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HERMANN BREHMER'S TUBERCULOSIS TREATMENT METHODS: POTENTIAL APPLICATIONS FOR CACHEXIA IN AIDS AND CANCER

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ABSTRACT

The innovative treatment methodologies for tuberculosis by the German physician Hermann Brehmer (1826-1889), established in the mid-19th century, achieved significant success and may offer valuable insights for the modern treatment of cachexia in AIDS and cancer. Brehmer's approach, which included hydrotherapy, a special diet, and rigorous physical activity, demonstrated impressive patient outcomes and highlighted the potential for integrating historical methods with contemporary therapeutic strategies. This paper provides a comprehensive understanding of Brehmer's methods, their evolution, and their potential applicability to modern chronic infectious diseases and conditions associated with cachexia, ensuring that the audience is well-informed and knowledgeable. By examining the interplay between nutrition, physical activity, and immune function, a holistic approach is proposed that combines Brehmer's principles with immunotherapy to optimize treatment outcomes for HIV, tuberculosis, and cancer patients.

Keywords: Hermann Brehmer, tuberculosis, cachexia, hydrotherapy, immunotherapy, HIV, cancer, sanatorium, multidrug resistance, nutritional therapy

Introduction

Hermann Brehmer (1826-1889) was a German physician who began his academic career as a natural science student at the University of Breslau (now Wrocław in Poland) (Fig. 1). His personal battle with tuberculosis led him to seek treatment from Vinzenz Priessnitz (1), a self-taught hydrotherapist whose methods were recognized by Austrian health authorities (2). This was a time when tuberculosis was a significant public health concern, and the available treatments were often ineffective and harsh. Priessnitz's treatment, which combined hydrotherapy with a special diet and physical activity, starkly contrasted the prevailing medical practices (2). Brehmer's journey and the historical significance of his methods in the context of 19th-century medical practices are crucial to understanding the evolution of medical treatment, connecting us to the roots of our current medical knowledge.

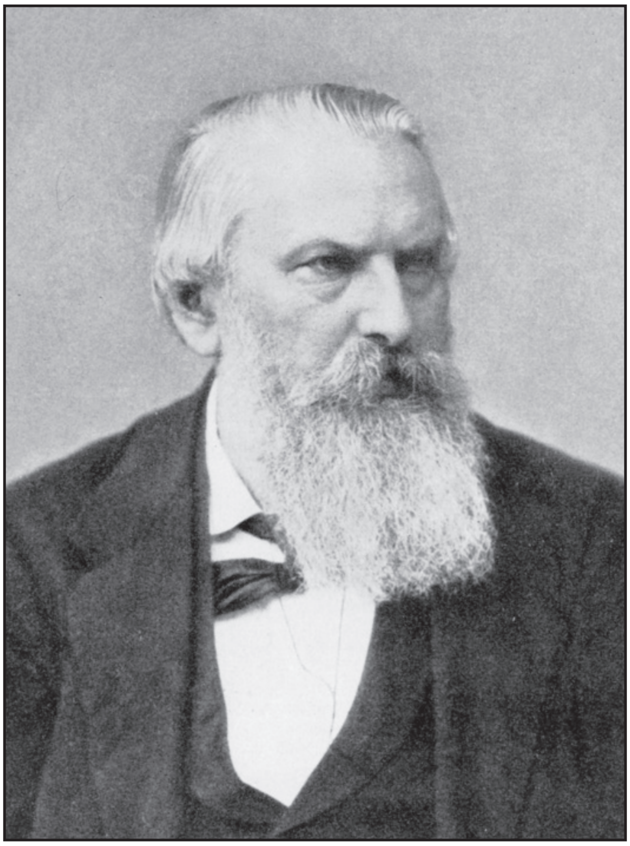

Figure 1. Hermann Brehmer (1826-1889), the German physician known for his pioneering work in tuberculosis treatment and establishing the first sanatorium for tuberculosis patients.

In Germany in 1859, Hermann Brehmer founded the first particular hospital for treating tuberculosis, which he preferred to call a sanatorium rather than a hospital (3) (Fig. 2). He is worth mentioning because his experiences with his method for the treatment of tuberculosis (he had excellent results with more than half of his patients) may be highly relevant even today for the treatment of chronic infectious diseases commonly associated with cachexia, such as tuberculosis and HIV disease. Brehmer's treatment methods may hopefully be used not only for the prevention and treatment of cachexia but also as part of a strategy to combat the problem of multidrug resistance in tuberculosis bacteria. The potential of Brehmer's methods to address such a significant issue is intriguing and engages us in the potential of the research. It could also help minimize the problem of genotoxic side effects associated with several of those drugs that are now commonly used for the treatment of these diseases. This might hopefully be achieved if a combination of Brehmer's principles and various forms of immunotherapy (with a combination of both therapeutic vaccines and immunostimulating hormones) can be used as first-line therapy for both tuberculosis and HIV disease instead of currently used anti-tuberculosis and antiretroviral drugs. The drugs now used for first-line treatment for these diseases could become second-line therapy, with present second-line drugs used against tuberculosis becoming third-line therapy. But something similar might hopefully also be possible with many cancers.

Figure 2. The Brehmer sanatorium, the first dedicated hospital for tuberculosis treatment, founded by Hermann Brehmer in Görbersdorf (now Sokołowsko, Poland). The sanatorium became a model for subsequent facilities worldwide.

This paper delves into Brehmer's treatment methods' potential to optimize immunological functions in HIV and cancer patients. By evaluating their relevance to contemporary medical challenges, the aim is to inspire the readers with the potential application of these methods to treating cachexia in AIDS and cancer. This exploration could open up new avenues in the fight against multidrug-resistant tuberculosis, offering a fresh perspective on treating these chronic infectious diseases and instilling hope for the future of medical treatment.

Influence of Priessnitz and Schönlein

Vinzenz Priessnitz (1799-1851) was a self-taught hydrotherapist who received special permission from Austrian health authorities to use his methods to treat patients (Fig. 3). Priessnitz was very popular, receiving patients from several European countries (4-7), including the young

Leo Tolstoy (1828-1910), long before he became a famous author. This is most likely because he suffered from tuberculosis and was also a brother of the Austrian Emperor.

Figure 3. Vinzenz Priessnitz (1799-1851), the self-taught hydrotherapist known for his influential methods in treating tuberculosis and other diseases through hydrotherapy.

Priessnitz was well-regarded by members of the liberal medical school at the University of Vienna, among the foremost medical scientists in Europe at that time, with the pathologist Baron Carl von Rokitansky (1804-1878) (8), being perhaps the most important one (Fig. 4). Rokitansky was an Austrian pathologist who contributed significantly to understanding diseases through his extensive work in pathological anatomy. This might explain why Priessnitz was well regarded by Austrian health authorities and even received a gold medal on the Emperor's birthday as an official recognition of his achievements. Priessnitz did not only use hydrotherapy but also a special diet plus much physical activity. He presumably could not read classical languages, but what the bright autodidact and perhaps an illiterate had done was more or less rediscover many of the same principles that Hippocrates (c. 460 – c. 370 BC) had also emphasized and seen from his own experience that they worked for many diseases, including tuberculosis (9). It might be speculated that it was partly because Vienna's medical scientists realized this and supported him. An illiterate who independently rediscovered the methods of Hippocrates and found that they worked deserved support!

Figure 4. Baron Carl von Rokitansky (1804-1878), an Austrian pathologist known for his contributions to medical ethics and pathological anatomy.

Priessnitz had as an assistant a remarkable woman named Marianna von Colomb (10). Marianna (Marie) Katharina Rosa Josepha von Colomb was born in Warszawa on July 16, 1808, as the daughter of Ludwig Christoph von Colomb (1768-1831). Her father was born in Berlin but had been employed in the Polish army since 1793 (10), when Poland was still a kingdom as part of the Polish-Lithuanian Commonwealth. The Polish-Lithuanian Commonwealth collapsed in 1795 when Poland's territory was partitioned between the Kingdom of Prussia, the Russian Empire, and Austria. However, Ludwig Christoph von Colomb continued to work as an army officer in what had been previously Poland until 1815, when he got another position (10). He came from a family of Huguenot ancestry, descending from Henri Colomb, who in 1685 had fled to Copenhagen from France and later became a merchant in Neustadt an der Dosse (10) - after Louis XIV had declared Protestantism illegal with the Edict of Fontainebleau, also called the revocation of the Edict of Nantes. Ludwig Christoph von Colomb had in 1802 married Martyna von Záblocka (1781-1825), who came from the Polish noble class (from the house Wrzesnia); he had, therefore, a solid attachment to Poland and the Polish language (10).

Ludwig Christoph von Colomb had a sister, Marie Elisabeth (1741-1796), who was the mother of Wilhelm (1767-1835) and Alexander (1769-1859) von Humboldt (10). Wilhelm and Alexander von Humboldt were renowned Prussian scholars; Wilhelm was a philosopher and linguist, and Alexander was a famous geographer, naturalist, and explorer. His uncle Peter Colomb had a daughter, Catharine Amalie (1772-1850), who in 1795 married Gebhard Leberecht von Blücher (1742-1819) (10), a Prussian field marshal known for his role in Napoleon's defeat at the Battle of Waterloo in 1815.

Marianna von Colomb had first come to Priessnitz as a patient with a severe chronic disease that many years earlier had been diagnosed as cancer (probably a wrong diagnosis since it is difficult to see how she could have survived for so many years afterward if the diagnosis had been correct) but had become cured after three years in Priessnitz's hydrotherapy institution. She was then in her thirties and unmarried and wished now to use the rest of her life to help other patients. She, therefore, asked Priessnitz if she might become his student to learn about his treatment methods, which Priessnitz accepted, and she ended up working for Priessnitz as his assistant (10).

It is not known if it was Priessnitz himself, Marianna von Colomb, or both who were the 'doctor' for Brehmer when he was at Priessnitz's hydrotherapy institution. He was cured of his active tuberculosis and decided to become a medical student instead of continuing as a natural science doctoral student, allegedly because he was persuaded to do so by Professor Johann Lukas Schönlein (1793-1864) in Berlin (Fig. 5). Schönlein was a German physician who significantly contributed to medical education and clinical practice. It may be speculated, though, that it first may have been Marianna von Colomb who, after she had herself been denied access to German universities to become a medical student because female students were not admitted at the universities in Germany at that time (10), may have asked Hermann Brehmer to shift from natural science to become a student of medicine so that Brehmer could help her write a book she had planned to write about the methods of Vinzenz Priessnitz — which it is known that Brehmer did at the same time as he was a medical student in Berlin.

Figure 5. Johann Lukas Schönlein (1793-1864), a pioneering physician and educator, known for his significant contributions to medical science, including the identification of the fungal cause of favus.

It may also be speculated that Brehmer was at the beginning reluctant to follow Marianna's suggestion because he was too fond of botany after he had been a student of Christian Gottfried Daniel Nees von Esenbeck (1776-1859) in Breslau. Christian Gottfried Daniel Nees von

Esenbeck was one of the best botanical scientists in Europe after Carl Linnaeus (1707-1778), a Swedish botanist, physician, and zoologist who formalized the modern system of naming organisms called binomial nomenclature. He described approximately 7,000 plant species, almost as many as Linnaeus himself. Nees von Esenbeck was a convinced democrat and spokesman for the emancipation of women and had been among the political activists on the side of the revolutionaries in 1848 (10), as also Hermann Brehmer had been (there is even a letter preserved, showing that Hermann Brehmer at that time had contact by correspondence with Karl Marx, a German philosopher, economist, historian, sociologist, political theorist, journalist, and socialist revolutionary). In addition to his ordinary lectures in botany and philosophy, he also gave during the period November 1849-March 1850 (for the second time) a series of lectures about social politics and Julius Fröbel's publication Das System der sozialen Politik [The system of social politics], where Marianna von Colomb very likely must have been one of the students (10). Julius Fröbel (1805-1893) was a German geologist, mineralogist, and journalist who, like Nees von Esenbeck, was also a strong proponent of the emancipation of women and held it very important that women should be economically independent (10). Nees von Esenbeck was deprived of his professorship and pension in Breslau in 1851 due to conflicts with the government (but continued for seven years more, maybe until he died, as President of the Leopoldina Academy) and died virtually penniless seven years later.

But Hermann Brehmer might, hypothetically, have been more favorable to Marianna's proposal to write for him a recommendation letter to her cousin Alexander von Humboldt in Berlin so that the latter might help him in his work as a botany doctoral student – since Alexander von Humboldt was also one of the best botanical scientists in Europe at that time. However, with a background as a scientist quite different from Nees von Esenbeck, nothing would be better for a young botany student than having both teachers and advisors for his thesis work. But when Alexander von Humboldt met the former tuberculosis patient and read the recommendation letter from his cousin, he may immediately have realized that there was something much more exciting and far more critical than a collection of rare and hitherto undescribed plant species.

It may be speculated that it was Alexander von Humboldt who arranged for a meeting between Hermann Brehmer and Schönlein in Berlin, perhaps (very speculatively, but not at all implausible) after Marianna had sent with Hermann Brehmer a letter with secret content to her cousin, which was not the ordinary recommendation letter that Brehmer thought it was, but where instead she explained about her challenging situation after she had been denied access to the university as a medical student, and asked her cousin to try to persuade Hermann Brehmer to shift from botany (which might have been the reason why Hermann Brehmer wanted to meet Alexander von Humboldt in Berlin) to medicine. Schönlein was naturally very interested in listening to the story of a former tuberculosis patient who had been cured and understood that this was something that needed to be followed up in a proper scientific way – at the same time, he could see no better motivated and better-qualified candidate for doing this research job than the former tuberculosis patient himself.

Schönlein's Contributions to Medical Science

Schönlein was one of the foremost medical teachers in Europe at that time. He was the first to demonstrate that microorganisms can cause diseases in humans when he found, in 1839, that the skin disease called favus was caused by a fungus (later named Achorion schoenleinii) (11-14).

Schönlein had also been the first to recognize that what earlier had been considered two different diseases, viz. phthisis (referring to the cachexia of the patients) and tuberculosis (referring to the tubercles found in the lungs), was the same disease, which he proposed in 1839 – but apparently without inventing this term - should be called tuberculosis (15). The word "tubercle" had been introduced 150 years earlier, in 1689, by the English physician Richard Morton (1637-1698) to describe the characteristic lung lesions found in TB patients.

Schönlein was a great reformer of medical education. He was one of the first medical professors in Germany to use German rather than Latin as a teaching language in his lectures. Also, Schönlein introduced modern clinical teaching in Germany and several new methods for examining patients, including auscultation, percussion, and chemical and microscopic blood and urine investigations (12, 15). Some of these methods had earlier been developed in France, with the invention of the stethoscope by René Laënnec (1781-1826) (16), a French physician who invented the stethoscope and is considered the father of clinical auscultation, is significant for examining TB patients. However, Schönlein was the first to introduce them to medical students in Germany. Schönlein stimulated students and staff to make their observations and held such lively instruction sessions at the bedside that students flocked to Würzburg while he was a professor there. Schönlein conducted his clinical teaching in much the same way that patients are presented to the students today, starting with presenting case history and chemical, physical, and microscopic findings. He would then control these findings, instigate a discussion toward a diagnosis, and finally discuss etiology and therapy with the students (17).

Schönlein had an educational background not much different from what Brehmer should get after the latter had finished his medical studies. Schönlein is now the founder of the so-called natural, historical school of studies and classification in medicine, which aimed to use methods equivalent to those used in botany and zoology. He based much of his work on the results of experimental research in chemistry and physics and broke a good deal of new ground in this way (15). Like Brehmer later on, Schönlein had first been a student of natural sciences before he switched to medicine. His primary interest when he was very young was not in medicine but in knowledge about nature, which experienced a period of significant scientific advances at the beginning of the 19th century. Schönlein began his studies of natural sciences, particularly under Georg Augustin Bertele, in 1811 at the University of Landshut, well-known for its emphasis on natural philosophy (17). The leading teachers there were the former Bamberg professors Andreas Röschlaub (1786-1835) and Philipp Franz von Walther (1782-1849), who taught that the only way for medicine to progress was by use of physics, chemistry, and other natural sciences. Schönlein then changed his course to become a medical student (17, 18). However, while a student, he sought beyond the ordinary medical curriculum and was concerned with comparative anatomy. His particular interest was the anatomy of the brain, which was also the topic for his doctoral thesis in 1816, Von der Hirnmetamorphose (15, 17).

Schönlein was an opponent to the use in medicine of that kind of natural philosophy that had been popular in Germany during the Romantic period (15, 19-23), i.e., he was an opponent to that school of thought about medical practice that has been called Romantic medicine (18), or, better, the medicine of Romanticism (21). During 1797-1848, German medical thought had a distinct character compared to the rest of Europe (20). It had been considerably influenced by philosophy and had absorbed ideas deriving from neo-Platonism and vitalism, as well as by the modern philosophy of nature (Naturphilosophie) that had developed in Germany during the same period, especially the ideas of Friedrich Wilhelm Joseph Schelling. It was characterized by the deductive character of its theories, the grounding of medical thought in non-materialist philosophy, and its close ties with the Protestant religion. These factors, in combination, had caused it to evolve away from those standards dominating elsewhere in Europe, which the model of medicine set as an empirical science based on the inductive method of research (20).

The physicians of the German Romantic school were critical both to positivistic science, Kant's transcendental philosophy of nature, and the speculative methods of Schelling and Hegel, despite the unquestionable influence of Schelling on their metaphysical understanding of nature, body, and soul, and on their diagnostic and therapeutic practices (21). 'Romantic medicine' was not a single entity; various concepts were developed, and different conceptual answers were given to the triumphs elsewhere of empiricism and positivism in medicine (21). It has been considered a strange aberration by some modern historians of medicine (18). However, the earlier condemnation of this form of medicine only as a 'strange aberration' has now given way to a much more nuanced and balanced view (21, 23, 24). At the same time, there has been a renewed interest in Schelling's philosophy. Some of its concerns may correspond to central points in the critique of medicine of our days (21). The concept of the patient as a person, the ethical dimensions of diagnosis and treatment, and the social and cultural aspects of medicine have not lost their significance even today (21).

Ethical Considerations in Medical Science

However, it was not only physicians and medical scientists from the German Romantic school who were deeply concerned with medical ethics and social and political issues. The pathologist Baron Carl von Rokitansky in Vienna, who, similarly to Schönlein, was a political liberal, is told personally to have performed two autopsies per day, seven days per week, and to have performed as many as 30,000 autopsies when he finally died himself. Thus, he can presumably not have had much time to visit patients. At the same time, they were still alive to be able to correlate personal clinical observations with what he later could find at the autopsy table. Despite this, he is paradoxically credited with being an essential pioneer in medical ethics in clinical research. Although Rokitansky defended the "materialistic method" in scientific research, he rejected materialism as a philosophical worldview. In his commemorative speech on the occasion of the Institute of Pathological Anatomy opening at the General Hospital of Vienna, he warned against abusing "natural science liberties." Scientists should first regard humans as "conscious and free-willing subjects" and only then follow their urge toward knowledge. The feeling of humanity would be lost if physicians considered human beings as research objects. Thus, Rokitansky brought up the question of ethics in medicine for the first time. In another speech about the "solidarity of all animal life," delivered at the Imperial Academy of Sciences, Rokitansky showed his proximity to Arthur Schopenhauer's writings on compassion.

Another great pathologist, Rudolf Virchow (1821-1902), who had been one of Schönlein's students, was not only a great pathologist but is also considered to have been the founder of social medicine (25, 26). Virchow passionately advocated social and political reform. He considered medicine a social science, and politics is nothing but medicine on a large scale. As a social science, as the science of human beings, medicine must point out problems and attempt their theoretical solution: politicians and practical anthropologists must find the means for their solution. Physicians are the natural attorneys for people with low incomes, and social problems fall to a large extent within their jurisdiction.

With the wisdom of hindsight, it can be seen that this understanding of the relationship between medicine and politics is not without serious dangers. It was precisely how the Nazis in Germany were thinking. Children with severe developmental disturbances, homosexuals, Gypsies, and Jews were all regarded as analogous to dangerous bacteria or tumor cells that had to be removed, if necessary, by brutal methods so that society as a whole might be healthy. Rudolf Virchow himself, however, was very distant from such thinking. He was a convinced democrat, like his teacher Schönlein, who was a convinced political liberal and Republican (who, nevertheless, against his wishes, had to accept the appointment of becoming the private physician to the Prussian king – but he refused to accept honorary titles that he was offered because of his Republican conviction).

With his approach to medicine, Schönlein may – together with Johannes Müller and Karl von Rokitansky – be regarded as an essential intellectual forerunner of his famous student Rudolf Virchow (1821-1902) (27, 28), who proceeded to rebuild the theoretical foundations of pathology by stating a new physiological definition of disease and by introducing the cell theory (27, 29, 30), thus considering disease to be a process not only happening at the level of organs - as the great pathologist Giovanni Battista Morgagni (1682-1771) (8, 31-34), and von Rokitansky earlier had done (8) – thus understanding disease processes at the level of the whole organism (as had been understood already during Antiquity) and at the level of individual cells.

Historical Understanding of Disease

Disease is a process that happens in the whole organism. It should be treated with consideration, for the entire organism is something that has been well understood for thousands of years, maybe as long back as since our early Paleolithic ancestors – although it is not always well enough understood by modern physicians in their over-emphasis on exact diagnosis (instead of relying more on treatment methods that have a much broader action, thus making accurate diagnosis less necessary) and on finding and using drugs with very narrow pharmacological targets, while neglecting, for instance, the importance of adequate nutrition both in cancer and serious infectious diseases. What the modern physician does is, by military analogy, to overemphasize the use of very precisely targeted weapons, like the guns of snipers or precisely targeted smart bombs, instead of relying more on imprecise weapons, such as machine guns or dumb cluster bombs. The smart bombs and the snipers are sound when the enemy's location is precisely known, but they are not good when it is dark, and the enemy cannot be seen. For the general, what is called collateral damage to civilians is, of course, a problem when using very imprecise weapons, and it is a problem for the physician as well when a drug has many serious side effects. There are, however, also drugs and other treatment methods available that are almost free of severe side effects, and which therefore may be used like machine guns or dumb target bombs when it is dark, with good chances of a positive therapeutic effect even in the absence of a precise diagnosis, but with minimal risk of severe side effects for the patient.

The understanding of this from the time of Antiquity is well illustrated, for instance, by Hippocrates. Hippocrates did not have the diagnostic tools or that precise understanding of the nature and causes of several different diseases that modern physicians have - but with all these handicaps, compared to modern colleagues, he was most likely a good and successful physician. It is also typical of Chinese traditional medicine, representing an uninterrupted tradition that must be more than two thousand years old (but most likely going back to its roots several thousand years ago, not to say ten thousand years ago). It may have been well understood as early as by Imhotep, who was considered later by the Egyptians to have been the founder of Egyptian medicine but was also the architect of the first great pyramid (in Saqqara) and lived more than 4,500 years ago (35, 36). His architectural prowess, comparable to that of Leonardo da Vinci (1452-1519), the Italian polymath of the Renaissance, is a feat that is awe-inspiring. Vinci's areas of interest were vast, including invention, drawing, painting, sculpting, architecture, science, music, mathematics, engineering, literature, anatomy, geology, astronomy, botany, paleontology, and cartography. The breadth of knowledge is unparalleled in the last 5,000 years of world history. Suppose the Italian archaeologist, paleoanthropologist, and rock art expert Emmanuel Anati's revision of the date of the Israelite exodus from Egypt is correct, making Moses almost a thousand years earlier than previously thought (37, 38). In that case, Imhotep may have been identical to Joseph, son of Jacob, also called Israel, in the Bible (39). If this is correct, the description given of Joseph in the Bible must be regarded as a gross understatement compared to what is known about Imhotep from reliable Egyptian written sources. According to the Bible, Joseph's parents were forced to wait faithfully for each other for 14 years before they were allowed to marry. They could not anticipate that they should become rewarded for their faithfulness and patience by becoming parents to the most intelligent, wisest, diverse, creative, and inventive man known from all of world history through the next more than 4,500 years – and presumably for the next 5,000 years as well if our species is going to survive that long.

Pathological Anatomy and its Pioneers

De Sedibus et Causis Morborum per Anatomen Indagatis was written by Giovanni Battista Morgagni (1682-1771) when he was almost eighty (31). This book, in which Morgagni recorded the findings of 700 autopsies and linked them to the complaints of the patients and the symptoms of their diseases, marked the advent of anatomic pathology as a separate medical discipline (31) (Fig. 6). Morgagni is still the father of a new way of thinking in medicine based on anatomoclinical correlations (34). His research places him in a specific tradition of medical studies: the mechanistic approach to medicine, which at that time had to be considered new in different European contexts (34). This approach gave Morgagni the theoretical structure to find his anatomopathologic research and the revolutionary idea for his time: post-mortem dissections could help understand pathophysiologic mechanisms and clinical symptoms in the living (34).

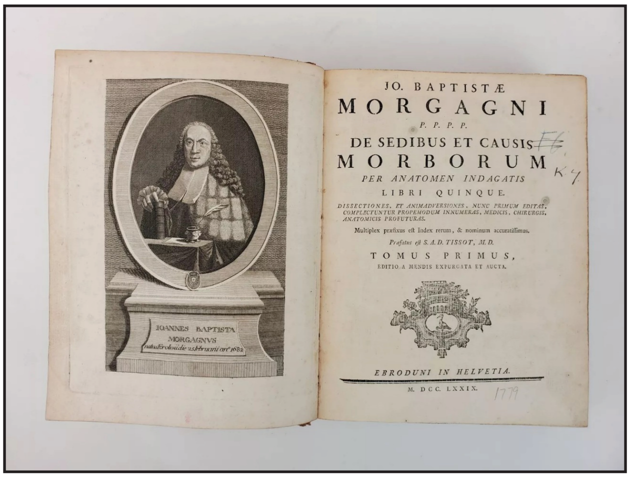

Figure 6. Giovanni Battista Morgagni's De Sedibus et Causis Morborum per Anatomen Indagatis, first published in 1761, a foundational work in pathological anatomy.

It is not unreasonable, however, that there among those medical scientists of the 16th and 17th centuries who were pioneers of the use of the new methods of natural science in the basal sciences of medicine (like, for instance, William Harvey and Nicolaus Steno) may have been others, who at least for themselves and in private conversations not recorded in form of written source material may have held similar views – as when for instance William Harvey, the discoverer of the blood circulation, was discussing with his patient and friend Lord Chancellor Francis Bacon in the unlit darkness of a ground cellar in Harvey's summer house outside London (40).

William Harvey (1578-1657) was an English physician who made seminal contributions to anatomy and physiology. His colleagues greatly respected him as a medical scientist but not much admired for his abilities as a practical doctor (41). It is not unreasonable, however, that he may have held theoretically sound views concerning the nature of diseases, even if he could not translate his theoretical understanding into better practical treatment methods. William Harvey told his young friend and private student William Aubrey (1626-1697), an English antiquary, natural philosopher, and writer, that he did not have any high regard for Francis Bacon as a philosopher, saying in derision about the latter: "He writes philosophy like a Lord Chancellor. However, I have cured him." (41). A medical doctor would presumably not have said he had cured a patient unless he had seen excellent or apparent results of his therapy. It is, therefore, an interesting question how much influence the scientist William Harvey may have had upon the philosophy of Francis Bacon (1561-1626), an English philosopher and statesman who served as Attorney General and Lord Chancellor of England, about methods of science. Was perhaps William Harvey the ghostwriter behind much of Bacon's philosophy and Bacon merely the public spokesman, similarly as it may be possible that the Apostle John, if he is identical with the Evangelist John, may have functioned as the public spokesman for a woman, viz. his adoptive mother Mary, who was also the mother of Jesus – which might perhaps explain the very female character both of the Gospel of John and the letters of John in the New Testament, which is the reason why John has been called the Apostle of love.

Rokitansky continued to work in the tradition that the work of Morgagni had first established. However, his work implied a significant advancement compared to Morgagni owing to his systematic study and description of a considerable number of autopsy cases, which made it possible for him to see several things that had not been noticed before and also recognize various new diseases – not new ones, but diseases that had not earlier been identified and described. Virchow and Rokitansky paved the way for the modern specialty of pathology as we know it today (42). While Virchow was the doyen of histopathology, Rokitansky's merit was his excellent gross pathology, establishing a nosological disease classification (42). For this achievement, Virchow called Rokitansky the Linnaeus of pathology (42). However, two serious drawbacks connected with Rokitansky's method of systematically describing as many autopsy cases as possible by the methods of gross pathological anatomy. One was his total neglect of histological studies, using the microscope – which would have made it possible also to discover bacteria that were important in infectious diseases, such as puerperal fever, if the microscope had been used. The other significant drawback was that he could not have had much time available for clinical observations. At the same time, the patient was still alive to correlate clinical observations while the patient was still alive with the autopsy observations. The same might be a severe drawback of much of modern pathology.

Virchov's cell theory of disease was a significant step forward, compared with Carl von Rokitansky, since the latter (in great contrast to Schönlein and also in comparison to Johannes Müller when studying normal anatomy and embryology) did not use the microscope in his examination of disease processes (8). Rudolf Virchow, however, must certainly have learned from his teacher Schönlein to use the microscope since that was an essential part of Schönlein's ordinary teaching, and Schönlein had also been the first one to discover that microorganisms can cause disease in humans.

It may be possible that the main reason for Rokitansky's refusal to use the microscope was that he thought it would have taken too much time per autopsy and that he considered it more important to study as many patients as possible rather than with the thoroughness that would have been possible if he had used the microscope. Rokitansky's refusal to use the microscope and also to teach his students about it may, however, probably help to explain why Ignaz Semmelweiss (1818-1865), who was one of Rokitansky's students and who realized (but not as the first one in Vienna) that puerperal fever was a contagious disease that strict hygienic measures could prevent, did never find the bacteria causing the disease (8). Semmelweis was a Hungarian physician and scientist, now known as an early pioneer of antiseptic procedures. Semmelweis never tried to use the microscope for studying autopsy material from patients who had died from the disease – while Joseph Lister (1827-1912), a British surgeon and a pioneer of antiseptic surgery, who was the son of an amateur optician very interested in microscopes, discovered the bacteria immediately when he tried to watch with the microscope he had learned to use from his father.

Teaching and Influence of Johannes Peter Müller

Given Schönlein's educational background, when he had started as a student of natural science, and his philosophical attitude to questions concerning the relationship between natural science and medicine, it is not likely that Schönlein should have discouraged Brehmer from continuing as a natural science doctoral student because Schönlein should have considered natural science to be inferior to medicine. It is more likely because Schönlein was already interested in tuberculosis and, therefore, may have found the disease history that the young botany student could tell him to be of extraordinary interest and far more important than the study of rare and hitherto undescribed plant species. So, Brehmer may have been handpicked by Schönlein to try to solve some of the challenging scientific problems raised by Brehmer's disease history as a patient. For doing so, it would not have been possible for Brehmer to find a better teacher in clinical medicine and a better doctoral supervisor in Europe.

But Schönlein was not Berlin's only good medical scientist and university teacher. Brehmer must also have found an excellent teacher in Johannes Peter Müller (1801-1858) (43) (Fig. 7). Müller was a German physiologist, comparative anatomist, embryologist, ichthyologist, and herpetologist who was known not only for his discoveries but also for his ability, similar to Alexander von Humboldt. to synthesize knowledge (44, 45). The Müllerian ducts are named after him (44).

Figure 7. Johannes Peter Müller (1801-1858), the German physiologist and comparative anatomist known for his groundbreaking work and influence on the development of scientific medicine.

Johannes Müller was born in Koblenz, France (43). Taking his still little examined school education in Koblenz at its starting point, it has been argued that Müller's pre-academic training in the applied sciences as well as in the old languages, which Müller saw as basic essential for the philosophically educated naturalist had a profound impact on the scientific-philosophical views he put forward in his Dissertatio inauguralis physiologica sistens commentarios de phoronomia animalium, that was published in 1822 (43). The Dissertatio was influenced, in particular, by the work of Pierre-Jean-Georges Cabanis (1757-1808) and can be read as a physiological application of French Enlightenment sensualist philosophy (43). It shows that Müller already, at an early moment, took up decisive impulses from revolutionary France (43).

Pierre-Jean-Georges Cabanis was a French physician, philosopher, and one of the founders of modern psychophysiology, who had argued that the brain is part of the body in which electricity is stored (46) and was a pioneer in the observation of digestive disturbances that accompany emotional upset (47). With extraordinary prescience, he distinguished emotional states associated with the suppression of digestion from those accompanied by accelerated gastric secretory and motor function (47). In his Rapports du Physique et du Moral de l'Homme, published between 1796 and 1802 (translated into German under the title Verhältnis der Seele zum Körper (1808)) (46), Cabanis proposed new ideas on brain function, the brain's sensibility, the concept of will, and the chemical basis of nervous activity (46). In the Rapports, Cabanis proposed a theory of how the brain and nerves relate to thought and behavior (46). Foreshadowing later developments in neuropsychology, he suggested that different parts of the nervous system have separate functions (46). Cabanis's far-reaching theory of how the brain works helped shape the understanding of the general notion of nervous energy in nineteenth-century European neuroscience (46).

Many physiological science contributions were made in the century preceding Müller's work. Müller gave order to these facts, developed general principles, and showed physiologists how recent discoveries in physics and chemistry could be applied to their work. Between 1828 and 1838, Müller published his critical neurophysiological and anatomical investigations (primary fibers, cranial nerves, reflex movement, experimental proof of Charles Bell's law) (45). His strategies and concepts in neurophysiology can be used as an example of his scientific approach more generally (45) Müller's magnum opus, Handbuch der Physiologie des Menschen, appeared between 1833 and 1840 (translated into English as Elements of Physiology by William Baly and published in London 1837–1843), marking the beginning of a new period in the study of physiology. For the first time, the results of human and comparative anatomy, chemistry, and other physical science departments, as well as tools like the microscope, were brought to bear on the investigation of physiological problems.

Johannes Müller has been called the father of scientific German medicine (48). An analysis of the four editions of Müller's Handbook of Physiology shows that he specified his arguments continuously by introducing clear definitions of physiological terms (stimulus, excitability, consensual movement, reflex), which were based on his manifold experiments and a critical review of recently published researches. The book became the leading textbook in physiology for much of the nineteenth century. It manifests Müller's interests in vitalism, philosophy, and scientific rigor. He discusses the difference between inorganic and organic matter. He considers in detail various physiological systems of multiple animals but attributes the indivisible whole of an organism to the presence of a soul. He also proposes that living organisms possess life energy for which physical laws can never fully account.

The most crucial portion of this work was dealing with nervous action and the mechanism of the senses. Here, Johannes Müller stated the principle, not before recognized, that the kind of sensation following stimulation of a sensory nerve does not depend on the mode of stimulation but upon the nature of the sense organ. Thus, light, pressure, or mechanical stimulation on the retina and optic nerve invariably produces luminous impressions. This he termed the law of specific energies of the sense.

In the later part of his life, Johannes Müller chiefly devoted himself to comparative anatomy. Fishes and marine invertebrates were his favorite subjects. He took 19 trips to the Baltic and North Sea, the Adriatic, and the Mediterranean to investigate salt-water life. It might be an exciting research task for historians of natural science in Norway during the 19th Century to study to what extent the research of Johannes Müller may have influenced the most important 19th Century marine biologists, such as father and son Sars, Peter Chr. Asbjørnsen, and Fridtjof Nansen – especially Nansen's pioneer work as one of the first neuroanatomists in Norway when he studied the anatomy of the nervous system of fishes, including the hagfish Myxine glutinosa.

Brehmer's Sanatorium and Treatment Methods

When he started as a medical student in Berlin, Brehmer already had much of the knowledge in basal sciences that he needed as a medical student from his earlier background as a student of natural science in Breslau. This, combined with excellent teachers and a doctoral supervisor, may explain why he could finish his medical studies, including a doctoral thesis, in only about three years. But at the same time, as a medical student in Berlin, he must have also taken the time to help Marianna von Colomb with her book projects. It would be easier to understand this if it happened because he felt an outstanding debt of gratitude. After all, it was Marianna von Colomb who had saved his life – assuming that it was Priessnitz's assistant and not Priessnitz himself who had the primary responsibility for this particular patient when Brehmer went to Priessnitz's institution in the hope of finding better treatment there than an ordinary physician could give him.

Maybe Brehmer felt much gratitude towards Marianna also because it had been Marianna who had first tried to encourage him to become a medical student and who may have helped him to get in contact with her cousin Alexander von Humboldt – which next might have led to a meeting also with Schönlein that had finally settled the question for him, what he should do for the rest of his life. Which he now could realize certainly had been the right thing for him to do after he had followed Schönlein's advice. Helping her with her book project felt both extremely meaningful and highly intellectually stimulating for him, helping him to understand even better what he had been taught by Schönlein and Johannes Müller when he had to teach Marianna about what he had recently learned. And it did not make the collaboration with the book project less enjoyable for Hermann that Marianna was not only a beautiful woman, but also - as he could now strongly feel every time he met her, but had to try to conceal as well as possible – an exceptionally sexually attractive one, as well as being endowed with qualities as a person far above the vast majority of both men and women.

Marianna von Colomb authored five different books on Priessnitz's treatment methods (2, 49-52). Additionally, it is possible that she assisted Brehmer with his doctoral thesis on tuberculosis, supervised by Schönlein, titled De legibus ad initium atque progressum tuberculosis pulmonum spectantibus [On the laws governing the initiation and progression of pulmonary tuberculosis] (53). The thesis reflects Brehmer's strong conviction and optimism regarding the curability of tuberculosis (53), directly opposing Laënnec's assertation, made over 25 years earlier, that TB, like cancer, is incurable (54). In either his inaugural address, his thesis, or both, Brehmer made a bold claim: Tuberculosis primis in stadiis semper curabilis [tuberculosis in the earliest stages is always curable] (54, 55). This statement was met with considerable skepticism, and Brehmer faced significant opposition from many of his colleagues, who mocked him as a charlatan (1). Despite this, a Hanoverian physician, convinced of Brehmer's theories, began sending him patients (1). However, due to his youth and limited resources, Brehmer lacked the opportunity to test his theory on the curability of tuberculosis extensively or to validity it with a large amount of clinical material at the beginning of his practice (1).

Personal Conflict and Institutional Challenges

After Hermann Brehmer and Marianna von Colomb had collaborated very closely with Marianna's book projects and most likely also with Hermann Brehmer's doctoral thesis about tuberculosis, a dramatic change in their relations happened after Brehmer had finished his medical studies. Brehmer married Marianna's younger sister, and from being very close, Marianna and Hermann Brehmer became bitter personal enemies, with neither party wishing any reconciliation until Marianna finally died (10). The circumstances give strong reason to suspect a classical drama of love and jealousy. However, it was presumably not the most common love affair since it may have been both Platonic and secret, not only to others but also because neither of the partners may have wished to disclose the nature and strength of their mutual emotions to the other. There were at least two critical reasons for this. One was the age difference in the wrong direction, with Marianna being 18 years older than Hermann (10) - while the actual bride was only 16 years older than her bridegroom. The other was the significant difference in their social background, with Hermann coming from the lower middle class as the son of an office clerk. In contrast, Marianna went socially and intellectually from the top of Prussian and Polish society.

A third-factor might, as far as Hermann was concerned, possibly have been the combination of deep gratitude and professional respect that he may have felt for the woman who had saved his life – if it was Priessnitz's assistant rather than Priessnitz himself who had taken care of him as a patient. Insulting Marianna by proposing to her that she should become his mistress would be unthinkable – even if he might be similar to many other men of the same age and not have objected to trying to establish a physical love affair with one of Marianna's female house servants if he found her attractive enough.

However, it is not any far step from a strong sense of personal gratitude for love – not even in the relationship between a man and a woman. When a person falls in love with another, there are unconscious signals that will tell about this to the object of love – and which generally will raise similar reciprocal feelings unless there are strong and obvious reasons to discard the first one as a potential object of love, which, of course, is something that frequently does happen. But neither Hermann nor Marianna had any reason to reject another as a hopeless person; everything suggests they must have held another in great esteem. In this case, there was also a solid intellectual contact when Hermann helped Marianna write her books, and there was a common romantic sense of the importance of working for significant and urgent causes in medicine and politics. It would be almost strange if a man and a woman had intimate contact in everything. Still, at the physical level (or physiological level, to state it more precisely), they should not also fall intensely in love with one another.

At the same time, Hermann Brehmer may presumably have been so young and inexperienced with women that he was not able to understand and interpret such signals correctly (e.g., changes in the diameter of the pupil and perhaps pheromones) that a person in love uses unconsciously to communicate their feelings to the object of love. For Marianna, it was probably similar, despite her much older age, because her social background combined with her severe disease over many years might have precluded regular social flirting contact with young men. So, she may have been equally inexperienced with love affairs as the 18-year-old Hermann.

Not understanding the emotions of the older sister, it is possible that Hermann did not realize he had done something wrong against the older sister when he married the younger one. Maybe, paradoxically, it was easier for Hermann Brehmer to ask the younger sister to be his wife because she was more like an ordinary woman for him – and not one for which he had such enormous respect that marriage and an extramarital love affair both were equally unthinkable. But for the older sister, it was a shock when she learned that Hermann would marry her younger sister. Why could he not have asked herself instead of the younger one to be his bride?

It took several years before Brehmer got the permission he had asked for from Prussian health authorities to change into a particular hospital for tuberculosis patients, the hydrotherapy institution he had taken over from his sister-in-law Marianna von Colomb when the economic situation for the institution became too difficult for the latter (10). His liberal political views were perhaps the most important reason. Still, it is also possible that his private life was a factor because people not in the family thought he had mistreated Marianna. This happened only after his former teacher and doctoral supervisor, Schönlein and Alexander von Humboldt, both highly influential men, supported his application to Prussian health authorities.

Principles of Brehmer's Treatment

However, after Brehmer had been able to test his treatment methods – which probably he had learned from Vinzenz Priessnitz and his sister-in-law, especially when he was himself a tuberculosis patient – on a large number of patients in his hospital, the results of his therapy were highly impressive. More than half of the patients recovered very well. However, there were several who went home from the hospital before they had been wholly cured – which was because it still had not been discovered that tuberculosis is an infectious disease caused by Mycobacterium tuberculosis. If Brehmer had known this earlier, he should presumably not have allowed patients to be discharged from the hospital before they were utterly asymptomatic so that they would not spread the bacterium to others after their return home.

The treatment was based on hydrotherapy, a special diet, and outdoor physical activity (1, 3, 53, 55, 56). It is impossible to say today whether hydrotherapy has any therapeutic value. Still, it could not have been harmful to the patients and may have helped to motivate some of them to comply with the rest of the therapy regime. However, in light of present-day knowledge about the interaction of nutrition and infectious diseases, Brehmer's special diet and physical activity must have been good for the patients. The diet was rich in probably all micronutrients except vitamin D (but there must have been abundant vitamin D synthesis in the skin when the patients were so much outdoors), and it is possible that the intake of iodine (I) was not exceptionally high, given the geographic location of Görbersdorf. But Brehmer's diet was also protein-rich and had a high fat content.

Hydrotherapy and Physical Activity

Brehmer created the forest shower (die Walddusche) (1). Each patient had to ascend each morning to the Walddusche (1). The Walddusche was situated on a mountain 300 m higher than the hospital, and the walk from the hospital to the Walddusche would typically take half an hour for a healthy person (1). The patient was then douched with a strong stream of water, which fell from a height of five meters and was of the thumb's thickness (1). The water lasted 30 seconds and was ice cold (1). The patient was then rubbed dry (1). Brehmer claimed this douche to be "of particular value in pleuritic exudates since it seems to act on the resorption of infiltrations. The douche, however, is a dangerous means of help and should only be given by the physician." (1). He held the opinion that the douche could only be effective if the water were of sufficient pressure and concentration (to provide enough stimulation of skin nerves reacting to mechanical stimuli, as in modern acupuncture, and not only of skin nerves reacting to temperature) (1). He believed that douches where the water fell freely and dispersed were ineffectual (1). According to Dettweiler, Brehmer did not hold regular office hours until the last few years of his life (1). Up to that time, he could only be seen professionally every day at the douche hours, which he supervised until he died (1). He also overcame all the patients' objections regarding ice-cold water use (1).

Case Studies and Clinical Outcomes

To illustrate the effectiveness of Brehmer's therapy, three case histories from Brehmer's book about tuberculosis from 1869 are given below (55):

Case II [page 322 in the second edition of Brehmer's book]. Male. Twenty-seven years of age. Ten years previously, he had bleeding. Percussion – full and clear all over. Auscultation – right front to third rib weaker vesicular breathing than on the left, and prolonged expiratory sound. Sputa – sparse and slimy. Treatment – Much exercise in the open air, rubs, later rain baths, and the Strahlen douche on the right side of the thorax. He remained a little less than five months and then had no physical signs. Eight years later, he was in excellent health.

Case III [page 324]. Male. Twenty years of age; sick for three-four years. Physical examination showed a light and whole percussion tone, but weaker than usual, and on auscultation, there was heard indefinite vesicular breathing with prolonged expiration on the left of the third rib and on the right in the supraclavicular fossa. Treatment – moderate exercise, mountain climbing, rain baths of thirty seconds. He was cured at the end of four months. He remained well and later entered military service.

Case XI. Male. Age fifty-two years. Hemorrhage in 1851 following "Grippe" [German word now used for viral lower respiratory infections, especially influenza]. This was followed by a cough and copious purulent expectoration. In 1885, he had pains in the kidneys with catarrh of the bladder and occasionally blood in the urine. In 1859, he again had pulmonary hemorrhages. In June 1860, his condition was as follows: A powerfully built but emaciated man whose whole impression was terrible. The thorax is paralytic; there are deep depressions above and below the right clavicle; the intercostal spaces are wide, inspiration superficial, and under the right nipple, pain on deep inspiration, respiration twenty-four. Percussion – regular over the entire front and back of the left chest; on the right side, there was an empty and light sound down to the second rib in front and likewise behind in the supraspinous fossa. Auscultation was vesicular over the whole left side; on the right side in front over the supra and infraclavicular region, there was bronchial breathing, weak bronchophony, and loud petite bubbling, consenting rales. These were also present in the supraspinous fossa. There was also indefinite breathing to the third rib and vesicular breathing from there down. Treatment was almost the same as with the other patients. Only more exercise was ordered in the fir woods. Within a short time, he ascended the Reichmacher twice daily without getting tired. He took about six to seven hours of walking exercise in all kinds of weather. In two months, his expectoration had almost entirely disappeared. He remained in the sanatorium for three months. A dry cough was the only symptom of a disease that remained. This also disappeared within four months of the continued use of the rain bath. He has remained well for eight years.

Until 1869, Brehmer had treated 958 patients in his sanatorium (1). Only 47 (or 4.8%) of these patients had died at Görbersdorf (1). On the other hand, 20% were permanently cured despite an average duration of cure of only 86 days (1). However, many patients went home from the hospital after they had recovered substantially but before they had become completely cured. Three hundred fifteen were in the stage of "collection" (1), which is probably a printing error for colliquation (meaning that there was still profuse discharge of expectorate from their lungs at the time when they left the hospital).

Potential Modern Applications

It would be of great interest to test Brehmer's treatment regime again, but now in combination with melatonin and other immunostimulating hormones (57), as well as a specifically designed antituberculosis therapeutic vaccine. But it would also be of great interest to try a similar combination of Brehmer-type special diet, much physical activity, high-dose melatonin, and therapeutic anti-tumor vaccines on cancer patients. Such a combination may have yet to be tried in well-planned and well-conducted clinical trials, not even at a pilot scale with a small number of patients. Not even the principles set forward in a very authoritative book published by WHO in 1968 about the interactions of nutrition and infection (58) It is considered part of the routine therapy and care for cancer patients in all cancer hospitals worldwide today. Nor is the importance of a correct omega-6/omega-3 PUFA ratio in the diet of cancer patients (59), which means at least not higher than 2/1, which is commonly considered part of the standard routines for treatment, care, and lifestyle guidance for cancer patients.

Conclusion

Hermann Brehmer's pioneering work in tuberculosis treatment offers valuable lessons for contemporary medicine. His holistic approach, which emphasizes the interplay between nutrition, physical activity, and overall health, presents a comprehensive framework for managing chronic diseases associated with cachexia. By revisiting and adapting Brehmer's principles, we can explore new avenues to improve patient care in HIV, cancer, and tuberculosis. Future research should focus on clinical trials integrating these historical methods with modern therapeutic strategies to validate their efficacy and optimize treatment protocols.

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