

## ANDREAS VESALIUS' CORPSES

### KADAVERI ANDRIJE VEZALA

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#### SUMMARY

*Judging from his writings, Andreas Vesalius must have had dozens of bodies at his disposal, thirteen of which were definitely from before 1543. They came from cemeteries, places of execution or hospitals. Not only did his students help him obtain the bodies, but also public and judicial authorities. At first, he used the corpses for his own learning purposes, and later to teach his students and to write *De humani corporis fabrica*, his principal work. Clearly he had an eye for comparative anatomy. He observed anatomical variants and studied foetal anatomy. Occasionally, he would dissect a body to study physiological processes, while the post-mortems on the bodies brought in by the families of the deceased gave him an insight into human pathology. Some of his dissection reports have been preserved.*

**Key words:** History of medicine; 16<sup>th</sup> century; anatomy; pathology; corpses; Andreas Vesalius; *Fabrica*.

To become the founder of modern anatomy, Andreas Vesalius (Brussels, 31 December 1514 - Zakynthos, 15 October 1564) must have had access to a large quantity of human remains in the broadest sense of the term. These constituted his source of data and his study material. At first, he used these remains to learn, and, when his knowledge reached an unprecedented level,

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to teach as professor of surgery and anatomy at the University of Padua and write his *magnum opus*, *De humani corporis fabrica* (Basel: Oporinus, 1543), commonly known by its abbreviated title *Fabrica*. This masterpiece saw three editions in his lifetime (Basel, 1543; Lyon, 1552; Basel, 1555), and there was a planned fourth edition, as is proven by a recently discovered copy of a *Fabrica* 1555, personally annotated by Vesalius himself<sup>1</sup>. Even today, *Fabrica* is regularly reproduced and has been translated in several languages and printed in luxury editions for bibliophiles.

The illustrations alone suggest that Vesalius used numerous, carefully prepared models. In addition, we forget all too easily that Vesalius was in the first place a doctor by training and that he actually did practise his profession. When making his anatomical observations, he took every opportunity to add to his own knowledge in this area. As, according to many, Vesalius was the first to descend from his *cathedra* to take the knife in his hand, he was able to spot many clinical or pathological changes in the body that would have otherwise remained unobserved. In this article we focus on the living people that those corpses once were, and on the medical observations he made.

After his studies at the *Pedagogium Castris* in Leuven (Louvain), Vesalius studied medicine in Paris from 1533 to 1536. There he paid regular visits to the famous *Saints-Innocents* cemetery in order to perfect his knowledge of osteology by studying exhumed bones. It was there that he made the discovery, sensational at the time, that the human lower jaw consists of a single bone in contrast to ‘other animals’. Vesalius however admitted that this observation was first made by a Roman, Aulus Cornelius Celsus (ca. 25 acn – 37 pcn) in his *De Medicina*<sup>2</sup>. Much later a medieval Arab physician Abd al-Latif al-Bagdadi (1162-1231) observed the same<sup>3</sup>. In Paris, Vesalius also visited the gallows

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<sup>1</sup> In this paper references to *Fabrica* give the year of publication, book, chapter, and page number; as a consequence of errors in the pagination in the 1543 *Fabrica*, the page that is repeated is followed by ‘bis’. For the editions see Harvey Cushing, *A Bio-Bibliography of Andreas Vesalius* (New York: Schuman’s), 1943; see pp. 79-92. Also Vivian Nutton, “Vesalius Revisited. His Annotations to the 1555 *Fabrica*”, *Medical History*, 2012, 56 (no. 4): 415-443. — All translations from the Latin are our own.

<sup>2</sup> Andreas Vesalius, *De humani corporis fabrica libri septem* (Basel: Oporinus), 1543, p. 44. Also A. Corn. Celsus, *De medicina libri octo* (Lugduni Batavorum: Joh. Arn. Langerak), 1730, p. 501. See also Maurits Biesbrouck, “Vesalius en het Cimetière des Saints Innocents te Parijs of de ontdekking dat de kinsymfyse bij de mens ontbreekt,” [Vesalius and the Cimetière des Saints Innocents in Paris, or the discovery that there is no mandibular symphysis in humans] *Acta Belgica Historiae Medicinae*, 1996, 9: 32-37, ill.

<sup>3</sup> Emile Savage-Smith, “Medicine”, Rashed, Roshdi (ed.), *Encyclopedia of the History of Arabic Science*, 1996, 3: 903-962. Also Nancy G. Siraisi, *Avicenna in Renaissance Italy*, Princeton, NJ: Princeton University Press, 1987, pp. 66-77.

mound on Montfaucon, where he once had to run for his life from a pack of wild dogs<sup>4</sup>. He recounts how he was forced to make these trips because anatomy lessons were inadequate.

In the autumn of 1536, he was back in Brussels where he conducted a private autopsy on the body of a girl from the retinue of the Duchess of Egmont to determine the cause of death. The family suspected that she had been poisoned, but Vesalius found a severe constriction of the abdominal organs and thorax caused by a corset that had been fastened far too tightly, in keeping with the fashion of the day. This is when he saw the so-called *corpus luteum* on her ovaries for the first time<sup>5</sup>.

Soon afterwards, on the gallows mound in Leuven he came across the cadaver of an executed criminal, most of whose flesh had rotted away. Together with his friend Gemma Frisius (later professor of mathematics and medicine and the teacher of Gerard Mercator) he took the corpse from the gallows and smuggled it in through the city gates (Fig. 1)<sup>6</sup>. It took him considerable time and trouble to remove the remaining

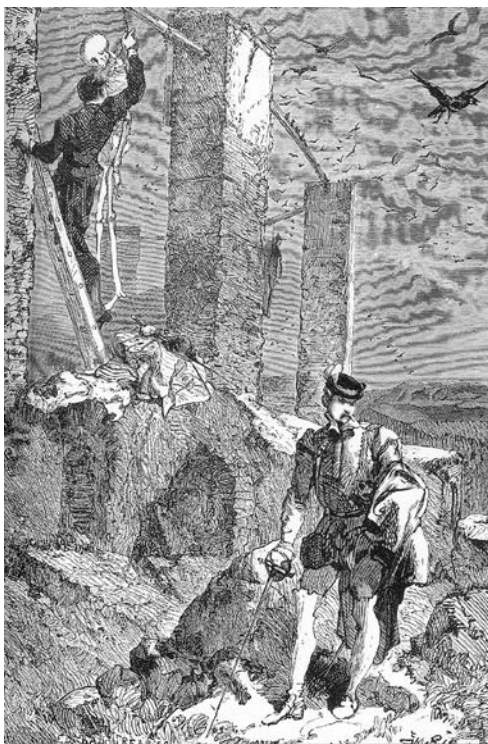


Figure 1 - Vesalius steals a body together with Gemma Frisius (etching by E. Morin, source: L. Figuiet, *Vies des savants illustres*, Paris: Hachette, 1870)

*Slika 1. Andrija Vesal krade kadaver s Gemmom Frisiusom (bakrorez E. Morina. Preuzeto iz: L. Figuiet, Vies des savants illustres, Paris: Hachette, 1870.)*

<sup>4</sup> Andreas Vesalius, *Epistola, rationem modumque propinandi radices Chynae decocti, ... pertractans* (Basel: Oporinus), 1546, see p. 194. Also Maurits Biesbrouck, "Het Parijse kerkhof les Saints-Innocents en Andreas Vesalius," [The Parisian Cemetery of the Innocents and Andreas Vesalius] *A. Vesalius Tijdschrift*, KULeuven Faculty of Medicine – Continuing Training, 2012, 24 (no. 2): 74-81, ill.

<sup>5</sup> Andreas Vesalius, *Epistola radices Chynae decocti*, see p. 141. Also Idem, *De humani corporis fabrica libri septem* (Basel: Oporinus), 1555; see p. 658.

<sup>6</sup> *Fabrica* 1543, I, 39, pp. 161-162.

flesh, which had become tough, by patiently boiling the bones and to collect a number of missing skeletal parts from the bodies of other executed criminals. He then assembled a skeleton using a new method of his own devising, which was far cleaner and displayed the osteological details of the bones far better than the methods that had previously been used<sup>7</sup>. To avoid any trouble, he claimed that he had brought the skeleton with him from Paris and gave it to Ghysbrecht Colen (Gisbertus Carbo), another friend from the student days in Leuven<sup>8</sup>. In Leuven he also had the opportunity to hold various public autopsies, with the support of Adrianus Blehenius, the Mayor of Leuven<sup>9</sup>.

In the spring of 1537, he travelled to Padua, probably via Basel, where he arranged for the publication of the second edition of his first work *Paraphrasis in nonum librum Rhazae* with Robert Winter. This work may be regarded as a bachelor's thesis *avant la lettre*. Only from the end of the 16<sup>th</sup> century onwards did students have to write a thesis on a regular basis. Its subject was the pathology and treatment of the sick<sup>10</sup>. After attaining the degree of doctor in Padua in December of that same year, he was given a teaching post in surgery, which also involved teaching anatomy. For the benefit of his students, he almost immediately started with the dissection of an eighteen-year-old man, which lasted several weeks. When it was over, he cleaned the bones and assembled the skeleton, which was used by Johan Stephen von Calcar as the basis for his three skeleton drawings for the *Tabulae anatomicae sex* that Vesalius published with Bernardus in Venice in April 1538 (Fig. 2)<sup>11</sup>.

<sup>7</sup> *Fabrica* 1543, Book I, Chapter 39: *Quo artificio humani corporis ossa et cartilagine inspectioni praeparantur* (on skeletology). For his technique see Régis Olry, "Andreas Vesalius on the Preparation of Osteological Specimens", *Journal of the International Society for Plastination*, 1998, 13 (no. 2): 8-12, ill.; and Monique Kornell, "Vesalius' method of articulating the skeleton and a drawing in the collection of the Wellcome library", *Medical History*, 2000, 44: 97-110, ill. Also Maurits Biesbrouck and Omer Steeno, "Leuven: Birthplace of Modern Skeletology, thanks to Andreas Vesalius, with the Help of Gemma Frisius, his Friend and Fellow-physician", *Acta Chirurgica Belgica*, 2012, 112: 89-105, ill.

<sup>8</sup> Omer Steeno and Maurits Biesbrouck, "Ghysbrecht Colen, alias Gisbertus Carbo, een Leuvense vriend van Andreas Vesalius," Luc Missotten (ed.), *Omtrent Andreas Vesalius*, Antwerpen-Apeldoorn, Garant, 2007, pp. 21-40, ill.; also Idem, "Ghysbrecht Colen, alias Gisbertus Carbo, Andreas Vesalius's friend from Leuven (Louvain)," *Acta Internationalia Historiae Medicinae - Vesalius*, 2007, 13 (no. 2): 75-76, ill.

<sup>9</sup> The Mayor of Leuven (from 1530 Adriaan van Blehen or Adrianus Blehenius) made 'any corpse whatsoever' available to Vesalius for that purpose. *Fabrica* 1543, p. 162 and *praefatio* 3r.

<sup>10</sup> Maurits Biesbrouck and Omer Steeno, "Het presentexemplaar van Andreas Vesalius' *Paraphrasis* (1537) voor zijn Leuvense vriend Rutgerus Giffeus," [The copy of Andreas Vesalius' *Paraphrasis* (1537) presented to his Leuven friend Rutgerus Giffeus] *de Gulden Passer*, 2012, 90 (no. 1): 75-87, ill.

<sup>11</sup> Charles Joseph Singer and Coleman Berley Rabin, *A prelude to modern science, being a discussion of the history, sources, and circumstances of the "Tabulae anatomicae sex" of Vesalius*,

All that we know about the preparation of his *Fabrica* are details scattered all over his works. But even a superficial knowledge of his principal work is enough to understand that it took an immense amount of dissection to produce it. At first, Vesalius was sparing in his use of corpses, as they did not come cheap. Dissections took place during cold winter months, as no preservatives were available at that time. The most perishable parts were dealt with first: the stomach, the thoracic cavity, and the cranial cavity, in that order. Only then did the muscles follow, and finally the bones<sup>12</sup>. When dissections were completed, the bones were usually cleaned to assemble a skeleton. In addition to the Leuven skeleton and the one constructed in Padua, there is evidence of at least five other skeletons that are his handiwork, but there were probably more, and not all human<sup>13</sup>. In the winter of 1539-40, during a guest lecture in Bologna at the invitation of professor Johannes Andreas Albius, he skeletonised the body of a French priest with an abnormal spleen, and he definitely had three more corpses at his disposal on this occasion<sup>14</sup>. For the sake of comparison, he assembled the skeleton of an ape.

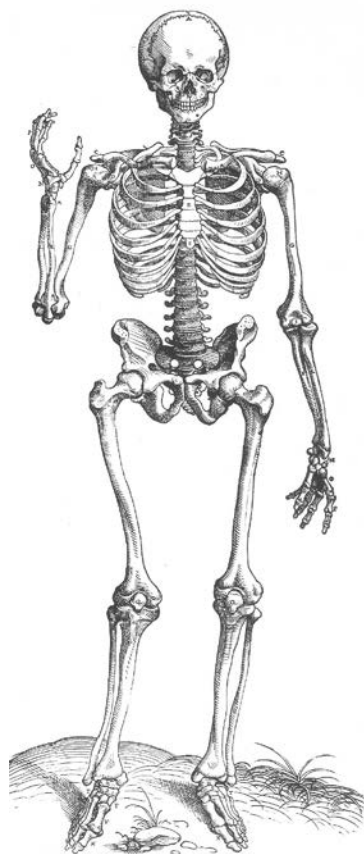


Figure 2 - Skeleton of an eighteen-year-old boy (Vesalius, *Tabulae anatomicae sex*)

*Slika 2. Kostur osamnaestogodišnjaka (Vezal, Tabulae anatomicae sex)*

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Cambridge University Press, Publications for the Wellcome Historical Medical Museum at the University Press, New Series No. 1, 1946, 58 pp. Also Jacqueline Vons, "Un atlas anatomique à la Renaissance: Les *Tabulae anatomicae sex* d'André Vésale," *Microscop*, 2010, 61: 14-15, ill.

<sup>12</sup> The order was not always the same, and Vesalius often used a different body for the different organ systems, but if corpses were scarce he sometimes had to demonstrate everything on the same corpse. In his 1543 *Fabrica*, Book V, Chapter 19, Vesalius explains how he proceeded in such cases.

<sup>13</sup> Maurits Biesbrouck and Omer Steeno, "Leuven: Birthplace of Modern Skeletology, thanks to Andreas Vesalius, with the Help of Gemma Frisius, his Friend and Fellow-physician," *Acta Chirurgica Belgica*, 2012, 112: 89-105, ill.

<sup>14</sup> *Fabrica* 1543, I, 17, p. 78 and V, 9, p. 512.

During his professorship in Padua he also constructed the skeleton of a six-year-old girl<sup>15</sup>. Later on, when he was in Basel to oversee the printing of his *Fabrica* by Oporinus, he put together the skeleton of Jacob Karrer, who had been beheaded for the attempted murder of his wife after she had caught him committing adultery. The skeleton is still displayed at the *Vesalianum* in Basel and is the only existing specimen put together by Vesalius<sup>16</sup>. After the publication, he constructed two more skeletons in Pisa in the early 1544, one from the corpse of a thirty-six-year-old nun and the other from a deformed seventeen-year-old girl who had been taken from the cemetery by students<sup>17</sup>.

When his reputation grew and he got to know influential people, Vesalius succeeded in convincing magistrates to delay the execution of a convicted criminal until a suitable moment, to ensure that the body would be fresh when it came into his hands. As Stéphane Velut (Université François Rabelais, Tours) pointed out in his remarkable lecture<sup>18</sup>, Vesalius would have needed several dozen heads just for a fairly short book on the anatomy of the brain (Fig. 3). Velut also pointed out how important it was to obtain the heads



Figure 3 - One of the many men's heads for Vesalius' anatomical study of the brain (*Fabrica* 1543, Book VII, Figure 12)

Slika 3. Jedna od mnogih glava muškaraca za Vesalova anatomska istraživanja mozga (*Fabrica* iz 1543., Knjiga VII., slika 12.)

<sup>15</sup> Andreas Vesalius, *Epistola radices Chynae decocti*, p. 202.

<sup>16</sup> Gerhard Wolf-Heidegger, "Vesals Basler Skeletpräparat aus dem Jahre 1543," *Verhandlungen der Naturforschenden Gesellschaft in Basel*, 1944, 55: 211-234. Also Charles Donald O'Malley, *Andreas Vesalius of Brussels 1514-1564* (Berkeley and Los Angeles: University of California Press, 1964), 8°, XV-480 pp., ill.; see pp. 137-138. See also [www.youtube.com/watch?v=IoRI8eepdKE](http://www.youtube.com/watch?v=IoRI8eepdKE).

<sup>17</sup> Andreas Vesalius, *Epistola radices Chynae decocti*, pp. 203-205.

<sup>18</sup> Stéphane Velut, *Les gestes de Vésale dans la dissection de l'encéphale (Fabrica, livre VII)*, Dir. Jacqueline Vons, 51e Colloque international d'études humanistes: Pratique et pensée médicales à la Renaissance - Centre d'Etudes Supérieures de la Renaissance, Tours, Cream, Video ca. 30m, 3 July 2007; see [www.canalc2.tv/video.asp?idVideo=6840](http://www.canalc2.tv/video.asp?idVideo=6840).

immediately after death, as the brain's morphological integrity is lost very quickly once the circulation has ceased, especially when adequate means of preservation are lacking. In the last book of the 1543 edition of *Fabrica*, Vesalius recommends that the head should be removed from the body, as it is easier to handle (Fig. 4). He adds that heads of decapitated men are far more suitable for this purpose, "especially if, through the cooperation of friendly judges and prefects, you can obtain them directly after the execution so that they are only just dead." He mentions with gratitude the name of Marcantonio Contarini, whom he considers patron of the students<sup>19</sup>. His book on the muscles, on the intestines, and other books must also have required a large number of bodies. Vesalius used all possible means to improve anatomical knowledge and used animals for comparison throughout his work. The plate showing a human skull next to a dog's is the first comparative anatomical illustration in the history of medicine (Fig. 5)<sup>20</sup>. He advises his students to pay attention whenever a piece of an animal is served on the table<sup>21</sup>.

Even though anatomy was in the focus of his research, Vesalius was a doctor above everything else and



Figure 4 - Putti working on a human head. Initial capital 'D' from the *Fabrica* 1543

Slika 4. Početno veliko slovo "D" s prikazom dječaka koji reže ljudsku glavu, *Fabrica* iz 1543.



Figure 5 - The first comparative anatomical illustration. A human skull on that of a dog (Vesalius, *Fabrica*)

Slika 5. Prva anatomsko ilustracija s usporedbom ljudske i pseće lubanje (Vezal, *Fabrica*)

<sup>19</sup> *Fabrica* 1543, pp. 650-651; he is even mentioned in the index as "MARCII ANTONII CONTARINI, laus 651.1" (praise of Marcantonio Contarini). M.A. Contarini (1485-1546/8) was *podestà* of Vicenza (1523-1524) and of Padua (1539-1540) and ambassador to the court of Charles V and Pope Paul III. The *podestà* dominated the city, and to avoid abuse of power was usually appointed for one year only.

<sup>20</sup> *Fabrica* 1543, I, 9, p. 36 and I, 12, p. 47.

<sup>21</sup> *Fabrica* 1543, I, 20, p. 94 and I, 21, p. 100.

remained interested in diseases and patients throughout his life<sup>22</sup>. Whenever he had a chance, he sought to understand physiological processes and tried to explain them with anatomical and pathological observations.

*Fabrica* also provides various dissection reports. There is a reference to Vesalius' student days in Paris when, after his famous discovery of the unpaired human mandible, he wanted to conduct his first public autopsy on the corpse of a beautiful young prostitute, who had been hanged (Fig. 6). He was interested in the origins of menstrual blood. Later he continued dissecting women who had died in various ways. In Padua, his students took from the grave the body of a woman of easy virtue for public dissection. She was the lover of a monk of the order of St Anthony and had died from 'strangulation of the uterus or cerebral palsy'. They had carefully removed the entire skin in order to prevent the monk from recognising her. But the monk and the girl's parents reported to the city prefect that she had been removed from her grave. In a similar way, Vesalius later obtained the body of a very old woman for whom he believed to have died of starvation during a serious grain shortage. In Book V of



Figure 6 - The vulva, vagina, and sliced uterus of a monk's lover (Fabrica 1543, Book V, Figure 27)

Slika 6. – Vulva, vagina i presjek uterusa redovnikove ljubavnice (Fabrica iz 1543., Knjiga V., slika 27.)

<sup>22</sup> Maurits Biesbrouck, "Les éléments anatomo-cliniques dans le premier livre de la Fabrica (1543) d'André Vésale," Jacqueline Vons (ed.), *Pratique & pensée médicales à la Renaissance - Actes du 51e Colloque international d'études humanistes (Tours, 2-6 juillet 2007)*, Bibliothèque Interuniversitaire de Médecine et d'Odontologie (Paris), Paris, De Boccard Edition-Diffusion, 2009, pp. 257-272; also Idem, "Klinische elementen in het eerste boek van Vesalius' Fabrica (1543)," *Montanus Tijdingen - Collegium Medico Historicum Brugense*, 2012, 85-95, ill.



his 1543 *Fabrica*, he recounts that the last body he obtained was a woman who, claimed to be pregnant to escape hanging. By prefect's order, she was examined by several midwives and was found to have lied, after which she was hanged. Despite all his efforts, Vesalius could not find out for how long the woman had been missing her period. In her, as in all the other women who had not been pregnant, Vesalius observed that the veins of the uterus looked similar - hair-thin and barely visible - incapable of pumping blood across the thick and contracted substance of the *corpus uteri*. The only conclusion that he arrived at was that menstrual blood was eliminated via the thicker veins of the *cervix*. Vesalius acknowledges that he used her body for Figures 24 and 27 of Book V of his *Fabrica*<sup>23</sup>. The woman on the title plate also died from hanging, as the bloated face and swollen eyelids indicate. Vesalius apparently persuaded magistrate Contarini to have the execution scheduled and carried out at the time that was most convenient for him. According to O'Malley, this is the same woman (Fig. 7 and 8). Of the corpses mentioned by



Figure 7 - Detail from the title plate of the *Fabrica* 1543. Vesalius dissects the body of the woman who was condemned to death by Marcantonio Contarini

Slika 7. Detalj s naslovnice *Fabrice* iz 1543 s prikazom Vezala kako secira tijelo žene koju je Marcantonio Contarini osudio na smrt

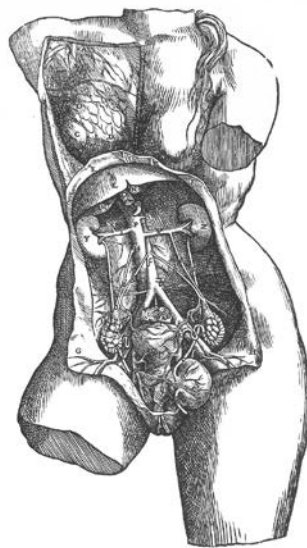


Figure 8 - A woman's torso (Vesalius, *Fabrica* 1543, Book V, Figure 25)

Slika 8. Ženski torzo (Vezal, *Fabrica* iz 1543., Knjiga V., slika 25.)

<sup>23</sup> *Fabrica* 1543, V, 15, pp. 538-539, cf. *Fabrica* 1555, V, 15, p. 663.

Vesalius in his 1543 *Fabrica*, and previously, thirteen were female, a total arrived at in O'Malley too<sup>24</sup>.

Chapter 9 of Book V deals with the spleen. In it Vesalius refers to three public autopsies. One was performed on the corpse of a resident of Padua who had been in prison for three years and died of 'black jaundice'<sup>25</sup>. Vesalius describes his unusually small spleen, which was both thinner and narrower than normal. There was fat adhering to its concave side, and it was bright white and contracted to the consistency of a very hard stone. The substance of the spleen was dry and extremely hard in this subject. The other public dissection was performed on the corpse of a criminal who was hanged in Montisseli and brought to Padua. His spleen was so enlarged that it nearly reached the size of the liver; it was attached to the front of the liver and extended over the front of the stomach. The substance of this spleen was exactly the same as in healthy people. The skin of this young man was hairless and very white, and showed no trace of 'black bile'. He had become a popular figure because of his behaviour and because he had escaped the noose as many as three times. The first time was in Venice, where he was given a flogging. Then he came to Padua, where his right eye and right hand were severed in punishment. In Montisseli he escaped from the prison, but was caught again for the last time. It was mainly because of this behaviour that he was used by the students for the dissection. In the case of a French priest in Bologna, who had died in hospital from an accumulation of water under the skin (oedemata), the spleen was white but small<sup>26</sup>. John Carman, professor of anatomy at the University of Auckland and co-translator with William Richardson of *Fabrica* into English, believes that Vesalius needed fourteen different corpses for Book V alone<sup>27</sup>.

In the chapter on the portal vein and its branches, Vesalius mentions a dissection of a patient who suffered from bleeding from the anus. His spleen

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<sup>24</sup> Charles Donald O'Malley, *Andreas Vesalius of Brussels 1514/1564* (Berkeley and Los Angeles: University of California Press), 1964, 8°, XV-480 pp., ill.; see p. 143 and p. 436 n. 7.

<sup>25</sup> 'Black bile' (L. *atra bilis*, F. *atrabile*) is no longer a physiological concept, just as 'black jaundice' is no longer a pathological entity. 'Black bile' was believed to form in the liver, just like yellow bile, and then move to the spleen, where it was rendered harmless and transported to the stomach through the branches of the portal vein. If this did not occur, it ended up in the blood and caused numerous diseases.

<sup>26</sup> *Fabrica* 1543, V, 9, pp. 511-512.

<sup>27</sup> John Burd Carman, "Preface," William Frank Richardson and John Burd Carman, *Andreas Vesalius: on the Fabric of the Human Body. A Translation of 'De Humani Corporis Fabrica Libri Septem'*. Vol. IV: Book V, *The Organs of Nutrition and Generation* (Novato, California: Norman Publishing, 2007), pp. ix-xiv; see p. x.

was unusually small and hard, and the vein under his rectum was thicker than his thumb and swollen with blood<sup>28</sup>.

Book IV deals with the nerves, and its fourth chapter with what Vesalius calls the 'first pair of brain-nerves' - the optic nerve. Here he describes the autopsy of a young man and a woman, both of whom had an eye problem:

*In Padua a public autopsy was then performed on a youngster who had been executed by hanging. His right eye had been pulled out the year before by an executioner. In the woman, the right optic nerve looked far thinner than the left, across its entire length, and not just at the place where it was attached to the eye, but also along its length, and on the right side, where the two nerves come together. As well as being thin, the right nerve was also harder and had a redder appearance, just as was the case with the adolescent, although in him the right nerve was not strikingly inferior in thickness or consistency than the left<sup>29</sup>.*

In the book on the intestines, Vesalius tells a story about a stonemason who fell to his death in Padua and whom he also dissected. He had a clear hernia. His right testicle had previously been removed together with the spermatic cord to treat the hernia, but the same problem recurred on the left side. During the dissection, Vesalius found that this time the problem had been caused by a rupture of the intestines and the *omentum* descending into the scrotum<sup>30</sup>.

Vesalius was also interested in the anatomy of the foetus, the chorioamniotic membranes, and the pregnant uterus. He had dissected enough dog pups to know that Galen had based his anatomy of pregnancy on this animal. But in his *China Root Epistle*<sup>31</sup> he admits that before the publication of his *Fabrica* he had had no more than a few opportunities to perform a dissection on a human foetus still in the womb. He and the attending colleagues knew so little about this and had too little time to be able to identify a difference between humans and dogs. So Vesalius had to wait until 1546, when another opportunity arose. In his 1543 *Fabrica* he speaks about having dissected the uterus of a woman who had been murdered by her husband. She was still in the early stages of pregnancy<sup>32</sup>.

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<sup>28</sup> *Fabrica* 1543, III, 5, p. 267bis.

<sup>29</sup> *Fabrica* 1543, IV, 4, p. 324bis.

<sup>30</sup> *Fabrica* 1543, V, 4, p. 495.

<sup>31</sup> Andreas Vesalius, *Epistola radices Chynae decocti*, p. 143.

<sup>32</sup> *Fabrica* 1543, V, 17, p. 540.

In Book VI, Chapter 8, in the discussion about whether the *pericardium* contains fluid, Vesalius reminds his students of several of his earlier autopsies:

*In general I have encountered less [pericardial fluid] in people who have recently died than in those that I dissected after a longer interval. In Bologna, I saw how the heart was removed from a living person, and in this case too, the sac contained water: it was not a pleasant experience, but we insisted on being present at the tragedy. In Padua, eager to investigate this water, we removed the heart together with the lungs and other intestines and took it, while it was still beating, to the nearest apothecary's shop, and encountered a great deal of water in the sac. In living dogs, both the cavity of the sac and the surface of the heart are moist, but there is no noticeable quantity of water; in dead dogs and pigs there is never more than a trace, although a certain quantity is present during vivisection. Consequently I am unable to make a definite pronouncement of the presence of water in living creatures, although I know that it is incorrect to state that there is none at all (whereas at present all who encounter it in dead subjects claim that the water arises after death through the conversion of spirit into water)<sup>33,34</sup>.*

Three years after the publication of his 1543 *Fabrica*, Vesalius returns to the spleen's function in his *China Root Epistle* as he describes the case of Belloarmatus from Sienna. This eminent legal scholar met Vesalius in Pisa in January 1544, after an afternoon lecture in the library. He took the opportunity to consult him about liver symptoms that had been causing him problems for a long time and agreed to attend the next dissection in order to follow the discussion about the intestines. However, when Belloarmatus returned home, he suddenly fell very sick and died shortly afterwards from apnoea. Before he was brought back to Sienna, Vesalius conducted a dissection at the request of his private surgeon. The peritoneal cavity was full of blood which was still warm. The cause of the massive hemorrhage was a ruptured abscess in the trunk of the portal vein, which had become pustular. To preserve the body for a bit longer, Vesalius removed the intestines, and took the

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<sup>33</sup> *Fabrica* 1543, VI, 7, pp. 584-585.

<sup>34</sup> Jozef Lemli, "Vesalius en de farmacie," *Kring voor de Geschiedenis van de Pharmacie in Benelux - Cercle Benelux d'Histoire de la Pharmacie*, Mei 1996, 45 (no. 90): 16-27. According to Lemli, the body had been quartered, although Vesalius does not explicitly mention this. However, it is possible, as he specifies that the person concerned was still alive in Bologna and that the heart was still beating in Padua! Vesalius gives too few details to identify the exact circumstances, but it is more than likely that both men were still alive just before the heart was removed.

liver with the gall bladder, stomach, and spleen to the school. There he saw that the gall bladder was completely white and the surface very uneven and lumpy with numerous swellings. Under the liver, the branches of the portal vein had become detached and the liver was as hard as stone. On the back of it, the portal vein was strikingly soft and putrid. The gall bladder was unusually pale and contained eighteen very smooth stones, triangular in shape, the size of a pea and green-black in colour. The spleen – the main thing he was interested in – was very large, soft, and paler than usual, and everyone assumed that it had taken over the function of the liver for a long time, as it was of the same size as the liver. The blood vessels between the spleen and the stomach were very large. Vesalius continues by referring to another dissection, that of Prosperus Martellus, a patrician from Florence, who had suffered from jaundice for years and also died suddenly. When Vesalius dissected him, he was on his way back from Pisa to Padua and at the point of leaving Florence in the company of Franciscus Campanus. The stomach of Martellus was swollen from an effusion of the bile, the spleen was soft and the enlarged gall bladder was the size of two fists and full of stones. The bile in the veins was thick and the fluid in the arteries coloured his hands as strongly as the bile itself. On his return to Pisa, Vesalius performed another dissection in Bologna, attended by students. He also dissected the bodies of René de Chalon, Prince of Orange (who died in Saint-Dizier on 18 July 1544), of Jan III van Halewijn (Lord of Halluin, who died on 29 July 1544) and of several other men who had been killed by cannon balls<sup>35</sup>. He recalls the first two cases in the 1555 *Fabrica*.

Vesalius' interest in anatomy and pathology persisted even after the publication of his *Fabrica* 1543, when he was in the service of Emperor Charles V as *médico de familia* (family doctor), as evidenced by the preserved *consilia*<sup>36</sup>. When he encountered optic nerves without a chiasma during dissection, he inquired whether the person concerned had suffered from double vision during his life<sup>37</sup>. When in one of the rowers of the papal boat he found a

<sup>35</sup> Andreas Vesalius, *Epistola radices Chynae decocti*, pp. 174-176. For a Dutch translation see *Andreae Vesalii Epistola de Radicis Chynae decocto. Opuscula selecta Neerlandicorum de arte medica*, Fasciculus tertius quem curatores miscellaneorum quae vocantur Nederlandsch Tijdschrift voor Geneeskunde collegerunt et ediderunt, Amstelodami, sumptibus Societatis, apud F. van Rossen, 1915, pp. 166-169. Cf. *Fabrica* 1555, p. 628. The Belloarmatus case also appeared in Rembert Dodoens, *Medicinalium observationum exempla rara, recognita & aucta* (Köln: Maternus Cholinus, 1581), 367 pp.; see pp. 105-106.

<sup>36</sup> A *consilium* is a written consultation, usually because the patient could not see the doctor after the examination for reasons such as long-distance travel. Thirteen *consilia* of Vesalius are currently known about, but there may have been more.

<sup>37</sup> *Fabrica* 1555, IV, 4, p. 518.

second bile duct that led into the stomach, he asked whether he had suffered from bilious vomiting. This turned out not to be the case, and Vesalius recorded the fact, although Galen had stated that bilious vomiting was common in such circumstances, as he recorded already in his first edition<sup>38</sup>. Vesalius had an eye for normal anatomic variants, but to prevent students from mistaking exceptions for the rule, he warned that anatomy must be studied using a body that meets the canonical definition<sup>39</sup>. Examples include variations in cranial shape, the occasional the small hole in the sphenoid bone for a vein between the *foramen rotundum* and the *foramen ovale*, in the number of vertebrae in the sacrum<sup>40</sup>, the presence of an *os vesalianum*, variations in the muscles (finger extensors), in the starting point of the *a. coeliaca* in the aorta, and the difference in origin of the left and right *v. spermatica interna*<sup>41</sup>. The variants or deviancies ('monstrosities') discussed by him are numerous and provide an idea of the number of bodies that must have passed through his hands.

One of his *consilia* was written in Brussels on 18 July 1557. It was published by Georgius Hieronymus Velschius (G.H. Welsch) in 1667, and is a reply from Vesalius to an earlier letter from Achilles P. Gasser about an aortic aneurysm suffered by Leonard Welser, a member of the famous Augsburg banking family. At that time, this condition was always fatal<sup>42</sup>. Welser was a patient of Vesalius, who made the diagnosis. Gasser wrote to inform Vesalius that Welser had died, and that an autopsy had been carried out by the Occos (father and son) and a few other doctors from Augsburg. They confirmed Vesalius' diagnosis and sent him the dissection report. In his reply, he mentioned that he had observed the same condition in the sister of Antoine Perrenot de Granvelle, then bishop of Arras and later the first

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<sup>38</sup> *Fabrica* 1543, p. 510. Both cases are mentioned by James Joseph Walsh. 'Andreas Vesalius (1514-1564)' in B. Windle, *Twelve Catholic Men of Science* (London: Catholic Truth Society, 1923), pp. 17-44.

<sup>39</sup> *Fabrica* 1543, III, 7, p. 280bis.

<sup>40</sup> In the case of the *sacrum*, he regards six vertebrae rather than five as the most common situation, whereas the reverse is true in reality: *Fabrica* 1543, pp. 79-85.

<sup>41</sup> A much more extensive overview of these variants can be found in: William Louis Straus, Jr. and Owsei Temkin, "Vesalius and the Problem of Variability," *Bulletin of the History of Medicine*, 1943, 14 (no. 5): 609-633. More recently: Jacqueline Vons, "Variations anatomiques et philologiques chez André Vésale", *Revue des sciences médicales*, 2012, 46 (no. 4): 425-434 (with bibliography).

<sup>42</sup> G. H. Velschius, *Sylloge curationum et observationum medicinalium centurias VI complectens* (J.U. Rumler, *Observationes medicinae*, LXXXI, p. 46- 47) Aug. Vindelic., 1667. For a discussion about this letter and Vesalius' reply, see also Joshua Otto Leibowitz, "Johann Udalric Rumler and a Letter of Vesalius," *Medical History*, 1964, 8: 377378.

cardinal-archbishop of Mechelen. Vesalius was thus the first to discover an aortic aneurysm that was subsequently confirmed by autopsy.

There is another *consilium* in reply to a *post mortem* report. It concerns King Henry II of France, who had suffered a fatal head injury in a tournament. Vesalius gives a detailed account of the course of the illness and the ruler's death throes in July 1559. In order to explore all possible methods of treatment, he experimented on the heads of four criminals decapitated the day before<sup>43</sup>.

In 1555, his *Fabrica* was republished by Oporinus in a new, revised edition in which Vesalius reworked a number of descriptions and presented new autopsies. By then, he was working for the emperor. In the eve of the 1550/1551 Diet of Augsburg, Vesalius performed a remarkable autopsy on a fifty-year-old spinster, who had suffered from a swelling of the lower abdomen for an entire year. Dissection revealed an unusual uterus that occupied virtually the entire abdominal cavity and had fused with the front abdominal wall. The cervix was closed, and the uterus contained more than sixty Augsburg measures (180 pounds) of serum. The right ovary had nine or ten cavities, each the size of a goose or ostrich egg, which were filled with an albuminous fluid. There were no oedemas, either of the extremities or of the abdominal wall. All other organs were sound. We know the dating thanks to Adolph Occo, who attended the dissection and who recounts it in more detail and somewhat differently from Vesalius. Roth wonders whether this could have been a case of a cystic fibromyoma of the uterus in addition to a multiple ovarian cyst<sup>44</sup>.

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<sup>43</sup> Alphonse de Ruble, *Antoine de Bourbon et Jeanne d'Albret* (Paris, 1881), I: 432-435. Also: Charles Donald O'Malley and John Bertrand de C.M. Saunders, "The 'Relation' of Andreas Vesalius on the Death of Henry II of France," *Journal of the History of Medicine and Allied Sciences*, 1948, 3: 197-213; four pages are added to this with the transcript of the Latin original by Vesalius. For some errors in transcriptions and translations of both see: Pauline Saint-Martin, Stéphane Velut, Jacqueline Vons, "Un témoignage d'André Vésale sur la mort d'Henri II", in Jacqueline Vons, Stéphane Velut, *Pouvoir médical et fait du Prince au début des temps modernes*, Paris, Coll. Medic@, De Boccard, 2011, pp. 29-45.

<sup>44</sup> *Fabrica* 1555, V, 9, p. 627. See also Jo. Schenck von Grafenberg, *Observatt. Med. Lib. IV*, 4. Francof. 1609, p. 683: "Haec ego Adolph. Occo R.P. Augustanae Medicus observavi, qui etiam dissectioni interfui, a Vesalio med. Imp. Caroli V. administratae." According to Roth (pp. 222-223), who cites Jean de Vandenesse (in Gachard), Vesalius was with Charles V on 8 July 1550 for the Diet of Augsburg, which was held from 26 July 1550 to 4 February 1551, although his stay was interrupted by a visit to Munich. They did not leave Augsburg until late October 1551, when they travelled to Innsbruck.

During the Diet, Vesalius performed several other autopsies, including the one on 'the eminent and learned Lord of Immerseel'<sup>45</sup>, who had had tachycardia for months, even though he seemed healthy. In his final weeks, however, his pulse dropped from nine to two or three. Finally, he developed an inflammation of the lower left leg. The autopsy revealed an unusually large heart. The left chamber contained almost two pounds of black, glandular flesh. Roth regards this as the first diagnosis of a partially thrombosed *aneurysma cordis* with embolism<sup>46</sup>. That same year he observed a similar condition in a servant of the Lord of Mol, after he had amputated his inflamed lower leg and forearm a few days before his death.

Vesalius also describes a case of a two-year-old girl whose head had grown larger than a man's head over the course of about seven months. She was thought to have a hydrocephalus, but he found no water 'as the books teach' between the bone and the *periosteum* or skin: instead, there was water in the brain cavity itself and in the lateral chambers. They contained nearly nine pounds, or three Augsburg measures, of water. The brain had become as thin as skin against the skull, and had gradually fused with the *pia mater*. The skull was largely membranous, as bone formation had only started. The cerebellum, the base of the brain, and the beginning of the nerves displayed no unusual features. The girl remained completely conscious until the moment of death. When he saw her a few days before she died, she had a severe coughing fit and showed signs of asphyxiation. Whenever her head was carefully raised, her face would grow red and she would weep copiously. Her limbs were limp and weak, but not paralysed. There was no epilepsy or trembling. The liver looked pale, and was smaller and stiffer than usual, but the spleen was very large and soft, as if it had taken over the function of the liver. Vesalius and the other doctors were amazed that she had remained without serious symptoms for that long<sup>47</sup>.

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<sup>45</sup> *Fabrica* 1555, I, 5, pp. 23-25 and Andreas Vesalius. *Anatomicarum Gabrielis Falloppii observationum Examen*, Venetiis, apud Franciscum de Franciscis, Senensem, 1564; see p. 154.

<sup>46</sup> *Fabrica* 1555, I, 5, p. 24. See related discussion in Joshua Otto Leibowitz, "Thromboembolic disease and heart-block in Vesalius," *Medical History*, 1963, 7: 258-264. In the 1555 *Fabrica*, Vesalius refers to a 'nobilissimus et doctissimus vir' (a very noble and learned man), without explicitly mentioning his name, but in his *Examen*, p. 154 he speaks of 'Dominus de Imersel'. Although van Immerseel was not his patient, Vesalius performed his autopsy in Augsburg. Roth rightly points out that if this man's date of death becomes known, it would be possible to determine the precise date of the subsequent dissections.

<sup>47</sup> *Fabrica* 1555, I, 5, p. 24.



Finally, Vesalius did the *post mortem* on the body of Ferrante Gonzaga, the younger brother of the Duke of Mantua, who complained of a severe headache and asthma, and died in Brussels on 16 November 1557<sup>48</sup>.

Table of corpses dissected by Vesalius

Period	Place	Subject	Observation
1533-36	Paris	several, cemetery	mandibula is only one bone
1533-36	Paris	young prostitute, hanged	menstruation process
Autumn '36	Brussels	girl (Duchess of Egmont)	corpus luteum
Autumn '36	Louvain	hanged criminal	skeleton, construction
Dec. 1537	Padua	18 year old boy	skeleton, construction
Winter 1538-39	Bologna	French priest	skeleton, construction; abnormal spleen and oedemas
1537-1542	Padua	woman, suicidal hanging	menstruation process
1537-1542	Padua	six-year old girl	skeleton, construction
1537-1542	Padua	prostitute	strangulation of uterus
1537-1542	Padua	old woman	starved to death
1537-1542	Padua	woman, hanged	menstruation process
1537-1542	Padua	male prisoner	jaundice, small and hard spleen
1537-1542	Padua	male hanged in Montiselli	enlarged spleen
1537-1542	Padua	deceased patient	anal blood, small and hard spleen
1537-1542	Padua	hanged young man	eye problem
1537-1542	Padua	woman	atrophic optical nerve
1537-1542	Padua	stonemason, death by falling	scrotal hernia
1537-1542	Padua	woman, murdered	pregnancy, obstetrical anatomy
1537-1542	Bologna	excision of heart	fluid in pericard
1537-1542	Padua	excision of intestines	fluid in pericard, heart beating
1542-43	Basel	Jacob Karrer, beheaded	skeleton, construction
Jan. 1544	Pisa	thirty-six-year old nun	skeleton, construction
Jan. 1544	Pisa	seventeen-year old girl	skeleton, construction (deformed)
Feb. 1544	Pisa	Belloarmatus	abscess with ruptured portal vein
Feb.-March 1544	Florence	Prosperus Martellus	stones in gall bladder
July 1544	Saint-Dizier	Prince of Orange	war lesions

<sup>48</sup> David S. Chambers, "A Mantuan in London in 1557: Further Research on Annibale Litolfi", in Edward Chaney and Peter Mack (eds), *England and the Continental Renaissance. Essays in Honour of J. B. Trapp* (Woodbridge: The Boydell Press, 1990), pp. 73–108; see p. 96.

Period	Place	Subject	Observation
July 1544	Saint-Dizier	Lord of Halluin	war lesions
1550	Augsburg	fifty-year old spinster	gynaecological problems
1550-1551	Augsburg	Lord of Immerseel	aneurysma cordis
1550-1551	Augsburg	two-year old girl	hydrocephalus
Nov. 1557	Brussels	Ferrante Gonzaga	asthma with headache
July 1559	Paris	king Henry II of France	brain damage

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#### SAŽETAK

*Sudeći prema njegovim djelima, Andrija Vezal očito je na raspolaganju imao desetine kadavera, a njih sasvim sigurno trinaest do 1543. godine. Tijela je nabavljao s groblja, iz stratišta ili bolnica. U tome su mu pomagali ne samo njegovi studenti, već i javne i sudske vlasti. U početku je kadavere rabio za vlastito učenje, potom i za poučavanje studenata i pripremu svoga glavnog djela O ustroju ljudskoga tijela (*De humani corporis fabrica*). Iz djela je vidljiva Vezalova sposobnost usporedbe anatomske oblika. Zanimala ga je i anatomija fetusa. Povremeno je secirao kako bi proučavao fiziološke procese, a tijela koja su obitelji donosile na autopsiju davala su mu uvid u patologiju bolesti. Neke od bilježaka sa sekcija ostale su sačuvane.*

**Ključne riječi:** *povijest medicine; XVI. stoljeće; anatomija; patologija; kadaveri; Andrija Vezal; Fabrica*