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COVER EDITORIAL

The medical lineage of the Monro family: the clinical contributions of Alexander Monro secundus

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The Monro family has served 126 years as chair of anatomy at Edinburgh University for three generations [1]. Alexander Monro secundus (Fig. 1a), together with his father and son (Alexander Monro primus (Fig. 1b), Alexander Monro tertius (Fig. 1c)), has made Edinburgh University an internationally important center for medical learning [2].

His life

Scottish physician, anatomist, and medical educator Alexander Monro secundus was born in Edinburgh on 20 May 1733. His father is Alexander Monro primus, and his mother is Isabella MacDonald [3]. He started his education at James Mundell's private school. Monro's father cared about his son's education. Monro took courses in mathematics, history, physics, philosophy, Greek, and Latin on the arts faculty at Edinburgh University, which he enrolled in at the age of twelve [4]. He began his medical education in 1750 [5].

He was interested in anatomy and assisted his father in the dissection room [6]. His father supported his son's natural interest in medicine. In 1750, he prepared a manuscript interpretation for Anatomy of Human Bones. When Alexander Monro secundus was in his second year of medical education, his father entrusted his evening anatomy lessons to his son. After taking a session of evening classes, Monro primus petitions the city council to appoint his son as an anatomy professor. Monro primus supported this request with a certificate stating the satisfaction of the students his son taught in the evening class. Alexander Monro secundus was appointed assistant to his father on 12 July 1755 [5]. In the same year, Alexander Monro secundus presented his thesis titled "De testibus et semine in variis animalibus" (Fig. 2) and graduated in medicine [3].

Monro went to London after graduation. In London, he attended classes taught by William Hunter, his father's former student [5]. Monro secundus, who later went to Paris, returned to Edinburgh to help with anatomy lessons and other work at the university, as his father fell ill. After his father recovered, he went to Berlin, to the house of Johann Friedrich Meckel the Elder, where he stayed for several months [3]. Monro went to Leiden after Berlin. Here he met Bernhard Siegfried Albinus and Peter Camper. In January 1758, his father fell ill again, and he had to return to Edinburgh to teach anatomy. As of this date, he continued the work of the anatomy chair for 50 years [5].

Monro secundus' lessons were very popular, and the number of students who attended the lessons gradually increased. He was the most influential anatomy professor during his 50 years as a lecturer [4]. He had a private practice in addition to teaching. Despite the fact that Monro did not perform surgery, he was consulted in difficult cases. Monro secundus was passionate about theater and gardening in addition to medicine [3].

Monro secundus married Katherine Inglis on September 25, 1762. Monro and Katherine had 2 daughters and 3 sons [3]. Alexander Monro secundus retired in 1798 and transferred his seat to his son (Alexander Monro tertius), who was also a professor. In addition to retiring from teaching, he also closed his private practice. Monro suffered a stroke in 1813 and died on October 2, 1817. After his death, he was buried in Greyfiars churchyard, next to his wife, who had died 14 years before him [3].

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Fig. 1 The Monro family: **a** Alexander Monro secundus. **b** His father Alexander Monro primus, and **c** his son Alexander Monro tertius

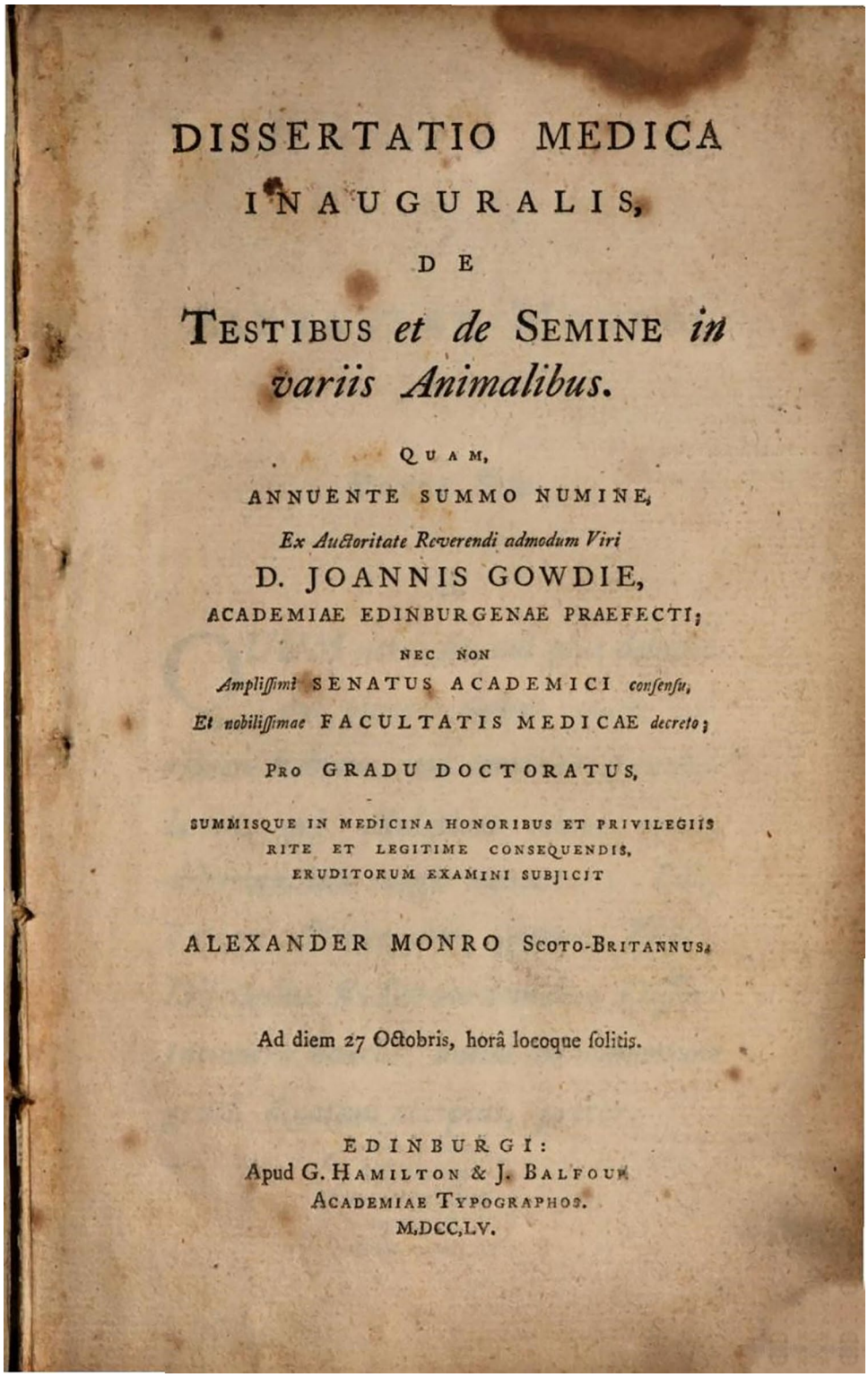
Career and achievements

The first publication of Monro sencundus, "De venis lymphaticis valvulosis: et de earum in primis origine" (Fig. 3), was published in 1757. In this publication, Monro argued that the lymphatic system was absorptive and different from the circulatory system. William Hunter claimed he had been teaching this for years and that Monro had stolen his idea. He accused Monro of stealing his idea, but Monro claimed that Hunter stole the theory from his thesis. Although Monro was the first to publish the book, Hunter had taught this theory before. However, Francis Glisson and Friedrich Hoffman published this theory nearly a century before either of them [3].

Based on a case of pneumothorax he observed with Meckel in 1757, he developed the method of cannula insertion with the help of a trocar, instead of the chest incision made by the surgeons of that time. This method was revolutionary for the eighteenth century. Monro described the interventricular foramen in an article he presented at a meeting of the Edinburgh Philosophical Society in 1764. He explained that the lateral ventricles communicate with the third ventricle via a vertical pathway in the middle and a transverse pathway below. He called it "iter ad tertium ventriculum." He noted that in the dissection of a hydrocephalus case, the foramen was enlarged compared to normal. Following the article he presented, he explained the interventricular foramen in detail in a publication he published in 1783 (Observations on the Structure and Functions of the Nervous System) (Figs. 4 and 5 and cover) and another publication 14 years later (Treatise on the Brain). Although Monro was the first scientist to describe foramen, other scientists were aware of these structures before Monro [1, 3].

Monro secundus made significant discoveries about the cranial cavity. The Monro–Kellie doctrine was revealed as a result of these observations. Physical principles were associated with intracranial structures. He explained that the brain is in an incompressible bone structure that cannot expand. He explained that the amount of blood in this bone structure is constant and that venous blood must constantly flow out of the cranium for the amount of arterial blood to remain the same [3].

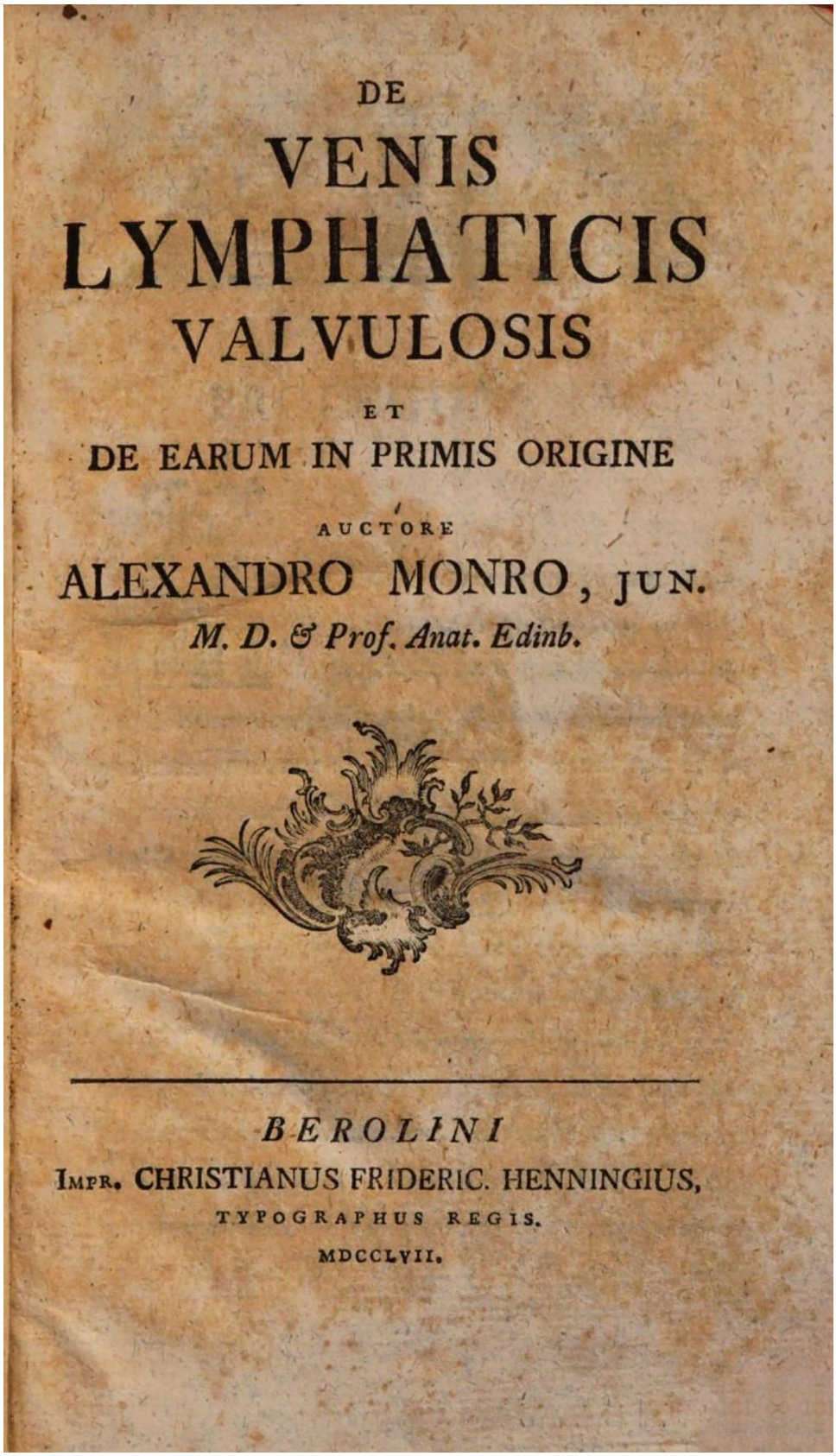
In 1785, he published "The Structure and Physiology of Fishes Explained and Compared with those of Man and other Animals." The "A Description of all the Bursae Mucosae of the Human Body" was published in 1788 and Monro explained in detail the 70 pairs of bursae in the human body in this publication [1, 3]. Another of Monro's contributions to neuroscience is his publication "Experiments on the Nervous System with Opium and Metalline Substances, to Determine the Nature and Effects of Animal Electricity," published in 1793 [3]. The last book of Monro secundus, "Three Treatises on the Brain, the Eye, and the Ear," was published in Edinburgh in 1797 [4].



DISSERTATIO MEDICA
INAUGURALIS,
DE
TESTIBUS *et de* SEMINE *in variis Animalibus.*

QUAM,
ANNUENTE SUMMO NUMINE,
Ex Auctoritate Reverendi admodum Viri
D. JOANNIS GOWDIE,
ACADEMIAE EDINBURGENAE PRAEFECTI;
NEC NON
Amplissimi SENATUS ACADEMICI *consensu,*
Et nobilissimae FACULTATIS MEDICAE *decreto;*
PRO GRADU DOCTORATUS,
SUMMISQUE IN MEDICINA HONORIBUS ET PRIVILEGIIS
RITE ET LEGITIME CONSEQUENDIS,
ERUDITORUM EXAMINI SUBJICIT
ALEXANDER MONRO SCOTO-BRITANNUS,
Ad diem 27 Octobris, horâ locoque solitis.
EDINBURGI:
Apud G. HAMILTON & J. BALFOUR
ACADEMIAE TYPOGRAPHOS.
M.DCC,LV.

Fig. 2 The scientific thesis of Alexander Monro secundus titled "De testibus et semine in variis animalibus"


DE
VENIS
LYMPHATICIS
VALVULOSIS
ET
DE EARUM IN PRIMIS ORIGINE
AUCTORE
ALEXANDRO MONRO, JUN.
M. D. & Prof. Anat. Edinb.

BEROLINI
IMPR. CHRISTIANUS FRIDERIC. HENNINGIUS,
TYPOGRAPHUS REGIS.
MDCCLVII.

Fig. 3 The first publication of Monro secundus titled "De venis lymphaticis valvulosis: et de earum in primis origine"

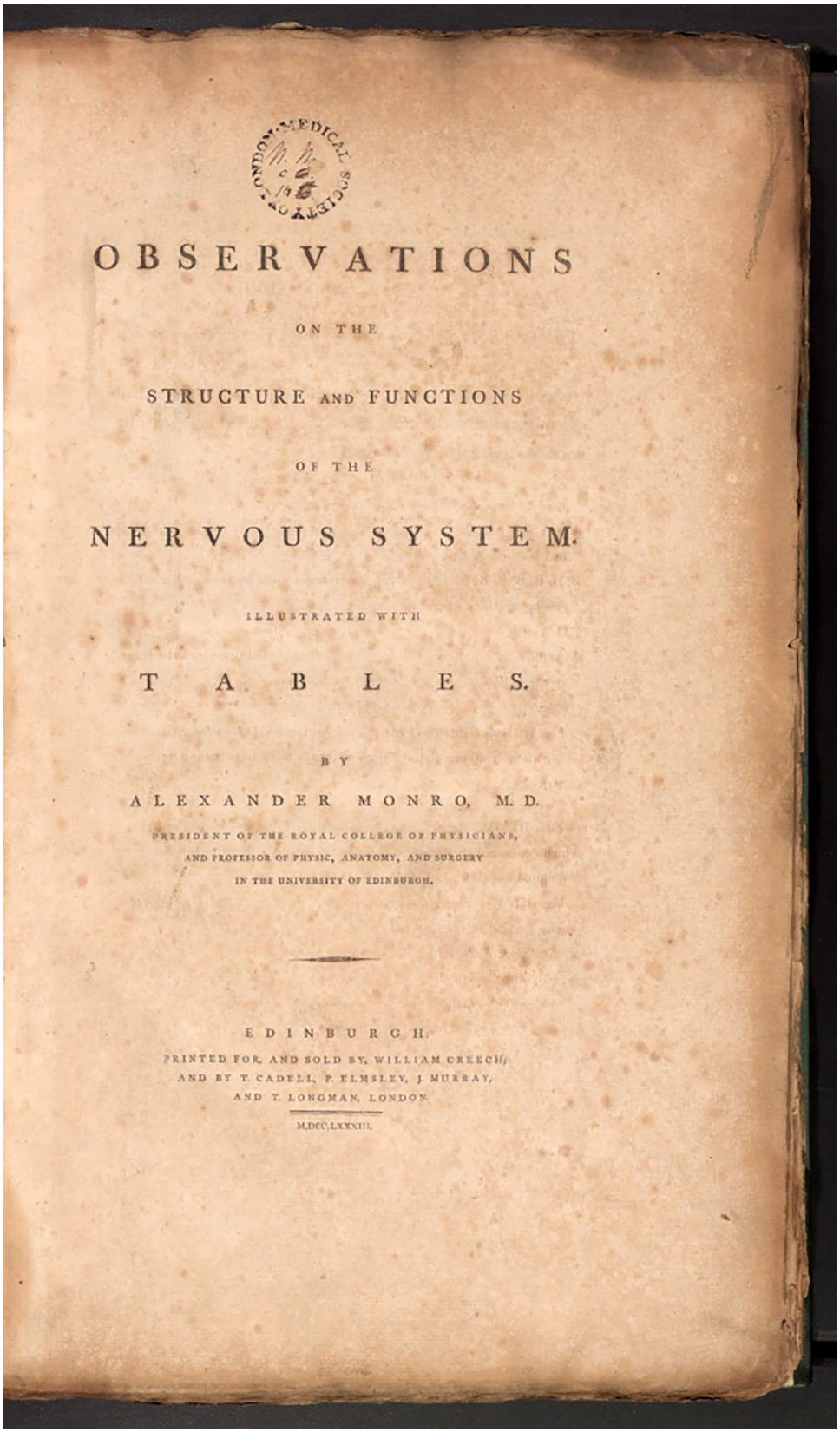


Fig. 4 The title page of published book called "Observations on the structure and functions of the nervous system"

Fig. 5 and cover The remarkable illustriations of "Observations on the structure and functions of the nervous system" book, published by Alexander Monro secundus

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Declarations

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Consent for publication Not applicable.

Conflict of interest The authors declare that they have no conflict of interest.

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