

Johann Nepomuk Czermak (1827–1873).

Johann Nepomuk Czermak and his journeys through Europe

Discoverer of interglobular dentin

In 1850, Johann Nepomuk Czermak (1827–1873) completed his dissertation Observationes novae de structura dentium penitiori (New Observations on the Internal Structure of Dentin) in Würzburg, Germany. In this dissertation, he became the first to describe interglobular dentin. Today, his findings are commonly known among dental professionals as "Czermak lacunae". While his name is familiar in dental histology, little is known about the life of this remarkable scientist, who pursued an academic career at various European universities and lived in several major cities across the continent. His life was marked by notable achievements, as well as painful setbacks.

Czermak was born into a respected family in Prague, which is now the capital of the Czech Republic but was an important city in the Austro-Hungarian empire at the time. His father, Johann Conrad Czermak, was a renowned physician to Prague's aristocracy. His brother Josef became head of psychiatry in Brno and later professor in Graz. His uncle Josef Julius Czermak was a professor of physiology in Vienna. The latter's son, Wilhelm Czermak, later served as a professor of ophthalmology in Prague. The family name is written as "Czermak" in German and Latin texts but as "Čermák" in Czech, where it remains a common surname. The name Čermák literally translates as "robin".

The Czermak household was a regular meeting place for members of Prague's scientific and political elite. In 1837, during the Congress of German Physicians and Natural Scientists, Jan Evangelista Purkyně visited the family home. At the time, Purkyně was serving as professor of physiology in Breslau, Prussia, Germany (today Wrocław, Poland), having previously been unsuccessful under the Austrian monarchy and relocated to Prussia. ("Purkyně", in this context, is also spelt "Purkinje", and he is known today for the eponymous cells, effect, images and fibres.) He became a close friend of the Czermak family and offered to mentor the then nine-year-old Johann Nepomuk should he choose to pursue a career in medicine.

A gifted child

Johann Nepomuk displayed an early talent for music, particularly piano, and composed pieces to express this talent. His parents even published one of his improvisations as Opus 1. Ultimately, however, Johann followed the family tradition and chose a career in medicine.

He began his studies in Prague but soon transferred to Breslau to study under Purkyně. In the spring of 1848, Czermak returned home to Prague for the Easter holidays. His visit coincided with the March Revolution, which gripped the streets of Prague and made a deep impression on him. He ended up staying in the city longer than planned and experienced key political events first-hand, such as the lifting of censorship and the establishment of press freedom. He joined the student guard and was quickly appointed an officer. Consequently, he took part in the June Uprising of 1848, including the attack on the Karolinum, the historic main building of Charles University, one of the oldest universities in Europe, founded in Prague in 1348. When the uprising was suppressed by Austrian troops, Czermak was arrested. However, friends of his family convinced the Austrian authorities that he had entered the Karolinum only to persuade other students not to participate. He was released shortly afterwards and returned to Breslau to resume his studies with Purkyně.

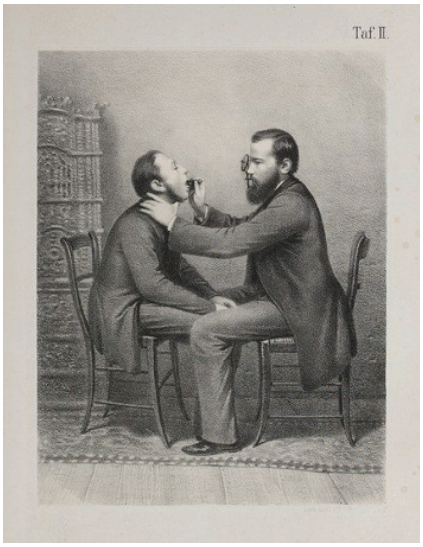
In the final year of his medical training, Czermak travelled to Würzburg on Purkyně's recommendation, where he studied under Albert von Kölliker. It was there that he completed the dissertation that would later earn him recognition in the field of dental science.

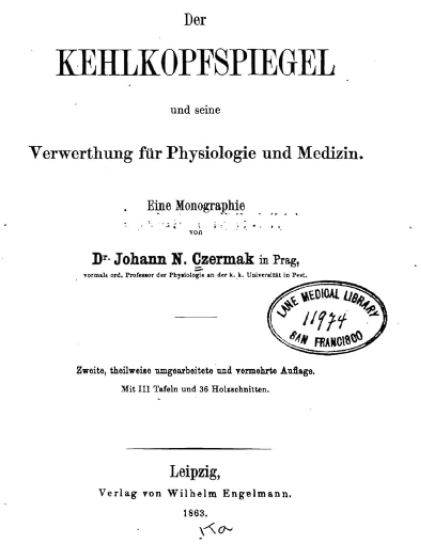
Career and setbacks

In April 1850, Jan Evangelista Purkyně returned to Prague after 27 years away and registered Johann Nepomuk Czermak as his assistant at the institute of physiology with the ministry of education. Under Purkyně's guidance, Czermak was so successful in his research that he was

awarded a lectureship in 1854. Although the minister of education, Count Leo von Thun, was aware of Czermak's interest in a professorship, he also knew that Purkyně had no intention of retiring.

As a compromise, von Thun offered Czermak a professorship in zoology in Graz, Austria, promising him a future chair in physiology at an Austrian university once one became available. In 1856, Czermak was appointed to the University of Krakow, Poland, which was also part of the Austro-Hungarian Empire at the time. However, he never felt fully accepted by his Polish colleagues. His appointment was perceived as favouritism by his colleagues in Vienna, and Czermak's limited command of the Polish language made it difficult for him to lecture effectively.




Der
KEHLKOPFSPIEGEL
und seine
Verwerthung für Physiologie und Medizin.
Eine Monographie
von
Dr. Johann N. Czermak in Prag,
Zweite, theilweise umgearbeitete und vermehrte Auflage.
Mit III Tafeln und 36 Holzschnitten.
Leipzig,
Verlag von Wilhelm Engelmann.
1863.
LANE MEDICAL LIBRARY
11974
SAN FRANCISCO

Left: Czermak examining a patient using his laryngoscope. Right: Czermak's book *Der Kehlkopfspiegel* ("The Laryngoscope").

The laryngoscope

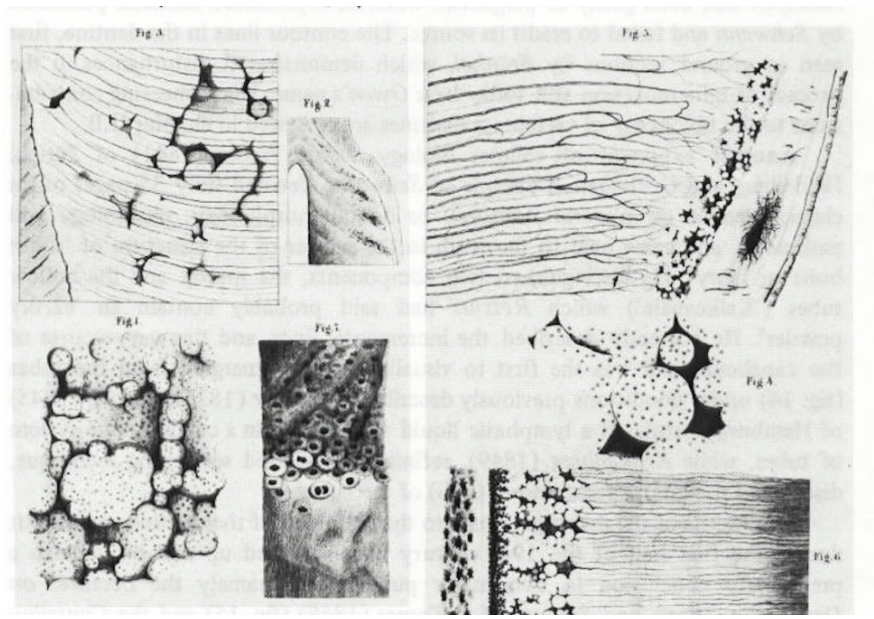
Years earlier, while still living in Prague, Czermak had married the daughter of a wealthy Viennese banker. Leaving his unsatisfying time in Krakow behind him, he now moved to Vienna with his wife. There, he focused on the physiology of the vocal cords, particularly the physical influence of different languages, including Arabic, on the human vocal apparatus. As part of these studies, he borrowed specialised laryngeal mirrors from Ludwig Türck, a neurologist in Vienna. These mirrors resembled those commonly used in dentistry.

Dissatisfied with their handling characteristics, Czermak developed his own tool: the head mirror, which was a circular mirror mounted on a headband, with a central opening aligned with the examiner's eye. This allowed artificial light to be reflected directly into the patient's larynx while simultaneously giving the examiner a clear view. This head mirror—which illuminated and visualised both the larynx and nasopharynx—became standard equipment among ENT specialists and can still be recognised today.

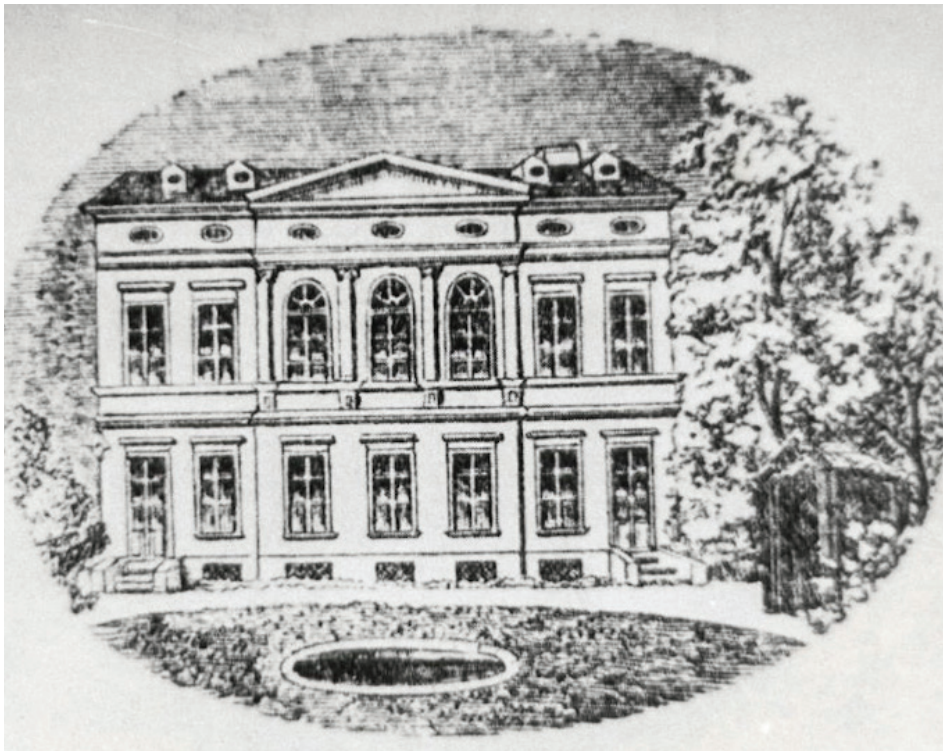
Czermak published his findings and innovations in a monograph titled *Der Kehlkopfspiegel* ("The Laryngoscope"). The book was translated into English and French and met with great success. Encouraged by the recognition, Czermak submitted his work to the French Academy of Sciences for consideration. Unexpectedly, however, Ludwig Türck also submitted a competing entry for the same prize, claiming that Czermak's results were based on his own earlier work and that he therefore deserved priority. Czermak firmly rejected the accusation, maintaining that he had merely borrowed Türck's instruments—not his research. Unwilling to settle the dispute, the Parisian jury opted for a diplomatic compromise and split the award between the two men. However, Czermak considered this to be an injustice and a betrayal.

Longing for Prague

In 1857, Minister von Thun offered Johann Nepomuk Czermak a professorship at the University of Pest (now Budapest, Hungary). However, Czermak longed to return to his native Prague. He wrote to Purkyně for advice, expressing concern



Interglobular dentin from Czermak's dissertation.



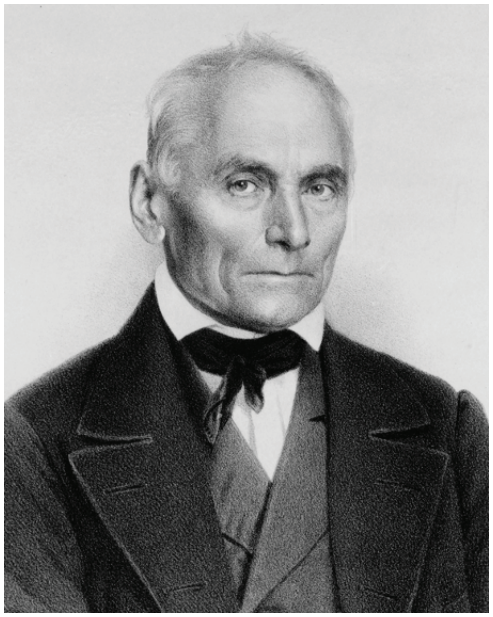


"Czermaks Garten", a street in Leipzig.

Czermak's private physiology laboratory in Prague.

that his teaching obligations in Pest would leave him little time for research. His alternative plan was to return to Prague and dedicate himself fully to physiology in a private laboratory. But Purkyně did not reply.

On 17 December 1857, Czermak wrote again, openly stating that he would like to work alongside Purkyně in Prague as a professor of experimental physiology. He expressly stated that he had no intention of challenging Purkyně's position. This time, Purkyně responded promptly—and rejected the proposal outright. Unbeknownst to Czermak, the day he sent his second letter was Purkyně's 70th birthday. Purkyně had probably expected a similar message from his former student. Instead, he interpreted Czermak's request as an attempt to unseat him.



Jan Evangelista Purkyně (1787–1869).

Deeply disappointed, Czermak accepted the post in Pest. Although he was received warmly, he soon realised that Hungarian was strictly required for both instruction and academic exchange—a language he did not speak. After just two years, he resigned and returned to Prague. In 1860, he founded a private institute of physiology on the grounds of his family estate.

Designed by the renowned Prague architect Josef Ullmann, the building featured an elegant two-storey façade and offered views of a carefully maintained garden. Here, Czermak devoted himself to science and to training a new generation of Prague physicians. Privately, he still hoped to one day succeed Purkyně, should he retire.

From Prague to Jena and Leipzig

But Purkyně was not only a university professor; he was also a prominent public figure, having been elected to parliament in 1861. The question of his possible successor gained public attention. When the medical press in Vienna criticised Purkyně for being unsuited to his academic role and for allegedly hindering Czermak's career progression, Prague united in defence of Purkyně. Both the press and the student body defended Purkyně vehemently. Although Czermak had played no part in any of these disputes, he was increasingly seen as persona non grata in Prague. Realising that he had no future there, he accepted a professorship at the University of Jena, where he spent five years.

He then moved to the University of Leipzig, where he established a new institute of physiology at his own expense. It included a large lecture hall that was designed not just as an auditorium but also as a spectatorium, allowing images to be projected during lectures—a novel concept at the time. In Leipzig, Czermak primarily focused on his lifelong interest:

the physiology of the senses. He became widely known for his final area of study: the hypnosis of animals. He hypnotised chickens, turkeys, ducks, geese, pigeons, songbirds and even a swan. He was the first person to demonstrate that, like humans, animals can be hypnotised.

A European par excellence

In 1873, Czermak spent his holiday in Karlsbad, where he diagnosed himself with diabetes during a routine self-examination.

His health deteriorated rapidly, and after his return to Leipzig he died there on 16 September. He bequeathed the spectatorium to the university and was buried in the Alter Johannisfriedhof cemetery. The original building no longer stands, but the adjacent street is still known as "Czermaks Garten".

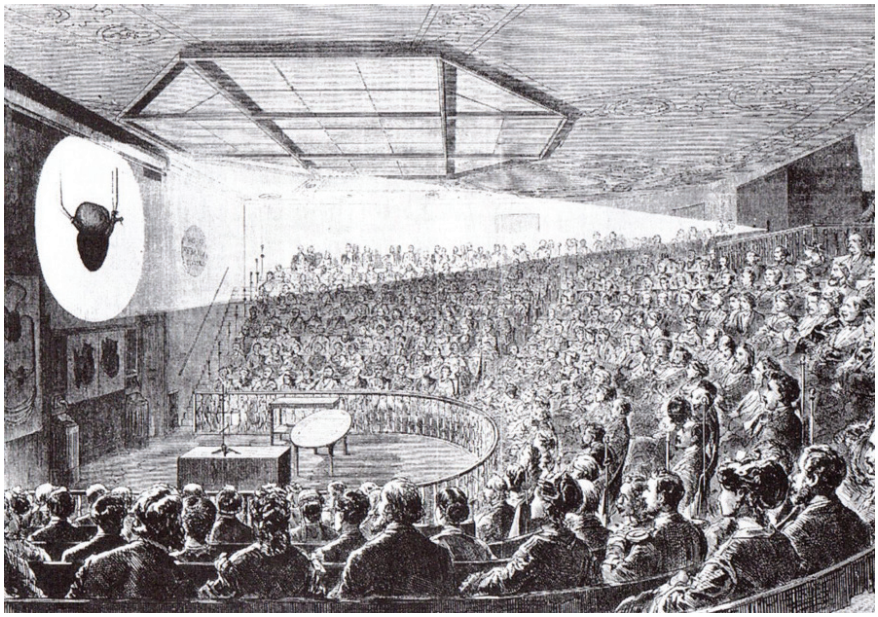
Czermak advanced the field of physiology through scientific achievements such as the Czermak lacunae and the laryngoscope, and he contributed to the training of countless doctors and scientists through his lectures and the institutions he established.

Despite his many successes and the recognition he received across Europe, he was disappointed by the circumstances he encountered and was ultimately unable to fulfil his lifelong ambition of becoming a professor in his native Prague. He studied in Prague, Vienna, Breslau and Würzburg, held academic appointments in Prague, Graz, Krakow, Pest, Jena and Leipzig, and delivered lectures in other countries including France and England.

Even in the 19th century, Czermak embodied an identity that transcended his place of birth—that of a true European.

Doc. MUDr. Otakar Brázda, CSc.
Prague

The author would like to thank MDDr. Maximilian Rudolf Woellersdorfer for his assistance in writing the German text.



A lecture in Czermak's Spektatorium in Leipzig.

The author

Otakar Brázda, MD, PhD, Associate Professor, is regarded as one of the most prominent Czech and Czechoslovak dental professionals. Born in Prague in 1932, he attended grammar school before studying at the faculty of medicine at Charles University, graduating in 1956.

In 1959, he began working as a junior doctor at the Second Dental Clinic in Prague. In 1964, he was appointed clinical assistant and began lecturing on all aspects of conservative dentistry. In 1990, he received his venia legendi and became an associate professor of dentistry.

Dr Brázda's academic and scientific career has been both rich and distinguished. He is the co-author of several textbooks on dental propedeutics, conservative dentistry, caries and endodontics, fluorides and caries, and the life and work of J. E. Purkyně. He frequently spoke at international congresses on all continents, and his outstanding language skills and high professional standards earned him wide recognition.

From 1990 to 1991, he served as Scientific Secretary of the Czech Dental Society (ČSK). From 1991 to 1996 he was chair of the society. He has served on the editorial boards of several journals, including *Česka Stomatologie*, *Stomatologické Zprávy*, *FDI Dental World* and *Asklepios*, and currently serves on the editorial board of *Praktický lékař*.

In 2022, he was awarded the prestigious prize of the *Živa journal*, the oldest Czech journal on natural sciences, founded in 1853 by Jan Evangelista Purkyně. Each year, the journal honours outstanding contributions with publication prizes.

Dr Brázda received the award in recognition of his work on the history of Živa and its connection to Purkyně and other notable figures in the history of science and medicine.