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Costanzo Varolio (1543–1575)

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Costanzo Varolio (latinised as Constantinus Varolius) is known worldwide in the field of neuroanatomy. His name is usually linked with the bridge (pons) formation that bears his name (*pons Varolii*), but he also contributed other neuroanatomical descriptions in the sixteenth century [1].

Little is known of Varolio's life. He is said to have been born in Bologna in 1543 but the day and the year of his birth are still controversial. According to Banzi [2] Varolio was born on the fourth or on the third of January 1544. His father, Sebastiano Varolio, is simply described as a 'citizen' (even an 'honest citizen') of Bologna. There is no information on his financial status. Following the custom of his time, Varolio first studied philosophy and then turned to medicine, especially anatomy, at the University of Bologna, under Giulio Cesare Aranzi or Aranzio (1530–1589) [1]. Varolio obtained his medical and doctoral degrees in the standard Italian style in 1566, after leaving the University of Padua [3]. In 1569, the Senate of Bologna appointed him to a newly instituted extraordinary Chair of Surgery, with the responsibility of teaching anatomy as well. He moved to Rome in 1572 and possibly taught at *La Sapienza*, although he was not listed in the *rotuli* of this University. Possibly he became physician to Pope Gregory XIII (1502–1585), at least according to Prospero Mandosio (1650–1709), learned

historian and member of the *Accademie degli Infecondi e degli Umoristi*, but this is denied by Luigi Gaetano Marini (1742–1815), universal scientist and prefect of the archives at the Vatican and the Castle of St. Angelo [4]. At any rate, he enjoyed the patronage of the Pope, who also came from Bologna. In Rome he had considerable success as a physician as well as a surgeon.

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Despite his short life, Varolio left us important works, among them a letter to the physician Gerolamo Mercuriale (1530–1606) dated April 1, 1572, entitled *De Nervis Opticis nonnullisque aliis praeter communem opinionem in Humano capite observatis* (On the optic nerves observed in the human brain and a few other particulars adverse to the common opinion) published in Padua in 1573, and the anatomical works *Sive de resolutione corporis humani* (Anatomy, or rather the essence of the human body) published in 1573 and *De Cerebro* (The Brain), published posthumously in 1591.

Varolio paid particular attention to the origins of intracranial nerves and some cerebral structures such as the ventricles, the cerebellum and the pons, which now bears his name. He developed a new method of dissecting the brain in the axial plane, from the base of the brain towards the convexity, instead of the other way around as was usual. This method allowed a better view of the structure of the brain and the cranial nerves [5]. Although the priority of this technique is usually credited to Varolio, Vesalius shows an image of this approach in the first edition of *De humani corporis fabrica*, in plate 48 [6].

In the *De Nervi Opticis*, Varolio recognised the pons as a connection between the cerebellum and the cerebrum, assuming that the cerebellum was associated predominantly with movement, the cerebrum with sensation. Varolio regarded the pons, which he named *pons tranversus cerebelli*, as part of the cerebellum, while the medulla oblongata passed below it, like water in a canal passing under a bridge. This structure is nowadays considered the base of the pons, containing corticospinal and pontocerebellar fibres, and is universally recognized as the *pons Varolii* [7]. Before Varolio, the pons had been illustrated by Bartolomeo Eustachi or Eustachio (1520–1574), in his famous *Tabulae Anatomicae* of 1552, but unfortunately this work remained unpublished for more than 150 years.

Varolio is also considered the first to have distinguished, in 1573, the lobes of the brain. He postulated that each cerebral hemisphere was made up of three *prominentiae* (prominences), which he called anterior, medial and posterior, believing they corresponded to the first, second, and third ventricles, respectively [8, 9]. In 1664, Thomas Willis (1621–1675), disregarding Varolio's prominences, pointed out that either hemisphere is subdivided into two lobes, anterior (our frontal and parietal in one) and posterior (our temporal and occipital lobes in one), divided by the middle cerebral artery [8].

Varolio was struck by an unknown disease and died prematurely in Rome in 1575, at just 32 years of age [2]. He is remembered as an innovative and talented anatomist. As early as 1583, the Swiss physician Felix Platter (1536–1614) cited Varolio's contribution to science, by his recognition of how a lens serves to focus the rays of light converging on it [10].

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