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Exploring the First Decade of the Anatomische Gesellschaft: Europe's Oldest Anatomical Society and a Comparative Perspective from Ottoman Medicine

Avrupa'nın En Eski Anatomi Derneği Anatomische Gesellschaft'ın İlk On Yılına Osmanlı Tıbbı ile Karşılaştırmalı Bakış

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ABSTRACT

This study aimed to assess the status of anatomy as a scientific discipline within Ottoman medicine in the context of modern medicine and to compare it with other contemporary schools of thought while also comparing the progress of European anatomy through the first decade of the Anatomische Gesellschaft. Starting in 1839, Ottoman authorities endeavored to establish a European-style foundation for anatomy, recognized as the oldest and most fundamental branch of medicine by the medical community, while also forging extensive relations with the European scientific community, including inviting physicians from central Europe to modernize the field of anatomy and promote comprehensive education in Ottoman medicine.

We analyzed the supplements of the Anatomische Anzeiger journal (Verhandlungen der Anatomischen Gesellschaft, Anatomische Gesellschaft) for the first ten years of congress submissions, specifically focusing on presentations, demonstrations, and the participation of international physicians and scientists. Additionally, we searched the online archives of the Ottoman state archives for invitations to scientific meetings and information about the involvement of scientists. This revealed that despite the active participation of many scientists in international meetings other than anatomy, particularly in research related to public health, there was a noticeable absence of contributions in the field of anatomy. This reveals that the modernization efforts of Ottoman medicine were primarily intended to define educational goals, with scientific research and application significantly neglected during this period. Our argument is supported by the fact that scientists trained in the same tradition, primarily from Vienna, played a significant role in both their quantity and experimental studies within the scientific activities of the Anatomische Gesellschaft considered in this study.

Keywords: Anatomical society, Anatomy research, Nineteenth-century Ottoman medicine

ÖZ

Bu çalışmanın amacı, Osmanlı Tıbbı içinde anatomiyi çağdaş tıp bağlamında bir bilim dalı olarak dönemi içerisindeki diğer bilim platformları ile Anatomische Gesellschaft'ın ilk on yılı boyunca anatominin ilerleyişini inceleyerek karşılaştırmaktır. Tıp camiası açısından tıbbın en eski, önemli ve temel bilim dalı olarak kabul edilen anatomi, Osmanlı Tıbbında 1839 yılı ile çağdaş zemine oturtulmaya çalışılmış, bilim dalının modernleşmesi, ciddi anlamda eğitim-öğretim yapılabilmesi için Avrupa bilim ortamı ile ileri derecede ilişkiler sağlanmış ve misafir hekimler getirilmiştir. Bu hekimlerin bir araştırma sahası olarak anatomi bilimine etkileri bugüne kadar araştırılmamıştır. Avrupa'nın en eski anatomi cemiyeti olan Anatomische Gesellschaft'ın kuruluşunun ilk on yılına odaklanarak, derneğin resmi dergisi Anatomische Anzeiger üzerinden kongre sunumları, gösteriler ve uluslararası katılımcılar araştırılmış ve aynı yıllarda yurtdışı kongre davetlerine katılım gösteren Osmanlı bilim insanları ve hekimlerin arşiv kayıtları incelenmiştir. Başta halk sağlığı olmak üzere, anatomi dışında birçok bilim dalında aktif katılım ve çalışma yürütülmesine rağmen anatomi alanında belirgin bir eksiklik görülmüştür. Bu, Osmanlı tıbbının modernleşme çabalarının temel olarak eğitim hedeflerini tanımlamaya odaklandığını, bahsi geçen dönemde bilimsel araştırma ve uygulamanın önemli ölçüde ihmal edildiğini göstermektedir. Aynı ekolden yetişmiş Viyana esaslı bilim insanlarının hem sayıca ve hem de deneysel çalışmalar bakımından, bu çalışmaya konu edilen Anatomi Cemiyetinin bilimsel faaliyetleri içerisinde önemli yer bulmaları, yukarıdaki düşünceleri destekler nitelikte görülmüştür.

Anahtar Kelimeler: Anatomi cemiyeti, anatomi araştırmaları, On dokuzuncu yüzyıl Osmanlı tıbbı

Introduction

The present study analyzes the role of European science and anatomy in the reform movement in Ottoman medical education and training, including the study of anatomy, like other sciences, within the context of the modernization efforts initiated in the Ottoman Empire. For this purpose, the study examined the oldest anatomical society in Europe (*Anatomische Gesellschaft)*, which has continued to exist until today, and its scientific activities in its first decade, and it observed the Ottoman medical anatomy of the time in this context. In the 1830s, the Ottoman and European medical and scientific communities established intense relationships, leading to the invitation of guest physicians in the late 1830s. This initiative modernized not only the science of anatomy but also all medical curricula in Ottoman medicine[1] and provided sufficient education and training.[2] As a matter of fact, several researchers have argued that the opening of the Galatasaray Medical School (Imperial School of Medicine) in 1839 was an effort to provide a European scientific foundation for Ottoman medicine, including anatomy.[3] We believe that meaningful insights can be provided by comparing the situations of the education, training, and scientific research aspects of anatomy in Ottoman medicine and the European medical community. In the 19th century, Ottoman medicine primarily featured anatomy-related publications in the form of translations or authored textbooks rather than research papers. Consequently, our aim was to explore the scientific interactions with Europe's oldest anatomical association. Professional associations started to appear as early as the Renaissance period in Europe.[4] The founder of the Medical Society of London (1773) -Dr. John Coakley Lettsom (1744-1815) explains the role of associations in medicine as follows: *'A society of medical practitioners of various ranks who would meet together to compare their observations and thoughts mutually, taking note of new discoveries at home and abroad.*'[5] Later, these associations emerged to organize subfields of medicine and related fields. Consequently, the members of professional medical organizations benefit from opportunities to develop clinical and educational guidelines, mentor young professionals, access the latest research advancements, and build collaborative networks among peers.[6] Undoubtedly, in this context, medical associations carry significant weight in terms of disseminating contemporary research, facilitating intellectual exchange,

1 Although there was another medical school in Ottoman-Egypt during this period, our focus was on Istanbul (Constantinople).

2 Ortug, G et al. 2003. "The role of Austrian physicians and Prof. Joseph Hyrtl (1810-1894) on modernization of Ottoman-Turkish medicine." *Ann Anat* 185 (6):593-6.

3 Ortug, A., and N. Yuzbasioglu. 2019. "Tracing the papier mache anatomical models of Ottoman Turkish medicine and Louis Thomas Jerome Auzoux." *Surg Radiol Anat* 41 (10):1147-1154.

4 Huynh KA, Chung KC. Concepts of Organizational Excellence in Medical Associations*. Plast Reconstr Surg Glob Open*. 2019 Jun 7;7(6):e2300.

5 Bramwell E. The evolution, function and scope of the medical society. *Edinb Med J*. 1947 Jul;54(7):382-90.

6 Huynh KA, Chung KC. Concepts of Organizational Excellence in Medical Associations. *Plast Reconstr Surg Glob Open.* 2019 Jun 7;7(6):e2300.

fostering international scientific connections, and ensuring the academician's ongoing relevance and currency in their field.

Our focus lies on the first decade of participation in the *Anatomische Gesellschaft* meetings and association, aligned with the historical context of the Ottoman Empire's modern medical school. Austrian physicians initially established the institution, and their successors sustained it from 1850 onward, reflecting the traditional succession of researchers within medical laboratories. Our study delves into the period of modernization, with particular emphasis on the inaugural generation of instructors.

I- *Anatomische Gesellschaft*: The first anatomical society founded in Europe

In the European medical community, the first and oldest international anatomical society (*Anatomische Gesellschaft*), which has continued its prolific scientific activity, was officially established on September 23, 1886. However, according to several researchers, the foundations of this society were laid earlier. They argue that the foundation of the *Anatomische Gesellschaft* began with the establishment of a society named "German Natural Scientists and Physicians" (*Gesellschaft Deutscher Naturforscher und Ärzte*), which was founded in Leipzig on 28 September 1822.[7] Within the broad scope of this association, encompassing various disciplines and branches, anatomists and physiologists pursued their scientific activities as a distinct scientific discipline. However, this association under the same roof continued until 23 September 1886. During a meeting of natural scientists and physicians held in Berlin on this date, a separate society was established by the anatomists present there to represent only this branch of medicine and to conduct independent scientific activities. The provisional board of directors was elected with the votes of 39 anatomists present, and thus, the *Anatomische Gesellschaft* was established as of 23 September 1886 to operate formally and independently. A commission was established to prepare a regulation regarding the establishment and operation of the Anatomy Society (Anatomische Gesellschaft), including the following members: (Fig. 1).[8]

Carl Friedrich Hasse (Breslau/Wroclaw)

Oskar Hertwig (Jena)

Wilhelm His (Leipzig)

Julius Kollmann (Basel)

7 DiDio, L. J., and E. Reale. 1990. "Historical aspects of the Anatomische Gesellschaft." *Anat Anz* 171 (4):227-30.

8 Kühnel, W. 1989. "100 Jahre anatomische Gesellschaft." Verh *Anat Ges* 82 (Suppl 64):31-75.

Friedrich Merkel (Göttingen)

Gustav Albert Schwalbe (Strassburg)

Wilhelm Waldeyer (Berlin)

The regulations adopted opened an important window not only for general systematic anatomy but also for related scientific disciplines, such as comparative anatomy, histology and embryology, zoology, physiology, pathological anatomy, and paleontology. Considering these developments in terms of organization and scientific activities, September 23, 1886, can be accepted as the date of establishment of the oldest anatomical society in Europe.[9]

Figure 1: The team that prepared the founding charter of the Anatomische Gesellschaft (1886) (Credit: Public domain images) *Karl Hasse, also known as Carl Hasse and Carl Friedrich Hasse

The first regulation prepared by the committee on the purpose, organization, and scientific activities of the Society was approved by approximately 40 scientists present at the session, and the following people were elected to the first board of directors (*).[10] (Fig. 2)

President: A. von Koelliker

Vice-President: C. Gegenbauer

9 Kühnel, W. 1989. "100 Jahre anatomische Gesellschaft." Verh *Anat Ges* 82 (Suppl 64):31-75.
10 Ibid Kühnel W., 1989

W. His

W. Waldeyer

Secretary: K. von Bardeleben

Although it was mainly German-speaking anatomists who established the *Anatomische Gesellschaft* through effective and constructive initiatives, notably the name of the Society excludes the term "German". This word was not used in particular, and attention was paid to gaining international quality as early as the establishment of this scientific community.[11] Subsequently, there were contributions to the *Anatomische Gesellschaft* from Germany, other nations in Europe, and countries of other continents.[12] One year later, the Society, which had only 39 members when created, increased the number of officially registered members to 174 during the first scientific meeting held in Leipzig on 14-15 April 1887. Of these new members, some of the scientists participated from outside Germany.[13] Here, it is also important to note the high numbers of newly participating members from Austria-Hungary compared to other regions.

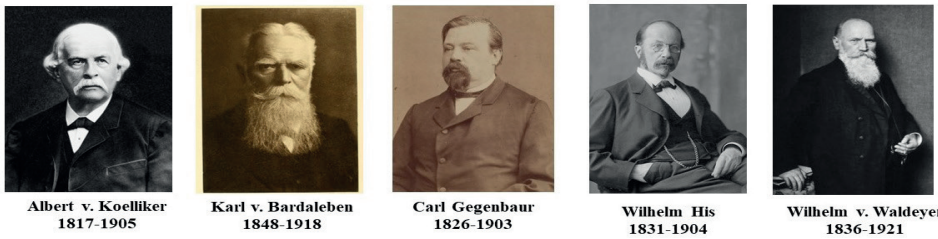

Figure 2: First board of management of Anatomische Gesellschaft (Credit: Public domain images)

Another important feature of the Society is that its membership was not limited to anatomists but also included individuals from various interdisciplinary backgrounds. Thus, the Society comprises 124 anatomists and histologists, 16 zoologists, 14 pathological anatomists, and 10 physiologists.[14]

Shortly after the establishment of the *Anatomische Gesellschaft*, national anatomy societies were established in several European and other continents. Accordingly, the earliest

11 Schierhorn, H. 1980. "[The multinationality of the Anatomische Gesellschaft and the usage of the so-called congress languages in her meetings (author's transl)]." *Anat Anz* 148 (2):168-206.

12 For example, it is noteworthy that the following names attended as members to the second meeting held in Würzburg on 20-23 March 1888: From the USA; L. Howe (Buffalo) Bernays (St. Louis) From Japan; Miyashita (Tokyo) Lustig (Turin). Please see *Anat. Anz.*vol jahrg. 3 (1888). G. Fischer.

13 Number of members of the Anatomical Society from outside Germany: Austria-Hungary:23, Russia: 8, United Kingdom: 7, Sweden: 6, Netherlands: 6.

14 Kühnel, W. 1989. "100 Jahre anatomische Gesellschaft." Verh *Anat Ges* 82 (Suppl 64):31-75.

establishment dates for the oldest anatomical societies in Europe, America, and Japan are as follows :[15]

Anatomical Society of Great Britain and Ireland: 1887

Association of American Anatomists: 1888 (or 1889)

Japanese Association of Anatomists: 1893

Shortly after the establishment of the *Anatomische Gesellschaft*, the first issue of the society's official journal, "Anatomical Journal" (*Anatomischer Anzeiger*), was published by G. Fischer, on 1 June 1886. It has become a lasting and effective scientific journal that has continued to exist. It is currently published under the name "Annals of Anatomy".

A few months after its foundation (November/1886), the *Anatomische Gesellschaft* initiated an extensive promotional campaign focusing on its objectives and functioning. During the founding meeting, principles regarding the program, purpose, and organization were extensively elucidated. Additionally, invitations were extended to new members from Germany and other countries to join the society. An important point here is the international character of the *Anatomische Gesellschaft* and the diversity of its fields of interest. Thus, in addition to anatomy, experts in other disciplines, such as zoology, comparative anatomy, physiology, pathological anatomy, paleontology, and botany, also participated in the society and presented important research in the scientific meetings of the following years. Therefore, a broad spectrum of scientific and international quality has been established. Such inter-scientific communication and interaction efforts, which began right after the establishment of society, should be regarded as a critical aspect of the modern scientific mindset of the time.

Interestingly, anatomy in Ottoman medicine, which initiated its approximation to European medical science and the community as early as the early 19th century[16], was not represented on this platform. The first significant strides in Europe-inspired modern medical

15 We should mention that long before the aforementioned fully organized Anatomical Societies, which continued their scientific activities without interruption, an anatomical society was established in France, but it was short-lived and focused only on local scientific activities. On November 3, 1803, that scientific organization was established by G. Dupuytren, Paris, France. R. Laennec was the first president of the Societe Anatomique de Paris. After the dissolution of this very short-lived society, the same organization was re-established by J. Cruveilhier on January 12, 1826. As it can be understood from this, significant attempts to gather within the frame of the science of anatomy and to carry out scientific activities on this basis began in the early ninth century. DiDio, LJ., and E. Reale. 1990. "Historical aspects of the Anatomische Gesellschaft." *Anat Anz* 171 (4):227-30.

16 There had been much earlier transfers, as many of the non-Muslim physicians that practiced in the Ottoman Empire had studied in Italy during the 17th century, though here we covered the timeline where reforms of medical education applied to the Ottoman School via the influence of European medicine.

teaching and education in the Ottoman Empire were made in 1827.[17] It is known that in 1839, physicians coming from Austria made significant efforts in terms of teaching, education, and mindset within Ottoman medicine.[18] However, despite these developments, there is no trace or activity of Ottoman anatomists in the Anatomy Societies founded in Germany and its scientific activities. This fact is quite thought-provoking for the analysis of progress in science and research in Ottoman anatomy. Indeed, these were the years of the reign of Sultan Abdulhamid II (r. 1876-1909) known for an absolutism period, and such research on anatomical specimens might not have been encouraged by the Ottoman authorities of that time. On the other hand, Aykut E. mentions the frequency of medical and scientific content in the daily newspapers and illustrated journals from 1880s as a public interest of science during this period.[19] Therefore, it is interesting, for example, why these anatomical specimens are not presented on a scientific platform, even though it is a rare case rather than conducted scientific research.

II- A Glimpse into the annual meetings of the Anatomische Gesellschaft during the first decade of its existence

Supplements to the Anatomische Anzeiger (Verhandlungen der Anatomischen Gesellschaft, Anatomische Gesellschaft), where congress submissions were published, are available at Biodiversity Heritage Library (BHL) (https://www.biodiversitylibrary.org/).[20] A summary of the scientific activities of the first decade (1887-1896) of the existence of the *Anatomische Gesellschaft* can be found in Table 1.

17 Ülman, YI. 1998. "Mekteb-i Tıbbıye-i Adliye-i Şâhâne'nin 1846-1847 Öğretim Yılı Faaliyet Raporu." *Yeni Tıp Tarihi Araştırmaları (The New History of Medicine Studies)* 4:117-148.

18 Ortug, Gursel. 1982. "Tip tarihi bakimindan Osmanli Imparatorlugu'nda anatomi ogretimi ve tesrih [The anatomy teaching and dissection in the Ottoman Empire in respect of the history of medicine]." *Turk Kulturu* 20:378-385.,

19 Aykut E. (2021) gives examples of the anatomical oddities and rare specimens published in popular non-medical Ottoman weeklies.

20 Please see electronic sources in the bibliography to access the links of Anatomischer Anzeiger journals between 1886-1896

Table 1. General Overview of Scientific Meetings of the Anatomische Gesellschaft (AG) in Its First Decade (1887-1896)

Number of meetings	Congress President (Welcome Speech)	Number of AG members	Congress dates and locations	Total number of participants	Number of scientific sessions	Number of presentations (oral)	Number of demonstrations
1	Albert von Koelliker (1817-1905)	174	14.-15. April 1887 Leipzig	60 AG members 6 guests	4	17	8
2	Karl Gegenbaur (1826-1903)	211	20.-23. May 1888 Würzburg	74 AG members 15 guests	3	41	24
3	Wilhelm His (1831-1904)	236	10.-12. October 1889 Berlin	65 AG members 9 guests	3	21	25
4	Wilhelm von Waldeyer-Hartz (1836-1921)	---(*)---	04.- 09. August 1890 Berlin	37 AG members 8 guests	8	39	9
5	Albert von Koelliker (1817-1905)	251	18.-20. May 1891 München	58 AG members 12 guests	5	25	13
6	Wilhelm His (1831-1904)	260	07.- 09. June 1892 Wien	58 AG members 4 guests	6	33	10
7	Wilhelm von Waldeyer-Hartz (1836-1921)	----(*)---	21.-24. May 1893 Göttingen	60 AG members	6	21	9
8	Carl Toldt (1840-1920)	274	13.-16. May 1894 Strassburg	73 AG members 20 guests	5	38	15
9	Friedrich Sigmund Merkel (1845-1919)	282	17.-20. April 1895 Basel	75 AG members 9 guests	5	31	11
10	Karl Wilhelm Kupffer (1829-1902)	292	19.-20.April 1896 Berlin	80 AG members 16 guests	5	37	25

*Membership numbers for the years 1890 and 1893 could not be obtained.

During its early years, the *Anatomische Gesellschaft* experienced significant growth in membership, starting with 40 participants in 1886 and continuing to increase to 292 members by 1896.[21] Scientific sessions were a prominent feature of the annual meetings, which commenced in 1887. These meetings saw a varying number of sessions, ranging from a minimum of three times in the second and third meetings to a maximum of eight times during the Berlin meeting in 1890. The inaugural meeting in Leipzig in 1887 included four scientific sessions and 17 presentations, along with eight demonstrations, attended by 60 society members and six guests. Additionally, 8 demonstrations[22] were conducted in that meeting.

21 Kühnel, W. 1989. "100 Jahre anatomische Gesellschaft." Verh Anat Ges 82 (Suppl 64):31-75.

22 This means practical demonstrations in the exhibitions. This may include but is not limited to new scientific

A decade later, at the Berlin meeting, there were five scientific sessions featuring 37 studies and 25 demonstrations, with 80 society members and 16 guest scientists. The 1890 Berlin meeting had the highest number of scientific studies (39) and demonstrations, matching the record set for 1889 Berlin and 1896 Berlin, each with 25 demonstrations. A significant milestone occurred during the third meeting in Berlin in January 1889, when Wilhelm His Sr. (1831-1904) emphasized the importance of unity in anatomical language in his speech, proposing scientific initiatives toward this goal and leading to the establishment of a commission.[23] Subsequent meetings saw the convening of terminology committees and making important decisions regarding anatomical nomenclature, with participation from anatomists proficient in English, French, Italian, and German.[24] In its latest gathering, the *Anatomische Gesellschaft* resolved to meet in Berlin in 1890, from August 4 to 9, delegating the scientific aspects of their discussions to the anatomical section of the Tenth International Medical Congress, which was scheduled shortly thereafter.[25]

The studies and proposals presented by the terminology and nomenclature committee were discussed in detail in the meeting held in Basel in 1895, and the first international terminology, nomenclature, and related rules were accepted in the field of anatomy, and are referred to as Basel Nomina Anatomica (BNA).[26]

III- Anatomy in Ottoman medicine and international scientific relations during the 19th century

Although modernization and institutionalization of the Ottoman Empire's medical education and training and its efforts to adopt modern scientific mentality as represented by Europe, discipline and its applications occurred during the rule of Selim III (1789-1807),[27] original modernization efforts and measures started during the rule of Mahmud II (1808-1839).[28] As part of the significant attempts at embracing modern medical science and

preparations or models, scientific instruments, and plastination.

23 In the committee selected for anatomy and physiology studies, A. v. Kölliker served as the President, K. Bardeleben served as the secretary, and the members included O. Hertwig, W. His, J. Kollmann, F.S. Merkel, G. Schwalbe, C. Toldt, and H. W. G. v. Waldeyer.

24 The non-German members of the committee were; Sir William Turner (Edinburg), Romonoti (Pisa) ant Lebouq (Gent).

25 Miller, WD. 1890. "Tenth International Medical Congress, Berlin, 1890." *Am J Dent Sci* 23 (11):496-511.

26 Kachlik, D.I et al. 2009. "Mistakes in the usage of anatomical terminology in clinical practice." *Biomed Pap Med* Fac Univ Palacký Olomouc Czech Repub 153 (2):157-61. doi: 10.5507/bp.2009.027.

27 Selim III was a significant figure primarily known for his military reforms. However, the influence of these reforms extended beyond the military sphere to areas such as medicine. One notable example is the establishment of the first medical academy, Tıbhane, in the Imperial Arsenal (Tersâne-i Âmire), in 1806. Additionally, in a book review by Akoglu K. (2020) of Stanford J. Shaw's work, it is stated that "The first instance of a systematic public health service based on modern principles and methods was observed in the Ottoman Empire during the reign of Sultan Selim III, and it was suggested that this occurred through the channel of military reform."

28 Akıncı, S. 1962. "Osmanlı İmparatorluğu tıbbında disseksiyon ve otopsi." *İstanbul Üniversitesi Tıp Fakültesi Mecmuası* 25 (1):97-115., Kazancıgil, A. 1991. XIX. yüzyılda Osmanlı imparatorluğunda anatomi:(Şanizade-

institutionalization, Galatasaray Medical School was founded in 1839, and some physicians from Austria were invited to Istanbul to ensure a modern education here. The Vienna Medical School (Josephinum) played an important role in the relations between the Ottoman Empire and Austria.[29]

The first Austrian physicians who came to Istanbul, Dr. Karl Ambros (Carl Ambroise) Bernard (1808-1844), Dr. Jacob Anton Neuner (1806-1842), and Pharmacist Antonie Hoffman (?), had an important mission for both the establishment and organization of Galatasaray Medical School and the modernization of Ottoman medicine, and they especially took very important initiatives for providing anatomy education and training according to European standards.[30]

Dr. Bernard and Dr. Neuner, both trained at Josephinum, arrived in Istanbul in 1838, and Dr. Neuner was appointed the personal physician of Sultan Mahmud II. However, Dr. Neuner returned to Vienna in 1839 after the death of Sultan Mahmud II, and Dr. Sigismund (Sigmund) Spitzer (1813-1895) replaced him with the recommendation of Prof. Josef Hyrtl (1810-1894). Dr. Spitzer was a medical student at the University of Vienna when Prof. Hyrtl was an anatomy prosector. Apparently, Dr. Hyrtl recommended one of his pupils for the appointment to the new anatomy professorship position in 1839. Dr. Spitzer became the director of the Imperial School of Medicine in 1844 after the death of Dr. Bernard.

Thus, the modernization and institutionalization movement initiated by Dr. Bernard and his team continued with Dr. Spitzer.[31] It is known that Dr. Spitzer brought a series of anatomy and histology preparations prepared by Prof. Hyrtl with him to Istanbul and used them in medical education and training there.[32]

Bianchi): Özel Yayınlar, Ortug, G 1982. "Tip tarihi bakimindan Osmanli Imparatorlugu'nda anatomi ogretimi ve tesrih [The anatomy teaching and dissection in the Ottoman Empire in respect of the history of medicine]." *Turk Kulturu* 20:378-385., Terzioğlu, A. 2000. "İstanbul Tip Fakültesi Tarihçesi." *Journal of Istanbul Faculty of Medicine* 63 (2):3-9, Ülman, YI. 1994. "Journal de Constantinoplea göre Mekteb-i Tıbbiye-i Adliye-i Şahanenin Galatasaray dönemi." Masters, Deontoloji ve Tıp Tarihi Istanbul Universitesi Sağlık Bilimleri Enstitüsü (101)., Ülman, YI. 1998. "Mekteb-i Tıbbıye-i Adliye-i Şâhâne'nin 1846-1847 Öğretim Yılı Faaliyet Raporu." *Yeni Tıp Tarihi Araştırmaları* (The New History of Medicine Studies) 4:117-148.

29 Aykut, Ebru. 2021. "Anatomical Things at the Juncture of Commerce and Science in the Late Ottoman Empire." *European Journal of Turkish Studies*. Social Sciences on Contemporary Turkey (32)., Ülman, YI. 1998. "Mekteb-i Tıbbıye-i Adliye-i Şâhâne'nin 1846-1847 Öğretim Yılı Faaliyet Raporu." *Yeni Tıp Tarihi Araştırmaları* (The New History of Medicine Studies) 4:117-148.

30 Ibid. Aykut, Ebru. 2021.

31 Gurkan, Kazim Ismail. 1967. Türkiye'de Hekimliğin Batıya Dönüşü (The Transition of Medicine to the Western Model in Turkey). Istanbul: Yenilik Basımevi., Ortug, G.et al. 2003. "The role of Austrian physicians and Prof. Joseph Hyrtl (1810-1894) on modernization of Ottoman-Turkish medicine." *Ann Anat* 185 (6):593-6. doi: 10.1016/S0940-9602(03)80134-6.

32 Erbengi, T. 1988. "Histoloji (Histology)." In Dünya'da ve Türkiye'de 1850 Yılından Sonra Tıp Dallarındaki İlerlemelerin Tarihi (The History of Advances in Medical Fields Worldwide and in Turkey Since the Year 1850), edited by Ekrem Kadri Unat, 208-2019. Istanbul: Cerrahpaşa Tıp Fakültesi Vakfı Yayınları.

Due to the services they provided to the Ottoman Empire, Prof. Hyrtl, Dr. Bernard, and Dr. Spitzer were honored and rewarded with an order from the Ottoman State[33] (Fig. 3).[34]

Figure 3: Austrian physicians who made significant efforts and contributions to the modernization and systematization of Ottoman-Turkish medicine. All three physicians were honored with a service medal by the Ottoman Sultan Abdülmecid (1823-1861). (Credit: Dr. Bernard's image obtained from the public domain, Dr. Spitzer's image is printed with permission from Josephinum –Ethics, Collections, and History of Medicine, MedUni Vienna, Dr. Hyrtl's image Wellcome Collection, https://wellcomecollection.org/works/khak3qxq Accessed 19 September 2023)

33 The primary source of this information is (Turkish Presidency State Archives of the Republic of Turkey — Department of Ottoman Archives/Türkiye Cumhuriyeti Cumhurbaşkalığı Devlet Arşivleri Başkanlığı Osmanlı Arşivi, A.}DVN.MHM. 14/ 10, A.{DVNSNMH.d... 11/30, HR.MKT 702/30).

34 Ortug, G. 1982. "Tip tarihi bakimindan Osmanli Imparatorlugu'nda anatomi ogretimi ve tesrih [The anatomy teaching and dissection in the Ottoman Empire in respect of the history of medicine]." Turk Kulturu 20:378-385., Aykut, E. 2021. "Anatomical Things at the Juncture of Commerce and Science in the Late Ottoman Empire." *European Journal of Turkish Studies. Social Sciences on Contemporary Turkey* (32).

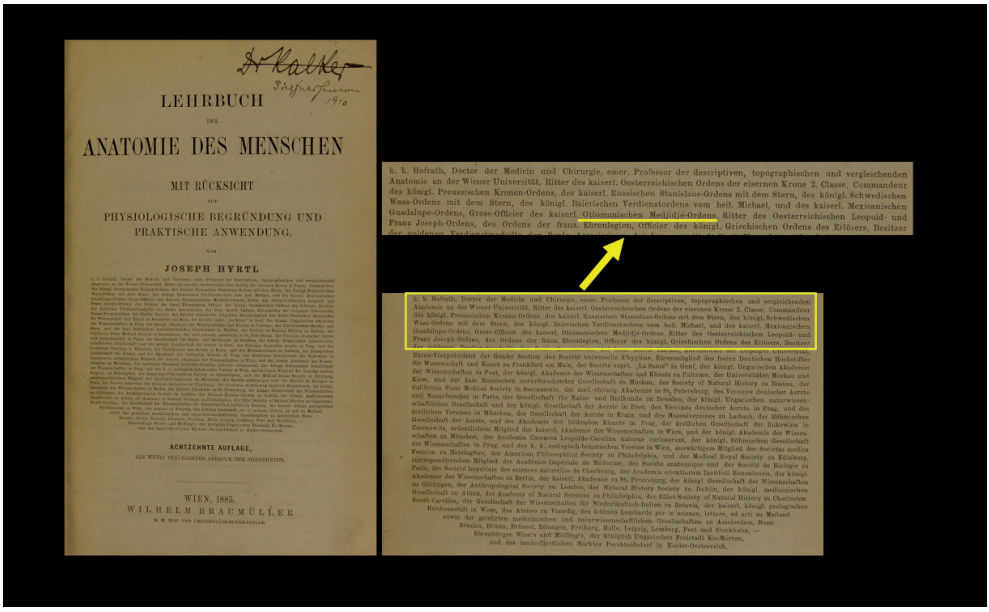

Figure 4: Information about the service medal awarded to Prof. Hyrtl by the Ottoman Sultan Abdülmecid (1823-1861) can be seen on the cover image of the book titled "Lehrbuch der Anatomie des Menschen" (Wien, 1885). (Credit: Wellcome Collection. CC BY] https://wellcomecollection.org/works/krejv86u Accessed September 19, 2023

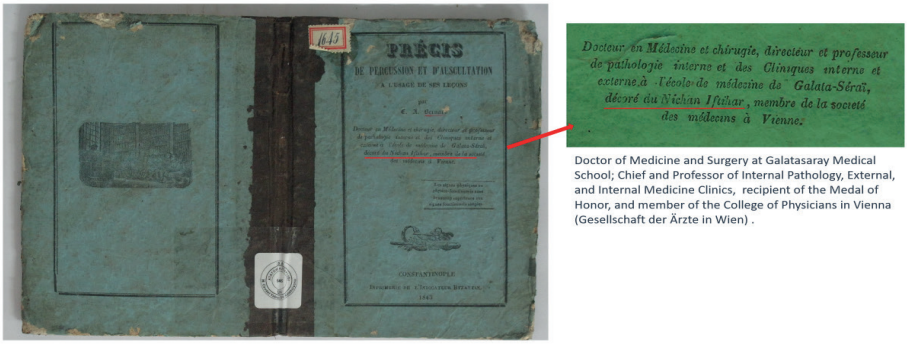

Figure 5: Information about the honor (service) medal given to Dr. Bernard can be seen on the cover picture of the book titled "Précis de percussion et d'auscultation à l'usage de ses leçons" (Constantinople, 1843). (Credit: IBB Atatürk Kitaplığı (IMM Ataturk Library), printed with permission)

Information about the meritorious service medal received from the Ottoman Empire can also be found on the cover of Dr Hyrtl's well-known anatomy book titled "Lehrbuch der Anatomie des Menschen" (Fig. 4). The news of Dr. Spitzer's fourth-order Medjidie award was

also covered in some Austrian newspapers of the period.[35] Due to his services, Dr. Bernard was awarded the "Medal of Honor" by the Ottoman Sultan and received an expensive gift adorned with diamonds in 1843. Information about the Medal of Honor can also be found on the first page of Dr. Bernard's book titled "Precis de Percussion," published in 1843 (Fig. 5).

In 1845, by successfully treating Sultan Abdulmecid, Dr. Spitzer established a friendship with the Sultan, a young physician in his early 30s. Spitzer received an official appointment as an imperial physician, granting him unlimited access to the Sultan.[36] Marcel Chahrour states in his detailed work about the effects of Austrian medicine and the reform of the Medical School in the Ottoman Empire that there is no official record of the number of physicians sent to the Ottomans from the Habsburg Empire for an official mission. Accordingly, it was estimated to be between 12 and 15; most of them operated in the Istanbul area at the request of Ottoman authorities.[37] In addition, at least one mission was also known to be working in Palestine.[38]

Cadaver dissections and advanced anatomy models of the time were included in anatomy education in Ottoman medicine through the efforts of invited physicians. Although the adequacy of cadavers is arguable, at least during this period, cadaver dissection was officially granted permission.[39] It would be fair to define the first period of reform in Ottoman medicine, until the 1850s, as being under the influence of Austrian physicians. Dr. Spitzer left Istanbul in 1850 out of fear for his life due to threats, after informing Sultan Abdulmecid about a plot. Due to his close ties with the Sultan, he was appointed as a counselor to the Ottoman embassy in Vienna in 1857, and shortly thereafter, he was appointed as the representative of the Porte at the court of Naples, where he remained until 1860.

The directorship of the school passed to a French epidemiologist, Dr. Antonine Fauvel (1813-1884), who became influential in the school afterward. Allegedly, this was due to diplomatic pressure rather than scientific skills.[40] Indeed, from 1839 to 1870, until efforts were made to convert medical education to Turkish, the school's curriculum was in French.

35 Schmidt, A. 1847. "Österreichische Blätter für Literatur." Kunst, Geschichte, Geographie, Statistik und Naturkunde (ÖBL) 4 (311):1231., "Laibacher Zeitung (07.12.1847), številka 146. URN:NBN:SI:DOC-IYUD8MZT from http://www.dlib.si

36 Chahrour M. 'A civilizing mission'? Austrian medicine and the reform of medical structures in the Ottoman Empire, 1838-1850. *Stud Hist Philos Biol Biomed Sci*. 2007 Dec;38(4):687-705.

37 In addition, Sarı N. (2001) states during the period of 1870-71, eighty-five Austrian and Hungarian doctors were appointed to work in military service and hospitals in the Ottoman Empire.

38 Chahrour M. 'A civilizing mission'? Austrian medicine and the reform of medical structures in the Ottoman Empire, 1838-1850. *Stud Hist Philos Biol Biomed Sci.* 2007 Dec;38(4):687-705.

39 Aykut, E. 2021. "Anatomical Things at the Juncture of Commerce and Science in the Late Ottoman Empire." European Journal of Turkish Studies. Social Sciences on Contemporary Turkey (32).

40 Chahrour M. 'A civilizing mission'? Austrian medicine and the reform of medical structures in the Ottoman Empire, 1838-1850. Stud Hist Philos Biol Biomed Sci. 2007 Dec;38(4):687-705

After this introduction to the establishment of the reform period in Ottoman medicine and anatomy and the influence of Austrian physicians, the second period of the 19th century marked the end of Austrian influence and mostly continued with the pupils of these physicians and their own graduates of the Imperial School of Medicine. The period until the secondary reform to convert medical education into Turkish is not well known for the history of anatomy. However, we mostly see names of the anatomy prosecutors and educators such as Dr. Palaiologos (Palyoluk) Effenti, Dr. Ioannis Kallias (Kalyas) (Successor of Palaiologos - chair of Anatomy for 1859-1883 Imperial School of Medicine), Dr. Davut (?), Dr. Agop (?), Dr. Hristo Stambolski (1843 – 1932), Dr. Yakova Aristidi (1835-1900), Dr. Mehmet Rasim Pasha (?), Ismail Besim Pasha (?), Yusuf Rami Bey (1856-1916), Hikmet Emin (?), Mustafa Münif Efendi (1855-1937, Civil Medical School), and Mehmet Tahir (1881-1940).[41] Group pictures of students and their instructors from the civil and military medical schools can be seen, depicting a cadaver on the table along with skulls and bones (Fig.6-7)

Figure 6: Students and teachers at the Imperial Civil School of Medicine, dated between 1880 and 1893. (Credit: Library of Congress, Prints & Photographs Division, Abdul Hamid II Collection, LC-USZ62-68432, Public domain)

41 Kyrkoudis, T., Tsoucalas, G., Thomaidis, V., Papavramidou, N., & Fiska, A. 2022. "The Greek Anatomist Ioannis Kallias. An Important Figure Of The Imperial School Of Medicine In The Ottoman Constantinople" Archives of the Balkan Medical Union : the Official Journal of the Balkan Medical Union, 57(2), 204–210.; Ulucam, E., Gokce, N., & Mesut, R. (2003). Turkish anatomy education from the foundation of the first modern medical school to today. JISHIM, 2, 50-2.

Figure 7: Students of the sixth class and teachers at the Imperial School of Medicine (Military), dated between 1880 and 1893. (Credit: Library of Congress, Prints & Photographs Division, Abdul Hamid II Collection, LC-USZ62-77267, Public domain)

Another important figure of this period is Dr. Hasan Mazhar Pasha (1845-1920), who is considered the 'founder of modern anatomy' in Turkey. He became a docent in 1878 at the *Mekteb-i Tıbbiye-i Adliye-i Şahane (Military Medical School)* and became a professor in 1879. He is known as one of the founders of *Tıbbıye-i Mülkiye (Civil Medical School),* which was established in 1867, and which conducted its curriculum in Turkish, and for creating the Turkish Medical Dictionary (Lügat-ı Tıp). After the conversion of medical curricula to Turkish, another problem arose: the lack of Turkish textbooks. Dr. Hasan Mazhar Pasha considered the needs of students when teaching anatomy classes at Mekteb-i Tıbbiye-i Şahane, and accordingly, he translated and authored textbooks. In this regard, his two main works were "İlm-i Teşrih-i Tavsifî" (Descriptive Anatomy Science) and "İlm-i Teşrih-i Topografî" (Topographic Anatomy Science).[42]

42 Çakmak, B. 2023. Mekatib-i Tıbbiye-i Şahane Anatomi (İlm-i Teşrih) Muallimi Ferik Hasan Mazhar Paşa. *Journal of Modern Turkish History Studies/Cumhuriyet Tarihi Araştırmaları Dergisi* (CTAD), 19(39).

Clearly, another aspect of the period is that the majority of efforts were directed toward establishing a modern school tailored to the needs of the time rather than scientific research.

Discussion

In this research, we aim to present a distinct perspective on a limited period when European anatomy research was flourishing with great findings and to investigate whether there was any influence on the anatomy of Ottoman medicine, which was founded by physicians trained in the same institutions as those pillars of anatomy. Numerous articles have been published on individuals who played key roles in initiating modern medical education in our country, as well as on educational materials and the evolution of educational programs. A brief historical overview of this subject is provided below.

Most history of anatomy studies primarily focuses on the beginnings of modern medical education, obtaining permission for cadaver dissection, and advancing anatomy education through improved curriculum or teaching materials while explaining the development of anatomy in 19th-century Ottoman medicine, often touching upon the translation and/or writing of original anatomical textbooks. Undoubtedly, these are all crucial factors that significantly contributed to the progress of anatomy as well as medical education itself. Nevertheless, the field of anatomy, which forms the fundamental framework for various biological sciences such as biological anthropology, gross anatomy, comparative anatomy, and microanatomy, and which witnessed the rapid emergence of a wide range of interdisciplinary research publications during that era, was often overlooked as a subject of research.

None of the studies considered the development of anatomy as a scientific discipline or why there is a lack of significant work in this field of medicine. In particular, when other medical fields make numerous contributions. Is this solely due to bureaucratic reasons, or perhaps because the invited physicians were too young and inexperienced to contribute significantly to the scientific framework of the medical college, aside from improving teaching methods? Our primary aim in this article is to shed light on this overlooked aspect and present potential arguments.

In the years following the establishment of the Anatomische Gesellschaft, significant research, discoveries, and techniques emerged in the fields of anatomy, embryology, and histology in European medicine. Although the efforts in Ottoman medicine for modernization and compliance with European/modern scientific approaches had begun long ago, we do not see the involvement of Ottoman anatomists in the activities of society. This situation suggests that, although the modernization of Ottoman medicine started in 1827 and gained significant momentum with a crucial step in 1839 by the invitation of Austrian physicians and the establishment of modern medical education at the Galatasaray Medical School, it

did not bring about significant innovations in scientific research. This applies to both macro-anatomy and histology and developmental anatomy (embryology).

The primary reason for this is the fact that permission to work with cadavers was granted much later (1841) compared to the countries previously mentioned. Initially, cadaver dissection permits only allowed for the use of bodies of shipyard prisoners who were killed by natural causes or by accidents, and the number of cadavers available was severely limited.[43] Historical sources indicate that even when permission for dissection was granted, the public had reservations about the practice, primarily due to Islamic beliefs that emphasize the preservation of the body in its entirety without disintegration.[44]

In 1846, to address the shortage of cadavers, a new solution emerged: permission was granted for the dissection of African slaves, both male and female, who had lost their lives in the Slave Market.[45] Ebru Aykut also mentions that it was Dr. Spitzer's idea to seize the opportunity to obtain data for anthropological research from the Slave Market. However, we do not have any traces of whether he conducted any anthropological research.[46] So, the question arises: were there any studies in the fields of anatomy or histology-embryology that did not require human cadavers, or was it simply not feasible? While providing a definitive answer to this question is challenging, it appears that no research had been conducted that would be substantial enough to be presented at the scientific meetings of that era. We have not come across any publications that document such research.[47] It is worth noting that some foreign surgeon-teachers criticized the medical school of that period for its inadequate physical facilities such as well-established laboratories and insufficient equipment for medical education, including the study of anatomy.[48]

The first microscope for Ottoman medical education was imported from Vienna in 1840, indicating the early use of histology. Additionally, in 1841, permission was granted for anatomy

43 Akkin, SM., and Dinc G.. 2014. "A glimpse into the process of gaining permission for the educational dissection of human cadavers in the Ottoman Empire." *Clin Anat* 27 (7):964-71. doi: 10.1002/ca.22421. ; Kahya, E. 1979. «Bizde disseksiyon ne zaman ve nasıl başladı.» *Belleten* 43 (172):739-760.

44 Kahya, E. 1979. "Bizde disseksiyon ne zaman ve nasıl başladı." *Belleten* 43 (172):739-760.

45 Aykut, E. 2021. "Anatomical Things at the Juncture of Commerce and Science in the Late Ottoman Empire." *European Journal of Turkish Studies. Social Sciences on Contemporary Turkey* (32).

46 Prof. Hyrtl sold a large collection of crania to the Mutter Museum in Philadelphia. In his letters, he mentions that it was too difficult to obtain Muslim and Jewish skulls; he had to bribe most of the gravestealers, and his 'pupils,' who were physicians of the Turkish Pachas, procured most of them. Even though we do not know the exact name, Dr. Spitzer was also a pupil. Please refer to Keckeisen (2012) for detailed information about Hyrtl's collections.

47 Aykut (2021) mentions about research conducted by Dr. Augustin Weisbach on Turkish crania for anthropological assessment during his stay in Istanbul between 1868 and 1886. This biological anthropology article can be found in Weisbach, A. 'Mittheilungen der anthropologischen Gesellschaft in Wien,' 8-9, November 20, 1873, pp. 185-245. Although the methodology was a part of anatomy as the study did not directly contribute to the evolution of anatomical research in Ottoman medicine, we did not further discuss it.

48 Aykut, E. 2021. "Anatomical Things at the Juncture of Commerce and Science in the Late Ottoman Empire." *European Journal of Turkish Studies. Social Sciences on Contemporary Turkey* (32).

dissections and autopsy studies of the human body.[49] While there were efforts to introduce histology (ilm-i ensaç) courses into Ottoman medical education for the first time in 1872, and a physician was sent to Vienna to learn histological studies and methods and implement them in the Ottoman medical program,[50] we do not find significant traces of Ottoman-Turkish medicine in the fields of anatomy and histology in those meetings. Despite such scientific initiatives and serious efforts, there are no traces of Ottoman medicine in Europe in terms of the branches of macro-anatomy, microanatomy, and developmental anatomy (embryology). However, it is evident not only from the history of anatomical sciences but also from the studies presented at annual meetings that very impactful and significant anatomical studies and research were being carried out during this time. Furthermore, the anatomical society continued to grow with an increasing number of international members and intense scientific activities during the lifetimes of important anatomical figures in Ottoman medicine, such as Dr. Hyrtl (1810-1894) and Dr. Sigmund Spitzer (1813-1895). Even though these figures may not have been actively practicing (Dr. Spitzer left Istanbul in 1850), it would be expected that they should have influenced their successors in the field of anatomy in the Ottoman Empire. The only scientific presentation at an international meeting that we could find records of was obtained from a medical newspaper. It reported that Dr. Spitzer delivered a presentation on the physio-pathological characteristics of castrated individuals during a meeting of the "Vienna Doctors Association" held on November 16, 1848, in Vienna.[51] Despite their significant contributions to European anatomy and the substantial impact Dr. Spitzer had on Ottoman medical education, it is curious that their pupils did not represent Ottoman anatomy at the international anatomy congresses.

In fact, archive records show invitations to international medical congresses and the state's responses regarding participation, whether as a member of the medical faculty or not, in different fields. For example, as mentioned above, the tenth International Congress hosted various associations from different medical fields, drawing several attendees—5526 in total.[52] Congress records show that twelve of these participants were from the Ottoman Empire, including renowned figures such as the pioneering pediatrician Dr. Giovanni-

49 Akıncı, Sırrı. 1962. "Osmanlı İmparatorluğu tıbbında disseksiyon ve otopsi." *İstanbul Üniversitesi Tıp Fakültesi Mecmuası* 25 (1):97-115., Ortug, Gursel. 1982. "Tip tarihi bakimindan Osmanli Imparatorlugu'nda anatomi ogretimi ve tesrih [The anatomy teaching and dissection in the Ottoman Empire in respect of the history of medicine]." *Turk Kulturu* 20:378-385.

50 Erbengi, Turkan. 1988. "Histoloji (Histology)." In Dünya'da ve Türkiye'de 1850 Yılından Sonra Tıp Dallarındaki İlerlemelerin Tarihi (The History of Advances in Medical Fields Worldwide and in Turkey Since the Year 1850), edited by Ekrem Kadri Unat, 208-2019. Istanbul: Cerrahpaşa Tıp Fakültesi Vakfı Yayınları., Ortug, Gursel. 1998. "Osmanlı-Türk tıbbında histoloji (İlm-i ensaç) öğretim ve eğitimi hakkında bir ön çalışma." V.Türk Tıp Tarihi Kongresi Ankara.

51 Sachs, Wittwe. 1848. Allgemeine medicinische Central-Zeitung. Edited by Louis Posner. Vol. XVII: Berlin : Expedition der Allgemeinen Medicinischen Central-Zeitung.

52 Hirschwald, August 1891. Verhandlungen des X. Internationalen medicinischen congresses, Berlin, 4.-9. august 1890. 5 vols. Vol. 1. Berlin.

Battista (John-Baptista) Violi (1849-1928)[53] and Dr. Edwin Van Milligen (1850-1900), an ophthalmologist and aurist who also served as one of the surgeons to the Imperial harem and as a personal attendant to Sultan Abdul Hamid II.[54] Another interesting coincidence is that both of these doctors have ties to Austria, as they both pursued special training in Vienna before returning to Istanbul in 1874. The fact that several other physicians participated in various medical congresses during the 19th century and it seems the focus was mostly on public health such as various aspects of vaccination against smallpox, prophylaxis of venereal diseases, sanitation of cities, and sewage.[55] Indeed, Dr. Violi is also known for his Institute for Smallpox, the "Establishment Vaccinale [Vaccinogène]," founded in 1880, where the only smallpox vaccine and serum in the Ottoman Empire were produced until 1892.[56]

The most important point to emphasize here is, considering that scientific research is a culture in which researchers advance by building on the knowledge of the professors who came before them, it can be suggested that this mindset was just emerging at a time when scholastic thought was fading, and the scientific mindset was evolving. What is intriguing is that foreign scientists who came from the source of the early transformation of this phenomenon either did not prominently engage in this shift or chose to remain primarily as physicians and lecturers.

During these periods, various scientific associations not specifically related to anatomy but to the general field of medicine were established in Ottoman medicine. Dutch physician Peter Pincoffs, serving in the British army, and his associates, who were members of the allied armies stationed in Istanbul, founded one of these on February 15, 1856, under the name 'Société Medicale de Constantinople' (Istanbul Medical Society).[57] Its main purpose was to address medical challenges faced by physicians caring for wounded soldiers in Istanbul and to foster solidarity among them. Another significant development is the society named 'Cemiyet-i Tıbbiye-i Osmaniye,' established in Istanbul in 1862 by the students of Mekteb-i Tıbbiye-i Şâhane (Imperial School of Medicine) which is the continuation of the first modern medical school of Ottoman medicine-Tiphane ve Cerrahhane-i Amire (Royal School of Medicine and Surgery, establishment 1827). The association was divided into

53 Dr Violi introduced a vaccine production institution along with a children's hospital, dispensary, and sanatorium, which was the first sanatorium hospital, Saint George Hospital, in 1902 in Burgazada, Istanbul, for the fight against tuberculosis.

54 See Dinc and Etker 2004 for information about Dr. John-Baptista Violi,: Wood 1929 and Hirschwald 1891 for information about Dr. Edwin Van Milligen.

55 Bakkal, A. 2020. "Osmanlı Döneminde Tıp Alanında Eser Veren Balkanlı Hekimler." *Turkish Academic Research Review* 5 (4):662-684.

56 Dr. Violi presented his vaccination equipment at different fairs throughout the world and received positive feedback from the Chicago fair. He was also awarded the Order of Medjidie in 1897 for his contributions to vaccination efforts. [Y.. PRK.UM.. , 41 – 115, H-20-12-1315İ ; HR.TH.. 187 – 69, M-13-01-1897]

57 İhsanoğlu, E. 1996. "Osmanlı Türkiyesinde kültür ve bilim hayatında tüzel kişiliğin gelişmesi ve teşkilatlanmanın başlaması." *Erdem* 9 (25):265-292.

eleven branches, one of which was 'Anatomy and Physiology'.[58] This might be the earliest form of an anatomical society in Turkey.

The society's objectives were to translate foreign medical and dentistry studies into Turkish and to publish a monthly Turkish journal.[32] It is worth mentioning that an association solely dedicated to the field of anatomy was not officially established until much later, in 1991, under the name of the 'Turkish Society of Anatomy and Clinical Anatomy (TSACA)'.

Conclusion

This article outlines the development of the science of anatomy in Ottoman medicine, focusing on points that have not been emphasized to date, particularly within the European scientific community of the same period. Various medical societies were established in the Ottoman Empire since 1856, and the Cemiyet-i Tıbbiye-i Osmaniye, founded in 1862, had a structure that could be considered an early organization of anatomy, with its "Anatomy and Physiology" subunit. In-depth research of the era reveals that, despite the modernization initiatives that commenced in Ottoman Medicine in 1839, the field of anatomy predominantly adhered to theoretical and traditional classical principles for an extended period, neglecting experimental research.

Furthermore, anatomy research and education, which lagged significantly behind European science, particularly in the early-mid 19th century, began to align more closely with its contemporaries in the early 20th century, coinciding with reforms during the Republican era.

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