



Happy birthday Doctor Kußmaul!

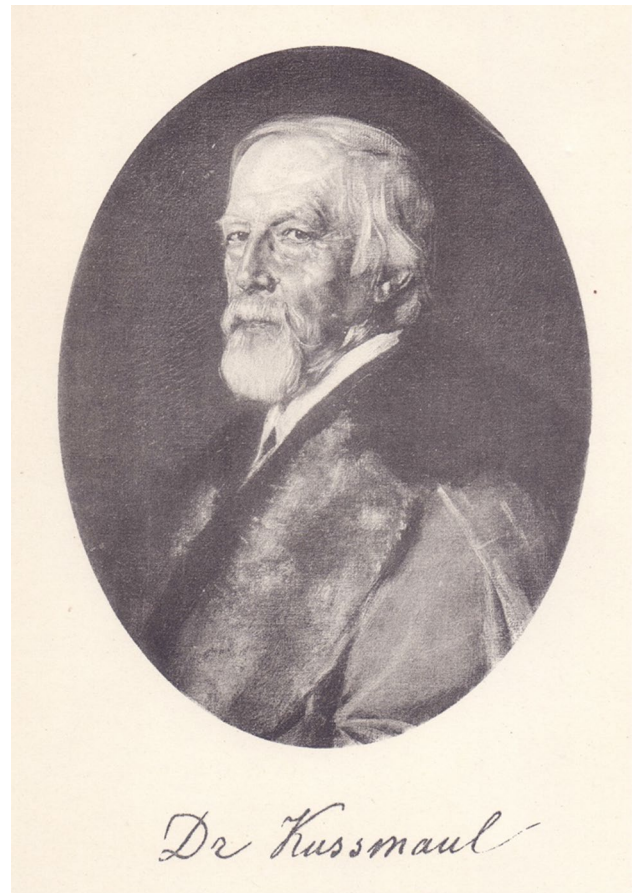
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200 years ago, on 22 February 1822, Adolf Kußmaul was born in Graben near Karlsruhe in Germany, and is renowned as being one of the most prominent internists of the nineteenth century. Every medical student in the world learns the name Kußmaul through his precise description of “deep” breathing in diabetic ketoacidosis. His scientific interests covered many fields of medicine: he developed a stomach pump, was one of the first to attempt gastroscopy, described periarteritis nodosa and conducted research on disorders of the speech. Yet, there remains a lesser known accomplishment, as it was Kußmaul who invented the figure of “Herr Biedermeier”, with whose poems the young Kußmaul joked about the petit-bourgeois habits of the time. Much later, Biedermeier became the name affiliated with an epoch in European cultural history.

Kußmaul and Biedermeier

Kußmaul’s father and grandfather were physicians and, following in their footsteps, he too studied medicine. It was around 1850 that together with his lawyer friend, Ludwig Eichrodt, Kußmaul concocted the pseudonym “Herr Biedermeier”, an imaginary village schoolteacher who, in his lower middle-class contentment and parochialism, was an excellent caricature of the people at that time. The poems signed “Biedermeier” were very successful. It was only after his retirement that Kußmaul removed the clandestine veil relative to the pseudonym “Biedermeier” [1]. Around 1900, Biedermeier became the name affiliated with the epoch in European culture between 1815 and 1848.



From primary care to clinical research

Kußmaul first worked as a general practitioner in the Black Forest. This phase of his life was terminated by a severe illness (probably Guillain Barré Syndrome) [2]. Once recovered, Kußmaul decided to change his life and started an academic career. He learned an important lesson from his period of ill health. It made him become, in his own

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words, “an understanding physician”. He often recited to his students the lessons learnt and he wished them to pass through an affliction of their own in order to become better physicians as they would then understand what care, kindness and tenderness mean to a suffering patient. He insisted that his students should learn the particulars of nursing, from the making of a bed, to preparation of food. He laid great emphasis on the moral and mental influence that a physician has upon their patients [3] (Fig. 1).

Kußmaul earned his doctorate in Würzburg in 1854, supported by Rudolf Virchow, and his habilitation in Heidelberg, in 1855. Professorships followed in 1859 in Erlangen and in 1863 in Freiburg. From 1876 to 1888 Kußmaul held the chair of internal medicine at the newly founded German Kaiser Wilhelm University in Strasbourg. He taught his students to respect the “country doctors”, repeatedly urging his students to read their medical reports carefully and forbidding them from making degrading remarks about colleagues in primary care [2].

Fighting anti-vaccinationists

Like nowadays, during this time, the south of Germany was a focal point of an “anti-vax” movement. In a newspaper, a clergyman and fundamentalist catholic politician from Freiburg called smallpox vaccination a sinful “*intervention in Divine Providence*”. In 1870, Kußmaul responded with articles in a newspaper, presenting all scientific arguments in favour of vaccination, in a coherent manner, to the public. But he also became satirical, he wrote: “*If vaccination is an encroachment on the divine plans, as Dr. Hansjakob suggests, then first he must take off the lightning conductor from his church, since the lightning conductor is as well such a sin*”. A million copies of Kußmaul’s articles were reprinted by the German government in 1914 to reduce the “anti-vax” opposition to the compulsory smallpox vaccination [4].

Fig. 1 Portrait of Prof Adolf Kußmaul by Franz von Lenbach [1]

Kußmaul respiration

In 1874, Kußmaul published the observations of three people with diabetes who died in a coma. He was the first to describe the typical deep breathing—and so his name became immortalized in medical history. His description reads as follows:

“In this type of dyspnea there is not the least suggestion, as is so common in all other types, that the passage of air to or from the lung has to combat obstruction; to the contrary, it passes in and out with the greatest of ease. The thorax expands noticeably in all directions without a pulling-in of the lower end of the sternum or of the intercostal spaces. The complete inspiration is followed by a likewise complete expiration. In the deepest parts of the lungs, one can notice perfectly clear, loud and distinct vesicular breathing; and yet everything is indicative of extreme air hunger, such as the discomfort of angsty of which the patient complains, the extreme activity of the respiratory muscles, and the loud noise that the powerful inspirations and more so the expirations make as the air passes through the larynx. A true stridor, however, never exists. The marked contrast between the extreme general weakness of the patient and the powerful respiratory movements is a striking peculiarity of this picture” [5]. This translation was published by the Viennese Physician Prof. David Adlersberg, who had immigrated to the USA [3].

Kußmaul’s heroic attempts to treat the diabetic coma with blood transfusions—in one case even with mutton blood—were futile and even dangerous. It was not until the year of Kußmaul’s 100th birthday that the history of insulin treatment of diabetic ketoacidosis started [6]. Kußmaul also mentioned the typical smell of the breath and suspected acetone as the cause. In all three cases, he also described “pseudoperitonitis”—abdominal pain in diabetic ketoacidosis, a symptom which has repeatedly led to misdiagnosis [5].

I.

Zur Lehre vom Diabetes mellitus.

Ueber eine eigenthümliche Todesart bei Diabetischen, über Acetonämie, Glycerin-Behandlung des Diabetes und Einspritzungen von Diastase in's Blut bei dieser Krankheit.

Von

Prof. Dr. Kussmaul
in Freiburg i. Br.

Discoveries in many fields of medicine

It is amazing in how many different disciplines of medicine Kussmaul made important discoveries. Already when he was a student in Heidelberg, he took part in a scientific prize competition. To his father's great delight, he won the gold medal donated by the Grand Duke of Baden. In this work, he almost discovered the ophthalmoscope, what was missing was only the illumination of the retina invented by Helmholtz [7]. Kussmaul was the first to coin the term *periarthritis nodosa*. Together with the pathologist Rudolf Robert Maier, he described a patient with multiple vascular changes of nerves, heart, kidney and bowel. The 28-year-old patient died four weeks after the admission to the hospital. The dissection discovered a previously unknown disease. A specimen was sent to Rudolf Virchow, who replied that he had never seen such a case [8].

Kußmaul gained great popularity by the use of the stomach tube in the treatment of pyloric obstruction. And he performed one of the first gastroscopies. Before the use on a patient, he tried the instrument in a professional sword swallower. But the light source was too weak to permit reliable observations, nevertheless his work gave an impetus to the development of modern gastroenterology [9]. Kußmaul improved substantially the technique of pleurapunction and thoracocentesis and reported convincing results in 16 patients. He inserted a U-tube into the pleural space and washed pus out of empyemata with antiseptic solutions [10]. Kussmaul was as well as the first to use the term *pulsus paradoxus*, called later Kussmaul's sign, which is a paradoxical rise in jugular venous pressure on inspiration. The sign can be observed in obstructive pericarditis [11].

Research needs money, more money and again money!

In 1888, along with von Frerichs, von Leyden, Gerhardt and Seitz, Kußmaul was one of the founders of the "German Congress for Internal Medicine" in Wiesbaden, which continues to the present day. The "highlight" of the first congress was the lecture by Robert Koch. The pinnacle of Kußmaul's career was the 58th Assembly of German Naturalists and Physicians in Strasbourg in 1885, which he chaired. At the end of his opening speech, he addressed the politicians who were present saying "In order to make research in science and medicine a success, you need money and more money and again more money! *a ceterum censeo*" which is just as applicable today as it was in 1885.

The most popular German in Alsace

During his time in Strasbourg, Kußmaul was quite well-accepted by the local Alsatians, who were not very enthusiastic about the German Occupation. However, through his "un-Prussian" Baden nature and his devotion to the care and treatment of patients, he impressed the Francophiles. So much so, in fact, that he was even invited to give lectures in Paris. Like von Recklinghausen, Hoppe-Seyler and von Schmiedeberg, Kußmaul contributed to the excellent reputation of the German Strasbourg University. Kußmaul had tears in his eyes when he handed over the clinic to his successor Naunyn in April 1888 [12]. Shortly beforehand, Kußmaul had been called to the bedside of Frederick, the German Crown Prince, who, due to poor health, was in San Remo taking advantage of warmer climes during the winter months. Kußmaul diagnosed advanced laryngeal carcinoma; however, Fredericks' wife, Crown Princess Victoria, trusted exclusively her English laryngologist. He called Kußmaul "a *senile bearded man, who on top of that comes from a very outdated school*" [2]. Kußmaul commented on this in a letter: "After all, it is always the doctor's fault if patients suffer harm through their own imprudence; the evil outcomes are always laid at our door" [2]. However, despite being unheeded, Kußmaul's diagnosis was correct. Friedrich became German Emperor and King of Prussia in March 1888, reigned for 99 days and died on June 15th.

Cui honorem honorem

Kußmaul continued to be active as an emeritus—he was a highly esteemed doctor of celebrities. He died in Heidelberg on 28 May 1902. The Grand Duchess of Baden attended the funeral of the physician of her family, wreaths from the Crown Princesses of Sweden and Norway, and the Prince and Princess of Montenegro adorned the grave of the honorary citizen of Heidelberg [6]. Adlersberg summarized Kußmaul's work as follows: Adolf Kußmaul was one of the great physicians of the second half of the nineteenth century, one of the pioneers who broke the "unnatural alliance" which medicine had formed with philosophical speculation and placed scientific medicine rightly among the biological sciences [3].

Declarations

Conflict of interest I hereby declare that there is conflict of interest concerning the publication.

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