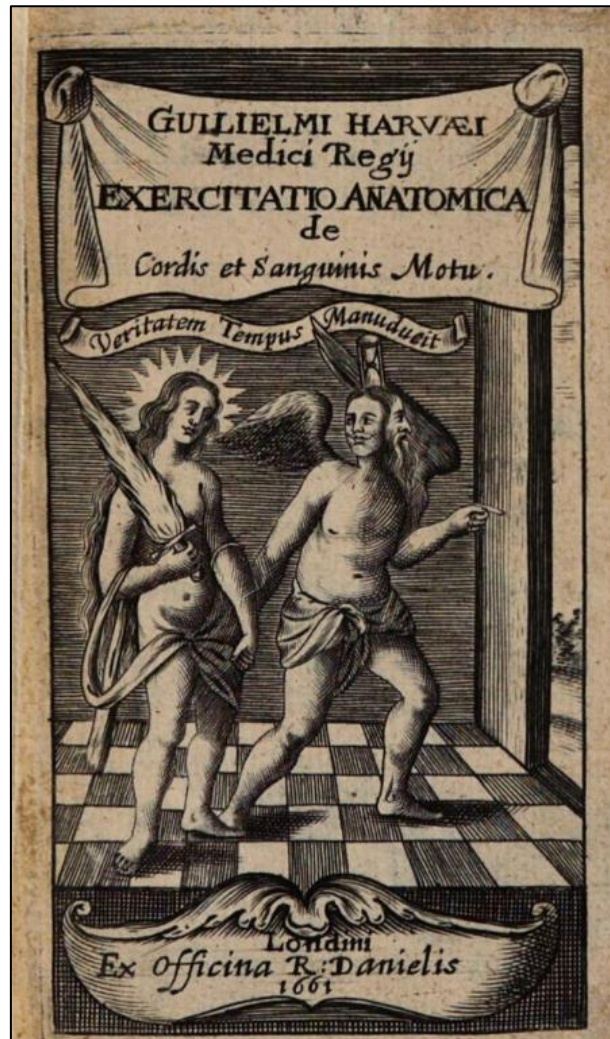


**EXERCITATIO ANATOMICA DE MOTU CORDIS ET SANGUINIS
IN ANIMALIBUS PER SE ILLUSTRATA ET SIMPLIFICATA**



A MATTHÆO GÁVIÁ IN USUM DISCENTIUM REDDITA.

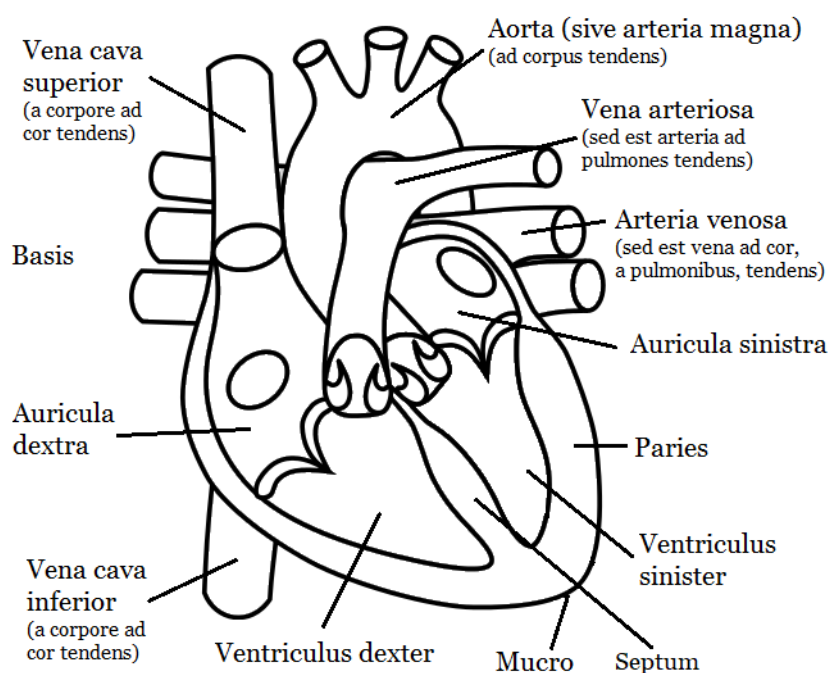
Editio 1.4

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Lectoribus letricibusque optimis suis Matthæus

Below you will find the first three chapters of William Harvey's *De Motu Cordis*, imagined for those who have completed *Familia Romana* and who wish to cut their teeth on a scientific work from the 17th Century. Harvey (1578 – 1657) was an English doctor from Folkestone, Kent, who studied first at Cambridge and then Padua before taking up a job as a physician at the still-operational St. Bartholomew's Hospital (St. Bart's) in the City of London. In his *De Motu Cordis*, Harvey reports on his extensive investigations into the motion of the heart (and blood) in animals and concludes that blood must circulate around the body. Although similar ideas had been proposed before, Harvey's was the first time that the Galenic view of blood—that it is created in the liver and is attracted to the parts of the body that need it where it is use up—was seriously challenged. Harvey faced criticism at first but he saw within his own lifetime the acceptance of his theory.

For those coming to this text for the first time, it may be beneficial to revise the basics of blood circulation as we understand it today. Although Harvey's text was concerned with circulation in animals in general, I give here a brief overview of the human system. First, the anatomy of the heart.



The heart has four cavities: two atria and two ventricles. This is where the Latin terminology Harvey employs begins to confuse us. The ventricles have the same name in Latin: *ventriculi* (< *venter*). The atria, however, to Harvey, were *auriculæ* (< *auris*). In modern anatomy, the auricles are in fact two appendages to the atria that sit above them and increase their volume.

It can be seen from the diagram above that the walls (*parietes*) of the ventricles are thicker than the atria, and the left ventricle's is thicker than the right (note that this is the *anterior* view of the heart: the right side of the heart is depicted on the left side of the image). The job of the **right ventricle** is to pump blood to the lungs, which it does in systole (i.e. when the heart muscles contract). The blood is thus sent from the right ventricle via the pulmonary artery to the lungs, where it picks up oxygen breathed in and deposits waste carbon dioxide to be breathed out. (Blood has a number of functions but the transport of these two gases is one of the main ones.) Note that the pulmonary artery by Harvey is called the *vena arteriosa* (the arterial vein).

Blood does not actually flow into the air sacs (the alveoli) of the lungs, which can be a life threatening event. Instead, blood flows from the pulmonary artery into tiny vessels called capillaries which surround the alveoli. The capillaries allow oxygen and nutrients to flow out of the blood, and waste and carbon dioxide to flow back in, but prevent the 'escape' of the blood cells themselves. The capillaries are so small that they cannot be seen without a microscope. Microscopes were novel inventions when Harvey was alive but apparently he did not have access to one. Thus he was ignorant of the existence of capillaries and could only surmise as to how exactly blood flowed from the arteries to the veins. The capillaries were first observed in 1661 by the 'Father of Microscopical Anatomy,' Marcello Malpighi (1628 – 1694) just a few years after Harvey's death.

From the lungs, the blood flows to the **left atrium** (*in auriculam sinistram*) via the pulmonary vein (the *arteria venosa*). From the left atrium, it is pumped into the **left ventricle**. From the left ventricle, it is pumped via the aorta (same in Latin, but sometimes the *arteria magna*) to the whole body, hence why the left ventricle's walls are thickest: more force is needed. In the body, the blood deposits its oxygen and

picks up carbon dioxide. Again, it flows through a network of capillaries around the body's tissues. It then returns via the vena cava (same in Latin) into the **right atrium**, thence to the right ventricle. Thus the circulation of blood.

The text on which this edition is based is the 1661 London edition. The task of simplifying the text involved firstly transcribing it with modern orthography. I dropped long Ss and adopted rules of punctuation in use today. I also amend obvious errors and adopt spelling consistent with 'classical' usage. I use only the words found in *Familia Romana* though one of the joys of this text is the technical vocabulary employed as well as various metaphors Harvey adopts. Therefore, new vocabulary is introduced and explained in the usual way in the margins.

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This is very much a work in progress. You will likely find errors and you may have ideas for improvement. I would love to hear your thoughts: my contact details are below.

Gratias vobis quam maximas ago!

Matthæus Gávia (Matthew Jay)

[@MattJayLats](#) / [@SalviSitisPod](#)

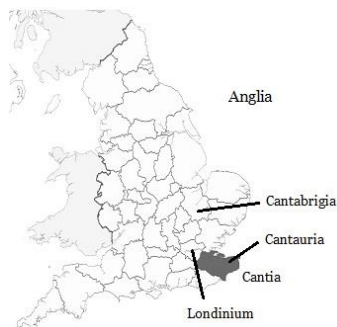
www.matthewjayepi.com

matthew.jay.15@ucl.ac.uk

CAPITULUM PRIMUM

Causæ cur auctor scripserit.

Guilielmus Harvejus (Anglice, William Harvey), natus Kal. Apr. 1578, obiit a. d. III Non. Jun. 1657. Medicus Anglus, hunc librum scripsit anno 1628 de motu cordis et sanguinis.
Anglice *adv* < Anglicus
Anglicus & Anglus < Anglia



Harvejus in Cantia natus est. Cantauriæ et Cantabrigiæ studuit et etiam Patavi, in Italiá. Postea Londinii medicus fuit

motus -ús *m* < movere
difficillimus -a -um *sup* < difficilis

systole -es (*acc* -en vel -em, *abl* -e) *f*
= ubi cor pulsatur et minus fit ut sanguinem ex se mittat
diastole -es *f* (*acc* -en vel -em, *abl* -e) = ubi cor extenditur ut sanguis in id fluat (diastole ↔ systole)

in-spicere = intus videre
ex-trahere
rem attigisse = rem invenire
privatim *adv* < privatus
publice ↔ privatim



prælectio anatomica
anatomica = scientia formæ corporis (scientia < scire)
mihi male-dicere = dicebant me false cogitare
confirmare = animo firmum facere
utilis = qui prodest
particeps -icipis *m* & *f* = qui partem capit



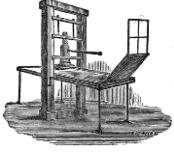
Cum motum cordis et sanguinis in animalibus invenire oculis meis, et non per aliorum medicorum libros, vellem, rem difficillimam esse reperi et, sicut alii medici, pæne putavi Deum solum id scire posse. Nec enim quomodo nec quando systole aut diastole fieret, propter celeritatem cordis, cognoscere potui. Putavi itaque me non posse scire quid sit motus cordis et sanguinis in animalibus.

Tandem, post aliquot temporis, varia animalia frequenter inspiciendo, ex hoc labyrintho me extractum esse existimabam, simulque credebam me rem attigisse et me scire quid sit motus cordis. Quá de causá, non solum amicis privatim, sed etiam publice in prælectionibus meis anatomicis, proponere meam sententiam ausus sum.

Quæ sententia aliis magis placebat, aliis minus (ut sæpe fit). Hi mihi maledicebant quia contra sententiam veterem dixi; illi vero confirmaverunt id quod invéni et utile fore et scitu dignum. Poscebant ut plura dicam et scribam de motu cordis.

Tandem, partim amicorum precibus, ut omnes meorum laborum participes fierent, partim etiam propter aliorum invidiam, coactus sum

typus -i *m* = forma litteræ ferrea :
 typis mandare = scribere typis et
 prelo



prelum -i
n

libentius *comp* < libenter
 Hieronymus Fabricius ab
 Aquapendente, 1533 – 1619,
 medicus Italus

ocasio -onis *f* = tempus idoneum

typis mandare sententiam meam ut omnes de me et de re ipsá recte
 censere possent.

Et hoc etiam libentius feci, quod Hieronymus Fabricius ab
 Aquapendente, cum fere omnes animalium partes imaginibus bene
 descripsisset in libro suo, cor solum mihi reliquit.

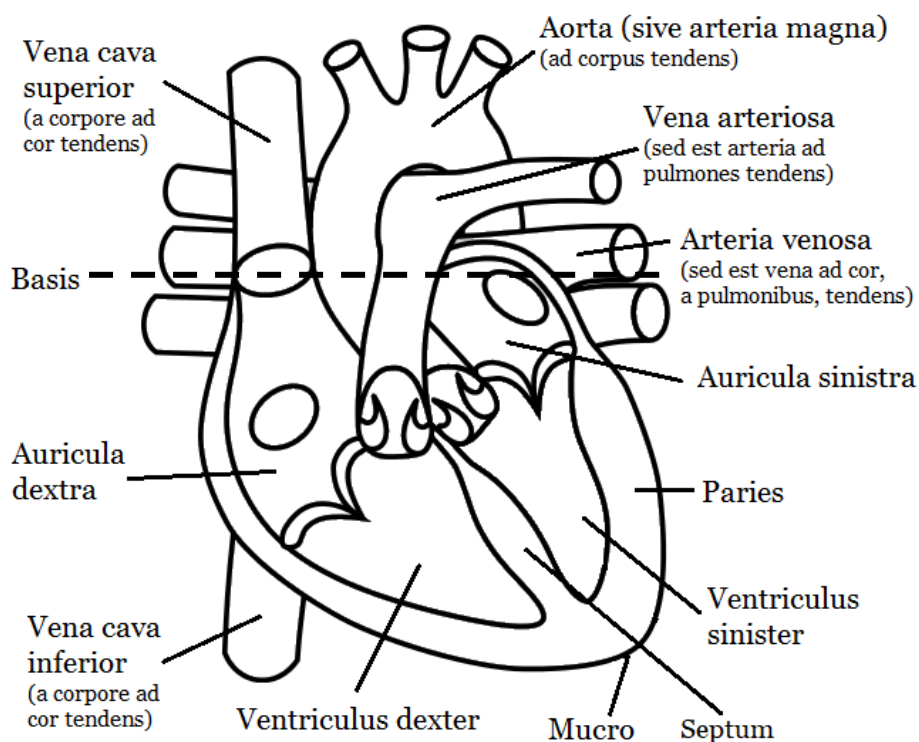
Spero fore ut homines qui me sequuntur putent me recte fecisse
 nec omnino frustrá vixisse. Forsan nunc, quia viam ad scientiam
 meliorem patefeci, posteriores occasionem quærendi capient.

CAPUT SECUNDUM

Qualis sit motus cordis.

Partes cordis ut ab Harvejo appellantur. Hodie auriculæ atria nominantur (id est, sunt cordi atrium dextrum et atrium sinistrum).

vena -æf
basis -is (acc -in vel -im, abl -i)
auricula -æf
ventriculus -i m < venter
mucro -onis m
septum -i n
paries -etis m
arteria -æf
aorta -æf



observare = videre



bufo -onis
m



cochlea -æf



concha -æf



squilla -æf

pisciculus -i m (dim) < piscis
manifestus -a -um ↔ dubius
attente (adv) < attentus
quoad = usque ad id tempus quo
tarde (comp tardius) < tardus
clare (adv) < clarus
quies -etis f = tempus quietum

pulsatio -onis f < pulsare

longius-culum = aliquantum longius



anguilla -æf

Primum itaque in cordibus, omnium adhuc viventium animalium, aperto pectore observare licet esse tempus in quo cor aliquando moveri et in quo aliquando quiescere.

Hæc facilius videri in cordibus frigidorum animalium, ut bufone, serpentibus, cochleis, squillis & pisciculis omnibus. Fiunt quoque omnia manifestiora in cordibus calidiorum, ut canis et porci, si attente observaveris quoad mori cor & tardius moveri. Tum etenim tardiores et rariores motus cordis fieri cernere clare poteris. Et etiam qualis sit motus, et quomodo fiat, facilius intueri licet. In quiete, ut in morte, cor pigrum jacet.

Eo quo movetur tempore, tria præcipue animadvertenda sunt:

I. Cor durum fieri et in mucronem se sursum tollere sic ut pulset pectus et foris sentiri pulsatio possit.

II. Undique contrahi, præcipue secundum latera, ita ut minoris magnitudinis et longiusculum appareat. Cor anguillæ extractum, et in manu positum, hoc facit manifestum: æque etiam apparet in corde parvorum piscium et illis animalium quibus cor est longiusculum.

durius-culum = aliquantum durius



musculi
(musculus -
i m)
corporis
masculini

albidus -a -um = aliquantum albus
tensio -onis f < tendere
diminuere = minorem facere
contractio -onis f < contrahere

minorari < minorare = diminuere
rationi consentaneum = id quod
rationi convenit

observatio -onis f < observare
coarctare = coartare = angustum
fieri cogere
contentus -a -um < continere

exprimere -pressi -pressum < ex +
premere
albescere = album fieri

allisio -onis f < allidere < ad +
lædere
in-crassatio -onis f < in-crassare =
crassum facere
egressio -onis f < egredi

vulgo *adv* = ab omnibus

dilatate = latum facere

inanire = vacuum facere

similiter *adv* < similis

vigorare = vigorem (= vires) addere

ex-tensio

postea : postea in capitibus proximis

III. Cor duriusculum fieri quando movetur, sicut musculi quando illi moventur.

IV. Quoque notandum est in piscibus et aliis animalibus, ut serpentibus, ranis, et ceteris, quando movetur cor, albidioris coloris esse; cum vero quiescit coloris sanguinei esse.

Ex his mihi videbatur manifestum motum cordis esse tensionem quandam ex omni parte, quoniam diminui et durescere in omni motu videtur; cordisque motum esse similem musculorum, dum contractio fit. Musculi enim cum moventur, tenduntur, duri et crassi fiunt et tolluntur, et similiter cor.

Ex quibus observationibus mihi videtur cor, eo quo movetur tempore, contrahi, parietes crassas fieri, ventriculos coarctari et contentum sanguinem exire. Ex quartâ observatione satis patet, quia sanguinem in corde prius contentum expresserit, albescere cor; in quiete, intrante in ventriculos de novo sanguine, cordi reddere colorem sanguineum. Hoc nemo dubitare poterit, cum viderit, vulnere in ventriculo facto, singulis motibus sive pulsationibus cordis, sanguinem contentum cum impetu prosilire e cordis ventriculo.

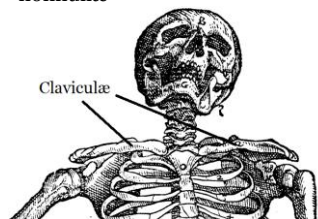
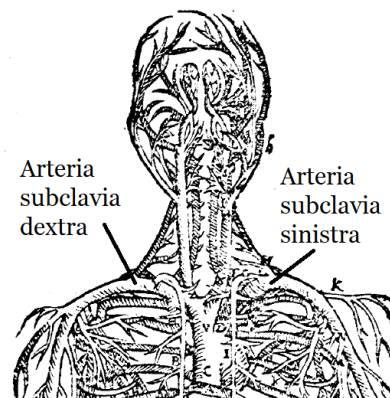
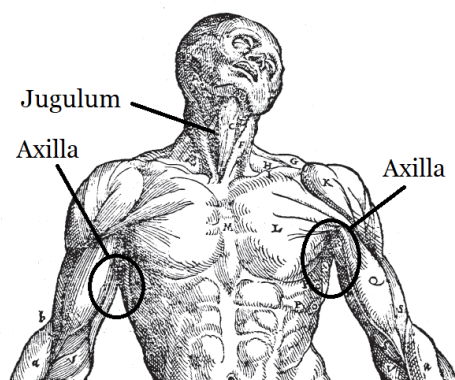
Hæc itaque eodem tempore fiunt: tensio cordis, pulsus qui foris sentitur propter allisionem ejus ad pectus, parietum incrassatio et contenti sanguinis egressio cum impetu e ventriculis.

Hinc contrarium vulgo receptæ sententiæ apparet, secundum quam eo tempore quo cor pectus pulsatur, et pulsus foris sentitur, unâ cor dilatari secundum ventriculos, et impleri sanguine putatur. Contra intelliges rem se habere, videlicet cor, dum contrahitur, inaniri. Nam motus qui vulgo cordis diastole existimatur, vero systole est. Et similiter motus proprius cordis diastole non est, sed systole, neque in diastole vigoratur cor, sed in systole. Tum enim tenditur, movetur, vigoratur.

Neque verum est, quod vulgo creditur, cor suo motu aut extensione sanguinem in ventriculos attrahere, sed potius cor, dum movetur et tenditur, sanguinem exprimere; et dum dilatatur, cor recipere sanguinem eo modo quo postea patebit.

CAPUT TERTIUM

Qualis sit motus arteriarum.

Partes corporis superiores
nonnullæarteria subclavia = arteria quæ sub
claviculâ invenitur

Etiam in cordis motu observanda sunt hæc, quæ sunt de arteriarum motu et pulsationibus:

eo tempore quo = quando

similiter *adv* < similistardius *adv comp* < tardus -a -umitem = similiter
qui-vis quævis quodvis = quem vis;
sive hoc, sive illudarteriotomia -æ *f* = sectio arteriæ
facta sanguinis mittendi causâ
sectio -onis *f* < secare
saltus -ûs *m* < salire

ex-pellere

I. Eo tempore quo fit contractio cordis et pulsatio pectoris est systole. Tunc arteriæ dilatantur, pulsum dant et sunt in suâ diastole. Similiter, eo tempore quo ventriculi cordis contrahuntur et emittunt sanguinem contentum, vena arteriosa pulsaturque cum aortâ et aliis omnibus arteriis corporis.

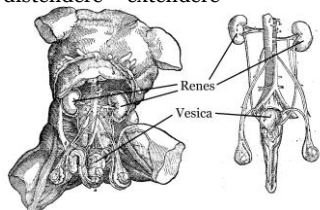
II. Quando sinister ventriculus cessat moveri, pulsare et contrahi, cessat quoque pulsus arteriarum. Immo, quando tardius contrahitur, pulsus in arteriis vix sentitur. Similiter est, cessante dextro, in venâ arteriosâ.

III. Item, sectâ quâvis arteriâ, in ipsâ contractione ventriculi sinistri, emittitur sanguis ex vulnere cum impetu.

IV. Similiter, sectâ venâ arteriosâ, eodem tempore quo dexter ventriculus contrahitur, e venâ arteriosâ sanguinem salire cum impetu videbis.

V. Similiter denique in omni arteriotomiâ, videbis saltum sanguinis fieri in arteriarum diastole, quando cor ferit pectus. Sed quoque videbis, quando cor contrahitur (id est, quando cor est in suâ systole), sanguinem expelli eodem motu.

distendere = extendere



immissio -onis *f* < immittere < inmittere



follis -is *m*



chirotheca
-æ *f*

inflare = implere aëre

inflatio -onis *f* < inflare



miles
tympanum
pulsat

tumor -oris *m* = inflatio, abscessus
aneurisma -atis *n* = pars arteriæ
distenta
descensus -ús *m* < descendere
indies *adv* = omnibus diebus

di-vertere
infarctus -a -um < in-farcire
infarcisse infarctum (et
infarctum) = implendi causá
immittere
impulsus -ús *m* < im-pellere

Ex his observationibus clarum videtur diastolen arteriarum fieri eo tempore quo systolen cordis; et arterias impleri & distendi propter sanguinis immissionem, a contractione ventriculorum cordis. Distendi arterias quia replentur ut vesica, non repleri quia distenduntur ut folles. Eádem de causá universi corporis arteriæ pulsant a tensione sinistri cordis ventriculi, sicut vena arteriosa a dextri tensione.

Denique arteriarum pulsum fieri ab immissione sanguinis e ventriculo sinistro, eodem modo quo cum quis in chirothecam inflat, omnes digitos simul videt distendi. Sic etiam secundum cordis tensionem similiter pulsús fiunt, qui quantitatem et ordinem cordis pulsantis servant.

Nec est expectandum, propter motum sanguinis, tempus inter systolen cordis & diastolen arteriarum (præcipue magis distantium) intercedere, nam eodem modo res se habet ut in inflatione chirothecæ vel ut in tympano ubi pulsús et motús simul sunt in utroque extremo.

Accidit me vidisse ægotantem, qui mihi hanc veritatem apertissime confirmabat. Habuit tumorem ingentem, pulsantem, *Aneurisma* dictum, in dextrá parte juguli, prope descensum arteriæ subclaviæ in axillas. Indies crescebat propter immissionem sanguinis ab arteriá singulis pulsationibus. Pulsus ejusdem brachii fuit tenuis quia major sanguinis pars in tumorem divertebatur. Quare motus per arterias vincitur et ulteriores arteriæ minus pulsant. Ergo clarum est pulsús arteriarum esse nil nisi impulsús sanguinis in arterias.