F. C. Donders on Dutch stamp, 1935

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Donders - Father of Clinical Refraction

Frans Cornelis Donders (1818-1889) was born in Tilburg Netherlands, after eight older sisters. Having acquired his medical degree from Leyden University in 1840, he was appointed Professor of physiology at Utrecht University, in 1848.

Donders was the most eminent of 19th century Dutch physicians being one of the pioneers in ophthalmology. His interest in the subject began in 1847, with a study of muscae volitantes (visual floaters seen before the eye). This resulted in his formulation of what is now known as Donder’s law: the rotation of eye around the line of sight is involuntary. His article “Relation between Optical axis and Accommodation in Bulbi”, based on the optical refraction, and accommodation, clearly explained normal sight, myopia, hypermetropia and presbyopia, in relation to the size of eye-bulb in 1862. He discovered that astigmatism is caused by uneven and unusual surfaces of cornea and lens, creating the scientific field of clinical refraction.

In 1858, Donders established the first eye hospital in Netherlands, and in 1864 published his influential work, the 635 page English book “On the anomalies of the accommodation and refraction of the eye with a preliminary essay on physiologic dioptrics” in 1864. For the first time it described complete doctrine of theory, practice and employment of corrective prescription glasses.

Less well known is Donders’ interest in physiology and mental process. He tried to measure the time required for simple mental processes. With the then available resources, he designed a number of instruments with a subtractive method in his laboratory. He said that “mind is not the brain, but what the brain does.... one discovers that oxygen has been consumed, comparing the incoming and out-flowing blood”. This insight constitutes the basis for widely used modern functional imaging techniques, PET and fMRI.

Donders is considered the father of mental chronometry. F.C Donders Center for Cognitive Neuroimaging (FCDC) and research was opened at Radbond University, Nijmegen in Netherlands, in October 2002.

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