Anders Retzius (1796–1860)

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Anders Adolf Retzius (Fig. 1) was born on October 13, 1796 in Lund as the son of Anders Jahan Retzius (1742–1821) and Ulrika Beata Prytz (1764–1808), the younger brother of obstetrician Kristian Retzius (1795–1871); he later became the father of neuroanatomist Gustaf Retzius (1842–1919) [2, 4].

Retzius was initiated into zoology by his father, a professor of natural history. He studied anatomy and zoology at the University of Copenhagen and medicine at the University of Lund, graduating from the latter institution in 1819 [4]. His teachers included Arvid Florman (1761–1840), Johannes Reinhardt (1776–1845), Hans Ørsted (1877–1851) and Ludvig Jacobson (1783–1843).

One of his early discoveries was the interrenal organ of elasmobranchs (cartilaginous fish, including sharks), shown later to be homologous to the mammalian adrenal cortex. He published two important morphological studies on the vascular and nervous systems of Myxine glutinosa (hagfish). In collaboration with professor J.S. Billing of Stockholm's Veterinary Institute, Retzius described the ciliary and sphenopalatine ganglia in the horse, and found that the rami communicantes between the cerebrospinal nerves and the sympathetic trunk are connected with the ventral roots as well as to the dorsal roots; he also discovered the peripheral canal of the cornea, later named the 'canal of Schlemm' [4]. Retzius carried further comparative anatomical studies on the avian and reptilian respiratory system, and on the Amphioxus (lancelet).

In 1821 Retzius joined the Veterinary Institute, where he was appointed professor two years later. In 1824, endorsed by Jacob Berzelius, Retzius became professor of anatomy at the Karolinska Institute [5]. In 1826, he was elected to the Royal Swedish Academy of Sciences.

His collaborators included Karl von Baer (1792–1876) in Königsberg, Ernst

Heinrich Weber (1795–1878) in Leipzig, Johannes Müller (1801–1858) in Berlin, Justus von Liebig (1803–1873) in Giessen and later Munich, Rudolf Wagner (1805–1864) in Erlangen and later Göttingen and Theodor von Bischoff (1807–1882) in Heidelberg. Retzius was introduced to microscopy by Jan Evangelista Purkyně (1787–1869), when he attended the Congress of Naturalists in Breslau in 1833 [4]. Subsequently he carried out studies on dental histology, describing the brown striae of the tooth enamel or 'contour lines (striae) of Retzius' [6].

Because his eyesight deteriorated, he devoted his last two decades to gross and topographic anatomy and anthropology. He studied the stomach in rodents, dogs and humans, and defined the divisions of the pyloric antrum and canal, as well as the gastric canal along the inner surface of the lesser curvature. He described the extraperitoneal prevesical space between the symphysis, the bladder, and the anterior abdomen in man, called 'cavum Retzii' or 'retropubic space of Retzius' [1].

The cortical structure with which the name of Anders Retzius is associated by neuroanatomists is a group of gyri he described in 1856 in several mammals (including humans) on the underside of the splenium, in the angle formed by the hippocampus and the dentate gyrus. They appear to be rudimentary in the human brain, but are important in other species, conceivably associated with olfaction. His son Gustaf Retzius named these convolutions 'gyri Andreae Retzii' [8]. Designated as *Balkenwindungen* ('callosal gyri') by Emil Zuckerkandl (1849–1910), and regarded as belonging to the hippocampal formation by Carlo Giacomini (1840–1898) on the basis of their structure, they appear as round or oval eminences on the medial surface of the hippocampus. They are not invariably found in every mammalian species: occasionally, they are little more than mere suggestions, whereas when strongly developed they resemble a spirally-wound cord [9]. Cytoarchitectonically, the

intralimbic gyri of Anders Retzius belong to the phylogenetically older *allocortex* because they have only three layers of neurons in comparison with the six layers of *isocortex*; they are found in a transitional area between the fascia dentata and the fasciolar gyrus [10].

As an anthropologist, Retzius introduced a new classification of human races, based on anatomical cranial characteristics, and he coined the term dolichocephalic and brachycephalic [4]. He also pioneered craniometry and is considered one of the founders of physical anthropology.

Influenced by scientific idealism, which viewed perfection as the ultimate goal for history, society and mankind, Retzius favoured an embryological conception of evolution, based on the stages of growth to maturity, as an alternative (spiritual) approach to Darwin's (materialistic) natural selection [3].

A polymath, Retzius also contributed to the history of Scandinavian anatomy, horticulture and to the sanitation and the water supply of Stockholm, and he authored biographical notes on Anders Johan Hagströmer (1753–1830), Arvid Henrik Florman (1761–1840), James Cowles Prichard (1786–1848), Michaël Skjelderup (1769–1852), Georges-Louis Duvernoy (1777–1855), Carl Adolf Agardh (1785–1859), and Jacob Berzelius (1779–1848) [7].

Retzius died on April 18, 1860 in Stockholm. He occupies a place among the foremost anatomists and anthropologists of the 19th century, and is credited with introducing the teaching of comparative anatomy and histology into medical curricula in Sweden. In 1896, Gustaf Retzius dedicated his two-volume *Das Menschenhirn* ('The Human Brain'), a classic of macroscopic neuroanatomy, to his late father, in commemoration of the centennial of his birth.

Conflict of Interest None.

References

1. Breimer L (1978) Anders Adolf Retzius (1796–1860). Invest Urol 16:253
2. Grant G (2011) Gustaf Retzius (1842–1919). J Neurol 258:706–707
3. Gustafsson T (1994) En harmonisk och hierarkisk ordning: Synen på utveckling i 1800-talets svenska biologi. Lychnos Lärdomshist Samfundets Årsbok (Uppsala) 1994:87–113
4. Larsell O (1924) Anders A. Retzius (1796–1860). Ann Med Hist 6:16–24
5. Lindblad T (2000) Anders Retzius och Karolinska Institutet. Hagströmer Biblioteket, Stockholm
6. Pindborg JJ (1962) Anders Adolf Retzius and Alexander Nasmyth: A correspondence between two great nineteenth-century dental histologists. J Hist Med Allied Sci 17:388–392
7. Retzius A (1902) Skrifter i Skilda Ämnen jämte Några Bref (Samlade och Utgifna af G. Retzius). Nordiska Bokhandeln, Stockholm
8. Retzius G (1878) Notiz über die Windungen an der unteren Fläche des Splenium corporis callosi beim Menschen und bei Thieren. Arch Anat Physiol Anat Abthlg 1877:474–479
9. Santee HE (1915) Anatomy of the Brain and Spinal Cord with Special Reference to Mechanism and Function, 5th edn. Blakiston, Philadelphia
10. von Economo C (2009) Cellular Structure of the Human Cerebral Cortex (translated and edited by L.C. Triarhou). Karger, Basel

Fig. 1. Oil painting of Anders Retzius by professor Axel Jungstedt (1859–1933), dated 1900; collotype by Chr. Westphal, Stockholm [7]. Copying, redistribution, or retransmission without the author's express written permission is prohibited