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HISTORICAL NOTE

The fissure of Sylvius (1614–72)

Franciscus called Sylvius, was a descendant of a protestant family named Du Bois (changed to de la Boë¹) from Cambrai, in France. For religious reasons the family moved to Germany. Sylvius was born in Hanau, Germany. He read medicine at the universities of Sedan and Leiden. He began his studies in June, 1632 at Leiden and offered a disputation *Positiones variae medicae* in 1634. Sylvius obtained his medical doctorate at the University of Basel on 16 March 1637, defending a thesis *De animali motu ejusque laesionibus*. According to Haller this is the first description of the lateral cerebral fissure. This fissure and the cerebral aqueduct were not fully described by Sylvius until 1663.¹

He practised for a short period but graduated again at Leiden University in November 1638. His skills in teaching anatomy brought him respect and a certain fame: “many students, and certainly not the worst ones, attended his courses, so that it seemed as if only he could understand and explain anatomy.”

One of these students was Thoma Bartholini, son of the famous Danish anatomist Caspar Bartholini. In the 1641 edition of his well known textbook *Institutiones anatomicae* published by Thoma, 12 years after Caspar's death, it is clear that Caspar with Sylvius had shown and named the cerebral fissure separating the temporal lobe from the frontal lobe above.² Not until 1663 was it separately published in Sylvius's *Opera as Disputationes medicarum ad C Bartholini Institutiones Anatomicas*, but Caspar Bartholini gave credit to Sylvius for the discovery, probably in his thesis of 1637.

After this important work, Sylvius turned his attention to the circulation. He was able to show that the blood had an independent flow or circulation through the blood vessels, pumped by the heart. Thus, he tried to convince his seniors of the medical faculty that Harvey's theory was correct. Professor Johan Walaeus, one of his professors, became a spirited proponent of Harvey's theory. Sylvius had proposed the circulation in the lungs in his thesis of 1634, 6 years after *De motu cordis*.

Sylvius moved from Leiden to Amsterdam in 1641. He practised there for 17 years, until in 1658 he returned to Leiden as Professor of

Medicine. He gave his inaugural lecture *De Hominis Cognitione* on 17 September. He was an excellent and enthusiastic teacher and lecturer, concentrating on the more common ailments prevalent at the time in the Caecilia Hospital. He applied the Socratic method and emphasised the modern systems of diagnosis, prognosis, and therapy. His work shows the importance he attached to necropsies as a way of verifying or rejecting clinical diagnoses, as well as giving clues as to the nature of the disease. It is Sylvius who is said to have first demonstrated at necropsy the lung tubercles.

Sylvius became interested in iatrochemistry, a concept that sought to explain physiological processes as dependent on chemical mechanisms; the idea was not far removed from modern neurotransmitters. Of the theses presented under his presidency, one named *Disputationem medicarum decas I* (1663), contained “the primary natural functions of the human body deduced from anatomical, practical and chemical experiments.” Sylvius regarded as fundamental the effervescence or violent reaction, between acid and alkaline secretions and he rejected the classic humours. But he retained the notion of the animal spirits. These spirits in the blood were transported by the neck arteries in the capillaries on the brain surface in a process analogous to distillation. The most spiritual part of the blood passed the pores of capillaries, first in the grey matter and then in the white matter.

Because of his brilliance, clinical teaching in Leiden flourished under Sylvius and attracted many students from many other countries. When he died on 15 November 1672, the medical faculty of Leiden went into a relative state of decline.

Sylvius published his pathology under the title *Praxeos medica idea nova*. Unfortunately, he could only complete the first volume (1671). His former pupil Justus Schrader posthumously published the other volumes, including the appendix. Generally speaking, diseases were caused by abnormal effervescence due to abnormal secretions, which could be either sharp alkaline or sharp acidic. A defective animal spirit resulting from an accumulation of a volatile acid spirit, for instance, caused epilepsy. Therapy consisted of the prescription of alkaline salts, opposing the action of the excess of acid.

His contributions to the anatomy of the brain were recognised by Thomas Bartholinus, who in 1640 remarked:

“we can not pass over in silence the very accurate anatomist D. Franciscus Sylvius, since we borrow from his noble brain and ingenuity the admirable new structure of the brain.”

His works in neuroanatomy were published in the disputation *De spirituum animalium in cerebro, cerebelloque confectione, per nervos distributione, atque usu vario*, defended by the student Gabriel Ypelaer under Sylvius's supervision in 1660. The lateral fissure of Sylvius is described:

“...the surface of the cerebrum is very deeply marked by twistings (gyri) which are somewhat similar to convolutions of the small intestine. Particularly noticeable is the deep fissure or hiatus which...begins at the roots of the eyes (oculorum radices)...it runs posteriorly above the temples as far as the origin of the brain stem (medullae radices)...It divides the cerebrum into an upper, larger part and a lower, smaller part. Twistings occur along the fissure's length and depth even with the origins of smaller convolutions at the most superior part of it.” (1663, pp 43–44.)

Sylvius's accurate study of the outer surface of the brain was done because of his interest in the vascular system on the brain surface, and his interest in the grey matter related to the animal spirits.

The ventricular aqueduct

The connection between the third and fourth ventricles had already been mentioned or supposed by Galen in *De usu partium* as a canal giving communication between the cerebrum and the cerebellum. Vesalius had described in the *Fabrica* (1543) an “anus-like orifice of the meatus which extends from the third to the fourth ventricle” below the quadrigeminal bodies. In chapter 21 in the disputation of Franciscus Sylvius is described a canalis vel aquae-ductus between the conjoined roots of the spinal cord and under “our bridge” (pons Varoli) and the corpora quadrigemina. The aqueduct was certainly known before Sylvius, and both Haller and Morgagni were critical of naming the aqueduct after Franciscus Sylvius.

The naming of the fissure followed Thomas Bartholini's homage to Sylvius's work, but it had been described by Caspar Bartholini.

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