scientific literature, which has allowed to reach a deep knowledge on the ceroplastic techniques in Madrid schools: the two collections historical evolution, authorship attribution with the different identification of artificers (anatomists, sculptors, modelers ...), and the specific modus operandi developed in the anatomical cabinets of these institutions.

Also, the artistic diagnosis has been focused on understanding the evolutionary processes that have generated different pathologies in the three-dimensional models, and on knowing which have been the causes that have triggered the deterioration.

Based on a strict methodology of actuation, a specific decision-making model has been developed for each case study.

Results: This work will show the most relevant results obtained, explain the criteria that have ruled the conservation actions and will detail the methodologies of restoration carried out to give solutions according to the sculpture specificity and its deterioration stage.

Conclusions: The objetive has been, and still is, to recover as far as possible the physical integrity of the sculptures, always starting from the most respect to their historical-artistic and scientific values, with the purpose of contributing to the recovery of a unique patrimony that confirms the knowledge advances in the period of Spanish Enlightenment.

Source of funding in Competitive Projects

Ref.: HAR 2009-10679: The art of anatomical ceroplastics: Characterization of materials and methodology of actuation in conservation of collections of anatomical models in wax (Museo de Anatomía “Javier Puerta”. Facultad de Medicina. Universidad Complutense de Madrid – Museo Anatómico. Facultad de Medicina. Universidad de Valladolid).

Ref.: HAR 2013-42460: Ceroplastic in Veterinary: documentation, materials characterization and conservation-restoration methods in the Complutense collection.

PERDURABLE IMPERMANENCE: SCIENCE OF MATERIALS IN THE ART OF CEROPLASTIC RESTORATION

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Wax, as a material, has traditionally been destined to, through multiple applications, an immediate use and disappearance. Its lack of transcendence, its impermanence, has been the essence of its existence in most of the functions it has had throughout history. However, when wax becomes art, the great virtue of its variable and mutable material becomes its main limitation.

We want, we wish, we long for art to last, to transcend with it, so that it can be admired as a future contribution of an entire era in which it was generated. However, the Art of Wax Modelling has a delicate, mutable and difficult to preserve physical support, and on which Science must act to reveal all its secrets, in order to make it perdurable.

The interaction between Art and Materials Science is not new, and there are many collaborations that can be found in the specialized literature. The collaboration between these two branches of knowledge is allowing to discover many of the secrets that keep the art works of the past. This knowledge allows restorers to act upon them without altering them, while improving their present and future state of preservation.

This interaction is still very scarce in the field of Wax Modelling. Surely not because of the lack of quality of the pieces that are available, which is huge, but because of the lack of knowledge of the great public of this art and the small number of works available, compared to other fields. However, collaboration between materials scientists and restorers is urgent and necessary. It would not be rigorous to ignore the modern techniques of characterization of materials and their application to this field. Nevertheless, how to begin?

It is not easy to open a path in which we do not know our destiny. Perhaps, the best is to ask to the pieces what they restoration needs are. Mostly, we find pieces that present flaws, cracks and defects, so the most urgent thing is to try to prevent them from spreading and, if possible, to repair them. Close critical fissures, joint separate parts of the same sculpture, are the basic goals of all restorer.

On the other hand, we find that the materials that we have to joint, the cracks that we have to identify, are not well characterized, and what is worse, have evolved over time. We all have had the experience of how waxes, over time, lose their initial ductility and end up becoming hard, fragile and brittle materials.

Therefore, the challenge is twofold. On the one hand, we have to join pieces, glue them together with some type of adhesive that is strong enough

to hold them, but at the same time, it should be possible to be removed, if required, in the future. The intervention of the restorer must be reversible. All this without forgetting that the adhesive must not modify the structure of the material on which it is applied.

Given this situation, a protocol of study and scientific action is presented, proposing the following steps:

Generate a material similar to the original, or as close as possible. From the information available in the literature used by ancient masters, and collected in their books, it is feasible to emulate the methods of production of the material by using their master formulas. In this way, waxes similar to those used centuries ago, that we still have in our museums, can be recreated. This let us have a material on which to investigate without destroying the vestiges that have reached us today. In addition, this material could be used as filling in areas with significant material losses.

Establish a criterion to evaluate the aging process of the materials. In our case, we chose to consider ultraviolet radiation as the main agent of degradation of materials. Nonetheless, how much does ultraviolet radiation have accumulated over the history of the pieces? Obviously, it is impossible to know because each collection, each piece, has a different story. However, a criterion can be established from the measure of the hardness of the material (intimately related to its fragility, in this case) that has reached us throughout the centuries. This simple and non-destructive test that needs very small amount of material, so it can be applied to small pieces detached from the original works. Therefore, if we radiate with ultraviolet radiation a material produced in similar conditions to those collected in the writings that relate its production and we measure sequentially the evolution of its hardness, there will come a time when the historical material and the new one have a similar hardness value. At that moment, we can consider that the process of accelerated aging by ultraviolet radiation has reached its goal.

Evaluate by means of specific mechanical tests the structural characteristics of the original material, the material accelerated aging, and the adhesives that are used to perform the restorative interventions.

Electron microscopy analysis of the bonded areas, in order to identify the micromechanisms of deformation, rupture and takeoff of the pieces tested in the previous point.

These last two points let us select, based on quantitative criteria, the most suitable materials depending on the action that is wanted to perform on the piece to be restored.

METHODOLOGY OF PHYSICAL-

CHEMICAL ANALYSIS APPLIED TO THE STUDY OF WAX SCULPTURES

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As it is known, the artistic value, the perfection and the realism of the anatomical models are the result of the skills and the knowledge of anatomy of the people in charge of their execution. But they are also the consequence of the right selection of the materials used in its manufacturing and of the technologies used in their application. The name of "wax modeling" makes a clear reference to one of them, the wax. Under this name different types of materials are included, but in this case, it refers to the beeswax, substance characterized by its low melting point and plasticity. However to be used in this type of works it is usually mixed with other substances and the result obtained is named as paste-wax. These additives are greases (animals or vegetables) and natural resins. In addition, in order to represent certain vital organs associated to the anatomical model, it was necessary to employ colored substances (pigments). On the other hand, there was common the use of human hair for the representation of the hair of the figure or even of silk threads for the lymphatic vessels.

To know the nature of these materials and the form in which they were used is necessary to carry out a work of documentation based on the research of different sources of information, such as, texts regarding to art technology, invoices, contracts, previous studies of other anatomical models and so on. Obviously, the laboratory studies are an interesting possibility to improve the knowledge about these heritage objects.

The laboratories specialized in the study of art works have very precise analytical techniques and have developed protocols adapted for the study of artistic materials. For this reason, in the case of the anatomical modeling wax, they can provide value information regarding to the materials used to make them and how they were applied. Likewise, they can give support in the processes of conservation that they are going to be applied.

In this oral presentation the work carried out in the Laboratory of Materials of Departamento de Pintura (Pintura y Restauración) of Facultad de Bellas Artes is presented. This work has been focused on studying of some was anatomical models of the Universidad Complutense de Madrid, specifically, the Museo de Anatomía Javier Puerta and

the Museo Veterinario Complutense. In the first case, this work was requested by the Vicerrectorado Extensión Universitaria, Cultura y Deporte as part of the conservation project applied to the anatomical model "The Parturient". Regarding Museo Veterinario Complutense this research is part of the research project headed by professors Alicia Sanchez and Joaquin Sanchez de Lollano.

The analytical techniques used have been: stereoscopic microscopy (EM), optical microscopy (OM), scanning electron microscopy-energy dispersive X ray (SEM-EDS), Fourier transform infrared spectroscopy (FTIR) and gases chromatography-mass spectrometry (GC-MS). The processes of sampling are explained. The methodology of analysis, the experimental data and the interpretation of the results obtained are shown. In all cases this research has been developed according to the need of the conservation project.

This research has allowed to identify the components of paste-wax, the pigments used in the coloration of sculptures and how they were applied. The presence of varnishes has also been established and the nature of resins used has been identified. In addition, the efficiency of the cleaning systems tested has been studied.

CLEANING OF WAX ANATOMICAL MODELS: A METHODOLOGICAL PROPOSAL FOR THE ROYAL COLLEGE OF SURGEONS OF SAN CARLOS

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Introduction: Ceroplastia arises from the insatiable curiosity of physicians and artists by the knowledge of the human body. The anatomical models would become in valuable didactic tools, as well as objects of contemplation.

Nowadays they are preserved in university museums, as in the case of the Museum of Anatomy “Javier Puerta”, located at the Faculty of Medicine at the Complutense University of Madrid. This museum is the depositary of the pieces that have survived from the anatomical and obstetric museum existing at the Royal College of Surgeons of San Carlos in Madrid, created in 1787.

Since the end of the 20th century numerous initiatives have arose to adopt policies and management methods among which are the overall action plans on the collections and the conservation strategies. In this sense, the most important for this research is the change in the composition of the waxy paste. Different types of wax were used together with additives, pigments and natural dyes resulting in complex waxy pastes for identification and subsequent preservation. Once the piece was finished, a coating film was added, increasing the conservation problems of the artworks.

The physical-chemical analyses carried out on some of the pieces of the Museum of Anatomy “Javier Puerta” determined that the major component of the waxy paste is beeswax, including in a lesser extent a pinacea diterpenic resin, and in very small extent lard. The diterpenic resin also constitutes the coating film of the specimens. This varnish required a cleaning treatment because not only creates a visual alteration but also affects the original materials, being necessary to find the most appropriate materials and methods to suggest a suitable cleaning system for the waxworks.

Objectives

This PhD Thesis born with the aim of developing a methodological proposal on cleaning and removal of film-forming material for the wax sculptures of the Museum of Anatomy “Javier Puerta”, and specific objectives are drawn up:

1. The knowledge of the materials used in the sculptures subject to study, besides the verification of the relationship between the results of chemical analysis with the formulas and recipes documented.
2. A review and updating of the existing literature on traditional methods used throughout history for cleaning and removal of film-forming material of the artworks produced in waxy material.
3. The assessment of the validity of the methodology proposed by its practical application of wax models under study.
4. The contribution of evaluation criteria on the usefulness of the techniques and methods proposed for conducting chemical analyzes that confirm the effectiveness or inefficacy of protocols performed on lightening the varnish of the pieces in wax of the Collection of Madrid.

Materials and Methods: Two pieces, representing different areas of the brain, were used to carry out the essays. Prior to lightening the varnish, a preliminary cleaning step was performed to remove dust and dirt deposits from the surface. An acid buffer -pH 5-, applied with swab rolled, was selected with a conductivity of 4 mS/cm, and the addition of 0.2% of triammonium citrate.

Up to 4 essays, derived from each other, were made. Visual analysis under an optical microscope (SZN-2 Optika at 4.0x magnification) were performed, as well as FTIR spectroscopy, with a Nicolet 6700 Thermo Scientific^{TM} equipment (covering the 400-4000 cm^{-1} wave number range, a resolution of $4cm^{-1}$ and an accumulation of 64 sweeps).

The first test was made with Carbopol, and rinse with deionized water. For the second one a rigid Phytagel gel was employed from a buffer at pH 4.5; there was no need for either swab or rinse. In both cases, ethyl and isopropyl alcohols were add-

ed in a small proportion, in some cases. Areas of ½ cm^2 were marked in controlled times of 5 and 10 minutes, both front and back.

The third test used a resin soap gelled with Klucel G at 4%; rinse was made with deionized water to which 1% of Tween 20 was added. Areas of ½ cm^2 were marked in different controlled periods of ½, 1 and 5 minutes, both front and back.

The last essay sought to verify if it was feasible to lighten the varnish in successive layers without altering the surface, for which the two best-tested materials were chosen, Carbopol with 5% isopropanol and resin soap. A 3 x 2 cm work area was delimited divided into two longitudinal zones of 1 cm. Each treatment was applied in three times of 1 minute: the first application covered the entire strip of the selected system, the second left one of the three quadrants free, and the third applied only to the last section.

ORAL COMMUNICATIONS

WAX MODELLING PROCESSES IN EPHEMERAL SCULPTURE OF FALLAS FESTIVAL. HISTORIC CONTEXT AND TECHNOLOGIC DESCRIPTION

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Fallas festival, developed in the city of València and in its closest surroundings, it is known by the creation of ephemeral satiric sculptures that achieve their mission every 19th March (Saint Joseph's Day in Spain), when they burn up. However, since 1934 and thank to a proposal from the artist Regino Mas, one of these figures (ninots in valencian) gets redeemed officially every year as prove of popular absolution through the fire pardon.

The technic execution has suffered an important historic development, evolving from the simple sculpture of wood coated of old dresses, to the use of synthetic materials such as the expanded polystyrene. A fraction from this evolved fringe belongs to the use of wax as a basic material for the anatomic conformation of heads and hands. These pieces joint with other elements of paperboard and wood to conform the satiric models of the valencian Fallas since the middle of the 19th century from the second half of the 20th century.

Due to the maritime connexion with the neighbour Italic peninsula, especially from the 15th century, the elaboration of waxy pieces bounced into developing and industry related, especially with the offerings and religious exhorts. In 19th century, thanks to artists such as Antonio Cortina, the great artlessness that contributed the waxy backing to the satiric-dressed figures. He made this material turned into the most used till the irruption of the whole modelling ninot in paperboard.

The historic and technologic study of the valencian satiric representation, festive and ephemeral, shows an enriching vision about the uses of wax as an artistic support, far away from the anatomic models from teaching practice and other creations devised for lasting in time.

MADAME TUSSAUD: A LEGEND IN WAX

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The remarkable true story of the woman behind the worldwide waxworks empire- Madame Tussaud.

In an astonishing life that spanned both the French and Industrial revolutions, this single mother and entrepreneur travelled across the Channel to England, where she overcame the odds to establish her remarkable and enduring brand. Determined to leave an account of who she was and the times she lived through, her memoirs, letters and papers offer a unique insight into the creation of the extraordinary empire which bears her name.

Millions of people have flocked through the doors of Madame Tussaud's wax museum since they first opened over 200 years ago and it remains just as popular as it ever was.

There are many reasons for this enduring success, but at the heart of it all is good, oldfashioned curiosity.

THE PROFESSIONAL FIGURE OF THE ANATOMICAL SCULPTOR IN SPAIN'S UNIVERSITIES, C.1860-1945

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Introduction: A recent research project identified around 1000 Spanish sculptors who exhibited at national and international exhibitions between

c.1862 and 1920. Only very few became acclaimed artistic sculptors, so what became of the others? This paper presents the country's Faculties of Medicine as hitherto little-known professional destinations for sculptors of this period.

Objectives: The paper examines the professional and institutional role of the Anatomical Sculptor and Assistant Anatomical Sculptor by considering the selection processes, requirements and responsibilities, and some examples of their production in both wax and plaster. It seeks to consider their anatomical works in relation to their artistic output and career trajectories.

Materials and methods: Textual and documentary sources are drawn from the historical archives of several universities, and the nineteenth- and early twentieth-century Spanish press. I also analyse objects which have survived in university and museum collections.

Results and conclusions: The position of Anatomical Sculptor (and Assistant) was, for some artistically-trained sculptors, a stepping stone to academic teaching and valuable training in anatomical observation; for others, it proved a permanent career transition which provided economic stability, sometimes at the price of artistic obscurity.

HIDING THE SACRED. WAX MASKS FOR SAINT UNCORRUPTED BODIES

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The aim of this research is an approach to the use of wax masks in a religious context. Preservation of the flesh, mummification or saponification are the scientific background for a controversial topic. From a cultural point of view, some saint uncorrupted bodies are exposed with a wax mask in order to hide the sacred flesh. The coverage is a print or an auratic image that recalls the face of a person still present by his body. The main objective is to understand the reasons why some uncorrupted bodies are venerated with a mask or without. The methodology is an archive research for each specific case to analyze the reasons behind the use of a cover for the Sacred: degradation due to war, humidity, vandalism or ideology are some of the most common causes. From this main objective we can move forward the mask itself as a human production: who, when and how each wax piece was made according to the preserved information. Some of the study cases are Saint Olegarius in Barcelona, Saint Padre Pio in San Giovanni Rotondo, Saint Bernardette Soubirous in Nevers or Saint Joaquina Vedruna in Vic, among others.

LIGHT AND WAX IN MEDARDO ROSSO SCULPTURES

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Medardo Rosso was an Italian sculptor who developed his work between the 19th and early 20th centuries. He gave a new vision to the classical concept of sculpture: the dematerialization of form and its boundaries blurred through the modelling in wax and its relation with the light.

Objective. One of purposes of this research is the analysis of his work: drawings, photographs and sculptures, in order to understand the development and evolution of the conceptual principles, defining his creative work - Seeking the exchange of three-dimensional sculpture with the two-dimensionality of painting; understanding how the photographic study of his sculptures allowed him to approach to visual and sensorial aspects that later transmitted by means of the modelling in wax. Also It deals with an investigation the characteristics and properties of wax as a sculptural material.

Methodology. Initially a compilation of the works of Medardo Rosso is realized through drawing, photography and sculpture. The photographic process used by the sculptor is then compared to determine the lighting, the point of view and materials chosen for its realization. Identification of objective and subjective aspects shown in his wax sculptures trough wax proprieties and the selection of themes. Investigate new contemporary art fields.

Conclusions. Medardo Rosso transgressed a classic concept of sculpture by fusing an ambiguous sculptural and pictorial vision through works in wax. His wax sculptures do not seek formal representation. They symbolize the emotions, spirit of the soul, and light which enhances those aspects away from the ephemeral moment that the Impressionists sought.

WAX MODELS COLLECTION FROM "MUSEO DE HISTORIA DE LA MEDICINA ANDRÉS SORIANO LLERAS", BOGOTÁ- COLOMBIA: CHALLENGES FOR COLOMBIAN MEDICAL HERITAGE

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The wax models collection, belonging to the "Museo de Historia de la Medicina Andrés Soriano

Lleras", was creating by a local artist, Lisandro Moreno Parra in Bogota during the 1930´s. The manufacture of 1000 pieces was based in examples from European collections published in medical journals. Even though the wax models were made as didactic materials for dermatology classes, changes in the medical education and the introduction of new resources for teaching, put them into forgetfulness. Nowadays, the museums conserves only 325 pieces. This paper presents the process of recovery of the wax collection, highlighting its importance for history of Colombian medicine and the history of medical education. As well, the presentation addressed the initiatives to recover and conserve this material. However, this case shows the challenges that medical collections confront as being recognize as cultural heritage into the Colombian context. From this point of view, the wax collection typifies the situation of scientific heritage in general.

ABOUT THE IMPORTANCE OF THE CONSERVATION AND EXHIBITION OF THE ANATOMIC WAX MODELS COLLECTIONS

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When speaking of wax sculpture, it is important not to forget the concept of ephemeral. The fragility of their condition has given them a marginal place in the disciplines of Art History and Medical Education. In turn, over time they have become unique and exotic objects. The disuse of their primordial function (anatomical instruction) has allowed them to become relics in the history of medicine. The intention of this presentation is to conceive the anatomical wax models as historical documents and aesthetic objects, emphasizing the importance of its conservation within universities and medical institutions. The object of study is the collection of 16 anatomical wax models, preserved in the Palacio de la Escuela de Medicina, arrived to Mexico in 1874 from Vasseur´s workshop. We intend to analyze the measures that have been implemented for its conservation and specific exhibition. Finally, we will present a brief synthesis of the curatorial script of the Anatomy Hall, which was the culmination of the restoration project of the mentioned objects in 2013, where they were the main figures of the script.

ANATOMICAL WAS IN MADRID AND BARCELONA. SURVIVAL OF DIDACTIC MATERIALITY BETWEEN THE 18TH AND 19TH CENTURIES

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Introduction: During the eighteenth century anatomical ceroplastics was introduced as a new didactic method that included touch as one of the indispensable senses, which together with sight, complemented the knowledge of the discipline. Among the paradigmatic examples we have the pieces of the late eighteenth century that are preserved in the Museum of Anatomy Javier Puerta of UCM, coming from the College of Surgery of Madrid. However, in the current Faculty of Medicine of the University of Barcelona, two anatomical pieces in wax of the mid-nineteenth century are preserved, which were created under similar didactic needs, but through expressive forms that fit other aesthetic models.

Objectives: To know the similarities and differences in the was elaborated in the College of Surgery of Madrid at the end of the XVIII century and the Faculty of Medicine of Barcelona of mid-nineteenth century.

Material and Method: Comparative study of the anatomical wax pieces of both institutions and of the documents preserved in relation to these pieces. The work is based on the analysis of the ceroplastic objects and their contribution to the didactics of the anatomical discipline.

Results and Conclusions: The differences observed in the anatomical pieces in wax of each training center, allowed us to establish the material results that each institution adjusted to its different needs within each contextual framework.

BEEHIVE AS SCULPTURE IN ITS ORIGINAL STATE AND BEESWAX AS MATERIAL FOR EPHEMERAL INTERVENTIONS. THREE ARTISTS: TOMÁS GABZDIL LIBERTINY, REN RI AND ROSARIO PLATÉ

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Introduction: I intend to show the sheer beauty of beeswax forms in the beehives themselves, in their original, pure and unaltered state as well as in a manipulated or semi-intended condition in the interventions developed by two artists. (Ren Ri and Liberty)

The Chinese artist Ren Ri creates sculptures

using beehives by introducing a queen bee in a methacrylate polyhedron with rods placed in different directions. In his latest exhibition organized in Hong Kong and called “Yuansu Projects”, he makes maps using beeswax cells in reticular planes thus showing the intimate collaboration that exists between them.

Slovakian artist Tomás Gabzdil Libertiny uses beehives where bees make their cells on planned volumes and introduces figures in the beehives over which bees create a second skin.

On the other hand, using beeswax as the material for an ephemeral sculpture, artist Rosario Platé creates a full-scale image of herself shaped as a lit candle that lasts throughout the exhibition. The figure is placed in a metal tub used as the container for the molten substance.

The beeswax with flux accelerating additives allows the artist to control the melting speed resembling the interventions carried out by sculptor Nele Azevedo with his ice men since 2012.

3D VIRTUAL REGISTRATION AND VISUALIZATION ON WAX ANATOMICAL SCULPTURES OF THE JAVIER PUERTA ANATOMY MUSEUM, MADRID (SPAIN)

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This paper proposes a procedure for the registration and technic analysis of different anatomical pieces make on wax. The wax anatomical sculptures studied are in the Javier Puerta Anatomy Museum, in the Faculty of Medicine, Complutense University of Madrid, Spain. The five pieces of polychrome wax selected, end of XVIII century, are part of the big collection of the museum and show the gestation and childbirth.

Particularly, they are attributed to Juan Chaez and Luigi Franceschi sculptors with the collaboration of Ignacio Lacaba anatomist. The 3D models of the sculptures have obtained by means of high resolution Laser Scanner with light-white (Led) through software (VXelements) of the Creaform Company. As a result, the outcomes of this research reveal the splendid details of the technic and the different layers coloured what represent the blood vessels, veins and arteries with extremely perfection. The 3d registration permits to visualize the object for studying the material employed, the execution technic, the conservation state and small imperceptible features by the human eye.

RESTAURATION AND CONSERVATION OF WAX OBJECTS: THE EXPERIENCE OF A MEXICAN CRAFTSMAN

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Introduction: Museums and universities in Mexico often have wax sculpture collections that include, among other objects, anatomical sculptures, portraits, Agnus Dei reliquaries, small devotional sculptures (Baby Jesus, the Virgin, reliquaries, etc.), and dioramas; these pieces may be religious, civil-heroic, or historical – there are many that depict 19th century Mexican historical figures from the era of Independence. Despite this long tradition of waxwork in Mexico, there are very few if any specialists working in wax sculpture.

The objectives of this presentation are: to offer a case study of the restoration and creation of civil, religious, and educational objects, a field I have been working in for the past 34 years as a wax craftsman.

Materials and methods: In my work, I seek to conserve the traditional use of raw beeswax, which I obtain directly from beekeepers and process manually, allowing me to guarantee the purity of the wax and its suitability for work. Likewise, I respect traditional artisanal techniques, such as the production of molds and models or use of specialized tools that have been used for centuries by anatomists and craftspeople. Certain challenges require the implementation and adaptation of techniques from other disciplines, including sculpture, textile production, wood carving, gilding, painting, and anatomy, among others.

Results and conclusions: In the case of restoration, an initial diagnostic test is required to determine the type of intervention needed to conserve the piece. Later, I proceed to clean and restitute missing parts. The objective of this conference is to share my experience and facilitate a conversation between experts, as well as to call attention to these historical objects in order to promote further research and preservation, particularly in Mexico.

Additional topics of interest for the conference include:

• The relationship between my work and its potential education value, particularly in spreading cultural heritage and producing educational dioramas.

• The lack of wax-specialized restorers.

MAGNETS FOR FRAGMENT'S UNIONS IN WAX SCULPTURE: APPLICATION TO THE SCULPTURE OF THE DIADÚMENO AND MAGNETIC WAXES.

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Structural interventions in sculptural restoration give priority to the stability of the original piece over the principles of reversibility, tending to be quite invasive to the original work. The use of magnetic devices as a joining method for fragments and prosthesis as been proofed as a powerful tool to return the aesthetic and integrity to the artwork, maintaining a large reversibility.

The restoration methods should be revisited when working in wax sculptures due to their fragility. We have studied the possibility of providing stability to a fracture of a Diadúmeno sculpture's arm made of beeswax with 25% of rosin resin and reinforced with natural tow, inserting permanent magnets of Nd-Fe-B. The position of the magnets have been determined using a theoretical model based on Physics. Mechanical and magnetic studies have been carried out on a series of beeswax and wax-resins samples, mixed with different ferrous proportions to determine the optimal composition for the prostheses. With the work we show the feasibility of using the combination of magnets and wax-based protheses as reversible tool for the restoration of wax sculptures.

THE WAX CLINICAL MODELS OF THE UNIVERSITY OF GRANADA (SPAIN). CRITERIA AND CONSERVATION

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The collection of Clinical and Anatomical Models of the University of Granada (Spain) includes 35 wax clinical models supplied by the Olavide Museum (Madrid) in the 19th century. From an historical viewpoint this collection reborn as artworks, long lost its educational use. However, we should be in charge of the conservation of these pieces as scientific-technological heritage, not only as sculptures.

A multidisciplinary work team started this task with the cataloging and restoration of this collection. To understand the technology and the materials is essential for the comprehension of the alteration processes and their needs about the treatments and preservation. That's why we accomplished the analysis of the body and polychrome by GC-MS, SEM-EDX and POM.

Afterwards, the conservation processes must take a unified approach that respects the inner meaning of these pieces: documental, historic and artistic value of the art is protected by the Cultural Heritage Law in Spain. Alas, it's silent about the value of the scientific-technical heritage. Due to this, the respect for the historical additions, the prohibition of nonessential reintegration, etc., are mandatory but not appropriate.

This communication wish to convey that the knowledge of the material is crucial, just as applying the right treatment is important. The elimination of the additions and reparations -used only to extend the use of these pedagogical tools- is needed because they hide clinical information. Likewise, recovering the color and shape of the pathologies is needed to preserve the scientific data that give the real value to this collection of clinic models.

Acknowledgements: Department of Human Anatomy and Embryology (University of
Granada), Investigation Group HUM450.

THE ROLE OF VIRTUAL RECONSTRUCTION IN THE RESTORATION OF WAX ANATOMICAL MODELS.

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Introduction: Virtual reconstruction can play an important role in planning the reconstruction of wax anatomical models that have suffered some type of amputation helping to avoid any harm during the mould making process.

Objectives: To determine the usefulness of virtual reconstruction techniques in the restoration of anatomical wax models that has lost some of its elements.

Material and methods: In order to test this technique, an anatomical wax model from the Museum of Anatomy “Javier Puerta” of the Complutense University of Madrid was chosen to carry out the present study. This model, representing a face presentation birth, was seriously damaged and both the right foot and the left arm were missing. First of all, a total of 261 pictures of the figure was taken from all angles to build a 3D mesh using photogrammetry technique. All of the photographs were processed in Agisoft Photoscan 1.3.1. in order to obtain a 3D model, and afterwards the resulting mesh was exported to Pixologic ZBrush, a powerful digital sculpting program. In ZBrush, some errors of the mesh were fixed and later on, the missing arm and foot were modelled.

Results and conclusions: An accurate 3D model has been obtained without any manipulation of the wax model and the virtual reconstruction of the missing parts was fully satisfactory. Virtual reconstruction make it possible to avoid direct intervention on the wax anatomical models in order to obtain moulds during the reconstruction process of their missing parts.

Funding source: Banco Santander – Complutense University of Madrid (PR26/16-20322).

POSTER SESSIONS

PLASTINATION TECHNIQUES AS AN EDUCATIONAL AND SCIENTIFIC TOOL

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Biological materials preserved under plastination techniques are mainly used to obtain real models for educational purposes. Plastinated elements alongside plaster, clay, paper mache, and wax models conform a valuable tool for the teaching of anatomy and its pathologies in the biomedical sciences.

One of the most important activities of Parque de las Ciencias is focus on health sciences communication. Therefore our institution is not only using old techniques for science dissemination as exhibiting patrimonial objects (plaster or wax models), but we are investing in a new and supplementary technique that provides an extraordinary educational, didactical and scientific support: the Plastination. In order to develop such elements we have invested in our own specialized laboratory where Plastination process (Process that involves the replacement of the fat and the water for a polymer such as silicone, polyester resin or epoxy resin at the cellular level, in tissues or organs) takes place with all the necessary security measures.

Although two disciplines work together, the art of sculpting and the medicine, providing as a result extremely interesting objects for teaching, Plastination technique has the main advantage of using real anatomic organs that have an invaluable didactic, scientific, artistic and museological value, including reliability and a long-term strength.

3D DIGITAL TECHNOLOGY APPLICATION IN AN ANATOMICAL MODEL OF WAX: MEDICI VENUS OF "JAVIER PUERTA" ANATOMY MUSEUM (FACULTY OF MEDICINE. COMPLUTENSE UNIVERSITY OF MADRID)

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Introduction: The collection of artificial wax models in "Javier Puerta" Museum of Anatomy in the cabinet of the Royal College of Surgery of San Carlos in Madrid were created for educational purposes. In this collection stand out a model of a female figure with a natural size body similar to the typical grecolatina Venus. Known as the Venus de Medici, it was created by Ignacio Lacaba between 1786-1787, just after his return from the Court of Paris. The Venus wax model is considered the only model which can be dismantled.

Objective: From the point of view of the delicate state of the Venus preservation, now that important deteriorations affect the model stability and the model has damages derived from previous and not respectful interventions, it has been considered appropriate to include advanced digitization with 3D techniques that made possible an exhaustive study of the sculpture. The main objective has been to obtain a virtual replica of the model to be able to propose different restoration options, avoiding the direct manipulation and the risks derived from it.

Materials and methods: First it has been made a photographic record. Then the photogrammetry technique has been used to obtain the final result, the three-dimensional model. To design prototypes and guarantee the correct stability of the sculpture have been used software’s depending on the state of the process. Likewise, virtual reconstructions of the damaged areas have been made to show how

the final result would be if the real intervention was carried out on the model: cleaning of pollutants, removal of non-original materials (varnishes, adhesives, wax pastes...), and volumetric reconstruction of the gaps and treatment of chromatic retouching with pigments.

Conclusions: With these tools, the restorer has a virtual replica of the model to study different solutions, choosing and taking into account the characteristics of the original model.

POLYCHROMY OF WAX

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Introduction: Wax is widely known for its uses in sculpture; its flexibility, specially when heated, makes it a great material for modelling and casting. It can be easily found already prepared to use, such as red wax. However, it can also be manufactured from raw beeswax mixed with fats and a wide range of earthy matters, which provides different colors, textures and consistencies.

Objectives: To practice the same procedure on three types of wax (refined beeswax, raw beeswax and red wax) to provide reliable visual results, and compare how color changes with the different components.

Materials and methods: The materials used are beeswax, refined beeswax, red wax, vaseline, kaolin, ceramic powder, terracotta powder and pigments. The method consists of heating separately each one of the three different waxes on an stove and adding vaseline to them, in the proportion of between 100:25 and 100:50, to increase their malleability. The larger the percentage of fat, the more flexible the wax; however, when excessive the sculptures could easily suffer damage when the temperature rises. Then, earthy matter is added to the molten mixture. This procedure is repeated for each wax with each matter. The colours obtained by adding pigments to each wax are also compared by adding titanium white, yellow ochre, crimson red and ultramarine blue to the waxes prepared with kaolin.

Results and conclusions: Two color palettes were made with the resulting waxes. Although it can be easily polychromed with oil paint, we can also manipulate the color of wax and make it play an important role in our sculptures.