



# What is the history of the term “azygos vein” in the anatomical terminology?

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## Abstract

The term “azygos vein” is in common use in modern anatomical and cardiovascular textbooks to describe the vein which ascends to the right side of the vertebral column in the region of the posterior mediastinum draining into the superior vena cava. “Azygos” in Greek means “without a pair”, explaining the lack of a similar vein on the left side of the vertebral column in the region of the thorax. The term “azygos” vein was utilized firstly by Galen and then was regenerated during Sylvius’ dissections and Vesalius’ anatomical research, where it received its final concept as an official anatomical term. The purpose of this study is to highlight the origin of the term “azygos vein” to the best of our knowledge for the first time and its evolution from the era of Hippocrates to Realdo Colombo.

**Keywords** Anatomy · “azygos vein” · “sine pari vena” · Terminology · Vesalius

## Introduction

The term “azygos vein” can be found in all modern anatomical textbooks. The term is used to describe a vein that ascends on the right side of the vertebral column in the region of thorax draining into the superior vena cava, while on the left side of the vertebral column hemiazygos and accessory hemiazygos veins can be come across. Although important research has been conducted regarding the anatomy and the variability of the azygos vein, to the best of our knowledge the origin of the official term “azygos vein” has never been determined. The current study is an effort to clarify the making of the term and the process that was needed until its modern concept.

## History of the origin of the term “azygos vein”

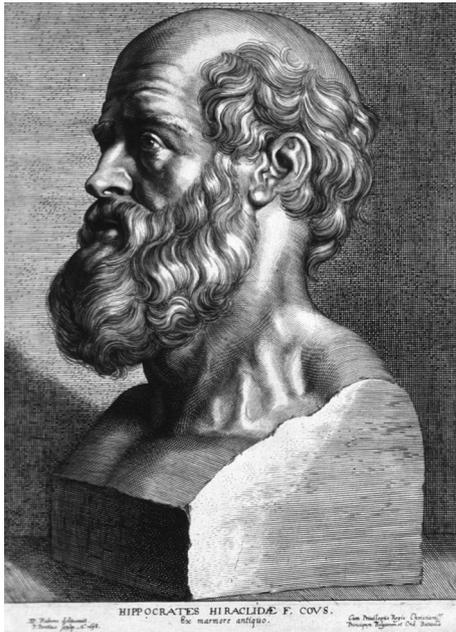
Hippocrates (Fig. 1) did not make any mention with regard to the azygos vein. In his great work entitled “About sacral disease” (Περὶ ἱερῆς νόσου), he said “Καὶ ἡ μὲν ἀπὸ τοῦ ἥπατος ᾧδ’ ἔχει· τὸ μὲν τι τῆς φλεβός κάτω τείνει διὰ τῶν ἐπὶ δεξιὰ παρ’ αὐτόν τόν νεφρόν καὶ τὴν ψυῆν ἐς τὸ ἐντός τοῦ μηροῦ, καὶ καθήκει ἐς τόν πόδα, καὶ καλέεται κοίλη φλέψ· ἡ δὲ ἑτέρα ἄνω τείνει διὰ φρενῶν τῶν δεξιῶν καὶ τοῦ πλεύμονος· ἀπέσχιστα δὲ καὶ ἐς τὴν καρδίην καὶ ἐς τόν βραχίονα τόν δεξιόν· τὸ δὲ λοιπὸν ἄνω φέρει διὰ τῆς κληΐδος ἐς τὰ δεξιὰ τοῦ ἀυχένου, ἐς αὐτὸ τὸ δέρμα, ὥστε κατάδηλος εἶναι· παρὰ δὲ τὸ οὖς κρύπτεται καὶ ἐνταῦθα σχίζεται..” that means: “And the vein that arises from the liver displays the following directions: one part of that vein is directed to the right, along the kidney and the psoas muscle, to the medial aspect of the femur and reaches the foot· that vein is called vena cava· the other vein is directed upwards between the right portion of the diaphragm and the lung, provides a branch to the heart and the right arm and its rest part ascends from the clavicle to the right of the neck underneath the skin, where it is seen clear” [16]. From that text, it is apparent that Hippocrates did not mention the existence of a vein (azygos) to the thorax, since he stated that the (superior) vena cava directs upwards bifurcating to the jugular and subclavian vein.

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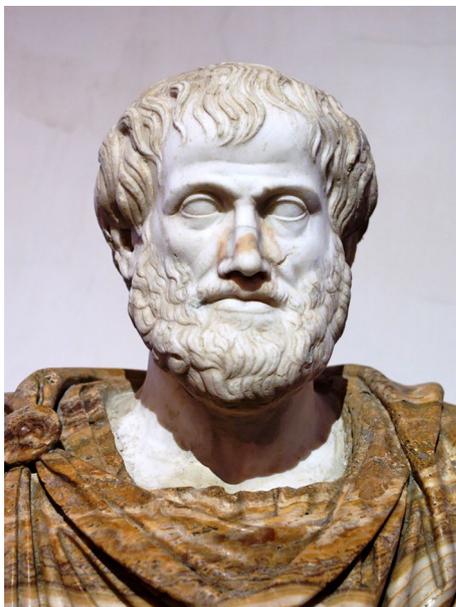
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**Fig. 1** Hippocrates of Kos (460–370 BC). The Greek physician often referred to as the “Father of Medicine”. Public domain

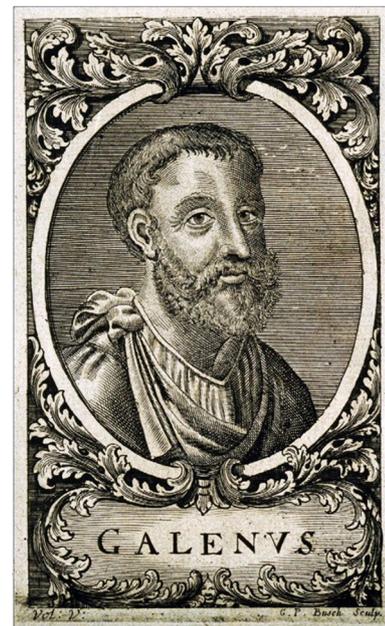
Aristotle (Fig. 2) in his great treatise entitled “About the histories of animals, part 3” (Τῶν Περί τὰ ζῶα ἱστοριῶν) reported: “Ἡ δ’ ἐπὶ τὸν σφόνδυλον τοῦ τραχήλου τεινούσα φλέψ καὶ τὴν ράχιν πάλιν παρὰ τὴν ράχιν τείνει..ἀπὸ δὲ ταύτης τεινούσι παρὰ τὴν πλευρὰ ἐκάστην φλέβια καὶ πρὸς ἕκαστον τὸν σφόνδυλον, κατὰ δὲ τὸν ὑπὲρ τῶν



**Fig. 2** Aristotle (384–322 BC). The ancient Greek philosopher. Public domain

νεφρῶν σφόνδυλον σχίζεται διχῆ”, which means: “The vein (that arises from the great vessel, thus the vena cava) that is directed to the vertebra of the neck and the back is once again coursing posteriorly adjacent to the vertebral column... From that vessel small vessels are originating nearby to each rib and each vertebra and at the vertebra superior to the kidneys, the vessel bifurcates to two vessels” [2]. The vein that directs to the vertebra of the neck presumably corresponds to the brachiocephalic and internal jugular vein, whereas the vessel that directs posteriorly adjacent to the vertebral column and provides small vessels nearby to each rib and vertebra presumably is the azygos vein, due to its similar direction and the costal vessels are similar to the intercostal vessels of the azygos vein. Furthermore, that vessel bifurcates, at the height of the vertebra above the kidneys, likely the twelfth thoracic or first lumbar vertebra, into two vessels, presumably the ipsilateral ascending lumbar and subcostal vein.

Galen (Fig. 3) in his work entitled “On anatomy of veins and arteries” (Περὶ φλεβῶν καὶ ἀρτηριῶν ἀνατομῆς) described the azygos vein as follows: “Κατὰ δὲ τὸν αὐτὸν τρόπον ἐπὶ μὲν τῶν πλείστων ζῶων εἰς τὰ τοῦ θώρακος ἀριστερὰ μέρη φέρεται φλέψ, ἐπιβαίνουσα τῷ πέμπτῳ τοῦ μεταφρένου σπονδύλῳ. Τοῖς πιθήκοις δ’ ἀνωτέρω βραχὺ τοῦ τῆς καρδίας ὡτὸς ἐν τοῖς δεξιῶις φλέψ αὕτη τέτακται, καταφερόμενη μὲν ὁμοίως κατὰ τὴν ράχιν, εἰς ἅπαντα δὲ διανεμομένη τὸν θώρακα, πλὴν δυοῖν, ἔστι δ’ ὅτε τριῶν τῶν πρώτων μεσοπλευριῶν” [10], which means: “In the same manner in most animals a vein runs to



**Fig. 3** Galen of Pergamon (129–200 AD). Greek physician, surgeon and philosopher in the Roman Empire. Public domain

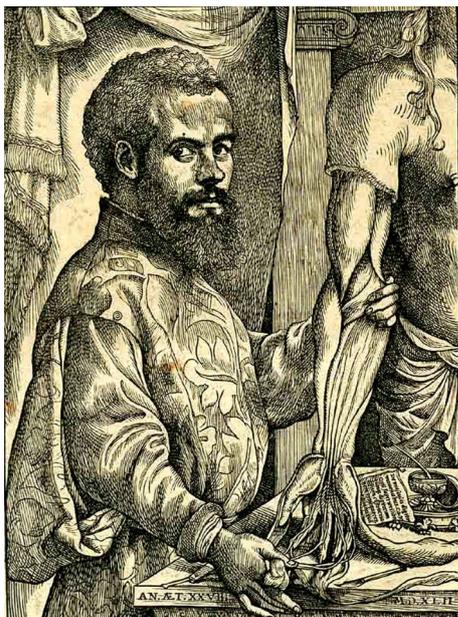
the left surface of the thorax, reaching the fifth vertebra of the back. In the monkeys, slightly higher than the auricle of the heart, a vein placed on the right, running down along the spine, is distributed to the whole thorax, except the first two or three intercostal spaces” [14]. Galen described properly the direction of the azygos vein from the region of the fifth vertebra to the left parts of the thorax. Usually, the classical anatomical textbooks describe the course of the azygos vein as located at the right aspect of the thoracic vertebrae [25]. However, in Gray’s Anatomy is stated that the azygos vein often passes left of the midline in part of its course [42]. In particular, Saito et al. found the azygos vein on the left in 94% [31], whereas Nathan found an incidence of 53% [27]. Although classical standard anatomical textbooks mention that the arch of the azygos vein corresponds posteriorly to the level of the fourth thoracic vertebra [23, 42], recent studies show that the azygos vein most commonly joins the superior vena cava at the level of the fifth thoracic vertebra. In particular, Shen et al. demonstrated that the azygos vein terminated at the level of the fifth thoracic vertebra in 47% and at the level of the fourth thoracic vertebra only in 10% [33], whereas Mirjalili et al. mentioned that the azygos vein most commonly terminated at the level of the fifth thoracic vertebra in 49% of the material [24] and Uzun et al. reported that the incidences were 48% and 17.3%, respectively [39]. Thus, it is apparent that Galen observed clearly that the termination of the azygos vein was located at an inferior vertebral level than it is usually considered in the standard textbooks. Furthermore, he noted that the azygos vein terminated into a vessel that was located higher than the auricle of the heart, thus the superior vena cava. An additional proper Galen’s notice was his claim that the first two or three intercostal spaces are not supplied immediately by the azygos vein. Indeed, the first intercostal vein is drained to the right brachiocephalic or vertebral vein, whereas the second to third or fourth intercostal veins form the superior or supreme intercostal vein that joins the azygos vein [42].

Galen in another work of his own entitled “On anatomical procedures” (Περὶ ἀνατομικῶν ἐγχειρήσεων) wrote with regard to the azygos vein: “ἐπισκέψαι δὲ καὶ ὅπως ἀπὸ τῆς κατὰ τὸ δεξιὸν οὐσῆς κοιλότητος ἦπει τις φλέψ ἐπὶ τῆν ῥάχιν, ἀναβαίνουσα τῷ πέμπτῳ τοῦ μεταφρένου σπονδύλῳ, καὶ ὡς ἡ φλέψ αὕτη παραγίγνεται μὲν ἀεὶ πρὸς τοῦτο τὸ χωρίον ἐπὶ πάντων τῶν ζώων, ἐν οἷς ἐρρήθη γυμνάζεσθαι σε κατὰ τὰς ἀνατομὰς· οὐ μὴν ἐπὶ πάντων γ’ ἀπὸ τοῦ δεξιῶ τῆς καρδίας ὡτός, ἀλλ’ ἐπ’ ἐνίων, ἐπειδάν ἡ κοίλη φλέψ παρέλθῃ τοῦτο, πρὸς τὴν σφαγὴν ἀναφέρεται. Τοῦτων τῶν ζώων εἰσὶ καὶ οἱ πίθηκοι” [11], which means: “Observe too how a vein comes to the spine from the hollow cavity on the right, mounting on the fifth dorsal vertebra, and how this vein always reaches this region in all those animals on which you were advised to gain anatomical experience. But it does not (arise) from the right auricle in all animals,

but in some where the vena cava passes through the auricle it is carried up to the neck. Among such are the apes” [34]. Galen in this text emphasized that although azygos vein arises in most animals from the left atrium of the heart, in species, such are the apes, the vein arises from the superior vena cava as it occurs in humans.

In Galen’s work “Hippocrates De acutorum morborum victu liber et Galeni commentarius” (Ἱπποκράτους, Περὶ διαίτης ὀξέων νοσημάτων βιβλίον καὶ Γαληνοῦ), Galen stated: “ἀποφύσεις δὲ αὐτῆς, πρὶν ἐπὶ τὴν καρδίαν ἀφικέσθαι μεγάλων μὲν φλεβῶν εἰς τὸ διάφραγμα, μικρῶν δὲ εἰς τὸ τοῦ θώρακος αὐτοῦ κάτω μέρος τῶν ὀκτώ πλευρῶν, ὃ ὑπὸ μιᾶς ἀζύγου τρέφεται φλεβός, ἐπὶ μὲν ἐνίων ζώων ἀνωτέρω τῆς καρδίας ἀποφυομένης, ἐπ’ ἐνίων δ’ ὡσπερ καὶ ἐπ’ ἀνθρώπων, καθ’ ὃ μέρος ἢ δὴ ψαύει τοῦ τῆς καρδίας ὡτός ἢ κοίλη φλέψ. Ἐντεῦθεν γάρ ἀποφυομένη ταπεινότερα φέρεται διὰ τῆς καρδίας ἐπὶ τὴν ῥάχιν κατακαμπτομένη. Αὕτη μὲν οὖν ἡ φλέψ εἰς τὰ κάτω μέρη τοῦ θώρακος μερίζεται ταῖς ὀκτώ πλευραῖς ἐκατέρωθεν ἄχρι τοῦ διαφράγματος· αἱ δ’ ὑπόλοιποι τοῦ θώρακος ὑψηλαὶ πλευραὶ τέσσαρες ὑπὸ συζυγίας ἄλλης τρέφονται φλεβῶν, ἀποφυομένων τῆς κοίλης πρὶν εἰς τὰς σφαγίτιδας σχισθῆναι” [12] that means: “(the superior vena cava) prior to its drain into the heart, provides large veins to the diaphragm and small veins to the inferior part of the thorax at the region of the lower eight ribs, a part that is supplied by a not paired (ἀζυγος) vein, that in some animals arises above the heart and in some animals as well as in humans arises from the point where the vena cava enters the auricle of the heart. From that point the vein comes from the heart inferiorly, bending to the back. That vein in the inferior parts of the thorax is distributed to the (inferior) eight ribs bilaterally up to diaphragm· the rest superior four pairs of ribs of the thorax are nourished by other veins arising from the (superior) vena cava prior to its bifurcation to the jugular veins”. In this text, Galen for the first time in the literature utilized the term “ἀζυγος φλέψ” (azygos vein), however, not as an official anatomical term but rather as an adjective to the term “vein”, describing the no existence of a similar paired vein on the left side. Once again Galen emphasized the fact that this vein nourishes the inferior eight ribs (he means the intercostal spaces) an appropriate notice since the superior three or four intercostal spaces are nourished from the ipsilateral superior intercostal vein. At this text, Galen pointed properly the fact that the (right) superior intercostal vein originates by the (superior) vena cava prior to its bifurcation to the jugular veins, thus from the ipsilateral brachiocephalic vein. Moreover, Galen claimed that in some animals azygos vein arises just above the heart, but in other animals as well as in humans it arises from the junction point of the auricle and superior vena cava.

Andreas Vesalius of Brussels (1514–1564) (Fig. 4), the famous Renaissance anatomist and surgeon [36], studied the



**Fig. 4** Andreas Vesalius (1514–1564). The founder of modern human anatomy. Public domain

anatomy of the azygos vein meticulously and in a systematic way in his work “The Venesection Letter”, in Latin “Epistola, docens venam axillarem dextri cubiti in dolore laterali secundam”, which was published in 1539. This study was published a few years before the publication of his great work “De humani corporis fabrica” (1543) and contained an analytical description of the azygos vein, which he compared to the description made by Galen. The “Venesection Letter” was written while an intense dispute between physicians was taking place in reference to venesection method in pleurisy. Vesalius supported that veins on the right arm should always be opened, independently from which side the pleurisy exists, due to the existence of the azygos vein only on the right side, which drains the blood directly to the right basilic vein [32]. For that reason, he considered absolutely necessary to clarify the topographical anatomy of the vein as it is proved by his own words.

In the “Venesection Letter”, one can find an analytical description of the azygos vein, but if we are to understand him, we must bear in mind that Renaissance anatomists still considered the right and left auricles as part of the vena cava and pulmonary veins, respectively [19]. Vesalius’ exact words were: “Deductis his propaginibus, cava vena cordis dextrae auriculae firmissime adnata, paululum que ad longitudinem saepe unius vertebrae ascendes, ex dextra sui parte, in simiis, canibus aliis que proxime hominem referentibus animalibus..” [41], which means: “These extensions having been given off, the vena cava, attached very firmly to the right auricle of the heart, ascending a little, frequently the width of a single vertebra, distributes a vein

[azygos vein] from its right side, which compares in apes, dogs and other animals closely to that in man”. Vesalius provided information regarding the azygos vein of humans and animals and comments on the similarity of the anatomy of the vessel in both of them. Moreover, as it is obvious in his following words, his anatomical knowledge was gained through dissections and observation, proving Vesalius’ true scientific mentality: “Huic ego de venae ortu percunctati, praeter oculatam fidem, nihil in rei testimonium adferre possum. Quantumvis nam que operose & industrie vena caeve divaricationi animum adhibuerim, perpetuo supra cordis auriculam, venam sine pari, non aliter at que in canibus ac fimiis, in hominibus propagatam deprehendi” [41] which means: “To this question of the origin of the vein I can add no other testimony except ocular belief. However carefully and industriously I have studied the branches of the vena cava I constantly find the vena azygos given off in men, no differently than in dogs and apes, above the auricle of the heart” [32].

Vesalius described the course of the azygos vein in agreement with the modern anatomical textbooks, on the right side of spine, giving the intercostal veins on both sides. Vesalius’ own words were: “venam dispargit, quae dextrae spinae regioni innixa, deorsum ad ultimam us que thoracis vertebra ac prima secundam que lumborum contorquetur, ac utrinque que singulis sibi correspondetibus costarum intervallis, singulos ramos satis insignes communicat” [41], which means: “The vein interconnecting the right spinal region is reflected downwards all the way to the last thoracic vertebra and the first and second lumbar and gives off, on both sides, to each of its corresponding costal intervals distinct single branches” [32]. According to classical anatomical textbooks [42] and recent studies [20], the azygos vein is more commonly anterior to the vertebral column and often passes to the left of the midline for part of its course. As it is abovementioned, researchers such as Saito et al. [31] and Nathan [27] noted specific incidence of left-sided azygos vein.

Vesalius provided specific conclusions regarding the vertebral level, where the azygos arches to the vena cava: “Sub cordis autem basi, aut priusquam cor cava vena attingit, eam enasci, nemo vel qui ipse secandi munus obierit, vel qui secantem spectarit, afferent. Haec quidem eo induxi, ut commonstrem hanc supra cordis auriculam venam que in cor dispersam, super quartam & sere tertiae metaphreni vertebrae sinem a cava etiam in hominibus productam” [41] which means: “But no one who has either engaged in the task of dissecting personally or who has observed a dissection will allege that it arises under the base of the heart or before the vena cava reaches the heart. I have drawn attention to these things that I may show that this [vein] above the auricle of the heart and that distributed to the heart arise from the cava, even in man, above the fourth and almost at the end of the

third metaphrenic vertebra.” Vesalius described the azygos vein arching to the level of the fourth thoracic vertebra and ending to the right cavity of the heart in agreement to modern anatomical textbooks, where the azygos vein arches to the level of the fourth thoracic vertebra and ends to the right atrium of the heart through the superior vena cava [27, 42]. However, as it is abovementioned recent studies prove that the azygos vein joins the superior vena cava at the level of the fifth thoracic vertebra, a level that has been mentioned by Galen.

Vesalius insisted on the existence of the right-sided azygos vein: “Est & aliud circa praesentis venae initium non oscitanter obseruandum, eam nimirum, ut prius quo que admonui, a cave dextro latere enatam, non autem (quod forte quispiam Anatomes ignarus, at que depravato Galeni loco in libello de Venarusectione illusus affereret) ex ipsius sinistro, aut medio qua spinam cava respicit enata” [41] which means: “There is another feature concerning the origin of the above vein which must not be carelessly overlooked. It undoubtedly arises, as I have also previously suggested, from the right side of the cava but does not derive (as perhaps someone ignorant of anatomy and deceived by the corrupted passages in Galen’s little book *De venarum sectione* might assert) from the left side or from the middle of the cava where it faces the spine”. Vesalius did not hesitate to strongly disagree with knowledge widely accepted during his era, as Galen’s anatomy was, and this was one of the reasons he was rejected by his teacher Jacobus Sylvius [3, 38]. However, Vesalius misinterpreted Galen claim, since the latter one did not state that the azygos arises from the left side of the cava, but it curves to the left part of the thorax, as usually does.

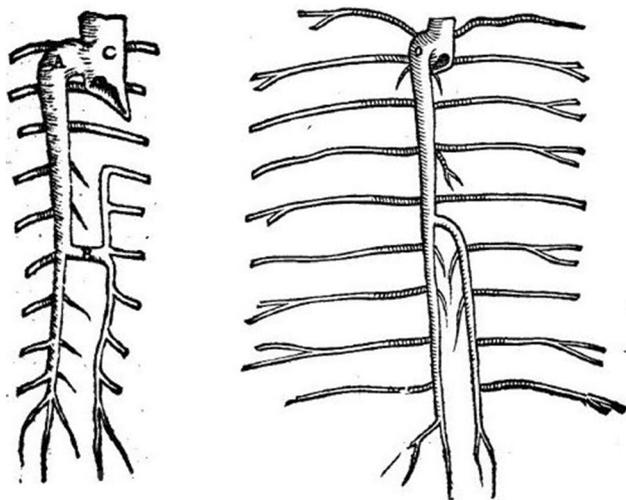
Vesalius in his “Venesection Letter” informs us in detail about the anatomy and the course of the azygos vein and the neighboring structures: “Quod si quis inficiabitur, ob oculos fidelissimos rerum testes coram ei obijciam, quibus si orbatu quispiam huiusce rei aliud requirat testimonium, is per me vel solo tactus sensu evadet certissimus, modo secanti mihi haud dedignetur assistere, vel prestantissimorum viro-rum iudicii assentiri non detrectet. Caeterum miraberis forsitan, cur adeo religiose de vene huius ortu disceptem. Non ob aliud sane, quam ut nove & aliquando decem inferiores utriusque lateris costas, ea nutriri mihi annuas, illamque a venae cavae dextro deductam largiaris: praesertim quum norim, non ad manum ilico corpus humanum fore, ex quo haec (si absurdiora duxeris) contemplari queas. Adde & meae propositionis robur, hinc imprimis desumendu. Sed ad reliquas venae cavae soboles revertamur” [41] which means: “But if anyone should be tainted, I shall present in his presence and before his eyes, the most faithful witnesses, or if deprived of these and needing other testimony, he through me or by the sense of touch alone will be set aright if he does not disdain to be present when I am dissecting, or decline to

agree with the judgment of the most eminent men. For the rest, you may perhaps wonder why I discuss the origin of this vein so conscientiously. For no other reason, to be sure, than that you may grant me that nine and sometimes ten of the lower ribs of either side are nourished by it and that you concede that it is given off on the right side of the vena cava; especially since I know a human body will not be available on the spot from which you could observe these things (if you should consider this unreasonable). Hence the force of my argument must be considered” [32]. Once again Vesalius emphasized the importance of observation while seeking scientific truth. He took no previous anatomic information for granted, he was obligated to dissect, observe and prove before he displayed any results. Moreover, Vesalius tried to prepare an argument in reference to the venesection method in cases of pleurisy. Since the azygos vein lies on the right of the thorax, absent on the left, phlebotomy on the right basilica vein favors the treatment of pleurisy, independently from which side pleurisy exists. This was the argument that made Amatus Lusitanus to begin a scientific controversy which led to the discovery of the valves of the azygos vein and the systematic study of the valves of the veins in general [9].

Vesalius also provided us with an excellent theory regarding the derivation of the term “azygos”. “Deinde non praeter rationem, hanc inter caeteras ras venam coniuge carentem ac sine pari Latinis, Grecis vero ἄζυγη passim appellatam legimus. Siquidem ita nominari meretur, quod ex latere opposito nullam sibi correspondentem venam sortitur” [41] which means: “We read that this particular vein lacking a mate was usually called, not without reason, *sine pari* in Latin, ἄζυγη in Greek. For it deserved to be so named as no vein corresponding to it chances to exist on the opposite side...” [32]. In that point, we have to add that the term “azygos” or in Latin “sine pari” was probably regenerated by Vesalius’ teacher Jacobus Sylvius (the Latinized name of Jacques Dubois) (1478-1555) (Fig. 5), the famous French anatomist, after the first use of the term by Galen. Anatomical nomenclature was in great disorder till the time of Jacobus Sylvius, and there can be no doubt that in this, as in other matters, Vesalius owed him a not inconsiderable debt [35]. Sylvius gave separate names to many blood vessels, which Galen ignored, and are still used today, such as jugular, subclavian, axillary vein [3]. Jacobus Sylvius is considered as the founder of the modern anatomical terminology, and is the first anatomist to give names to most of the muscles, nerves and vessels [8]. Sylvius explained why he invented new terms in the preface of his second book: “Imitating Hippocrates and Galen, we amused ourselves with new names of some parts, especially of veins, arteries and muscles, for the sake of brevity of speech and perspicuity of thing” [37]. He probably introduced us again the term “azygos”, not as an adjective to the unpaired vein lying on the right



**Fig. 5** Jacobus Sylvius (1478–1555). French anatomist and teacher of Vesalius. Public domain



**Fig. 6** Drawings made by Vesalius where the azygos vein is displayed together with hemiazygos and accessory hemiazygos vein. From “De Humani Corporis Fabrica treatise”. Public domain

of the thorax, but as an official term, which can be found in the works of his students Vesalius and Estienne, published before Sylvius’ famous “Isagoge” in 1555. Vesalius, in his “Fabrica” mentioned first to the best of our knowledge officially the term “sine pari” (Fig. 6) [40], but he did not mention the name of his teacher Sylvius, presumably due to a conflict that he shared for years with his teacher. With regard to the hemiazygos vein Vesalius in the same treatise probably described firstly the presence of hemiazygos vein

as follows: “ipsius ramu, qui in sinistra ductus, in plures digeritur propagine” [40], which means: “A left sided duct being a ramus of the azygos vein that is ramified in many branches”. Estienne in his work “De dissectione partium corporis humani libri tres” published in 1545 utilized the term “sine pari” and described the anatomy and course of the vessel [6]. In the following text are the words of Jacobus Sylvius where he used the term “azygos” vein, as he explained the role of the valves of the veins: “There is also a similar projection of membrane at the mouth of the *vena azygos* and often at those of several other large vessels, such as the jugulars, brachial and crural veins and the trunk of the vena cava as it leaves the liver. The use of these is the same as that of the membranes closing the mouths of the vessels of the heart” [19].

To the best of our knowledge, anatomists before Vesalius and Sylvius did not use that term neither in Greek nor in Latin. In specific Berengario de Carpi (1460–1530) in his anatomic textbook “Isagogae breues et exactissimae in anatomia humani corporis” published in 1530, having already studied and commented on the “Anathomia Mundini”, did not mention the term “azygos” or “sine pari” vein [4, 22]. As we searched through the Latin text of Mondino’s de Luzzi famous work “Anathomia corporis humani”, which was published in 1316 and remained for two centuries a classical anatomical textbook [21], we did not come across the term “azygos” or “sine pari” [26]. Taking into account that Mondino as well Berengario de Carpi did not make any mention of the “azygos” vein or “sine pari” vein, it is apparent that Sylvius and Vesalius are the first anatomists dealing with the onomatology of that vein. The term cannot be found neither in the works of the Byzantine physicians Paul of Aegina (seventh century AD) [1], Theophilus Protospatharius (seventh century AD) [30] and Oribasius (fourth century AD) [28], nor in the “Onomasticon” by the Greek scholar Julius Pollux (second century AD) [29] or the Canon of the Persian Avicenna (eleventh century AD) [15], although their works are not considered classical anatomical textbooks. Furthermore, Rufus of Efesus (late first century AD) in his work “Περὶ τῶν τοῦ ἀνθρώπου μορίων” (On the names of the parts of the body) did not make any relative mention to the azygos vein [13].

After the publication of the first edition of “Fabrica” in 1543 the contemporary authors, such as Bartolomeo Eustachio described or represented that vein as “sine pari” or “azygos vena”. Especially Eustachio in his eight plate of his famous work “Tabulae Anatomicae” (Anatomical Engravings) that completed in 1552, but published by Giovanni Maria Lancisi in 1714 utilized the term “azygos vena” [7]. Furthermore, Realdo Colombo, the successor of Andreas Vesalius in his treatise entitled “De re Anatomica” that published in Venice in 1559, utilized the terms “ἄζυγον ἢ venam sine pari” [5]. It is apparent that after Vesalius the

term “azygos vena” had been established in the official international anatomical nomenclature. In specific, in the Basle *Nomina Anatomica* (1895) that is the first official internationally accepted anatomical terminology, as well as in the next editions of *Nomina Anatomica*, the term “azygos vena” is introduced [17]. The term “hemiazzygos vena” of Greek origin is introduced by Albert von Haller in approximately 1776 in his work entitled “*Elementa Physiologiae Corporis Humani*” [18].

## Conclusion

An effort to determine the origin of the term “azygos vein” has been made in the current study, which proved Galen to be the first physician and anatomist who utilized the term “azygos” as an adjective to the vein lying on the right side of the vertebral column in the thorax. Thousands of years later Jacobus Sylvius and Andreas Vesalius, while naming many anatomical elements, granted the name “azygos” in Greek or “sine pari” in Latin for the specific vein. The term “azygos vein” was maintained until nowadays and constitutes an official internationally accepted anatomical term.

**Author contributions** All authors declare that they have participated equally in the preparation of the manuscript.

## Compliance with ethical standards

**Conflicts of interest** The authors declare that they have no conflict of interest.

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