

Early depictions of the nasal turbinates in the 15th century*

Wolfgang Pirsig

Ulm, Germany

SUMMARY

Although nasal turbinates had already been described by Hippocrates, it was not until the 15th century that they were depicted. The inferior turbinate was shown for the first time rather true-to nature in the works of the Middle Rhenic Master circa 1450-1460 and Leonardo da Vinci in 1489. The posterior ends of the middle turbinates were depicted on a woodcut by Georg Thomas for Dryander's "Anatomiae...pars prior" in 1536. These and a few other examples show that some artists were ahead of the medical profession in demonstrating anatomical details in the 15th and 16th century.

Key words: nasal turbinate, history, art, painter

Although nasal turbinates had been observed by Hippocrates long before the Renaissance, by the end of the 15th century there was still no medical illustration depicting nasal turbinates, either totally or partially. By that time, however, these structures had been depicted in the work of two painters, the Middle Rhenic Master and Leonardo da Vinci.

An oil painting on a wooden panel (137 x 108 cm) in the collection of the Institute of Arts "Das Städel" in Frankfurt/Main shows the Crucifixion with Mary, John the Baptist, and four angels on a gold ground (Anonymous, 1987). It was painted around 1450/1460 by the Middle Rhenic Master for the chapel of the orphanage in Frankfurt/M. Lying between Mary's shoes



Figure 1. Skull, detail of 'Crucifixion', 1450/60 (photograph by the author).

and the base of the cross is a skull without mandible, shown in three-quarter view and embedded in the leaves of plants (Figure 1). The skull is depicted in a very naturalistic manner, whereby the viewer can look into the anterior nasal cavities

through the piriform aperture. Medially, we recognize the anterior nasal spine and the furrow between the premaxillary wings. At the left lateral nasal wall, the bony head of the inferior turbinate and even the prominentia lacrimalis are visible (Figure 2). According to Dr. Stephan Kemperdick, art historian at "Das Städel", the detailed and exact observation of the nasal



Figure 2. Detail of Figure 1 showing the left inferior anatomy by the inferior turbinate.

Middle Rhenic Master was probably influenced by the work of two other painters: Jan van Eyck (1390 - 1441), from Ghent, and, in particular, Stephan Lochner (ca. 1410 - 1452), working in Cologne. Dr. Kemperdick emphasizes that the naturalism of this painted skull was unique at the time. Its accuracy even surpasses the depictions of skulls by leading contemporary Dutch painters such as Rogier van der Weyden or Petrus Christus.

Among the outstanding illustrations that Leonardo da Vinci (1452 - 1519) made of the human body, there are two drawings from 1489 that show the inferior nasal turbinate. In his draw-

ing 'Sagittal section of skull' (Clark 19057r/FB 40 r), we see the right half of the skull where the nasal floor, the lateral nasal wall with the inferior turbinate, the frontal base, and the frontal sinus are clearly depicted (Figure 3, bottom). Leonardo's comment in mirror-writing on the left-hand side of the drawing does not mention the inferior turbinate: "Where the line a m, intersects the line c b, will be the confluence of all senses; ... understand the whole."



Figure 3. Drawing by da Vinci, 1489 (Clark 19057r; from O'Malley, 1952).

In his drawing 'Anterior view of skull with frontal and maxillary sinus exposed' (Clark 19058v/FB 41v), the maxillary and frontal sinuses, the nasal cavity, and the roots of teeth in the upper and lower jaw have been exposed on the right half of the specimen (Figure 4). Besides the foramen of the right infraorbital nerve in the orbital floor and the nasolacrimal duct, the drawing also shows part of the inferior turbinate and the right incisive foramen in the nasal floor. Again, Leonardo's comment does not mention these anatomical details: "The cavity of the orbit and the cavity of the bone which supports the cheek, and that of the nose and of the mouth, are of equal depth and terminate in a perpendicular line below the sensus communis; and each of these cavities is as long as the third part of a man's face, that is from the chin to the hair." (English



Figure 4. Drawing by da Vinci, 1489 (Clark 19058v; from O'Malley, 1952).

translation from O'Malley & Saunders, 1952). On the left half of the skull, the drawing shows, in precise detail, the supraorbital and the supratrochlear foramina, the foramina nutricia of

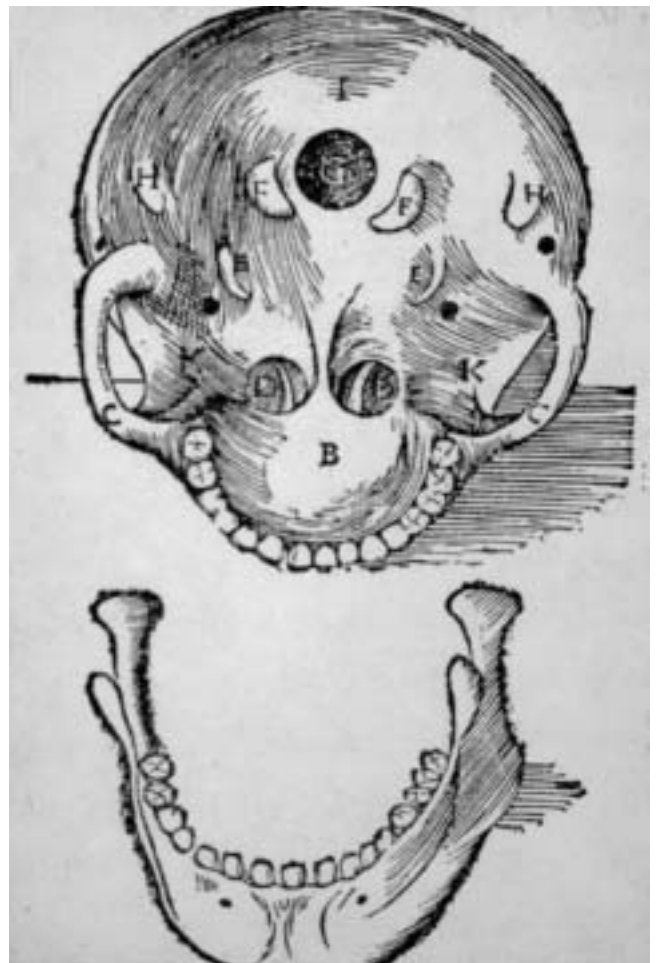


Figure 5. Woodcut by Georg Thomas, 1536 (from Herrlinger, 1981).

the nasal bone, the superior and inferior orbital fissures, as well as the infraorbital and mental foramina!

It was not until 1536 that a woodcut was made – by Georg Thomas of Basel – depicting the posterior ends of the middle turbinates in a skull (Figure 5). This print appeared in Johannes Dryander’s “Anatomiae, hoc est corporis ... pars prior” in 1537. This view of the base of the skull allows one to look into the nasal choanae. It is very schematic, though, and of poor quality in comparison with Leonardo’s true-to-nature anatomical details. Georg Thomas depicted neither the sutura palatina mediana nor the incisive foramen.



Figure 6. ‘Skull of a man and dog’ from “Fabrica”, 1543 (from Singer, 1957).

The figures of Vesalius’ “e Humani Corporis Fabrica libri septem” (Basel 1543) are outstanding in their artistic conception and much better in distinguishing anatomical details of the skeleton. These drawings have been attributed with relatively great certainty to Jan Stevens of Kalkar (1499-1546/50), who was a student of Tiziano Vecellio (1477/1480-1576). With equal certainty, however, it is generally accepted that Andreas Vesalius (1514-1564) himself would have made some of the drawings for the “Fabrica,” either totally or partially (Van Hee, 2000). As for the nasal turbinates, not much can be found in the illustrations of the “Fabrica”. The woodcut ‘Skull of a man and dog’ (Fabrica Liber I) clearly depicts the anterior nasal spine and the premaxillary wings, while only the very anterior part of the right inferior turbinate can be recognized (Figure 6). Incidentally, Vesalius used this figure to demonstrate that the human skull has no separate premaxillary bone and that in this respect it differs from that of the dog (Singer, 1957).

At the end of this historical vignette, we turn to Giulio Casserio (1561? -1616), the anatomist who gave the turbinates their present name in his work “Pentaesthesia h.e. de quinque sensibus liber” (1610). As Casserio says in “de turbinatibus ossibus,” “There are, hidden in the depths of the nostrils oblong little bones which may be called spongy, and seem like the steps of a ladder, because one is placed over the

other. ‘Cuculla,’ some call them I know not through what comparison, unless perchance they wish to liken the two superior to a hood which, however, I would rather compare to the Concha Veneris. Hippocrates not inaptly calls them sleeves (manica). Turbines I would call them from their form and function, and I always use this term in humans.” (This English translation is taken from Wright, 1914.)

Casserio then describes the turbinates in cattle, the horse, sheep, the hare, the cat, and the dog, referring to these structures as bones, not cartilages as others had done. He notes that they originate from the lateral nasal wall, emphasizing that the turbinated bones (turbinata ossa) are always found in sets of three on both sides. Unlike the inferior turbinate, the two other turbinates are hollow. All of them are spongy and fragile. It was not until the 18th century that a more detailed and more exact description and depiction was made available by Albrecht von Haller in his “Icones anatomicae” (1743 – 1756).

Studying the early depictions of a cleft lip, we could show that it was late Gothic and Renaissance artists who depicted the conspicuous signs of surgically treated patients with cleft lip more than 130 years before the surgeons illustrated such cases (Pirsig et al., 2001). In the same period – that is, between 1450/60, when the Middle Rhenic Master created the ‘Crucifixion’, and 1536, when Georg Thomas illustrated Dryander’s “Anatomiae” – there was also a long stretch of time in which some artists were ahead of the medical profession in depicting anatomical details of the nasal turbinates.

REFERENCES

1. Anonymous (1987) Städelsches Kunstinstitut und Städtische Galerie: Verzeichnis der Gemälde. Frankfurt am Main.
2. Dryander J (1537) Anatomiae, hoc est corporis....pars prior. Eucharium Cervicornus, Marpurgi.
3. Herrlinger R (1981) Geschichte der medizinischen Abbildung I. Antike bis um 1600. 4th ed. Heinz Moos Verlag, München.
4. Kemperdick S (2001) Personal communication.
5. O’Malley CD, Saunders JbdeCM (1952) Leonardo da Vinci on the human body. Henry Schuman, New York.
6. Pirsig W, Haase S, Palm F (2001) Surgically repaired cleft lips depicted in paintings of the late Gothic period and the Renaissance. Brit J Oral Maxillofac Surg 39: 127-133.
7. Singer Ch (1957) A short history of anatomy & physiology from the Greeks to Harvey (The Evolution of Anatomy). Dover Publications, New York.
8. Van Hee R (2000) Andreas Vesalius and his pupils: The breakthrough of anatomy. In R van Hee (Ed.) Emperor Charles V and Medicine. Academia Press Scientific Publisher, Ghent, pp.37-62.
9. Wright J (1914) A History of Laryngology and Rhinology. 2nd ed. Lea & Febinger, Philadelphia and New York.

Wolfgang Pirsig
Mozartstrasse 22/1
D-89075 Ulm
Germany