

ORIGINAL PAPER

AN INSIGHT INTO THE HISTORY OF ANATOMOPATHOLOGICAL MUSEUMS. PART 2

JACEK GULCZYŃSKI¹, PIOTR PALUCHOWSKI², JACEK HALASZ², ADAM SZARSZEWSKI²,
MAREK BUKOWSKI³, EWA IŻYCKA-ŚWIESZEWSKA^{1,4}

¹Department of Pathology and Neuropathology, Medical University of Gdańsk, Gdańsk, Poland

²Department of History and Philosophy of Medical Science, Medical University of Gdańsk, Gdańsk, Poland

³Museum of Medical University of Gdańsk, Poland

⁴Department of Pathomorphology, COPERNICUS, Gdańsk, Poland

The second part of the comprehensive work concerning pathology museums and collections presents their history since the 19th century. The evolution and specialisation of museums, depending on the attitude of their creators and geographic localization, have been analysed. The changing aspects of obtaining the exhibits and how they were preserved, presented, and stored are also a part of this work. The methods of human organ fixation reached excellence in the 19th century, but the rarity of some pathologies urged the scientists to recreate them artificially in models for didactic purposes. In the 19th and 20th centuries one could observe the flourishing development with a plateau and then decline from the second part of the 20th century to the reorientation of the museums that took place in Europe and North America. The history of anatomopathological museums is connected with ethical problems related to acquisition of exhibits in previous centuries and especially during World War II. The changing purpose of the collections, as well as their unclear future and the impact on the visitors, are evident.

For the last 50 years, many museums have been closing completely, but some collections have been digitalised and are still in permanent use. The uniqueness of old specimens with certain diseases, often long gone and not observed anymore, makes them important in many aspects nowadays. Pathology museums are themselves relics of the past, being at the same time tangible proof of ways of development in medicine, but also a way of preservation of human knowledge in a special type of relation with the human body.

Key words: pathology, museum, history, collections, preservation, ceroplastics.

Introduction

We present the second part of an insight into the history of anatomopathological museums [1], analysing their complex phenomenon from the middle of the 19th century up to now. The pathology collections and museums beginning from the 16th century are strictly connected with the history of autopsies,

being a multidimensional element in the progress of anatomy, pathology, and medicine as a whole. The development of pathology and, in parallel, pathology museums and collections, according to Axel Bauer can be divided into several stages during their 500-year history [2]. It started during the Renaissance with the creation of modern anatomy and the first noted pathological findings concluding in the first

collections of curiosities and specimens. The scientific foundation was created by Vesalius (*De Humani Corporis Fabrica* 1543), ending with the publication of Théophile Bonet's *Sepulchretum sive anatomia practica* in 1679. Many physicians studied diseases during and after autopsies. This stage was followed by the era of noting, and registering and collecting pathological findings and publishing them in *specilegia* – assemblages of autopsy reports [3], the first attempts at understanding the process of disease and demise, ending with the publication of *De sedibus et causis morborum per anatomen indagatis* by Morgagni in 1761. The collections underwent transformation from assemblages of curiosities, through the stage of mainly medical exhibits, later to become more sophisticated and specialised, based on specimens acquired during autopsies and/or surgical procedures [1]. Many methods of fixation were developed through the centuries, starting from simple osteological specimens, and then wet specimens in glass jars and tubes, preserved in alcohol or even honey, as well as dried exhibits. Later collections were enriched with drawings, then photographs, and finally with full medical documentation. Pathologies were also copied in models, first in stone, bone, wood, and ivory, and later in wax (ceroplastics), as well as models made of plaster and papier-mâché [1, 4].



Fig. 1. Bell's Palsy wax model

Source: Courtesy of Dr William Edwards from Gordon Museum, King's College London, United Kingdom

In the 19th century the medical sciences underwent a massive revolution. The progress was marked by a transition from speculative theories of the turn of the 19th century (mesmerism, Brownism) to procedures based on clinical research and medical experiments. This shift resulted in a number of discoveries

related to the theory of microbes, the development of anaesthesia, hygiene, antiseptics, and surgery. The changes were also introduced in the fields of pathology and sample collections. The development of other sciences like biology, physics, and last but not least chemistry, also played a major part. Consequently, the 19th century witnessed the formation of a multitude of anatomical and pathological assemblages, usually housed by universities and hospitals [4, 5]. At the beginning of the 19th century morgues and autopsy rooms were already in the majority of larger hospitals. The post mortem examinations were still performed by surgeons, but pathology was already established as a separate medical branch and this procedure was slowly becoming reserved only for its specialists. Soon after, pathology became a basis for clinical diagnostics and nosology. With a huge number of autopsies, instantly many pathological findings, anomalies, and malformations were observed and noted, and consecutively collected and presented. At the turn of the 20th century pathology separated from anatomy and clinical specialties and became an independent discipline of medicine. The majority of hospitals and universities with their own pathology departments had collections of specimens mainly for educational purposes.

Development of medicine and pathology – the foundation for the popularity of anatomopathological museums in the 19th century

In the 19th century, assemblages slowly changed from partly entertaining to more scientific ones with a strong educational aspect. The development of pathology was based on technical inventions and innovations in already existing equipment. So-called “Inspectors of the Dead” and “Curators of Museums” were slowly replaced by lecturers, and later professors of pathology. The improved process of tissue fixation helped to maintain and preserve the specimens. Formaldehyde was discovered in 1859, and tissue fixation features of formalin (formaldehyde solution) were announced by Ferdinand Blum (1865-1959) in 1892 [6]. Zygmunt Laskowski (1841-1928), the Polish anatomist and professor in Paris and Geneva, worked on a fixative mixture helping to maintain the integrity and structure of the tissues. By mixing phenol solutions with glycerine they managed to keep “all features of fresh specimens, the colour of the muscles slightly darker than fresh – soft without any odour”. We must note that Laskowski was also the creator and the first director of the Anatomical Museum at the University in Geneva [7].

The revolution in communication and popularisation of regular medical journals resulted in quick exchange of medical information. This was the time

when anatomical and anatomopathological museums flourished [3]. Since the turn of the 19th century they have had a profound impact on medical education. Those real, three-dimensional, natural exhibits had immense didactic value that was acknowledged in universities that created their own assemblages. Due to rapid development, beside collections that were strictly anatomical, the pathological ones were either created *de novo* or made separate. Eventually the narrowing of the scope of collections followed with assemblages in osteopathology, dermatopathology, teratology, or brain banks. Scientific societies tried to create their own expositions either from the very beginning or by acquiring already existing entities founded earlier by wealthy scientists, such as William (1718-1783) and John Hunter (1728-1793) [1, 8].

Their popularity and usefulness, not only in medicine, confirmed the need for gathering and recording specimens in order to learn and understand rare cases and then teach the students. Such ideas were the foundation of Musée Dupuytren in Paris. Guillaume Dupuytren (1777-1835), a French surgeon, was one of the founders of the *Société Française de Pathologie*. After his death, Matthieu Orfila (1787–1853), a forensics professor, convinced the city authorities to use the money left by Dupuytren to create a museum of morbid anatomy. At the time of its opening it owned ca. 1000 exhibits, reaching 6000 in 1870. Some of them were made by Ludwik M. Hirsfeld (1816-1876), later to become the Chair of Anatomy at the Imperial-Royal Medical-Surgical Academy in Warsaw. Functioning up to 2016 (now moved to Campus Jussieu at UPMC – *L'Université Pierre et Marie Curie*), it showed the strong belief among 19th century scientists about the role of such institutions [9, 10, 11].

Part of a contemporary Friedrich-Alexander-Universität Erlangenürnberg anatomopathological museum collection dates from 1804 [12]. As is the case with the majority of such places, it was planned as a widely understood didactic aid. Thus, it contained also zoological and anthropological specimens for

comparative anatomy lectures, as well as forensic medicine exhibits. In 1862 some of the specimens were separated as part of the *Museum Patologico-anatomicum*, functioning beside the local university hospital, as an attempt to assemble examples of typical lesions, but also rare phenomena. In the 20th century the collection was neglected, and currently the assemblage is successively being restored and holds about 1200 wet specimens [12, 13].

The next renowned anatomical museum (today *Museo Leonetto Comparini*) is a part of the *Centro Universitario* in Siena. It was organised by Giovanni Paolo Mascagni (1755-1815), an anatomist famous for his anatomy atlases, where the human body was depicted in 1 : 1 scale [14]. Later the collection expanded by ca. 800 skulls and pathological fetuses. The museum houses a collection of 19th century models of lymphatic vessels and an ample collection of plates with anatomical drawings, including a few by Leonardo da Vinci (1452-1519). Some of the rooms are arranged as reconstructions of dissection theatres, laboratories, and study environments, as catalogued in 1865 [1, 14, 15].

Another influential institution, the *Museo di Anatomia ed Istologia Patologica*, was created in Pisa in



Fig. 2. Museo "Leonetto Comparini" Siena, Italy

Source: Photo by Luca Borghi for Himetop – The History of Medicine Topographical Database: himetop.net



Fig. 3. Panoramic view of the museum in Pisa

Source: Courtesy of the Museum of Pathological Anatomy, University of Pisa, Italy

1870 as a part of the local Medical School. It clearly shows the way specialised collections were created in the 19th century. What is particularly interesting is the part covering the majority of congenital neonatal malformations. A collection of anatomopathological parts contains around 1500 prepared anatomical specimens (both dry and wet) and is continuously being expanded, usually with autopsy exhibits. Recently, pulmonary pathology exhibits of occupational diseases were constructed. In addition, medical documentation was gathered, containing around 30,000 reports, the latest dating from 1884 [16, 17].

Virchow's ideas and heritage

Initially, in the 19th century, Karl Rokitansky was considered to be the most influential scientist and prosector. He was also connected and engaged in the expansion of the Narrenturm collection. But it was Virchow's theory of cellular pathology (*omnis cellula e cellula*) that totally changed the point of view on understanding and diagnosing a disease. Rudolf Virchow had a great influence on the scope of scientific research in the 19th century, being a pathologist and an active politician (as a scientist he also dealt with anthropology, hygiene, and archaeology). In 1849 Virchow became the head of the Pathology Department in Würzburg, the first such department in Germany. He continued to maintain and expand the collection started by the previous anatomy professor Karl Friedrich von Heusinger (1792-1883) [18, 19, 20].

Virchow performed many autopsies and consequently found a multitude of pathological changes, hence his motto: "No day without a specimen". To improve navigation over the vast collection he had to prepare its first catalogue [21, 22]. In 1856 Virchow moved to Berlin to run the Department of Pathological Anatomy and Physiology at the Friedrich-Wilhelms University and the newly built Institute for Pathology on the premises of the Charité [23]. That is where he created another enormous collection of scientific exhibits. From just 1500, it reached over 23,000 dry and wet specimens by the end of his life. They could be divided into three parts: anatomy, typical lesions, and stages of disease [24]. Virchow wanted to share the exhibits with a wider public, so in 1899 he opened the *Pathologisches Museum*. This kind of archive was supposed to be used in the everyday work of scientists, physicians, medical teachers, as well as students. The goal of the museum was also to present the human body in something like a three-dimensional atlas. Quite often the exhibited cases were supplemented by an additional description and supported by plaster or wax models. From this perspective the Berlin collec-

tion was the first professional pathology museum with an exact exhibit scenario. Rudolph Virchow died in 1902, but his successors continued his work and expanded the collection to 26,000 exhibits before World War II. After the war its scant remnants grew again to about 10,000 specimens. Later, an additional 3300 exhibits belonging to Johann Gottlieb Walter (1734-1818) were added in the collection [25, 26, 27, 28]. Virchow had many continuators – von Rindfleisch (1836-1908) in Würzburg, in Greifswald it was Paul Albert Grawitz (1850-1932) [29], and Julius Arnold (1835-1915) from Heidelberg (today part of the Ruprecht-Karls-Universität Heidelberg collection) [30]. Felix Jacob Marchand (1846-1928), from the Institute of Pathology in Giessen, later in Marburg and Leipzig, was so impressed by Virchow's collection that, based on over 32,000 autopsies, he decided to create his own assemblage reaching a total of 10,000 exhibits. However, only



Fig. 4. Museum in Tartu

Source: Courtesy of Maie Toomsalu, Tartu

a little over 600 items, mainly tuberculosis lesions, have survived until today [31, 32].

The Estonian Tartu collection, founded by August Antonius Raube, dates from 1890. It was kept in the Old Anatomical Theatre. The assemblage was to serve as an illustration for anatomy lectures. Later the museum was opened to non-medical students and Tartu citizens, with Friday as a day especially for housewives. The items were scattered as a result of two World Wars but have been reacquired and presented to the public since 2005 [33]. It is impossible to describe or even to list all European pathology museums or collections here, but we cannot leave unmentioned some of the most prominent, like the London Bart's Pathology Museum, the Hunterian Museums (London and Glasgow), the Gordon Pathology Museum, the Berlin Museum of Medical History at the Charité, the Lyon Hospitals Hôtel-Dieu Museum in France, the Basque Museum of the History of Medicine and Science in Leioa, and the Medicinsk Museion in Copenhagen [34].

Models

In the 19th century models presenting the human body were quite common. An important person in this area was Joseph Towne (1806-1879) from England, who made excellent models from wax. They became popular in Europe, the USA, and India. Today, being a great part of the Gordon Museum in London, they are still available for public viewing [3, 35, 36, 37]. Other famous wax modellers from the 19th century were Luigi Calamai (1800-1851) and Egisto Tortori (1829-1893) from Florence [4, 38]. Since wax was a rather expensive material, another substitute used for pathology models was *papier mâché*, i.e. paper pulp mixed with glue. The cheaper models were so successful that they were purchased by universities, schools, hospitals, and even private persons. This interest proves that medicine and pathology were popular among general society [39, 40]. The models were used to present pathological changes, as well as embryology, osteology, or obstetrics. In the field of skin pathology Le Musée de l'Hôpital Saint-Louis in Paris, tied with the Université de Paris V, dating from 1866, is quite famous. First colour and black and white plates with reproductions were supplemented by wax models, and later by moulages. This technique reflected the human anatomy and different diseases, after taking direct casts from the body using gelatine, alginate, or silicone moulds, using wax as the primary material, later to be replaced by latex and rubber. Another way was to take the cast from a healthy person and later skilfully "apply" the desired disease fea-

tures with coloured wax and pigments. Such specimens were presented to the public in 1889 and in 1892 at the First and Second International Congresses of Dermatology. Collections of Le Musée de l'Hôpital Saint-Louis depicted mainly dermatopathology: leprosy, lupus erythematosus, mycosis fungoides, and many others. What was pivotal in the course of teaching medicine is that this venue popularised moulages, especially in dermatology, with some highly contagious diseases as the first choice and life size three-dimensional models. The important aspect was that they were safe for learning physicians [41, 42].

Another material in anatomopathological modelling was plaster. In Leipzig, sculptor Franz Josef Steger (1845-1938) with the help of Wilhelm His (1831-1904) created a collection of plaster models using his own technique – freezing the body before taking the cast, in order to make a more detailed moulage. Steger's models can be found today in university collections in Berlin, Münster, Edinburgh, Aberdeen, Melbourne, and Otago [38, 43]. Still, wax was the best material to resemble human body, with or without pathological changes. At the turn of the 19th century one of biggest such collections was founded by the Swiss painter Léonce Schiffman – *Sammlung Schiffman-Binda-Bonardo*. It covered the stages of brain development, stages of pregnancy, multiple pregnancies, genital disorders, and other pathologies [44, 45].

Assemblages in Poland

Proper collections started to exist as a didactic aid at the turn of 18th century at medical universities on Polish territory in Vilnius, Kraków, and Lviv. The Jagiellonian University collection expanded in the 19th century and developed into a large museum of both pathology and comparative anatomy. It was constantly enriched by consecutive heads of the department to reach over 2000 specimens of all kinds. The Anatomy and later the Pathology Department at Vilnius University also created its own collection. Unfortunately, due to preserving all specimens in alcohol solutions, almost all of them were eaten by Napoleon's soldiers retreating after the defeat in Russia [46]. In 1865 a separate Department of Anatomical Pathology was created in Wrocław, but the museum specimens, though mainly anatomical, date from earlier years and come from another University - Viadrina [47]. The beginnings of the Warsaw collections are connected with Professor Edward Loth (1884-1944), one of the organisers of Warsaw University in 1915 and the founder of the Department of Anatomy. During the Uprising in 1944 the majority of the collection was lost. After WWII anatomical



Fig. 5. Plaster Models in Pathological Cabinet, The Museum of the Faculty of Medicine at the Jagiellonian University, Kraków, Poland

Source: Internet



Fig. 6. Exhibition room with specimens in the old building of the Pathomorphology Department, Medical University in Gdańsk

Source: Private archives of Dr Ewa Iżycka-Świeszewska



Fig. 7. Cardiopathological specimen from the old collection of the Pathomorphology Department, Medical University in Gdańsk

Source: Private archives of Dr Ewa Iżycka-Świeszewska

specimens were obtained from the Children's Memorial Health Institute and Department of Neuropathology at the Institute of Psychiatry and Neurology. The Museum of Anatomy at the University of Poznań was founded by Professor Józef Markowski (1874-1947), temporarily from Lvov, and later continued by Stefan Różycki (1886-1953), the head of the Descriptive and Topographic Anatomy Department. In 1939, the University of Poznań was closed, to be reopened by Nazi Germans in 1941 as the *Reichsuniversität Posen*.

After WWII, along with newly established or reinstated academic medical centres, new anatomy and pathology collections started to be created *de novo* in Białystok, Gdańsk, Lublin, Łódź, Szczecin, and Wrocław. Smaller assemblages functioned since the beginning of 20th century also in Zabrze and Katowice at city hospitals [48]. Nowadays anatomopathological museums in Poland are small and limited.

Anatomical collections outside Europe

Pathology as a science developed and was taught at European universities, where also many Americans were educated. The great physician and pathologist William Osler (1849-1919) studied in Montreal, Canada but continued his postgraduate education in Europe. Being a clinician, he performed over 1000 autopsies himself and deposited interesting findings in the Pathology Museum (1876-1884), now the Maude Abbott Medical Museum Osler Collection, Montreal, Quebec, Canada. Aldred S. Warthin (1866-1931) described the idea of the collection: "(To Osler) the pathological specimen, properly prepared and catalogued, was a record of disease more instructive than any textbook description could possibly be. [...] Each had a wonderful beauty of its own – valuable in that it demonstrated some essential bit of knowledge of disease for which it should be preserved as an individual record" [49].

In America the beginnings of pathology collections were to some extent connected with the Civil War (1861-1865). In 1862 Gen. William A. Hammond (1828-1900) started the Army Medical Museum in Washington, D.C. by depositing the first three dried and varnished tissue specimens. Initially it gathered specimens connected only with military medicine. The wounds, for example, were photographed, then whole medical records, including surgical treatment, were made, and then the results were noted. It resulted in issuing *The Medical and Surgical History of the War of the Rebellion* [50]. Later the collection developed and was subdivided into two separate entities: The National Museum of Health and Medicine and The Armed Forces Institute of Pathology. The first collected military medical records dating from the Civil War, along with medical instruments and 5000 osteological specimens and 10,000

preserved organs, present cases of injuries and different diseases. It also contained the largest American collection of embryologic material. The mission of The Armed Forces Institute of Pathology (AFIP) was different. Its latest form evolved in the 1940s and 1950s. The institute, based on its vast archives gathering all possible medical information (documents, clinical and radiological data of the patients, tissue samples and microscopic slides, and in many cases also fully preserved organs), was meant to provide the best possible medical expertise in diagnostic consultation, education, and research not only for the U.S. military but also the civilian community. In this institute autopsies of famous people, including some of the American Presidents, were performed. Its scientific staff with enormous experience and knowledge also played a major role in the TNM project (Tumour Node Metastasis) of the Union for International Cancer Control (UICC). The AFIP Atlases of Tumour Pathology, published by the American Registry of Pathology, contributed to standardisation in diagnosis all over the world. Before its closing in 2011 the AFIP was assisting with over 40,000 consultations a year. The Museum of Medicine, with modest remnants of its collections, is still open to visitors [51].



Fig. 8. The main building of AFIP

Source: Courtesy of Dr Jerzy Lasota, National Institutes of Health, Bethesda, MD, United States

Another famous American collection is at the Mütter Museum, named after Thomas D. Mütter (1811-1859). He donated the collection of wet and osteological specimens, models, and surgical instruments, along with some funds, to the College of Physicians of Philadelphia. It has grown, acquiring among many others items the famous Mütter American Giant and a collection of skulls from the Austrian anatomist Josef Hyrtl (1810-1894). It is also currently the place where members of the public can view slides of Al-

bert Einstein's brain. The Mütter Museum is still expanding its collections of objects, conforming with the Collections Management Policy [52, 53].

In Sydney, a pathology museum originated in the 1880s as a teaching aid for the lecturers of the Medical School of the University of Sydney and was called the Museum of Normal and Morbid Anatomy. Currently the Museum holds over 1600 exhibits which are also digitalised [54]. The Museum of Human Disease connected with the University of New South Wales is also located in Sydney. Founded in the 1960s by a pathologist, Donald L. Wilhelm (1919-1977), it initially evolved as a didactic aid for medical students, and nowadays with multiple interactive presentations it allows the wider public to experience contact with anatomy and pathology. This museum creates awareness in society about general public health and diseases [55].

In Asia the largest medical museums with pathology units are situated in Hong Kong (the Hong Kong Museum of Medical Sciences established in 1996), Seoul (the Korean Choowondang Museum of Medicine), and Bangkok (The Siriraj Medical Museum established in 1886). An interesting museum with a narrow specialisation is the Meguro Parasitological Museum, Tokyo, Japan, which collects exhibits dealing with parasitology of humans. Another one is the Ibn Sina Academy of Medieval Medicine and Science in India, where handmade antiquated clay and mud moulds show the respiratory and gastrointestinal systems anatomy and disorders [56, 57].

Pathological museums and anthropology

In the 19th century in France a new branch of the field dealing with the human body was created: Physical Anthropology, the first methodologist of which was the surgeon Paul Broca. His studies have influenced the development of medicine and anatomopathology, especially the research in the field of comparative anatomy, studies on the evolutionary development of the human species, and the anatomical variability between contemporary populations, one individual in the course of his life and various types of deviations in human anatomy. The widespread adoption of the theory of evolution in science also resulted in the creation of many anthropological museums, where one can find anatomopathological material, and vice versa.

Ethical aspects

In the history of science there is a general tendency to concentrate on breakthrough events, discoveries, and theories, often ignoring their moral and social context. Although in early medical practices a human corpse was, due to religious aspects,

of tremendous importance, the proper treatment of it had always been a marginal issue. The outcome of the moral dilemmas that eventually followed were philosophical and theological discourses, social response, or attempts at legal regulations. For instance, the British Anatomy Act of 1832 addressed the issues of grave robberies, corpse trade, or the criminal practices of killing people for corpses (the so-called “Edinburgh Scandal”). We must note, however, that the dissected corpses were often those of convicts and suicide victims, penalised even “beyond death”, or individuals from social margins. Today, the widely accepted practice, devoid of moral doubts, is to donate your own body for the purpose of medical research [58]. With all due respect to the advantages of anatomopathological assemblages as teaching aids, not just for students of medicine and physicians, but also a wider public in all aspects of general knowledge and consciousness of basis of any disease and human body as a precise biological organism, their ethical aspects require commentary. Through the centuries authentic human exhibits usually came from autopsies or surgical excisions. But the aspect of how the latter were obtained posed a problem for scientific and public discussion. Through many decades, cases of stealing bodies and selling them to morgues and anatomy lecturers were frequent. The case of Burke and Hare even gave foundation for R.L. Stevenson’s book *The Body Snatcher* (1884). Many specimens came from bodies of victims and executed prisoners including, for example, casualties of the French revolution, as well as people with inborn defects or just of Aboriginal or African origin.

The greatest turmoil was connected mainly with medicine during the Nazi era in Germany. Science was used as proof of righteousness of the theory of white, Aryan race supremacy over others like Jews, Gypsies, or Slavic people, but first of all the deformed or people with congenital malformations. Many of them were executed just for preparation of anatomical or pathological exhibits. August Hirt (1898-1945), SS officer and head of the Institute of Anatomy in Strasbourg, prepared a collection of skeletons of concentration camp prisoners killed in gas chambers. Hermann Voss (1894-1987) served as director of the Anatomy Institute in Posen (Poznań). He used bodies of victims executed by Gestapo in his experiments and research. Joseph Mengele (1911-1979), who led his experiments in the Auschwitz-Birkenau camp, gathered collections of internal organs or even complete heads of children killed there [59]. Part of these and many other collections survived, often scattered in Germany and locally outside. The bad reputation also touched neuropathology because several prominent Nazi scientists collected brains obtained from the handicapped and neurologically ill people. Some of such actions had cryptonyms, such as Aktion T4

(from the address Tiergartenstrasse 4). The brains and skulls of patients from neuro-psychiatric hospitals constituted material for neuropathological studies (Scherrer, Hallervorden, Spatz, and others) [60].

Ghoulis circumstances linked to WWII, and later the development of other means of teaching pathology, caused many collections of unknown or genocide provenance to be destroyed. Also, many eponyms are now being removed from medical vocabulary and many medical museum specimens, being the result of Nazi medicine, have had to be given a proper burial. Nevertheless, recently there have been voices saying that, despite the gloomy history, they should be preserved as a tribute to those anonymous people’s martyrdom for the medical progress of future generations. Some museum exhibits showing Aborigine or South American human remnants returned them to be buried in their countries of origin, sometimes even by identified ancestors. These problems influenced also the evolution of anatomopathological museums in recent decades. Accordingly, the German centre of plastination, Plastinarium in Guben, should be mentioned here. It was founded by Gunther von Hagens, known widely for his controversial attitude towards autopsy and the human body. The societies face moral dilemmas regarding anatomical and pathological collections, and ambivalent feelings concerning public displays of human corpses or their parts at exhibitions, such as *Body Worlds* or *The Human Body Exhibition*. People are often more offended when exhibitions take place far from medical universities or even museums, in shopping centres or at fairs [34, 61, 62, 63]. Thus, with the history of human body collections in mind, fundamental questions arise about the status of a human corpse, the moral value of a dead human body, about the evolution of ethics relating to the human corpse (attitude to autopsy, preparation, semi-artistic events) and, finally, about legal regulations regarding the human cadaver and human body parts [58].

The value and future of anatomopathological museums and collections

After the boom period, the second half of the 20th century noted a steady decline in pathology collections, caused by a diminishing number of autopsies performed, the development of imaging techniques, and improved hospital diagnostics and treatment. The collections became less attractive for students and physicians, and the skill of preservation techniques steadily deteriorated. Many collections were destroyed, scattered, or moved. A few institutions still cultivate the tradition of keeping and presenting or developing the collections nowadays. Very often they contain exhibits of lesions not seen today, now

extremely rare, or unavailable for gross inspection because of the modern treatment approach. Some of the anatomopathological collections were revitalised and digitalised and are still in the curriculum of medical students. Some of the exhibits have been shown to non-medical spectators as a source of wider knowledge. Just as in centuries before, they stimulate not only physicians and surgeons, but also scientists and artists [2, 3, 9, 14, 33, 37, 64].

The anatomopathological assemblages had an immense impact on the development of pathology and medicine in general. Their descriptive value, ranging from two-dimensional drawings to three-dimensional exhibits both of natural origin and models, remains unparalleled. They are tangible proof that a picture is worth a thousand words, therefore all of these stand for hundreds of book volumes. The uniqueness of rare pathologies multiplied by models has allowed students and physicians all over the world to prepare before real contact with as yet unseen diseases [4, 35]. It was then, but it is happening now too because some diseases are reappearing and the only source of medical evidence and depiction are those in the “old” museums. The word “museum” links in our minds immediately with “relics”, when essentially medical and pathology museums are “libraries” with vast amount of information available at hand. They should be living and evolving teaching resources rather than stagnant and dusty exhibitions. Especially now, in the era of digitalisation, the resources may be available worldwide (with some obvious restrictions) [7, 8, 11, 27, 29, 34, 36, 37, 46, 50, 65]. But these original collections still have great biological value by offering pathological samples for research purposes. They can be analysed radiologically and they can undergo molecular biology tests. The “old” medical information can be supplemented by the newest technology, which leads to more accurate diagnoses and can help our contemporaries [33, 51, 64].

An interesting aspect is the source of the exhibits and the obvious difference between human origin specimens and nature recreated by the human hand. The way they were stored and presented speaks volumes about the attitude towards body parts and pieces of art with their depiction. We can see the evolution from *Kunstkammer*, through whole, sometimes shocking, dioramas prepared with utmost care (F. Ruysch, *La Specola*), to general and later specialised collections and dedicated museums. We could observe the growing knowledge of details of human anatomy and pathology, and, from an artistic point of view, perfection of the techniques of recreating or preserving nature. In the era of easily accessible knowledge on the Internet, we are facing a dilemma – to see the original with our own eyes or just look at a digitised image on a screen. Some of the contemporary

collections are blooming and attracting attention, but some remnant museums have deteriorated and been moved to cellars or unused corridors. The only way to maintain them is to give them proper meaning in every aspect, to perceive the vast knowledge and even mystical beauty presented. If we learn how to benefit from them, then they will find a reason to exist in the future.

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Address for correspondence

Piotr Paluchowski

Department of History and Philosophy of Medical Science
 Medical University of Gdańsk,
 Tuwima 15
 80-210 Gdańsk, Poland
 e-mail: p.paluchowski@gumed.edu.pl