

## Life of Gerard Blasius, and His Description of the Spinal Cord\*

### Gerard Blasius'un Hayatı ve Medulla Spinalis Tasviri

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#### ABSTRACT

Gerard Blasius (Blasius or Blaes) is a Dutch physician, chemist and anatomist. In this study, Gerard Blasius' life, books and his contributions to neuroanatomy were researched. Blasius has written dozens of books. It is accepted that first important study of spinal cord is belong to Blasius. He depicted the horizontal section of the spinal cord and represented the white and gray matters in these drawings successfully. Besides, in these drawings, spinal ganglion, anterior median fissure, posterior median sulcus, brainstem, terminal filum, cerebellum, vertebral artery, anterior spinal artery and spinal dura mater are seen remarkably. In addition to being one of the leading scientists in anatomy, zootomy, botany and chemistry, Blasius' description and drawing of spinal cord in detail must be seen as a success beyond the his time.

**Keyword:** Gerard Blasius, Neuroanatomy, History of medicine, History of anatomy

#### Öz

Gerard Blasius (Blasius or Blaes) Hollandalı bir doktor, kimyager ve anatomisttir. Bu çalışmada Gerard Blasius'un yazmış olduđu eserler ve nöroanatomiye yaptıđı katkıları incelendi. Blasius onlarca kitap yazmıştır. Medulla spinalis hakkında ilk önemli çalışmanın Blasius'a ait olduđu kabul edilmektedir. Medulla spinalis'in horizontal kesitini çizmiş ve bu çizimlerde gri ve beyaz cevher'i güzel bir şekilde tasvir etmiştir. Ayrıca bu çizimlerde; ganglion spinale, fissura mediana anterior, sulcus medianus posterior, beyin sapı, filum terminale, cerebellum, arteria vertebralis, arteria spinalis anterior ve dura mater spinalis'in de görüldüğü dikkat çekmektedir. Blasius; anatomi, zootomi, botanik ve kimya alanlarında önde gelen bilim adamlarından biridir. Bunun yanı sıra, onun özellikle medulla spinalis'i ayrıntılı bir şekilde tarif etmesi ve çizmesi yaşadığı çağın ötesinde bir başarı olarak görülmelidir.

**Anahtar Kelimeler:** Gerard Blasius, Nöroanatomi, Tıp tarihi, Anatomi tarihi

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## INTRODUCTION

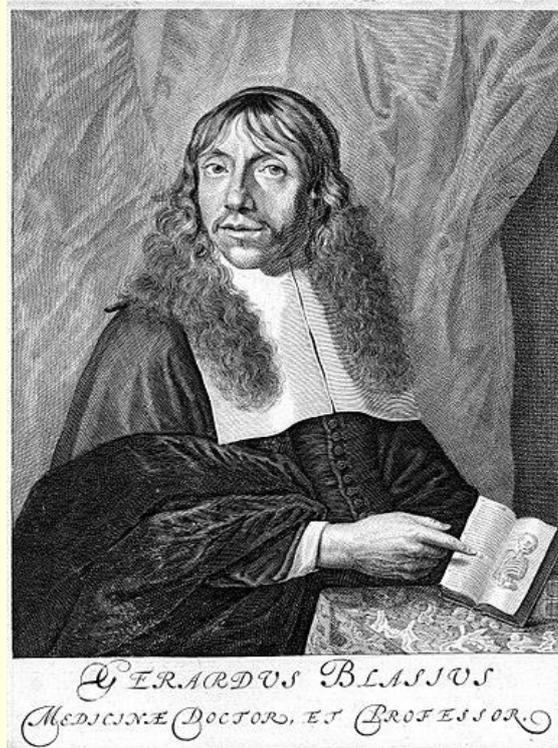
People have tried to understand their own structure since their existence. So, sometimes they made dissections on human body, sometimes they made dissections on animals and they tried to adapt this human body by made comparison.<sup>1</sup> Good anatomy learning and knowledge is one of the indispensable conditions for success in medical practice. The fact that today's medical literature has very detailed anatomy knowledge is the product of hundreds of years of knowledge. Numerous scientists have contributed to this.<sup>2</sup>

Gerard Blasius (Blasius or Blaes) is one of these scientists. Blasius had made a number of dissections on both animals and humans. He had examined information of previous scientists in detail; also he had immortalized this information with books to reflect their knowledge in later periods. Blasius is also considered a good academician. It is seen in his books that he did his work with his students and trained them during he made dissection.

The purpose of this study is to examine Gerard Blasius life and work and to evaluate the contribution to anatomy.

### His Life

Gerard Blasius (**Fig. 1**) is a Dutch physician, chemist and anatomist. There are differences in the literature about his birth and death dates (1627-1682, 1625-1692, 1625-1682).<sup>3-5</sup> His father Leonard Blasius served as an architect to Christian IV (1577-1648), the king of Denmark.<sup>3</sup> Joan Blasius (1639-1672), the little brother of Gerard Blasius was a lawyer and poet.<sup>3,6</sup> Gerard Blasius had married Cornelia van Ottinga in 1653. His wife was a silk merchant. They had eight children but three of them had death at young age. Blasius was buried in the Canal Verver that in Groenburgwal.<sup>3</sup>



**Fig. 1** The portrait of Gerard Blasius (1638-1686) which can be found at [https://en.wikipedia.org/wiki/Gerard\\_Blasius](https://en.wikipedia.org/wiki/Gerard_Blasius) Accessed 16 December 2017

Blasius began his education in Denmark; after his father died in 1644 they moved to Leiden. In 1648, Blasius graduated from faculty of medicine with a thesis named *De nephritide* related with kidney diseases that he had written under Otto Heurnius (1577-1652).<sup>7</sup>

In 1655, Blasius became a doctor in Amsterdam. Besides, he was interested in embryology, zootomy, botany and chemistry. He had vast knowledge related chemistry and botanical knowledge about it. He also taught these lessons to his students.<sup>3</sup>

Despite its richness and size, there was no university in Amsterdam in the XVII<sup>th</sup> century. The first higher education institution, Athenæum Illustre was built in the chapel of the old St. Agnes monastery in 1632. Unlike a university, Athenæum did not give degrees. Thus, Athenæum was limited to giving lessons to students who went to elsewhere. The syllabus did not include medical education until a few decades after its foundation in 1660.<sup>7</sup> In 1660, he became the first professor of medicine in Amsterdam.<sup>3</sup> Blasius was the first person in Athenæum to have a formal position for medical education and thrown together informal teachings and people who teaching for professional surgeons or midwives in Amsterdam as a whole.<sup>7</sup> He and his students performed dissections on cadavers at the hospital and at his home. However, Blasius never got permission to made a dissection at the Theater Anatomicum. Because this permission was given to surgeons only.<sup>3</sup>

In addition, he and his students also made dissections on the animals such as the monkey, hedgehog, calf, horse, heron, sheep, tortoise, dormouse and snake. One of the most famous of his students, Niels Stensen, who discovers the incisive foramen and parotid duct, is also known to dissect on animals and to discover the parotid duct in sheep.<sup>8,9</sup> Due to Niels Stensen's discovery, disagreements occurred between the Blasius and Stensen. Although Gerard Blasius have claimed in his book named *Medicina generalis nova accurataque methodo fundamenta exhibens* that he discovered this discovery in 1661, in the following years it became clear that this discovery belonged to Niels Stensen.<sup>10,11</sup>

Blasius has provided basic and comprehensive training to his students. Those students have been very successful. Blasius was elected as a member of the *Collegium privatum Amstelodamense* in 1664. In 1666, he published *Anatome medullae spinalis, et nervorum inde provenientium*<sup>3-5</sup> which was about anatomy of the spinal cord. In 1670, he was allowed to dissect hospitalized patients who died in beds under his jurisdiction, so that students could relate theory and practice.

### His Books

At the beginning of his career, Blasius organized several works by other authors, probably due to his wide range of teaching assignments. Some of these: Johann Vesling (1598-1649), Nathaniel Highmore (1613-1685), Thomas Bartholin (1616-1680), Thomas Willis (1621-1675), and Lorenzo Bellini (1643-1704).<sup>7</sup>

Blasius' own publications also covered many medical fields. Blasius has written dozens of books.

In 1659, his book named *Commentaria, in syntagma anatomicum, Viri Clarissimi Joannis Veslingii Anatomici quondam Patavini (Amstelodami, Apud Joannem Janssonium)* was published. It has 258 pages. In 1660, the book is formed 28 pages, *Oratio Inauguralis De iis Quae Homo Naturae, quae Arti, debeat, Recitate In Illustri Amstelodamensium Athenaeo (Amstelodami, Apud Petrum Van Den Bergh)* was published. The other book named *Medicina generalis nova accurataque methodo fundamenta exhibens (Amstelodami, Apud Petrum vanden Berge)* was published in 1661. It has 451 pages. In the foreword of this book had showed that Blasius trained young students. In 1665, the book named *Medicina universa; hygieines & therapeutices fundamenta methodo nova brevissimè exhibens (Amstelodami, Apud Petrum vanden Berge)* was published. This book has 510 pages. The other book was published in 1666 and has 90 pages *Anatome medullae spinalis, et nervorum inde provenientium (Amstelodami, Apud Casparum Commelinum)*. Pearce<sup>5</sup> and Markatos et al.<sup>3</sup> state that Blasius has comparatively depicted the anatomical structures of 119 animals; 78 of these structures were displayed illustrations excellently, whose dissections are made by him in this book. However, when the book is examined, it is seen that there are only illustrations of spinal cord (**Fig. 3**). At the same year, the book named *Anatome contracta, in gratiam discipulorum conscripta, et edita (Amstelodami, Apud Gerbrandum Schagen, in plateâ Vitulinâ)* was published. It has 318 pages. In 1667, *Observationes anatomicae selectiores Collegii private Amstelodamensis. (Amstelodami, Apud Casparum Commelinum)*, in 1673 *Observationum anatomicarum Collegii privati Amstelodamensis, Pars Altera. In quibus praecipue de Piscium pancreate ejusque succo agitur, Figuris elegantioribus illustrata. (Amstelodami, Apud Casparum Commelinum)* were published. These books include the works of on the

animal and human dissections. The book published in 1667 is *Institutionum medicarum compendium, Disputationibus XII in Amstel. Athenaeo publice ventilatis, absolutum*. (Amsterdam: Petrus van den Bergh).

The book named *Miscellanea anatomica, hominis, brutorumque variorum, fabricam diversam magnâ parte exhibentia* (Amstelodami, Apud Casparum Commelinum) that includes 374 pages was published in 1673. When the human body was scarce, he provided a wide area on the dog's anatomy which was the most common substitute of the human body, thus enabling the students to learn. The other book that examines animals as well as the human body is *Observata anatomica in Homine, Simiâ, Equo, Vitulo, Ove, Testudine, Echino, Glire, Serpente, Ardeâ, variisque animalibus aliis. Accedunt extraordinaria in Homine reperta, Praxin medicam æque ac anatomen illustrantia* (Lugd. Batav. & Amstelod Apud Gaasbeecks). This book was published in 1674 and it has 162 pages. The book named *Ontleeding des menschelyken lichaems, Beschreeven en In verscheydene Figuren afgebeeld* has 262 pages and it was published in 1675. In 1676, the book named *Zootomiae, seu Anatomies variorum animalium pars prima* (Amstelodami, Apud Abrahamum Wolfgang) that has 482 pages was published. This book was formed in 1673 by a change of name and enrichment of the book *Miscellanea anatomica, hominis, brutorumque variorum, fabricam diversam magnâ parte exhibentia* (Amstelodami, Apud Casparum Commelinum).

The book named *Observationes Medicae Rariores Accedit Monstri Triplicis Historia* (Amstelodami, Apud Abrahamum Wolfgang) was published in 1677 and has 482 pages. This book contains reports on rare cases that were becoming increasingly popular in those years. However, most of the work in this book concerns zootomy.<sup>7</sup>

In 1680, the book named *Medicina curatoria methodo nova in gratiam discipulorum conscripta* (Amsterdam: Apud Henricum & Theodorum Boom) was published and it contains 388 pages. *Anatome animalium, Terrestrium variorum, Volatiliium, Aquatiliium, Serpentum, Insectorum, Ovorumque, Structuram naturalem Ex veterum, Recentiorum, propriisque Observationibus proponens, Figuris Variis Illustrata* (Amstelodami, Sumptibus viduæ Joannis a Someren, Henrici & viduæ Theodori Boom) that has 552 pages was published in 1681. In this book, anatomic structures related to animals were examined and the information in the literature and Blasius' own information were combined. Cole<sup>13</sup> stated that this work of Blasius is very important in the history of zootomy and acknowledged as the first extensive book of the comparative anatomy. In 1700, the book named *Observationes medicae rariores in quibus multa ad anatomiam et medicinam spectantia deteguntur Accedit Monstri Triplicis Historia* (Amstelodami, Apud Henricum & Joannemboom) was published and has 206 pages.

### His Description of Spinal Cord

Naderi et al.<sup>4</sup> stated that the history of spinal cord anatomy is relatively less than the other parts of the nervous system. In addition, knowledge about the spinal cord anatomy was usually obtained by observing spinal traumas. The first report about on the spinal cord injury is recorded in the Edwin Smith Papyrus. Little was known about the function of the spinal cord before the anatomical studies of Galen. Galen had provided anatomical details of the vertebral column, spinal cord and nerve roots by animal dissection and vivisection. In later times, although scientists such as Avicenna (980-1037), Andreas Vesalius (1514-1564) and Charles Estienne (1503-1564) have various contributions to the anatomy of spinal cord, the first important study of spinal cord is considered to belong to Blasius.<sup>3-5</sup> In later years, many scientists such as Francois Pourfour du Petit (1664-1741), Domenico Mistichelli (1675-1715), Felix Vicq d'Azyr (1748-1794), Luigi Rolando (1773-1831), Charles Bell (1774-1842), Karl Fredrich Burdach (1776-1847), Benedict Stilling (1810-1879), Ludwig Türck (1810-1868), Jacob Augustus Lockhart Clarke (1817-1880), Charles Edouard Brown-Séquard (1817-1894), Rudolph Albert von Kölliker (1817-1905), Friedrich Goll (1829-1903), Henry Charlton Bastian (1837-1915), William Richard Gowers (1845-1915), Paul Emil Flehsig (1847-1929), Joseph Jules Dejerine (1849-1917), Sir Victor Alexander Haden Horsley (1857-1916), Heinrich Lissauer (1861-1891), Edward Flatau (1868-1932), Otfried Foerster (1873-1941), Bror Rexed (1914-2002) added a number of contributions to the knowledge that Blasius discovered.<sup>4-5</sup>

The most important work of Blasius' books is named *Anatome medullae spinalis, et nervorum inde provenientium* published in 1666 (**Fig. 2**). It is accepted that first important study of spinal cord is belong to

Blasius.<sup>3-5</sup> According to these drawings in the book (**Fig. 3**) he depicted the horizontal section of the spinal cord and represented the white and gray matters in these drawings successfully (**Fig. 4**). In addition, he described the origin of the anterior and posterior spinal nerve roots. Besides, in these drawings, spinal ganglion, anterior median fissure, posterior median sulcus, brainstem, terminal filum, cerebellum, vertebral artery, anterior spinal artery and spinal dura mater are seen remarkably. In the lower segments of the spinal nerves, the drilling of the spinal dura mater with a narrower angle than the upper segments have been shown quite nicely. Pearce<sup>5</sup> and Naderi et al.<sup>4</sup> stated that these structures were illustrated clearly for the first time by Blasius.

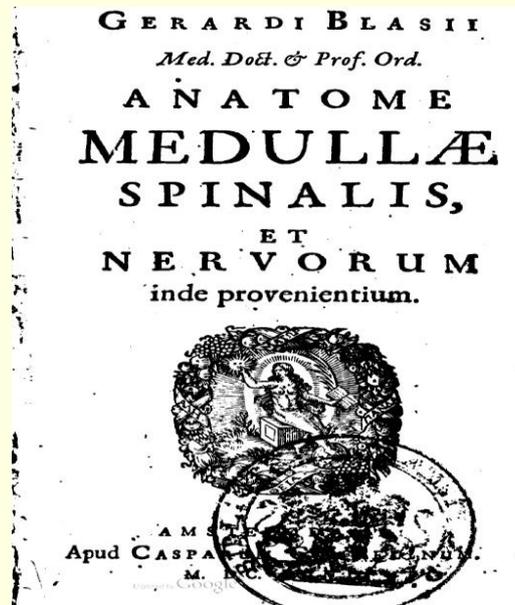


Fig. 2 Title page of *Anatome medullae spinalis, et nervorum inde provenientium* (1666)

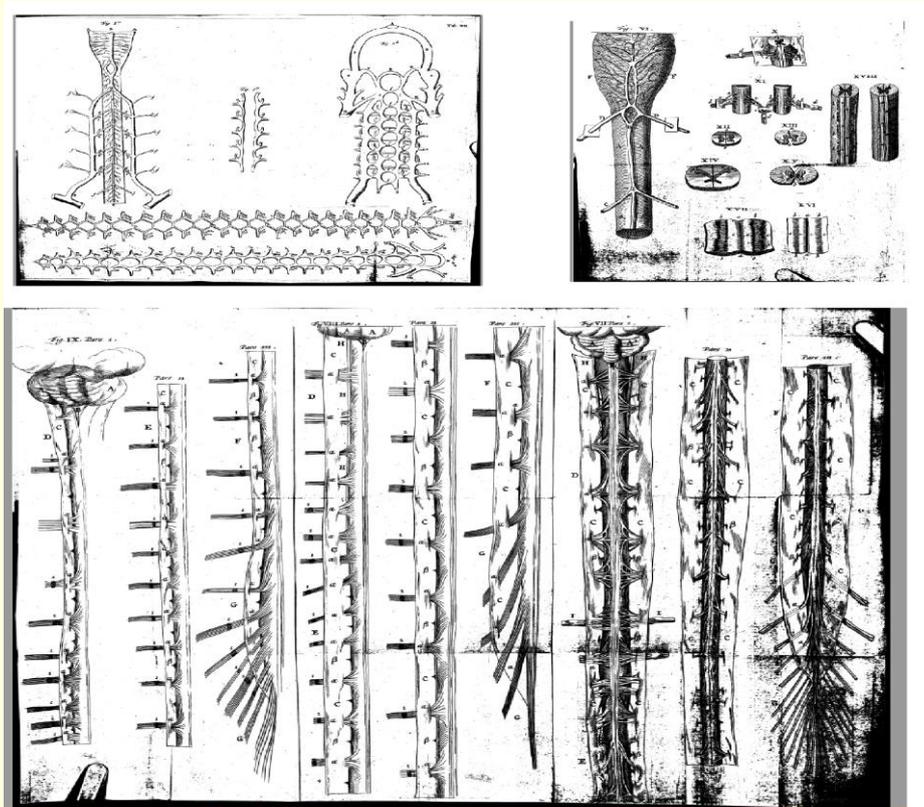


Fig. 3 Displays of the spinal cord in *Anatome medullae spinalis, et nervorum inde provenientium* (1666)

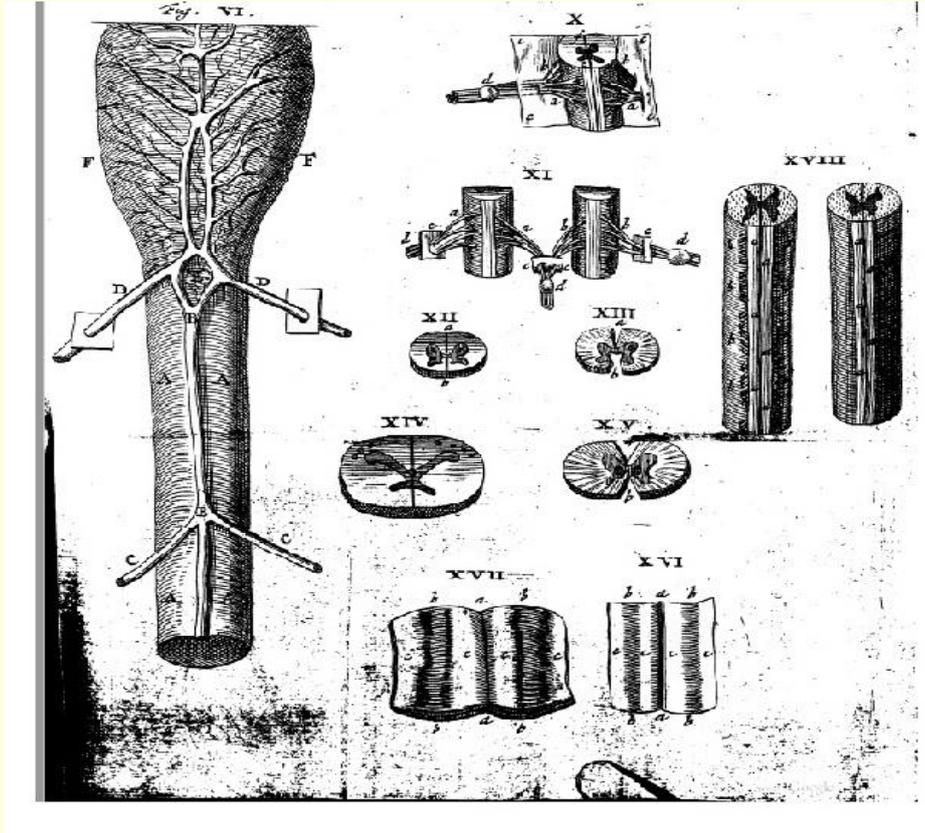


Fig. 4 Displays of the white and gray matters in *Anatome medullae spinalis, et nervorum inde provenientium* (1666)

## CONCLUSION

In addition to being one of the leading scientists in anatomy, zootomy, botany and chemistry, Blasius' description and depictions of spinal cord in detail must be seen as a success beyond the his time. Blasius has provided important knowledge on the spinal cord anatomy which is not known in detail in previous years and has laid the ground for many scientists to contribute to the spinal cord anatomy. Therefore, his contributions to our understanding of the spinal cord development cannot be overstated.

## Conflict of interest

The authors declare that there is no conflict of interest.

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