

Jules Bernard Luys: from a description of the subthalamic nucleus to hypnotism

Jules Bernard Luys: da descrição do núcleo subtalâmico ao hipnotismo

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ABSTRACT

The authors review the role of Jules Bernard Luys in the discovery of the subthalamic nucleus (STN) over 150 years ago. The relationships between the STN and movement disorders, particularly hemiballismus and Parkinson's disease, are well known. The academic life of Jules Bernard Luys can be divided into two periods: a brilliant start as a neuroanatomist, culminating in the discovery of the STN, followed by a second period marked by a shift in his academic activity and an increased interest in topics such as hysteria, hypnotism and, eventually, esotericism.

Keywords: Subthalamic nucleus; Basal Ganglia Diseases; Movement Disorders; Dyskinesias.

RESUMO

Os autores revisam o papel de Jules Bernard Luys na descoberta do núcleo subtalâmico (NST) há mais de 150 anos. As relações da NST com distúrbios do movimento, em particular o hemibalismo e a doença de Parkinson, são bem conhecidas. A vida acadêmica de Jules Bernard Luys pode ser dividida em duas fases: a primeira, um brilhante começo de sua carreira como neuroanatomista, culminando na descoberta do NST, seguido por um segundo período marcado por uma mudança em sua atividade acadêmica, e maior interesse em tópicos como histeria, hipnotismo e finalmente esoterismo.

Palavras-chave: Núcleo Subtalâmico; Doenças dos Gânglios da Base; Transtornos dos Movimentos; Discinesias.

INTRODUCTION

The second half of the 19th century saw the rise to prominence of Jean-Martin Charcot (1825-1893) arguably as the most important and best-known professor of neurology in the world at the time. Charcot established a school of neurology at the La Salpêtrière Hospital in Paris, France, which has become known as the “Mecca of neurology” due to its reputation¹. The school attracted physicians and young neuroscientists such as Pierre Marie, Joseph Babinski, Gilles de la Tourette, and Jules Bernard Luys^{1,2,3}. Luys consists in the subject of this historical note, which reviews his life and

contribution to the field of neurology, particularly his studies of the subthalamic nucleus (STN) as well as his great interest in hysteria, hypnotism, and esotericism in the final period of his life.

Jules Bernard Luys – a short biography

Jules Bernard Luys (1828-1897), a Parisian neurologist, started his anatomical studies as an intern under the supervision of Charles Robin and was awarded a PhD in medicine in 1857 (Figure 1)^{1,2,3,4,5,6}. He became the *chef de service* at the La Salpêtrière Hospital in 1862, when Jean-Martin Charcot had just become director of the clinic for diseases of the

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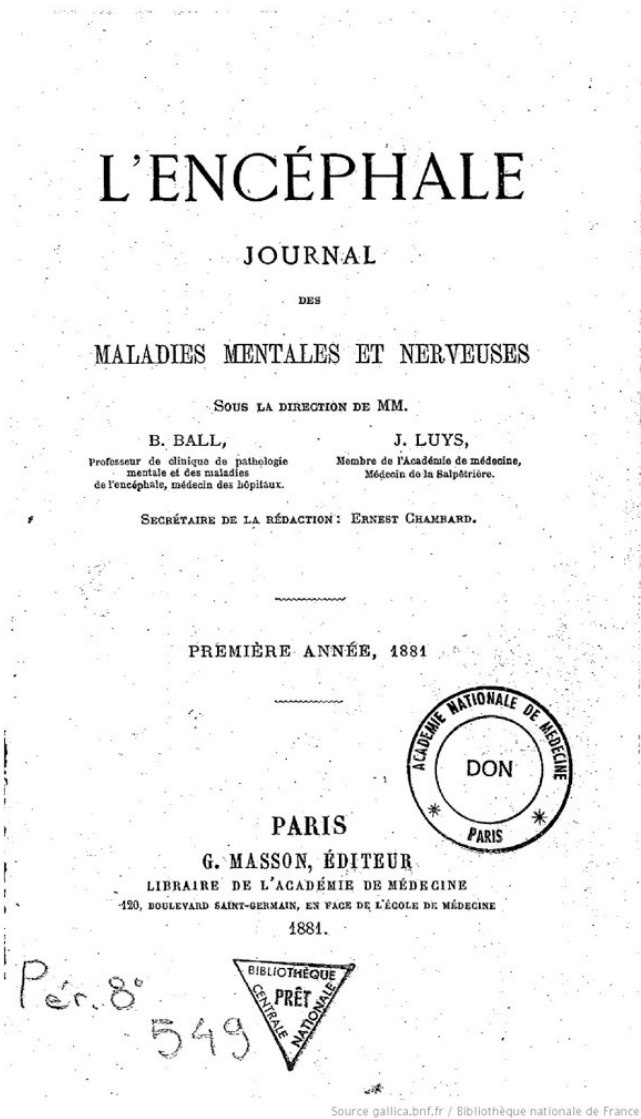
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Figure 1. Portrait of Jules Bernard Luys (1828–1897).

nervous system^{2,5,6}. Luys also worked at the Charité Hospital and became director of the Maison de Santé Esquirol and mental asylum at Ivry-sur-Seine, France. He was co-founder and editor of *L'Encéphale* (Figure 2), the first “impartial, practical and skeptical” journal on nervous diseases in France, which was published between 1881 and 1889 and republished under the same title in 1906^{2,3,5,6}. Luys’s published works include “*Recherches sur le système cérébro-spinal, sa structure, ses fonctions et ses maladies*” (1865), a 660-page treatise accompanied by an 80-page atlas containing 40 plates, each with approximately 15 lithographs^{2,5}. The book covered the anatomy, pathology, and physiology of the brain and spinal cord. Then, in 1873, there was the publication of two volumes (a textbook and atlas) containing photographs by his son, Georges Luys, with 70 prints reflecting what Jules Bernard Luys had previously tried to show in his lithographs. The motivation behind his pioneering work with photography arose from criticism of the potential subjectivity, and hence inaccuracy, of lithography^{2,7}. In addition to his memorable contributions to the field of neuroanatomy, Luys extensively wrote on neuropsychiatry (insanity, hysteria, and hypnosis)^{2,8}. In 1877 he became a member of *l'Académie de médecine* and was awarded the *Légion d'honneur*^{2,4,9}.

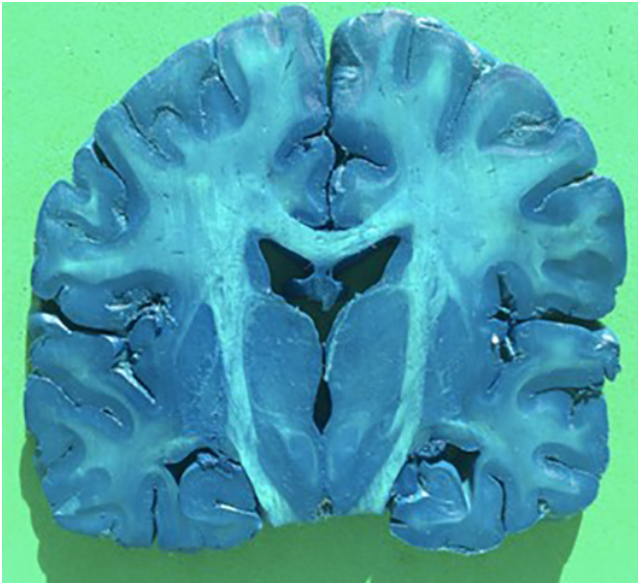


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Figure 2. The *L'Encéphale* journal. First edition, 1881. Published under the editorship of B. Ball and J. B. Luys²⁴.

Luys's masterpiece: a description of the subthalamic nucleus

Luys made many decisive contributions to neuroanatomy, including various publications and the identification of anatomical structures. Two structures in the forebrain identified by him are still associated with his name: the central medial thalamic nucleus and the STN, or corpus Luysii^{2,3,5,6}. The STN was first erroneously described by Luys as the “*bandelette accessoire de l'olive supérieure*” because of its spatial relationship to the red nucleus, which he called the “*olive supérieure*”^{2,5,6,10,11}. Several years later, in 1877, the psychiatrist Auguste-Henri Forel coined the eponym “corpus Luysii” in honor of Luys^{2,3,10,11}. A biconvex structure, the STN is composed of projection neurons located in the diencephalon and is surrounded by dense bundles of myelinated fibers (Figure 3). It is anteriorly and laterally limited by the internal capsule, which laterally separates it from the



Source: Courtesy of Prof. PhD. Murilo Sousa de Meneses, Department of Anatomy, Universidade Federal do Paraná.

Figure 3. Gross anatomy. Photograph of fixed brain (coronal view) showing the subthalamic nucleus of Luys (arrows).

internal globus pallidus (GPi); ventrally, it is limited by the substantia nigra (SN) and cerebral peduncle; dorsally, by a portion of the fasciculus lenticularis and zona incerta, both of which separate it from the ventral thalamus; and medially, by the nucleus of the fields of Forel, the H field of Forel, and the posterior hypothalamic area (rostrally) and red nucleus (posteriorly and medially). The STN has three major functional roles: limbic (medial limbic territory), motor (large dorsolateral motor territory), and associative (ventromedial associative territory)^{11,12}.

Subthalamic nucleus-related disorders

Unilateral lesion of the STN leads to contralateral hemiballismus, a classical clinical observation that has also been experimentally demonstrated^{13,14,15,16}. The etiology of such lesions varies and includes focal hemorrhagic and ischemic lesions; hyperglycemia and other metabolic disturbances; infections or parainfectious disorders; multiple sclerosis; primary or metastatic tumors; neonatal anoxic brain injury; and trauma^{14,15,16}. Non-motor manifestations are more subtle and less frequent, but may include neuropsychiatric disorders such as hyperphagia, aggressiveness, anxiety, irritability, euphoria, and different types of impulse-control disorders^{13,17}. The crucial role of the STN in the pathophysiology of Parkinsonian signs and symptoms results from the fact that dopaminergic neuronal dysfunction induced by degeneration of the substantia nigra leads to STN hyperactivity secondary to dysfunctional dopamine D2 receptor signaling and inhibition of the external globus pallidus (GPe), the main STN inhibitor^{13,18,19}. Although levodopa is the main and most effective medication for the treatment of motor symptoms

in Parkinson's disease (PD), chronic treatment can be undermined by complications that include motor fluctuations and involuntary hyperkinetic movements (levodopa-induced dyskinesias). In these scenarios, neuromodulation techniques, including ablative surgery and deep brain stimulation of the STN (DBS-STN), can be effective^{18,19}. DBS-STN has been used as an established therapy for selected patients with PD for over two decades^{18,19}. However, the effects of DBS-STN are limited to certain motor aspects of PD, most notably appendicular rigidity, tremor, and bradykinesia. The procedure obviously involves acute and long-term complications, including perioperative complications, induction of other movement phenomena (e.g., capsular contractures, blepharospasm, and freezing of gait), and adverse effects on behavior and cognition^{18,19,20}.

Luys's last two decades of life and the shift in his academic interest

In 1864, Luys was chosen to be the director of the Maison de Santé Esquirol, a mental health center in the small city of Ivry-sur-Seine, where he was mayor from 1869 to 1870. Luys suffered from progressive deafness in his later years, but remained academically active^{2,4,5,6}. In 1886, he left the La Salpêtrière Hospital and started a new activity as head of the Charité Hospital, where he became more interested in hysteria and hypnotism^{2,5,6}. From this period onward, his great academic prestige gradually dissipated, while he approached his final years emphatically devoting his attention to studies on more ethereal topics, particularly esotericism, generating fierce criticism from the academic community, while his innumerable contributions to neuroscience were relegated to the background^{2,4,5,6}. He practiced hypnosis using approaches that were unique compared with his contemporaries (Charcot and others), such as associating test tubes with drugs and toxic substances presented to the patient during the session, and practicing hypnotism in public sessions, including laypeople^{6,21}. Moreover, he studied the so-called brain emanations and the interface of magnetism and hypnosis.^{22,23} His last talk was at the Congress of Psychology, Munich, in 1896 on the "structure of the brain," just one year before his sudden death at the age of 69^{2,4,5,6}. In December 1987, Ernest Cadet, secretary of the *l'Académie de médecine* at the time, wrote a posthumous tribute to Luys, emphasizing their 40-year friendship and Luys's honesty and investigative spirit^{2,4,5,6}.

CONCLUSION

We have described Jules Bernard Luys's scientific career, from his early studies on neuroanatomy, culminating in the description of the STN, to the final years of his life, when he developed an interest in hysteria, hypnosis, and esotericism, leading him to unconventional experiments in these fields.

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