

ADOLF WEBER: ATTEMPT AT A LIFE PORTRAIT

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*"Once more one of the greats in the discipline of medical science is gone: on the 17th of July in Darmstadt, Adolf Weber closed his never-tired eyes. With him a truly brilliant man, physician and scholar has passed on; a genius as a human being, whom the hardships of life in no way spared, but whose creative joy was never robbed and whose course toward extended goals was never hindered by these hardships. A genius as a physician, who after only a short period of instruction became practically and creatively active in the area of ophthalmologic medicine in an excellent manner. A genius as a scholar, who by means of sharp observation and intelligent deduction indicated new paths in many ways, learning and teaching in not only his special discipline but also in practically all areas of human knowledge."*¹

Thus OLLENDORF (1915) began his eulogy on WEBER, whose 150th birthday occurred on June 19, 1979. Even if we allowed this date to fade away unnoticed, it should nevertheless provide us with enough impetus to commemorate this man by a short sketch of his life. His name may no longer be familiar to most of us, but we still profit every day from his genius and untiring creative spirit. His life is an impressive example of how a solid education, a

sharp and keen intellect, and a strong will are capable of producing valuable fundamentals in a broad spectrum and with relatively simple means, even outside of universities and institutes.

FRIEDRICH FERDINAND ADOLF WEBER, about whose life we unfortunately do not have much information, was born on June 19, 1829, the fourth of six children of the medical doctor Georg Friedrich Weber in Giessen. There, the father, who had earlier been a pastor (KOERNER, 1937), had a small orthopedic practice (LEBER, 1915). WEBER spent his childhood in Giessen, attended the *Gymnasium* and for a while the vocational school as well. In 1848 WEBER began his study at the University of Giessen, where noted scientists like LIEBIG then lectured. Because of LIEBIG's teaching, WEBER felt attracted to the study of chemistry; however, he finally decided to study medicine, while continuing to attend LIEBIG's lectures. In 1854, he completed his studies and wrote his doctoral dissertation on "*The adenoid in the female breast*".

WEBER is reputed to have taken part with youthful enthusiasm in the rebellion of Schleswig-Holstein against Denmark (LEBER, 1915).

WEBER felt primarily attracted to surgery and went to Berlin for further training. "Here in Berlin, however, as he himself later expressed, 'fate showed him a path, which he luckily followed' " (OLLENDORF, 1915). Coincidentally, he heard about the opening of an eye clinic by a young instructor named ALBRECHT VON GRAEFE. There the most difficult eye operations were to be performed and the inner eye could be visualized by means of a mirror discovered by HELMHOLTZ, the existence of which was ignored at the University. Because of intervention by the "foppish fellow" ("geckenhafter Jüngken") (WEBER), visits to the clinic had been forbidden to the students.

"It is a well-known fact that never before and for a long time thereafter, lectures and courses, in which patients were demonstrated were forbidden to the medical private instructors of the Berlin University and were reserved for the higher wisdom of the regular professors." (LEBER, 1915)²

In LEBER (1915) we also read what enthusiasm the 81-year-old WEBER expressed about the lectures of GRAEFE:

*"... What a surprise awaited us here! The intellectual and enthusiasm-transmitting lectures of the young man poured forth a richness of scientific facts to us, of which people in the other clinics had not heard; at the same time, the diction of the lecture was gripping, as Liebig's had been. The treasures that this brilliant mind had gathered in a two-year travel among the main centres of medical research, had been weighed for their significance and brought into perspective and kneaded into a solid body of didactic knowledge according to the principles honed from his own experience."*³



Fig. 1: Adolf Weber (1829 – 1915)

Therefore, it hardly surprises us that WEBER gave up his original plans and turned himself into an "ophthalmologic specialist" ("Ophthalmologe in spezi", LEBER, 1915), as he called himself at one point. He became a zealous student of GRAEFE, as his notes from GRAEFE's lectures during the winter semester 1854 – 1855 prove; "He took unbelievably accurate notes — the kind of student, so attentive, conscientious and intelligent — one can today only dream of in vain", wrote LEYDHECKER (1979). And out of the student grew "His colleague and soon his friend, a true bosom friend; each of us younger ones noticed that", wrote HIRSCHBERG (1918), "when WEBER visited the clinic; we did not have to look first at his ring bearing GRAEFE's picture." This friendship, "which grew out of mutual esteem and common scientific interests, was repaid after GRAEFE's early death with undying gratitude to the end of WEBER's life," (LEBER, 1915).

OLLENDORF (1915) gives us inside view into this friendship when he reports on the letters of GRAEFE to WEBER:

"Mutual communications and questions about the scientific work of the other formed the main content of the letters, including experiences with operative methods as well as cases from practice that they described and frequently referred to each other, partly just to hear the other's opinion, partly to obtain advice about further therapy. Just as Graefe valued Weber as a like-minded colleague, he also honored him as a human being and selfless 'old and true friend'. 'Believe me, my good friend', wrote Graefe in 1858, 'that in this unjust and unthankful world a noble and warm-blooded character like yours, is truly uplifting and enlivening'. In a letter from 1867, Graefe writes: 'In the midst of the many and harsh disappointments that one has to endure in life, it is really a pillar and a nourishment for the better, more humane part of our egos to encounter intellectually free and true human beings, in whom the conviction lives that the individual exists and functions not for himself, but for others and for the cause that inspires him. Since it now becomes more and more apparent to me that you surely belong to these more nobly organized men with your entire being, the association with you is a celebration for me, your friendship a sacred possession.' Finally I would like to mention a letter from the subsequent year in which Graefe writes: 'The friendship that you generously bring to me is a jewel rooted in pure and spiritual ground, which no one can rob me of. I am quite cognizant that you overestimate me in most regards, but in one way your expectations will not be disappointed, even when the spark of spirit that brought me close to you is long extinguished, I mean, a free and true attitude of friendship.' Equally touching, Graefe's joy penetrates the letter in which he announces a forthcoming reunion with his friend; in almost every year he used the occasion of the Heidelberg Congress to visit Weber in Darmstadt and for a few hours 'to be able to enjoy (him) totally alone', he writes in 1865, 'how genuinely I am looking forward to shaking your hand soon and talking with

you about ophthalmology and about human matters in general'; 'but', he adds another time, 'do not say anything to our other colleagues so that we can enjoy this short time in peace.'"⁴

In spite of this close connection with GRAEFE, WEBER settled down in 1855, for reputedly personal reasons, in Darmstadt as "ophthalmologist and surgeon" (HORSTMANN, 1934). He preferred difficult eye operations. His furnishings were rather simple, OLLENDORF (1915) explains:

"... but he knew to alleviate this problem because of a personal unpretentiousness that he preserved his whole life long; if one of his patients had to remain with him, he simply relinquished his bed and slept on the operating table himself."⁵

In 1860 at the latest (the exact time is variously recorded), WEBER established a private clinic that at first consisted of only one room. In 1871, WEBER furnished a whole house as a clinic at 42, Frankfurt Street in Darmstadt. His reputation obviously must have been very good: *"... those with eye diseases streamed to him not only from Darmstadt and the whole of South Germany, but his reputations as a surgeon advanced and brought him patients from all countries, even from overseas"* (OLLENDORF, 1915).

By means of establishing an office in Frankfurt/Main, WEBER widened his field of activity once more. *"Despite an unusually large practice, Weber still found time for scientific work and publications. This fact is not surprising; indeed, his deep scientific predisposition made it really a matter of course. For even during office hours and at the operating table, he remained the researcher, who not only wanted to heal according to the existing methods, but tried simultaneously to establish the character and origin of the disease and to develop new therapeutic methods. No routine treatment was given at the office visit; and when, because of the thorough examination and the subsequent intellectual evaluation of each case, he occasionally forgot the name of the patient, this should be forgiven from the scientific standpoint, even if the patient was annoyed (undoubtedly justified from his standpoint). And just as he learned from each case, it was a necessity to him that he communicate to others what he had gained; thus the relatively large number of lectures and publications."* (OLLENDORF, 1915).

His humane medical and scientific activities were officially acknowledged. In 1878, the title of a privy councillor for medicine was awarded him. Together with M. KNIES, he received the Albrecht von Graefe award in 1879 for his achievements in the area of glaucoma. In the association of Hessian physicians he became an honorary member. Only at the age of 68 years did WEBER give up his practice in Darmstadt and two years later his office in Frankfurt. However, he was not idle afterwards. As the sole living member of the founders

of the Heidelberg Ophthalmological Society. WEBER composed the commemorative publication in 1907: "For the 50th anniversary of the formation of the Graefe school."

Besides that, he held lectures in different societies and founded the Society of Art, Science and Literature.

"Only in the spring of 1915 did the 85-year-old begin to succumb to the weaknesses of age" (HIRSCHBERG, 1915), and although he fought against it, he fell victim to "arteriosklerosis of the heart" (LEBER, 1915). Three days later the funeral and subsequent cremation took place with only close family members, friends and colleagues present.

"The memory of this distinguished man," as LEBER (1915) closes his eulogy, *"who worked untiringly toward the progress of his science and who was devoted selflessly to the interest and well-being of his numerous patients; who, loving and humble in acquaintances and at the same time ingenious and original, rejoiced to the greatest extent in the esteem and friendship of his colleagues, will remain unforgotten by all those who stood near him. In the annals of science his name will live on!"*

In addition to numerous small publications, WEBER occupied himself with a few main areas, principally glaucoma. Already in Berlin, he made a significant contribution. LEBER (1915) describes it:

"His first paper in ophthalmology reveals his splendid gift of observation. The paper appeared during his stay in Berlin in 1855 under the title: 'A case of partial hyperemia of the choroid in a rabbit', which gives no clue to the importance of the observation. Until then it had generally been assumed erroneously that the optic nervehead was in glaucomatous excavation not pressed back and deepened, but bulged forward at a corresponding degree. Ed. Jaeger and von Graefe were among the first to fall victim to this error. Similar to a glaucomatous excavation was the case described by Weber of a rabbit eye afflicted with a posterior Staphyloma, in which competent ophthalmoscopists could not convince themselves that the largest part of the white disc was actually concave, whereas they believed of that they saw a severely tumorous convexity. After Weber had substantiated the correct interpretation of the ophthalmoscopic finding and had confirmed it by a histologic examination, v. Graefe arrived at the same interpretation of the supposed convexity of the glaucomatous papilla, which he expressed only with great reservations (v. Graefe Archiv II, 1, p. 248)."

Besides ophthalmoscopy, WEBER was concerned with tonometry. He was the first to realize that the varying rigidity of the eye produces a measurement error in the traditional impression tonometry. He attempted to avoid this by an instrument that flattened only a small area of the globe. Thus, he invented in

1867 the first applanation tonometer. The actual instrument of that time was less successful than its fundamental principles, which are still valid today.

In 1877, WEBER defined the origin of glaucoma in a 91-page treatise (WEBER, 1877). He was able to draw the correct conclusions from numerous experiments, pathologic-anatomical and clinical studies which he had conducted, proving an impairment of outflow in the chamber angle as the pathogenesis of glaucoma. Thereby he challenged the former opinion that glaucoma is the result of a hypersecretion, which V. GRAEFE believed to be secondary to a chronic inflammation; DONDERS, on the other hand, believed it to be related to an angioneurosis.

WEBER's priority in this discovery could be challenged since KNIES published a similar article before him. At the beginning of his paper, WEBER defended himself: "Other circumstances as well as the conviction that truth will in time emerge, have kept me from publication until now . . . I now feel myself pushed toward a hastened publication because recently a few relevant facts, even if erroneously interpreted, have already been published." (WEBER, 1877).

WEBER also devoted extensive studies to the treatment of glaucoma; he made pilocarpine a useful drug for glaucoma therapy. This is one of his most commendable achievements. Here we may be permitted to quote from our monograph (ENGELMAYER, KRIEGLSTEIN, 1980).

"Weber, who from the beginning of his career had dealt with glaucoma, was concerned not only with the surgical treatment of the affliction but he was also open to try topical and systemic treatment, which was then still in its infancy and upon the development of which he had a decisive influence. In 1863, stimulated by the publications of the 'Medical Times and Gazette', Weber lectured on experiments of others with calabar beans. Experiments with those 'seeds which are probably destined to a great therapeutic future' did not yet allow considering their use in glaucoma. The substance was tried in mydriasis resulting from neural lesions. As an addition to his paper, Weber reports on experiments with other pupil contracting agents: Graefe had used morphine and Weber himself 'had conducted such experiments with a few alkaloids belonging to the acute narcotics . . . I used particularly digitaline, especially its acetate, conine and nicotine in experiments on animals.' The substances proved hardly effective and severely irritating: 'An experiment on my own eye was punished by a very severe keratitis,' Weber writes. After that, he tried on himself and his patients with paralyzed oculomotor function, 'another, very harmless, but according to my present experiments not a very effective miotic — fresh tobacco leaves.'

When an article by LAQUEUR about the use of eserine in glaucoma appeared, Weber also published his relevant experiences in 1876, with the

remark: 'I would probably have delayed the following lines a long time according to my own principle of letting a manuscript lie in my desk a while before publication, if the preliminary communication of LAQUEUR and the insistence of a few friends, to whom I had made my experiments in this context known, had not urged me to confirm the observation of the former and to escape the reproach of the latter.'

On October 28, 1876, WEBER finally published his article 'Concerning the effect of pilocarpine (pilocarpium muriaticum)'. Weber had successfully employed the Jaborandi infusion for a long time, as he notes, and in May of that year, had obtained pure pilocarpine for experimental purposes, which had been produced industrially for the first time by the Merck Factory. Weber describes the well-known, usual effects like salivation and sweat secretion. Feelings of weakness and minimal sickness were induced by the pure alkaloid, but not by the infusion, Weber saw this as the major reason 'why we use the pilocarpine injection almost exclusively rather than the tea, which also satisfies us with regard to the intensity and to the constancy of the effect.' Weber knew the constrictive effect on the pupil, which he describes in its time course, but which he does not value: 'Pilocarpium muriaticum was used mainly because of its characteristic of strongly stimulating the metabolism, whereas we ignored its mictic effect, since for that eserine achieves all that is desired. For the first indication, I believe that no substance can equal it.'

WEBER recommends it for vitreous opacity as the only clear ophthalmological indication after chronic iridochoroiditis, in which he obtained outstanding success. The way into its great ophthalmologic future was opened to pilocarpine first in 1877 when Weber wrote at the end of his treatise on glaucoma: 'I can give a warmer recommendation (than that of eserine; commented the author) for the pre- and post-treatment of glaucoma to pilocarpine: here the vascular-alleviating effect is paired in fortunate union with the effect of contracting the sphincters, and I live in the hope, that iridectomy can be replaced by the use of pilocarpine in some chronic and uncomplicated glaucomas and a large number of inadequate operative results can in any case be corrected.' "

In addition, cataract operations are counted among WEBER's most important fields of interest. He excelled particularly in linear extractions of the hard cataract. His pertinent studies and experiments were "highly important and significant for their time", as HIRSCHBERG (1918) emphasizes; however, today they are only of historical interest. For his operative method he constructed a hollow-lancet knife, with a diameter of 0.719 mm. Apropos, he remarked as follows: "It is as unlikely that a thousandth of a mm can be ground by the instrument maker (of those times, commented the author), as that the physician can attain that precision with his cataract incision."

(HIRSCHBERG, 1918). How far Weber's method spread is not known; neither then nor later did he report his results. Supposedly, he performed seven hundred such operations and once stated that his procedure had found no dissemination, "because the immediately following antiseptics made such an accuracy no longer worthwhile." (HIRSCHBERG, 1918).

WEBER received great recognition for his work about the excretory tear system. In a comprehensive article, he describes the results of his study of this organ. Starting from the anatomy, where he also prepared drains by using Wood's alloying technique, he thoroughly researched the physiology. He does not forget to let harsh criticism ring loudly: "... one sees in recent books, where one is used to find only good things, illustrations of this organ. Through these illustrations, one cannot find one's way, even with the best topography; one reads in one of the latest issues of the *Annales d'oculistique* the fantastic assertion that every naso-lacrimal duct is equipped with three valves, two near the mouth and one at the opening into the sac, and various other evidence of incomplete anatomical knowledge." (WEBER, 1863). By means of numerous experiments, like manometric measurements in the duct, etc., WEBER proves that blinking the lids is the most important factor for tear drainage. WEBER worked successfully on improving operative methods for duct constrictions; he developed a special knife that found wide use.

Finally, WEBER's achievements in eye hygiene made in the 1880's deserve mentioning. The prevention of increasing myopia in school children took first rank. WEBER worked with exemplary competence with the "*Ueberbürdungs-Kommission*" ('Commission for Visual stress') which presented the "expert opinion of the medical central committee in the Grand Duchy of Hessen concerning the protection of the students, concurred upon in its meeting in Darmstadt on November 20, 1882" (WEBER, 1883). Instigation for the investigation that lasted for several years was the frighteningly high number of children with impaired vision, particularly with near-sightedness, which was significantly higher in the investigated region than in other areas. WEBER, who presented a self-devised plan for a new kind of school building which above all dealt with the lighting conditions, drew up nine demands that included the correct amount of light coming into the school rooms; construction of school benches according to set principles and under the control of the state; the distribution of subsets to fit the bodies according to measurements made at the beginning of each semester; the number and length of intermissions and recesses and the demand for recreation halls; the necessity for "distance of the eyes from the work;" the demand that "all printed material, which does not correspond to the requirements of eye hygiene, such as closely lined booklets, tables and number models as well as preprinted card patterns and narrow sewing patterns, be banned from the school;" the danger of Gothic script and the physiologically more pleasing round type, the prohibition of dictation and

the limitation of copying to only the most necessary; and the demand for regular eye examinations by specialists complete the eye hygiene in the schools.

“The warm recognition which WEBER’s influence in this area has found in his home state, proves that significant use was made of his proposals,” writes LEBER (1915).

ADOLF WEBER: Attempt at a Life Portrait

Summary

Adolf Weber war born on June 19, 1829, in Giessen. His father was an orthopedic surgeon in the same city, where Adolf Weber went to school and graduated from medical school in 1854. He was much influenced during his medical education by the famous analytical chemist Justus Liebig in Giessen. In late 1854 he moved to Berlin where he met Albrecht von Graefe. He was excited about the lectures and the surgery of von Graefe, so he decided to become an ophthalmologist. In the years after 1854 a deep and sincere friendship developed between Adolf Weber and Albrecht von Graefe. In 1881 Adolf Weber moved into his private ophthalmological practice in Darmstadt. Difficult eye operations were the main field of his work in Darmstadt where he practiced until 1897.

He was one of the founding members of the Heidelberger Ophthalmologische Gesellschaft, the first ophthalmological society in the world which was initiated by von Graefe in 1856 with eight members. At the age of 86, in 1915, Weber died in Darmstadt. The scientific work of Adolf Weber was devoted to optic disc excavation, to applanation tonometry, to the etiology and the therapy of glaucoma. In the latter field his main contribution consisted in the introduction of pilocarpine into glaucoma therapy. Beside this very pertinent innovation in therapy of one of the most blinding diseases Weber contributed many ideas to the surgery of cataract, the surgery of the lacrimal ducts, and to socio-ophthalmological problems.

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