

Medicine in Stamps

Albrecht von Graefe (1828-1870): founder of scientific ophthalmology

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Ancient Greece counted on some 30 different gods to protect her health, but none was designated guardian of sight. The Pharaohs of Egypt trusted special court physicians to treat trachoma, the dreaded chlamydial eye disease that plagued its citizens, but they were helpless against its blinding outcome. Through the centuries, physicians mostly fumbled when it came to eye ailments, leaving them to the machinations of quacks. Little was known of the physiology of the human eye, and treatment modalities were rudimentary and ineffective. However, in the mid-nineteen century, a quartet of gifted European doctors pooled their insight and experience to form a discipline that offered new diagnostic and therapeutic interventions for the first time. Called oculists, they were von Arlt, Donders, von Helmholtz, and Albrecht von Graefe, the leader of the pack.

Described as tall, dark and handsome, Albrecht von Graefe was the wealthy son of Dr Carl Ferdinand von Graefe, the Prussian Surgeon General and Director of Surgery at the university hospital in Berlin. Born in 1828, he took his early education at the local French high school, then studied philosophy, physics and mathematics, and obtained his medical degree in 1847. After graduation, he set out for Prague, where he met Carl Ferdinand von Arlt, then the best-known oculist in Europe. Professor von Arlt and others played a vital role in shaping von Graefe's interest in eye diseases. But the turning point came in London, where he worked at Moorefield's Hospital, a specialty hospital for diseases of the eye, and there met Franz Cornelius Donders, a Dutch physiologist of refraction fame, with whom he would eventually forge not only friendship but new scientific theories.

Von Graefe's circle of friends included many notable men in ophthalmology, such as Hermann von Helmholtz, inventor of the ophthalmoscope, and William Bowman, who discovered Bowman's membrane, the anterior limiting membrane in the cornea. Von Graefe also taught

many famous students, including Argyll Robertson, Friedrich Horner and Theodore Billroth.

THE ACADEMICIAN Von Graefe became an associate professor, then a full professor of ophthalmology at the University of Berlin, and was the first German professor of eye diseases. Enthusiastic with high expectations, he captured the eager minds of many, through outstanding lectures at the university, writings in his journal, or discussions at meetings. One of his protégés, Karl Weber, noted: *"One was spell-bound in his clinic, as if in a magic place. The multitude of new facts and viewpoints ever heard before, the fascinating presentation and glowing enthusiasm acted like a revelation."* Another admirer, EV Bergman, wrote: *"... there gush forth thoughts which would cause the brain of an ordinary mortal to exhaust itself or even burst asunder, rather than procure such masterly concepts."*

Von Graefe established an eye clinic-hospital in Berlin, which immediately became a renowned centre for the study of ophthalmic medicine. It formed the model for many similar clinics in Germany and Switzerland. In 1854, at the age of 26 years, he founded the prestigious eye journal *Archiv für Ophthalmologie*, with Donders and von Arlt serving as co-editors. Its first issue consisted of 480 pages, 400 of which were personally penned by him.

A gregarious person, von Graefe hosted many boisterous dinner parties, which provided the opportunity for collaborative discussions. Out of these gatherings grew the first unofficial meeting of the German Ophthalmological Society held in the town of Heidelberg in 1857. The Society was officially founded in 1863, and when first established, was the only international organisation of its kind (but had only four non-German members).

GLAUCOMA, CATARACTS AND EYE-BRAIN INTEGRATION Von Graefe is best known for his pioneering work in glaucoma, a condition then thought



to be purely inflammatory in nature. The source of intraocular fluid was unknown, even though Schlemm's canal, the key outlet in the eye's drainage system, had been discovered back in 1830. Von Graefe incorrectly fingered the iris as the site of fluid manufacture, but quickly recognised that raised intraocular pressure was the actual culprit in glaucoma, correctly linking this to optic nerve atrophy and blindness. He classified glaucoma into three sub-types, and open-angle glaucoma is still known in some quarters as "*maladie de Graefe*." He even began work on a device called an impression-tonometer to measure intraocular pressure, but had to abandon his efforts because of the lack of superficial anaesthesia.

Von Graefe introduced iridectomy as a surgical solution to relieve the intraocular pressure. His particular method is still relevant today in certain kinds of glaucoma, notwithstanding the advent of laser iridectomy. His clinical experience also helped to pinpoint the importance of pupillary constriction (miosis), with the eventual development and use of miotic medications by his students.

In 1865, von Graefe introduced a new approach to cataract surgery by using a modified linear extraction method that significantly decreased the rate of infection. Hailed as one of the most significant advances in cataract surgery since French surgeon Jacques Daviel introduced extracapsular extraction in 1748, von Graefe's technique would become the gold standard for the next one hundred years. His imprint is left today in surgical instruments that bear his name -- the Adson-Graefe forceps and von Graefe extraction knife.

In addition to surgical skills, von Graefe was a consummate clinician. He was the first to use the ophthalmoscope invented by his friend, Hermann von Helmholtz, his expert use leading to the identification of central retinal artery embolic occlusion, papilloedema, and optic neuritis. He also contributed importantly to our understanding of eyeball motion, and the integration of brain and eye in the formation and location of images. One of his early papers described in intricate detail the

physiology of the extraocular muscles. In his first three years of practice, he inspected over 200 cases of ocular palsies, and began to develop new theories of strabismus. He used prisms to map out images, and performed successful operations on patients with palsies and strabismus. And he is known to all endocrinologists for "von Graefe's sign," which describes the inability of the upper eyelid to track the globe upon downward gaze in exophthalmic goitre (Graves' disease).

Eventually, Von Graefe would reach the conclusion that fusion of the two images from both eyes into one coherent image occurred not in the retina but in the brain. This shifted the focus to the brain as the integrating centre for visual perception. He introduced perimetry and the plotting of visual fields, and described different types of hemianopsias, postulating, for example, that homonymous hemianopsias were due to unilateral cerebral disease.

AN EARLY END In 1862, von Graefe developed tuberculous pleurisy. He was then only 34 years old. Despite an apparent remission a year later, his disease soon relapsed. He struggled with haemoptysis, but continued to work with the help, some say, of opium. He died on the night of July 20, 1870 at a young age of 42 years. By that time, this German professor, who gave medicine its firm foundation of scientific ophthalmology, had performed over 10,000 ophthalmic surgeries.

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