Niels Stensen (1638-1686): Scientist, Neuroanatomist, and Saint

Paolo Perrini, PhD, MD
Neurosurgical Department,
University of Pisa,
Pisa, Italy

Giuseppe Lanzino, MD
Department of Neurologic Surgery,
Mayo Clinic,
Rochester, Minnesota

Giuliano Francesco Parenti, MD
Neurosurgical Department,
University of Pisa,
Pisa, Italy

Reprint requests:
Paolo Perrini, PhD, MD,
Neurosurgical Department,
University of Pisa,
Via Roma 67,
56100 Pisa, Italy.
E-mail: p.perrini@ao-pisa.toscana.it

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Niels Stensen (1638-1686) was a prominent Danish scientist who laid the foundations of paleontology, geology, and crystallography. He undertook a personal search for the truth, rejecting many assumptions of his time, and he struggled to acquire a firm foundation of knowledge based on close observation and rigorous experimentation. Niels Stensen is known eponymously for the discovery of the duct of the parotid gland (ductus stenonianus) but most clinicians are not familiar with his contributions to anatomy beyond his studies on the glands. In 1665, he delivered a lecture in Paris on the anatomy of the brain, the *Discours sur l'anatomie du cerveau* ("A Dissertation on the Anatomy of the Brain"), which is a seminal investigation on methods in neuroscience. His scientific letter on a hydrocephalic calf represents an early pathophysiological investigation on hydrocephalus. In 1667 Stensen converted to Catholicism and in 1677 he was consecrated titular bishop of Titiopolis. He spent the last years of his life in poverty and traveled continuously trying to bring back northern Europe to Catholicism. This essay highlights the life and the scientific contributions of Niels Stensen, with emphasis on his contributions to neuroscience.

KEY WORDS: History of medicine, Hydrocephalus, Neuroscience, Niels Stensen, Pineal gland, René Descartes, Thomas Willis

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We must always remain in ignorance if we sit down with what the Ancients have taught us and if Men capable of making such Inquires do not contribute their Labor, Industry and Study, in order to arrive at the knowledge of Truth, which is the principal aim of all who search for it sincerely.

Niels Stensen, *Discours Sur L'Anatomie Du Cerveau* (a dissertation on the anatomy of the brain, 1669)[1]

Niels Stensen (1638-1686) or Nicolaus Stenonis, often shortened to Steno (Figure 1) was a great anatomist before he became a pioneer in the fields of paleontology, geology, and mineralogy. A brief review of Stensen's life and travels is essential in understanding his vision and his boundless intellectual passion for science and medicine (Table).

Niels Stensen was born in 1638 in Klareboderne Lane in Copenhagen, not far from the Round Tower, one of the first star observatories in Europe.[2-6] His father, Sten Pedersen, was a goldsmith and a court jeweler who came from a family of preachers. As a young child, from his third to his sixth year, Stensen experienced serious illness that kept him from playing with his contemporaries, and led him instead to listen to adult conversations, especially when the subject was religion. At the age of 10, Stensen was admitted to the School of Our Lady, where he received an excellent humanistic education and studied mathematics and languages. In 1656, he began the study of medicine at the University of Copenhagen under Thomas Bartholin (1616-1680) and Simon Paulli (1603-1680).

During the war with Sweden and the siege of Copenhagen (1658-1660) the students were called to serve in the defense of the city.[5] These difficult years involved, despite the war, a period of intense intellectual activity for Stensen, as disclosed by his scientific diary titled "Chaos." It reveals that he studied in depth excerpts from a wealth of literature including Athanasius Kircher (1602-1680), Johannes Kepler (1571-1630), Galileo Galilei (1564-1642), Blaise Pascal (1623-1662), Gassendi (1592-1655), and Marin Mersenne (1588-1648). The scientific diary also illustrates Steno's initial methods of research. The young Stensen, like Peter Sørensen (Petrus Severinus, 1540-1602), supported Paracelsus (1493-1541), who criticized

FIGURE 1. *Portrait of Niels Stensen (1638-1686) painted as scientist to the Medici court in Florence. From the Uffizi Gallery by anonymous artist.*

Galen's ideas and was fascinated by the Descartes method of obtaining absolute certainty by using methodological scepticism.[6]

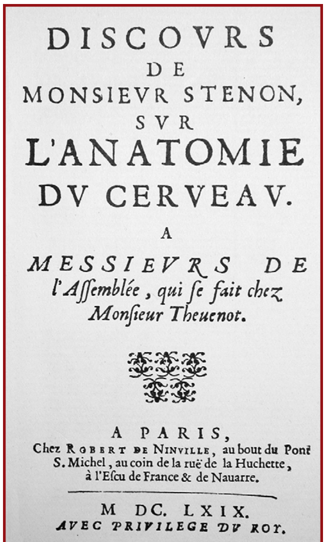
In 1659, Stensen set out on the usual educational journey and his first destination was Rostock in Germany. In 1660, Stensen decided to move to Amsterdam to continue his scientific efforts under the Dutch anatomist Gerard Blaes (Blasius, 1625-1692). On April 7, 1660, he discovered the excretory duct of the parotid gland while dissecting the head of a sheep.[5] The dispute with Blasius over credit for the discovery of the parotid duct led Stensen to move to the University of Leiden where he studied the anatomy of glands under Frans de la Böe (Franciscus Sylvius) (1614-1672) and Johannes Van Horne (1621-1670). Franciscus Sylvius, who was credited with the discovery of lateral fissure, stimulated Stensen's interest in brain anatomy. Concurrently, Stensen was introduced to several scientists including Jan Swammerdam (1637-1680), Frederik Ruysch (1638-1731), Reiner de Graaf (1641-1673), and Dutch philosopher Baruch Spinoza (1632-1677). His anatomic studies led him to publish *Observationes Anatomicae* (Anatomic Observations) in 1662 in which he revolutionized the knowledge of glandular function. According to a mechanistic and Cartesian view of the body, Stensen suggested that invisible pores act as sieves that remove the different-shaped particles of specific fluids from the blood. In addition, he distinguished between excretory

TABLE. Chronology of Events in the Life of Niels Steensen

1638	Born in Copenhagen.
1656	Student of medicine in Copenhagen under Thomas Bartholin (1616-1680). Begins to write "Chaos" manuscript.
1658–1660	The students take part in the defense of Copenhagen during the war with Sweden.
1660	Moves to Amsterdam to study anatomy under Gerhard Bläes (1626-1682). Discovers the excretory duct of the parotid gland while dissecting the head of a sheep.
1661	Moves to the University of Leiden to study under Frans de la Böe (Franciscus Sylvius) (1614-1672) and Johannes Van Horne (1621–1670).
1662	Publishes *Observationes Anatomicae.*
1664	Moves back in Copenhagen and publishes *De Musculis et Glandulis Observationum* Specimen in which he recognized that the heart was a muscle. Moves to Paris where he received his medical degree from the University of Leiden.
1665	In Paris, in a meeting of the Melchisedec Thévenot circle, he delivered a lecture on the anatomy of the brain, published on 1669 as *Discours sur l'anatomie du Cerveau* in which he criticized the brain anatomy of Descartes and Willis.
1666	Moves to Italy and meets in Rome the anatomist Marcello Malphighi (1628-1694). Moves to Florence invited by the Grand Duke Ferdinand II as anatomist of S.M. Nuova and as member of *Accademia del Cimento.*
1667	Publishes *Elementorum Myologiae Specimen* in which he used geometry to demonstrate that a contracting muscle changes in shape but not in volume. Publishes *Canis Carchariae Dissectum Caput* in which he supported the organic origin of fossils and lays the foundation of paleontology. Conversion from Lutheranism to Catholicism.
1669	Publishes *De Solido Intra Solidum Naturaliter Contento Dissertationis Prodromus* in which he lays the foundation of modern geology and crystallography. Writes the scientific letter *De Vitulo Hydrocephalo Epistola* published in 1673.
1671	Accepts a post as *Anatomicus Regius* in Copenhagen. First description of Fallot's tetralogy.
1675	Back to Florence and enters the priesthood.
1677	Nominated Bishop by the Pope Innocent XI and comes on a mission in Lutheran North.
1680	Accepts a position in Münster.
1684	Moves to Hamburg.
1686	Dies at Schwerin.

glands and lymphatic nodes and discovered the lacrimal ducts, suggesting that tears were secreted by the glands and not the brain.

In 1664 he returned to Copenhagen and published *De Musculis et Glandulis Observationum Specimen* (Specimen on Muscles and Glands) which he dedicated to the Danish King Frederick III. This work summarized the results of his anatomic discoveries on ducts, glands, and the mechanics of muscles. Based on a geometrical model of the movement of muscles, Stensen provided the basis for a new myology and proposed that muscle movement is the result of fiber shortening. [7, 8] This was a radically new theory incompatible with the dominant concept of contraction by inflation that was favored by Renè Descartes (1596-1650), Thomas Willis (1621-1675), and Giovanni Borrelli (1608-1679), due to their adherence to the Aristotelian axiom: "anything which moves is moved by something else." Stensen recognized that contraction of the heart was caused by contraction of its fibers, strongly rejecting the Cartesian theory of the heart as the center of the heat.


DISCOVRS
DE
MONSIEVR STENON,
SVR
L'ANATOMIE
DV CERVEAV.
A
MESSIEVRS DE
l'Aſſemblée, qui ſe fait chez
Monſieur Theuenot.

A PARIS,
Chez ROBERT DE NINVILLE, au bout du Pont
S. Michel, au coin de la ruë de la Huchette,
à l'Eſcu de France & de Nauarre.

M DC. LXIX.
AVEC PRIVILEGE DV ROY.

FIGURE 2. *The title page of the Discours sur l'anatomie du cerveau of Niels Stensen published in Paris in 1669.*[1]

In 1664 Stensen traveled to Paris where he continued his anatomic studies in the circle of Melchisedec Thévenot (1620-1692), Louis XIV's Royal Librarian.[4] In this academy (which would soon be merged in the French Academy of Sciences of Colbert), he delivered his famous lecture on the anatomy of the brain, *Discours sur l'anatomie du cerveau (*Figure 2*).*[1] This lecture was a seminal investigation on the theoretical and technical aspects of brain research. Sixty-seven years later, Jabob Benignus Winsløw (1669-1760) incorporated the entire essay in his *Exposition anatomique de la structure du corps humain*.

In 1666 Stensen was active as scientist at the court of the Grand Duke Ferdinand II (1610-1670) in Florence where he collaborated with the scientists of the *Accademia del Cimento*. In 1666 Stensen also dissected the head of an enormous shark captured near Leghorn and noted the similarity between the teeth of this specimen and the glossopetrae melitenses (tongue stones from Malta), which were believed to be snakes' tongues that were turned into stones by Saint Paul while he visited the islands of Malta (Figure 3). In his report *Canis carchariae dissectum caput* (The Head of a Shark Dissected), Stensen recognized that the glossopetrae were fossil shark's teeth and laid the foundation for modern paleontology.[2, 6] After his conversion to Catholicism in 1667, Stensen traveled extensively for his geological research and in 1669 published *De Solido intra solidum naturaliter contento* (Dissertation on a Solid Contained Naturally Within a Solid). In this work, which is a milestone in geology, he explained the origin of fossils, described the formation of the earth's strata, and enunciated some basic principles of the science of stratigraphy.[6] In 1669, Stensen spent a few months at the court of the Archduchess Anna (1616-1676) at Innsbruck where he dissected a monstrous calf with hydrocephalus.[9, 10] His scientific letter *De vitulo hydrocephalo epistola* (Letter on a Calf with Hydrocephalus) was an early pathophysiological investigation on the development of hydrocephalus. [9-11]

The *Discours Sur L'Anatomie Du Cerveau* and the Search for a New Methodology in Brain Anatomy

The focus of this lecture, delivered in Paris in 1665, was the methodology of brain research culminating in vivid criticism of contemporary anatomists.[12] Stensen rejected the contemporary methods of dissections based on transverse sections of the brain and proposed a new method of study based on investigation of white matter defined as "great masterpiece of nature":

> As for my own part, it is my opinion that the true method of dissection would be to trace the nervous filaments through the substance of the brain, to see which way they pass, and where they end; but this method is accompanied with so many difficulties, that I know not whether we may hope ever to see it executed without a particular manner of preparing.[1]

The anatomic quest of Steno emphasized the priority of dissection combined with careful observation and refused contemporary anatomic models strongly influenced by Galenic concepts.[13] Interestingly, he conceptually anticipated the fiber dissection technique that was subsequently described by the French anatomist Raymond Vieussens (1641-1715).[14,15] The adherence of Stensen to experimental results and their honest interpretation led to a rejection of blind allegiance to philosophical and scientific authorities. In this context, he confuted the doctrine of ventricular localization of the soul as well as Willis's speculations on cerebral localization, which were modifications of the views of ancient writers.[16] Similarly, Stensen contested the anatomic assumptions of Descartes' description of the pineal gland. In *L'Homme*, Descartes depicted the human body as a machine controlled by the soul, the seat of which was the pineal gland.[17] Descartes described the pineal gland as a mobile structure, sur-

FIGURE 3. *Woodcut from Canis carchariae dissectum caput (1667), in which Stensen revealed the fossil origin of glossopetrae and laid the foundation of paleontology.*

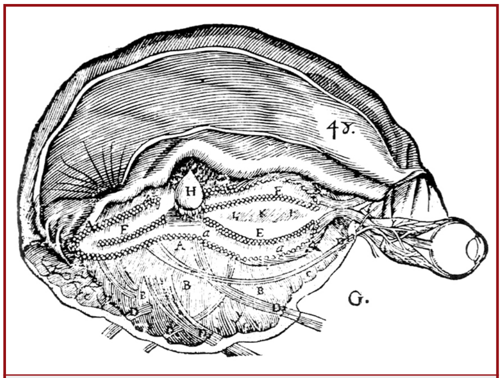


FIGURE 4. *Original drawing from L'Homme (1647) by René Descartes showing the supposed location of the pineal gland (H) relative to the hollow ventricles (E).[17] In Descartes' description of the physical machinery of the body, the pineal gland was the primary locus for mind-body interaction in humans. Descartes wrote: "Thus when the soul wants to remember something, this volition makes the gland lean first to one side and then to the other, thus driving the spirits towards different regions of the brain until they come upon the one containing traces left by the object we want to remember."[17]*

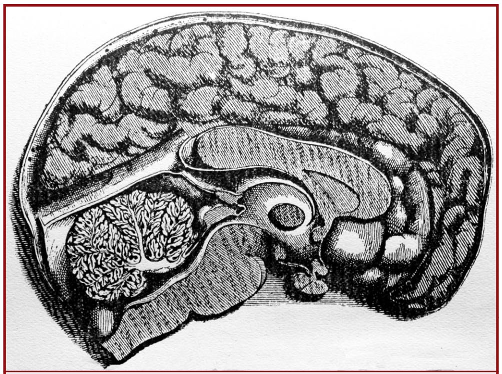


FIGURE 5. *One of the three illustrations from Stensen's Discours sur l'anatomie du cerveau (1669).[1] In this mid-sagittal section of the brain the steadiness of the pineal gland is overemphasized by the presence of an imaginary ligament connecting the gland with the tentorium.*

rounded by small arteries and suspended in the ventricles (Figure 4). Although Stensen admired Descartes' philosophical method, his careful dissection neatly demonstrated the anatomic errors of Descartes on pineal gland, finally solving the "most famous anatomic dispute which this age has produced" (Figure 5). In broader terms, this helped to separate science and medicine from the realm of philosophy:

> *Such of Descartes' friends who look upon his man only as a machine, will be so good as to believe that I do not believe here speak against his machine, the contrivance of which I have admired; but as for those who pretend to demonstrate that Descartes's man is made like other men; anatomic observations may easily convince them that this is a fruitless attempt.*[1]

According to Stensen, brain research had been hampered by methodological difficulties in brain dissection and by slavish adherence to the dogmas of ancient scientific authorities. The correct dissection should be performed with the brain still in the skull to carefully describe the anatomy without damage to the delicate nervous structures. Stensen identified two main mistakes of neuroanatomic research in the 17th century: errors in dissection and errors in anatomic illustrations. He was aware that the brain is so soft that it could be molded by the anatomist to accord with traditional anatomic conceptions:

> *Dissections or preparations being liable to so many mistakes, and anatomists having hitherto too readily formed systems, and molded these soft parts in the manner that was most agreeable to each, we cannot be surprised to find so little exactness in their figures. But this want of accuracy in the figures is not owing to bad dissections only. The ignorance of drawers has contributed very much, and the difficulty of expressing the several eminences and depressions of the parts, and of understanding what the anatomists chiefly insist upon, furnishes them with a never failing excuse.*[1]

In this context Stensen criticized the anatomic illustrations produced by Christopher Wren for Thomas Willis's 1664 book *Cerebri Anatome* (The Anatomy of the Brain).[16] Stensen pointed out that the pineal gland was shown to be round instead of conical, that the cross section of corpus striatum showed an inaccurate configuration, and that the pons Varolii was overelongated (Figure 6). In addition, he criticized Willis's system and his effort toward early cerebral localization. In fact, Willis located "sensus communis" in the corpus striatum, imagination in the corpus callosum, and memory in the cortex.[18] The new experimental approach of Stensen established a break with speculative schemes inherited from the authorities of the past. He believed that, because the normal cerebral anatomy was poorly investigated, there were insufficient data to describe the functions of specific parts of the brain:

> *I have hitherto said nothing of the uses of the parts nor of the animal actions, as they are called, because it is impossible to explain the movements of a machine, till we know the contrivance of his parts.*[1]

Stensen proposed a number of planned investigations to understand the nervous system. He suggested studying the comparative anatomy and the embryology of the nervous system in animals to acquire information in a more intelligible state than in adult humans. He also proposed studying selective effects of different diseases on the brain to gain insight on brain function. Finally, he outlined the importance of experiments on living animals to investigate the effects of different drugs on the brain.

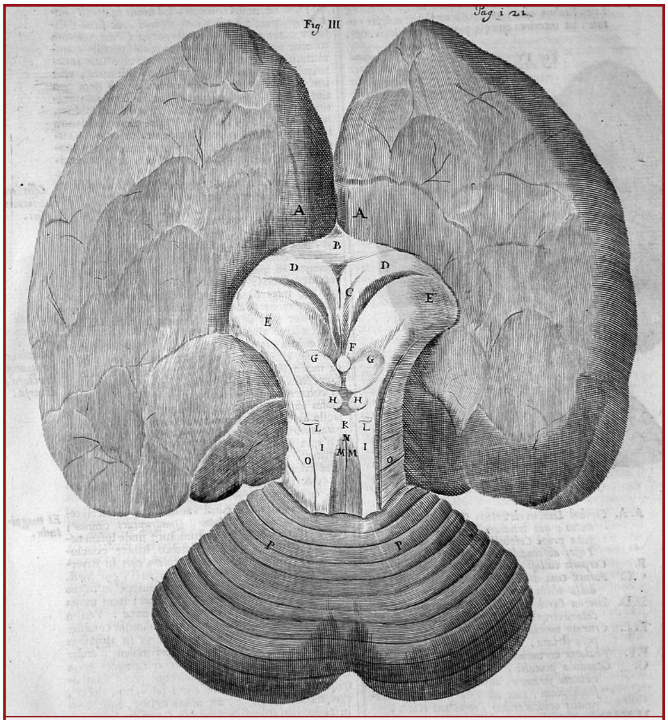


FIGURE 6. *Illustration, by Sir Christopher Wren, of the dorsal view of the brain from the Cerebri Anatome, 1664.*[18] *Stensen criticized the anatomic illustrations produced by Christopher Wren because they were not accurate and were very simplified. Stensen wrote: "In the third figure he represents the superior or pineal gland like a round ball; and consequently according to this figure, the apex of that gland cannot be said to be turned either forward or backward."*

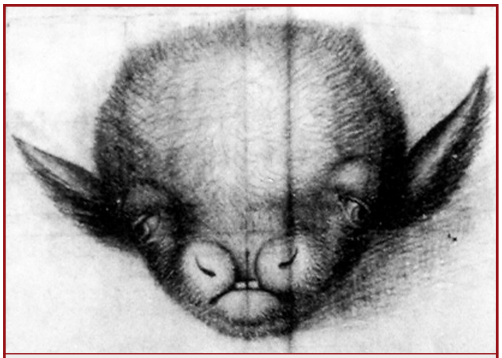


FIGURE 7. *Picture of hydrocephalic calf drawn by the Archduchess Anna in a letter to her brother. Florence, Archivio di Stato.*

The Dissection of a Hydrocephalic Calf

Early in the 17th century the study of ventricular anatomy was still associated with the search for the seat of the soul.[13] According to Galen's theory, vital spirits were filtered through the rete mirabilis, a vascular network at the base of the brain, with the resultant formation of animal spirit or soul, which was located in the ventricular system. Galen's physiology considered cerebral respiration as an active process with air inspired into the ventricles and waste products (pituita) leaving the brain through the pituitary gland.[11]

In the 17th century, renewed interest in the anatomy of the ventricles and hydrocephalus was supported by the scientific investigations and writings by Marco Aurelio Severino (1580-1656), Thomas Bartholin, and Paul Barbette (1620-1666). Most of these studies consisted of clinical descriptions of pediatric cases of hydrocephalus. In 1669, Stensen dissected a monstrous calf with obstructive hydrocephalus caused by a cystic tumor originating near the optic chiasm (Figure 7). The scientific letter describing this dissection, *De vitulo hydrocephalo epistola* (Letter on a Calf with Hydrocephalus) was published by Thomas Bartolin in *Acta Medica et Philosophica Hafniensia* in 1673, and represents the first pathophysiological explanation for the development of hydrocephalus.[4,9-11] Stensen clearly described the pathological anatomy of the hydrocephalic calf including the agenesis of corpus callosum and pointed out the effects of intracranial hypertension on the ventricular walls and cerebral sulci.

> *Although the lateral parts* (the hemispheres) *should be normally have their extremity folded inwards, over the second pair of tubercles* (lateral geniculate bodies) *they were completely unfolded. Although they should have been united in the midline to the median parts called the corpus callosum, the septum pellucidum, and the fornix, they were fully separated so that the falx, which is normally situated outside the cavity, protruded within the cavity and impeded the extremities of the lateral parts of the brain from reaching each other less.*
>
> *. . . Although there should normally have been two cavities in the lateral parts of the brain, and additionally a third cavity according to the teaching of the Ancients, this entire space was opened into a single cavity. The cerebral substance in the lateral parts, which is otherwise rather thick, had been thinned here by the water pressure . . .*
>
> *. . . And as a result of the volume of water, the convolutions in the brain, which normally appear as rather numerous and deep, had all disappeared* (Figure 8).[10]

Stensen was able to extract from this specimen four pounds of "water with the same color and taste as that which usually enters the cavities of the brain in healthy animals."[10] He suggested that such ventricular dilatation "could not have occurred unless the bones of the skull had given way."[10] He explained the spectacular enlargement of the lateral ventricles in contrast to the third ventricle suggesting "the water had exerted its force where it encountered the least resistance."[10]

Against the belief that the pituitary gland played a central role in eliminating the phlegm, Stensen showed that the hypophysis presented a normal aspect despite the hydrocephalus:

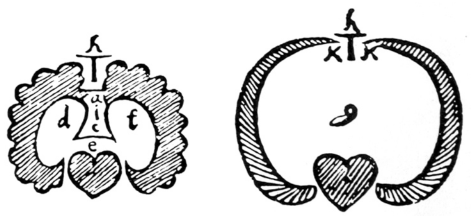


FIGURE 8. *Illustrations from De vitulo hydrocephalo epistola of Niels Stensen (1673). Left, Coronal section of normal brain disclosing a simplified view of the ventricular system. Right, Coronal section of the hydrocephalic calf showing agenesis of corpus callosum, ventricular dilatation, and flattening of cerebral sulci. a, Corpus callosum; i, septum pellucidum; c, fornix; h, falx cerebri; kk, medial surface of cerebral hemispheres; d and t, lateral ventricles; e, third ventricle; g, hydrocephalic ventricular system.*

> *. . . The lower small gland* (pituitary gland) (*assigned by the majority of anatomists to the absorption of the liquid of the brain) was found totally unaltered here as far as the variety of its colors, its magnitude, and the cavity visible inside the gland are concerned, even though it floated in a copious amount of this serous liquid.*[10]

Although in the 17th century the dynamics of cerebrospinal fluid were poorly understood, Stensen suggested that the cystic tumor caused ventricular dilatation by obstructing the normal outflow of fluid: ". . . (The cyst) by closing the exit of the water and by retaining this in the brain, was the cause of the swelling of the head."[10]

Pathological evidence from the hydrocephalic calf was used as an early attempt to provide insight on cerebral localization:

> *That the union of the lateral parts of the brain through the corpus callosum, the septum pellucidum and the fornix is not absolutely necessary for the animal's feeling and movement, since this animal has lived many weeks without them. Thus, those who build a part of their teaching of the brain on this union can find reason from this case to question this doctrine.*[10]

Final Years

In 1672 Stensen accepted the position of royal anatomist in Copenhagen where he ended his scientific career. After his return to Florence in 1674 he became a priest and in 1677 was appointed apostolic vicar of northern missions and titular bishop of Titiopolis by Pope Innocent XI.[19] Stensen spent his last years traveling continuously in an attempt to bring back northern Europe to Catholicism. He lived in self-inflicted poverty and died at Schwerin in 1686. His body was buried in the Church of San Lorenzo, Florence. In 1988, Stensen was beatified by Pope John Paul II and made Saint patron of scientists. To honor Niels Stensen, in northern Germany, many student homes in university cities are named after him, as well as churches and other institutions in the past 20 years since his beatification.

CONCLUSION

Niels Stensen was one of the foremost Danish scientists: a great anatomist, a pioneer in neuroscience, and the founder of paleontology, geology, and mineralogy. Through rigorous and objective observations, he reached scientific conclusions still valid today. Although not a physician himself, Stensen contributed enormously to the birth of a scientific method in medicine. The inaugural lesson at the anatomic theater in Copenhagen in 1673 coincided with the end of his scientific career and represents his spiritual legacy:

> *Pulchra sunt quae videntur, pulchriora quae sciuntur, longe pulcherrima quae ignorantur"*
>
> [*Fair is what we see, fairer what we have perceived, fairest is what is still in veil.*]

Disclosure

The authors have no personal financial or institutional interest in any of the drugs, materials, or devices described in this article.

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COMMENTS

This is an excellent article about one of the least known works on neuroanatomy in the 17th century. It is one that is extremely important because of its insistence on careful observation rather than preconceived theories of structure and function. The criticisms that Steno brings against Descartes and Willis are well taken. In many ways this is a 17th century basic science work on neuroanatomy, while the better known publication of Thomas Willis gains much of its reputation and strength from the clinical correlations that Willis presents. As a practicing physician, Willis was in a better position than Steno to make these connections.

The original work published in 1669 is extremely rare. It small format and 60 pages of text contribute to its scarcity. The facsimile cited in the bibliography of this article offers the modern reader an excellent opportunity to become familiar with this seminal work.

Eugene S. Flamm
Bronx, New York

Niels Stenson is not an individual that would come readily to mind to most neurosurgeons and neuroscientists. His research and writing efforts in the neurosciences have clearly been lost in a historical cloud, so the authors are to be congratulated for taking the time to rectify this situation. I have had a facsimile edition of Stenson's work on the brain from an early Congress meeting but really did not look at it in any detail. This article encouraged me to go back and look at his writings, in particular, the essay on the hydrocephalic calf. I recently completed a historical chapter on hydrocephalus and only wish I had been able to include this historical vignette in the chapter, but alas it is too late to do so. A common theme in the 17th century was to be a polyglot and immerse oneself in a number of different subjects, be they literature, science, or religion or other subjects. As a result this gentleman became a pioneer in the studies involving paleontology, geology, and mineralogy. Steno clearly assumed this educational directive and pursued a number of interesting projects. In reviewing the giants that he studied under, including La Böe, Sylvius, Swammerdam, Ruysch, de Graaf, and many others, he clearly sought out the best in educators and used it to his full advantage. His anatomical research has been documented well and Stensen's duct still remains a part of our anatomical literature. His brilliant revelation that muscles contract by shorting of the fibers was truly brilliant. Unfortunately his anatomical essay on the brain, given as a lecture in Paris, has been lost in the historical archives and clearly is not an eminent subject to the modern scholar.

As a pediatric neurosurgeon I was particularly interested in his anatomical dissection of a hydrocephalic calf with an enormous head. This writing is clearly one of the earliest pathophysiological studies on a case of hydrocephalus. One must also clearly realize that this work was done before the seminal work of D. Cotugno who was the first to clearly describe cerebrospinal fluid and its origin. Stenson not only described the hydrocephalus but also clearly details the cystic tumor near the optic chiasm that was leading to the fluid obstruction. He clearly noted the associated agenesis of the corpus callosum along with the dilated ventricle effect on the brain, eg, the thinning of the cortical mantle. In this study we find one of the first clearly illustrated and documented cases of intracranial hypertension that he felt was due to obstructing of the cerebrospinal fluid flow.

In reviewing Stenson's writings on brain anatomy the authors provide a vivid view of his contemporary criticisms of contemporary writers for accepting earlier errors of writers, in particular, those of Galen and his followers. Stenson did not stop there, because he went onto provide a new way of dissecting the human brain, a way to better delineate the white matter tracts and nuclei — this "fiber" dissection provided a revolutionary view of the brain's underlying anatomy. He was also clearly not faint of heart as he took on one of the leading philosophers, Rene Descartes, and challenged his view of the pineal gland as being the seat of the soul, clearly an error and he pointed out in his challenge why. An if that was not enough he took on Thomas Willis and Christopher Wren for their anatomical descriptions in Willis' great book on cerebral anatomy—descriptions that he felt were in error or, at the very least, insufficient data were available to document their observations. With such little understanding of the functions of specific parts of the brain Stenson felt that Willis and Wren had clearly overstepped rational bounds.

With all this wonderful research, amazingly sanguine ideas, and a natural skill at scientific investigation one wonders why he ended up an itinerant traveling titular bishop in poverty trying to bring Catholicism to the heathens of Europe. Even more amazing is that a recent pope considered his efforts so important he has recently become beatified and is now recognized as our patron saint of scientists.

James Tait Goodrich
Bronx, New York