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The History of the Basal Ganglia: The Contribution of Karl Friedrich Burdach

PDF (Size: 1098KB) PP. 374-379 DOI: 10.4236/nm.2012.34046

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ABSTRACT

It took many centuries for the basal ganglia (BG) to be recognized as specific brain entities involved in the control of psychomotor behavior. Andreas Vesalius (1514-1564) was the first to delineate this set of structures, but he did not name them nor pay any attention to their functional significance. This was left to the English physician Thomas Willis (1621-1675), who used the term *corpus striatum* (striated or chamfered body) to designate the largest BG constituent, which he considered a major sensorimotor integration center. Willis' s pioneering description influenced markedly some 18th and 19th centuries scholars, particularly the German physician and anatomist Karl Friedrich Burdach (1776-1847). Burdach' s insightful studies of the human brain are summarized in a three-volume treatise entitled *Vom Baue und Leben des Gehirns* (1819-1826). This landmark opus provides a description of the BG whose originality has largely been overlooked. Burdach' s careful investigation allowed him to differentiate the caudate nucleus from the putamen, which he respectively termed *Streifenhügel* (elongated hillock) and *Schale* (shell). He also called the putamen *Linsenkern* (lens-shaped nucleus), a term that he admittedly borrowed from his compatriot Johann Christian Reil (1759-1813). He further identified a paler structure (*blässer Klumpen*) within the inner portion of the lentiform nucleus that he called *globus pallidus*, and correctly identified its inner and outer segments (*innern und ?ussern Theil*). He aptly pointed out that the major BG nuclei are separated from one another by fibers fascicles that he termed *inner* and *?ussre Capsel* (internal and external capsules). Burdach also referred to the substantia nigra (*schwarzgraue Schicht* or *stratum nigrum*) and claustrum (*Vormauer*), but gave full credit to the French anatomist Félix Vicq-d' Azyr (1748-1794) for their discovery. Although Burdach did not comment much on BG function, his anatomical description was sufficiently cogent to be still in use two centuries after its inception.

KEYWORDS

Basal Ganglia; Movement Disorders; Striatum; Globus Pallidus; Putamen; Neuroscience History

Cite this paper

A. Parent, "The History of the Basal Ganglia: The Contribution of Karl Friedrich Burdach," *Neuroscience & Medicine*, Vol. 3 No. 4, 2012, pp. 374-379. doi: 10.4236/nm.2012.34046.

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