

Albrecht von Graefe and the foundation of scientific ophthalmology



Friedrich Wilhelm Ernst Albrecht von Graefe
(or Gräfe; May 22, 1828 – July 20, 1870).
Source:<http://ihm.nlm.nih.gov/images/B13143>

Albrecht von Graefe is considered one of the founding fathers of modern ophthalmology. On his 150th death anniversary, we intend to remember his career and accomplishments, and his contributions in putting ophthalmology on a sound scientific foundation.

Born in Berlin in 1828, Albrecht von Graefe was the son of Karl Ferdinand von Graefe (1787–1840), professor of medicine and surgery at the University of Berlin, and of Augusta von Alten (1797–1857). His parents were acquainted to the Polish and Austrian high society and fervent Francophiles.^[1,2] After receiving his primary education from private tutors, he frequented the French gymnasium. In 1843, he enrolled at the University of Berlin and passed the state medical examination in the winter 1847–1848.^[3,4]

In the summer of 1848, von Graefe began a “grand tour” across Europe to perfect his medical education. In the first half of the 19th century, medical education in Germany was grounded in theoretical, nonapplied knowledge. This was not the case in other parts of Europe, where the study of medicine was closer to clinical research. For two and a half years, von

Graefe travelled throughout Europe studying and working with the most renowned physicians of his time. His first stop was Prague (summer-fall 1848). He studied ocular diseases with Carl Ferdinand von Arlt (1812–1887) and decided to specialize in ophthalmology. His next stop was Paris (winter 1848–1849). Since the first decades of the century, French scientific institutions, such as the Sorbonne, the Collège de France, and the Muséum d’Histoire Naturelle, had attracted physicians and scientists from around the world. They formed a new type of research community that considered empirical clinical observations as important as theoretical knowledge. Graefe became part of this vibrant international network. He studied experimental physiology with Claude Bernard (1813–1878) and worked with him on numerous physiological problems, including the function of the extraocular muscles and optic nerves. He also studied with Julius Sichel (1802–1868) and Louis Auguste Desmarres (1810–1882), two of the most prominent ophthalmic surgeons of their time. Between 1849 and 1850, Graefe moved to Austria to work with Eduard Jaeger (1818–1884). At the time, a reform of the faculties of medicine had been just passed that gave university professors a large degree of autonomy. Some of them decided to follow the example of Parisian institutions by integrating clinical practice in medical education. Jaeger was among those who made that choice. He put his patients at Graefe’s disposal, and let him teach some of his students. In July 1850, von Graefe was again in Prague, where he spent 2 weeks at von Arlt’s clinic, perfecting his skills in cataract surgery.^[5] He went then to London, where he met William Bowman (1816–1892), surgeon at Moorfield Eye Hospital, and Francis Cornelis Donders (1818–1889), director of the Netherlands Hospital for Eye Patients.^[3]

Graefe’s return to Berlin and the foundation of modern ophthalmology

In November 1850, Graefe was back in Berlin. He opened an eye clinic on the model of those he had seen in France. There, he provided medical consulting, treatment, teaching, and research. Facilities of this kind played an important role in the development of medical specialization in Germany.^[6]

Medical specialization is a relatively recent phenomenon. For centuries, specialized medical practice existed outside official medicine. Healers who performed operations on specific parts of the body were dentists, oculists, and bonesetters. They transmitted their knowledge orally and empirically, and occupied a low position in the medical hierarchy. Until the 1850s, medical specialization developed unevenly across Europe. Ophthalmology was one of the first fields to organize as a structured specialty. Chairs of ocular surgery were established in France in 1765 (Paris) and 1788 (Montpellier), but the outbreak of the French Revolution put an end to the development of French ophthalmology for nearly 50 years. In Austria, the teaching of ophthalmology was introduced in 1773 by Empress Maria Theresa. In 1812, a professorship in ophthalmology was established at the University of Vienna did not lead to further developments. In Germany, the University of Berlin offered a course in ophthalmology from 1828. The same year, the Charité Hospital established an eye clinic.

From the middle of the century, specialists gradually grew in number and became a recognizable social category. They opened private clinics combining teaching and medical research. Medical specialization became perceived simultaneously as a form of knowledge and practice. The specialized physician began to be associated with medical progress, and to be considered as more competent than a general practitioner because of his ability to deal with difficult cases. By the 1890s, the “battle” for the



Figure 1: Statue and memorial of Albrecht von Graefe in Berlin. Source:Manfred Brückels, Own work,Creative Commons Attribution-Share Alike 3.0

acceptance of specialties within traditional medical institutions and the general public was won.^[7]

Graefe's clinic became a reference point for the treatment of eye diseases, attracting patients, students, and assistants.^[5] They flocked from all over the world to attend his lessons, which he gave in German, French, and English. He had numerous assistants from Europe: Argyll Robertson (1837–1909) from Edinburgh, John Soelberg Wells (1824–1879) from London, Sir Henry Rosborough Swanzy (1844–1913) from Dublin, Andreas Anagnostakis (1826–1897) from Athens, Robert Blessig (1830–1878) from St. Petersburg, Eduard Junge (1832–1898) from Moscow, Carl Waldenhauer (1820–1899) from Riga, Henri Dor (1835–1912) from Bern, Friedrich Horne (1831–1886) from Zürich, Edmund Hansen Grut (1831–1907) from Copenhagen; others came from North America: Eklanan Williams (1822–1888) from Cincinnati, Aaron Friedenwald (1836–1902) from Baltimore, Charles Stedman Bull (1844–1914) from New York, and Francis Buller (1844–1905) from Montreal.

In 1854, Graefe founded the *Arkiv für Ophthalmologie*, the first specialized scientific journal in ophthalmology published in a German state. He was also at the origins of the foundation of the German Ophthalmological Society (1857), the oldest medical scientific association in the world. By the age of 30, Graefe was one of the most renowned ophthalmologists of the time.^[8,9] In 1867, he presided over the third International Congress of Ophthalmology held in Paris. In 1870, he was elected as foreign member of the Royal Swedish Academy of Sciences.^[4,5]

Graefe is applied in his profession a rigorous method based on clinical observations and experimental practice. He was among the first practitioners to make a systematic use of the ophthalmoscope. Invented in 1851 by Hermann von Helmholtz (1821–1894), this instrument made possible for the first time in history to observe the posterior segment of a living eye. The use of the ophthalmoscope let von Graefe making numerous contributions in the physiology and pathology of the eye. He discovered that the fusion of the two images from both eyes into a coherent image occurred not in the retina but in the brain. He identified three subtypes of glaucoma; he introduced iridectomy to relieve intraocular pressure and applied this procedure to treat iritis and iridochoroiditis.^[10] He introduced the linear extraction for cataracts, reducing infections in the cornea. He also invented a specific knife equipped with a narrow, pointed blade that minimized the egress of aqueous humor. Von Graefe also improved the surgical treatment of strabismus. He had the idea of sharing the surgical correction on the two eyes, intervening on the

healthy eye to correct a squint. He also described different cases of hemianopsias, postulating that homonymous hemianopsias were due to unilateral cerebral disease.^[11,12]

Von Graefe died in Berlin on July 20, 1870 [Fig. 1]. He left an impressive number of publications that form an unequalled repository of knowledge and a monument to the early years of scientific ophthalmology. His commitment to his profession, his dedication to his patients, students, and colleagues, and his relentless work for creating an international community of eye specialists remain foundational in modern ophthalmology.

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Conflicts of interest

There are no conflicts of interest.

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