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# RENAISSANCE ANATOMIST JACOPO BERENGARIO DA CARPI – AN INSIGHT INTO HIS LIFE AND WORK. AN EMPHASIS ON HIS CONTRIBUTION TO ANATOMICAL TERMINOLOGY

# RENESANSNI ANATOM JACOPO BERENGARIO DA CARPI – UVID U ŽIVOT I RAD, S NAGLASKOM NA NJEGOV DOPRINOS ANATOMSKOJ TERMINOLOGIJI

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Summary

*In general, Vesalius (1514–1564) is considered a pioneer in the study of anatomy. However, he had several important predecessors whose contributions are considered fundamental to the history of anatomy. Amongst these pre-Vesalian anatomists, Jacopo Berengario da Carpi (c. 1460–1530) is widely acknowledged as the most important one, and by some scholars even as the first ever anatomist. Berengario was the first anatomist who recognized the value and importance of anatomical illustrations for text comprehension. Our analysis is based on his works "Carpi Commentaria super anatomia Mundini" (1521) and "Isagogae breves" (1522). In contrast to Vesalius, who attempted to put into practice only Latin nomenclature, Berengario da Carpi had no ambition to reform anatomical terminology or*

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*purge it from "barbaric" terms. He just adopted the most widely used terms of his time, no matter their Latin, Greek, or Arabic origin. His work titled Isagogae contains an important list of all relevant terms used in the text, which serves as a historical record of the anatomical nomenclature used in his period. All this establishes the historical legacy of his work, which contributed to the development of anatomical terminology. This is why, from the current perspective of a medical school anatomy teacher, Berengario's conviction about the need not only to read a textbook but also to see anatomical structures with one's own eyes is relevant even in the third millennium.*

***Keywords:*** *Renaissance medicine, Jacopo Berengario da Carpi, pre-Vesalian anatomy, anatomical terminology, anatomical illustrations*

## Introduction

The primary sources of anatomical knowledge in the early 16th century were the works of Galen (129–216 AD), which, for a long period of time, dominated the field of medicine. These writings were used in universities all over Europe, and their authority was not long questioned (Lindemann, 2010, pp. 84–90). According to the English medical historian R. French, anatomy played only a minor role in medieval medical education, e.g., in the 12th-century medical compendium of the Salerno School, "The Little Art of Medicine" (lat. *Articella*, or *Ars medicinae*), anatomy had no place (French, 1993, p. 81). In the late Middle Ages and early Renaissance, the study of human anatomy was revived as northern Italy took advantage of the gradual rehabilitation of human bodies' dissections. These had long been forbidden since the time of the Alexandrian school in the 3rd century BC.

During the Renaissance, anatomy also underwent such a transformation; that is, it was reformed according to ancient Greek principles. This marked a major turning point in the history of anatomy, beginning a recognizably modern understanding of the functioning and anatomy of the human body. We may call this the "anatomical renaissance" (Cunningham, 1997, p. 3).

Systematic dissection of the human body began at the University of Bologna in the Colleges of Arts and Medicine, where surgery was taught alongside internal medicine. Possible precursors of medical dissection can be found in legal studies, where it was often necessary to ascertain the causes of death when assessing the lethality of injuries, poisonings, stillbirths, and related cases. By adopting the practice of teaching anatomy through the dissection of dead human bodies, Bolognese physicians were doing something very unusual (French, 1993, pp. 81–82). The first known systematic dissector was Mondino dei Liuzzi (c. 1275–1326).

Among his most important followers was Jacopo Berengario da Carpi (c. 1460–1530), a predecessor of Vesalius who is often regarded as the first modern

anatomist. From his biography, we briefly note that he was born around 1460 in the town of Carpi in northern Italy. At the beginning of the 16th century, Berengario moved to Bologna–the city he called *mea altrice* (meaning "the nurturer of my studies")–where he received his doctorate in medicine in 1489. He practiced as a physician and surgeon, but he also studied and taught anatomy. This was exceptional in his time because those who taught anatomy were usually trained as physicians, meaning they had taken an academic course in medicine at the university. Between 1502 and 1527, he lectured on surgery and anatomy at the University of Bologna.

It is noteworthy that Berengario published his three major works within eight years, although he worked hard as a physician and surgeon. In 1514, he published a medieval dissection manual entitled *Anatomia Mundini noviter impressa ac per Carpum castigata* ("Mondino's Anatomy Rewritten and Corrected by Carpi"). His second book (1518) was an important treatise on skull fractures, *Tractatus de fractura calvae sive cranei* ("Treatise on Fractures of the Calvaria or Cranium"). This work is considered a landmark in the field of skull surgery. It is the first book devoted entirely to head injuries and their surgical treatment (Parent, 2019, p. 3). In 1521, his most influential work, illustrated with woodcuts, *Carpi Commentaria super anatomia Mundini* ("Commentary on Mondino's Anatomy"), was published in print. One of his most important pre-Vesalian anatomical studies was the 1522 compendium *Isagogae breves in anatomiam humani corporis* ("A Short Introduction to Anatomy"), with an added account of the anatomical nomenclature of his time. Berengario died in Ferrara around 1530.

## Berengario's "transition" to anatomist

Renaissance medicine thus revived the ancient interest in the anatomy of the human body. However, a description of the "real state" of medieval anatomy can be found in F. H. Garrison (1927, p. 609):

Up to the time of Leonardo's wonderful drawings, it was mainly porcine, simian, bovine, pseudo-Galenic, and, as far as the dry texts are concerned, more a contribution to general morphology than actual human anatomy. Thus, medieval surgeons did very well with operations on the external parts. When they opened the abdomen, they were really fishing in the dark, performing autopsies *in vivo*.

The accusation of human vivisection was leveled against Berengario when the Italian anatomist Gabriele Falloppio videlicet accused him of this practice in his work *De morbo Gallico* (*On the French Disease, Syphilis*):

> *"Hic (Iacopus illae Carpensis) ita erat infensus Hispani, ut (cum esset Bononiae) geminos ex eis laborantes morbo Gallico ceperit, et vivos anatomicis administrationibus destinaverit; qua de re profligatus Ferrariae obiit,"* (Fallopio, 1574, cap. 76, pag. 126).
>
> "This (the famous Jacopo de Carpi) so hated the Spaniards that (when he was in Bologna) he took from among them twins suffering from syphilis and decided to perform a vivisection on them; being therefore devastated, he left for Ferrara." (Translated by the authors)

Falloppio was probably exaggerating because there is no direct evidence to support this accusation. André Parent (2019, p. 2) supports the thesis of misunderstanding and clarifies that "what Berengario called *Anatomia vivorum* is nothing other than the so-called *Anatomia fortuita* (accidental, natural), i.e., what doctors can see during various surgical operations". Berengario was clear about this in his commentary:

> *"Tempore enim nostro non fit anatomia in vivis, nisi forte a medicis, ut mihi contingit interdum in incidendo apostemata etc., ubi cognoscunt colligantias membrorum, positiones et operationes et omnia requisita in anatomia."* (*Commentaria*, 1921, fol. 4b.)
>
> "For in our time, anatomy is not practiced on the living, unless, perhaps, by physicians as sometimes falls to my lot in cutting an abscess, etc., when they acquaint themselves with the anatomic relations of the organs, positions and operations and all the things that are requisite in anatomy." (Translated by Choulant, 1920, p. 137)

In the dedication of his work, *Commentaria,* Berengario emphasized his long study of texts and bodies, "... what I have seen by long experience in dissecting the bodies both of the living and the dead, and what I have sought in long reading" (*Commentaria*, fol. 4v). He found anatomy most useful in the study of disease, and stressed, as he himself did, that a good anatomist should dissect many different subjects in order to learn it (*Commentaria*, fol. 5v).

Berengario thus devoted much of his time to anatomy, to which he seemed to have had a special inclination, and boasted of having dissected several hundred bodies (Choulant, 1920, p. 136). It is not known when Berengario's interest in anatomy became dominant, although his 1514 edition of Mondino's *Anatomy* may indicate this.

## Berengario and Mondino dei Liuzzi

Berengario's role model in matters of anatomy was Mondino dei Liuzzi, also known as Mundinus (c.1270–1326), a Bolognese surgeon and professor of medicine. His treatise *Anatome omnium humani corporis interiorum membrorum*, abbreviated *Anatomia Mundini*, dated 1316, was first printed in Padua between 1475 and 1478. The treatise can be considered the standard work on anatomy used in Italian universities of the late Middle Ages and early modern period. This medieval treatise was based on the traditional medieval teaching of anatomy, which took place over a dissected body. Public dissections were part of the medical curriculum, during which the body was dissected, and the audience was shown one organ after another. Mondino's text was read aloud to explain what the students were observing. Dissections, according to the model of Mondino, were based on the "three venters" of the body *(abdomen, thorax, cranium)*. The three venters were dissected in a sequence that avoided the worst effects of putrefaction.

Berengario studied Mondino's work in such detail that he became its (cautious) critic, and in 1514, he published the medieval dissection manual under the title *Anatomia Mundini noviter impressa ac per Carpum castigata* (Mondino's Anatomy reprinted and corrected by Carpi). The work was probably prepared as an aid for his students.

Its publication indicates that Berengario, at that time, began to place more emphasis on anatomical research, which had initially been only an auxiliary discipline for him as a surgeon at the University of Bologna. Mondino, however, in a blind trust in Galen and the Arab physicians, had repeated all the misconceptions based on observation of dissected animals (e.g., liver with five lobes, heart with three cavities, seven-chambered uterus). Although Berengario criticized Mondino, he also corrected Galen but merely stated that he did not see it that way, leaving Galen's original claim and his own findings side by side (Čihák, 2014, pp. 4–5). Similarly, Garrison is of the opinion that although *Anatomia* is full of Galenical errors and preserves the old fictitious anatomy of the Arabists with the Arabic terms, "this work was for over a hundred years the only textbook of anatomy in all the medieval schools" (Garrison, 1917, p. 144).

Thus, *Anatomia Mundini* represented a crucial work in the development of pre-Vesalian anatomy and was was an inspiration for Renaissance anatomists (Achillini, Zerbi, and Berengario). The problems were related to its form, as the text was written in impoverished Latin with many convoluted terms taken from Arabic, Hebrew, Greek, and Latin, causing terminological confusion, as one anatomical structure could have several names or one term could refer to several different

structures. Therefore, pre-Vesalian anatomists attempted to replace Arabic and Hebrew terms with Greek ones in the hope of creating a more coherent anatomical nomenclature. As Parent notes, these efforts to create a coherent anatomical nomenclature should not be seen as the result of a rejection of Arabic works; quite the contrary. Arabic/Islamic scholars have fruitfully filled the gap between Galen and the pre-Vesalian anatomists. In doing so, the pre-Vesalian anatomists paved the way for a fundamental reform of anatomical nomenclature, in which Vesalius attempted to introduce exclusively Latin nomenclature (Parent, 2019, p. 12–13).

## Anatomia sensibilis

Since the beginning of the 16th century, knowledge through the senses, such as sight and touch, became a central requirement in medical knowledge. A fundamental prerequisite for this approach was dissection: the anatomist had not only to dissect with his own hands but also to see with his own eyes and no longer be content with book knowledge drawn from the writings of authorities. The truth was to be sought not in texts but in bodies, of which only direct observation could provide reliable knowledge (French, 1985, pp. 42–43). This is confirmed by an excerpt from Berengario's *Commentaria*:

> *"Et non credat aliquis per solam vivam vocem aut per scripturam posse habere hanc disciplinam: quia hic requiritur visus et tactus."* (*Commentaria*, 1521, fol. 6v)
>
> Let no one think that he can acquire this discipline only by word of mouth or by the written word: for here sight and touch are indispensable." (Translated by the authors)

Berengario's conclusions were based on the method of systematic dissection. According to him, real evidence in the anatomical study could only come from the testimony of the senses, and this is what he called *anatomia sensibilis*, a procedure he used for both research and teaching purposes. It is a concept that emphasizes sensory versions of truth over textual ones. As quoted by Lind (1975, p. 10), Berengario insists upon the precedence of sense perception over authority in the following passages:

> *"Et cum isto textu [of Galen] concordat sensus: sic ergo sint cauti componentes libros de anatomia et non credant auctoritatibus sed sensui sicut nos facimus et faciemus."* (*Commentaria*, fol. 153v)
>
> "And let sense perception agree with this text [of Galen]: and thus let those who write books on anatomy also not trust in the authorities but in their sense perception as I do and shall do."

*"Galenos cum suis sequacibus cuius opinionem semper tenemus nisi ubi discordat ab ipso sensus."* (*Commentaria*, fol. 412v)

"Galen with his followers whose opinion I always maintain except when sense-perception disagrees with him."

*"Multi tamen aliter sentiunt, sed sensus in hoc est iudex."* (*Commentaria*, fol. 443r)

"Many, however, believe otherwise, but sense perception is the judge in this matter."

(Translated by Lind, 1975, p. 10)

## Commentaria super Anatomia Mundini

In 1521, Berengario da Carpi wrote an extensive commentary on the *Anatomy* under the title: *Carpi Commentaria cum amplissimis additionibus super Anatomia Mundini una cum textu eiusdem in pristinum et verum nitorem redacto* ("Carpi's Commentaries on the Anatomy of Mondino, with very copious additions, together with his text restored to its former and true splendour"). Cunningham (1975, p. 75) emphasizes the main idea of this work: re-establishing the text as Mundinus intended it—free from the errors and accretions introduced by generations of manuscript copyists. On the opening page of this work, Berengario claims that his intentions in doing this are to produce peace and concord among anatomists:

*"Visis tot et tantis altercationibus inter scribentes de Anatomia placavit mihi, quod longa experientia vidi secando et vivorum et mortuorum corpora, et quod longa lectione quaesivi per viam Commenti in unum breviori quodam summario perstringere. Et dux meus erit optimus Mundinus Bononiensis… In qua exposition aliqua notatu digna iunioribus non inutilia addam. Duce semper sensu et divini Galeni auctoritatibus et rationibus quibusdam."* *(Commentaria, 1521, fol. 4v)*

"When I saw so many and so great altercations between those writing on Anatomy, I resolved through means of a Commentary to draw together, by some quite brief summary, what I have seen by long experience in dissecting the bodies both of the living and the dead, and what I have sought in long reading. And my guide will be the excellent Mundinus of Bologna... In this exposition, I will add some noteworthy things, not without their usefulness, from more recent writers, always with the senses and some authorities and reasonings of the divine Galen as my guide..." (Translated by Cunningham, 1997, p. 75)

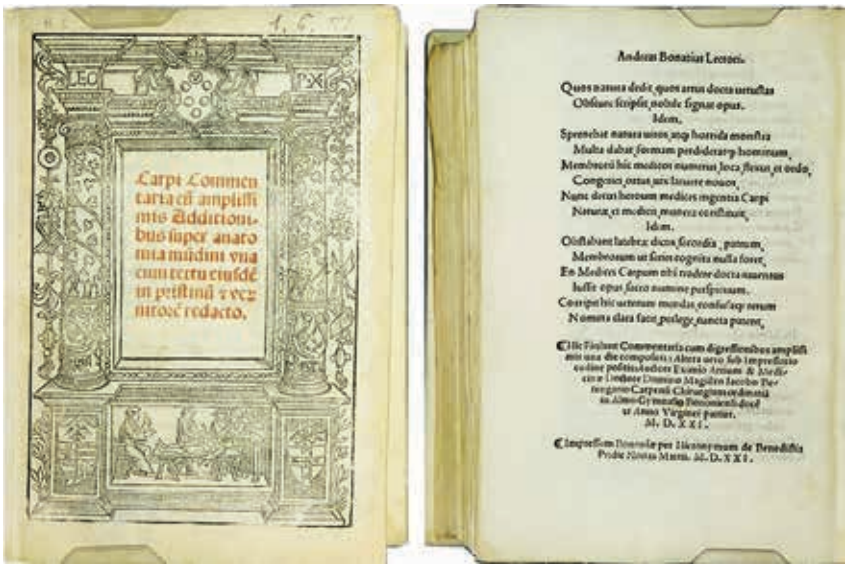


Figure 1. The title and last page of the work *Commentaria super Anatomia Mundini* (1521).

The only and very rare edition of this work is the printing Bononiae, 1521, per Hieronymus de Benedictis. Although modestly titled, his *Commentaria* is, in fact, an original contribution of considerable value and the first illustrated textbook of anatomy ever printed (De Santo et al., 1999, pp. 199–212; Prioreschi, 2007, p. 4; Singer, 1925, p. 97).

The book has 528 pages and is illustrated with 21 full-page anatomical wood engravings depicting the muscles and bones of the human body. Following Mondino's text, Berengario systematically described the general characteristics of the main structures and regions of the body, together with the properties of fat, membranes, flesh, fibers, ligaments, tendons, nerves, and muscles. Following Mondino's arrangement, the abdominal organs, which are most susceptible to putrefaction, were discussed first. This follows the custom of medieval works, in which the contents were arranged according to the relative rate of decay of tissues and organs.

## Terminology examples

Berengario da Carpi bore no ambition to reform anatomical terminology or purge it of "barbaric" terms; he simply adopted the terms most widely used in his time, whether Latin, Greek, or Arabic. To illustrate the mentioned, here are a few anatomical terms of historical as well as linguistic interest found in the text of the

*Commentaria* (fol. 174i–175r). For completeness, we list their occurrence in current anatomical terminology.

**A. *lacertus – musculus***; according to Berengario, these terms were synonymous: "*Musculus et musculus pisciculus et lacertus dictus est ad formam parvi muris et parvi piscis et lacerti animalis*" (*Commentaria*, fol. 71b). The muscle is named after the shape of a small mouse, a small fish, and a lizard. However, there are also muscles that do not have the above names: the long muscles, the transverse abdominal muscles, and the diaphragm (*Commentaria*, fol. 71b). Some authors attribute *lacertus* to a muscle that has a more sensory function (*spiritus sensitivus*) and *musculus* to a muscle that has a more motor function (*spiritus motivus*). In 1864, Hyrtl introduced the synonymous term *lacertus fibrosus*. Eventually, this name was also included in the BNA (1895), and the PNA of 1955 added the term aponeurosis *m. bicipitis brachii* as a synonym. These two terms have remained in the official anatomical nomenclature to this day (Šimon et al., 2016, p. 317). The *Terminologia Anatomica* (TA) of 1998 includes these terms.

**B. *mirach/myrach*** (Arab.) – abdomen, abdominal wall (also according to Berengario). Du Cange's Dictionary of Medieval and Modern Latin (1883–1887, vol. 5, col. 563c, online: http://ducange.enc.sorbonne.fr/MYRACH), states: *"…vox Arabica, quam Medici usurpant pro partibus continentibus stomachi. Vide Mundinum in Anatomia pag. 43"*, or in English: "… an Arabic word that doctors use for the parts surrounding the stomach. See Mundinus in the Anatomia, page 43". Hyrtl mentioned these meanings of *mirach*: abdomen, regio abdominalis, abdominal musculature, and, rarely, umbilicus and peritoneum (1879, pp. 177–179). The last anatomists to mention this term were Casparus and Thomas Bartholinus (1641, lib. I, page 9): *"pars anterior infimi ventris myrach dicitur"*, meaning: "the front of the abdomen, which is called myrach." This term is now obsolete, so it is not found in the current anatomical nomenclature.

**C. *matrix;*** according to Oxford Latin Dictionary [mater; term. perhaps from nutrix] – female animal kept for breeding, dam; also applied to human beings (OLD, 1968, p. 1084). In the translation literature of late antiquity, *matrix* often renders *μήτρα* (Greek word for 'womb'), and it is possible that the phonetic similarity between the two words was one of the factors behind the semantic change in the Latin term. In addition, there is a close relationship between the meanings "mother, breeder" and "womb"(Adams, 1982, p. 106). After its meaning as "womb" became established, we find it in late Latin medical literature–e. g., in the work *Gynaecia* of T. Priscian from the 4th century–exclusively in this meaning throughout the work (Priscianus, lib. III). Medieval authors

used the synonyms *μήτρα, ὑστέρα, matrix, vulva,* and *uterus* for the womb. In Mondino, the chapter on the uterus is called *De anatomia matricis*, and in Berengario *De matrice non pregnante*. Current anatomical terminology (TA, 1998; 2019) uses the term *uterus* for the womb and also recognizes the term *matrix*, but in the sense of *bed*: *matrix unguis* – nail matrix.

### Isagogae breves

One of the most significant pre-Vesalian anatomical studies was the compendium *Isagogae breves perlucidae ac uberrimae in anatomiam humani corporis a communi medicorum academia usitatam* ("Short introduction on the anatomy of the human body used with great profit and clarity in medical colleges") written by Berengario in 1522. It is a shorter version (80 folios) of the *Commentaria*, which includes a concise and detailed description of the human anatomy, as well as a guide for dissection. The second edition of the book (1523) is the only version that contains Berengario's illustration of the brain (Parent, 2019, p. 4).


Figure 2. The title and last page of the work *Isagogae Breves* (1523).

## Terminology examples

To illustrate the then anatomical terminology, we will discuss the following terms from historical-linguistic aspect, including the occurrence in the current anatomical terminology.

**A. *nucha/nuca*** (Arab.) – nape, neck. Du Cange's Dictionary (vol. 5, col. 619b, online: http://ducange.enc.sorbonne.fr/NUCHA) quotes Silvaticus: *"Locus, ubi collum craneo jungitur (vox Arabica)*", meaning: 'the place where the neck joins the skull' (Arabic word). Joseph Hyrtl derived the word's origin from the Arabic *nuqrah*, meaning 'a dimple in the neck' (Hyrtl, 1880, pp. 356–357). During the period from Avicenna to Vesalius, the term was used to refer to the spinal cord, e.g., *nucha, medulla spinae est* ('nucha, that is, the spinal cord') (Mondino) and *nucha sicut et cerebrum velatur a dura et a pia matre* ('the nucha, like the brain, is covered with hard and soft linen') (Berengario, *Isagogae*, 57h). Nevertheless, Onomatologia Anatomica Nova (Barcia Goyanes, 1986, vol. VI, p. 135) states: "Although, we can infer from what da Carpi says that in his time the name *nucha* was already commonly used to refer to the back of the neck, we have not found this word in any 16$^{th}$-century anatomy, although we have searched for it in texts." In the currently used anatomical nomenclature (TA, 1998), the term *nucha* appears in the following terms: *ligamentum nuchae; m. transversus nuchae; fascia nuchae; linea nuchalis superior, inferior, suprema; planum nuchale.* However, the latest anatomical nomenclature version (TA, 2019) shows only the term *fascia nuchae*.

**B. *embotum*** – funnel. According to Du Cange's Dictionary, the meaning of *embotum* is a funnel (vol. 3,col.254a.http://ducange.enc.sorbonne.fr/EMBOTUM). In Berengario, its description is found in the figure of the brain ventricles (*Isagogae breves*, fol. 54v and 56):

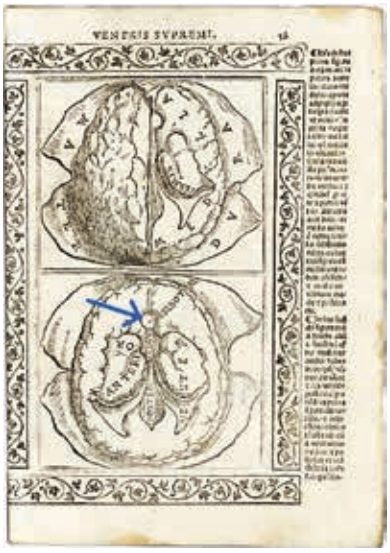

Figure 3. View of the brain ventricles (fol. 54v and 56) from *Isagogae,*1523.

Berengario describes the term *embotum* and its function in the text in these words:

> *"…unum foramen, per quod spiritus ad alios ventres tendunt et etiam aliquae humiditates in ipsis contentae descendendo exeunt ad certam vacuitatem tendentem versus os basilare. Haec vacuitas vocatur a Mundino lacuna, ab Avicenna caput rosae et ab aliis embotum, quia est lata superius, stricta inferius. Per istud embotum evacuantur ut plurimum humiditates superfluae cerebri"* (*Isagogae,* fol. 54v)
>
> "...a foramen through which the spirit and some humidities contained in them descend and pass out to a certain vacuity stretching toward the basilar bone. This vacuity is called *lacuna* by Mondinus, head of the rose by Avicenna, and *embotum* by others because it is broad above, narrow below. Through this embotum to the aforesaid bone are evacuated for the most part the superfluous humidities of the brain." (Translated by Lind, 1959, p. 143)

The *embotum* is currently an obsolete term; in today's anatomical terminology, it is called *infundibulum hypophysis* (TA, 1998) and *truncus infundibularis* (TA, 2019) – pituitary stalk.

**C. *pecten*** – Berengario mentioned the term *pecten* as follows: *"Quinta est pars pecten dicta; intra quam est os pubis seu pectinis,"* (*Isagogae*, fol. 4a), meaning: "The fifth part is called the rest; inside it is the *os pubis* or *os pectinis*." As stated by Hyrtl (1880, p. 387), Roman physicians called the pubic region *pecten* and the pubic bone *os pectinis*. The meaning of this term was clearly defined by Celsus*: "A quibus [coxis] oritur os, quod pectinem vocant; rectius in viris, recurvatum magis in exteriora in feminis,"* (lib. VIII, cap.1, p. 328), meaning: "Out of them [the hips] comes a bone called the *pecten*, which is straighter in males and more curved on the outside in females." Hyrtl offered an explanation for why the term *pecten* came to be used in the sense of 'ridge': "…because there is hair in the pubic area, which, as in the combing of wool or flax, is wont to hang on a comb…" (1880, p. 387). There is also the term *pecten manus*, which consists of the parts: *procarpus*, *antecarpus,* and *metacarpus* (*Isagogae*, fol. 67i). Current anatomical terminology (TA, 1998) includes the terms *pectin ossis pubis, pecten analis*, and the derived terms *linea pectinata, m. pectineus, mm. pectinati, lig. pectineum*, and *lig. pectinatum*. TA 2019 lists only *pecten ossis pubis, lig. pectineum, pecten analis*, and *linea pectinata*.

## "Anatomical dictionary"

Berengario apparently lacked a list of the anatomical vocabulary of the time, so at the end of the *Isagogae* editions of 1522 and 1523 (fol. 75k3–79), he attached *Index rerum dignarum cura, quae hoc volumine continentur* ("The index of the results worthy of attention that are contained in this treatise"). He included all relevant terms from the text, providing a comprehensive historical record of the anatomical nomenclature of his time. He explored and reviewed several anatomical terminologies, as well as the contributions of translations of classical texts available to him. This work by Berengario can be considered the first attempt at an "anatomical dictionary".

In the example below, we see that each term is assigned a folio (*folium*) and a page (*pagina*) where the term is found in the text, e.g., *vena ischiadica & saphena* folio XVI, pag. l.

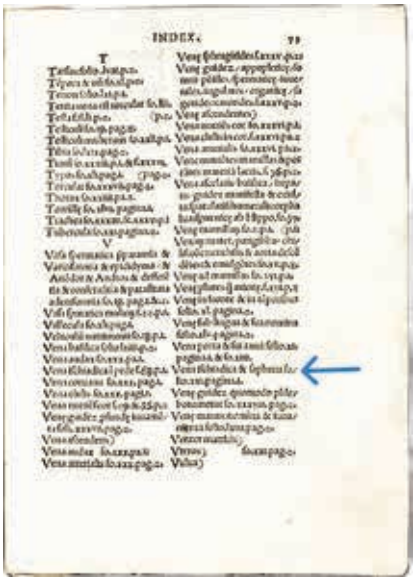

Figure 4. An example from *Index rerum dignarum cura, quae hoc volumine continentur* (*Isagogae*, 1523, (fol. 75k3–79).

## Conclusion

Berengario was the first to teach and emphatically argue that anatomy must be studied on the human body and not in books. His deeds and work illustrate the transition from the uncritical repetition of ancient notions to reliance on empirical observation. As we have already stated, he claimed that he always accepted Ga-

len's views–except when they contradicted his own observations (*Commentaria*, fol. 240r, 398r, 412r). In contrast to Vesalius, who attempted to put into practice only Latin nomenclature, Berengario da Carpi had no ambition to reform anatomical terminology nor purge it of "barbaric" terms. He simply adopted the most widely used terms of his time, no matter if they were of Latin, Greek, or Arabic origin. His work titled *Isagogae* contains an important list of all relevant terms used in the text. This writing represents a historical record of the anatomical nomenclature used in his era. The contribution of Berengarius to anatomy was most eloquently appreciated by Fallopius when he stated: *"Iacobus Carpensis primus procul omni dubio anatomicae artis, quam Vesalius postea perfecit, restaurator"*, which translates as: "Jacobus Carpensis was, without any doubt, the first restorer of the anatomical art, which was later perfected/completed by Vesalius." (Fallopius, 1561, fol. 25d). The view of a contemporary anatomist confirms that Berengario's conviction about the necessity not only to read a textbook but also to see the studied anatomical structures with one's own eyes is relevant even in the 21st century. However, this does not negate the fact that offering high-quality, life-size anatomical models serves as a valuable adjunct to anatomical dissection.

## References


1. Adams, N. J. (1982). *The Latin sexual vocabulary*. Duckworth.
2. Barcia Goyanes, J. J. (1983). *Onomatologia anatomica nova. Historia del lenguaje anatómico (Vol. VI).* Universidad de Valencia.
3. Bartholinus, C., & Bartholinus, T. (1641). *Institutiones anatomicae. apud Franciscum Hackium*.
4. Berengario da Carpi, J. (1514). *Anothomia Mundini noviter impressa ac per Carpum castigata*. Giustiniano da Rubiera.
5. Berengario da Carpi, J. (1521). *Commentaria, cum amplissimis additionibus super Anatomia Mundini, una cum textu ejusdem in pristinum et verum nitorem redacto*. Girolamo de Benedetti. Retrived from: https://archive.org/details/ita-bnc-mag-00001056-001/page/n14/mode/2up
6. Berengario da Carpi, J. (1522, 1523). *Isagogae breves, perlucidae ac uberrimae, in anatomiam humani corporis a communi medicorum academia usitatam*. per Benedictum Hectoris. Retrieved from: https://wellcomecollection.org/works/ujm5ynjj/items?canvas=147 (1522); https://archive.org/details/BIUSante_05337/page/n99/mode/2up (1523).
7. Berengario da Carpi, J. (1535). *Isagogae breves, perlucidae ac uberrimae, in anatomiam humani corporis a communi medicorum academia usitatam*. Bernardinum de Vitalibus Venetum.
8. Celsus. (1859). *De medicina libri octo* (Ch. Daremberg, Ed.). Teubner.
9. Choulant, L. (1920). *History and bibliography of anatomic illustration in its relation to anatomic science and the graphic arts* (M. Frank, Trans.). University of Chicago Press.

10. Cunningham, A. (1997). *The anatomical Renaissance: The resurrection of the anatomical projects of the ancients*. Scolar Press.
11. Čihák, R. (2014). *Vývoj anatomického poznání. Anatomie od Vesalia po současnost 1514-2014* (M. Grimm, O. Naňka, & K. Černý, Eds.). Grada.
12. De Santo, N. G., et al. (1999). *Berengario da Carpi. American Journal of Nephrology, 19*(2), 199–212. https://doi.org/10.1159/000013452
13. Du Cange, Ch., et al. (1883–1887). *Glossarium mediæ et infimæ latinitatis*. L. Favre, Niort. Retrived from: http://ducange.enc.sorbonne.fr/NUCHA; t. 5, col. 563c; http://ducange.enc.sorbonne.fr/MYRACH; t. 3, col. 254a; http://ducange.enc.sorbonne.fr/EMBOTUM
14. Fallopius, G. (1561). *Observationes anatomicae*. apud Marcum Antonium Ulmum.
15. Fallopius, G. (1574). *De morbo gallico liber absolutissimus*. apud Aegidium Regazolam.
16. French, R. (1993). The anatomical tradition. In W. F. Bynum & R. Porter (Eds.), *Companion encyclopedia of the history of medicine* (pp. 81-101). Routledge. https://doi.org/10.4324/9781315002514
17. French, R. (1985). Berengario da Carpi and the use of commentary in anatomical teaching. In A. Wear, R. French, & I. M. Lonie (Eds.), *The medical Renaissance of the sixteenth century* (pp.42-73). Cambridge University Press.
18. Garrison, F. H. (1917). *An introduction to the history of medicine* (2nd ed.). W. B. Saunders Company. Online version.
19. Garrison, F. H. (1927). Early medieval anatomy. *Bulletin of the New York Academy of Medicine, 3*, 607–609.
20. Hyrtl, J. (1880). *Onomatologia anatomica*. Geschichte und Kritik der anatomischen Sprache der Gegenwart. Braumüller. https://doi.org/10.5962/bhl.title.26730
21. Hyrtl, J. (1879). *Das Arabische und Hebräische in der Anatomie*. Wilhelm Braumüller.
22. Lind, L. R. (1959). Jacopo Berengario da Carpi, A short introduction to anatomy (Isagogae breves). University of Chicago Press.
23. Lind, L. R. (1975). *Studies in pre-Vesalian anatomy: Biography, translations, documents*. The American Philosophical Society.
24. Lindemann, M. (2010). *Medicine and society in early modern Europe* (2nd ed.). Cambridge University Press.
25. Oxford Latin Dictionary. (1968). Retrieved from: https://archive.org/details/aa.-vv.-oxfordlatin-dictionary-1968/page/1084/mode/2up
26. Parent, A. (2019). *Berengario da Carpi and the Renaissance of brain anatomy. Frontiers in Neuroanatomy, 13*, 11. https://doi.org/10.3389/fnana.2019.00011
27. Prioreschi, P. (2007). History of medicine (Vol. V). Horatius Press.
28. Priscianus, T. (1894). *Theodori Prisciani Euporiston libri III cum physicorum fragmento et additamento pseudo-theodoreis* (V. Rose, Ed.). Teubner.
29. Singer, C. (1925). The evolution of anatomy: A short history of anatomical and physiological discovery to Harvey. Kegan, Trench, Trubner & Co.
30. Šimon, F., Zborovjan, M., & Marečková-štolcová, E. (2016). Lacertus in der Geschichte der anatomischen Nomenklatur. *Graeco-Latina Brunensia*, *21*(2), 317–327.https://doi.org/10.5817/GLB2016-2-21
31. Terminologia Anatomica. (1998). FCAT. Thieme.
32. Terminologia Anatomica. (2019). *International anatomical terminology* (2nd ed.). FIPAT.

SAŽETAK

*Općenito, Vesalius (1514. – 1564.) smatra se pionirom u proučavanju anatomije. Međutim, imao je nekoliko važnih prethodnika čiji se doprinosi smatraju temeljnima za povijest anatomije. Među tim predvesalijevskim anatomičarima, Jacopo Berengario da Carpi (oko 1460. – 1530.) široko je priznat kao najvažniji, a neki ga znanstvenici čak smatraju prvim pravim anatomom. Berengario je bio prvi anatom koji je prepoznao vrijednost i važnost anatomskih ilustracija za razumijevanje teksta. Naša analiza temelji se na njegovim djelima "Carpi Commentaria super anatomia Mundini" (1521.) i "Isagogae breves" (1522.). Za razliku od Vesaliusa, koji je nastojao uvesti isključivo latinsku nomenklaturu, Berengario da Carpi nije imao ambiciju reformirati anatomsku terminologiju niti je „očistiti" od „barbarskih" izraza. Jednostavno je usvojio najčešće rabljene izraze svoga vremena, neovisno o njihovu latinskom, grčkom ili arapskom podrijetlu. Njegovo djelo "Isagogae" sadrži važan popis svih relevantnih izraza korištenih u tekstu, što služi kao povijesni zapis anatomske nomenklature njegova razdoblja. Sve to potvrđuje povijesnu vrijednost njegova rada, kojim je pridonio razvoju moderne anatomske terminologije. Zbog toga je, iz današnje perspektive profesora anatomije na Medicinskom fakultetu, Berengarijevo uvjerenje o potrebi ne samo čitanja udžbenika već i neposrednog promatranja anatomskih struktura vlastitim očima, relevantno čak i u trećem tisućljeću.*

***Ključne riječi**: renesansna medicina, Jacopo Berengario da Carpi, predvesalijevska anatomija, anatomska terminologija, anatomske ilustracije*