First Find Your Part, Then Name It.

This paper will exemplify the theme Language Growth and Transition by examining the development of a technical terminology for certain portions of the heart and its related vessels. This development may be traced in writings on medicine in general and anatomy in particular over a period of something like 2500 years, from the ancient Greeks to the modern international nomenclature (which is in Latin). In these writings we can observe the increasingly detailed knowledge of the structures of the heart and the consequent need for new terminology to keep pace with the new discoveries; this is the growth alluded to in the series title. We can also examine the process of translation into Latin which made the writings of the ancient Greek researchers available to the medieval and later world; this is the transition of the series title. Taken together these studies open up a fascinating and much neglected field of research into linguistic and medical history.

Many authors supply evidence for heart terminology over this period; but three stand out as of particular importance because they have written at some length and in some detail about the heart. They are Aristotle, Galen and Vesalius, and they will form the framework of our discussion. But before we examine in detail the terminology they use with reference to the heart we may usefully spend a moment setting them against their historical background in medical research and hence indicating the reasons for choosing them.

Historical background

Aristotle, the greatest research scientist of antiquity, lived in the 4th century BC (384-322). His treatises A Study of Animals and Parts of Animals contain detailed descriptions of the heart and vascular system

1 Aristotle: Historia Animalium I 17 (496a 4ff) and III 3 (513a 16ff).

insofar as these were known in his time. He represents the period before the scientific study of human anatomy from human material began. He writes at one point:³ “The internal parts of the human body are for the most part unknown, so that in studying them one must have recourse to the parts of other animals to which their nature is similar.” Animal anatomy is now known to be a very fallacious guide to human anatomy, a fact which renders Aristotle’s descriptions of supposedly human anatomy sometimes difficult to interpret; yet this Aristotelian method is still apparent in the work of Vesalius nearly 2000 years later. For our present purposes Aristotle represents the backdrop against which the drama of heart research has been and is still being played.⁴

Galen, the greatest medical writer of antiquity, lived in the second century AD (129-c199). There are detailed descriptions of the heart in his treatises On the Function of the Parts⁵ and On Anatomical Procedures,⁶ and there is a short but very important passage in On the Doctrines of Hippocrates and Plato⁷ in which he talks about the valves of the heart. The period between Aristotle and Galen saw the inauguration by Herophilus and Erasistratus at the Museum in Alexandria of the scientific study of human anatomy from human material; the explosion of knowledge about the human heart to which this led is very apparent when Galen’s descriptions are compared with Aristotle’s. The writings of Herophilus and Erasistratus and other important figures within this period have not survived; Galen’s outstanding importance is due in large part to the fact that in his voluminous works he records a great deal about the discoveries and teachings of his predecessors, and thus informs us, for instance, that it was Erasistratus who first made detailed observations of the valves of the human heart and correctly deduced their function.⁸

³ op. cit. note 1 above, I 16 (494b 22).
⁴ Aristotle has been chosen in preference to the Hippocratic corpus (which includes a treatise On the Heart) because there is much uncertainty over the dating of the corpus.
⁵ Galen: De Usu Partium VI and XVI 10ff.
⁶ Galen: De Anatomicis Administrationibus VII.
⁷ Galen: De Placitis Hippocratis et Platonis VI 6.

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therefore represents for us the great period of ancient Greek medical research, a period which, as Galen was himself aware, had already come to an end before his time.

Andreas Vesalius is the great renaissance researcher into human anatomy; his work *On the Fabric of the Human Body* stands at the beginning of the modern revival of anatomical research, after it had been largely in abeyance since Galen's time. He lived in the 15th century AD (1514-65); his great work was published in 1543 when he was only 28 years old. A veteran already of many dissections, he had discovered that the anatomy described in Galen's works (which had enjoyed for many centuries a reputation for infallibility) was often that of apes or domestic animals rather than of humans; and one of his avowed aims in his work was to set the record straight. He was experienced as a translator from Greek into Latin, having been previously involved in a venture for a publisher to provide corrected and updated translations into Latin of Galen's works. He was therefore interested in terminology as such, and not only supplies lists of terms in his work but frequently comments on their usage as well.

Vesalius' importance for our present purpose is twofold. Firstly, he represents the process of transition involved in translating Greek terminology into Latin. Such translations began about the time of Cicero (1st century BC), who included an anatomical passage in his *On the Nature of the Gods*. In the early first century AD Celsus made extensive use of Greek sources in compiling and writing (in Latin) his *On Medicine*. Slightly later in the same century the elder Pliny made much use of Greek sources in compiling his encyclopedia entitled *Natural History*; this work too is in Latin. These three authors are basic sources for the early history of Latin terminology, and Vesalius had read them. In the area of the heart, however, they are a little disappointing: Celsus dismisses the heart in a single brief sentence, and Pliny in a single brief paragraph. I shall mention them when they are relevant as background to Vesalius's work.

8 ib.

9 Cicero: *De Natura Deorum* II 133-9.

10 Celsus: *De Medicina* IV 1 4: "To this [i.e. the lung] is attached the heart, which is muscular by nature and lies within the left breast; it has, as it were, two ventricles (duos quasi ventriculos)."

Secondly, Vesalius represents the beginning of another explosion of knowledge about human anatomy, which built on the achievement of the ancient Greek researchers. This would give rise in AD 1628 to William Harvey’s epoch-making discovery of the circulation of the blood, as detailed in his treatise On the Movement of the Heart. Like Vesalius’ work, this treatise is in Latin, and I shall make reference to it where relevant. From Vesalius and Harvey there is a direct line of development to the modern international nomenclature.12

Heart

The Greek word for ‘heart’ is kardia; the Latin is cor (genitive cordis). The Greek word is as old as Homer (perhaps 8th century BC) and even older, for the three words kardia, cor and heart are cognate and go back to the parent Indo-European language. They hardly qualify as technical terminology in the present context and will therefore not be further discussed.

The shape of the heart was known in Aristotle’s time, but there is no specific terminology: he refers simply to ‘the blunt end’ (to kyrton)13 and ‘the sharp end’ (to oxy)14 or ‘the peak’ (to akron).15 As the blunt end is on top it had come by Galen’s time to be called the head: Galen writes:16 “[The heart is not perfectly spherical but,] starting from a broad and circular base (basis) on top, called its head (kephale), gradually decreases in size like a cone and at its lower end becomes thin and narrow.” Vesalius retained this terminology, translating kephale into Latin as caput.17

12 As my authority for the modern international nomenclature I have used Feneis, H.: Pocket Atlas of Human Anatomy (Thieme 1985).

13 ib. 496a 11.

14 op. cit. note 1 above, 496a 12.

15 op. cit. note 2 above, 666b 2.

16 op. cit. note 5 above, VI 7.

17 Vesalius, A.: De Humani Corporis Fabrica VI 14 ad init.
Greek word *basis* had been borrowed into Latin in the classical period, so that Celsus was able to use it anatomically with reference to the base of the brain (*basis cerebri*);\(^ {18}\) it was well established anatomically by Vesalius’s time, and he used it for the base of the heart.\(^ {19}\)

The sharp end still had no specific name in Galen’s time; he refers to it simply as 'the lower end' (*to kato peras*).\(^ {20}\) Perhaps he implies a reason for this lack of name when he writes: \(^ {21}\) “This portion of the heart [the sharp end] is the least important, the most important being that from which the vessels grow out.” In Vesalius we find that the sharp end has become *mucro*,\(^ {22}\) the Latin word for the sharp end of various objects including a sword. Celsus uses *mucro* only of a weapon\(^ {23}\) or a surgical implement;\(^ {24}\) the elder Pliny is our earliest witness for its use to designate the sharp end of the heart.\(^ {25}\) Vesalius followed Pliny’s lead, but applied the word also to other pointed parts of the body, including the pointed cartilage at the lower end of the breast bone.\(^ {26}\) The modern terminology has abandoned this word with reference to the heart and instead uses *apex*, now a general word for the sharp top of anything, but which had started life in Latin as the word for the pointed cap worn by certain priests (it does not appear in Celsus). We have therefore moved hardly at all from the Aristotelian *to akron* ‘the peak’.

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18 op. cit. note 10 above, V 26 2.

19 op. cit. note 17 above, VI 9 init.

20 op. cit. note 5 above, VI 7.

21 ib.

22 op. cit. note 17 above, VI 9 passim.

23 op. cit. note 10 above V 26 3A.

24 ib. VII 7 4B.

25 loc. cit. note 11 above.

26 He describes it as “the mucronate cartilage”: op. cit. note 17 above, I 19 ad fin.
Aristotle is the earliest author to record that the heart has more than one chamber inside it: his word for these is koiliai. Koilia is an abstract noun meaning ‘hollowness’; like other abstract nouns it could be used to denote concrete instances of this quality. It had earlier been applied by Herodotus to the human abdomen27 and by Hippocrates to the chambers in the lungs;28 now we find Aristotle applying it to the chambers of the heart. He says that the heart has three koiliai, thus causing authorities from Galen on to speculate on what he meant; both Galen29 and Vesalius30 address the problem, which is, however, irrelevant for the present purpose.

Galen repeated Aristotle’s word koilia for the ventricle, and was aware that the heart has only two. Cicero is our earliest witness for the translation of koilia into Latin as uentriculus: he refers in On the Nature of the Gods to the part of the heart “which they call the ventricle of the heart (uentriculus cordis)”.31 We notice here the defining cordis ‘of the heart’, due to the fact that koilia, as we saw, could refer also to other entities, including the abdomen, for which the usual Latin word is uenter. Venticulus is the diminutive of uenter, and Celsus applied it specifically to the stomach, which he defines as ‘the receptacle of food’ (receptaculum cibi).32 He follows Cicero in using uentriculus for the chambers in the heart.33 The modern Latin technical term for the stomach is still uentriculus, that for a ventricle of the heart being uentriculus cordis with Cicero’s dependent genitive still intact.

27 Herodotus: Historiai II 87.
28 Hippocrates: De Articulis 41.
29 op. cit. note 5 above, VI 9.
30 op. cit. note 17 above, VI 12 ad fin.
31 op. cit. note 9 above, II 138.
32 op. cit. note 10 above, IV 1 6.
33 See the passage quoted in note 10 above.
We find in Galen that the heart, in addition to having two ventricles, has two ears (otae); he writes:34 "They are so called from their resemblance to ears, for they grow on either side of the heart as ears do on the head." Aristotle does not mention them, but they appear in the Hippocratic treatise *On the Sacred Disease*; here the author comments on the absurdity of calling them 'ears' when they do not hear anything.35 Vesalius translates using *auricula*, the diminutive of *auris* 'ear'; as none of the classical or Silver age authors mentions this feature of the heart we do not know if this use of the word goes back to the classical period. Vesalius comments that they owe their name to the fact that they resemble ears in appearance but not in function;36 he obviously has in mind the Hippocratic remark referred to above. The modern term is *auricula*.

**Vessels**

Aristotle writes:37 "The heart is the origin of the *phlebes*". He means that it is the origin of what would now be called the vascular system, for the sentence illustrates the well-established fact that in Aristotle's time veins and arteries were not distinguished, and the word *phleps* 'vein' was applied to either.

Aristotle recognised two main *phlebes* coming out from the heart. One of these he termed *megale phleps* 'the great bloodvessel'; he says that it is attached to the right ventricle38 and thus enables us to be sure that he is referring to what we now call the vena cava. To the other he gives the name *aorte*.39 This is presumably the feminine of an adjective *aortos* meaning 'suspendable' or 'hanging'; it appears in New Comedy about the same period to denote a shoulder-bag. The shape of what is now called the

34 op. cit. note 6 above, VII 9 init.
35 Hippocrates: *De Morbo Sacro* 20.
36 op. cit. note 17 above, VI 14 init.
37 op. cit. note 2 above, 665b 16.
38 op. cit. note 1 above, 513b 2.
39 ib. 496a 7, where it seems clearly to agree with *phlebi* understood.
arch of the aorta certainly resembles the handle by which something might be carried, and the original reference of the word *aorte* may have been to this shape.

As far as Aristotle is concerned, both these *phlebes* contain blood. He writes of them:40 "These are the first to receive the blood from the heart, and all the others are offshoots from them. It was pointed out earlier that they exist for the sake of the blood: liquids must have a receptacle, and the *phlebes* as a whole are this receptacle and the blood is in them." His word for ‘receptacle’ here is *angeion*, the standard Greek word for any type of container for liquids.

The word *arteria* ‘artery’ appears in Aristotle but does not refer to a bloodvessel. In fact it denotes the windpipe, and Aristotle took it over in this meaning from Plato’s *Timaeus*.41 He tells us that it contains air and nothing else, and writes:42 “If something solid or liquid finds its way into the *arteria*, it causes chokings and distress and harsh coughing.” He also indicates that at the bottom end it splits into two, one part going to each lung. There is thus no doubt of its meaning in this and other passages.

By Galen’s time the veins had been anatomically distinguished from the arteries. Galen writes:43 “Veins and arteries are alike in all respects except the thickness of their coverings; here the amount of difference between them was correctly calculated by Herophilus, who stated that the artery is six times as thick as the vein.” The Greek text of this sentence reveals an important shift in terminology since Aristotle’s time. *Phlebes* no longer applies to all the vessels in the vascular system; it has now been confined to what we know as the veins, and for the other system Aristotle’s word *arteria* has been pressed into service. To Aristotle, as we have seen, *arteria* was the windpipe, and the reason why the word was extended to the arteries is furnished by an ancient hypothesis about the human body whose originator is not known but which goes back at least to Herophilus’ teacher, Praxagoras of Cos. This theory said that after the

40 op. cit. note 2 above, 667b 16.
41 Plato: *Timaeus* 70d 2.
42 op. cit. note 2 above, 664b 5.
43 op. cit. note 5 above, VI 10.
air has entered the lungs through the windpipe (arteria) it travels on down into the left ventricle of the heart and from there is distributed through the vessels which go out from the left ventricle to the whole of the body. As these vessels were taking air around the body they were all therefore windpipes - arteriae - and that was how the word came to be applied to half the bloodvessels in the body. The point is that, according to this theory, these were air vessels; the bloodvessels went out from the right ventricle of the heart and continued to be called phlebes.

In Latin uena had been, like phleps, the word for any bloodvessel; when phleps was specialised in meaning uena was similarly affected. Latin had no equivalent for arteria and therefore borrowed the Greek word; Cicero is the earliest Latin author to pair uenae et arteriae 'veins and arteries' 44.

The exact function of the arteries was a matter of controversy among the ancient anatomists. Erasistratus had said that they have no blood in them at all, only air; others insisted that they do have some blood along with the air. Galen describes an experiment he made which proved that there is at least some blood in them; 45 but air was regarded as their main content in his time and for many centuries thereafter. This had various linguistic consequences.

(1) The two ventricles of the heart were given names, which Galen uses: the left ventricle, which handles air, was called the pneumatic ventricle, and the right one, handling blood, was the haematic ventricle. 46

(2) Phleps having now become specialised, angeion became the term for vessel in general. It survives in the word angiology, the study of bloodvessels.

(3) Arteria continued to denote the windpipe; but it was found desirable to be able to distinguish this from all the 'new' arteriae. So the windpipe, which has a number of cartilaginous rings around it, was given the adjective 'rough' (tracheia arteria), and the others, which have no such

44 op. cit. note 9 above, II 138.

45 Galen: An in Arteriis Natura Sanguis Contineatur VI.

46 op. cit. note 5 above, VI 12. Galen seems to imply that the terms went back to Erasistratus.
rings, were described (if it was necessary to mark the contrast) as ‘smooth’ (leiai arteriai). Galen uses this terminology and tells us that the smooth arteries are connected to the heart. But interestingly enough our earliest witness for the phrase tracheia arteria is in its Latin guise as aspera arteria, which goes back once again to Cicero, antedating all our Greek evidence; but he must be translating from Greek, for he had no technical expertise in this field. Cicero’s phrase was taken over by Vesalius; but the official name is now trachea, a latinised form of the Greek adjective meaning ‘rough’.

(4) If the arteries contain only or mainly air, why do they have to be six times as thick as the veins? Galen informs us of the reason: it is because air percolates easily through apparently solid objects and needs a very thick coat to prevent it from escaping. But there was another problem involved here. Of the two vessels which make connection with the right side of the heart and which should therefore be thin (because they were phlebes) one is indeed thin, but the other, which connects the lung with the right ventricle, is thick like an artery. So Galen calls this the artery-like vein (arteriodes phleps), a term which was invented by Herophilus, who made the original discovery about the thickness of the coats. Similarly on the other side, the aorta is undoubtedly an artery, but the vessel going to the lung is much thinner, like a vein; it was called the vein-like artery (phlebodes arteria) a name presumably invented by Herophilus in parallel with the other.

Vesalius translates this terminology directly into Latin, so that arteriodes phleps becomes arterialis uena and phlebodes arteria becomes uenalis arteria. Neither arterialis nor uenalis is classical; the classical adjective uenalis meaning ‘for sale’ is not connected with uena. Harvey used Vesalius’ terminology, and it was not until shortly after Harvey’s

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47 op. cit. note 6 above, VII 4.
48 op. cit. note 9 above, II 136.
49 op. cit. note 17 above, VI 4.
50 op. cit. note 5 above, VI 10.
51 Rufus of Ephesus, Onom. 203.
time that an Italian anatomist by the name of Marcello Malpighi got rid of these confusing designations by proposing the names *uena pulmonalis* ('pulmonary vein') for the vein-like artery and *arteria pulmonalis* ('pulmonary artery') for the artery-like vein. This is the modern terminology.

Aristotle had called the main vein ‘the great vein’; Galen returned to Hippocratic terminology and called it ‘the hollow vein’ (*koile phleps*). Cicero is our earliest witness for *uena caua* as a translation of this; Vesalius used the same phrase, which is also the modern designation. For the main artery Galen dropped Aristotle’s word *aorte* and called it simply ‘the great artery’ (*megale arteria*) or ‘the greatest artery’ (*megiste arteria*), thus producing a nice pair with ‘the great vein’: he was aware that most of the bloodvessels in the body are paired artery/vein. Vesalius translated Galen’s *megale arteria* into Latin as *magna arteria* and used this as his normal designation for this artery, recording Aristotle’s name in only one passage of his work.

Galen also knew that there are certain arteries and veins which nourish the substance of the heart itself. His phrase designating the arteries which do this is ‘the arteries actually belonging to the heart’; the veins he describes as ‘surrounding the heart like a crown’ (*peristephanousai ten kardian*). It is this expression which gave rise in Vesalius to the adjective *coronalis* ‘crown-like’, applied to both the veins and the

52 op. cit. note 35 above, 6.

53 op. cit. note 9 above, II 137.

54 Both phrases in op. cit. note 5 above, XVI 10.

55 op. cit. note 17 above, p. 394 (wrongly numbered 294). He writes of the aorta: “This artery was called by Aristotle *aorta* because its sinewy portion, which he said could be seen even in the dead, resembles perhaps the sheath which the Macedonians call *aorta*.”

56 op. cit. note 5 above, XVI 13.

57 Singular used at ib. VI 14.
arteries. The form of the adjective has been changed in the modern terminology to *coronaria*, perhaps to leave *coronalis* for the coronal suture.

**Valves**

Aristotle does not mention the valves of the heart. Galen inherited and used the classic description of them by Erasistratus, who had not only described them but correctly deduced their function, pointing out that they allow material to pass through and then prevent it from flowing back again in the opposite direction.59 We recognise this immediately as the function of what we now call a valve; but there was no word for such a mechanism in Erasistratus' time, and he refers to the valves of the heart simply as 'membranes' (*hymenes*).60 Our earliest classical evidence for a word meaning 'valve' comes from Hero of Alexandria; although he writes in Greek, the word is a Latin one, *assarium*, in this meaning known only from this passage.61 The Latin word which would eventually give us our word 'valve', namely *valua*, was in use throughout the classical period but did not mean 'valve'; it referred to the doors of a temple and was usually plural. There is no trace of it in Vesalius. The earliest use in English of the word 'valve' with reference to the heart is given by the *Oxford English Dictionary* as 1615; and shortly after that (1628) Harvey uses its diminutive *valuula* for the membranes forming the valves of the heart.62 It is thus true to say that there is no specific word for 'valve' in either Galen or Vesalius. They both follow Erasistratus' terminology and refer to 'membranes' (*hymenes, membranae*).

In Galen the word *hymen* 'membrane' refers, not to the valve as a whole, but to each of the segments which make it up: two in the case of what is now known as the mitral valve, and three in the others. So he describes the mitral valve as 'an outgrowth (*epiphysis*) consisting of two

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58 op. cit. note 17 above, VI 9 init.

59 loc. cit. note 7 above.

60 ib.


62 Harvey: *De Motu Cordis* 13.
membranes', and his general term for the valve as a whole is 'the outgrowth (epiphysis) consisting of membranes'. In this phrase epiphysis is applied in the singular to the valve as a whole; but he also uses the word in the plural referring to the segments which make up the valve. This plural usage is apparent in his description of the arterial valves which, he says, possess 'three outgrowths (epiphyseis) consisting of sigmoid membranes'; this means, not three valves, but three membranes making up a single valve. It is important to distinguish these singular and plural usages in Galen, as they are reflected in Vesalius and Harvey.

Vesalius translates hymen as membrana or membranula, following Cicero (who used membrana for the membranes of the eye in On the Nature of the Gods) and Celsus (who used membranula for various membranes, though not those of the valves of the heart). For the valve as a whole he drops Galen's epiphysis 'outgrowth' in the singular and uses instead membraneus circulus 'membranous circle' or totum membraneum corpus 'the whole membranous structure'. The individual segments of the valves are membranulae orificiorum cordis 'the membranes of the heart's orifices'; and he also picks up Galen's plural use of epiphysis and refers to the segments as membranei processus 'membranous outgrowths': thus he says that the mitral valve has duos tantum membraneos processus 'only two membranous outgrowths' and that the tricuspid valve consists of trium membranularum seu processuum 'three membranes or processes'.

The modern terminology for the segments of the valves is based only in part on Vesalius. We must now consider the valves individually.

63 loc. cit. note 7 above.
64 op. cit. note 5 above, VI 10.
65 ib. VI 14.
66 op. cit. note 9 above, II 142.
67 op. cit. note 10 above, e.g. IV 1 6 (of certain membranes in the abdomen).
68 This and the following phrases are from op. cit. note 17 above, VI 13.
(a) *Tricuspid valve.* Galen, following Erasistratus, says that this consists of three membranes (*hymenes*) "very similar to the barbs of arrowheads" (*akidon glochisin homoiotatoi*); and he says that as a consequence of this Erasistratus' followers used the adjective 'three-barbed' (*triglochis*) to describe them (what they had in fact done was to pick up a Homeric adjective used of arrows and apply it to this structure). The interesting thing here is the use of the plural: they applied the adjective 'three-barbed', not to 'it' (the valve) but to 'them' (the individual segments). They therefore said that this valve consisted of 'three-barbed membranes' (*hymenes triglochines*), a phrase which meant, not 'membranes possessing three barbs' but 'membranes which form a three-barbed structure'. The key points in this description, then, are the arrowhead (Greek *akis*), the barbs (Greek *glochines*) and the unusual use of the adjective *triglochis* to mean 'forming a three-barbed structure'.

Now we turn to Vesalius' description, which is based on Galen's. In describing the tricuspid valve Vesalius says that the membranes come together to "produce a shape not unlike a triangular cusp": 'cusp' is in Latin *cuspis*, the regular word for the point of a weapon. He goes on to say that this cusp resembles "particularly the cusp (*cuspis*) which the Turks use on their weapons nowadays for penetrating armour". To translate Greek *triglochis* he uses a Virgilian word *trisulcus*, applied by Virgil in the *Georgics* to the forked tongue of a snake, and translated 'three-forked' or 'three-pronged'. Interestingly, in using this word Vesalius

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69 loc. cit. note 7 above.
70 ib.
71 Homer: *Iliad* V 393.
72 loc. cit. note 7 above.
73 op. cit. note 17 above, VI 13.
74 ib.
75 ib.
76 Virgil: *Georgics* III 439.
presses its etymological meaning of ‘three-furrowed’ rather than ‘three-pronged’. He says that the membranes when closed together resemble *spiculorum sulcis*: *spiculum* is the Latin word for the barb on an arrowhead (it is much used by Celsus in his section on military surgery) and the phrase means ‘the furrows between the barbs’. This is clear from his further explanation: he says that the Turks “make a triangular cusp, but in order to reduce the weight of the iron portion and to make the corners sharper they file out a groove (*sulcus*) between each pair of angles, so that as the cusp rises from base to point it shows three angles and three grooves.” And he goes on: “You will see the same thing in the heart if you close the three membranous processes in the course of your dissection.” He uses *trisulcus* in the plural, as Galen had used *triglochis*, describing not the valve as a whole but the individual membranes as *trisulcae* ‘forming a three-furrowed structure’.

When we go to Harvey we find that Virgil’s *trisulcus* has been replaced by *tricuspis*, a word used by Ovid in the meaning ‘three-pronged’. In Harvey it is still plural and denotes ‘forming a three-pronged structure’; Harvey refers to “the three tricuspid valvules [*valuulae tricuspides tres*] at the entrance to the right ventricle” and contrasts them with “the three semilunar ones [*semilunares tres illae*] at the orifice of the artery-like vein”. In the modern terminology we find an adjective *tricuspidalis* which is manifestly formed from this; but the important thing is that the modern term is used in the singular, describing not the individual membranes but the valve as a whole. It is only at this last stage that the individual segments have come to be called *cuspides* ‘cusps’;

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77 op. cit. note 10 above, VII 5 1-5.

78 op. cit. note 17 above, VI 13.

79 ib.

80 ib.

81 op. cit. note 63 above, 17.

82 Ovid: *Metamorphoses* I 330.

83 op. cit. note 63 above, Prooem.
word *cuspis* is not so used by Vesalius (for whom *cuspis* was the whole head, not an individual barb) or Harvey (who refers to the cusps as *ualuulae* 'little valves').

(b) *Mitr*al valve. This is the one that has only two segments, a fact observed by Erasistratus and mentioned by Galen. In Galen’s time the valve had no name. Vesalius in describing it (or rather in describing them, the two segments that make it up) writes that “you might not inappropriately compare them to a bishop’s mitre”. Harvey refers to them (again, the two segments making up the valve) as *ualuulae mitrales*: we notice the plural again, and the same slightly unusual use of the adjective to mean ‘forming a mitre-like structure’. This adjective too is now singular agreeing with *ualua*, and the unusual adjectival usage has gone. The word *cuspis* ‘cusp’ has spread from the tricuspid valve to this one as well.

(c) The arterial valves. These have three segments each, described by Galen (following Erasistratus) as *sigmoeideis* ‘sigmoid’. The use of the plural this time is regular, as each individual segment has the sigmoid shape (the shape of our capital C, known to Greek epigraphists as the lunated sigma). Vesalius says that they (still the segments) “resemble, as it were, the shape of the half moon (*semiluna*)”; Harvey glosses the Greek word sigmoid as *semilunaris* ‘semilunar’, and this is the modern adjective, which still describes the segments and not the valve as a whole, differing therefore from *tricuspidalis* and *mitralis*.

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84 ib., 17. Near the end of the Introduction he seems to use *tricuspides* for *ualuluae*: he refers to the membranes forming the mitral valve as *tricuspides mitrales*, and later in the same para. the word *tricuspides* is a reference to the mitral valve.

85 op. cit. note 17 above, VI 13.

86 op. cit. note 63 above, 17.

87 loc. cit. note 7 above.

88 op. cit. note 17 above, VI 13.

89 op. cit. note 63 above, 13 (where the reference is to the valves in the veins).
It may be observed lastly that the modern terminology distinguishes the cuspides of the tricuspid valve from the valvulae (Harvey’s word) of the other three valves; but in English the distinction is lost, as both words are translated ‘cusps’. 

Envoi

Much anatomical terminology arises from analogy, in that the part is named after something which it is thought to resemble; thus we have in this paper encountered supposed resemblances to an ear, a shoulder bag, a crown, temple doors, an arrowhead, a bishop’s mitre and a half moon. There are two interesting footnotes to this.

(1) The process of describing parts by analogy was always a deliberate one and long regarded as a good way of giving the reader at least some idea of what a part looked like; and it was accepted that the analogy might well produce a technical name. When Galen points out that the membranes forming the mitral valve have no technical designation he explains why: “no anatomist has undertaken to liken them to anything else.” Vesalius was prolific with these analogies, some of which we have already noticed. It may be added by way of illustration that the pelvis is so named because Vesalius remarks that the formation produced by the sacrum and the two hip bones “resembles a basin (peluis).”

(2) In his treatise On Bones Galen remarked that the bone we now call the hip bone “has no name of its own”; and because of this remark (repeated by Vesalius) it actually came to be known as os innominatum ‘the unnamed bone’. That is its technical name in the first edition of

90 The Nomina Anatomica (4th edition 1977) notes: “The term valva is to define the entire valvular mechanism. The terms valvula and cuspis are used almost as synonyms, but the latter possesses chordae tendineae” (p. A61).

91 op. cit. note 5 above, VI 14.

92 op. cit. note 17 above, I 29.

93 Galen: De Ossibus ad Tirones 20.

94 op. cit. note 17 above, I 29 init.
Gray’s Anatomy, where the author remarks that “the os innominatum [is] so named from bearing no resemblance to any known object.”95 This is a curious relic of the notion that parts of the body should be named from what they resemble. The name has now been replaced by the much more pedestrian *os coxae* ‘hip bone’.

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95 op. cit. note 37 above, p. 76.