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# FRANCISCUS CORNELIUS DONDERS.

BY

HENRY W. WILLIAMS, M.D.,

PROFESSOR OF OPHTHALMOLOGY IN HARVARD UNIVERSITY.

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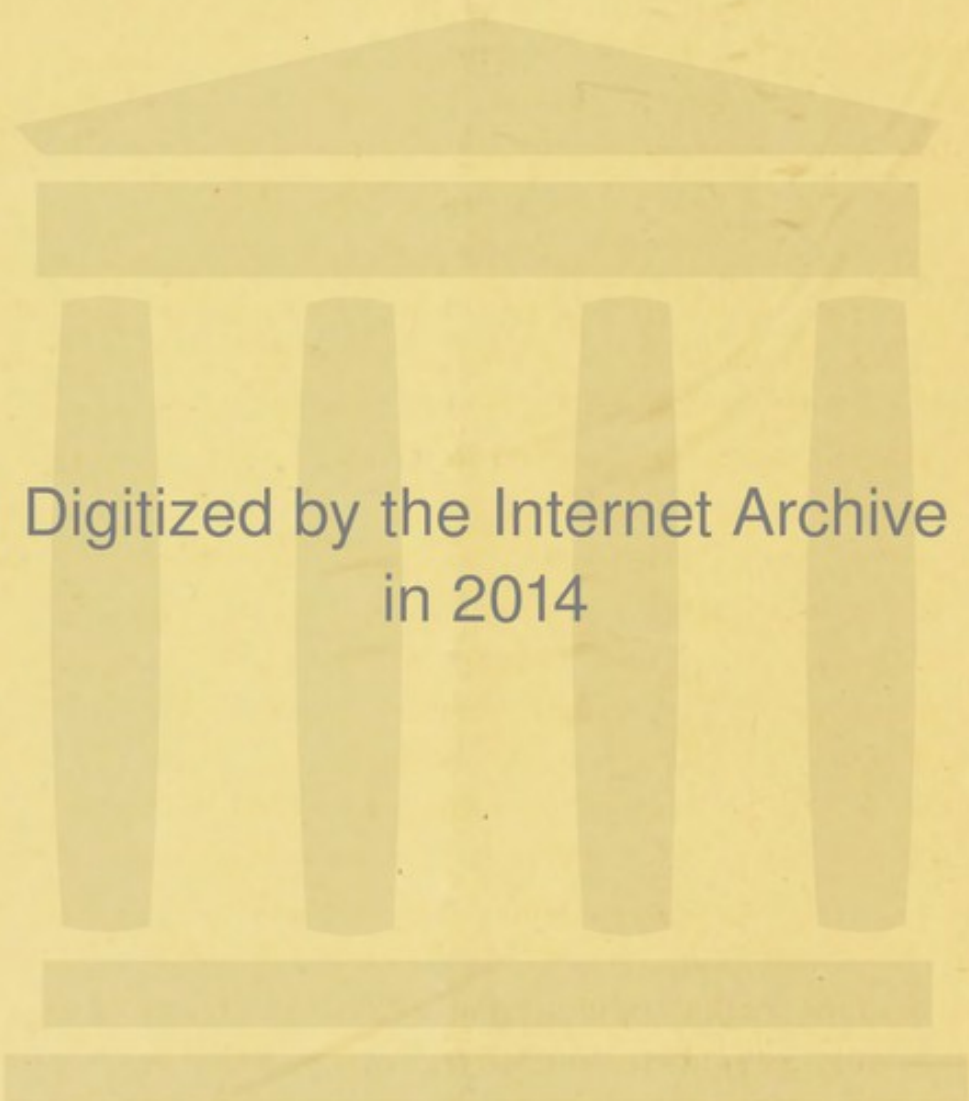
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## FRANCISCUS CORNELIUS DONDERS.

IN assuming the honorable duty of preparing a biographical notice of Professor Donders, the writer must acknowledge indebtedness, for many details, to accounts of his life and work by his coadjutors and friends, Moleschott, Snellen, Nuel, and Landolt, and to his own speech at the festival in his honor on his seventieth birthday.

Franciscus Cornelius Donders was born at Tilbury, in Holland, on the 17th of May, 1818; the tenth child and only son of parents in very moderate circumstances. His father's death occurred about a year later. From his seventh to his thirteenth year he was at school in Duizel, where he learned to write his own language, something of French, mathematics, and music. From eleven to thirteen years he served as submaster at the school, thus defraying his expenses. His studies were continued at Liege, in pursuance of his mother's wish that he should become a priest; but this plan being defeated by the occurrence of the Belgian revolution, he returned to the French school at Tilbury. Becoming fond of study, he was sent to Boxmeer, where he learned to write and speak Latin with great fluency, and a little Greek, but where mathematics, for which he seems to have had special aptitude, was neglected. At the age of seventeen he entered the School of Military Medicine at Utrecht, where he became enthusiastic in the experimental study of chemistry, the natural sciences, and physiology. After four years of study, desiring to obtain his diploma, he applied for examination; but a technical objection being made by the Faculty, he was advised to present himself at the University of Leyden. Here, through the merits of his dissertation and an address in Latin in which he convinced the Faculty that he was worthy to receive the degree of Doctor, he made such an impression of his capacity that in three days he returned to Utrecht as M. D. Of his "*Dissertatio Inauguralis sistens Observationes Anatomico-pathologicas*," Professor Moleschott says, "In this trial test I could well discern the future master."



Before he was twenty-two years of age, Donders was sent as junior military surgeon to the garrison at Vlissingen. Here, and especially at The Hague, the seat of government, where he was stationed a year later, he had the advantage of polite society, and of contact with distinguished men, — with opportunities for culture in art and literature, as well as in science and general and professional knowledge. He amply profited by these advantages, and perfected his acquaintance with French, English, and German, so that he wrote and spoke these as if they had been his native tongue; acquiring also a grace and urbanity of manner for which he was distinguished in all his social and professional life. The attention of his superiors being attracted by some of his published scientific papers, he was sent again to Utrecht, in 1842, to reorganize the Military Medical School; and was appointed Professor of Anatomy and of Physiology at the institution where so recently he had been a pupil.

Here began Donders's real scientific life. Convinced that book knowledge, especially in the natural sciences, has little value in contributing to further advancement, unless completed by careful personal experimental investigation, he accepted the offered position without a moment's hesitation, although he thus gave up the pleasures and advantages of the capital, and accepted a smaller income: "For I felt," he says, "that to teach was my vocation."

Thus he established himself for life, as it proved, in a small city of Holland. Quickened into still greater activity by the labors he assumed, and animated by the example of Professor Mulder, — whose laboratory became, as Donders expressed it, the cradle of physiological chemistry, — and in co-operation with his venerated teacher, Professor Schroeder, he devoted himself with ardor to explorations in every part of anatomy and physiology, verifying each observation with his own eyes, and accepting nothing as proved which his own experience had not confirmed; but showing marvellous lucidity in directing researches, in forming conclusions, and in appreciating the values of results gained and the means of utilizing them. "There is no domain in the vast science of Physiology," says Landolt, "in which Donders did not leave traces of his labors. The vitality of tissues, the circulation of the blood, digestion, secretions, movements, language, the organs of sense, the secrets of the nervous system, have all in turn been investigated by this indefatigable explorer." He founded, with Ellermann and Jansen, the "*Nederlandsch Lancet*," that they might have an organ for the announcement of new discoveries; and he largely augmented his own labors by frequent contributions to its



pages. Rousing emulation in others, he disarmed jealousy by his candid and cordial recognition of their meritorious work. Hoarding none of his own acquisitions, he added to the joys of discovery the pleasures of disclosure. As a teacher, he was radiant; he seemed superb in the lucidity, conciseness, elegance, and adaptiveness of his style of explanations, — which he often made, in several vernaculars, where he saw that he was not understood by an intelligent disciple. Donders himself says: "To teach is as great a joy as to learn. Acquired knowledge is as a hidden treasure, which slumbers useless until it is disclosed in teaching." His instruction was most suggestive, for himself as well as for his hearers, — opening as it were new horizons of thought. Nuel says of his manner of teaching, "Few have equalled, none surpassed him." And Moleschott, in his address of greeting on his seventieth birthday, says of him, "Donders has remained at Utrecht, but all the world has come to him."

We find him, at the age of twenty-four, giving, as Professor, eighteen lectures weekly for forty-six weeks of the year, on anatomy, histology, and physiology, and yet finding time for a vast amount of original investigations. In his modest address on the occasion of his jubilee, last year, he thus expresses his appreciation of the favorable circumstances by which he had been surrounded: "No other period has been comparable with this for great discoveries in so many fields of biological science. Von Baer had discovered the ovule of the mammals; Bischoff had demonstrated that the embryo is built up exclusively by means of segmentation of cells; Schwann found in the cell the origin of all the fundamental forms of life; Henle had created, in his "Anatomie Generale," an organon of histology. At the same epoch appeared the Physiology of Jean Muller. It was in such a world I had the good fortune to have place; every circumstance seemed to be adapted to render my life and my work prolific."

In 1847 Donders became Professor Extraordinarius at the University of Utrecht, giving courses on Legal Medicine, Hygiene, Anthropology, and Ophthalmology. "After a time," he says, "my teaching of Ophthalmology gave a new direction to my life." Two distinguished men from Edinburgh were one day among his auditors, and urged him to visit the great eye hospitals of England at the time of the International Exhibition in 1851. At London he saw Bowman, equally renowned as physiologist and ophthalmologist, and also Von Jaeger of Vienna and Von Graefe of Berlin. These friends became to him "the most precious treasure of my whole career." He could announce to them the recent discovery, by his compatriot Cramer



of Haarlem, of the *modus operandi* by which was effected the accommodation in the human eye, hitherto unexplained; and he learned from them of the invention of the Ophthalmoscope by Helmholtz; by means of which all the secrets of the before unexplored interior of the eye could be revealed to the wondering observer. Before returning to Holland he went to Paris in company with Von Graefe; there visiting the large Cliniques for diseases of the eye, and comparing their methods of diagnosis and practice with those seen at London. Thenceforth, without abandoning general physiology, Donders worked especially in physiological optics as applied to eye affections, in so doing largely enhancing his already great renown. Impatient to await the arrival of an ophthalmoscope which Helmholtz was to send to him, he constructed one for himself; not of superimposed glass plates, as contrived by Helmholtz, but of a silvered mirror with a central perforation, as now generally used;—and was enthusiastic in his instant perception of the value of its disclosures.

In 1864 appeared Donders's monumental work on the Refraction and Accommodation of the Eye, published by the Sydenham Society at London, and soon translated into many other languages. It came to the world of Ophthalmology as a revelation,—a complete and finished creation, involving infinite labor and research,—from which nothing could be retrenched without loss, and to which nothing could be added without superfluity. It created scientific Ophthalmology. His discovery of Hypermetropia, his explanation of Astigmatism, his indication of the relations between different forms of Strabismus and the hypermetropic or myopic conditions of refraction of the eye, were and must remain masterpieces of absolute demonstration.

It would be almost impossible to give even a catalogue of Donders's published works. His friend Nuel, in the "*Annales d'Oculistique*," cites two hundred and eight of these, and adds, "This list is by no means complete." Already, in 1846, he had translated into Dutch a German work on Ophthalmology by Ruete, which seems unquestionably to have inclined his spirit of investigation towards the eye. He says, "Thanks to the progress of the histology and physiology of the eye, its diseases are those which best admit of a physiological explanation." To elucidate some questions which had suggested themselves in this translation, Donders published within about a year, in the *Nederlandsch Lancet*, three notable papers on Physiological Optics,—among these a monograph on "The Relations between the Convergence and the State of Accommodation of the Eyes."

After his return from England, in 1851, Donders obtained endow-



ments for the Netherlands Hospital for Diseases of the Eyes, which, with the co-operation of Snellen, he established and conducted at Utrecht;—thus entering a field where the large opportunities for direct and skilled personal service towards his suffering fellow men afforded a new satisfaction to his sympathetic nature. The means thus offered for continuing scientific observation were also most advantageous, and afforded ample fruition in the hands of such a man,—who loved accurate research, not only for its own sake, but for the delight of imparting and applying the knowledge thus gained for the relief of humanity.

So great a man cannot be wholly unconscious of his worth; but Donders's modesty was sometimes almost diffidence. We rejoice that in his later years he was allowed the gratification of knowing that he had been eminently useful, not only by his own labors, which had advanced Ophthalmology a century, but largely also by rendering applicable the results of the labors of others. The invention of Von Helmholtz, which indeed opened a new world to Ophthalmology, might have rested in the laboratory of the renowned physicist who devised it, but perhaps little suspected its practical value, as a mere bit of apparatus for experiment, because he lacked opportunities for its clinical use. Moreover, as an apostle of Ophthalmology, Donders became the exemplar and teacher of disciples from near and far countries.

When, in 1862, upon the decease of Schroeder, the Professorship of Physiology at the University was tendered to Donders, he once more obtained subscriptions of large sums for the building and equipment of a new physiological laboratory, so supplied with all modern means of research that it should be a model institution. But his enormous labors in so many departments made it imperative that he should divide his responsibilities with worthy assistants,—Snellen assuming the management of the Ophthalmic Hospital, and Englemann the charge of the laboratory and of the courses in Microscopic Anatomy and Physiological Chemistry,—Donders reserving to himself the instruction in General Physiology and Physiological Optics, and the time for original investigations. At the Festsitzung der Ophthalmologischen Gesellschaft, in 1886, in the great hall of the University of Heidelberg, for the presentation to Von Helmholtz of the Graefe Medal, which, according to the statutes of its founder, should be given once in ten years to him of any nationality who had done most for the promotion of Ophthalmology, Donders, as the most distinguished member of the society, was selected as the orator. After



a feeling eulogy of the founder, Von Graefe, he spoke of Von Helmholtz, who, as the inventor of the Ophthalmoscope, had marked the dawn of a new era in our knowledge of diseases of the eye; and of the gratitude due to him for having thus endowed the profession and humanity, taking away the reproach of our former utter ignorance of the pathology of the deep-seated parts of the eye, and well deserving the high award then for the first time made.

In May, 1888, Donders attained his seventieth birthday; at which time, according to the laws of the University of Utrecht, its Professors retire from office. This event was made the occasion of a festal homage, rendered by the King of Holland, the most distinguished of his fellow countrymen, his fellow citizens, his coadjutors, and by representatives of his disciples and of Ophthalmology from every part of the world. It was an apotheosis. There he gave a most simple and unostentatious narration of his life and work, with grateful acknowledgment of the friendships by which he had been encouraged, and of the circumstances by which he had been favored.

Once again, in August, 1888, he assumed the place of honor at the Heidelberg annual convocation of Ophthalmologists. Now, alas! we shall see him no more. Since March the 24th, Ophthalmology mourns its chief, — the world of science one of its brightest ornaments.

