

Hermannus Boerhaave simplex veri sigillum

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Herman Boerhaave, 1668 - 1738

Stipple by John Chapman, after Jan Wandelaar. Courtesy of the Blocker History of Medicine Collections, Moody Medical Library, the University of Texas Medical Branch, Galveston, Texas.

Dutch medicine in the era before Boerhaave

Before the foundation of the first university in The Netherlands, Leiden University, by Prince William of Orange-Nassau on December 31st 1574, Dutch medical students used to travel abroad and mainly to Padua for their medical education. Although the Renaissance with its spirit of new research started

the introduction of anatomy and physiology as the basis of medical science, on the whole, medicine was still predominantly the study of the old manuscripts of Hippocrates, Galenus and Avicenna. In Padua a first start with clinical teaching was made by Giovanni Battista da Monte (Montanus, 1498-1552), but the role of the student still was only that of a passive observer. After his death, clinical teaching was discontinued and did not actually exist anywhere in Europe.

In 1581 one of the Dutch pupils of Padua, Jan van Heurne (1543-1601) was appointed as the second professor of medicine after Gerard de Bondt (Bontius 1522-1597) at Leiden University and he proposed to introduce the Padua model of clinical teaching also in Leiden, but the idea was rejected by the curators of the university. The foundation of the second university in The Netherlands in Utrecht in 1636, where clinical teaching was proposed as a novelty, made the curators of Leiden University reconsider the matter and Jan van Heurne's son, Otto van Heurne (Heurnius), who succeeded his father as professor of medicine in Leiden, was able to introduce the first form of clinical teaching there in 1637. His most important pupil Franciscus de la Boë (Sylvius, 1614-1672) was appointed as professor in Leiden in 1658 and was one of the most prominent promoters of the iatrochemic school, which was founded in The Netherlands earlier by Jean Baptiste van Helmont (1577-1644). Clinical teaching then developed rapidly after his appointment and the Saint Caecilia hospital in Leiden was the first hospital north of the Alps which became a real teaching hospital where Sylvius introduced bedside teaching with students rather than mere silent observers as they were in Padua under Montanus.

After the death of Sylvius, however, clinical teaching was neglected and medical education fell back to the old traditions of reading the works of Hippocrates

and Galenus as had happened before in Padua after 1552. Anatomy and physiology were still poorly integrated in the medical studies and no attention was given to pathology.

Boerhaave's early years

Boerhaave was born December 31st 1668 in Voorhout as son of Jacobus Boerhaave and Hagar Daalders and was baptized on the next day, New Year's Day 1669 by his father, who was minister of the Dutch Reformed Church. Also Boerhaave's future was designated as that of a minister of the church. As preparation for his future post as minister, Boerhaave started his studies in divinity and philosophy at the age of fifteen at Leiden University and from 1689 also studied mathematics and experimental physics.

After his graduation in divinity and philosophy in 1690 he was appointed to supervise the Leiden University library, which gave him enough time to also take up studies in medicine, botany and chemistry. In his youth Boerhaave had a severe ulcerating disease of the leg, which probably also rose his interest in medical studies.

He attended very few formal lectures, attaining his results mainly by self-study of the works of Hippocrates, Galenus and especially of Thomas Sydenham (1624-1689). Sydenham, after having been an officer in Cromwell's army against King Charles I, became the most prominent physician in England in the second half of the 17th century. In his medical theory he unites the iatrochemist and iatrophysic approach into one and is one of the most important revivers of the views of Hippocrates. Although he paid little attention to the development of anatomy and physiology and even seems to have lacked any knowledge of William Harvey's recent description of the circulation, his importance for the development of medicine is crucial for his elaborate epidemiological studies on smallpox, measles, typhoid fever, syphilis and gout. But his main contribution to medicine is his conviction that a physician should rely on his own observations and clinical experience. This special attitude had an important influence on Boerhaave's conception of medical practice.

Boerhaave completed his medical studies with graduation in medicine on July 15th 1693 with the thesis "De utilitate explorandorum in aegris excrementorum ut signorum" (On the usefulness of examination of the excreta as a sign of disease). This graduation did not

take place in Leiden, but for his graduation he undertook the longest journey he ever made in his life: 115 kilometres from Leiden to Harderwijk. Harderwijk was only a minor university of which the main achievements were the graduation of Boerhaave in 1693 and of Carolus Linnaeus, the Swedish botanist, in 1735. Probably the reason for the graduation in Harderwijk was the fact that it was much cheaper compared to Leiden. This journey would be decisive for his further career in the sense that on his journey back to Leiden, Boerhaave became involved in a discussion on Spinoza's philosophy. Spinoza with his main doctrines opposed to the dogmas of Christianity, was considered a danger to faith and state by the Church and even the slightest suspicion of being a follower of his doctrines meant that Boerhaave would lose every chance of ever having a pastorate. This awareness was decisive for his choice to devote his further life to the practice of medicine. He practiced as a physician in his home town of Leiden and gave lessons in mathematics. Before long he was noticed by the curators of the University.

Boerhaave's early university career

At the turn of the century Leiden University had five professors of medicine: Bidloo, Dekkers, Hotton, LeMort and Albinus. Because some of them neglected their duties as teachers, the University was in rapid decline. Drélincourt, who was a professor of medicine at the time of Sylvius, had died in 1697 and four years later, in 1701, Boerhaave was appointed as his successor, however not in the position of professor, but in the position of reader (Lector Institutionum Medicarum) at a salary of 400 guilders per year. Boerhaave accepted his nomination with an inaugural address "Oratio de commendande studio Hippocratico". Amidst the opposing views of iatrophysicists and iatrochemists this address acted as a clarion to recall medicine to experience at the bedside in a true Hippocratic sense (Lindeboom) and gave insight into his plans for a very structured method of medical teaching to students in which his introduction to clinical medicine was based on the general view points of physiology, pathology, symptomatology and treatment. As the salary did not counterbalance the costs of living, Boerhaave also gave private lessons in which he gave demonstrations in anatomy, physics and chemistry. In 1703 his salary was raised by fifty percent to 600 guilders.

Boerhaave, though not in a position of professor, was now an important lecturer at Leiden University. He received tempting invitations from the Frisian University in Franeker and from Groningen University to accept the chair of medicine and Leiden University succeeded in retaining him with the promise that the first vacant chair in the faculty of medicine would be his. This was to come about in 1609 by the death of Petrus Hotton, professor of botany.

The chair of botany to which Boerhaave was appointed also carried the important post of "praefector horti" (director of the university botanic gardens). In this function, Boerhaave published an important catalogue of all the plants in the garden already the year following his appointment. By the time he finished in this position, the number of plants had been doubled.

Meanwhile Boerhaave published his most important works on clinical medicine: *Institutiones medicae* (1708) with theoretic reflections on medicine and *Aphorismi de cognoscendis et curandis morbis* (1709, Aphorisms on diagnosis and treatment of diseases). These books laid the foundation for modern clinical medicine in that they firmly positioned anatomy and physiology as the basis for the practice of medicine.

The summit

Boerhaave now held an important position, both with his chair in botany, his popular medical practice and his private lessons in medicine, mathematics, chemistry and physics.

So when Govert Bidloo (1649-1713, professor of medicine and Rector Magnificus) died, Boerhaave was requested to take the chair of clinical medicine and was appointed at the same time as rector of the University. As a rector he shocked the Senate of the University by delivering a lecture not on medicine, but on the assumptions and certainties in mechanics, in which he argued for experimental verification of all hypotheses.

With the post of professor of clinical medicine he was also commissioned to teach bedside medicine at the Caecilia hospital and in this activity he gained immortal fame and with it he gave a foundation to medical education which is still relevant in our present time. He exercised the taking of a patient's history including details concerning life style, occupation, former illnesses and child birth with his students,

followed by a detailed description of the nutritional status and all the symptoms and signs, a differential diagnosis, diagnosis, prognosis and recommended treatment. For each patient a progress report was written. But above all his thoughtful observation of objective signs and his personal attitude towards the patient as an individual made him by far the greatest physician of his time.

In his daily relations he was winning and kind, his humaneness was praised by many who came into contact with him. His readiness to help was well known; none hesitated to appeal to him. He not only taught his students, but he assisted them by word and deed; when they were sick he visited them, he tried to promote their social interests in every way possible (Lindeboom).

Doctors from all over the world asked him for his written consultations, which he gave in all unpretentiousness with great practical clinical advice. His name and fame became so widely known that letters addressed as "Boerhaave, Europe" would reach him. He was elected a member of the French Royal Academy of Sciences and of the London Society, even Tsar Peter the Great, Prince Eugenius of Savoy and Franz, duke of Lorraine and husband to the Empress Maria Theresia, paid him a visit in Leiden.

The final years

Already at the summit of his career he was called to a third chair: that of chemistry on the death of Jacobus LeMort in 1718. Before his appointment he had given many private lessons in chemistry and performed experimental work.

From 1718 he held three chairs: botany from 1709, clinical medicine from 1714 and chemistry from 1718. In 1727 Boerhaave fell ill, possibly he had pneumonia, and in 1729 he had to resign from his chairs in botany and chemistry because of health problems. After his resignation, in 1732, he still published a major work on the theory of chemistry, *Elementa chemiae*, which remained the standard work on chemistry for more than seventy years.

In 1731 he accepted, for the second time, the Rectorate of the university with a lecture "De honore medici servitute" (On the honour of the physician in serving), his last official lecture and swan-song, in which he gave an overview of his opinion on the art of medicine and the physician as a servant to Nature. From this lecture it is obvious that Boerhaave had

ripened over the course of the years. This scholar, grown grey in the practice of his art, could no longer take for his theme that of his oration of 1703, in which mechanical principles were proposed as the most simple explanation of the working of the human body. While he accepted all the advances of the science of his time, this man had humbly returned to medicine as a "ministerium naturae". How much had happened between that day, 22 March 1687, when as a student he ascended the rostrum in the Grand Auditorium of the University for the first time, and this day, forty-one years later when he slowly stepped down from it for the last time in his life having given the ultimate demonstration of his device "Simplex veri sigillum" (Lindeboom).

In 1738, the 16th of April, Boerhaave gave his last clinical lecture to his students, but was already too ill to finish the examination of the patient and had to give up. Over the next months he showed signs of atrial fibrillation and cardiac failure, but recovered somewhat during the summer. In September his condition deteriorated and on September 23rd Boerhaave died early in the morning.

Though dead, Boerhaave's influence on the art of medicine was continued by his many pupils who founded important medical institutions all over Europe, of which the most well-known are: Gerard van Swieten, founder of the First Medical School of Vienna and personal advisor of the Empress Maria-Theresa, Albrecht von Haller, founder of the medical school in Göttingen, Johannes Theodorus Eller in the Charité in Berlin, Linaeus in Uppsala, Blumentrost in St. Petersburg, Plummer, Cullen, Rutherford, Monro, Sinclair and Innes in Edinburgh and from there in Philadelphia, United States.

Thus Boerhaave deserves a prominent place in the chain of Hippocrates, Galenus, Andreas Vesalius, Robert Koch and Louis Pasteur and his heritage of teaching medicine on the basis of thorough study of anatomy and physiology, careful inventory of symptoms, thoughtful observation of signs, all while respecting the patient as an individual, is still valid today.

This makes him, as Albrecht von Haller called him, *communis Europae praeceptor*.

Undoubtedly Boerhaave's most well-known case is that of Jan Gerrit, Baron of Wassenaar, admiral to the Republic and dike-reeve of the Rhineland area.

This case has since been known as Boerhaave's syndrome as described by Repák et al. in this issue.

On October 29th 1723 the baron's son asked Boerhaave for urgent help because his father was suffering from excruciating pain in the chest. Three days previously the admiral had consumed a heavy meal of duck for which he used an increasing dose of an emetic afterwards. During vomiting the patient experienced a sudden heavy pain in the chest. Next morning the patient died; from Boerhaave's description of symptoms and signs we would today diagnose "death from septic shock". At autopsy the opening of the chest revealed a heavy smell of duck meat, three litres of pleural effusion were present and an eight centimetre tear in the oesophagus was found.

At this point Boerhaave diagnosed the condition but concluded that a cure would never be possible. Perhaps this was the only time that this illustrious physician was wrong in his judgment, as with improving surgery and endoscopy nowadays, 265 years after Boerhaave's death, patients with "his" syndrome can be saved.

Acknowledgement

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