

The ceroplastic collection of the Royal Veterinary School in Madrid

A history waiting to be recovered

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The principal aim of this article is to raise awareness of a collection whose singular nature endows it with enormous heritage value. It presents a historiographical and artistic analysis of the collection of wax models formed at the Royal Veterinary College in Madrid in the period from 1793 to 1863 and currently preserved in the Complutense Veterinary Museum. The data extracted from primary documentary sources, such as the records from the old school which have been preserved, have been verified using secondary bibliography, complemented by scientific observations on the sculptures in question. The results obtained have enabled us to reconstruct the history of the creation and functioning of the 'Waxworks Laboratory', to identify the manufacturers and the technical choices they made, to date each model, and to determine the reasons behind the loss of a significant number of them.

THE Complutense University of Madrid possesses a rich historical heritage including a number of historic, artistic, scientific and technical collections on display at the museums maintained by several faculties on the campus. Each of these represents, by itself, an extraordinary legacy replete with information that is fundamental for understanding the material culture of the institution's past. The Veterinary Museum in particular houses a collection of enormous value for the history of this field of science. The exhibits comprise a number of distinct collections that encompass the period from the time of the 'horse doctors' and the first Veterinary College, in 1793, to the present day. This article focuses particularly on the collection of wax models,¹ a set of pieces which – together with other types of models and preparations – serves to illustrate how teaching methods evolved, provides insight into areas of particular interest at different moments in time, and brings us closer to the successive theories on which veterinary science was based.

The creation of the Royal Veterinary College in Madrid

The desire to promote scientific knowledge for the betterment of society favoured the creation, at the

height of the Age of Enlightenment, of institutions that would facilitate progress in the field of clinical science, medical surgery and veterinary science. Spain took as points of reference the *École Royale de Vétérinaire* in Lyon (1761–1889) and the *École Vétérinaire* in Alfort (1765 to the present day). In 1784, Segismundo Malats i Codina, Chief Veterinary Surgeon of the 'Lusitania' Regiment of Dragoons, and Hipólito Estévez Vallejo, Chief Veterinary Surgeon of the 'Almansa' Regiment of Dragoons, received scholarships from King Carlos III to study at Alfort.² There they encountered the school's famous anatomical cabinet and at the completion of their studies they returned to Spain with the idea of creating a college in Madrid with a similar facility.

From 1790 onwards, a number of different projects were drawn up for the creation and functioning of the Veterinary College in Madrid but, in the end, it was the plan submitted by Segismundo Malats and Hipólito Estévez that was, with some amendments, accepted. The project was delayed by the death of the king in 1788; final approval had to await a new Royal Warrant, issued on 23 February 1792.³ The Protector, appointed by the king at the proposal of the High Committee of the Cavalry, was the highest authority at the institution, which also had a veterinary

surgeon in the post of director. The main functions of the new centre (Fig. 1), which maintained the Alfort Veterinary School as its benchmark, included training professionals to resolve issues such as the fight against plagues and infectious diseases in animals, the improvement of livestock, and especially the health-care of horses, due to the importance of the animal for the army, transport, commerce and agriculture. Nevertheless, its principal activity was to produce veterinary surgeons with better training in caring for horses than the old *albeítaires* or ‘horse doctors’. These professionals would take up the posts of army vets charged mainly with looking after the horses and would take precedence over the ‘horse doctors’ when it came to filling municipal vacancies.

In the beginning, teaching was spread over two years. In the first year, students were taught anatomy (with dissection), the art of shoeing, equine illnesses and diseases, the external features of horses and horse hygiene. The second year covered anatomy, physiology, medical issues and the curing of illnesses and diseases. The teachers were Segismundo Malats and Hipólito Estévez, both with previous training and experience as army ‘horse doctors’ and having studied not only at Alfort but also at other centres in Germany, Denmark and England.

In 1800 the syllabus was extended to four years to include new subjects and teachers, such as Antonio Bobadilla y Brieva, professor of anatomy (one of the first students trained by the school itself), Francisco González, army ‘horse doctor’, who would teach pathology, surgery and hospital care, Joaquín Villaba, army surgeon, in charge of equine physiology, and Benito Agustín Calonge, who would teach medicine, chemistry and botany. Tomás Schwartz joined in 1802 as deputy-professor of forge work: he had extensive experience as a shoer, although he never qualified as a veterinary surgeon.⁴

As mentioned above, practical anatomy was taught during the first two years of study. Apart from the classrooms, the school had an anatomy theatre where the students attended dissections.⁵ There was also a ‘Pieces Laboratory’ (where the specimens – injected, dissected or preserved in alcohol – were prepared). In addition to animal skeletons and dissected specimens, the lecturers used the treatises written by Malats and Estévez as teaching resources.⁶ It is likely that the school, from its very beginnings, also had a small display of artificial and natural pieces, as was common

in the institutions belonging to the field of health sciences. Indeed, during the opening ceremony of the college’s first academic year, on 18 October 1793, the representatives of Madrid’s various Royal Academies, the San Carlos Royal College of Surgery and the Royal Veterinary School itself, visited the Laboratory and were able to admire the variety of objects that filled its shelves. Over time, new anatomical preparations, wax models and other collections would be added.⁷

At the end of the eighteenth century, the anatomical drawings and prints that circulated in Europe began to give way to new, three-dimensional methods of representation. At the same time exhibitions of wax figures were commonly held in salons, where both their precision and their beauty could be observed, and where human and animal anatomy could be compared in vivid reality that had a disquieting effect on the spectator.

This growing interest in empirical science led to an increase in demand from collectors for similar specimens, since wax models were able to represent Nature with remarkable precision. Pietro Leopoldo, Grand Duke of Tuscany, with the help of Abbot Felice Fontana, created the Museum of Physics and Natural History in Florence, opened in 1775. It was endowed from the beginning with a workshop where a vast number of models were produced; many of these were commissions from both local and European institutions.⁸ Ceroplastics as a technique used in the teaching of science and medicine was expanding rapidly,⁹ though it coexisted alongside the practice of dissection as a complementary educational tool. Spain was somewhat late in joining this innovative trend. The

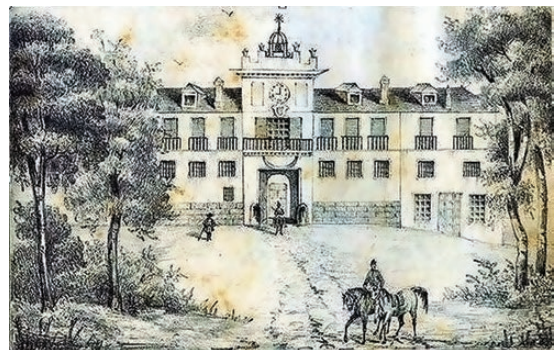


Fig. 1. *The National Veterinary School in Madrid*, anonymous lithograph, early nineteenth century, History Museum of Madrid, inv. no. 1544.

anatomical theatre in Madrid had no wax models until 1728, though their usefulness had already been proven in other countries. It was not until 1787, with the creation of the anatomical cabinet at the San Carlos Royal College of Surgery, that interest began to grow in ceroplastics as a teaching material. A large number of wax anatomical figures were made at its facilities with the close collaboration of the dissector Ignacio Lacaba and the sculptors Juan Cháez and Luigi Francesqui, who were joined in 1806 by Dionisio Bergaz and Antonio Busquet.¹⁰

The specimens on display rendered these cabinets important promotional elements for the institutions. The exhibits acted as a powerful attraction both for scholarly visitors and for the public, who came to satisfy a morbid curiosity.¹¹ The most important visitors to the Royal Veterinary College included King Ferdinand VII in 1818,¹² the Queen Regent in 1834,¹³ and the eminent scientist and father of toxicology, Mateo Orfila in 1846.¹⁴

The appointment in 1799 of Félix Colón de Larreátegui¹⁵ as Protector of the Royal Veterinary School gave the institution a fresh impetus, thanks to the passing of new by-laws aimed at improving the way it operated. It was considered convenient at this time to include the subjects of Complete Anatomy and the Horse Exterior, and models of the jaws with teeth of the main animals, classified by ages, were commissioned with a view to improving the training of the students. Perhaps the most significant event in this area was the commission given by the Protector, in 1803, to the director of the school, Segismundo Malats, the professor of anatomy, Antonio Bobadilla, and the anatomical dissector, José Atayde Hornillo, to endow the cabinet with a good collection of natural and artificial pieces.¹⁶ They collaborated on the creation of numerous skeletons and the preparation of dissected specimens by means of the injection of wax, as well as other techniques.¹⁷ It was at this time that the person in charge of the anatomical cabinet, Hipólito Estévez, began to receive frequent requests for the purchase of materials for the models that were to be made in the so-called 'Waxworks Laboratory'. The list included the typical tools of a ceroplastics workshop including needles, syringes and tubes for injecting, twine, a range of spatulas and brushes, rasps, hammers, drills, scalpels, spirits of wine and isinglass for glue.¹⁸ A large number of models must have been produced in those years, as evidenced by the visit made by M. H. Giesker

to the institution in 1811; he recorded his impressions in a document where he describes in detail the various halls of the centre, the activities carried out there, and the academic and artistic heritage that had already been assembled there. During his visit he saw a hall furnished with many expensive cabinets with large glass doors where the exhibits were displayed: 'nearly all were of wax, and very well made'.¹⁹

Making artificial models using wax was an extremely complex technical process, and being slow and laborious work it entailed a significant cost for the school. Despite these disadvantages, wax models were considered effective instruments for teaching, having the capacity to display with great realism the progress being made in knowledge of anatomy, clinical cases and the various pathological conditions suffered by animals; they also solved the problems arising from the dissection of corpses. In general, it was the teachers who requested the new models needed for the classroom. On occasion, the requests were made in order to create a physical record of a type of pathological lesion encountered in clinical cases. The new wax model would be proposed to the school board, the body authorized to approve the proposal, and finally it would be ratified by the Protector.

On specific occasions, the models were commissioned from external wax sculptors but the resulting delays in delivery and high associated costs led to a decision that it would be more convenient for the school to have its own workshop where models could be made on the basis of teaching requirements, as we shall see below. The purpose of the collection of anatomical models at the Veterinary College, like that of the San Carlos Royal College of Surgery, was to display anatomy and knowledge of other sciences in a permanent and accessible manner throughout the whole year. (Dissections were limited to a short period of time due to the fact that Spain experiences many months of high temperatures and modern techniques for preserving corpses had not yet been developed). Furthermore, in veterinary surgery, although it was easier to obtain corpses and specimens, it is important to bear in mind that their size and weight made them difficult to handle. Indeed, at the Royal Veterinary College, dissections were performed on the corpses of donkey foals and a good number of models were reproduced on a smaller scale in contrast to many of the wax models of humans, which were normally life-size.

In 1825, the Protector and Duke of Alagón, Francisco Fernández de Córdoba, a personal friend of Ferdinand VII, gave a fresh impetus to the Royal Veterinary College in which the Anatomical Cabinet was one of his main objectives. In April 1827, he requested a report on the state of the collections and the annual costs of each hall. The highest budgetary allocations were assigned to the college hospital and garden (where fruit, vegetables and medicinal plants were grown) although both of these generated revenues. Of the remaining halls, the importance attached to the collection of wax models and the Anatomical Cabinet is proved by the allocations assigned to them. Specifically, the latter was endowed with 14,000 *reales* per year (an amount which included the salary of the ‘maker of pieces’ and the cost of the materials employed) and a further 3,146 *reales* were assigned to the Anatomical Amphitheatre. The difference is highlighted if we compare this to the 9,400 of the Forge, the 4,380 of the Infirmary, the 3,600 of the Apothecary, the 3,600 of the Zoological Cabinet and the 2,400 assigned to the Library.²⁰

By appointing Cristóbal Garrigó as ‘Vice-Professor’ and lecturer in anatomy in 1828,²¹ the Protector made it possible to create a varied range of pieces aimed not only at improving the teaching of anatomy but also (and above all) at enhancing the ‘splendour and prestige’ of the institution, the only establishment of its kind in Spain.²² The Protector ordered an inventory to be made in triplicate with a copy to be left in the cabinet with the pieces classified and numbered so that it could be consulted by ‘the inquisitive and intelligent people who visit the cabinet’.²³ The pieces were exhibited in the cabinet on stands made of pine or walnut;²⁴ various documents state further that the pieces were exhibited on shelves protected by panes of glass, equivalent to display cabinets.²⁵

This heritage, with its extraordinary scientific, historical and artistic value, was always an object of admiration and was on show at the different premises occupied by the School and later in the Veterinary Faculty. Since its relocation to its current site, however, the collection has been shown on very few occasions, one of them in an exhibition held on 6–8 May 1993 to celebrate the bicentenary of the creation of the Veterinary College, in which ten wax pieces were exhibited (all large-format pieces, including a horse liver).²⁶ Currently, the entire surviving collection can be seen in the halls of the Complutense Veterinary Museum.

The ‘Waxworks Laboratory’: makers, materials and manufacture

The wax sculptors performed their craft by combining typical studio sculpture techniques with knowledge of new advances in the field of health sciences. Their plastic models had to provide a hyperrealistic representation of human and animal nature and hence had to be of extremely high quality. When we examine the wax models in detail we can see that their producers relied on conventions of naturalistic representation that had clear educational purposes: due to their extreme realism, the sculptures were able to act as substitutes for the cadavers in the anatomy classes and hence functioned as efficient tools in the transmission of scientific knowledge.²⁷

Consequently, manufacturing techniques of an enormous procedural complexity were developed whose secrets were jealously protected, only the materials used and a minimum of constructional detail being recorded in writing. The most laborious and painstaking part of the work was without doubt that centred on the positioning of muscles, nerves, veins, arteries and lymphatic vessels, and on imitating the finish of each organ or body-part, coloured either by adding pigments to the liquid wax or by subtle strokes with a soft-haired paintbrush. The results depended on the experience, skill, taste and sensitivity of the individual craftsman.

Many records from the beginnings of the Royal Veterinary School have been lost, so it is difficult to identify the first authors and determine which models formed part of the original collection. Whether particular wax sculptures were acquired by the college or commissioned from outside the institution remains unclear. No records survive to suggest that the anatomy lecturers produced sculptures of this kind, although orders for materials intended for the anatomical cabinet show that they did dissect animal corpses using the wax injection technique.

The first modeller of whom we know from the documents preserved in the General Archive of the Complutense University is Luigi Francesqui.²⁸ He worked from 1790 as a wax modeller, in collaboration with the sculptor Juan Cháez, at the anatomical cabinet of the San Carlos Royal College of Surgery.²⁹ On 24 July 1805, Francesqui, on learning that the Royal Veterinary College was looking for people qualified in ceroplastics, wrote to the Protector, Félix Colón,

offering his services which, if accepted, he would perform during the free time remaining to him after fulfilling his obligations to the anatomical cabinet of the Royal College of Surgery.³⁰ The reputation already enjoyed by Francesqui for the anatomical waxes he had made together with Cház and the dissector Lacaba proved an insufficient endorsement for Colón, for on 27 July, the Protector requested that Francesqui make a model of a horse, chosen by the Protector himself, in order to assess the results. For this exercise, Francesqui was provided with resources, instruments, premises and the dissected specimen that he was to imitate.³¹

The extraordinary skill and technical virtuosity shown by Francesqui finally won him the post of ‘head maker of waxes’ at the Pieces Laboratory of the Cabinet of the College. He took up his post on 30 July 1805.³² He had already reviewed the equipment available to him and considered that some significant items were missing, which would have a negative impact on his daily tasks. He made a request for additional tools and materials that he considered essential. The document, dated 29 July 1805, contains a list: a jasper stone, iron spatulas, curved spatulas with and without teeth, knives, punches, boxwood tools, pencils, paper, compass, paintbrushes of various sizes, spirits of wine varnish, turpentine, soap, plain oil, walnut oil, whitened virgin beeswax, and a series of ground oil colours, including white lead, red ochre, orpiment, carmine and Prussian blue.³³ This choice of materials is fully in keeping with the workshop tradition established by the Florentine school. It was also in line with the way Francesqui carried out his commissions in the cabinet of the Royal College of Surgery, as verified by the payments he received for the construction of anatomical models between 1795 and 1806: virgin beeswax, whitened wax, walnut oil, turpentine, rosin, soap, plaster for making moulds, oakum, white lead, fine carmine, vermillion, red ochre, Prussian blue, lacquers, gamboge, and tools such as brushes, silk ribbon, wire thread, iron to make frames, glass eyes, human hair, walnut stands and purple taffeta for trimming.³⁴

Unfortunately, the scarcity of preserved documentary sources and the lack of complete inventories prevents us from determining with certainty how many sculptures he might have made for the Royal Veterinary College. To judge by the Ode which Gregorio Isaac Díaz de Goveo published in his honour

in 1815, he must have been highly productive since, in a footnote, the poet stated that ‘the exquisite cabinet of the School [Veterinary] is likewise his work . . .’³⁵ It is highly likely that Francesqui’s contribution came to an end around this date; according to the *Diario de Madrid* newspaper, he died a few years later, on 29 May 1817, in Alcalá de Henares.³⁶

No information has been found regarding the operations of the Waxworks Laboratory between 1817 and 1828. Only the budgets of January 1828 contain the costs to the college for the making of new artificial models. It was going to be necessary to find a lecturer who worked in wax and who was willing to work full-time for an agreed number of years in order to lower the high cost of maintaining the cabinet. The estimated salary to cover this work was covered by an allocation of 10,000 *reales de vellón* per year. Two other makers were cited that same year, though a search through the archives has revealed little data about them. In the minutes of 1 July 1828, the school board expressed the need to replace the wax pieces and proposed commissioning an expert to produce new sculptures (for the moment, only those that were absolutely necessary) and to ‘compose’ (restore) those which were in poor condition. The Protector decided that the expansion of the collection should commence with the simplest and least costly pieces, and it fell to the professor of anatomy to designate those to be reproduced. Félix Antonio Cañas fulfilled the necessary requirements and was proposed for the task. A few days later, he was commissioned to make a pathological wax model,³⁷ the artist being obliged by the Protector to bear all the costs of the materials.³⁸ This relationship can not have proved successful, for only a few months later the college turned to another wax sculptor, nicknamed ‘the American’. The latter was asked to reconstruct (repair) a damaged horse head³⁹ (no longer preserved), for which he received two payments that must have been considered substantial, since the Protector reminded the board to present him with a budget with sufficient advance notice before proceeding with the construction or repair of further models.⁴⁰ From the documents consulted, it would appear that ‘the American’ carried out only this one commission.

The ‘Vice-Professor’, Cristóbal Garrigó, showed a certain predisposition towards the art of wax, and consequently the school board charged him in June 1829 with completing and extending the collection

of anatomical and pathological sculptures, and with reconstructing and repairing some of those already existing, he having demonstrated that he ‘combined a knowledge and a liking’ for the subject.⁴¹ It was proposed that he be trained by another expert sculptor, a task for which Pedro Pablo Sánchez Osorio, the second maker of anatomical pieces at the San Carlos Royal College of Surgery, was specifically considered.⁴² Furthermore, he was entrusted with the training of two physiology students, with the idea that they could assist the ‘Vice-Professor’, deputize for him, or succeed him in the future.⁴³ The recruitment of Sánchez Osorio to the cabinet was a significant event, not only as it promoted the artistic training of the young Garrigó, but also because of the number of models which the two of them made and repaired. Sánchez Osorio brought with him the improvements and methods that had been developed in the cabinet at San Carlos during the period after Francesqui had left.⁴⁴

With the firm intention of endowing the college with an extensive collection of quality wax models for use in any of the academic subjects that might benefit from them, the Protector at that time, the Duke of Alagón, in a document from 1830, relieved Garrigó from the task of making skeletons and from his other responsibilities, and showed a constant interest in monitoring the progress of his learning.⁴⁵ One of the arguments most frequently advanced in support of this on-site training was that, in view of the negative experiences in the past, it was cheaper to teach a lecturer to make these models than to hire an external craftsman.⁴⁶ The artificial models, once made, had to be shown to the Protector and, after he had given his approval, went on to be exhibited in the anatomical cabinet.⁴⁷ All the protectors, teachers and heads of the college attached considerable importance to the wax collection. In addition to its educational function and artistic quality, it was also valuable in economic terms. A large number of references in the documentary sources of the archive provide proof of this. The college devoted a generous budget to the manufacture and restoration of wax pieces which covered the wages of the craftsmen, the acquisition of materials, the refurbishment of rooms and the purchase of cupboards and display cabinets for exhibiting the finished models in the Anatomical Cabinet. By way of example of the initial economic value of the pieces, we have the assessment carried out by an external expert,

the wax sculptor Dionisio Giraldo Bergaz, maker of pieces at the San Carlos Royal College of Surgery. The piece which he considered to be worth the most was the myology of the donkey foal which he valued at 11,000 *reales*. This figure can be compared with the annual salary of the sculptor Cristobal Garrigó of 10,000 *reales*. The total value of all the sculptures made by Garrigó up until 1831 amounts to 35,340 *reales*, though he went on to make more in the following years.⁴⁸

After twenty-two months of learning with Sánchez Osorio, Garrigó continued producing the pieces for which he was commissioned,⁴⁹ and on 13 January 1852 he was named ‘maker of wax pieces and anatomical dissector’.⁵⁰ Garrigó rounded off the training in wax sculpture he received from Sánchez Osorio with classes in technical art (drawing and sculpture) at the San Fernando Royal Academy of Fine Arts.⁵¹

It is important to note that the college also acquired finished pieces. The teaching staff made repeated requests for these, but in many cases their requests were denied, mainly for economic reasons, while others got bogged down in the lengthy complexities of administrative procedures. In March 1833 it was proposed that the management acquire a wax anatomical figure of a woman. The singular feature of the sculpture in question was that it could be disassembled, allowing the location of the viscera of the thorax and abdomen to be observed, as well as the position of the foetus.⁵² The model in question belonged to a physician in Madrid and Garrigó was charged with acquiring it. He valued the model at between 70 and 80 *reales*, although when the time came to sell, the price had fallen to 29 or 30 *reales*, as the model had suffered some damage which Garrigó believed could easily be rectified. He proposed buying it for its usefulness and because it would ‘enrich the cabinet’ by providing a good model from which to make similar veterinary pieces. The Protector, however, rejected the proposal.

Some years later, in 1859, the faculty board accepted that performing this type of work with wax entailed extraordinary expense which was impossible to sustain. Furthermore, they added by way of argument, ‘pastes have been invented which are better suited to moulding and colouring, are considered to be long-lasting, are faithful copies of anatomical parts, which are acquired in Paris, for a much lower cost than if they were made in wax . . .’⁵³ The papier mâché models of Louis Auzoux were cited as obvious substitutes

for their wax counterparts. The old wax sculptures gave way to models made with other, more resistant, materials (plaster, papier mâché) which were cheaper and mass-produced by commercial houses to meet the huge demand. The wax pieces, intended for a small number of students and interested persons in universities, academies and museums, were replaced by new models which were easier to handle and preserve and which soon spread to all kinds of teaching, including schools, and to all parts of the world. The new models incorporated the latest scientific theories such as evolution. The wax sculptures, in addition to their anatomical or pathological interest, were preserved due to their artistic and cultural value.

The constant interest shown by Garrigó in broadening his technical knowledge and reflecting his achievements in the collection in his charge, led him, in 1860, to request permission for access to the natural history cabinet of the Natural Science Museum in Madrid for the purpose of taking plaster moulds of a model which represented the development of the egg and its embryo.⁵⁴ Death overtook him in 1863 while he was working on this piece, and it was left unfinished. As with many others among his works, this one has been lost through carelessness and neglect.

Garrigó's vacant post as Anatomical Dissector and Maker of Wax Pieces was temporarily filled by Santiago de la Villa Martín,⁵⁵ before being offered on a more permanent basis to Rafael Espejo del Rosal in the same year.⁵⁶ The archive of the Complutense University has no records linking this person to the creation of new artificial models.⁵⁷ Later documentation relating to the collection contains information on anatomical sculptors such as Miguel de la Cruz, who was employed from 1910. Even during the years of the Civil War (1936–39) Canet Cortell was proposed for this post⁵⁸ and in 1944 the position of curator and 'anatomical preparator' was held by Félix Talegón Heras.⁵⁹ We have found no evidence, however, that these people intervened on the wax pieces in any way or that they were engaged at any time in the making of new wax models for teaching.

The collection of wax models, which is the subject of this paper, displays a wide range of manufacturing techniques,⁶⁰ demonstrating a search for specific solutions for each case-study proposed. Some of the sculptures were made with the help of moulds to create the main body and direct modelling to reproduce the anatomical or pathological details indicated

by the dissector. Small pieces, such as hearts or jaws, are generally solid; others are hollow but contain an iron frame or animal bones to which fine layers of coloured wax has been applied until the desired result was obtained. Wax pastes are combined with layers of plaster, on occasion placed over metal strips. The colour finishes are of great quality and imitate realistically and with great precision the integument of the animals, their internal anatomy, or the pathological features presented.

The wax models in the collection

These sculptures were conceived for the purpose of teaching a range of topics in veterinary science (anatomy, surgery, reproduction, morphology, aging, pathology and lesions, malformations and the resolution of surgical processes). In turn, some of them reflect a combination of skills and knowledge which makes them extremely versatile models. If we analyse the types of piece commissioned and the date of commission, we can observe the areas which aroused interest at different times: from simple descriptive anatomy to more complex and elaborate models which aimed at explaining physiological processes, scientific theories or professional techniques.

The collection that has survived to the present day includes forty-one pieces, some of which are the result of a complex technical manufacturing process. This section of the article discusses the most significant information about the wax models found in the documentation. The models are presented in groups, although unfortunately many have disappeared.

Models for the study of anatomy

This group includes pieces by different authors that show anatomical structures with no alteration and with no other specific purpose (such as the teaching of reproduction or clinical issues, for example).

One of the most interesting pieces is the Small Horse (MV-590) (Fig. 2), a round-bodied figure showing the muscular planes and the viscera and fitted with glass eyes. It is an anatomical model executed to scale and the technical result achieved is one of extraordinary virtuosity. It is therefore surprising that no records relating to it have been found in the archives. We cannot be certain, but judging by the plastic features of the model and its uniqueness within the collection as a whole, it may have been executed by



Fig. 2. *Small horse showing muscular planes and viscera (MV-590); possibly attributable to Luigi Francesqui, c. 1805. Image courtesy of Luis Castelo.*

Francesqui when he joined the Pieces Laboratory in the early years of its functioning.

A second piece devoted to the anatomy of this animal is the Horse Head (MV-670), for which we do have original information. This work is without doubt one of the greatest exemplars of the technical difficulties involved in the production of this type of sculpture. Its maker, Garrigó, not only employed coloured wax pastes but also resorted to mounting the vertebrae on an iron frame. Originally, the model represented the bones of the skull and the cervical region, the cervical ligaments, the larynx, the pharynx and the oesophagus, the arteries on the left-hand side and veins on the right; all of these remain today, though in extremely poor condition. According to the records, however, it also included some anatomical details that have not been preserved, such as parts of the ear and the eyeball.⁶¹

The inventories from 1949 to 1965 list another Horse Head but, unlike that described above (which included the cervical vertebrae and the ligaments in the back of the neck) the head and neck of this piece were modelled in such a way as to permit the study of the muscles and vessels.

Sánchez Osorio assisted Garrigó in the construction of the sculpture called 'Myology of the Donkey Foal'⁶² (MV-300). The model is a life-sized, round-bodied model of the animal stripped of its skin to permit observation of its anatomy in full detail: muscular

planes, veins, arteries, etc. The muscles which move the ears, the outer parts of the ear, and the divisions of the carotid arteries and veins were also represented; unfortunately, the sculpture was completely decapitated just a few years ago. Garrigó worked on this model in 1830⁶³ and the result must have been extraordinary, for it was praised by the head maker of specimens at San Carlos Royal College of Surgery, Dionisio Giraldo Bergaz,⁶⁴ and the preserved records which refer to it state that it was valued at 11,000 *reales of vellón*.

Another piece called Myology corresponds, we believe, to a myology mounted vertically on a panel (MV-671), dating from 1830.⁶⁵

The documentation from 1831 lists a wax heart, stated to have been presented by Sánchez Osorio.⁶⁶ Currently, three complete hearts (MV-663, 692, 693) and a fragment of a ventricle (MV-667) form part of the Complutense Veterinary Museum collection (Fig. 3). They differ greatly in terms of craftsmanship and the lack of archive data prevents us from attributing authorship. A series of pieces repaired by Garrigó is mentioned in the same period, including the hind-quarters of a horse, a rectum and a bladder.⁶⁷

From 1 November 1831 comes a reference to a wax ear that was not made in the College Laboratory and which has been lost. The Protector was presented with a bill for this piece but, considering it excessive and given that it was delivered two years



Fig. 3. *Equine heart* (MV-663). Possibly made by Cristóbal Garrigó and Pedro Sánchez de Osorio, 1831. Image courtesy of Luis Castelo.

late, he insisted on a discount.⁶⁸ The records from two years later indicate the production of another piece with the same characteristics, this time by Garrigó.⁶⁹

A large-scale work of extraordinary technical complexity is a model of general neurology begun in July 1832. From the description, it included a whole skeleton and ‘the nerves and nervous parts’. This piece demonstrates the importance attached in the latest discoveries in physiology to the nervous system as a regulator of the organism. Sadly, this evidently spectacular sculpture has not survived, nor has any visual documentation been found in the archives to show us what it originally looked like.⁷⁰

A further large-scale model represents the hind-quarters of a mare, showing the various structures of the reproductive system (MV-672). Garrigó began work on this on 3 July 1834. In September he was engaged in assembling the natural bones and creating a supporting iron frame. In the first few days of December he was busy preparing the wax pastes to create the layers of muscles, which he finished that same month. He made the tendons and modelled the kidneys in January 1835 and two months later, in March, he put the external arteries and veins in place, and part of those of the abdominal cavity. He finished

the model on 13 April, after a total of eight months of intensive work.⁷¹

The following commission from the Faculty Board was for the creation of the spleen (currently MV-771) and stomach of a horse (two pieces of which have been preserved: MV-664, 669), which Garrigó began in April 1835 and which kept him busy for the following months.⁷² Once he had finished this, he began work on a new commission dedicated to the stomach of the ruminants which he finished on 11 October.⁷³ Unfortunately, neither this piece nor another that is cited in the various inventories of the Royal School from 1949 to 1969 (referring to an ox and showing the spleen, liver and intestines) have survived. These same inventories record three horse brains showing the sphenoidal and parietal surfaces. Three brains have been preserved (MV-665, 666, 662). There are four small pieces for which no clear data regarding author and date have been found, although they are in all likelihood the work of Garrigó. These are a lower jaw of a horse (MV-668) and upper jaw and orbital region of a horse (MV-755), a horse’s liver (MV-675) and a horse’s leg showing the musculature and blood vessels (MV-679). Lastly, four loose fragments have been preserved which come from larger anatomical pieces.

Clastic models

The constant search for formulae which would meet the teaching requirements of the anatomists who commissioned the works led Garrigó to make a number of clastic models. This type of dismountable model (from the Greek *klao*, break down into parts) enabled teachers to reproduce dissections and show the location of different anatomical components and how they were related to each other. In a way, these anticipated the anatomical models that would be made decades later, mainly in papier mâché. This manufacturing technique had been used previously by Francesqui, who is credited with a model of exceptional quality and realism – a human figure incorporating dismountable elements allowing the brain, thorax and abdomen to be observed in detail – which resulted from a commission received from the University of Alcalá de Henares.⁷⁴ A document dated 19 October 1830 records that Garrigó was still busy making a wax model of the brain of a horse, copied from a real specimen and incorporating seventeen detachable pieces to show the sinuses and the meninges (MV-682).⁷⁵ The

sculpture was finished on 29 October 1830.⁷⁶ His master, Sánchez Osorio, emphasized in a certificate the value of this clastic brain, 'which deserves the utmost attention, being a piece worth four thousand reales, not only because of the mechanism, but because it can be used to study and place the pieces . . .'⁷⁷

Furthermore, the various inventories of the Anatomical Cabinet record the existence of the uterus of a cow in wax, defined as a clastic uterus, which is now lost.

Models for the study of pathologies or operations

One of the aims of creating artificial models was to provide visual testimony of interesting illnesses or lesions. The first mention of this type of model refers to the pathological case of a horse that had suffered a ruptured abdomen. Garrigó made an initial design modelled in clay before proceeding to create the final sculpture showing the volume, the shape of the intestines and way they extruded from the rupture, as well as the muscles of the abdomen and some of the respiratory muscles.⁷⁸ In November 1829 his work focused on making a wax cast of the cancerous stomach of a horse.⁷⁹ There are also records showing that he made the right lobe of a diseased lung, which he finished in early December 1830.⁸⁰ The few pieces attributed to his master, Sánchez Osorio, include a horse stomach with cancer in the pyloric region, which kept him busy for several months.⁸¹

In addition to the regular requests for pieces scheduled for teaching purposes there were occasional special commissions, for example when an urgent request might be made in relation to an animal suffering from illness or injury that would be of interest to the college. One instance of this was the ulceration of the nasal cartilage of a horse which died of glanders at the institution and for which Sánchez Osorio produced a model that recorded this lesion in wax.⁸² Furthermore, in March 1832, his assistant modelled the knee of a horse that had been brought to the centre due to an external carcinomatous tumour. Two moulds were made, one with skin and one without.⁸³ There is also a documentary record of the knee of a male hinny (cross from a male horse and a female donkey), also with a carcinomatous lesion.⁸⁴

In April 1832, Garrigó began work on two hernias,⁸⁵ which he finished in July.⁸⁶ In the last quarter of 1833 he began making the hindquarters of a horse with a hernia which was causing gangrene in the intestines;⁸⁷

it is very likely that this is the piece currently listed as MV-674.

One of the most outstanding of the pathological models is the polycystic kidney of a horse mounted on a walnut panel and preserved in the current collection (MV-676), and that of a female camel from the 'House of Wild Beasts in Madrid', which showed tubercular lesions; for this latter work Garrigó, was commissioned to model the lesion as a matter of urgency, since the body had already begun to decay.⁸⁸ It has the additional value of demonstrating the interest of the college in comparative pathology, including other, non-domesticated species. This piece, like almost all of the pathological models, has not survived.

Another model mounted on a walnut panel which has not been preserved represented the abdominal and thoracic cavities with their viscera of a horse with miliary tuberculosis. Garrigó finished it on 3 July 1834.⁸⁹ It was referenced in the college inventories up until 1969, since which time all trace of it has been lost.

Another loss of special interest is a piece which showed the larvae of the stomach parasite *Gasterophilus equus* suffered by horses, originally described as a 'picture in wax'.

The collection of lower jaws

The use of lower jaws in veterinary teaching was common, as it enabled students to learn how to recognize the ages of the different species and showed the defects and disorders of dentition. A cautious estimate allows us to conclude that the collection of lower jaws originally had over sixty-five pieces and included the dentition of a wide range of animals: horse, donkey, cow and dog. Unfortunately, only eleven of them have survived to the present day (MV-1695-1705) (Fig. 4), but these are representative of the technical quality and anatomical detail of what must have been an extraordinary collection of samples. This series was made between 1829 and 1833.

The technical procedure consisted of modelling the selected lower jaw or dentition in clay and then preparing the plaster moulds for the wax casts. The constant use and handling of these models by students of the College caused wear and tear and some were broken, necessitating their repair so that they could continue fulfilling their academic purpose. The task of periodic maintenance fell to the person who also made the pieces.



Fig. 4. Collection of eleven equine jawbones (MV-1605–1705), c.1829–33. Image courtesy of Luis Castelo.

A set of these pieces existed before Garrigó began his work as a wax sculptor. He began his set of lower jaws in August 1829, the month in which his master informed the board that Garrigó had made a clay model of a pair of lower jaws at age six and another pair of lower jaws at age two and a half.⁹⁰ It must have taken him approximately a month to prepare the clay models, as it was not until 30 September that the board was informed that they had been cast in wax.⁹¹ In September he had already finished modelling an upper jaw complete with skull and face, and a lower jaw.⁹² He continued this series with another two lower jaws, at age six, complete with veins, arteries and nerves, and the records indicate that he ‘perfected those which existed’, so we cannot rule out the possibility that the lower jaws that have reached us date from before the time Garrigó joined the Waxworks Laboratory.⁹³ In October 1830 he was asked to make eight lower jaws of horses for ages seven, six, five and two; once the clay models were finished, he went on to the make the casts in January 1831.⁹⁴ In the following months he made clay models, wax moulds and wax casts of the lower jaws of horses of different ages.⁹⁵

He also made the lower jaw of a six-month old donkey foal and cast five lower jaws of a cow which he finished on 4 December of that year.⁹⁶ Anatomical knowledge of these types of animal was clearly a matter of interest in day-to-day teaching at the college as he continued to make the lower jaws of cows

and donkey foals in the following years.⁹⁷ In 1833 he made ten front sections of the lower jaws of cows, with dentition, to complete the collection of ages of that species, as well as modelling and finishing eight front sections of the lower jaws of dogs, with dentition, which represented the various ages of that animal – these, the document states, ‘making the collection complete’.⁹⁸

Obstetric and foetal development models

The first documented wax models in this category were a cow’s womb in 1832 with the cotyledons enlarged due to the period of ovulation (which could correspond to the piece currently labelled as MV-677).⁹⁹ The inventories also list a model first cited as a complete piece, then, due to its deterioration, as a fragment, which is said to have represented the abdominal and pelvic regions of a cow, showing the arrangement of the genitalia. To these we can add the clastic cow’s uterus referred to elsewhere. Unfortunately, for reasons unknown, hardly any pieces depicting the bovine species have been preserved.

As far as the equines are concerned, one surviving piece illustrates the gestation of the mare (MV-678) (Fig. 5), though we cannot be certain that it corresponds to any of the pieces labelled ‘abnormal parturition’ which appear in the documentation. Four collections of ‘parturition’ were made in this series.¹⁰⁰ By way of example of the complex technical process



Fig. 5. *Gestation or possible difficult birth of a mare* (MV-678), Cristóbal Garrigó, c. 1835. Image courtesy of Luis Castelo.

involved in this type of model, the production chronology is given of the natural parturition of the mare, with an anterior (head-first) presentation (MV-683). First, Garrigó made a clay model of the dissected specimen showing the natural birth. He then moulded it in plaster, a task that took him a month and which he finished on 4 February 1836. At the beginning of March, he made a wax cast of each of the pieces that would make up the final sculpture. When he opened the moulds and took out the positives, he had to correct a number of flaws and after that he applied the anatomical details using oil colours. He finished this anatomical model on 9 June.¹⁰¹

The following commission which occupied his time was another parturition by a mare, on this occasion showing the posterior presentation where the hind legs appear first (MV-681).¹⁰² He made a clay model of the foetus as a first step to making the moulds. These broke during the sculpting process and he had to repair them.¹⁰³ He began to add colour to the surface of the sculpture on 9 September 1836.

Once this was finished, in February 1837 he began two models of the abnormal parturition of a foal, which he would work on for the following months until July of that year.¹⁰⁴ The records consulted permit a chronological reconstruction of the creation of this model. Once he had prepared the clay in March, he began to model, to make the moulds and cast in wax in May; the moulds of the parturition and those of the foetus were finished in June; the wax positives were ready the following month, which he devoted to

eliminating the burrs left by the joins in the moulds and to perfecting minor flaws; by 3 August he had completely perfected the parturition and joined the pieces together and he now proceeded to colour the surface of the wax; by 3 September he had finished applying colour to the sculpture and proceeded to put in place the anatomical details, such as vessels, periosteum and the membranes of the placenta. He finished the work on 18 October 1837.

Models such as the hindquarters of a horse with hypospadias could be placed somewhere between pathology and reproduction. This piece was recorded in inventories since 1949, but it has not been preserved.

Models with malformations

In December 1830 Garrigó produced a number of artificial teratological models, such as two sows joined at the thorax as an example of malformation. He was assisted in this by Sánchez Osorio.¹⁰⁵

Historical evolution of the collection: a slow decline

The wars that took place over the years were an undeniable risk factor for the collection and also for the institution which housed it, the Royal Veterinary School. The first of these, and of considerable magnitude, was the War of Independence (1808–14).¹⁰⁶ The cabinet was restored, as far as possible, in 1818, and visited afterwards by the king. This war and the later vicissitudes suffered by the school made it necessary to restore and expand the wax collection in the first third of the nineteenth century. In a lengthy report written in June 1821, the director of the school, Segismundo Malats, stated that the anatomical cabinet, under Professor Antonio Bobadilla, ‘has not received any improvement in these last three months: an infinite number of pieces are missing, and those that are there require prompt repair’.¹⁰⁷

There was another period of war between 1820 and 1823. Spain was invaded by the ‘Hundred Thousand Sons of Saint Louis’ army; the French troops occupied the school and caused serious damage.¹⁰⁸ A document written by Bobadilla, the director of the time, stated that in the previous war the centre had been spared, but in this second conflict this had not been the case, so that urgent measures needed to be taken.¹⁰⁹

In the first third of the nineteenth century it proved necessary to reconstitute the collection, as recorded in the documents preserved from 1827. Furthermore, the school's annual report for the academic year 1829–30 states that the collection of anatomical and pathological pieces had been restored after the deterioration caused to the anatomical cabinet 'due to the unfortunate times'.¹¹⁰ Several historical events in this period, such as the Riego uprising, the abovementioned occupation of the college by French troops and the death of Ferdinand VII in 1833 all created a period of political instability and change which affected the normal functioning of the institution and acted as a brake on its scientific progress.

Another extremely important factor in the preservation of the collection has to do with the fact that it was moved to many different premises. From its original location in Recoletos Street in Madrid, in 1793, to its current premises on the university campus, the centre relocated five times. Some premises were provisional and short-lived, but this did not prevent them from presenting further opportunities for loss and damage to the collection. Additional relocations took place due to building and refurbishment work. There is a documentary record of one such occasion, dated 12 April 1830, when the entire collection of wax models was moved by grooms and porters due to the deplorable state of the ceiling of the Cabinet; this meant emptying the shelves, removing the glass from the display cabinets, etc.¹¹¹

In 1832 work was again carried out in the cabinet, supposedly intended to improve the conservation and exhibition of the collections; by that time Garrigó had contributed a good number of pieces;¹¹² the Waxworks Laboratory was installed in premises formerly occupied by the apothecary, in 1833.

According to documentation from 1838 and 1842, the state of the college was disastrous.¹¹³ Garrigó issued a certificate for glazing work due to falling glass in the cabinet,¹¹⁴ a situation which continued into 1845.¹¹⁵ Three years later, after the director of the school had sent a number of official letters to the General Director of Public Education, the latter visited the site to see for himself the deplorable state of the facilities. A commission was set up to propose improvements and rebuild the ruined areas; furthermore, instructions were issued to endow the school with a proper anatomical theatre, dissection rooms and other areas.¹¹⁶

In addition to the economic difficulties which the institution was going through, in 1851 notification was given of the collapse of part of the school, affecting the library.¹¹⁷ The director was obliged to lay off employees and cut costs in all areas, including the Waxworks Laboratory, which was eliminated as no funds were available to acquire even the most essential materials.¹¹⁸ It was perhaps this difficult economic situation, together with the emergence of other, lighter and cheaper anatomical models (such as those executed in papier mâché and plaster), which explains the gap in the production of new models that occurred in those years. During that period we have found no documents written by Garrigó regarding new commissions.

Concern about the preservation of the ceroplastic collection was, however, a constant issue, judging by the report drawn up in 1863, which noted that the Cabinet now had more light due to the installation of a large skylight; the result, however, was that this let in too much sunlight, which could spoil 'the precious pieces in the collection, causing them to lose value, and making it necessary and urgent to prevent this by means of curtains'.¹¹⁹

When Garrigó died in 1863 he was succeeded by Rafael Espejo del Rosal who failed to fulfil his commitments. As a result, the teaching staff of the college issued a statement to the rector in which they informed him of the situation and explained how Espejo de Rosal's total neglect was affecting the Cabinet.¹²⁰

Two relocations between the premises of Carrera de San Francisco and the Casino de la Reina were particularly serious. To that we must add the damage suffered by the college in 1869, after the 1868 revolution, when militia companies occupied the premises at night with the resulting deterioration of the installations.¹²¹

At the site in Embajadores Street (opened in 1882 and closed in 1958), the collection was located first in a cabinet and later in two museums, one for normal and pathological descriptive anatomy and another devoted to teratology.¹²² There were staff assigned to the posts of curator, anatomical sculptor, photographer and painter, but there is no record of wax pieces being made nor of significant work being undertaken on the collection. Indeed, as late as 1893 the social and professional press reported on the state of abandonment of the collection of pieces by Garrigó.¹²³

The episode of the Civil War would come later (1936–39). However, the loss of specimens suffered in 1958, when the college was relocated from Embajadores Street, was even greater. It was then that the majority of artificial models from the wax collection were lost, especially those of pathological interest, of which hardly any are still preserved. After leaving Embajadores site, the models were first located provisionally in temporary buildings near the current site of the university campus and, in 1968, the college relocated to the present-day Department of Anatomy where an anatomical museum was established. Until the 1980s, the sculptures were exhibited in the showcases of this museum. These spaces were later converted into dissection rooms and the wax collection was rehoused in showcases distributed among the department's classrooms and corridors.

In 2003, the Veterinary Faculty initiated the process of recovering its heritage and consolidating it in the Complutense Veterinary Museum. The dispersed pieces were collected together with a view to their preservation and diffusion. In 2005 the ceroplastic collection was incorporated into the Veterinary Museum and the pieces have been preserved there ever since (Fig. 6). From 2013 to the present day they have been the subject of a research project focusing on the conservation and restoration of this unusual collection of enormous heritage value.¹²⁴

The documentation in the custody of the Complutense Veterinary Museum includes inventories of the anatomical museum and the anatomy department chairs (from 1949, 1963, 1965, 1968 and 1969). They confirm the gradual loss of sculptures as a result of successive relocations or for other reasons.



Fig. 6. View of the present-day Complutense Veterinary Museum, showing the collection of wax pieces. Image courtesy of Luis Castelo.

Conclusion

The material history of wax is a history of disappearance. Its presence in the field of art was limited to a secondary position as it was perceived as an ignoble material, useful merely in copying and in exercises of technical virtuosity. Even so, its plastic qualities (it melts, it can be liquified and its physical states mutate), attracted the attention of both the learned and the inexpert, whose eyes looked with wonder at its hyper-realistic forms to penetrate the flesh and explore the intricate details of the body.

The Complutense Veterinary Museum houses an extraordinary collection of artificial models, a highly heterogeneous collection of animal species, fields and perspectives. Amongst the most outstanding of these, as we have shown in this study, are the wax models which combine the scientific values of each era with the technical skill and artistic quality achieved by their makers. They are essential elements when it comes to understanding the material history of the veterinary discipline as each sculpture reflects in plastic form the progress achieved by scientific debate, and transmits, in a format more efficient than the corpse, the ideas which served to instruct students. True treasures of knowledge deserve to be valued and disseminated.¹²⁵

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Notes and references

- 1 Despite the considerable losses suffered by this collection in Madrid, to date we know of no other collection of veterinary wax sculptures in Spain as varied as that existing at the Complutense University. There are several anatomical wax pieces at the Veterinary Faculty in Zaragoza attributed to Pedro Garrigó Cánovas, son of Cristóbal Garrigó de Nis, the sculptor of the anatomical pieces in the Madrid Veterinary College; between 1847 and 1851 Pedro Garrigó also made several pieces for the General Cavalry School in Alcalá de Henares, but none have been preserved.
- 2 G. Suárez Fernández (ed.), *Libro conmemorativo del bicentenario de la Facultad de Veterinaria 1793–1993* (Madrid, 1993), p. 34.
- 3 *Ibid.*, p. 38.
- 4 *Ibid.*, pp. 34–55.
- 5 Dissections were performed in the theatre, above all on young donkeys: these were cheaper and enabled the study of the anatomy of the equids, the main subject of interest of veterinary schools for decades.
- 6 S. Malats, *Elementos de Veterinaria que han de enseñar a los alumnos del Real Colegio de Veterinaria de Madrid*, vol. II (Anatomy); H. Estévez, *Elementos de Veterinaria que han de enseñar a los alumnos del Real Colegio de Veterinaria de Madrid: Exterior del caballo* (Madrid, 1794).
- 7 Suárez Fernández, *op. cit.* (note 2), p. 42. Archive of the Complutense University (AGUCM), cat. nos v02-024 and v01-047. Documents of the Protector, November 1827.
- 8 For the history of plastic anatomy at La Specola in Florence, see: M. L. Azzaroli, 'The zoological museum of Florence', *Curator* 15 (1972), pp. 93–117; B. Lanza *et al.* (eds), *Le cere anatomiche delle Specola di Firenze* (Florence, 1979).
- 9 For further information on ceroplastics in Europe we refer the reader to: T. N. Haviland, 'A brief account of the use of wax models in the study of medicine', *Journal of the History of Medicine and Allied Sciences* 25 no. 1 (1970), pp. 52–75; S. de Chadarevian and N. Hopwood, *Models: The third dimension of science* (Stanford, 2004); R. Panzanelli (ed.), *Ephemeral Bodies: Wax sculpture and the human figure* (Los Angeles, 2008); A. Cunningham, *The Anatomist Anatomist's d: An experimental discipline in Enlightenment Europe* (Burlington, VT, 2010); A. Maerker, *Models Experts: Wax anatomies and Enlightenment in Florence and Vienna, 1775–1815* (Manchester, 2011); L. Dacome, *Malleable Anatomies. Models, makers and material culture in eighteenth-century Italy* (Oxford, 2017).
- 10 For more detailed information on the Madrid collection we refer the reader to A. Sánchez, N. del Moral and S. Mico, 'Entre la ciencia y el arte. Ceroplástica anatómica para el Real Colegio de Cirugía de San Carlos (1786–1805)', *Archivo Español de Arte* 85 no. 340 (2012), pp. 329–49.
- 11 The cabinet and visits to it were mentioned in periodical publications, for example in the *Guía de Forasteros, el manual histórico topográfico administrativo y artístico de Madrid*, 3rd edn (1844). The Veterinary Cabinet in the Puerta de Recoletos is listed among the Madrid museums in *El Repertorio General o Índice Alfabético de los Principales Habitantes de Madrid* (1851), Veterinary School: Paseo de Recoletos, no. 16.
- 12 Visit of Ferdinand VII to the Royal Veterinary School, in *Gaceta de Madrid*, 2 June 1818. Available in pdf form at: <http://www.boe.es/datos/pdfs/BOE//1818/066/A00546-00547.pdf>, p. 546.
- 13 N. Rodríguez Garrido and A. Salvador Velasco, 'Visita de la Reina Gobernadora a la Real Escuela de Veterinaria: consideraciones entorno a su papel en la absorción del Tribunal del Protoalbeiterato', *XIII Congreso Nacional de Historia de la Veterinaria* (Gerona, 18–20 October, 2007), pp. 118–19.
- 14 *El Español*, 24 October 1846.
- 15 In 1797 this outstanding military figure was appointed by King Charles IV as Secretary of the *Real Junta de Caballería del Reino*, the Royal Cavalry Board. In 1799 he was appointed Protector of the Royal Veterinary College and held that post until 1806, the year in which he resigned. He held the post of Protector of the Royal Veterinary School once again from 1808 to 1818 and was also appointed Secretary of the Supreme Council of War and Minister of War. J. M. Perez García, 'El teniente General D. Félix Cloón (1752–1820). Retrato por Francisco de Goya, Protector de la antigua Escuela de Veterinaria de Madrid en 1799. Aportaciones a su biografía', *Anales de la Real Academia de Doctores de España* 7 (2003), pp. 173–81.
- 16 AGUCM, cat. no. 20/06-001, document written by the Protector, Félix Colón, dated 29 October 1803; Document written by Segismundo Malats, 30 November 1803.
- 17 AGUCM, cat. no. 20/06-001. On 29 November the director had to insist again. On 30 October 1803 a list was provided of the instruments needed to make skeletons, and another on 19 December 1803, and on 21 January, 27 February and 11, 19 and 31 March 1804.
- 18 AGUCM, cat. no. 20-06-001. List of materials needed to make pieces to be placed in the Anatomical Cabinet, dated 19 December 1803. Signed by Hipólito Estévez and Segismundo Malats.
- 19 Giesker was Chief Veterinary Officer at the Royal Health School in Braunschweig. His report on the Royal Spanish Veterinary College in Madrid (Part 1), *Terapéutica Veterinaria Biohorm* no. 24 (1974), p. 123 states: 'The room for preparations was no less beautiful than the previous ones, equipped with many expensive cupboards with large glass doors, inside which were the preparations, almost all of wax, very well worked. The natural preparations, due to the heat, were not well preserved.'
- 20 AGUCM, cat. no. v02-024, Document dated 19 April 1827.
- 21 Appointment by Royal Order, dated 25 July 1828. He is assigned a salary of 7,700 reales per year.
- 22 AGUCM, cat. no. v01-007, Minutes of 7 July 1828.
- 23 AGUCM, cat. no. v01-047, Documents written by the Protector of the college, 26 November 1827. AGUCM, cat. no. v01-034, stating that the 'Vice-Professor' will be responsible for drawing up an inventory with the necessary explanations for visitors to the cabinet. AGUCM, cat. no. v01-005, in a document dated 9 May 1829, it is decreed a copy of this document will be on every shelf and will contain information only about scientific items, not furniture or fittings.
- 24 AGUCM, cat. no. v01-051, Faculty Board, Document addressed to the Protector, 9 November 1830. AGUCM, cat. no. v01-034, Minutes of 8 November 1830: a polished walnut panel is requested for the model of a right lobe of a lung with pathology.
- 25 AGUCM, cat. no. v01-011, Minutes of 9 June 1842. Some documents contain orders for glass or for repairs to glass. Furthermore, the budgets contain allocations for shelves and

- glass for the cabinet, AGUCM, cat. no. v01-051, official letter dated 19 January 1830, with amended budgets.
- 26 Brochure of the historical exhibition held to celebrate the bicentenary of the Veterinary Faculty in Madrid; document held by the Complutense Veterinary Museum.
- 27 Ludmilla Jordanova, 'Museum: representing the real?', in *Realism and Representation. Essays on the problem of realism in relation to science, literature and culture*, ed. G. Levine (Madison, WI, 1993), pp. 255–78.
- 28 This is how the artist signed his name in the various records preserved in the General Archive of the Complutense University and in the Marqués de Valdecilla Historical Library, originating from both the Anatomical Cabinet of the San Carlos Royal College of Surgery and the Waxworks Laboratory of the Royal Veterinary College in Madrid.
- 29 Inventory of the San Carlos Royal College of Surgery, 1795. Records. AGUCM, cat., carpeta AH-429: payments to Cháez and Francesqui.
- 30 AGUCM, cat. no. AH-429. The records state that Francesqui was from Volterra and that, by Royal Decree, October 1790, he was appointed to the post of 'maker of pieces' at the Anatomical Cabinet of the San Carlos Royal College of Surgery, with a gratuity of 6,600 reales per year.
- 31 AGUCM, cat. no. 20/06-001. Document written by the Protector July 1805.
- 32 The title of the record is highly indicative: 'Mr Luis Francheschi, who is preferred in the making of anatomical wax pieces', AGUCM, cat. no. 20/06-001.
- 33 AGUCM, cat. no. 20/06-001. Veterinary College. List of requirements for making wax pieces for the Cabinet. 29 July 1809. Luis Francesqui and Segismundo Malats.
- 34 AGUCM, cat. no. H-451, Payments to Francesqui in 1795 and 1806.
- 35 *Diario de Madrid*, 21 May 1815. (<http://hemerotecadigital.bne.es/issue.vm?id=0001742806&search=&lang=es>), p. 561.
- 36 *Diario de Madrid*, 16 June 1817. (<http://hemerotecadigital.bne.es/issue.vm?id=0001759747&search=&lang=es>), p. 746.
- 37 AGUCM, cat. no. v01-034, Minutes of 10, 14 and 17 July 1828.
- 38 AGUCM, cat. no. v01-007, Document written by the Protector, dated 15 July 1828.
- 39 AGUCM, cat. no. v01-007, Document written by the Protector, dated 6 October 1828.
- 40 AGUCM, cat. no. v01-007, Minutes of 16 June 1828; cat. no. v-01-034, Minutes of 9 October 1828.
- 41 AGUCM, cat. no. v01-005, Document written by the Protector, dated 7 June 1829.
- 42 AGUCM, cat. no. AH-447; the payroll of the San Carlos Royal College of Surgery lists Dionisio Bergaz as head sculptor of wax pieces, Pedro Sánchez Osorio as assistant sculptor and Vicente Rodríguez as apprentice. From the periodical publication *El Español*, dated 26 August 1845, we know that Sánchez Osorio won the competitive examination for the post of 'maker of pieces' in 1818, and that he was then aged sixty-two; he continued to provide his services at the cabinet of the Royal College and also made pieces for the cabinet of Santiago de Compostela and that of Natural History in Madrid. It is stated that he received offers from abroad due to his skill and talent in the art of wax. His file, AGUCM, cat. no. AH-406, states that, in 1846, in view of his advanced years and fragile health, he put forward the idea of teaching two disciples and, in recognition of his services and lengthy career, he requested an increase in salary. He died on 2 March 1849.
- 43 AGUCM, cat. no. v01-034, Minutes of 1, 9, 11 and 30 June 1828. AGUCM, cat. no. v01-034 and cat. no. v01-005, Minutes of 22 July 1829 the Protector decided, in view of the opinion of the members of the Board regarding the excessive spending on wax and other materials, that only Garrigó would be taught, as he had demonstrated the appropriate aptitude and knowledge and would therefore learn more quickly.
- 44 AGUCM, cat. no. v01-004, certificate issued by Sánchez Osorio, dated 31 March 1831, in which he describes his own technical and artistic training: 'disciple of the art of wax at the Florentine school and the art of miniature at that of Paris and drawing at those of Valencia, Granada and Barcelona and relief printing at that of Madrid.'
- 45 AGUCM, cat. no. v01-034.
- 46 AGUCM, cat. no. v01-051, Faculty Board, draft version of a document written to the Protector at the beginning of November (no exact date) 1830. AGUCM, cat. no. v01-051, Document written by the Protector dated 4 October 1830, ordering that he receive a monthly report on the sculptures being made and their state of completion.
- 47 AGUCM, cat. no. v01-051, Minutes of 2 November 1830.
- 48 File on Cristóbal Garrigó, General Administration Archives (AGA), box 31, record 14821. Certificate issued by Dionisio Giraldo Bergaz, dated 22 October 1831.
- 49 AGUCM, cat. no. v01-034, Minutes of 16 July; cat. no. v01-004, Minutes of 7 March 1831; cat. no. v01-004, Minutes of 6 April 1831 and document dated 8 April by the Protector. Sánchez Osorio requests that the Board issue him a certificate accrediting his work for the College; however, the board resolves that it does not fall within its competence to do so.
- 50 Appointment of the 'maker of pieces' in AGUCM, cat. no. v02-051, Cristóbal Garrigó's file.
- 51 Archivo de la Real Academia de Bellas Artes de San Fernando. Orders, official letters and passes. 1830–33. Record 4-54-12. AGUCM, cat. no. v01-034. According to the Minutes of 2 November 1830, Garrigó's drawings are presented to the Protector so that he can verify the former's progress at the San Fernando Royal Academy of Fine Arts. A document dated 20 July 1830, signed by Martín Fernández de Navarrete and addressed to the Council of the Royal Academy, states that in view of the drawings presented by the disciples who attended day classes at the Convento de la Merced, the Ordinary Board Meeting of the San Fernando Royal Academy granted permission to study a range of subjects, '... Mr. Cristoval Garrigo to a class devoted to the study of heads' (1830. Official letters of Disciples' passes. Academy Library).
- 52 AGUCM, cat. no. v01-001, Minutes of 11 March 1833; cat. no. v01-001, document written by the Protector, dated 28 March 1833.
- 53 AGUCM, cat. no. 89 06-001, Professors' meeting of on 1 September 1859 to discuss a document to be sent to the General Directorate of Public Education on 11 August; they issue their decision on 6 September 1859.
- 54 AGUCM, cat. no. 89 06-001, Document written by the Protector, dated 7 February 1860.

- 55 AGUCM, cat. no. v01-020, proposal of the Director, dated 2 March 1863.
- 56 Rafael Espejo del Rosal takes up the post on 29 July 1863. AGUCM, cat. no. v01-020, document dated 4 August 1863.
- 57 As mentioned at the beginning of this work, Garrigó's work had to be continued through his son, who followed in his footsteps as regards technique and made a series of pieces for the Veterinary College in Zaragoza and for the Army. See note 1.
- 58 AGUCM, cat. no. v02-001, Documents dated 13 February 1936 and 14 November 1939.
- 59 AGUCM, cat. no. v02-037, file on Félix Talegón Heras.
- 60 For the technology employed in the construction of wax models, see A. Sánchez Ortiz, S. Micó Boró, 'Manufacturing techniques and the art of wax modelling: from the sculptor's studio to the anatomical workshop', in *Making and Transforming Art. Technology and interpretation*, ed. H. Dubois *et al.* (London, 2015), pp. 86–94; A. Sánchez Ortiz, P. Matía Martín, 'Modelos auxiliares o simulacros de carne. Procedimientos tecnológicos en la creación de modelos de cera', *De Arte* 15 (2016), pp. 310–26.
- 61 Details survive regarding Garrigó's moulding of components for this important piece. The document, dated 9 February 1830, states that the eyeball and bones of the tongue were moulded to make a head with the neck and ligaments, arteries and veins. Faculty Board, document addressed to the Protector, dated 19 October 1830, describing the piece as finished. AGUCM, cat. no. v01-051.
- 62 In the Minutes of 16 December, he requested a bigger space given the size of the piece, and the Minutes of 20 December record that this request was granted. On 23 December 1830 there is record of the casting in wax of a donkey foal for a myological study, AGUCM, cat. no. v01-034. In cat. no. v01-051 a notification from Pedro Osorio on 1 December 1830 states that, together with Garrigó, he made a mould in six pieces of a donkey foal for a myological statue. A document written by Pedro Sánchez Osorio on 3 January 1831 mentions that he was still working on the wax donkey foal for the myological study, AGUCM, cat. no. v01-051.
- 63 AGUCM, cat. no. v01-004, Minutes of 7 February 1831.
- 64 File on Cristóbal Garrigó, General Administration Archives (AGA), box 31, record 14821. Certificate issued by Dionisio Giraldo Bergaz, dated 22 October 1831.
- 65 AGUCM, cat. no. v01-051, Document written by Sánchez Osorio, dated 7 October 1830.
- 66 AGUCM, cat. no. v01-004, Minutes of 6 and 14 April 1831. The Minutes of 14 April confirm that Sánchez Osorio is the author and that he has requested a reward of of 800 *reales* for the work. AGUCM, cat. no. v01-034.
- 67 File on Cristóbal Garrigó, AGA, box 31, record 14821. Certificate issued by Dionisio Giraldo Bergaz, dated 22 October 1831.
- 68 AGUCM, cat. no. v01-004, Document written by the Protector, dated 1 November 1831.
- 69 AGUCM, cat. no. v01-001, Document written by the Protector, dated 4 May 1833 and report by Garrigó, dated 3 July 1833.
- 70 According to the Minutes of 2 August 1832, he had started the piece AGUCM, cat. no. v01-034. From August until October had prepared the bones of the skeleton which support the general neurology. The bones have been given two layers of wax, which had been cleaned and had colour applied, the vessels had been put in place and covered with the periosteum; in September and October the nerves and ligaments were added. AGUCM, cat. no. v01-006, Notifications by Garrigó, on 1 July, 1 August, 3 September, and 1 October 1832. According to Minutes dated 3 December 1832, he continued working on the piece and in March he worked on the donkey foal at the same time. The neurology was recorded as completed in the Minutes of 9 May 1833, AGUCM, cat. no. v01-034.
- 71 AGUCM, cat. no. v01-017, Minutes of 3 July, 4 September, 3 November, 3 December 1834; cat. no. v01-035, Minutes of 1834, fol. 56; cat. no. v02-010, Minutes of 8 January, 9 February, 6 March and 13 April 1835.
- 72 AGUCM, cat. no. v02-010, Minutes of 13 April 1835; cat. no. v01-035, Minutes of 11 June and 2 July 1835.
- 73 AGUCM, cat. no. v01-035, Minutes of 2 July, 5 October and 9 November 1835.
- 74 *Diario de Madrid*, 21 May 1815. (<http://hemerotecadigital.bne.es/issue.vm?id=0001742806&search=&lang=es>), p. 561.
- 75 AGUCM, cat. no. v01-051, Faculty Board, document addressed to the Protector, dated 29 October 1830.
- 76 AGUCM, cat. no. v01-034. The Minutes of 2 November 1830 confirm that Garrigó has completed a horse's brain, fully accurate in all the details, and the Protector is urged to see the piece for himself.
- 77 AGUCM, cat. no. v01-051.
- 78 AGUCM, cat. no. v01-005, Report by Sánchez Osorio, dated 31 July 1829; cat. no. v01-034, Faculty Board. Minutes of 3 August 1829.
- 79 AGUCM, cat. no. v01-005, Document dated 10 November 1829.
- 80 Request for a panel of polished walnut for the diseased right lobe made by Garrigó. AGUCM, cat. no. v01-034, Minutes of 8 November 1830. Notification is given that the piece was finished on 2 December 1830, cat. no. v01-051.
- 81 AGUCM, cat. no. v01-051; documents dated 19 October 1830 and 4 January 1831.
- 82 AGUCM, cat. no. v01-051, Faculty Board; document written to the Protector, dated 29 October 1830; document written by the Protector, dated 25 October 1830; cat. no. v01-034, Minutes of 25 October 1830.
- 83 AGUCM, cat. no. v01-006, notifications from Garrigó, dated 31 March and 30 April 1832.
- 84 AGUCM, cat. no. v01-034, Report by Garrigó, dated 31 March 1832.
- 85 AGUCM, cat. no. v01-006, notification from Garrigó, dated 30 April 1832.
- 86 AGUCM, cat. no. v01-006, notification from Garrigó, dated 1 July 1832; cat. no. v01-034, Minutes of 2 July 1832.
- 87 AGUCM, cat. no. v01-001, Minutes of 2 November, state that it is finished. Notification from Garrigó dated 1 August 1833 and Minutes of 2 November 1833.
- 88 AGUCM, cat. no. v01-001, Document written by the Protector, dated 12 November 1833.
- 89 AGUCM, cat. no. v01-034, Minutes of 2 January. He is already working on the piece. In v01-017, Minutes of 7 April, 9 May, 4 June and 3 July 1834, the progress of the piece is verified. He stated on 9 May 1834 that he has added colours and blood

- vessels, intestines, the bones which he has covered with periosteum and that he will then add the tubercular lesions. On 4 June he states that he has added the lung, liver, kidneys, the large intestine and the diaphragm to the piece, and it remains to add the small intestine and cover the bones with arteries and periosteum; finished on 3 July 1834.
- 90 AGUCM, cat. no. v01-034, Faculty Board. Minutes of 3 August 1829.
- 91 AGUCM, cat. no. v01-005, Report by Sánchez Osorio, dated 30 November 1829.
- 92 AGUCM, cat. no. v01-034, Faculty Board. Minutes of 3 September 1829; cat. no. v01-005, correspondence to the Protector, September 1829.
- 93 AGUCM, cat. no. v01-034, Faculty Board. Minutes of 7 December 1829.
- 94 AGUCM, cat. no. v01-004, Minutes of 7 February 1831.
- 95 AGUCM, cat. no. v01-004, Minutes of 1 September 1831.
- 96 AGUCM, cat. no. v01-004, notification from Garrigó, dated 8 November and 4 December 1831.
- 97 AGUCM, cat. no. v01-006, notification from Garrigó, dated 2 January and 3 February 1832. In January 1832, he states that, in the previous month of December, he had finished the lower jaw of a cow aged 10 to 12 months and had begun four jaws of donkey foals aged nineteen and thirty days and four and five months.
- 98 AGUCM, cat. no. v01-001, notification from Garrigó, dated 3 July and 1 August 1833.
- 99 AGUCM, cat. no. v01-006, notification from Garrigó, dated 2 January 1832; cat. no. v01-034, Minutes of 29 February 1832 record that he has finished the piece.
- 100 AGUCM, cat. no. v01-011, description of the halls of the college before work is carried out, in the session of 27 January 1842.
- 101 AGUCM, cat. no. v01-016, Minutes of 7 January 1836, 4 February 1836, 7 March 1836, 7 April 1836 and 9 June 1836.
- 102 AGUCM, cat. no. v06-003, Minutes of 19 January 1836. Garrigó states that he is still working on it.
- 103 AGUCM, cat. no. v01-016, Minutes of 4 July, 8 August and 9 September 1836; AGUCM, cat. no. v01-035, Minutes of 9 December 1836.
- 104 AGUCM, cat. no. 20/06-003, Minutes of 19 February 1837; cat. no. v01-035, Minutes of 6 March, 10 April, 5 June, 15 July, 3 August, 3 September, 18 October 1837.
- 105 AGUCM, cat. no. v01-051, Minutes of 2 December 1830; cat. no. v01-034, Minutes of 23 December 1830; cat. no. v01-051, document written by Sánchez Osorio to the Faculty Board, dated 3 January 1831.
- 106 We have not found inventories or lists of the possible losses to the collection or the cabinet during those years. The losses are, however, recorded in documents: AGUCM, cat. no. 20 06-001, document dated 4 January 1809. A request is made for the drawing up of a list of losses caused by the occupation of the school by French troops. There is also a reference to the losses suffered by the library and cabinet during the years of the War of Independence in the *Repertorio General de Noticias políticas, civiles, económicas, y estadísticas de Europa, y más particularmente de España para el año 1823* (Madrid, 1823), pp. 145–8.
- 107 AGUCM, cat. no. v01-013, state of the National Veterinary School, report by the director Segismundo Malats, dated 27 June 1821.
- 108 Suárez Fernández, op. cit. (note 2), p. 54. AGUCM, cat. no. v01-002, record dated 5 December 1823 on the loss and damage caused to the School by the French; cat. no. v01-003, Official letters written by the Protector, dated 6 December to 23 July 1823.
- 109 AGUCM, cat. no. v01-036, document written by the Director, dated 6 June 1823.
- 110 AGUCM, cat. no. v01-051, annual report for the academic year 1829–30.
- 111 The Protector insists that this is done carefully and entrusts the task to the auxiliary staff of the school (grooms) and the porter who are to ensure that nothing is damaged, AGUCM, cat. no. v01-051, document written by the Protector, dated 12 April 1830.
- 112 AGUCM, cat. no. v01-034, Minutes of 14 May 1832.
- 113 AGUCM, cat. no. v01-018, document written by the Protector, dated 27 February 1838; cat. no. v01-011, Minutes of 26 August 1842. Many areas of the College are declared to be unusable.
- 114 AGUCM, cat. no. v01-011, certificate written by Garrigó, dated 3 May 1842.
- 115 AGUCM, cat. no. v01-015, Official letters of the Board, dated 24 July 1845.
- 116 AGUCM, cat. no. v01-022, letter from the General Directorate of Public Education to the Director of the college, 2 August 1848.
- 117 AGUCM, cat. no. v01-066, document dated 24 June 1851.
- 118 AGUCM, cat. no. v01-066, document written by the director in which he describes the state of the buildings and the cut-backs made due to the lack of funds.
- 119 AGUCM, cat. no. v01-020, document written by the director, dated 19 August 1863, and budget of the most indispensable items required for public service and teaching.
- 120 AGUCM, cat. no. v01-020, notification from the rector, dated 4 August, and notification from the director, dated 10 August 1863. Furthermore, they reprimand him for not having contributed anything except two jaws, even skeletons.
- 121 AGUCM, cat. no. SG-2222, document written by the director of the college to the rector of the Central University, dated 17 August 1869.
- 122 Teaching begins in the academic year 1882–3. From the beginning there is an area allocated for the museum. From that year until 1958, the collections are housed at different sites due to successive refurbishment works.
- 123 *La Veterinaria Española* no. 1281, 20 May 1893; *Heraldo de Madrid* no. 921, 13 May 1893.
- 124 The project is part of the Spanish National R+D+i Plan, ref: HAR2013-42460-P.
- 125 The ceroplastic collections of the Medical and Veterinary Faculties were not included in the Complutense University Catalogue for 1989. See M. J. Irigoyen and A. Peláez, *Artistic Heritage of the Complutense University of Madrid. Inventory (Patrimonio Artístico de la Universidad Complutense de Madrid. Inventario)* (Madrid, 1989).