



# Tracing the papier mache anatomical models of Ottoman Turkish medicine and Louis Thomas Jérôme Auzoux

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## Abstract

Papier-mâché means chewed paper, and it defines a method. Various decorative products and functional tools have been produced with this method, which includes various techniques and materials. Maybe, the most interesting one among these is anatomic models developed and spread around the world by the French physician Louis Thomas Jérôme Auzoux (1797–1880) at the beginning of the nineteenth century. The purpose of this paper is to investigate the role of Dr Auzoux' human anatomical models in Ottoman–Turkish medicine. Primary and secondary sources were analysed such as Museum collections, archives, and scientific databases accessible on the Internet. This revealed that, at the beginning of the 1820s, Dr. Auzoux developed the method for papier-mâché anatomical models after a period of suffering difficulties in finding and preserving cadavers for dissection at the medical faculty which he worked. In 1825, he completed his invention, which had significant advantages over previously used methods for anatomical models, and then founded a production workshop in St. Aubin. Many medical schools in Europe, Africa, and South America utilised these models. Sources mentioned that the Ottoman Empire also purchased various anatomical models. Although it is not exactly known how many and from which models, it is known that whole male and female body models and pregnancy developmental models were purchased in 1837. In addition to human anatomic models, Dr. Auzoux's company also began to manufacture veterinary and botanical models soon. In that period of the Ottoman Empire during which cadaver dissection was forbidden and only artificial models and drawings were used for the education, Auzoux's models can be considered as very important tools for the Turkish Ottoman medical education and influential on the transition from traditional to modern medicine. Today, unfortunately, the fate of most of the human anatomical models purchased in the name of the Ottoman Empire is not known.

**Keywords** Auzoux · Anatomy models · Papier-mâché · Ottoman–Turkish medicine

## Introduction

Human body became a tool of practice and research along with other tools also used in the effort of understanding human anatomy. The search for materials which would help to properly discover this complex structure of human body varies depending on the opportunities presented in various periods. Cadaver dissection and education are considered to be indispensable for the science of anatomy, which stepped into a new age with Andreas Vesalius (1514–1564) in the wake of the Renaissance. However, practice on cadavers has never been free of problems either in the past or today. At

times, it has been made difficult by cultural and religious conditions and others by physical conditions. In European medicine as well, it is observed that scientific studies (dissection) on the human body were occasionally banned by church pressures and even Papal orders [6, 15, 23]. Similar practices and initiatives were also very widespread and significant in the world of Islam; anatomical investigations on the human body were strictly banned. In addition, the situation was also complicated in the Islamic world, because verses in the Quran and hadiths did not include any statement about cadaver dissection [20]. Shaykh al-Islam fatwas (scholarly explanation or ruling on matters of the Islamic law that had authority over the community) or opinions of the other Islamic scholars became effective on this ban in the later period [10]. However, there is a thought that these fatwas may be interpreted wrong and the idea of the Quran's ban on cadaver dissection is not correct [1, 20].

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With the Renaissance, European medicine broke free of such pressures on it and made significant moves. However, it only became possible in 1841 for Ottoman Medicine to reach this understanding and officially began cadaver dissections [1, 22, 24].

This situation led to the seeking of new options that would be always appropriate for use. Wood, wax, glass, and even cadavers themselves were among the various materials used for making anatomical models [19, 21]. One of the materials used for manufacturing such models, however, opened a new era in terms of not only education but also commerce, was exported to faculties in many parts of the world, and became very popular. These were anatomical models made of papier-mâché, chewed paper, which the French Physician Louis Thomas Jérôme Auzoux (1797–1880) popularised around the world at the beginning of the nineteenth century [14].

### Louis Thomas Jerome Auzoux and papier-mâché models

Born in Saint Aubin d'Ecrosville (Normandy) in 1797, Auzoux (Fig. 1) began to study medicine in Paris in 1816. He received training from the chief surgeon of Paris Hotel-Dieu, Guillaume Dupuytren (1778–1835), in 1818. During his training, the lack of sufficient cadavers for all students to study, existing difficulties in preserving cadavers, and expansiveness and fragility of wax models caused him to begin a quest. Thus, in 1819 (1820?), he visited the workshop of Jean-François Ameline (1763–1835), who was a professor of anatomy École Secondaire de Médecine at Caen, France [13, 25]. In 1808, Ameline had begun to make papier-mâché models and, according to Auzoux, shown the effectiveness of the method [13]. While Ameline used carton or cardboard only, Auzoux developed his own method using carton paste [12]. The method developed by Dr. Auzoux has some significant characteristics. The material used is light, not easily broken, and weather resistant at average temperatures. Parts can be made in requested dimensions, bigger or smaller than the original. It can be coloured similar to the natural. Pieces representing organs or sections can be separated and assembled again [27].

Auzoux presented the first anatomical model which he produced to Academie de Royale in 1822 [25]. He named these models, which could be disassembled and reassembled, 'anatomie clastique' after the Greek word 'Klastos', meaning divisible into pieces [31]. In 1825, he established a workshop in St. Aubin to manufacture the models which he designed (Fig. 2). Some of his models are shown in Fig. 3.

In addition to human anatomic models, Dr. Auzoux's company also began to manufacture veterinary and botanical models soon [14]. It is stated that, by 1858, Dr Auzoux marketed 53 anatomical models [16]. This amount increased



**Fig. 1** Thomas Louis Jérôme Auzoux [Lithograph by J.B.A. Lafosse, 1868, after Pierson. Credit: Wellcome Collection. CC BY] <https://wellcomecollection.org/works/mm6vwwt7#licenseInformation>. Accessed 23 Apr 2019

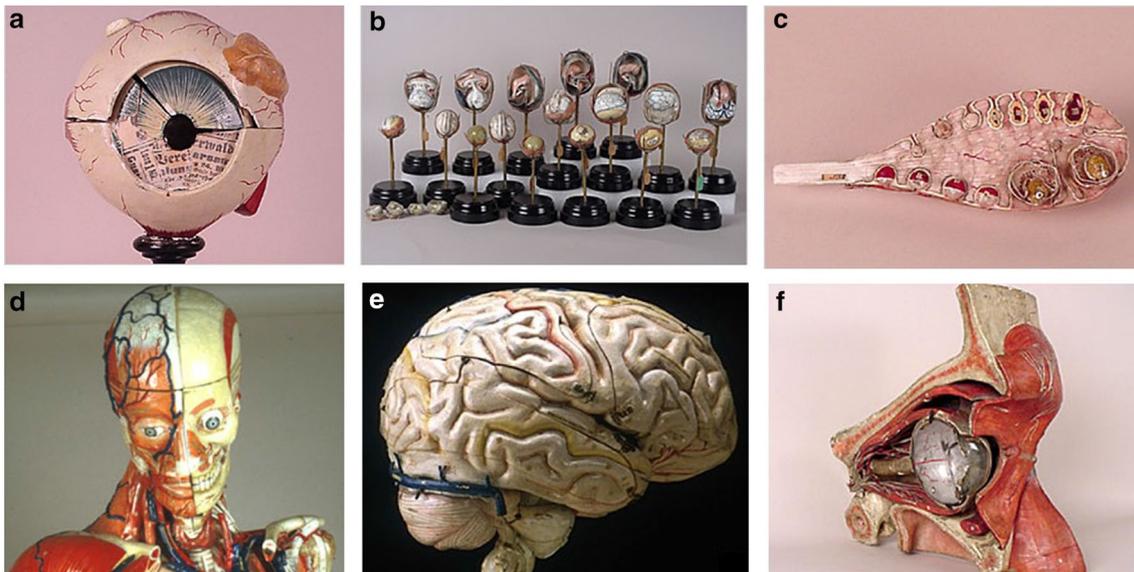
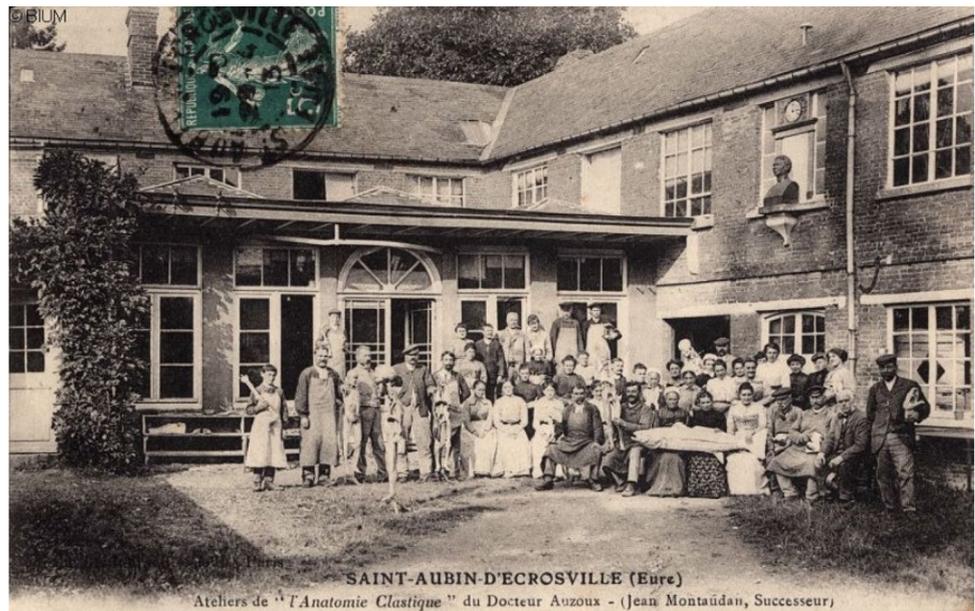
to 326 by the first world war and 100 of them were related to human anatomy and the rest of them were zoology or botany [17].

This historical paper aims to investigate the role of Dr. Auzoux' human anatomical models in Ottoman–Turkish medicine.

### Import of Auzoux models for Ottoman Empire

Many medical schools in Europe, Africa, and South America purchased these models [4]. The Ottoman Empire was also among them. Turkish Presidency State Archives, Department of Ottoman Archives include documents relating to requests made to the Auzoux's company [7]. These documents show orders for female as well as male human anatomical models, and subsequently models of a pregnant female. In the Ottoman Archives, the French invoice submitted by Auzoux to the Ottoman Ambassador of Paris, Nuri Bey, relating to the models ordered for the Imperial School of Medicine (Mekteb-i Tıbbiye-i Adliye-i Şahane) in 1837 is shown in Fig. 4. An English translation of the invoice is presented in Appendix. The statement of account contained in the invoice is given in Table 1.

**Fig. 2** Louis Auzoux's anatomy atelier and employees in St. Aubin d'Ecrosville [between 1870–1900] [https://commons.wikimedia.org/wiki/File:Auzoux\\_ateliers2.jpg](https://commons.wikimedia.org/wiki/File:Auzoux_ateliers2.jpg). Accessed 23 Apr 2019



**Fig. 3** Different models of various systems of Auzoux production. **a** Eye model about, 1900, **b** Embryo model. 21 models of different gestational stages, about 1895, **c** Cross-sectioned ovarium model, about 1895, **d** Male mannikin, about 1895, **e** Brain model, about 1895, and

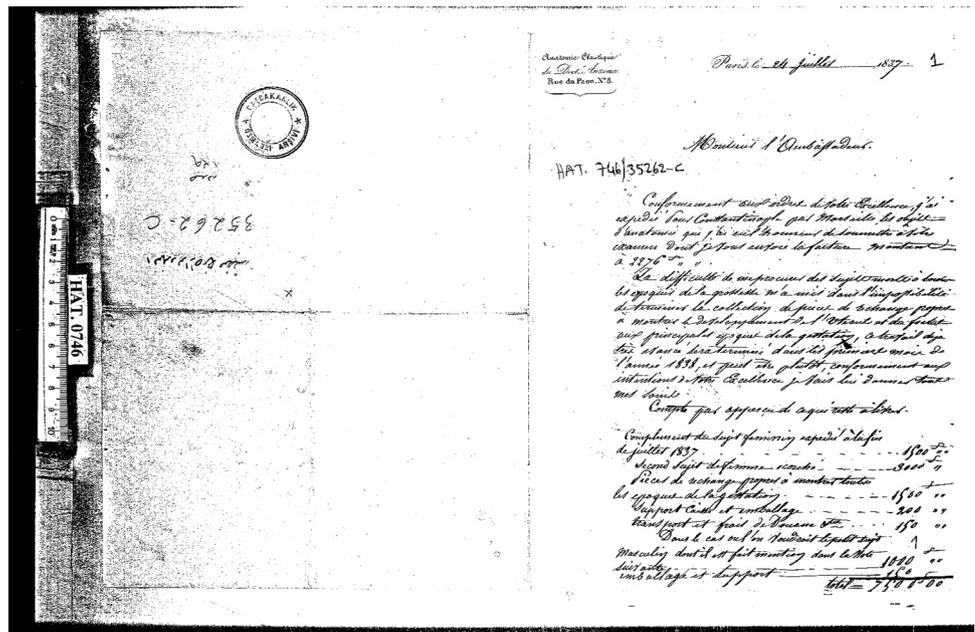
**f** Cross-sectioned eye model, 1856 (Credit: Division of Medicine and Science, National Museum of American History, Smithsonian Institution, printed with permission) [http://americanhistory.si.edu/anatomy/collection/nma03\\_collection\\_human.html](http://americanhistory.si.edu/anatomy/collection/nma03_collection_human.html)

It is mentioned in *Berliner Medicinische Central-Zeitung's* issue dated 31 June 1840 that 4000 francs were paid per piece of these anatomical models purchased for the Imperial School of Medicine [29]. Another source reports that the Ottoman Empire ordered a whole human model with a height of 116 cm for the Ottoman Empire's Haydarpaşa Hospital (l'Hôpital Haïtas Pacha) [12]. It is guessed that this model is the one which archive describe as a whole male human anatomical model (similar model belonging to year

1893 was given at Fig. 5 for representation). Although there is no clear date for the delivery of that model, it is believed that this was before the reception of female models in 1837. Currently, the total number and characteristics of the models ordered and used for education are not known.

The Medical School's building located in Galatasaray (therefore, the Imperial School of Medicine is also called Galatasaray Medical School in the jargon of history of medicine) was seriously damaged in a fire that broke out

**Fig. 4** Original French invoice submitted by Dr. Auzoux to the Ottoman Ambassador of Paris in 1837. (English version was given in Appendix) [7]. (Turkish Presidency State Archives of the Republic of Turkey—Department of Ottoman Archives/Türkiye Cumhuriyeti Cumhurbaşkanlığı Devlet Arşivleri Başkanlığı Osmanlı Arşivi)



**Table 1** Price chart of the order in BOA [7]

Additions to be submitted at the end of July 1837 about female model	1500.00 f
Second female model	3000.00 f
Anatomy parts showing every gestational stage of pregnancy	1500.00 f
Crate and packaging	200.00 f
Shipping and customs costs	150.00 f
In the case of the request of small male mannikin	1000.00 f
Crate and packaging	150.00 f
Total	7500.00 f

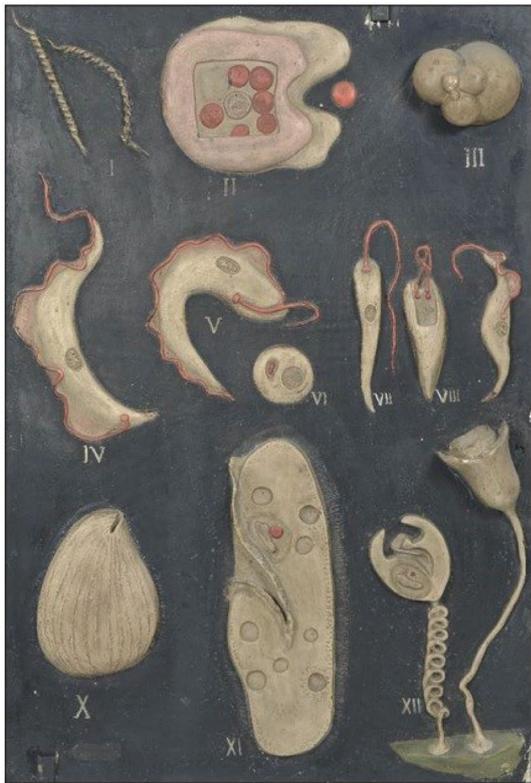
**Fig. 5** Life-size anatomical model of a man, front view (left) and lateral view (right), 1893 (Credit: Division of Medicine and Science, National Museum of American History, Smithsonian Institution, printed with permission)



on 11 October 1848. It is reported that a collection of natural curiosities, a botanical garden, a cabinet for natural philosophy, and anatomical collections were consumed by the fire [9].

The last documents relating to the purchase of these models in the digital collection of Ottoman State Archives belong to the year 1890 [8]. However, it is mentioned that those purchased in 1890 were brought from Vienna. Accordingly, they were most probably not Auzoux's models.

The fate of the anatomical models purchased for the Medical School is not clearly known in our day. However, a microbiological model set including 12 models of amoebae and flagella reported to be made by Auzoux between 1820 and 1840 and transferred from Darülfünun Medical Faculty which is the continuation of the Imperial School of Medicine at the beginning of twentieth century is currently held by Cerrahpaşa Museum of Medical History [28, 29] (Fig. 6).



**Fig. 6** The microbiology model of Auzoux residing in the Cerrahpaşa Museum of Medical History. 56 cm wide, 82 cm tall, and 13 cm in height. Manufactured by Dr Auzoux in 1820–1840, France. Marked as “Etablissements Auzoux, Rue de Vaugirard, Paris” at the bottom left of the model on a small plate. A total of 12 amoeba and flagella specimens on a gypsum board bonded to a metal frame [28]. (Reprinted with the permission from [28])

## Medical education in Ottoman Empire in nineteenth century

The Ottoman Empire's modernisation process and medical education before and after that process have been frequently studied. Official permission for cadaver dissection as a turning point for anatomical training has also been frequently addressed. However, the stereotyped statement of ‘training used to be given using models’ has never been elaborated on. The present study brings out some important details including relevant documents on this issue.

Establishment, upon a suggestion by the chief physician Mustafa Behçet, of the first School of Medicine and Surgery (Tıphane-i Amire and Cerrahane-i Amire) in Tulumacıbaşı Hall, Şehzadebaşı where is a deep-rooted central district of Istanbul, on 14 March 1827 during the reign of Sultan Mahmud II is considered to be the start of modern medical education in the Ottoman Empire [1, 18]. The period of study in *Tıphane-i Amire* was 4 years (Table 2) [18]. Currently, there are two main opinions about the qualification of the education provided. According to one of these, even North American medical schools managed to adapt to the curricula of discipline-based European medical schools only in the late nineteenth century [26] (The North American curriculum in the nineteenth century can be seen in Table 3 [18, 26]). It is argued, accordingly, that it was a very modern curriculum for the conditions of that period. However, the other opinion argues that school also remained insufficient soon. Accordingly, as it was soon understood that the school was not sufficient, Professor Bernard was brought, upon an invitation by Sultan Mahmud II, from the University of Vienna to restructure the school [2, 3].

On 17 February 1839, a modern military medical school named Mekteb-i Tıbbiye-i Adliye-i Şahane (Imperial School of Medicine) was established to educate and train military physicians [2]. The period of study in this school was 6 years [2]. Despite this modernisation, training based on cadaver dissection did not immediately start. It became possible in this military medical school only thanks to Professor Bernard, who was insistent on the importance of dissection and cadavers [24]. For this purpose, a contest and examination

**Table 2** Curriculum of Tıphane-i Amire [18]

Year				
1	Arabic	French	Physics	Chemistry
2	French	Anatomy	Zoology	Botanics
3	General health	Military medicine (surgery)		
4	Internal medicine	Surgery	Gynaecology and obstetrics	

Reprinted with permission from [18]

**Table 3** North American Medical Schools curriculum until the late nineteenth century [18]

Year	
1	Anatomy Physiology Pathology Chemistry Surgery Internal medicine Pharmacology Gynaecology and obstetrics Paediatrics
2	Repetition of the same lectures
1–3 years	Apprenticeship

Reprinted with permission from [18]

were organised for 25 people from across Europe [1]. Thus, after Prof. Bernard, Dr Spitzer, who was another Austrian, came to Istanbul and began to work as a teacher of dissection (anatomy). Thus, cadaver dissection in the Ottoman Turkish Medicine officially began with Dr. Sigmund Spitzer (1813–1895) upon the Ottoman Sultan's permit [24].

It is mentioned in many sources that anatomical education used to be focused only on skeletons, also models and drawings from Europe were utilised before cadaver dissection [1]. However, it has never been studied where materials qualified for carrying out such important training only using models were supplied from.

According to the documents shared publicly online in state archives, relevant documents begin only around 1836 and end around the 1890s. In this case, *Tiphane-i Amire*, which offered a 4-year education, seems to be the school to which these models came for the first time. It is reported that one female human anatomical model, a uterus model, and foetus models showing different stages of gestation to be utilised in obstetrics and gynaecology courses in the fourth year were ordered from France in 1837 [5].

In addition to previously ordered models, documents also show that new models were ordered. According to the invoice made out personally by Dr Auzoux and shown in Fig. 4, a female model had been delivered before 1837 and now additional pieces were ordered. It is mentioned that the production of models took 4 months to 1 year upon the order [17]. Designing an education similar to the one in Austria, Bernard and Spitzer drew up a curriculum appropriate for military students. Accordingly, obstetric and gynaecological content was not much [11]. Therefore, the models for female dissection, conception, and pregnancy which sources report were utilised in obstetrics training are believed to be associated with the School of Midwifery that was founded in 1842 [5]. As can be seen from the translation of the invoice from 1837 shown in Fig. 4, Dr. Auzoux mentioned that he had difficulty in finding dead fetuses and that, therefore, he could not finish the model

for pregnancy stages yet [7]. The price quoted on the invoice for this model is 1500 francs [7]. In the catalogue dated 1841, there are two different uterus models containing either 7 or 14 parts (Fig. 7). Based on the information (every gestational stage) quoted on the invoice, the model with 14 parts may be considered to as ordered with the quantity of three.

It attracts attention upon an examination of Auzoux's catalogues for that period that there are models for many different anatomical systems [4]. However, the fact that especially female anatomical and pregnancy models were frequently ordered provides clues about the social, cultural, and religious situation of the period.

The number and order year of the model which Chanal mentions as a 116 cm tall human model but described as only a male dissection model in state archives are not known [12]. However, it is believed to precede the mentioned dates.

This situation, it is also considered that the actual number of models was more than the ones mentioned in the documents obtained. In fact, it is reported that, during his visit to Istanbul in 1840, the Austrian Archduke Friedrich's (1821–1847) visited Galatasaray Medical School as Dr. Spitzer's guest, and that he became very interested in Auzoux's models and received detailed information about them [16].

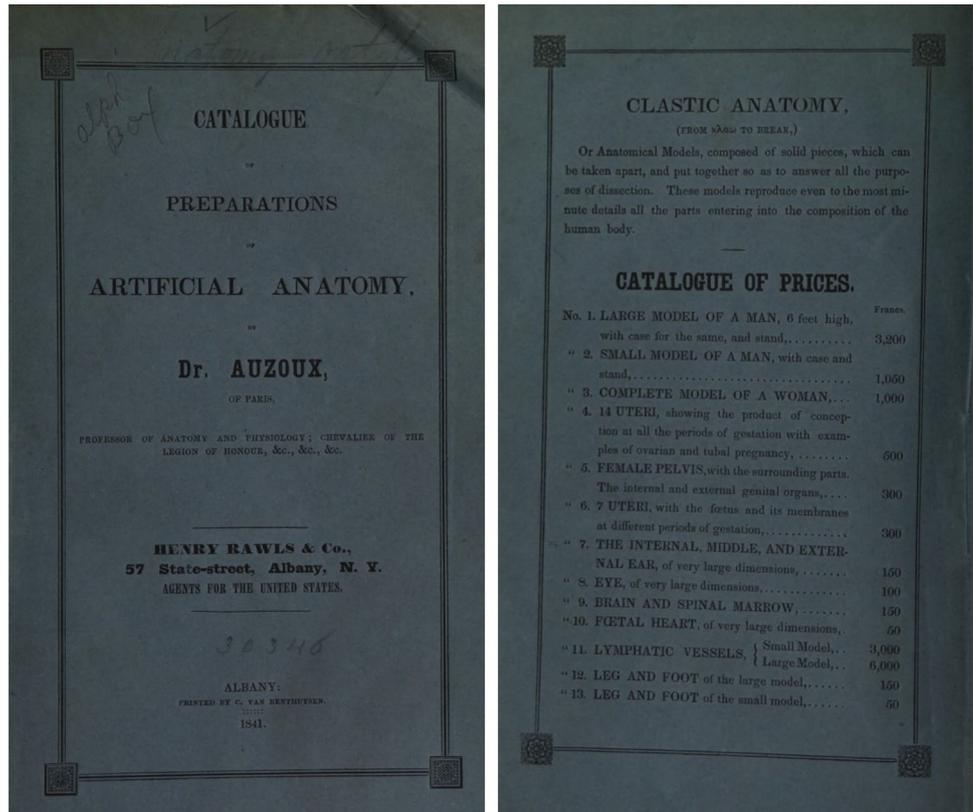
A big fire broke out in Galatasaray Medical School in 1848 [9, 30]. Many school premises were destroyed by the fire. In the same year, the school was moved to Humbarahane Barracks [30]. Just like other collections, it is believed that Auzoux's models purchased until that time were also destroyed in this fire, unfortunately.

## Conclusion

Considering that even the models utilised in the history of anatomical education had a period of modernisation and development within themselves, we believe that the current study is important for understanding that period. In addition, the fact that these models, which are reported to be mostly accurate and detailed and popular, were ordered generously in about the same years as other European and American countries clearly shows the value attached by the Ottoman Empire to the new and modern medical faculty and the influence of the modernisation period.

Darülfünun Medical Faculty continued as Istanbul University Faculty of Medicine after the university reform which was implemented in 1933, a decade later the foundation of the modern Republic of Turkey [29]. The reform has a special place and significance in the history of higher education in Turkey and considered as a milestone [29]. Digital archival data relating to anatomical models end in the 1890s. It is still an enigma whether any anatomical model was delivered to Istanbul University Faculty of Medicine.

**Fig. 7** Front and back covers of the Dr. Auzoux's 'Catalogue of preparations of artificial anatomy', Albany: C. Van Benthsen, 1841, Back cover also a price list (Credit: Courtesy of the National Library of Medicine) <https://collection.nlm.nih.gov/ext/mhl/101170613/PDF/101170613.pdf>



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**Author contributions** AO project development, data collection, and manuscript writing. NY data analysis, and manuscript writing and editing.

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### Compliance with ethical standards

**Conflict of interest** The authors declare that they have no competing interest.

## Appendix

Paris, 24 July 1837

Dear Mr. Ambassador,

On the orders of His Excellency, I have sent the models of anatomy from Marseille to Istanbul, which I have been honoured to present to your research; the total amount of 2276.00 f is also sending the bill.

Due to the difficulty of finding a dead human specimen in every stage of pregnancy, I could not collect all the anatomy samples to show the change of the uterus and foetus at various stages of pregnancy; this work, which is at a fairly advanced stage, will only be completed in the first months of 1838. Depending on the desire of His Excellency, the work may be over sooner; I will do my best on this.

## Summary account list for remaining jobs:

Additions to be submitted at the end of July 1837 about female model	1500.00 f
Second female model	3000.00 f
Anatomy parts showing every gestational stage of pregnancy	1500.00 f
Crate and packaging	200.00 f
Shipping and customs costs	150.00 f
In the case of the request of small male mannikin	1000.00 f
Crate and packaging	150.00 f
Total	7500.00

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