Mihály (Michael von) Lenhossék (1863–1937)

Frank W. Stahnisch · Andrew G. M. Bulloch

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Despite his involvement in the identification of the neuronal growth cone, the neurohistologist Mihály Lenhossék is often regarded as a marginal pioneer in late nineteenth and early twentieth century neurology [1]. In fact, he made major contributions to the study of nerve cells, nerve fibres and the structure of the neurocranium, as well as to forensic issues in psychiatry and general medicine [2, 9].

Lenhossék was born in Budapest as a member of a professorial dynasty, his father Josef von Lenhossék (1818–1888), uncles and grandfather Ignác Mihály all being university professors; his grandfather occupied the chair of general anatomy and physiology in both Budapest and Vienna. Following home education by his mother, who also taught him German, French and English, Lenhossék initially contemplated studying literary history. However, through the influence of his father, who was anatomy professor in Cluj-Kolozsvár (Klausenburg) in Rumania and later in Budapest, Lenhossék Jr. [3] was pushed into studying medicine, which he did in the metropolises of the Austro-Hungarian Empire, Vienna and Budapest. As an assistant in the anatomical institute of his father and still at medical school, he published his first piece of medical research, “On the Spinal Ganglia in the Frog” (in German) in 1886. Having completed his dissertation, “On the Ascending Degeneration of the Spinal Marrow” (in German) in Budapest (1889), Lenhossék became temporary head of the anatomical institute for 18 months, after his father had

unexpectedly died. When the vacant chair was filled with an external applicant, however, he moved to the University of Basle in Switzerland. There, he continued his innovative research on celloidin preparations of the central and peripheral nervous system for over 3 years and passed his *Habilitation* with a second dissertation: “The Fine Structure of the Nervous System in the Light of Recent Investigations” (in German) in 1893. During this time, the doyen of German morphological brain research, Rudolf Albert von Koelliker (1817–1905) became aware of Lenhossék’s work and offered him the position of anatomical *Prosector* in Wuerzburg. After 2 years, in 1896, he moved to the University of Tuebingen as an adjunct professor of anatomy, finally assuming the position of head of the Institute for Descriptive and Topographical Anatomy in Budapest in 1900, upon Lajos Thanhoffer’s (1843–1909) retirement. From then on, Lenhossék stayed in his home city—continuously pursuing anatomical research even after his official retirement—until his death at 74 years of age, from pneumonia [2] (Fig. 1).

During the time, Lenhossék taught nearly two generations of German, Hungarian and Austrian physicians and researchers and he inspired many important brain researchers such as Károly Schaffer (1864–1939; of “Schaffer Collaterals”) and the young Albert Szent-Györgyi (1893–1986; who won the Nobel Prize in Physiology or Medicine in 1937, just after his teacher’s death). Probably the most lasting contribution to neurology was Lenhossék’s work on the neurohistology and the histogenesis of nerve cells [4]. Together with von Koelliker, the Swedish anatomist Gustav Magnus Retzius (1842–1919) and the Spanish neurohistologist Santiago Ramón y Cajal (1852–1934), Lenhossék is regarded by some as a major protagonist of the neuron doctrine [5]. Likewise, he was instrumental in promoting the idea of the “nervous growth

F. W. Stahnisch (✉) · A. G. M. Bulloch
Department of Community Health Sciences,
Hotchkiss Brain Institute, University of Calgary,
3280 Hospital Drive N.W., Calgary, AB T2N 4Z6, Canada
e-mail: fwstahni@ucalgary.ca

A. G. M. Bulloch
e-mail: bulloch@ucalgary.ca

Fig. 1 Mihály Lenhossék (1863–1937). In: Schaffer K (1936) Dedicated to professor Michael von Lenhossék on the occasion of his 25th teaching anniversary as professor of anatomy (editorial). In: *Zeitschr f d ges Anat* 81:1 (transl. FWS)

cone” (“Wachstumssprosse”), which he publicly presented—in chicken and bird embryo preparations—in what was likely an on-site microscopic session during the 10th International Medical Congress in Berlin on August 7, 1890. This congress had been co-organized by Heinrich Wilhelm Gottfried von Waldeyer-Hartz (1836–1929), who, together with von Koelliker, invited Lenhossék to present his findings on the growth cone [6]. Soon after the congress (August 10) Ramón y Cajal published a research note on the same subject in a Spanish journal, the “*Gazeta sanitària de Barcelona*”. Cajal expanded upon this note in a two-part article in the “*Anatomischer Anzeiger*” in Germany, published on October 20 and November 21, 1890 [7]. On the basis of these publications, Ramón y Cajal later claimed priority over Lenhossék’s discovery of the neuronal growth cone, even though the Hungarian had already begun a large research programme and submitted a number of observations to local journals, such as in the article “About the Knowledge of the First Development of the Nerve Cell and Nerve Fibre in the Bird Embryo” (in German) a year before, in which he writes:

“[...] and in this regard I would like to favour the hypothesis that puts the mysterious energy directly into the free end of the sprouting protuberance, which will then enable the fibre [*i.e. the axon*] not only to grow by fast integration of all the new material beyond the medullary tube into the delicate embryonic textures, but at the same time also—perhaps through the uneven distribution of the new substances—to follow specific pathways” [8].

He continued further experiments in Mediterranean sharks at the Biological Marine Research Station in Naples, which Anton Dohrn (1840–1909) had set up for the international community of experimental biologists. Lenhossék lent further evidence to the growth cone structure in nerve cell development and regeneration through structured fibre outgrowths, which he termed “lemnoblasts” (Greek: *lemnos* for “band” and *blastein* for “to form”). As his pupil Károly Schaffer later stated [9], it was Lenhossék’s revision of his major textbook “*The Fine Structure of the Nervous System in the Light of New Investigations*” (in German) that from 1895 onwards led to the wide acceptance of the notion of the growth cone in the brain research community [10]. It is, nevertheless, plausible that Lenhossék’s location at the periphery of contemporary brain research (in Hungary) and his many publications in the Hungarian language hindered the diffusion of his very progressive ideas. However, his contribution to the neuron doctrine, his discovery of the growth cone—later experimentally reproduced by neurohistological luminary Wilhelm His (1831–1904) in Leipzig—as well as the research impact of his Hungarian students attest to the lasting influence of Lenhossék’s work on the history of modern neurology.

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Conflict of interest None.

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