NEWSLETTER
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Early color aesthetics:

Virtually absent from the optometry curriculum has been the study of the aesthetics of color, the empirical guidelines employed by artists to effect the most favorable visual sensations. Not until OHS member James Leeds recently showed me an old book by M. E. Chevreul, 1786-1889, did I realize that anyone had ever undertaken a scientific treatment of the topic.

Chevreul's original text was written in 1835 and published in 1838, in French. The book shown to me was published in 1906 as a reprinting of the third edition of the English translation of Chevreul's book by Charles Martel under the title of "The Principles of Harmony and Contrast of Colours and their Applications to the Arts," London, George Belland Sons. According to the translator's prefatory comments the third English edition appeared in 1860 with the assurance that, "it is hoped that the book will now be found as perfect as it is possible to make it."

Chevreul was a renowned French chemist whose concern with the perception of colors originated with his appointment as superintendent of the dyeing department of the Gobelin royal tapestry works. In his preliminary attempts to find explanations for perceptual color phenomena plaguing the tapestry makers he consulted the writings of Haüy, Buffon, Scherffer, Rumford, Prieur de la Côte-d'Or, et al. In his own endeavor to link together the phenomena he himself had observed, "so as to comprise them in one general expression in conformity with the writings I consulted. . . I was incessantly impelled. . . by my friend M. Ampère who. . . constantly replied,' So long as the result of your observations is not expressed by a law they are valueless to me.'"

The law of simultaneous contrast which Chevreul ultimately derived to serve as the theme of the text is expressed in its simplest form as follows: "In the case where the eye sees at the same time two contiguous colours, they will appear as dissimilar as possible, both in their optical composition and in the height of their tone." Tone is defined in terms of levels of grayness. In other words, the law states that two samples of different hue or of different luminosity will seem to differ more when viewed in juxtaposition than when viewed widely separated.

The almost 500 pages of the 1906 book deal with a wide range of the author's experimental observations and of practical applications of the law in chiaroscuro, painting, tapestry, carpets, mosaic, colored glass windows, textile fabrics, calico-printing, paper staining, printing, maps, engravings, architecture, interior decoration, clothing and horticulture. Included are 15 colored plates with remarkably well preserved hues. The colors blue, red, and yellow are classified as "simple" or "primary", with orange, green, and violet as "compound" or "secondary".

It is apparent that the several editions of the book were big sellers and served for many years as the bible for color aesthetics.

Nero, Seneca, et al:

You may have heard that emperor Nero (A.D. 37-68) used an emerald for viewing the gladiator combats and that his tutor and political consultant Seneca (c.4 B.C.- 65 A.D.) made a few observations about prism optics. But you may not have learned much about their personalities. If interested, you will enjoy reading The Flames of Rome, a documentary novel by Paul L. Maier, Doubleday and Company, 1981.

The author is a professor of ancient history. He developed a story to fit known individuals and recorded facts in the history of Rome during the tumultuous two decades following A.D. 47.

The book will not resolve the mystery of the smaragdus or emerald, but it will give you one very competent author's vivid appraisal and portrayal of the era, milieu, and personages. Very interesting reading.

Early optical oddities:

In the February 1981 issue of Optics News, Vol. 13, no. 2, pp 24-25, W. Lewis Hyde has briefly reviewed the new Optics Gallery which opened in the summer of 1986 at the Science Museum in South Kensington, London. Among his illustrations of displayed items is a replica of an ornate 1727 Scottish gravestone for a 12 year old boy which includes two sculptured reliefs of skulls wearing spectacles.

In a separate brief entitled "The Story Goes That. . .", on page 47, Mr. Hyde tells of a human interest incident involving the optics book author, Sir Arthur Schuster. In 1873, Schuster had passed his oral doctoral exams at Heidelberg and was awarded the degree without a dissertation upon making a $50 deposit to be forfeited if his dissertation was not submitted within one year. A week later the university librarian hopefully suggested to Schuster that he not submit anything. It seems that such forfeitures were the only income of the library!

About Theo Glaser:

How the profession of optometry has fared in the communist countries remains largely an unknown for those of us elsewhere. What is apparent, however, is that the integrity of the profession in the communist world is most intact in East Germany. This may well be due in significant degree to the leadership of one person, Theo Glaser of Dresden, who celebrated his 75th birthday on December 26, 1986.

An accolade to Herr Glaser by H. Gunther appears on page 193 of the November/December 1986 issue of Augenoptik, Vol. 103, No. 6. From it we learn that the honoree is "...zu den aktivsten Kollegen in der Geschichte der Augenoptik..." (among the most active colleagues in the history of ophthalmic optics).

His career of well over a half century is marked with numerous leadership roles in a variety of professional organizational posts, boards, panels, and editorial assignments. He persistently proselytized the term "optometric", and from 1953 to 1978 headed an "optometric" study group or task force to improve the quality of clinical service. He is credited with 123 professional lectures and 431 publications of original scientific articles, translations, reviews, and reports, including a widely used book, "Die Phorien" (The phorias). He served two journals and an encyclopedia as editorial consultant. His topical interests included monocular testing techniques, clinical studies of binocularity functions, ophthalmic standards, and motorists vision. He designed several clinical instruments, presently in use. Though he has been relatively confined to his country, his views and philosophy are truly international in spirit.

Would that he might now write his memoirs. Such memoirs would be an invaluable documentation of optometric history in a period and in a locale otherwise all too hazy.

50th Anniversary of Great Lakes Congress:

The Great Lakes Congress of Optometry is an annual regional gathering of optometrists of the states of Illinois, Indiana, Iowa, Michigan, Ohio, and Wisconsin for continuing educational purposes under the auspices of the Optometric Extension Program. The meetings scheduled for May 2-3, 1987 in Chicago will be the 50th Anniversary. An anniversary celebration feature will be the attendance by Leo Manas, O.D., a retired professor of the Illinois College of Optometry for many years, a special invitee for the occasion.

Dvorine's autobiography reviewed:

J.G. Sivak reviewed "Israel: A foreign born optometrist looks back on his American dream" by Israel Dvorine, O.D., Scientific Publishing, Baltimore, 1986, in the February 1987 issue of the American Journal of Optometry and Physiological Optics, Vol. 64, No. 2, p. 157. He concludes, "It should be included in the library of anyone interested in the history of optometry."

Dr. Dvorine was born in Czarist Russia, studied optometry, engaged in private practice, published extensively, and developed a pseudo-isochromatic color blindness test. Much of the book deals with Dr. Dvorine's interpretations of the struggles of the profession.

On the origin of spectacles:

The teasing search for the origin of spectacles continues, and the conjectural identifications of their inventor remain elusive. One recent literary review is the article "Spectacles: Past, Present, and Future" by Melvin L. Rubin in the March-April 1986 issue of Survey of Ophthalmology, Vol. 30, No. 5 pp. 321-327. Summarily reviewing the conventional notions of pre-spectacle visual aids in the ancient cultures he declares that "The first true spectacles were made about 1300." He then describes the subsequent development of spectacle design with several photographic illustrations from the American Academy of Ophthalmology Foundation Museum of Ophthalmology.

In the November-December 1986 issue of the same journal, No. 3, pp. 185-188, O.H.S. member Charles E. Letocha responds with some added details in a very erudite letter to editor Rubin entitled "The Origin of Spectacles." Among other resources of scholarly significance Letocha cites, the only two original references to the invention of eyeglasses, the sermon by Friar Giordano da Rivolta in 1305 and the late 14th century death notice of Friar Alessandro Spina. He also cites the first mention of spectacles in a Venetian glassworkers regulation of April, 1300. He favors the suggestions of historical researccher E. Rosen that, "most likely, the inventor was a lay person of Pisa" and "the date of the inventions is most likely 1286."

He expresses disappointment in our failure to have given recognition to the invention's septicentennial during 1986.

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Another optometrist memorialized:

The International Council of Omega Epsilon Phi fraternity has established the Dr. Philip Cooper Memorial Scholarship to be awarded annually to a second or third year student member of O E Phi fraternity.

Do-It yourself Optometry:

Mr. J. I. Hawkins, a civil engineer and the inventor and wearer of the first trifocals, was not very favorably impressed by the clinical skills and dedication of the practitioners of optometry of his day. In an article which appeared originally in 1826 in The Repertory of Patent Inventions, Vol. 3, pp. 347-353 and 385-392 he introduced his description of the marvels of bifocals with the following revealing paragraphs:

> But before going into the detail, I deem it proper strongly to impress on the mind of the reader the absolute necessity of his studying the subject for himself, if he would gain all the advantages that may be obtained from the use of spectacles For ...
>
> Finally, it is a hundred to one against his finding a spectacle vender who is both able and willing to investigate the state of the eyes, and adapt, in every minute circumstance, the best means of affording the greatest perfection of vision.
>
> Secondly, it is impossible that any person should communicate to an optician all his views and feelings, so that the optician shall have as lively a conception of them as the person himself possesses.
>
> Thirdly, in order to ascertain the true state of the eyes, it may in some cases be necessary to pursue a course of experiment occasionally for several days or even weeks together; so as to obtain correct knowledge of the various circumstances, without dwelling upon any one observation long enough to fatigue the eyes. In this pursuit no one can enter so warmly as the person who is to be benefited by the result.
>
> And, fourthly, the state of the eyes is subject to variation, and , therefore, the spectacles which may be very good now, may be imperfect a year or two hence.

In a few paragraphs later he capped his point with the following assertion:

> ... for it as almost as reasonable to expect that one person by eating should satisfy the hunger of another, as that an optician's transient view of the eyes of another should enable him to provide the best means of affording distinct, clear, durable, and comfortable vision.

The rest of the article deals with judging focal distance, use of an optometer, a make-shift method, the dimensions of glasses, and other practical details that the potential wearer should take into account.

The article was reprinted in April 1967 in Manufacturing Optician International, Vol. 19 (new series), NO. 10, pp. 539-541 and 543-545, with some accompanying editorial notes by A. G. Bennett, and called to our attention by O.H.S. member Charles Letocha.

Esthetic Visual Preservation:

To rehabilitate the lighting, interior and exterior, of the 1920 Colorada State Office Building, electrical engineer Les Yingling found himself involved with the Colorado State Historical Society. The historians "didn't want the public to perceive the place as a 1920's structure that had been gutted and turned into a 1986 office building."

To ensure the success of the undertaking the original or recreated luminaires had to be ingeniously adapted to preserve their original appearance characteristics but equipped with technologically modern lamp sources. The interesting story is told with numerous pictures in an aricle by architect Charles Linn entitled, "The best of both worlds: Historic luminaires and modern illumination" in the March 1987 issue of Architectural Lighting, Vol. 1, No. 3, pp. 20-25.

A von Graefe bicentennial:

The renowned Albrecht von Graefe had a famous ophthalmological father, Carl Ferdinand von Graefe. He was born 8 March 1787 in Warschau (Warsaw) and died of typhus on 4 July 1840 in Hannover. His extensive surgical accomplishments and publications are described in an article by M. Jahne in the January/February issue of Augenoptik, Vol. 104, no. 1, pp. 18-19, with a portrait on the inside front cover.

In the same issue, page 19, B. Lutze gives a brief summary of the life and works of Allvar Gullstrand, 1862-1930, in recognition of the 125th anniversary of his birth. He, too, was the son of a physician.

A reminder:

OHS member Charles Letocha asks, "do you think the membership is generally aware of Levene's book 'Clinical Refraction'? It's such a gold mine of informatin and the title is so misleading."

How true! The full title is "Clinical Refraction and Visual Science", but misleading nevertheless. It is pure history from cover to cover, and in no sense does it deal with the current status of the terms in the title. Upon first seeing the book, I asked John Levene why this title was chosen. He explained that the publishers insisted that the book would not sell if it was identified as "history".

Fortunately, those thoroughly interested in the history of optometry seem largely aware of this fine resource. Perhaps a few others have been serendipitously exposed to some history as a result.

The book was published in 1977 by Butterworths and Company.

H.W H.

About our membership:

The OHS has maintained a remarkably constant membership count during its 17 years of existence. The count at the moment is 258, of whom 220 are in 35 of the 50 American states and in Puerto Rico and the District of Columbia. The other 38 are in 17 different countries. Two of these are island countries and the other 15 are on six continents.

The turnover of membership is really quite small, as is the growth.

Borish on "21 points":

Dr. Irvin M. Borish, Benedict Professor of Optometry at the University of Houston adds his interesting comments on the origin of the Optometric Extension Program "21 points", often attributed to A. M. Skeffington, O.D. The following passages are excerpted from Dr. Borish's letter of March 10, 1987:

> I must apologize for not writing you sooner about the recent [October 1986, Vol. 17, p. 60] Society bulletin in which you mentioned the anniversary of the OEP "21" points and asked for suggestions of their origin.

I have assumed that the 21 points were derived from Sheard's original "18 tests" which he published in his book, DYNAMIC OCULAR TESTS in 1917. (A reprint of this paper appears beginning on page 42 in the SHEARD VOLUME - VISUAL AND OPHTHALMIC OPTICS, published as a memorial to Sheard in 1957.) Although Sheard did not use the same names for the tests which later became popular, he was covering the same areas. In a later paper entitled "Considerations Regarding the Analysis and Interpretation of Data on Ocular Accommodation and Convergence" (page 233) he proposes a new "20 test" routine and mentions his earlier shorter one. In this latter one, he uses the nomenclature which more closely approximates that used by Skeffington, although he describes pretty much the same tests in both papers. He gives credit in his second list to the "additions" of others.

Sheard did not differentiate adduction from abduction, etc., in his original listing. He also did not separate the vertical phorias form the ductions as Skeff did later. If you compare the routines listed by Sheard and the Skeffington "21 points", you note that Sheard listed "History" as #1. This was not listed by Skeffington at all, so that Sheard's #2 becomes Skeff's #1, Sheard's #3 becomes Skeff's #2, etc., with just a few exceptions. Sheard first listed tests of amplitude of accommodation early in the routine, but later moved them back. He also originally included cyclophoria tests which Skeff totally ignored. Skeff introduced both "Binocular" and "dissociated" cross-cylinder findings where Sheard only used "monocular" cross-cylinders, and also added phoria tests of both values of the cross-cylinders. He also made two tests of the dynamic skiametry. This resulted in 21 "points" in Skeff's routine. The order and even the numbering seem, once you drop "history", "cyclophoria" and also "objective measurements of the amplitude of accommodation" and consider where Skeff inserted the added tests, almost too similar for just coincidence.

Of course, science is full of examples of several individuals independently coming up with identical concepts, and so it may be here. I may also be influenced by the fact that Bill Needles supplied me with a good deal of the early history of Skeffington and I also spent some time with him myself early in my own career, and my inclination of the respective backgrounds and intellects, taking nothing away from Skeff, would prejudice me towards favoring Sheard as the likely originator.

Nineteenth century eyecare:

The following article was originally printed in Harper's New Monthly Magazine, September 1873, (Vol.47, No. 280). It is reprinted here in full:

MY BLINDNESS AND ALBRECHT VON GRAEFE.

By THE REV. WILLIAM H. MILBURN.

WHEN I was five years old an unlucky, unintended blow from the hand of a playmate inflicted a severe wound in my left eye. Had the incident occurred a hundred miles from a doctor, and my mother applied a wet bandage to the eye, I might have been saved more than forty years of twilight, deepening down into utter night, besides the thousand ills which come from dwelling in the darkness. But the accident befell me in the polite city of Philadelphia, famed for its medical schools and their distinguished professors; and of course one of these illustrious persons was instantly sent for. He was a tall, rawboned man, of stately but cold and forbidding manners, supposed to be very learned in his art, and withal an old bachelor—as fit to care for a wounded child as the King of Brobdingnag would have been to medicine Gulliver. I was put upon a regimen of lancets, cups, and leeches, Epsom-salts, castor-oil, rhubarb, and "spare fast that oft with gods doth diet." The patient must be reduced, to prepare him for an operation. No operation was really necessary, for in a healthy child a wound even in the eye, if let alone, will take care of itself. But what is a child to a learned medical professor with a score of private students, and, withal, the editor of a review? A subject, a capital subject, for an operation.

So there was a day when the professor, his brother professors, and their students, a room full of them, came together in my father's house to see a beautiful operation—beautiful enough, I suppose, to him who performs and to those who look on; but what of the child?—Oh, he is only a subject! The nitrate of silver was deftly drawn over the cicatrix. The child's mother, amidst the applause of the spectators at the delicate and beautiful manipulation, was commanded by

the professor to keep the boy in a dark room, and the eye constantly wet with this prescription — solution of sugar of lead — and the professor would see the patient to-morrow. The days wore on. The fire in the eye abated until it was quenched, gradually light was admitted into the room, and, thanks to modern science and surgical skill, a perfect cure had been wrought. But stay; there's a slight scar, and it must be removed. To be sure, it does not affect the sight, and if the natural secretions of the eye are allowed to go on, they will absorb it; but then there is the honor of science and the reputation of a great medical professor at stake —the operation must be repeated.

There was another day when a number of gentlemen, who looked like clergymen, except that they wore dress-coats, and when in deep thought held gold-headed canes to their noses, as if there were pouncet-boxes or receptacles for disinfectants in the tops, or as if the contact of gold with the delicate nerve at the end of the nose had a stimulating effect upon the organs of memory, invention, and device—Hermes's caduceus, to arouse wisdom and call the dead back to life —a day, I say, on which a group of these gentlemen, attended each by his retainers, came together to see the fire-king perform. Was he going to swallow live coals, thrust his hand into the flames, or walk into a heated furnace? No; only to thrust a living brand into a little child's eye, and then write a learned article for the next number of the *Medical Review*, for the encouragement of countless smaller fire-kings in the rural regions to inflict like tortures upon other helpless victims. It is said the "burned child dreads the fire," and it can be easily imagined that, having had one touch of this man's quality, I should shrink from the second. What could a child's cries, struggles, prayers avail? Where were my father and mother? Why did not these gentlemen with the white cravats and gold canes and the fine young students interfere and save a five-year-old boy from his torturer? Without an act of grace, a pat on the head, a caress, or word of sympathy, the harsh man seized, fastened me as in stocks between his knees, pressed my head against his left shoulder, and recklessly thrust the caustic through the eye— not a delicate operation, truly. But then his brother professors must agree with him that it was a shame such a beautiful operation should be spoiled by the unmannerly behavior of that cub. What right had he to make such an uproar—as if modern science ought to regard human agony? But that was more than forty years ago. It was the wont of a world-renowned American surgeon in lecturing on the eye to the students to begin thus: "Gentlemen, the eye is the most delicate organ of the body; you should be very cautious in beginning to treat it. I presume I spoiled a peck before I ever benefited one." Mine simply went into one of my professor's pecks. I wonder how many pecks, bushels, and tons of human eyes the faculty have disposed of, say, within forty years!

Then there were two years of darkness— darkness visible, intermitting with ghastly flames, lurid fires, from two furnaces heated seven times hotter; for the other eye had been kindled into a blaze of inflammation. What a long anguish it was for the child, for his mother and father! The voices of all who entered that room of suffering were low, their steps light and muffled, as if it were the chamber of death. The chief noise that broke the silence was made by the moans and sobs of the child, to which there was an echo in the stifled sobs and prayers of his parents. Sometimes, when I think of the operation and its results, my frame grows rigid, my fists clinch, and I feel, had that child been mine, I should have brained the doctor before he could have put the caustic in. According to physiology my system has undergone six complete changes since then, but my arms bear the marks of countless cuts made by the lancet; for those were the days of heroic medical treatment. I was bled, cupped, leeched anew, and made to swallow enough nauseous, perilous stuff to start a respectable young druggist in trade. To help allay and subdue the raging fires in the swollen, almost bursting, eyes, the solution of sugar of lead was again applied, as if it was resolved that what the inflammation spared the lead wash should destroy. When I was released from my gloomy chamber, as a captive from a dungeon where almost inquisitorial horrors had been experienced, shrunken well-nigh to a skeleton, it was found that the sight of one eye had departed forever, and that the lymph from the inflammation uniting with the residuum of the lead wash had formed opacities in the other, which in due time would darken the sun.

Such was the beginning of my acquaintance with oculists and their practice. After such an introduction one might fancy that a larger and more intimate knowledge with the professors and their art would not be desired. But hope makes us weak as well as strong, and I have therefore performed many a pilgrimage, and made many visits to the shrines of great and illustrious professors of the healing art, and have not disdained to visit at least one very famous, very money-making wonder-worker. As every one of my readers stands the chance of losing his sight, wholly or in part, and as this page may be read by many of my brothers and sisters in infirmity, I must needs pause, and for the benefit of all, as well as to gratify the curiosity of future ages, try to sketch Dr. Oxturn, a celebrated peripatetic friend of humanity, who devotes his days and nights to the relief and cure of impaired ears and

eyes for a very moderate compensation. Perhaps I might be ashamed to confess the acquaintance but that I happened to dine, nearly twenty years ago, with Mr. Prescott, the historian, who, as all the world knows, was nearly blind. As the talk went on he asked,

"Did you ever visit Dr. Oxturn?"

Somewhat sensitive about my acquaintance with this illustrious humanitarian, I answered, in genuine Yankee fashion,

"Did you?"

My friend hemmed and hawed, and seemed to be engaged in the solution of a knotty problem, but at length replied,

"Umph! yes—I have—seen him."

"With what result?" I asked.

"I beg your pardon," he rejoined, "but are you in the same boat?"

After comparing notes it was found that we had a common experience. As my acquaintance with Dr. Oxturn goes back a score of years, and as the fees which he derived from Mr. Prescott, myself, and thousands of patients in all parts of the civilized world have been scrupulously devoted—*i.e.*, a part of them, as he always told you—to benevolent and religious purposes, I suppose that no delicate feelings of pride caused by the honor of such an acquaintance ought to make me shy or ashamed in avowing to the public and to posterity my intimate relations with him. In his sublime mission of relieving the ills to which our flesh is heir, he came from his home across the deep to the New World. The columns of the journals heralded the advent of Dr. Oxturn to the chief city of that portion of the Occidental hemisphere in which I was then living, chronicling at the same time the unparalleled mighty cures he had wrought in Europe and America, urging with naïve and tender voice all sufferers from diseases of the eye and ear to visit the doctor's city of refuge.

With an army of sufferers drawn from all parts of a vast empire, I resorted to San Loretto, where miracles were performed. It was most edifying to see the crowd of human creatures in the great man's anteroom, waiting their turn, like children in the game where one is hot or cold as he is near or far from the object concealed, as planets approaching or receding from the sun. You had to wait a long time for your number to be admitted to the presence of the grand Panjandrum. Inflamed by that passion for the good of the neighbor which animates the breast of humanity, overcoming your natural diffidence, you would eagerly question the people around who were already under treatment. Deaf people whose ears were coming back to them would not possess much interest for a blind man. You wanted to see those whose sight was recovered, or in course of recovery. By mutual consent you were referred to Mrs. Tearly, a lovely widow who wept her eyes out in two nights and a day when her husband died, who, in reply to your question whether she was really benefited, answered, with such a sedate, convincing manner,

"I think I am a little—indeed, I might say a great deal; the gracious daylight is coming back to me after that bitter vale of tears."

At last your turn comes. With becoming awe and thankfulness you enter the great man's presence, take the chair opposite his, and your knees are inclosed between his. The light is good—he casts a rapid glance at your worst eye. "It is hopeless." Then he looks for a few seconds at the other, and bids you look up, down, to the right, to the left, this way, toward your nose, now this way a little.

"That's very good; you have some power in that eye—there's light here—bad eye, very bad eye, but I think I can benefit you; have saved much worse eyes than that. My treatment is perfectly original. I have given my life to the eye—have saved thousands of—blind men, women, and children. I live to do good, but of course I say nothing about that—let my *works* praise me. I understand you are a minister—I am a member of the church. I love the ministry! I give a large portion—the largest of my income—to the spread of the Gospel; but I say nothing about that. I charge you nothing for my examination. I have examined hundreds of thousands of eyes. But my fee for treatment will be two and a half a sitting. I think I can give you sight enough to read. What a pity that a fine young minister should not be able to pursue his studies! Truly the fields are white unto the harvest. Shall I begin with you now? I always take my fee in advance."

It is needless to describe the treatment; suffice it that the doctor used most powerful stimulants to excite what latent power there might be in the organ, thus seeming to do good; but of course, when the reaction came on, you were in worse case than ever, and quitted your Loretto shrine a sadder and a wiser man, with a deeper shadow on your path. I believe that Dr. Oxturn still sheds blessings on his race. However this may be, I am sure that the afflicted public enjoys the service of many of his disciples.

In due time I made a pilgrimage to Paris, but the renowned oculists of the French school did me no good. After manifold experiences, each followed by disappointment, and most of them by loss, I grew skeptical as to the wonderful stories I had heard about the great advances made within the last few years by some European professors as to the knowledge of the eye and its proper treatment. At length I became informed concerning the ophthalmoscope, and the revolution wrought by men of genius through its

aid. Dr. Frederick William Holcomb, of New York, is the person to whom I was indebted for admission into this new world of wonder. He studied my eye through the light of this magical instrument, and began to inspire me with hope once more that my steps might be led to where I could see as well as feel the sun; and my decision was made to visit Professor Von Graefe, of Berlin.

On a delightful September afternoon in 1868 my room in Paris was entered by my valued friend, Dr. Bliss, of New York, attended by the man whom I had crossed the ocean to see, of whom I now propose to give some account—premising that the acquaintance thus begun ripened into friendship during the months of my sojourn under the roof of his hospital (Klinik) in Berlin. The world has had many benefactors in this century, but few deserve a higher place in its loving remembrance than he of whose brief but brilliant career I am now to speak. For a part of the material of this sketch I am indebted to Dr. Warlmont, of Brussels, and to friends in Berlin.—A little way beyond the Thiergarten, or public park of Berlin, there stands a noble château, surrounded by a spacious and beautiful garden, which, as well as the royal residence near at hand, was called by the old Berliners Bellevue. The château was a kingly present from Frederick William III., the husband of the beautiful but ill-fated Louisa, and the father of Emperor William, to his beloved friend, Professor Von Graefe, the most renowned surgeon and oculist of Germany in his day—a favorite at once of the court and the people, and the glory of Berlin's great university. It was here that his still more brilliant and famous son first saw the light, on the 22d of May, 1828. As in the old story-books, all the good fairies seemed to gather around this little child's cradle—all save one—to bestow upon him their choicest gifts. One gave him beauty of person; another, a quick and fertile intellect; a third, sweetness of temper; the fourth, an inexhaustible faculty for words; and the fifth, a benevolence of nature which knew no bounds. The fairy that did not come was she who gives firm health and a robust constitution. Riches, honors, genius, were his birthright, and in addition to his gifted and distinguished father, it was his happiness to possess a mother as noble in character as she was in family—Augusta von Alten. Such was the good old king's interest in the child that he offered to be his godfather, and delegated his own son Albrecht to stand for him at the baptismal font in the French church at Berlin, where Molière, the clergyman, gave the child to God in the holy sacrament, and named him Albrecht.

The first dark cloud to shadow his young life was the sudden and premature death of his excellent father, in the very prime of his days, and at the height of his fame. This event occurred when Albrecht was only twelve years of age. Although of a bright and joyous disposition, and reveling in all kinds of boyish fun and innocent mischief, study was a passion with him from his earliest days. Once, when acting the part of a young lord in private theatricals, he turned with magisterial air to his own tutor, who was cast in the part of a valet, and exclaimed, in a speech not set down in the play, "Was ever such a blockhead of a servant seen?" and squared old scores by administering a sound cuff on the ear. He pursued his studies preparatory for the university in the gymnasium of the French colony at Berlin; and such were his ardor and quickness that the six years' course was concluded when he was only fifteen years of age, and by reason of his youth and the statute, he was compelled to wait a year before entering the university. He devoted this year to mathematics and the physical sciences with such enthusiasm and method, under the guidance of his accomplished master, Goepel, that he completed his university course in the first of these branches before his entrance, so that by the time he was sixteen he had done the mathematics, which few men have completed under the age of one-and-twenty. His home was still at lovely Bellevue, and its quiet charm soothed and cheered him after the heat of the lecture-room and the competition of the class—if that can be called competition wherein he distanced all his fellows. The nightly heavens possessed an unspeakable fascination for him, and it was his pleasing but hurtful practice to lie stretched for hours upon the grass, with his eyes fixed upon the moon and stars. When warned by his mother of the harm to his health which would come from this exposure, he removed to a spacious, unoccupied apartment in the house, and made his bed upon the floor, the better to command through the wide windows the outlook of the starry firmament. Entering the University of Berlin at the age of sixteen, he was graduated at nineteen, and received his license to practice medicine. His father had filled the chair of pathology and clinical surgery from its foundation; and that father's distinguished success in his profession, and the son's reverent love of his memory, no doubt gave the bias to his life and decided the choice of his career. His student life (Lehrjahre) was ended, and at the instance of his beloved mother he started upon his travels (Wanderjahre.) His private fortune enabled him to gratify all his tastes in foreign countries as well as at home; but his strong love for his friends led him to prefer congenial companionship to æsthetic refinement or sensual luxury. He therefore invited two of his fellow-students to share the pleasure and profit of his jour-

neys, and himself bore all the expense of the party. Prague was his first stopping-place, and here he encountered Arlt, who was pursuing his oculistic studies and researches with such enthusiasm that young Von Graefe felt the contagion, and decided to devote himself to this specialty. It was at this time that the foundations were laid of that brotherly attachment and love between Arlt and Von Graefe, which were arrested only by the latter's death. From Prague he proceeded to Vienna, where he made the acquaintance and became the pupil of Alfred Jaeger, celebrated for his oculistic skill and knowledge. Thence Von Graefe and his two friends proceeded to Paris.

In Paris the sceptre of oculistic learning and skill was divided between two men, Desmarres and Sichel; indeed, their fame was not only European, but world-wide. Von Graefe became the devoted student of both, but he was especially drawn by the brilliant originality of views, the wide medical learning, and the marvelous dexterity in operation for which Desmarres was so justly celebrated, and which gave him the largest and best-appointed Klinik and the vastest practice upon earth. His time was so engrossed by the practical duties of his profession and the immense number of his patients that Desmarres had not the leisure to follow out and test the conclusions of many of his own original suggestions. But among the throng of students who gathered to hear him lecture and see him operate there was a modest and beautiful young German, whose dark blue eyes responded to every suggestive hint, and followed every stroke of the knife, while his broad, rich nature received, as in a fertile soil, the scattered conjectures and prognostications as seed grains dropped by Desmarres, and where in due time they were to ripen to a harvest of blessing for the human race. Von Graefe's profound knowledge of anatomy and physiology, coupled with his habits of generalization, enabled him to appreciate, even more than Desmarres himself, the value of many of the master's hints, and to see whither they led. Not content with his present attainments, he keenly pursued, while in Paris, his physiological researches with Claude Bernard, and proceeded to London to prosecute them still farther, especially in the direction of the eye, under the guidance of the great and then unequaled Bowman. It was here his happiness to become the fellow-student and intimate friend of one whose immense learning and profound genius entitle him to an immortality of renown—Donders, of Utrecht.

After a brief visit to Dublin and Edinburgh, Von Graefe returned to his native city in 1850; and when only about twenty-two years of age, settled himself in Berlin for the practice of that branch of the medical profession which he had chosen under the influence of Arlt three years before at Prague—the cure of the diseases of the human eye. His ample fortune enabled him to establish a Klinik, or private hospital, at once; but no patients were found to occupy the wards at first, save rabbits. Providing himself with a collection of these little animals, he gave individuality to each by fastening tiny brass plates to their ears, on which their numbers were inscribed; and producing in their eyes the diseases to which man's organ is subject, he then skillfully treated them by application or operation, and made as careful a daily register of each case as though he were dealing with featherless bipeds. It was not long, however, before human patients began to flock to him, and these were soon followed by students, medical men, and professors, who came to hear him lecture and witness the performance of his operations.

As yet, the wisest physiologists and most experienced oculists knew comparatively little of the diseases of the human eye and the proper methods for their treatment. The range of the most skillful observer was limited to the mere surface of the living organ, and what slight glimpse of the interior could be caught through the pupil. Of course the eye of a dead man could be dissected, its anatomical structure be studied and understood, and some guess be made as to the functions of the various parts; but the whole interior of the eye, and many, if not most of the diseases to which it is subject, were nearly a sealed book to the professional as well as to the ordinary observer. There is one disease, for example, called glaucoma, to which persons of both sexes, of all ages and ranks in life, are subject, and from which tens of thousands annually lost their sight, and thenceforth remained in unbroken and hopeless gloom, for not only was the disease held to be incurable, but its cause and conditions were hidden in the deepest mystery. By reason of the new light thrown upon the delicate mechanism of the eye, and the almost exhaustive knowledge of the maladies from which it suffers gained within the last twenty years, Jaeger, of Vienna, has been able to construct a series of charts, showing the whole of the inner as well as the outer parts of the eye under the action of each of the one thousand diseases — so enormous is the number — of which it is the prey.

Von Graefe had scarcely been engaged in the practice of his profession a year when one of the world's greatest philosophers invented an instrument which was destined to accomplish as much for the eye as the telescope has for the heavens. The great mathematician and physiologist, Helmholtz, of Heidelberg, sorely feeling the need of a glass by which to see the eye's interior, set

his mathematics to work to demonstrate just what was needed, and then wrought the cunning mirror, and the ophthalmoscope was given to the world. This year, 1851, forms an era in the history of human sorrow, and the means for alleviating and removing one of its great causes—blindness. Fortunate in his organization, his estate in life, his preparatory studies, his friends, and his career, Von Graefe was now in a position to do more than all men before him together had done for the practical knowledge of the eye and its ills, and for their relief. Armed with this magic mirror, he pursued his investigations, night and day, with the zeal and energy which men lend to the search for gold. Dr. Groeschen happily says, in speaking of the friendship between Von Graefe, Arlt, and Donders, whose love for each other was like that of David and Jonathan: "They were like the leaves of the clover, when Helmholtz and his discovery, joined to them, made the four-leaved clover—presage of happy fortune."

In 1856, five years after the discovery of the ophthalmoscope, Von Graefe, a savant of twenty-seven years, banished to the night of the past the blindness fatally attached to the glaucomatous eye. Before him no man in the history of the world had ever successfully grappled with this mighty evil; now, in the light of his genius, and in the hands of his disciples, none need ever lose his sight from glaucoma. In the discovery of the nature and cure of this disease, and in the revolution effected relative to strabismus and strabotomy, there was enough to immortalize two men; and we are only at 1857. Even by 1854 Paris had ceased to be the seat of the highest activity and success in this department of science and art. The acknowledged sceptre of authority and power had been transferred from Desmarres and Sichel to the youthful hands of their late pupil, but now master, Von Graefe. In this year he added to his Klinik and lectureship a new element of power in the shape of a publication called the *Archives of Ophthalmology*. From this time, at least, the Latin forms of oculistics and oculist make way for the Greek ophthalmology and ophthalmologist. The first volume of the *Archives* appeared under his own name, but from that time forth under the names of Arlt, Donders, and Von Graefe, and is the treasure-house holding all the modern knowledge concerning the eye and its treatment.

During the ten years that elapsed from 1857 to 1867 various inestimable papers were published by Von Graefe in the *Archives*. I will not retrace the life he led during these ten years, which were the most active and fruitful that Providence accorded him. All those who at this time attended his Klinik have kept the remembrance of the zeal and efforts displayed in this arena of science, where master and pupils were rivals. It would be hard to convey to those who never knew him an adequate and yet credible notion of this man's tireless and almost superhuman labors. Although slight of build, narrow-chested, often gasping for breath, he seemed to defy fatigue, and set at naught the limitations of work which hedge most men's activity. He was usually up by seven, passed an hour or two in study, then read and answered his letters while taking his coffee. Nine was the hour for his lecture at the Klinik, where students and physicians from all parts of the globe were gathered. Fleet as his horses were, he was usually behind time. All impatience, however, was banished, as with a quick step he entered, breathless but smiling, and said, "I was to be punctual to-day; well, that will be for to-morrow." A more beautiful man's face than his has hardly been seen in modern times. Who that has looked upon it can forget the high, broad brow of the noble head, the dark blue eyes, and the exquisite lips, where sat such mingled beauty and power? It seemed, indeed, only as a lovely transparency through which the light of a still more lovely soul was shining. His action was quick and decided, yet graceful, his voice very pleasant to the ear, his speech easy and affluent. His manner had the simplicity and sportiveness of a child's, and yet you felt the dignity and authority of a master. Wholly unaffected, and even unconscious, in all he said and did, he yet breathed around you the atmosphere of supreme genius. It was strange to watch the love and reverence which attended his steps. The hour's lecture over, during which he had held the great throng spell-bound and even breathless by his eloquence, the death-like stillness broken now and then by irrepressible applause, he proceeded on his daily visit through the wards of his hospital. Day by day have I noticed the flurried manner of nurses and attendants, their eagerness tempered by a kind of devout worship, the hush of expectation which waited the master's coming—and now you hear his fleet, light steps, which keep his aids upon a run. He is in your room, where darkness and pain vanish at his cheering salutation. The bandages are removed in a trice. The examination is made with rigid fidelity—there is no haste here; the bandages are replaced, and away he goes, with loving words, which leave sunshine behind him.

To this Klinik all who wished his care and service, no matter what their rank or fortune, were obliged to come and take a bed. Half the patients, at least, were so poor that they could not pay the master's fee, and were even unable to defray the charge of their living: this came out of his generous bounty, and they received the same attention as the richest clients. After the visit to every pa-

tient, the operations began. Each case had been thoroughly examined and studied by one of his aids, and then by the master himself; so that he knew just what to do, and how to do it. Some days there were as many as sixty persons to be operated upon. Each patient was numbered, and the line was marshaled by the assistants and nurses. One by one they quickly took their places on the table; while, seated in his chair, his instruments at hand, the master proceeded promptly, but gently, to inflict the pain which was to give the life-long relief — scores, sometimes hundreds, of students standing by to witness the dextrous manipulation. Scientific method and military system reigned throughout, and yet no exact programme of details bound this man in chains; he kept himself free to meet whatever exigency might arise hour by hour.

The operations were usually ended by 5 P.M., the hour at which he professed to dine; but his swift horses rarely brought him to his house much before six. At dinner his buoyant spirits would break forth in charming talk, and all kinds of frolic and fun. Long before seven o'clock his anterooms were crowded by patients from all quarters of the earth, waiting for their preliminary examination. These were admitted one by one, each in his turn, to the cabinet, where the master patiently and carefully explored each diseased organ, and kindly, yet honestly, told the sufferer what he had to hope or fear. Thus was he occupied until ten or eleven at night, when the carriage was in waiting to bear him once more swiftly to the Klinik, where he made a minute examination of every patient operated on that day and the day before. In my lonely vigils I used to hear his carriage bearing him away at between one and two in the morning. In addition to this daily round, how he found time for his private studies, and the composition of his voluminous works, is more than I can tell; but time he did find to accomplish, as student and author, what would have made immortality for any other man, and at the same time to achieve such practical feats of skill, energy, and success as would be the full measure for a prodigy. Such was his life at Berlin for ten months a year, from 1850 to 1870, save when interfered with by sickness. On the 1st of August in each year he set out for Switzerland, to refresh himself among the mountains, which were to him as friends and consolers, in whose society he gained new life and inspiration. On the 1st of September he went to Paris, and by the 1st or 2d of October was at home again, exact as the sun-dial. Two months which were meant for recreation could not be released from the importunate hand of suffering. The afflicted from all climes followed to his mountain home, and thronged his temporary *salons* in the French capital. His generous heart could not resist the appeals of the unfortunate; and he held that a holiday in which he was obliged to work only eight or ten hours. In 1857 he attended a congress of ophthalmologists in Brussels, where his paper on the theory and treatment of glaucoma was received with an outburst of rapturous and long-continued applause by the two hundred distinguished men present. The idea of the congress pleased him, and he at once convoked a similar meeting of the leading men of his profession in his father-land at Heidelberg. From that time to 1868 he regularly attended these meetings (except when hindered by sickness), of which he was the very centre and soul, and for which he reserved the announcement of the results of his profound studies, as well as of his original and brilliant operations — thus sending away the throng of his disciples, gathered from many lands year after year, with a precious freight of new suggestions, knowledge, and power.

In 1861, while on his way from Switzerland to attend a session of this congress, he had a sudden and violent seizure of pleurisy at Baden-Baden, and for weeks his life hung suspended in the balance. Indeed, it was given out that he was dead, and the news flew like lightning throughout Europe, producing the deepest grief. Admirable eulogies upon him were pronounced by many of the first savants and professors of the age, in which were expressed just estimates of his character and of the invaluable benefits he had conferred upon the human race. Upon returning to life, the joy of his delicate and sensitive nature at reading these worthy and beautiful tributes was mixed with pain to find that a few of those whom he had deeply loved and cherished had exhibited an untimely resignation at his supposed death, and a disposition to undervalue his labors and discoveries. Thenceforth his manner among his associates and students was less frank and unconstrained than of yore. His resurrection from the dead, for such it seemed, was fitly celebrated by his friend Donders in a glowing and eloquent dedication to him of one of his great works. In 1862 he was married to the Countess Kneuth, a Danish lady of great beauty of person and charm of manner, but still greater beauty and sweetness of character, who thenceforth devoted her life to his comfort and happiness. Such were the depth and strength of her affection for her idolized husband, who breathed his last in her arms, that she survived him but a few months, dying, it is supposed, of a broken heart. There is a story told, I know not with what correctness, that their acquaintance began in his Klinik, where she was a patient. After examining her eyes, he told her that the operation might cost her her beauty. She mildly but firmly requested him to proceed, adding that

the beauty was of little consequence. The acquaintance thus begun ripened into love, and they were wedded. He was once requested by a brother physician to examine a young lady brought to Berlin for the purpose by her friends, but who was so timid that she could not be induced to visit the professor either at his house or the Klinik. It was therefore arranged that the two doctors should surprise her that evening at a large party. Separated from his friend in the throng, the professor encountered a young lady with a slight blemish in her eye, of which it appeared she was in perfect ignorance. Supposing her to be the person whom he was in quest of, he drew down the lower lid of her eye, and after an instant's inspection said, pleasantly, "Oh, that is a small matter, come to the Klinik in the morning, and I will attend to it." Utterly disconcerted for the moment by what seemed the rudeness of the stranger, the maiden inquired, as he turned to leave her, "Who is that impudent fellow that takes such liberties?" At this instant Von Graefe's friend found him, and conducted him to the shy damsel, who turned out to be an altogether different person. In consequence the professor had two young lady patients at the Klinik next morning.

Such was his estimate of the value of time, and his delicate sense of responsibility to the crowd of patients who daily waited upon his ministrations, that he could hardly be induced to attend any one, no matter how high the rank, save in his own hospital. The Czarina of Russia, then at Nice, sent an imperial summons for him to wait upon her there. He declined to go, on the ground of injustice to his patients. The Czar was obliged to seek the intercession of King William, the son of Von Graefe's godfather. At his urgent solicitation the professor consented to make the journey, traveling by express. Entering the imperial presence, he made a brief examination of the Czarina's eyes, assured her that the course pursued by her own physician was quite correct, and without an hour's halt set out for Berlin. The Queen-Dowager of Prussia, who is said to have been a peculiar person, insisted that Von Graefe should come to Potsdam. He declined, on the ground that he could not spare the time, and suggested that she should come to the Klinik. This she absolutely refused to do, and King William was obliged to mediate once more. At his request the professor promised to give the Queen one hour. A royal train was in waiting at the station, which bore him and his attendants with lightning speed to Potsdam, where carriages were ready to carry them to the palace. A lady in waiting informed the professor that her majesty was not yet up, but would receive him in an hour. Pulling out his watch, he answered, "In forty minutes from this time I will be at my Klinik." The Queen made her appearance in five minutes; the operation was performed; he returned to his hospital, and had ten minutes to spare. Thus must royalty sometimes bow to genius. Covetous of time, he was in all things else bountiful as the day. Although the revenue drawn from his private clientage was princely, notwithstanding the price for operations and treatment was fixed and very moderate, it was absorbed by his benefactions to those sufferers who were unable to pay, and to whom he gave bed and board, as well as light. While simple in his tastes, and inexpensive in his personal habits, so munificent were his charities that not only was his professional income spent, but his private fortune trenched upon. Affliction and poverty never appealed to him in vain; and even time, which he hoarded as a miser hoards gold, he used as a steward for mankind.

I have spoken of his visit to me in the September days of 1868. He was in Paris, professedly for rest and relaxation; but when I called upon him soon after, the anteroom was filled with patients, as it was every day. Among others, there was a lovely young girl, whose beauty was deformed by a most ugly swollen eye, from which the light had forever departed, while the other was in great peril. Her father had brought her from the other side of the world to see the renowned professor. The next day the bad eye was out, and two weeks after the happy girl was on horseback in the Bois. Two years later I met her in her distant home, with perfect sight in her remaining eye, and the other so deftly replaced that the closest scrutiny could hardly discover that it was not her own. It would be impossible to calculate how many human eyes Von Graefe has saved, and to how many he has restored the light of the world. I doubt if it has been the prerogative of any man in modern times to confer such substantial happiness as Von Graefe has bestowed upon countless thousands. I entered his Klinik in November, and found him thin and wasted, often gasping for breath, while his hair was blanched to silver, as though he had reached fourscore. But the great soul still shone through his pallid face, and gave the eye an almost ineffable loveliness, and the unconquerable will held his bodily powers up to an amount and quality of work which would have done credit to a giant. After a careful study of my eye, carried on day by day for weeks by his assistant, Ewers, and himself, it came my turn to occupy the table. Knowing that the operation would be a painful one, I had stipulated with him for the insensibility produced by chloroform. As I took my place he said:

"I have watched you closely, and see that

you are a man of nerve. There is only a slight transparent spot in the cornea into which I can cut; the merest muscular twitch, the deviation of the knife by the tenth part of a hair's-breadth, will ruin the operation; chloroform can not hold you as steady as your will. What say you? I have confidence in your self-control."

I answered, "Go on without the chloroform."

The eyelids were fastened back by springs, and the cutting proceeded.

First, a linear incision was made through the cornea or colorless part of the eye, and a cut in the iris or colored part behind. Delicate forceps were then introduced to draw the iris out so as to line the new-made opening, and the edges of the iris, clipped with scissors, were skillfully fastened to the surface of the eye. Thus the operation for artificial pupil, called iridectomy, required in this case about four minutes and a half—longer than usual, and it can be well imagined that the time seemed much longer to me. The master himself applied the bandages, and with cheery, loving words sent me away in the care of attendants, while he rapidly went on with other cases. That night, and every night and morning for fourteen days, he was at my bedside, bringing summer sunshine into the wintry darkness of my room. All went well for twelve days; the wound was healing, and light began to reveal itself; and if the promise of the time was kept, the second operation could be performed in a month, and then—Te Deum Laudamus. My friend had, so to say, opened the window-shutter, and his next step was to remove the thick heavy curtain within—the opaque crystalline lens—by what is called the peripheric extraction of cataract, cutting half-way round the eye, and by hooks or pressure withdrawing the tiny sack of water turned to stone. After the healing of the eye the second time a glass could be adapted to its service, and thus glimpses, if not the full vision, of the world might be gained. On the thirteenth day the master began to shake his head; something inexplicable was the matter. Both he and I were conscious of a change for the worse, but neither could guess the cause. Two days after, however, we understood it, when I was suddenly and violently attacked by congestion of the chest and right lung; the inflammatory condition had at first assailed the weak and ailing organ. Were this the place, I should like to speak of one who came in these days and ministered unto me while I was sick, and in the prison of doubt and pain, and to whom I am sure the word shall be spoken, "Forasmuch as thou hast done it unto one of the least of these, thou hast done it unto me."

On the same day Graefe took his bed, and for three weeks we did not meet again, during which time the lives of both had been in jeopardy. Once more he came, but with slow and languid step, and how ghastly pale and weak he was! But there was the old pluck, the dauntless will rising superior to decay. He said that the inflammation had made such ravages in my eye that the benefit from the first operation had been destroyed, and the second would be out of the question. Thus light and hope went out together. I had been a coward indeed to sink down in useless repining and complaint, and lose heart of grace, when that wasted, almost spectral, man stood at my side, speaking such calm, brave words. When my health was sufficiently recovered I left the Klinik, and took up my quarters in a pleasanter part of Berlin. Some weeks after I went to take my leave of the professor. It was in the evening, at his own house. I found him wasted to a shadow, his hand feverish and almost transparent, his breathing short and labored, and appearing so far exhausted that he could not last twenty-four hours longer. Very sweet and full of grace it was to sit once more in the radiant atmosphere of that man's presence, and hear the high soul, almost disembodied, use the words of our mortal speech. On the morrow he was to leave for Italy, I for Paris. I felt as if letting go the hand of one passing behind the veil of eternity. Softly we said good-by, and never met again. Such was the man's wonderful hold on life, and the reinforcing power of his will, that in the balmy air of Italy he gained a new lease of existence, and came back to Berlin with the birds and the fine weather. For another year, and more, the shrunken skeleton daily walked the wards of his Klinik, and the day before his death he performed ten operations. In the last months of his life he composed and published a magnificent and exhaustive treatise on glaucoma, that fearful disease of the eye which he was the first to explore and cure. This work was the song of the swan. Writing to Warlmont, at Brussels, in January of this year, he said, referring to a literary task, "Try to send me proofs easy to revise, because I feel myself sick; and when I work more than ten hours a day I feel it deeply." A very little while before his death, writing to Donders, at Utrecht, he said, "I am growing worse. Let us not speak of my health now; every hour that begins seems to be my last."

Notwithstanding his languishing, nay, dying condition, the sublime dedication of himself to the relief of human suffering and the energy of his inflexible will held him up to the use of the knife and the pen until the very last. Possessed of an indomitable and devouring zeal, he ended by being devoured himself. The end came on the 20th of July, 1870. "Draw the curtains," he exclaimed at the supreme moment, "and let me look upon

the sun once more," and died with the calm of the sage and the peace of the Christian. Brief as had been his career, the measure of his greatness and his fame was full. Most of the medical and scientific societies of the world had chosen him an honorary member; and many sovereigns had conferred upon him their decorations, among others the Czar of Russia, the "Grand Cordon of the order of St. Stanislaus;" the men of his own profession throughout the world held him as their prince or master. He advanced the knowledge of the eye and of its proper treatment under the manifold grievous ills to which it is subject, from the obscurity in which it had rested from the foundation of the world to the light and certainty of a comprehensive science, while the blessings of tens of thousands who were ready to perish were after all his highest meed of honor. When one reflects that Albrecht von Graefe passed from earth at a little more than forty-two years of age, and that his scientific and practical career lasted scarcely twenty years, his manifold and mighty works create an astonishment which beggars words. When Graefe breathed his last, Europe trembled under the tread of embattled hosts. Father William was going forth at the head of his armies to engage in the death-grapple with his French adversary. The flower of Germany was with him, and many a man on either side of the fray showed himself a hero, but not one of them exhibited higher qualities, or deserves a more lasting and illustrious commemoration, than he who was looking on the sun for the last time when the armed strife began. Half the population of Berlin escorted his coffin to the tomb, and buried it under roses and palms. The poor wept because their benefactor was gone, and the great felt in grief that the brightest and most beneficent light of modern science was quenched. I have thus sketched three men with whom my infirmity has brought me in contact. They are types. One hears much of utilitarians, quacks, swindlers, and is sometimes half inclined to think they compose the world.

But fuller knowledge yields consolation, and I am proud to live in an age blazoned with the deeds of such men as Bowman, Critchett, Helmholtz, Donders, Arlt, and Graefe; and I am glad to know that they have pupils and friends on this side of the water whose names are worthy to be mentioned with theirs—Knapp and Derby, of New York; Derby, of Boston; Bolling Pope, of New Orleans, and not a few others. If any man is disposed to undervalue the science and art to which the lives of these men have been given, let him remember the words of Helmholtz, than whom there is no wiser living philosopher: "Ophthalmology is to medical science what astronomy has long been to physical science—*its model.*"