Of the spleen, its description and history, uses and diseases, particularly the vapors, with their remedy. Being a lecture read at the Royal College of Physicians, London, 1722. To which is added some anatomical observations in the dissection of an elephant / [William Stukeley].

Contributors

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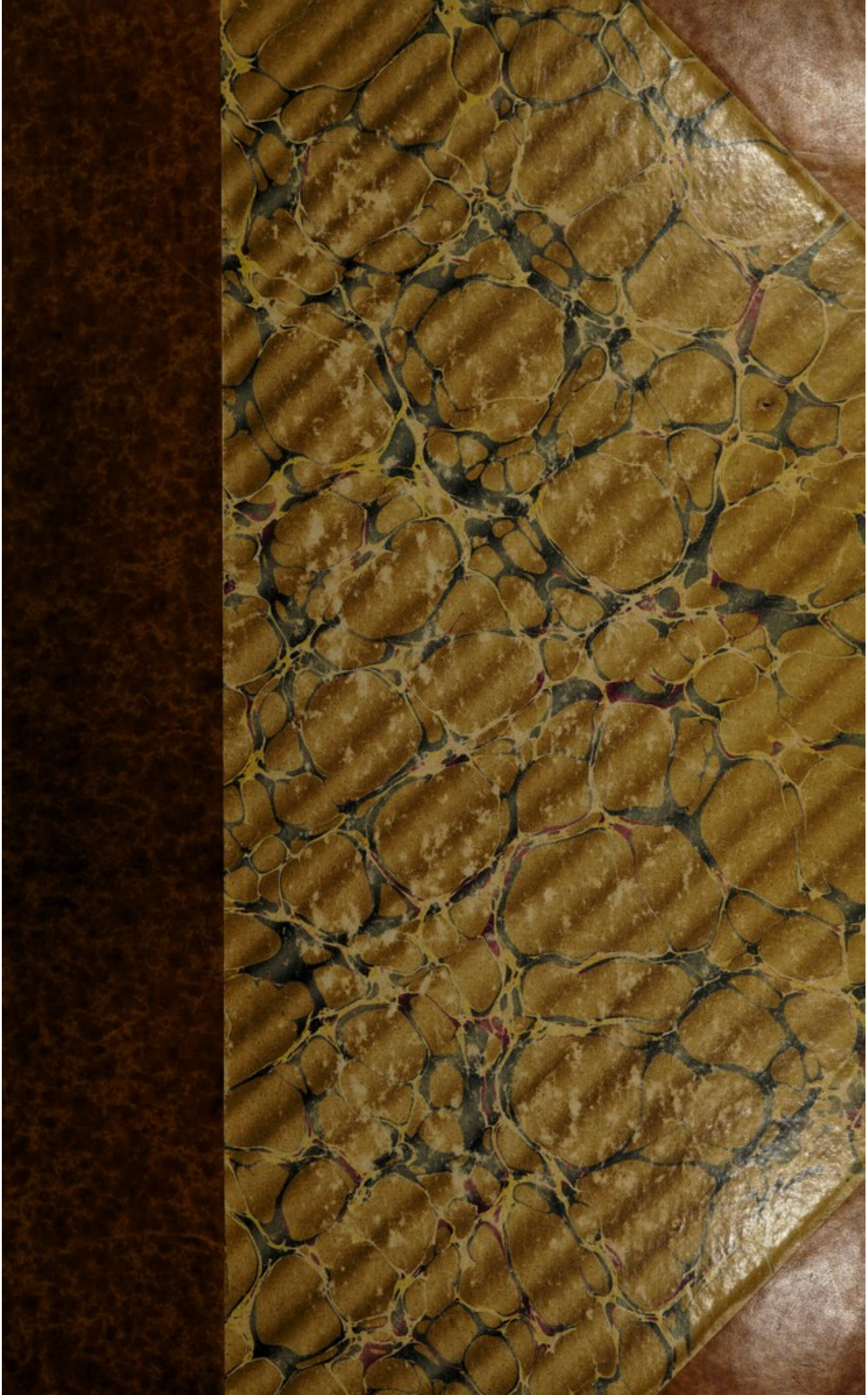

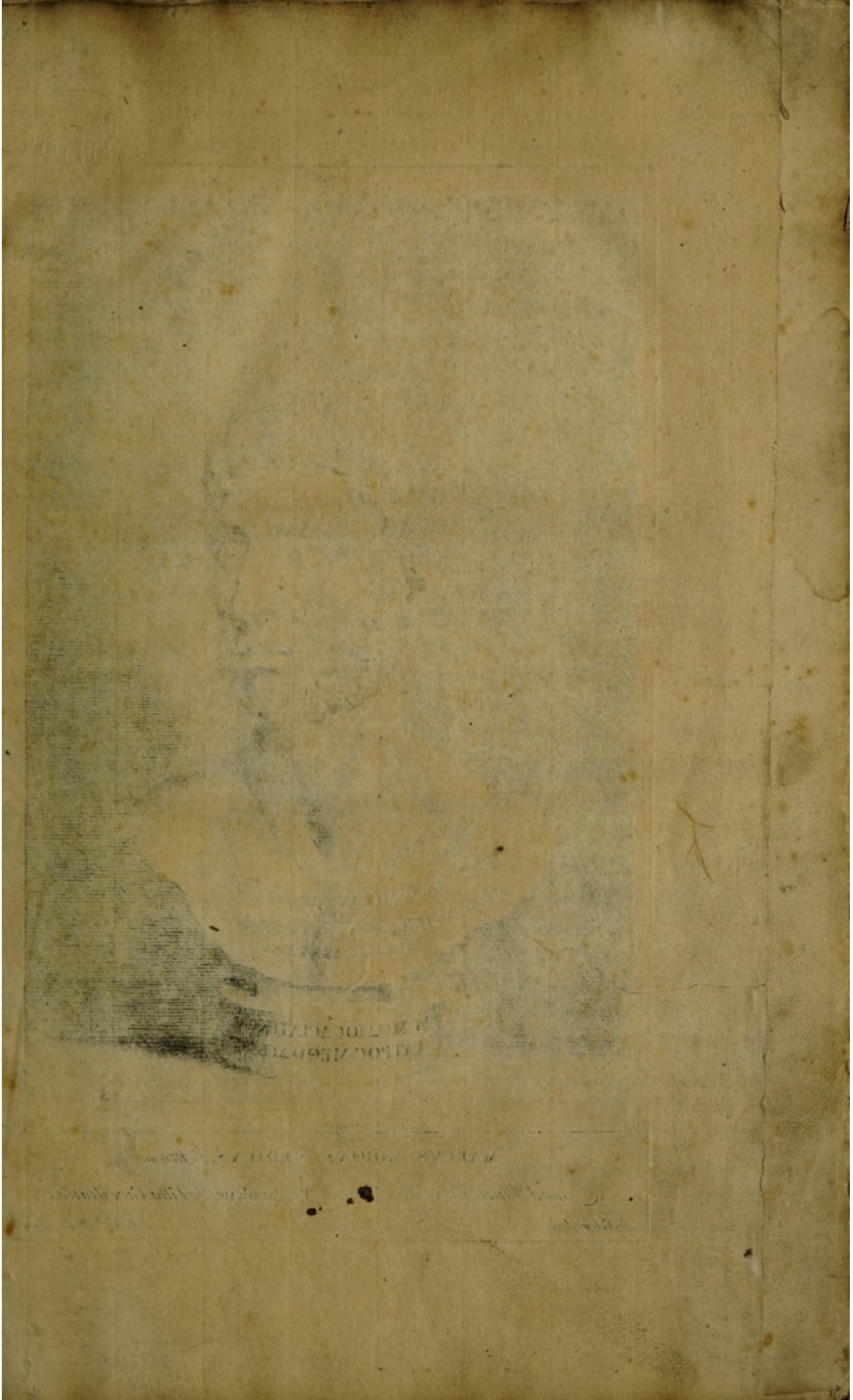

MARCVS MODIVS MEDICVS. *In Marmore*

Apud Illustrissimum Comitem Penbrokiæ, *In Villa Carviliana.*

Stukeley delin: *G. Vertue Sculp.*

OF THE

SPLEEN,

ITS

DESCRIPTION

AND

HISTORY,

USES and *DISEASES*,

PARTICULARLY THE

VAPORS, *with their* REMEDY.

Being a LECTURE *read at the Royal College of Physicians*, London, 1722.

To which is Added

Some ANATOMICAL OBSERVATIONS in the Dissection of an ELEPHANT.

By *WILLIAM STUKELEY*, M.D. CML. & SRS.

Nihil temere credendum, nihilque negligendum.

Hippoc. 6. Epidem. §. 2.

LONDON:

Printed for the AUTHOR. MDCCXXIII.

Louis W. Ritchie. M.D. 1879
1723
156 years
Georgetown D.C.

LIbrum hunc cui titulus, *Of the Spleen, its Deſcription and Hiſtory*, &c. dignum cenſemus qui typis mandetur.

Hans Sloan Præſes.
Henricus Plumptre, *Jo. Arbuthnott*, *Jacobus Jurin*, *Ca. Bale* } Cenſores.

Comitiis Cenſoriis in ædibus Collegii 7. Feb. 172¾.

TO

Sir HANS SLOAN, *Bar^t. M. D.*

Preſident of the College of Phyſicians,
London, *&c.*

SIR,

THE ſame reaſon that produces this lecture before the world, aſcertains its particular addreſs, becauſe upon reading it in the Theatre, you and the fellows of this illuſtrious body, were pleas'd to expreſs a deſire that it ſhould be printed. From thence I no longer look'd upon it as my own, but was ready to ſacrifice every private conſideration, rather than fail of the leaſt duty and veneration, I owe ſo great a ſociety; to which I had ſo lately the honor of being admitted, and by my faith given, promiſed to read within a year upon ſome anatomic ſubject. 'Tis no wonder I ſhould conſent to reſt my own reputation upon the credit and judgment of the *Britiſh* college of phyſicians, whoſe ſanction is ſufficient to prepoſſeſs the favor of the moſt diſtant ſons of *Hippocrates*; whoſe ſuffrage for true learning and

ſolid

ſolid philoſophy of right claims the higheſt eſtimate, and whoſe method of practice (without the leaſt vanity) may be ſaid to exceed all that has gone before.

Nevertheleſs 'tis not my intent to ſurcharge the indulgence of ſo deſireable a patronage. The world knows that a diſcourſe pronounc'd, eſpecially with ſome ſpecious ſhow of novelty, will paſs it ſelf with a tolerable grace upon an audience, but ſink at a nearer glance, and when read from a typographical copy. Tho' I would not prognoſticate ſo ill an *omen* upon my own pages, yet at preſent, perhaps, I know beſt their deficiency, and ſhall always take to my ſelf the errors, and refer to you the glory of giving an opportunity of improving our art; if either by their refutation, or new occaſional diſcoveries therefrom, it may receive the leaſt advances.

I have likewiſe made uſe of this occaſion to publiſh the account we drew up of the diſſection of the elephant which you procur'd us, moſt juſtly therefore to be return'd to you again. I doubt not but your innate candor will favorably receive this, how mean ſoever, monument of my reſpect, and the friendſhip you have honor'd me with, and of my willingneſs to obey every command of the college.

November 7.
1723.

W^m^ STUKELEY.

TO THE READER.

THIS discourse was wrote under the disadvantage of having only one preparing body, and read with no other solemnity than some preparations of spleens before us, and of the abdominal vessels injected with wax; because the executed bodies could not be procur'd according to usage. When I was induc'd to print it, I hop'd for many opportunities of re-examining my own opinions by the fountain of truth, in more frequent dissections, which is the reason of delaying its publication. But being defeated in those expectations, and some senior fellows of the College reminding me of my promise; oblig'd my complyance in the only command I should unwillingly obey. They suggested to me, that a lecture ought not to be look'd upon as a regular and finish'd work, and that if I thought fit, I might afterwards at my leisure improve it, and then it might properly be put into the learned language, and become a new book.

I must add the same apology for the plates, which tho' drawn without the necessary assistances such works reasonably require, yet I believe they are in the general not so materially different from nature, but that they may be corrected without much deformity. This must be attributed to the great difficulties we lye under of getting a sufficient number of bodies, seeing the sanction of acts of parliament in our favor is so notoriously eluded by the insolence of the mob at our executions, well worthy the further regard of the legislature, from which only we can expect a remedy in what tends so much to the good of the commonwealth, and mankind in general. However I am convinc'd that the world has lost much improvement from the modesty of the learned, I will not say from its own severity in judgment. But they that are most conversant in human nature will know, that perfect treatises upon any subject, are not to be expected from any person. For my own part, it will ever be my temper to love and honor those that correct my errors for truths sake. And

it will be obvious enough to an intelligent reader, that tho' I may have been too tedious in some particulars, yet several notions are started that I might, not impertinently, have much enlarged upon; and which I promise my self the pleasure of doing, when we are indulg'd with better opportunities for these sort of enquiries.

I am confident the reader will not be displeas'd at my prefixing a print of the famous Marcus Modius, *Physician in the court of* Augustus, *from the fine busto in my Lord* Pembroke's *noble collection, to show my high esteem for the wisdom of the ancients. And the admirable poem on the spleen (which I obtain'd leave to insert) I judg'd necessary, to help out my own description of the disease.*

The Elenchus *of the spleen, by way of* index, *is design'd to give the reader a more compendious view or scheme of the lecture, and a more connected deduction of the method of reasoning loosely diffus'd thro' the whole.*

A

PINDARIC ODE

ON THE

SPLEEN,

By the Late Right Honorable the

Countess of *Winchilsea.*

WHAT art thou Spleen, which every thing do'ſt ape?
thou *Proteus* to abus'd mankind,
who never yet thy real cauſe could find,
or fix thee to remain in one continu'd ſhape!
ſtill varying thy perplexing form,
now a dead ſea thou'lt repreſent,
a calm of ſtupid diſcontent;
then daſhing on the rocks, wilt rage into a ſtorm.
trembling ſometime thou do'ſt appear,
diſſolv'd into a panic fear;
on ſleep intruding do'ſt thy ſhadows ſpred,
thy gloomy terrors round the ſilent bed,
and croud with boding dreams the melancholy head.
or when the midnight hour is told,
and drooping lids thou ſtill do'ſt waking hold,
thy fond deluſions cheat the eyes;
before them antick ſpectres dance,
unuſual fires their pointed heads advance,
and airy phantoms riſe.
ſuch was the monſtrous viſion ſeen,
when *Brutus* (now beneath his cares oppreſt
and all *Rome*'s fortunes rolling in his breſt)
before *Philippi*'s lateſt field,
before his fate did to *Octavius* yield,
was vanquiſh'd by the Spleen.

Falſly the mortal part we blame
of our depreſt and pond'rous frame,

which

which till the firſt degrading ſin
let thee, its dull attendant, in;
ſtill with the other did comply,
nor clog'd the active ſoul diſpos'd to fly,
and range the manſions of its native ſky.
nor whilſt in his own heaven he dwelt,
whilſt man his paradice poſſeſt,
his fertile garden in the fragant eaſt,
and all united odors ſmelt;
no armed ſweets, until thy reign,
could ſhock the ſenſe, or in the face
a fluſht, unhandſom color place.
now the junquil o'ercomes the feeble brain;
we faint beneath the aromatic pain,
till ſome offenſive ſcent thy powers appeaſe,
and pleaſure we reſign for ſhort and nauſeous eaſe.

In every one thou do'ſt poſſeſs,
new are thy motions and thy dreſs.
now in ſome grove a liſtning friend
thy falſe ſuggeſtions muſt attend,
thy whiſper'd griefs, thy fancy'd ſorrows hear,
breath'd in a ſigh and witneſs'd by a tear.
whilſt in the light and vulgar croud;
thy ſlaves more clamorous and loud,
by laughters unprovok'd, thy influence too confeſs.
in the imperious wife thou vapors art,
which from o'er-heated paſſions riſe
in clouds, to the attractive brain,
until deſcending thence again,
thro' the o'ercaſt and ſhowring eyes,
upon her husband's ſoftned heart:
he the diſputed point muſt yield.
ſomething reſign of the conteſted field.
till lordly man, born to imperial ſway,
compounds for peace to make that right away,
and woman arm'd with ſpleen does ſervilely obey.

The fool to imitate the wits
complains of thy pretended fits,
and dullneſs born with him would lay
upon thy accidental ſway;
becauſe ſometime thou do'ſt preſume
into the ableſt heads to come.

that

that often men of thought refin'd,
impatient of unequal ſenſe,
ſuch ſlow returns, where they ſo much diſpenſe:
retiring from the croud, are to thy ſhades inclin'd.
o'er me alas, thou do'ſt too much prevail,
I feel thy force, whilſt I againſt thee rail,
I feel my verſe decay, and my crampt numbers fail.
Thro' thy black jaundice I all objects ſee
as dark and terrible as thee.
my lines decry'd, and my employment thought
an uſeleſs folly or preſumptuous fault.
whilſt in the Muſes paths I ſtray,
whilſt in their groves and by their ſecret ſprings
my hand delights to trace unuſual things,
and deviates from the known and common rules.
nor will in fading ſilks compoſe
faintly th' inimitable roſe:
fill up an ill-drawn bird, or paint on glaſs
the ſovereign's blurr'd and undiſtinguiſh'd face,
the threatning angel, and the ſpeaking aſs.

Patron thou art to every groſs abuſe,
the ſullen husband's feign'd excuſe,
when the ill humor with his wife he ſpends,
and bears recruited wit and ſpirits to his friends.
the ſon of *Bacchus* pleads thy power,
as to the glaſs he ſtill repairs;
pretends but to remove thy cares,
ſnatch from thy ſhades one gay and ſmiling hour,
and drowns thy kingdom in a purple ſhower.
when the coquette, whom every fool admires,
would in variety be fair,
and changing haſtily the ſcene
from light, impertinent and vain,
aſſumes a ſoft, a melancholy air:
and of her eyes rebates the wandring fires.
the careleſs poſture and the head reclin'd,
the thoughtful and compoſed face,
proclaiming the withdrawn, the abſent mind,
allows the fop more liberty to gaze,
who gently for the tender cauſe enquires.
the cauſe indeed is a defect in ſenſe,
yet is the ſpleen alledg'd, and ſtill the dull pretence.

But theſe are thy fantaſtic harms,
the tricks of thy pernicious ſtage,
which do the weaker ſort engage.
worſe are the dire effects of thy more powerful charms.
by thee religion, all we know
that ſhould enlighten here below,
is veil'd in darkneſs and perplext
with anxious doubts, with endleſs ſcruples vext,
and ſome reſtraint imply'd from each perverted text.
whilſt touch not, taſte not what is freely given,
is but thy niggard voice, diſgracing bounteous heaven.
from ſpeech reſtrain'd, by thy deceits abus'd,
to deſarts baniſh'd or in cells reclus'd,
miſtaken votaries to the powers divine
whilſt they a purer ſacrifice deſign,
do but the ſpleen obey, and worſhip at thy ſhrine.
in vain to chace thee every art we try,
in vain all remedies apply,
in vain the *indian* leaf infuſe,
or the parch'd eaſtern berry bruiſe;
ſome paſs in vain thoſe bounds and nobler liquors uſe.
now harmony in vain we bring,
inſpire the flute and touch the ſtring.
from harmony no help is had,
muſic but ſooths thee, if too ſweetly ſad,
and if too light but turns thee gayly mad.

Tho' the phyſician's greateſt gains,
altho' his growing wealth he ſees
daily encreas'd by ladies fees,
yet do'ſt thou baffle all his ſtudious pains.
not skilful *Lower* thy ſource could find,
or thro' the well-diſſected body trace
the ſecret the myſterious ways,
by which thou do'ſt ſurprize and prey upon the mind.
tho' in the ſearch, too deep for human thought,
with unſucceſsful toil he wrought,
till thinking thee t'have catch'd, himſelf by thee was caught:
retain'd thy priſoner, thy acknowledg'd ſlave,
and ſunk beneath thy chain to a lamented grave.

PRÆ-

PRÆLOQUIUM.

NON eſt dubitandum, auditores humaniſſimi, quin animalium mactatio ad deorum aras, anatomiæ ortum dederit. Illius ergo antiquitas, mundo coæva, ad ritus iſtos ſacros rectiſſime refertur: priuſquam genus humanum fædo carnium eſui aſſueſceret. Patet omninò, neminem quamvis mediocris ingenii, ab extis cæſorum conſulendis abſtinere potuiſſe. Quem non movet exquiſitæ compagis, texturæ nobiliſſimæ ratio & uſus? rara ſcilicet partium complicatio, inexplicabili curioſitate efficta, ſitu, figura, colore, varietate oculos etiam ſtupidiſſimos perſtringit. Neceſſarium eſt ut perfunctorie ad minimùm perluſtretur automaton hoc ſtupendum & admirabile: hic materiæ moventis mechaniſmus, elaſticis facultatibus inſtructus & animatus, tam ſuæ vitæ conſervandæ quam ſpeciei propagandæ curam gerens.

Huc uſque a ſacrificulis itum eſt, Deos ſanguine placantibus. Intimiora verò poſtea perſcrutati ſunt medicinæ patres & antiſtites. Non ideo contenti viſcera affabrefacta quorum uſus ignorabant, numinibus æque ignotis, ſub igne & fumo conſumere: ſed acie anatomici innocuique cultri & mentis acumine, reconditiſſima quæque naturæ penetralia rimari ſatagebant, nec minus gratè Deo vero litantes. His ſummis viris, longa ſerie & jure hæreditario, antiquis temporibus, concredita hominum ſalus. Sparta ſane illa longè nobiliſſima, & officium omni laude majus! Rectiſſime igitur ſecandis cadaveribus incubuere, ut œconomiæ animalis leges, per animalium anatomiam pateſcerent: ut viventis vis & energia, ut morbi & ſanitatis perverſæ paradigmata, demortuorum oſtendantur ſcrutinio; ut dapis carneæ & luxus ſulphurei nocumenta ejuſdem generis ſectionibus adjuventur.

Non eſt, auditores humaniſſimi & naturæ conſulti, quod apologiam imaginariæ alicui barbariei, fictæve crudelitati prætendam, in hujuſmodi exercitationibus. Præſertim in corona medicorum florentiſſima, a meticuloſæ plebis ſtoliditate alieniſſima: quorum maxime intereſt, liberrimum philoſophiæ & naturalis ſcientiæ campum aperire. Heic ſolum non profanum eſt ſanguine manus contaminare, fibraſque humanas audacter inſpicere & biolychnion in obſcuritate quærere. Facinus mehercule divinum! quod ad ſummi opificis honorem, auctoriſque machinæ adeo mirabilis gloriam redundet.

dundet. Verùm fas eſt primariam ejuſdem inſtitutionem tam clare ob oculos ponere, ut jam quoque quædam immolatio, ſuprema majeſtate dignior cenſeatur: quod reverentiam debitam & modeſtiam in tali diſquiſitione excitet. Antiqui corpus humanum, metaphora aptiſſima, templi appellatione frequenter indigitabant: nec affirmare dubitemus nullibi magis conſpicuam ſummi architecti præſentiam. In quo vera & genuina effulget viſibilis gloria, judæorum nempe *ſchechina*, ſicut olim ſuper arcam in ſancto ſanctorum templi *Schelomonici*. Illuc ſemel tantum in anno intrabat pontifex, pompa ſolenni at non ſine ſanguine. Mundus univerſus eſt Dei immortalis templum, ait *Triſmegiſtus*, at microcoſmus ejuſdem adytum ſacratius & penetrale. Ibidem immediate habitat & perpetuo operatur per divinam ſui ipſius particulam, animam ſcilicet rationalem. Qua abſente, nobis receſſus venerandos intrare non eſt nefas.

Liceat ergo, mihi apollinei chori infimo, propylæum ſaltem ſalutare, excellentias veſtras, viſcus illud famigeratiſſimum, lienem ſcilicet explorandum provocare: & colore & uſu obſcurum, ſed prorſus nemini, bilem, uti ſpero, moturum. Nec ſtomachum, vulgari ſenſu, excitet ſplen, hilaritatis ſedes apud antiquos. Diſpiciamus ergo paululum aliquando, quidnam ejus natura faciat aut feret.

A

LECTURE

ON THE

SPLEEN,

Read in the THEATRE *of the College of Phyſicians,*
London. March 14, 15, 16. 1722.
At the GULSTONIAN *Lecture.*

OPINION *of the* ANCIENTS.

THE Ancients having but a ſlender notion of the circulation of the blood, and none of the chyliferous ducts, ſuppos'd the meſenteric veſſels, eſpecially thoſe of the *porta*, conducted the digeſted aliment from the guts to the liver: which was the organ of their ſecond concoction or ſanguification. As the impure part of the chyle was left behind in the inteſtines, ſo the two excrementitious juices of the new-made blood, bile and melancholy, or yellow and black choler, were ſeparated therefrom, the one by the gall-bladder, the other by the ſpleen, towards purification. *Aretæus Diuturn.* 1. 15. *Avicen. Canon.* 3. *Fen.* 15. *tr.* 1. *c.* 2. This was done by an attractive quality peculiar in them for that purpoſe, by which they ſolv'd the buſineſs of ſecretion: not much unlike our preſent philoſophy, where the variety of attractions and coaleſcences of the ſeparated fluids in our glands, makes one of the chief requiſites. *Eraſiſtratus* and his ſucceſſors thought the liver a *parenchyma* of good blood coagulated, as the ſpleen of bad, and that they both drew the congenial humor to themſelves by ſimilitude and ſympathy. So that the gall-bladder and ſpleen were look'd upon in their eſteem, as reſervoirs of theſe feculencies of the blood, till they were either diſcharg'd the body, or alter'd for the better, and fit to be retain'd. The firſt having its excretory duct into the *duodenum*, there threw out its golden juice, not unuſeful in the way, by its *ſtimulus* on the inteſtines promoting their periſtaltic motion, and journey of the chyle thro' their whole length, as well as the diſcharge of the excrements: but the ſpleen having no ſuch outlett, was provided with arteries and veins, by all remarked as extraordinary, and more than ſeem'd neceſſary to the proportion of the bulk of the

part, even much larger than the *Epatics*. As the vein was to draw or convey this melancholy to the ſpleen, the artery by freſh ſtreams of pure blood coming to it in ſo plentiful a manner, was by degrees to concoct and clarifie it therein, till at length it was fit to be admitted into the maſs again. If this could not be done, it produc'd the diſeaſe of the part, which to this day we call the SPLEEN, meaning a redundancy of that humor, and for its relief was oblig'd to diſcharge it, either into the guts by the meſenteric veſſels, or by the hæmorrhoidals, or by urine thro' the emulgents, or by the *vas breve*, thence by vomiting thro' the ſtomach. They having a perfect notion of the arterial ſtrength of this part, by which it was able in contraction to force out its contained humour, as well as in a relaxed ſtate to admit it; and likewiſe that there was a natural communication between the ſpleen and all theſe parts. This then being the ſhop, as it were, of ſo beneficial an operation, they had reaſon enough to make it the ſeat of laughter, of mirth, and pleaſure. Here reſided the luxury of *Venus*, of laſcivious dreams, imaginations, and the golden age of Life. As the *atra bilis* created anger and melancholy, ſo the ſpleen which was to purge it off render'd us chearful and alert. Which opinions of theirs ſeem, if rightly underſtood, not far diſtant from the truth. Tho' ſome Splenetics may imagine it has no better a pretence to this merry quality, than as it adminiſters divers occaſions of laughter, at the ſtrange uſes from time to time, invention has attributed to this noble *viſcus:* for other I cannot think it, from the peculiarity and extraordinary elegance of its ſtructure, from the greatneſs and number of its blood-veſſels and nerves, the multifarious connections and relationſhip it has to ſo many other principal parts, eſpecially the whole contents of the *abdomen*. 'Tis plain, the lower belly is the kitchen (as we may aptly call it) of all the firſt and great actions of the animal family or œconomy, the ſtorehouſe and diſpenſary of the microcoſm. In *Hipp.* the *promus condus*, *œconomus*. Not to mention that therein are the proviſions for propagation of the *Species:* we ſee that the whole buſineſs of digeſtion and diſtribution of the nouriſhment is here perform'd. The uſes of the *apparatus* for this principal end are by the induſtry of the Curious pretty manifeſt, except that of the Spleen; which yet has not fail'd to be a ſubject of enquiry in all ages, and has rack'd the brains of phyſicians, as well as the bowels of their patients. For altho' the conceptions of the ancients about it are not abſurd, yet far are they from being very ſatisfactory, and perfectly conformable to the better *Idea* ſucceeding times have acquir'd of the ſtructure and mechaniſm of a living creature. But ſtill, what formerly was the ſeat of joy is become a topic of grief to the moderns, ſince our improvements have preſented us with no other than a negative knowledge therein; and in the main, we are forc'd to own our ignorance of nature's intention in forming the curious organ of the ſpleen.

PRESENT DESIGN. SECT. II. Certainly if beauty be the firſt temptation to love, we cannot but have a particular affection for the ſpleen. The delicacy of its conſtruction will at firſt ſight create a ſtrong deſire to know what purpoſe thereby is aim'd at in life. But it ſeems no eaſy task to anſwer the great problem of its uſe, after all the moſt famous Anatomiſts have fail'd in the attempt, after what the ſagacious *Malpighi* ſo ingenuouſly confeſſes, page 116. "What therefore, ſays he, is to be thought of this artificial bowel, I "am perfectly ignorant." But as every one has a right to expatiate in the free field of philoſophy, and the pleaſing reſearches of nature's works repay one's

one's time and pains with ſufficient knowledge, at leaſt we hit upon other uſeful thoughts by the way, if we be not fortunate enough to gain the mark of our enquiry; ſo frequently truths have been diſcovered by very inaccurate obſervers, which have eſcaped others diligence and perſpicacity. Or poſſibly from unwearied endeavors, or even extravagant imaginations, of a mind greedy of truth, a more happy hint may be promoted, in a future ſcrutiny of the ſame queſtion. " For which reaſon, and becauſe " the greatneſs of our profeſſion permits to every one a free way of " thinking, " as *Riolan* ſays, I ſhall not decline throwing in my mite, which may perhaps prove equally matter of mirth, and divert, but cannot offend any one, if not improve; ſince I ſhall avoid carping at others labours or ſolutions, ſuppoſing they proceeded from the ſame motive as my own; to promote, as well as I am able, natural knowledge, and the improvement of our art for the benefit of mankind, and to illuſtrate the glory of the all-wiſe Creator. Without the baſe endeavour of raiſing a name for one's ſelf upon impeachment of another's, which uſage may as juſtly be returned me again. Or as if there was no way of finding truth but with the torch of contradiction in the miſt of wrangling and calumny. Therefore I eſteem it ſupervacaneous, as well as it is ungrateful, to prefix a pompous introduction and ſpecious ſhow of reading, in rehearſal of all the opinions in writers upon this part, in order to indulge the vanity and ill-nature of pulling them in pieces. In the courſe of this lecture I ſhall only make uſe of the works of the learned to ſettle a true natural hiſtory of the part, and confirm my own ſentiments, where I imagine they conduce to that purpoſe. If it happens in a ſimple enarration thereof, what the poſitive uſe of it ſhould be appears, it matters not what it cannot be. If I have hit upon any thing as conformable to verity as novel, or but more approaching to veriſimilitude; I ſufficiently anſwer my propoſed end. If otherwiſe, 'tis no diſhonor to have fallen ſhort with ſo many elders of the faculty, and 'tis look'd upon as the mark of a generous mind, to have attempted a difficult ſubject: and certainly what is more worthy of ſearching into? 'Tis vain to trouble this learned auditory with mere tranſcriptions, with what is trite and facil. We were hopeleſs to find it out, if we did not attempt it; and why may not the ſame benefit at leaſt attend our curioſity, as has ſo often happen'd to the laborers in the philoſopher's ſtone, the longitude, or perpetual motion? who, tho' diſappointed in what they propos'd, yet have attain'd the honor of diſcovering by the way other very uſeful ſecrets. May not the ſupreme Author be ſuppos'd to have thrown in theſe great *Poſtulata*, on purpoſe to actuate the ambition of the Ingenious in contemplation of his works? However as to the product of our diſquiſition on this matter in an hypothetic way, the maſters of the Anatomic knife (of whom I have the pleaſure to ſee many in this place) will be but juſt to themſelves in vouchſafing it a conſideration, and if it engages them by a new *examen* to ſhow its falſity only, I ſtill promote the cauſe of truth; ſince it is the beginning of knowledge to diſcover error, and ſome ſatisfaction to be further aſſur'd what it is not, if we gain nothing more of certainty in ſuch an abſtruſe ſpeculation. I muſt likewiſe acquaint you that I deſign to throw looſely together what I have wrote on this ſubject, and much as at firſt it came from the pen, rather by the way of *ſocratical* quæries than dogmatical corollaries. A ſynthetical way of treating anatomical ſubjects I prefer with *Riolan*, *Anthopogr.* i. 21. and approved by the great *Morgagni adverſar.*

far. anatom. ii. p. 10. The reaſons I ſhall bring in proof of my aſſertions, will be promiſcuouſly interſpers'd, without any ſolemn ſtrictneſs or mathematical connexion and demonſtration, becauſe ſuch was the manner of the ancients, and I would rather perſuade than force an aſſent. Not to ſay that I judge ſuch a procedure fitter to entertain an audience, or that I am pretty much of *Baglivi*'s opinion in thoſe matters, *de fibr. motr.* i. 10. *coroll.* 2. I ſhall begin with a deſcription of the part laid down as exactly as I can, from whence if haply the deductions be not genuine, a ſhorter way may be pav'd for a ſtronger *Genius*.

SPLEEN'S SITUATION.

SECT. III. The ſpleen is a ſoft ſpungy *viſcus* ſeated in the left *hypocondrium* or upper angle of the belly, under the diaphragm and ſtomach, between it, the left ſide of the *vertebræ*, the falſe ribs and *colon* in its deſcent to the *anus*, and the left kidney, in the poſterior part of the body, within the ribs as it were, ſo that it cannot be felt externally unleſs ſwolen forwards either by nature or a diſeaſe, oppoſite to the liver; whence *Hippocrates* vi. *Epid.* calls it Ηπαϛ αϱιϛϵϱον the left liver, as if a poize to the great weight of the true. By *Aretæus*, *Galen*, *Pollux*, and *Heſychius* call'd Ισοῤῥοπον, Ισοπαϱες, Ισοϛαθμον, ϗ Ισοζυγον, in reſpect of the liver. *Hipp.* p. 54. & *Ariſtot.* Ed. Paris. 1619. *T.* 1. p. 776. 790. & *Græcus Anonymus.* Ed. 1616. c. 17. p. 20. 'Tis rarely ſituate on the right ſide, unleſs the order of the *viſcera* be inverted, as in that caſe mention'd *Philoſ. tranſact.* numb. 107, p. 146. *Pliny* xi. 37. owns ſuch prodigious. And *Ariſtotle hiſtor. animal.* i. 17. where he adds that the like has ſometime been found in brutes, and *gener. animal.* iv. 4. *Herophilus* the phyſician, famous for obſerving the rythm of pulſes, once found it, ſays *Galen* vi. 8. *adminiſtr. anatom.* and likewiſe *Cornelius Gemma Friſius. Coſmocrit.* i. 6. and *Cyclognom.* i. 6. *Spigelius anatom.* viii. 5. ſays he has ſometime found this anomalous poſition in coneys, in which it's moſt commonly fix'd to the bottom of the ſtomach by the *omentum*. Much the ſame in a dormouſe. *Drelincourt* obſerv'd it once at *Paris. De lienoſis* p. 3. and *Riolan. Opuſcul. anatom.* p. 118. *Mentellus* in *epiſt. ad Pecquet.* p. 49. and *Cattierus obſ.* 17. *ap. Borell.* p. 49. *Panarolus* in the year 1643, as appears from his *pente.* 5. *obſ.* 7. and *Fr. ab Aquapendente*, *Skenkius* 3. *obſ.* 9. *Drelincourt* the elder once in a *fætus* found it crouded thro' the diaphragm into the *thorax*. Nevertheleſs tho' in the moſt eſtabliſh'd order of nature it's placed on the left ſide and on the left end of the ſtomach, in ſome few creatures it inclines more towards the *pylorus* and *duodenum*, as in the *lucia piſcis*, land-tortoiſe, crocodile, pike, whence in the tortoiſe *Gaſſendus* not looking for it where it was, thought it had none, *in vita Peireskii*. In this creature it's much of the figure of a bean. The frog's is of the ſhape of a pea and bulk, placed in the very middle of the meſentery. In the skate it's placed between the middle lobe of the liver and the guts, it's broad, thick, and of a fleſhy colour. In the magpy it's long, and placed between the ſtomach and liver. In the bat it's ſmall and almoſt round, and poſited in the lower and hinder region of the ſtomach, and is redder than the liver. In the partridge the broader part of the ſpleen lies upon the liver, of a livid colour and hangs upon the liver, and has blood-veſſels to it, if Sir *George Ent* be not miſtaken. The eel's is red, placed upon the left horn of the ſtomach which is divided into two. In the frog fiſh on the left ſide pretty low, and in a large fiſh of the figure and bulk of a human kidney.

SECT.

SECT. III. 1. 'Tis ty'd to the *peritonæum* as, it borrows its external coat from it: to the back and *colon* by the inferior membrane of the *omentum*. Its concave ſide connects it to the upper fold of the *omentum*, and conſequently to the *Pancreas*. *Marchetti* has ſeen the *Pancreas* ſubſtantially annex'd to it. Intermediate membranes and fibres ſuſpend it between the diaphragm and left kidney, *Gal. Tom.* i. p. 415. and for the ſake of it the left kidney in all animals is of a lower poſiture than the right if my judgment be of any value. And by blood-veſſels and nerves it's nearly bound to them all, eſpecially the ſtomach, *Hipp.* p. 248. *Jul. Pullux.* p. 84. which it moſt particularly regards in all creatures, however various in other reſpects. Nor do blood-veſſels large and numerous alone, but likewiſe its upper part generally faſtens it to the coats of the ſtomach on its left ſide, ſo that it's not eaſily ſeparable. Moreover from the upper part of the ſpleen goes two at leaſt blood-veſſels, the venal and arterial *vas breve*, into the left ſide of the ſtomach. Sometime by its fiſſures and fibres it embraces the ſtomach as it were with fingers, as has been ſeen by *Riolan*, *Horſtius*, *Highmor*, *Lindanus*, &c. Nevertheleſs nature to ſhow her prerogative, and by way of *contraſt* and contrariety, has affix'd it to the *porta* in the *ſalpa* and diſtant from the ſtomach, if *Blaſius* his information be right. The hedghog's being large is faſtned very ſtrongly to the ſtomach by means of a membrane. The pidgeon's is much of the bulk and ſhape of a wheat corn, and is placed a little above the ſtomach, rather upon the gullet. In the weazel it's of a liver colour, and affixed to the whole length of the ſtomach, and broad at bottom. In reſpect to adheſion this chief difference is obſervable between human and brutes, that in moſt reſpects in the latter 'tis not ſo carefully ſuſpended, beſides that it has not ſo many blood-veſſels, and that it's never ty'd to the diaphragm. So that between the *vertebræ* and ribs it lies as behind a fortification. And in reſpect of other ſurrounding parts, in the whole it may be ſaid to be the moſt ſecurely guarded from external injuries, of any bowel in the lower belly, which I think another hint of its ſuperior excellence and uſe whatever it be. CONNEXION.

SECT. III. 2. There is uſually but one, yet *Hippocrates* long ſince has obſerv'd that nature, in this reſpect too, ſometimes deviates from her general practice. *Fallopius* has ſeen two or three of unequal bulk, plac'd atop of one another, *Obſ. ad P. Mannam.* p. 108. Such I take that mentioned in *phil. tranſ.* numb. 266. p. 690. by Dr. *Muſgrave*. *Ariſtotle* quotes ſuch a caſe *de generat. animal.* iv. 4. *Poſthius* ſaw it at *Montpelier*, *Panarol* at *Rome*, *Marchetti* at *Padua*, *anat.* c. 4. *Cæcil Foluis* at *Venice*, *Barthol. Epiſt.* 62. *Cent.* i. and *Boſchus*. Mr. *Cheſelden* tells us, he has twice in a human body ſeen three, twice two, and once four. *Cabrolius obſ.* 15. ſaw two ſpleens with diſtinct veſſels. *Morgagni* once in a man, twice in dogs obſerv'd many ſpleens, but never wanting: and inſtances of this ſort are innumerable among anatomiſts. *Anatom. adverſar.* iii. p. 35. *Cæl. Rhodigin.* inſtances it xxiv. 3. *Rondeletus in Skenkii* l. iii. *obſ.* 1. *Cornel. Gemma Coſmocrit.* i. 6. *Bourdon anatom.* c. 17. *Harderus obſ.* 45. the *German Ephemerides A.* 1672. obſ. 172. and 1686. *obſ.* 61. *Horſtius obſ.* 8. *Levin. Lemn. de occult. natur. mirac.* iv. 7. *Hofman.* iv. *de generat. hom.* 10. In the laſt body we diſſected in this theatre I obſerv'd a little ſpleen bigger than a walnut, of the ſame ſubſtance, fill'd with the ſame kind of blood as the true, and connected to it by veins and arteries. However generally in the whole theſe taken together make up the bulk of the common and natural one. In the *Pho-* NUMBER.

cena or ſea-calf there are four or five globular bodies, red, hardiſh, in ſubſtance like the ſpleen but of different bulks, the larger about the ſize of a bean or cheſnut, ſo that they ſeem ſo many ſpleens. The ſpleen it ſelf is compos'd, as it were, of many like globules clap'd together. *Ariſtotle hiſt. animal.* ii. 15. writes, " The ſpleen is generally in all creatures which " have blood, but in many of thoſe which are oviparous it's very ſmall, as " in moſt birds, particularly pidgeons, kites, hawks, owls. The *Capri-* " *ceps* bird wants it intirely, ſay ſome. *Bournigius de Sangu.* 13. *R. Moræus* " *de conſ. valetud.* p. 693. *Entii apolog.* p. 60. The ſame is ſaid of oviparous " quadrupeds, as the tortoiſe, watermouſe, evit, lizard, crocodile, frog. But I ſuſpect the truth thereof; or perhaps we may ſay with *Wotton de diff. animal. ſed exiguus admodum lien veluti notæ gratia habetur.* *Pliny* takes notice of this, xi. 37. *Hiſt. Nat.* Vipers have ſcarce any, tho' an eel has a conſiderable one. It's ſaid inſects have none, contrary to the proverb *habet & muſca ſplenem. Anonym. Græc. 7. Camerar. Cent.* vi. *obſ.* 37. That the chameleon has none is affirmed by many, *Democritus*, *Ariſtotle*, *Pliny*, *Solinus*, *Geſner* and *Aldrovand.* *Panarolus*, and the royal academy at *Paris.* In human, it's very ſeldom wholly deficient, as *Laurentius* ſays in the diſſection of a young man, who had no proper ſpleen, but the ſplenic veſſels were very large, and terminated in a kind of glandular body, whence two large hæmorrhoidal veins. *Anat.* vi. *quæſt.* 25. *Skenkius* obſerved the like in the famous *Matthias Ortelius* a citizen of *Antwerp*, *obſ. med.* iii. but *Morgagni anatom. adverſar.* iii. p. 36. queſtions whether he was not miſtaken, and that it lay hid under that fleſhy ſubſtance which he ſays cover'd the inteſtines. *Caſpar Bauhin* too mentions the ſame *In append. ad Rouſſetum de partu Cæſareo.* *Valſalva* has obſerved it wanting, *Theatr. Tom.* ii. 391. *Ariſt.* T. 1. p. 1124. *Hen. ab Here. obſ.* p. 221. and *Hoberius* in a woman at *Paris*, *De morb. intern.* p. 584. 1. 66. *ad calcem. Kerkringius obſ.* xi. p. 31. which are all the inſtances I have met with, and ſuppoſe it to have been only waſted away and diſappear'd, as happens ſometimes in diſeaſes, of which we ſhall have caſes hereafter in proper place.

FIGURE. SECT. III. 3. Its figure is exceeding various, beyond that of any other part of the body, which gives us a hint that it has no eſſential relation to its uſe. Sometime it's triangular, ſometime ſquare, round, globular, pointed, divided in the middle, or into lobules, *&c.* In *phil. tranſ.* numb. 58. p. 1188. there is an extraordinary ſpleen, large, and of the figure of a ſaw. *Highmor* and *Horſtius Junius* have noted it divided into lobes, the former gives us a cutt of a monſtrous one. *Rhodius* has ſeen one round, *Bartholin* divided into five lobes like the kidneys of calves. Its bulk both natural and diſeas'd is various, as *Ariſtotle* and *Galen* teach us. 'Tis generally about ſix fingers bredth long, three fingers bredth thick, and of the bredth of the hand: of the figure of a neat's tongue, or ſole of the foot, thence call'd ſometime *linguoſum viſcus.* *Hippocrates l. de anatom.* compares it with the human foot. *Ruff. Epheſ.* Hence the plaiſters of that form or pledgits are call'd *Splenia* by *Dioſcorides*, *Pliny*, *Martial*, *Pollux* and *Heſychius.* *Feſtus.* *Andr. Lacuna in Epiſt. Gal.* firſt by *Hippocrates* as *Galen* witneſſes. Likewiſe a piece of linnen ty'd upon the upper part of the head or forehead clothes, bears the ſame name, and are obſerved in antient *Greek* buſts as marks of deification. The ſide next the ribs is convex, the other concave, where the veſſels enter, and where it's join'd to the *omentum.* In the *Galeus piſcis mas* ſays *Charlton Mantiſſa*

tiſſa anatomica, the ſpleen riſes at the bottom and hinder part of the ſtomach, two fingers bredth at the beginning, for ſix fingers bredth long embracing the bottom of the ſtomach; after this it throws out a ſort of *appendix* like the gut *cæcum*, then it becomes ſmall and ends at the *pancreas*, being fifteen fingers bredth more in length: all this ſpace it ſends many and very large veſſels to the ſtomach and inteſtins. 'Tis larger in a man than any other creature, in proportion to the bulk of his body, and in a woman rather larger than in a man. The moſt general diſtinction is, that the human is not ſo long for its bulk as in brutes. As to its form, the irregularities often ſeen in it are owing to the preſſure of the circumjacent parts, which this ſpongy bowel adapts its ſelf to, there ſpreading out its bulk where leaſt reſiſtance, and receives their impreſſions too, like wax ſeal'd, or any ſoft ſubſtance caſt in a mold. This eſpecially is not to be wonder'd at, when it becomes diſeas'd; its ſides not being able to reſiſt the *impetus* of the circulating blood muſt ſwell out and relax, where its fibres are weakeſt, like Aneuriſms. Inſtances of ſuch we ſhall mention hereafter, nevertheleſs we obſerve 'tis always thick at the edges, not thin as the liver. It generally weighs with its contained blood, about fourteen ounces or a pound. When dry'd but a drachm. That of the goat before us weighs ℈iſs. The *Indian* pig's but two grains. The external face of the ſpleen is not ſmooth and level like the kidneys or liver, but full of little round riſings or *tubera* like the skin of thoſe that labor under the *elephantiaſis*, which I conceive owing to the foregoing reaſon, the blood diſtending its little caverns, or at leaſt to its own power of contraction, which ſtretches in ſome degree the outward ſurface or membrane, in the ſpace between the inſertion of its fibres therein. In outward circumſtances it's moſt various in human kind, for in brutes no ſuch remarkable difference is obſervable as to the ſame kind, only we may affirm it as an axiom, that the ſpleen of the latter is generally longer in ſhape, narrower, thinner and leſs withal, ſo that an ox's doubled ſhall not equal a man's. Still the variety of its ſhape in different creatures is ſurprizing, and nature ſeems to have made it in a merry mood. *Ariſtotle* iii. 13. *de part. animal.* teaches us in horned creatures 'tis moſt commonly round, in beaſts with divided toes long, in whole-footed animals between both. That of the oxen is a foot and half long, its breadth almoſt equal throughout, *viz.* four inches where narroweſt, five where broadeſt, ſcarce two in thickneſs. It's connected to the ſtomach for near the ſpace of nine inches by very many ſtrong fibres, in figure 'tis like the ſole fiſh, unleſs thinner at its extremities. The ſpleen of the lamprey is a wonderful variation in nature: it's placed at the bottom of and behind the ſtomach upwards, two inches broad, lower it ſharpens towards a point, but before it ſends out leftwards a ſort of *appendix* like the gut *cæcum* with a ſlender cavity in it, a third part of an inch broad and fifteen fingers bredth long; in the way it's ty'd here and there as with a fillet like the *colon*, and is of a darkiſh color. All this whole tract many and very large veſſels from the ſtomach and guts acroſs the meſentery enter the ſpleen. This and many more I had from Sir *Geo. Ent*'s *apologia*. The *Indian* pig's is long, thin, of a florid color, adheres to the left ſide of the ſtomach. In the ſprat it's very ſlender, long, and of a deep red. The barbel's is very florid, three inches long, firmly adheres to the ventricle and liver by many veſſels. In the place it's ſituate juſt by the gall-bladder, about the middle of the liver, ſmall, of a black

black color, ſcarce ſo big as the nail of one's little finger, yet with a convexity on one ſide. There are very eminent veſſels from it to the ſtomach and guts. The Haddock's is thin, long, livid, faſtned to the gut, and ſends a conſpicuous branch into the bottom of the ſtomach. In the ape it's very ſmall, long, of a ſcalene, triangular ſhape with impreſſions upon it, as it were the bite of teeth. It ſticks to the left kidney but free from the *diaphragm*, ſay *Sylvius* and *Blaſius*. An *Indian* monkey's was ſmall, ſcarce three fingers bredth long, ſays the laſt mention'd author. In the elephant we diſſected lately at the Preſident's, it was of a half-moon figure: the ſame in a lyon and pheaſant: pretty much the ſame in a horſe. The coney's is thin, ſharp at the ends, and repreſents the figure of an arm, ſays *Steno*. In a dog its upper part is narrow, contrary to the human, becauſe we may rather ſay its head is revers'd, ſo ſollicitous has nature been in diſtinguiſhing between us and brutes in this material organ. A caſtor's is ſmall, long and narrow. Wild *African* goat's oval: ſo is a frog's. Another wild goat's is ſquariſh, as that before us. The hedghog's is large, oblong, ſlender and round. Triangular in the *torpedo* and ſea-needle, where its ſubſtance is almoſt ſolid as to feeling like the liver. In the ſalamander it's long; round in hauks, ducks, eagles, crows, in the *oſſifraga*. Round like a heart, or pyriform, as in a crocodile, tortoiſe, ſword-fiſh, viper, pike. In the *Turſio* it's form'd as it were of many red parenchymous globules, from which ſhort veſſels go to the ſtomach, ſays *Bartholin*. In the ſea-calf 'tis like a tongue. In ſome fiſhes, as the *ſqualus*, its outward ſurface riſes in little round eminences, like cluſters of grapes, and in lizards too. *Bartholin* ſays in the dolphin it ſeems to conſiſt of many globules. The ſhape of the ſpleen in a horſe is like a plow-ſhare, its length a foot nine inches, its greateſt bredth ten inches, its leaſt one, from the broadeſt part to its point it decreaſes continually in bredth and thickneſs. A camel's is nine inches long, four broad, half an inch thick, ſays *Blaſius*. In a civet-cat eight fingers bredth long, two broad.

COLOR. SECT. III. 4. The color of the ſpleen is blewiſh, livid or like iron, and grows blacker with age. In a *fætus* 'tis red like the liver. In children new born is very freſh and florid, and becomes of a deeper dye in years, whence *Steph. de Mellis* calls it *luridus*, and rightly. The color in the human, as well as magnitude, is very various. It ſeems to darken in proportion to the heat of the animal. In oxen and ſwine 'tis whiter; in dogs and lyons generally more florid than the liver it ſelf. In an alpine-mouſe of a florid bloody color, ſo in the tiger, coney; in the frog red, the ſalamander's between black and red, blackiſh in the tortoiſe, of a bloody color in the viper, if of any. *Veſalius* takes notice the human is ſometime like the color and protuberances of an *Elephantiaſis*; and in ſome patients of that ſort their whole skin has ſo nearly reſembled it, that one would fancy they were compos'd entirely of ſpleens.

PARTS. SECT. III. 5. The human ſpleen being generally of an oval figure, the upper part of it is call'd the head, and the inferior its tail, by *Ruffus Epheſius*, and *Hippocrates de Oſſium nat. & L. Epidem.* The firſt by *Pollux*, is call'd Σπλωιον. Along the middle of its concave ſide runs a white callous line call'd *Raphe*, whereto the *Omentum* is faſten'd, and upon this all the veſſels enter into the bowel.

COATS. SECT. III. 6. 'Tis inveſted with two tunicles, the external deriv'd from the *peritoneum* or common lining of the *abdomen*, thicker than that of the liver, and thickning too with age. It's o'erſpread with many fine veſſels running

ning the length of it, and ty'd to the undermoſt by the extremities of the arteries. There are divers inſtances in Authors of this Coat becoming thick like leather. *Andernac. Columb. Bauhin, Hoffman, Spigel. Riolan, Bartholin, Tulpius* and others have ſeen it. *Malpighi* found the inner coat cartilaginous in an ox. *Spigelius* mentions its being bony, *V. Mæbii fundament. phyſiol.* p. 376. The inner coat is compos'd of various rows of ſtrong fibres croſſing one another with different directions in a curious manner. 'Tis ſmooth, thick, hard, ſolid, tough, and ſometime becomes bony, often tendinous or cartilaginous. 'Tis not made of an irregular woof of filaments, as other membranes generally are, but of ſmall muſcular fibres running to a point from one circumference, terminated by other like circles made of like threads or *radii* circumjacent: all which meeting with one another and firmly uniting, compoſe in the whole a muſcular panicle. 'Tis finer and thinner than the external: and air blown into the artery of the part, will paſs thro' it when the other is taken off. As the arteries ariſe from the body of the ſpleen, ſo the veins of the external coat are deriv'd from them, and by degrees conjoining into larger trunks, end in the entring vein, or go farther into thoſe of the *omentum*. This membrane is faſtned to that underneath it likewiſe, by many ſlender filaments ſeemingly propagated from the extremities of the fibrous pillars and net-work in the internal texture of the ſpleen. The ſpleen of the viper is ſaid to have but one coat. The outward tegument of that in the frog-fiſh is very lax, and not adherent to the inner, ſo that if you cut but a large wound, the ſpleen will ſlip out of it.

SECT. III. 7. The veſſels which run into the ſpleen are arteries, veins and nerves, all very large and numerous, wrap'd together in one membrane or *capſula* form'd from the inner coat, and which purſues them into the ſubſtance of the ſpleen it ſelf. The artery firſt exactly deſcrib'd by *Arantius*, is the left branch of the cœliac, and largeſt, which running parallel to the horizon towards the left, under the ſtomach, and having ſent many large branches to the ſtomach, *pancreas*, *omentum* both upper and under, *colon*, *rectum*, and ſometimes to more parts, ſuch as the meſentery, emulgents, kidnies, womb, bladder, and the like, becomes ſubdivided, firſt into two, then into four or more branches, and ſo enters and permeates, or rather compoſes the whole ſubſtance of the ſpleen: uniting all over its ſmaller twigs, with inexplicable variety running one into another, and forming an innumerable parcel of cells, between which they freely open into each other, as likewiſe into the wide expanſions of the entring veins. Sometime the artery ariſes directly from the aorta, as *Jac. Silvius, Car. Stephanus, Fernelius*, 1. 7. *Columbus* 11. *Arantius Obſ.* 35. *Septalius in Ariſtot. Prob. T.* 2. *Jeſſenius in Anat. Pragenſi. Riolan* 11. 23. and others have obſerv'd. The lienal vein is likewiſe very large, ariſing from (or rather running into) the left ſide of the *porta*. It accompanies the before-deſcrib'd artery, and having communicated its branches to (or rather borrow'd from) as many circumjacent parts as we related of the artery, divides into two main branches. Theſe ſubdivide again into ſeveral, and have *anaſtomoſes* with ſome of the arteries lying near them, and then are conducted ſide by ſide with the arteries into the ſpleen along the *raphe*. There are no manner of valves, as ſeveral authors have fancy'd, unleſs ſomewhat like one in the vein, but not of any ſtricture, and for what purpoſe ſhould there be ſuch, ſeeing the *anaſtomoſes* between the veins and VESSELS.

arteries elude their uſe. Indeed I ſuſpect both valves and *anaſtomoſes* are fictitious. The veins are continu'd in the ſpleen only as to their larger trunks, but not their minute ramifications, which would have weakned the bowel too much. The nerves of the ſpleen ſpring from the intercoſtal branch, and are ſtrictly bound upon every moſt minute branching of the blood-veſſels thro'out their whole progreſs. One branch particularly is beſtow'd upon the outer membrane obſerv'd to be very nervous.

STRUCTURE. SECT. III. 8. The ſubſtance of the ſpleen is different from any thing in the animal machine beſide. It conſiſts intirely of complications and inoſculations of arteries, veins, nerves, and a muſcular net-work of *fibrillæ*, which raiſe its whole body into cells of different figure and bulk, form'd between the veſſels and fibrous extenſions, reaching from one ſide of its inner coat to its oppoſite, or to the intermediate veſſels, or to others running croſways, or ſideways, with admirable curioſity connected together, and with the continuations of the arteries and veins, opening and communicating with each other all manner of ways: ſo that if you inject any liquor by the artery, it runs freely into the vein, *& vice verſa*.

ARTERIES. SECT. IV. This is a detail of its manner of ſubſtance and veſſels; but becauſe we deſign to give a more perfect hiſtory at leaſt, of the ſpleen, and that all our future reaſonings depend much upon the knowledge of its ſtructure and communication with other *viſcera* by means of its veſſels and nerves: we ſhall enlarge upon the whole, from our own and the ſtricteſt obſervations of anatomiſts hitherto communicated. And firſt as order requires, we will begin with the arteries, of which we have made a draught

TAB. I. Plate I. half as big as the life, chiefly from a curious preparation of the branchings of the *aorta* thro'out the *abdomen*, injected in wax by my friend and accurate anatomiſt Mr. *Joſhua Symonds* Surgeon: where I have ſtudy'd to extricate it as much from confuſion, as ſo perplex'd a ſcheme will permit; and taken the liberty to aſcertain the names of the branches, which in Authors are a little intricate; to reconcile them to their varying denominations, and reſtore their moſt rational ones, with all the care and judgment I could pretend to.

At the very deſcent of the great artery from the cavity of the *thorax* into the belly, in its paſſage thro' the *diaphragm*, go the two phrenic branches, mark'd in the ſcheme by the two letters B B, into the *diaphragm*, which divided into many ſprigs are chiefly diſpers'd upon its lower ſide towards the *vertebræ*, nevertheleſs ſend ſome ſprigs to the upper part of the *diaphragm*, and even to the *pericardium* where it's continuous to the *diaphragm*. Below this, the great artery from its forepart projects a large and remarkable artery call'd the cœliac, mark'd G. Ariſing forwards for a little ſpace, it becomes partite nearly at right angles into two branches of unequal bulk, at the upper limb of the inferior membrane of the *omentum* to which it's annex'd. The leſſer branch goes directly to the right, the bigger to the left. The one by a general name call'd the epatic, the other the ſplenic, from the

EPATIC. *viſcera* they chiefly tend to. The firſt or leſſer advancing towards the right ſide, being ſeated upon the *pancreas*, ſends a branch from its lower ſide mark'd H, to the lower membrane of the *omentum* on its right ſide, and to the aſcending *colon*, which may properly be call'd *Epiploo-colica poſterior dextra*, and a branch I *Gaſtrica dextra poſterior* from its upper ſide, with not many ramifications to the lower and back part of the ſtomach near the *pylorus* where it meets with the next: which goes from its upper ſide too, *viz.* the *pylorica* D. This encompaſſes the hinder part of the right ſide

of

of the ſtomach and *pylorus*. Then this epatic main branch becomes divided into two; the uppermoſt tends to the lower and concave ſide of the liver, and enters with propriety by the general name of epatics AA into that huge *viſcus*, nouriſhing its whole ſubſtance with the vital fluid; but firſt receives the umbilical artery *a* turn'd into a ligament, and throws off the two *Cyſticæ* call'd *Gemellæ* or twins CC, encompaſſing the whole gall-bladder, and gives a ſolitary branch *b*, taken notice of in moſt authors, into the ſame hollow ſide of the liver. The other ramification of the two before ſpoken of, mark'd E, taking a compaſs and converging to the left ſide, makes the *Gaſtro-epiplois dextra* ſpreading its ſelf along the bottom, fore and right part of the ſtomach upon the upper *limbus* of the anterior fold of the *omentum* with its ramifications on each hand, ſent out *geniculatim*, or like the leaves of plants from their chief rib, reaching midway of the length of the ſtomach and embracing the right and lower half thereof, they may be call'd *Rami anteriores gaſtrici dextri*, mark'd *ee*. But at the ſame time, at the ſame joints it affords twigs mark'd *dd*, to the whole right ſide of the upper *Lamina* of the cawl, the *Epiploicæ anteriores dextræ* repreſented depending and cut off in the ſcheme, that the ſubjected veſſels may the better appear. We muſt likewiſe obſerve, that before this and near its origin it diſpatches the *inteſtinalis* F to the *duodenum* which it covers with many branches, extending themſelves even beyond the beginning of the *jejunum*. And as it's annex'd and upheld by the *pancreas* and upper membrane of the *omentum*, at the ſame time it imparts a twig to the *pancreas* mark'd *f*, and others to the *omentum*. Return we now to the firſt mentioned great cœliac, and trace its left great diviſion call'd the ſplenic.

The ſplenic artery *g*, the other and larger and left diviſion of the cœliac, in its journey *ſiniſtrorſum* towards the ſpleen, ſupported by the *pancreas* and lower *omentum*, from its upper part ſends out a branch O, *gaſtrica poſterior* to the backſide of the ſtomach. Another from its underſide K to the middle of the *pancreas*, and properly the *pancreatica*. Next from its upperſide it parts with a very large and conſiderable branch, mark'd in the ſchemes by the letter P, the biggeſt of the whole ſtomach, call'd therefore *Gaſtrica major*. This creeps up perpendicular from the ſplenic behind the ſtomach, leaving two little twigs by the way pp on each hand upon the gibboſity thereof. When it's arrived to its upper part, with a full channel it diverges into two, nearly at right angles, one ramification marches along the ridge of the ſtomach towards the *pylorus*, beſtowing at equal intervals or knots on both hands copious branches, which deſcending on the fore and backſide of the ventricule in innumerable ſubdiviſions inoſculate with thoſe coming from the bottom, as before deſcrib'd, on the right ſide. Its other ramification on the top of the ſtomach going leftwards aſcends ſtill on the upper part of the ſtomach, diſperſing in like manner from æquidiſtant knots on both ſides, branches communicating with thoſe coming from its inferior and left ſide, and likewiſe with the *vas breve* from the body of the neighbouring ſpleen. Thence it arrives at the *cardia* or ſuperior orifice of the ſtomach, round which it twiſts it ſelf and in a ſpiral line from right to left, whence very properly call'd *coronaria* q. All this while it perpetually ſpreads it ſelf into ſmaller twigs upon the part, and diſpenſes one to the *æſophagus* it ſelf, coming down from the midriff. SPLENIC.

The ſplenic aforeſaid next (and ſometime before the laſt-mention'd) diſpatches from its lower ſide a very large branch L, with numerous off-

ſpring

ſpring call'd properly *Epiploo-colica media* ſ. *major*, going to the middle of the under layer of the *omentum*. It preſently divides with a right angle into two, one to the left, the other to the right, upon the length of the *colon* and *poſterior* caul. The ſplenic artery next from its upper ſide ſends a branch or two more to the ſtomach, on its back and left part, call'd *Gaſtricæ poſteriores ſiniſtræ* ſ. *minores*, mark'd Q Q. Sometime one of theſe forms the *vas breve*. And now the ſplenic growing near the ſpleen takes upon it that name with propriety, and divides into two branches at the letter R, the ſuperior and inferior. Sometime from the firſt goes off one of the laſt mention'd *Gaſtricæ ſiniſtræ* or *vas breve*. From the inferior, or often above it, is detach'd one of great conſideration N, which generally firſt ſends out the *Epiploo-colica ſiniſtra* M, to the lower *omentum* on its left ſide and *colon*. Then becomes the *Gaſtro epiplois ſiniſtra*, which goes to the under and left ſide of the ventricule, along the margin of the fore part of the *omentum*, meeting with the *Gaſtro-epiplois dextra* in the middle thereof. This from its upper ſide on both hands throws off double ramifications to the bottom of the ſtomach mark'd *n n*. From its under ſide, lets fall at the ſame time and at the ſame joints or ſpaces, long and narrow branches into the *anterior* membrane of the *omentum*, mark'd *o o*, repreſented cut off. The *ſuperior* and *inferior* branches of the ſplenic artery now ſubdivide themſelves into others, and are much contorted into many ſemicircles. From ſome of them there are one or more *anaſtomoſes* with the veins lying next 'em coming from the ſpleen mark'd *r*, as ſeveral authors ſay. Generally from the inferior goes that mark'd T, the *hæmorrhoidalis ſplenicæ externa* to the outſide of the deſcending *colon*. Then they all at once ſupported by the cawl enter the body of the ſpleen, in the ſtrait line and knobby ridge call *Raphe*, in the concave ſide thereof thro' its whole length, together with the veins and nerves: compoſing the main part of the texture of the ſpleen. All authors take notice with ſurprize of the exceſſive magnitude and number of them, for immediately theſe arteries fill the whole body of the ſpleen with their branches. *Spigelius* and *Bartholin* ſay, they five times exceed the veins in number. Numerous and very large arteries, ſays *Gliſſon*, enter the ſpleen, much larger than the hepatic, tho' the liver is ſix times as big. *Helmont* ſays there are 400 branches of arteries in the ſpleen. *Drelincourt* calls 'em *Arteriarum myriada*, p. 12. *de lienoſis*. *Zacut. Luſitan.* ſays, " it borrows its arteries from the great deſcending " *Aorta*, more in number and larger than its bulk requires. This is the reaſon of that palpitation Hypochondriacs feel in their left ſide. Sometime, as we ſaid before, from the ſuperior branch of the ſplenic, but more regularly from the body of the ſpleen and its head or upper part, goes the celebrated *vas breve arterioſum* into the left ſide of the ſtomach. This is what the antients fancy'd to ſpew the melancholly juice out of the ſpleen into the ſtomach. And what the moderns ſuppoſe to furniſh it with the acid liquor to cauſe appetite and promote digeſtion. However it certainly carries pure blood to that part as the reſt of the arteries, whenever the ſpleen contracts it ſelf. This is mark'd with the letter S in the ſchemes. It will ſwell towards the ſtomach upon a ligature, a plain indication that it communicates freely with all its blood-veſſels. Whenever it ariſes without the body of the ſpleen from the ſplenic artery, it ſends one branch into the ſtomach, another into the ſpleen. *Laurent.* vi. *Quæſt.* 26. ſays, he never found the *breve vas* wanting. *Bartholin* has ſometime ſeen

it

it very much branch'd out. *Rolfinch* obſerv'd it ſpread into ſix ramifications, *Hornius* into four. In conies it's generally double, and in the dog quadruple or more. *Sylvius* has ſeen three eminent veſſels going from the ſpleen to the emulgent vein. Sometime one is continu'd from the ſpleen to the internal hæmorrhoidals, but moſt commonly it communicates with both the meſenterics. There is another artery not to be neglected, mark'd V, ariſing from the body of the deſcending trunk of the *aorta*, and goes to the inſide of the *rectum*, in order to make the internal hæmorrhoidal. This always has communication with the inferior meſenteric and colic ones, ſometime it ariſes from the ſplenic it ſelf, ſometime from that I nam'd *Epiploo-colica media*, and ſometime from the *Epiploo-colica ſiniſtra*, or from others; but it's my buſineſs only to aſcertain Nature's moſt common and genuine methods. This hæmorrhoidal when it's arriv'd to the back of the *rectum* throws its branches on both ſides, and penetrates thro' its teguments to its inner membrane. HÆMORRHOIDAL.

The ſplenic arteries enter the ſpleen after a different manner in different animals, beſide the little and no way material varieties in creatures of the ſame *ſpecies*. As the ſpleens of moſt larger animals are of a longer figure than the human, they are generally introduc'd ſimply, and without many ſubdiviſions, into the broadeſt part or tail, whilſt the head is firmly annex'd to the ventricle by membranes, and the *vas breve* of both ſorts: but always in adults contorted and crooked, like the ſpermatics and hypogaſtrics ſpread upon the body of the womb. The reſt of the arteries in the ſcheme, as being not ſo much to our purpoſe, ſuch as the vertebrals, lumbals, emulgents, ſpermatics, iliacs, *ſacra*, *meſenterica ſuperior*, *inferior*, *media*, &c. to avoid being tedious, and becauſe they are ſufficiently known and underſtood by a bare inſpection, and the explanation annexed thereto; we ſhall not enlarge upon any further. It's enough to obſerve in general the communication of all the abdominal arteries one with another, and with the ſpleen, both by proximity of their origins from the *aorta* and ſplenic, and frequent *anaſtomoſes*, by way of the meſenterics, which I have not diſtributed ſo largely as in nature, that a drawing in *plano* might be leſs perplex'd. *Their* ENTRANCE.

SECT. IV. The next thing we proceed upon, is to recapitulate the veins correſpondent thereto, *viz.* the ramifications of the *porta* which is ſo remarkably diſtinguiſh'd from the *cava*, that it is as it were a ſyſtem of it ſelf, not generally emptying its fluid as all others, into the main channel of the great vein, but into the body of the liver, and therefore by the Ancients was call'd the hand of the liver, meaning thereby that it collected the chyle from the tract of the guts after digeſtion for the uſe of the liver, which was the organ of ſanguification according to their opinion, and ſo was the chief inſtrument of ſupplying life and nouriſhment to all the parts. Which is one inſtance of the Ancients having a notion of a motion of the blood in the veins from the leſſer branches into the greater trunks, being one half of the circulation. Were the abdominal veins deriv'd from the *cava*, as the arteries from the *aorta*, I might ſpare you and my ſelf the time of particularly deſcribing them, eſpecially ſeeing the ſchemes are mark'd with the ſame letters upon each correſpondent branch: But ſince Nature has for wiſe reaſons deduc'd them from ſo different origins, and ſome veins have no arteries, or not exactly parallel, and *vice verſa*; we cannot but conceive a great pleaſure in obſerving, under theſe circumſtances, by what VEINS.

arts that curious mechaniſt has render'd the two ſyſtems compatible, and as it were indented counterparts. For which reaſon I have ſo contriv'd the ſcale of the ſchemes, that by laying one over another, and holding them up againſt the light, they appear in their natural order and ſituation, one in reſpect of the other, as in the human body. And becauſe we cannot be too exact in a caſe of this importance, nor otherwiſe do juſtice to the part I have undertaken to patronize, but deviate too far from the method of other anatomiſts: I hold it highly neceſſary in the next place, to recite the hiſtory of the veins of the ſpleen, tho' as conciſe as may be.

TAB. II. From the concave ſide of the liver ſprings the great trunk of the *porta*, nearly as big as the *vena cava*, from many and large ramifications AAA, in the ſubſtance of that huge glandular *viſcus*. After its free *anaſtomoſes* with the *vena epatica* therein, it receives the umbilical *a*, now become a ligament, and then from its forepart the *cyſticæ gemellæ* collected from many ſmall hair-like filaments upon the body of the gall-bladder, mark'd C C. Then it receives a branch on each ſide B B the *phrenica dextra* and *ſiniſtra*, from the diaphragm, and next into its forepart a little on the right ſide another little branch D from the poſterior part of the *pylorus*, or inferior orifice of the ſtomach. Next it receives the tribute of the *Gaſtro-epiplois dextra* E into its right ſide from the lower and right half of the ſtomach and upper *omentum*. Sometime this is inſerted above, ſometime beneath the going off of the ſplenic. *Veſalius* ſays he has ſometime obſerv'd it implanted into the ſplenic it ſelf. 'Tis highly worthy of remark, that the *Gaſtro-epiploicæ*, both veins and arteries right and left, run in the margin of the upper limb of the *omentum* looſe from the ſtomach, and ty'd to it only at the intervals of the branches it ſends on both ſides to it, ſuſpended all the while by the *omentum*. This contrivance is admirable, becauſe they run the length of the ſtomach; and otherwiſe would be in danger of breaking, nor could they poſſibly ſo well adapt themſelves to the ſwelling and contracting of the ſtomach, or to its periſtaltic action in digeſtion. The other gaſtric veſſels which only run along its bredth more numerous and by ſhorter courſe, are by that means more free from ſuch an apprehenſion, therefore more cloſely connected to its exterior membrane. The branches running from theſe conform themſelves in all reſpects to thoſe of the arteries above deſcrib'd, and need not be repeated.

Next underneath this, and ſtill from the right ſide of the *porta*, comes in a branch from the *duodenum* and beginning of the *jejunum*, call'd *inteſtinalis*, mark'd F, receiving little twigs from the *pancreas* f, near its duct into that firſt nam'd inteſtin. The next thing that offers it ſelf to our conſideration, is the ſplenic vein G, breaking from the left ſide of the *porta*, and almoſt equalling it in bulk. It runs in an horizontal line under the ſtomach, upon the under *lamina* of the *omentum*, and upon the *pancreas* along with the ſplenic artery directly to the ſpleen. But firſt near its origin from its under ſide, it ſends a branch downwards H. into the right ſide of the lower duplicature of the *omentum* and *colon*, the *Epiploo-colica dextra*. Sometime this ariſes from the trunk it ſelf of the *porta*: then another branch from its upper ſide, and ſometime two, *venæ gaſtricæ minores*, OI, not much ſubdivided, to the back and left ſide of the ſtomach; whereof I is ſometime without a concomitant artery, becauſe of the diſtant origins of the ſplenic vein and artery. Next from its lower ſide goes a twig or two to the *pancreas* K. After this, or perhaps after the next from its upper

upper part goes a large branch the *Gaſtrica major* P, becauſe biggeſt of the ſtomach, ſupported by the inferior membrane of the *omentum*. It runs obliquely upward and leftward on the back of the ſtomach, diſperſing two ſmaller twigs to the backſide thereof pp, then going on divides into two greater branches at right angles, upon the top of the ſtomach, the right marching towards the *pylorus*, the left up to the *cardia* incircling it as is before deſcrib'd in its cotreſpondent artery: 'tis very beautiful to behold in dogs. The diſtribution of its *ſurculi* on all hands is like the artery too, and need not be recapitulated. On the left end of the ſtomach it communicates with the *vas breve* from the ſpleen.

Next, the ſplenic from its lower ſide diſpatches a conſiderable branch L, *Epiploo-colica media*, in its deſcent dividing into two at right angles upon the *colon* and lower *omentum*, as they lye under the ſtomach. They have numerous branches, ſometime an hæmorrhoidal is deriv'd from the left. Hence the ſplenic becomes branched out into two, ſuperior and inferior R, and they into many more. From one of its upper diviſions ſprings one or two more of the *Gaſtricæ minores ſiniſtræ*, bringing the recurrent blood from the left and wideſt end of the ſtomach Q. Sometime too they give the *vas breve venoſum*, which ſends one twig to the ſtomach the other to the head of the ſpleen. From theſe upper diviſions likewiſe are the *anaſtomoſes* of the neighboring arteries *r*, ſo much talk'd of, but perhaps only imaginary. But from the inferior branch of the ſplenic ſhoots out in a bow from left to right the *Gaſtro-epiplois ſiniſtra* N, which is the main channel of the blood on the left end of the ſtomach at its bottom, I need not be more particular upon it, becauſe in all points correſpondent to the artery which is ſynonymous. However near its origin goes off M, ſometime without an artery, the *Epiploo-colica ſiniſtra*. From ſome of thoſe lower branches of the ſplenic generally is detach'd the *Ramus ſplenicæ hæmorrhoidalis externus* T, from the outſide of the deſcending *colon*. Now the ſplenic ramifications are introduced in a row into the ſpleen, from whence on its upper part goes the *vas breve* to the ſtomach S, between its coats, riſing upwards towards its orifice, and communicating freely with its veins and arteries. Sometime theſe veſſels are doubled or trebled, and have a proportional exceſs of arteries. Sometime three, ſays *Saltſman, obſ. anatom.* four, ſays *Drelincourt* from his father's obſervations. In the crocodile, where the ſpleen lies towards the right ſide, the *vas breve* goes to the bottom of the ſtomach, and ſo in ſeveral other creatures where the *viſcus* obſerves that obliquity. The great branch of the *porta* which we left at the entrance of the ſplenic, ſoon from its left ſide receives the *hæmorrhoidalis portæ interna* V, from the deſcending *colon* and inſide of the *rectum* in its back part. Twice or thrice *Veſlingius*, once *Caſſerius* obſerv'd it to ariſe from the ſpleen it ſelf; oftner 'tis deriv'd from the ſplenic. But moſt generally between the ſplenic and meſenteric divarications as here depicted. This internal hæmorrhoidal joins with the external from the *hypogaſtricæ* of the *cava* by ſeveral *anaſtomoſes* about the *anus*. The meſenteric W, from many ſubdiviſions call'd by one general name Meſariacs, collects the blood promiſcuouſly from the guts, running every where upon the meſentery, and pours it with a copious ſtream into the liver.

VAS BREVE.

SECT. V. We have conducted the ſplenic vein R into the body of the ſpleen, which it enters in many ſubdiviſions along with the arteries and nerves. The arteries and veins, tho' they enter together marching ſide by ſide, and may for ſome ſpace be ſeparated from each other: yet upon the very

TEXTURE *of the* SPLEEN.

very point of their introduction, the ſides of their coats are ſo cloſely united that they ſeem one, and can ſcarcely be parted. In this particularity I find, that the artery pierces intirely into the vein, like letting one Pipe into another, and ſoldering up the oval aperture in the cylinder by which it enters, and this is done juſt upon the *Raphè*, ſo that the vein becomes a perfect *capſula* to the artery, as is moſt evidently ſeen in the ox's ſpleen before us, TAB. III. which I have caus'd to be exactly cut in Plate III. This is the *capſula* or *commune involucrum vaſorum per medium Lienis perreptans* of *Malpighi*, really the vein. This capſular vein much exceeds in bulk the artery which runs along the middle of it, leaving a large vacuous ſpace quite around. It's remarkable, that of its two coats or membranes which all veins have, juſt at its entrance it imparts its outermoſt to the inner membrane of the ſpleen, reſerving only its innermoſt and thinneſt, which it carries into the ſpleen. And here even in the body of the ſpleen the artery is ſtill contorted, and proceeds till it comes to the extreme ends and ſides of the ſpleen, ſending out branches every way: firſt larger trunks, then by degrees more and more minutely ramify'd, till in the main it fills the content thereof. *Heiſter* ſays the human ſpleen is not exactly like calves, but the veins reach farther into its ſubſtance. *Ruysk* ſays the veins in calves are preſently at an end. The extremities of theſe arteries are not drawn off as others into *anaſtomoſes* of the veins, but return either into themſelves, or into the ſpaces left every where between the arteries. For it cannot otherwiſe be underſtood, that theſe veſſels ſhould run backwards and forwards into one another all manner of ways, without leaving cells of no regular ſhape or bulk between, thro'out the whole body of the ſpleen, and thus it is in fact. *Hippoc.* calls the cells *Amplitudines*, *Cryptæ*, *Helices*. *Galen* κοιλοτητας. So that the whole ſubſtance of the ſpleen according to *Malpighi*, who has beſt deſcribed it, from the moſt nice and laborious diſquiſition, is a *congeries* of cells and cavities, form'd from and divided by theſe arterial ramifications, opening into one another, and into the arteries. He deſcribes theſe cells as membranous, and thinks their origin ought to be deriv'd from the expanſion of the coats of the veins, much as the cavities in the lungs ſeem continuations of the leſſning pipes of the *trachea*. This by obſervation holds good chiefly of the main trunks and firſt diſperſion of the veſſels, but the nearer you go towards the end and ſides, you find that the main compoſition of the cells is arterial; the capſular veins only attending them and ſpreading it ſelf conformably to the principal branches, and this is taken notice of by moſt authors; it eſcap'd not *Ariſtotle*'s diligence long ago. *Hiſt. anim.* iii. 4. But it's highly worthy of obſervation, that the *capſula* or vein, thro'out its whole progreſs, till it vaniſhes away, is punch'd thro' and thro' or perforated like lace quite around, and theſe holes in a large ſubject are very wide and numerous, and as big as the very artery in diameter. Thus Sir *Geo. Ent* of the ſpleen in a horſe, "*Ramus ſplenicus totum ferè interiorem ejus ambitum perreptat multiſque* "*paſſim foraminibus pertuſus eſt.* So he deſcribes for us the preparation in an ox thus. About three fingers from its thicker extremity the vein enters the ſpleen with a very wide mouth, and becomes every where as it were torn and ſtruck thro'. At its firſt entrance it envellops the arteries and nerves like a common *capſula*; ſoon after, 'tis vaniſh'd into broken parcels and filaments. He tells us in a ſheep the veſſels enter the ſpleen juſt by the greater angle where it reſpects the *pancreas* and ſtomach. The vein

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is big enough to admit the point of ones little finger. As ſoon as arriv'd within, becoming bifurcate, it's pefectly loſt into here and there a thin membrane, all along gaping with many and large holes. The artery will ſcarce equal a larger probe. It's diſtributed variouſly hither and thither with capillarys. It reaches the ambient coat, and a nerve always accompanies it. Thus far he. By means of the lace-like holes before ſpoken of, the whole ſyſtem of the ſpleen, all its vaſcular and cellular *compages* has an immediate communication into this vein, or *capſula*, either backwards or forwards. And if we ſuppoſe a ſtream of water injected by the artery, after it has fill'd all the cavities, it will run in as conſtant a ſtream thro' theſe holes into the vein, and ſo out again, and *vice verſa*. And this is the very practice they take in making all the curious preparations of the part before us. Being afterwards (when the blood by this means is perfectly waſh'd out with warm water) blown up and dry'd, if you hold the edges up againſt the light, or with a ſharp knife cut off the whole coat on one ſide, as was done in making our draught, you perfectly ſee the ſtructure thereof as we have repreſented it both by words and prints: Your eye very eaſily follows the veins enwrapping looſly the arteries, and purſuing them thro' their biggeſt ramifications, till at length they vaniſh inſenſibly. Thus *Blaſius* p. 99. ſays expreſly " in a ſheep, ox or deer, the " ſubſtance of the ſpleen has nothing venular, but the veins end immediately " at their entrance thro' the firſt tunic." And the ſame is true of all Spleens. Only *Ruyſk* ſays, the extremities of the veſſels of the ſpleen are ſtronger in human than any other.

SECT. VI. But what's highly to be regarded in the ſtructure of the ſpleen, is the infinity of little muſcular fibres or columns, ſagacious Nature has beſtow'd on the part, really diſtinct from the blood-veſſels or membranous expanſions; " *Fibrarum, nervoſarum ingens ſatellitium*, ſays *Gliſſon*, " *adeo ut ſextuplo minimùm reliqua omnia vaſa mole ſua ſuperent*. *Hipp.* calls 'em *filorum* καθαπλοκην, συμπλοκίω. Theſe likewiſe obſerve no manner of conformity, common plane or diſpoſition, but run acroſs one another, from one ſide of the ſpleen to the other, from one end to another with every ſort of direction; ſometime inſerted into one another, ſometime into the coats of the arteries, ſometime into the membranaceous *capſulæ*, and univerſally into the inner tunicle. And theſe fibrous columns muſt be underſtood to have their full ſhare in conſtituting the cells and cavities before ſaid to be between the veſſels, from which they are perfectly diſtinct and of different office. As *Wepfer*, *Highmor*, *Veſalius*, *Bartholin*, and moſt conſiderable Authors univerſally agree, deſcribing them as ſmall ſtrong filaments without any cavity. *Veſalius* ſays particularly, " as ſoon as the numerous blood-veſſels have " paſs'd the *Raphè*, they are ſuddenly branch'd out into innumerable and ſmall " ſub-diviſions, ſo that they ſeem rather ſolid fibres than veſſels. Again, he " calls it an innumerable complication of fibres. I ſcarce durſt call them " arteries and veins." Here he means the muſcular fibres, which he does not clearly enough obſerve diſtinct from the veſſels. " *Oculatior inſpectio*, ſays *Mal-* " *pighi*, *hujuſmodi fibras filamenta tantum eſſe tenuia & valida nullam cavi-* " *tatem habentia nec a venis vel arteriis orta*." *Bidlo* concludes the ſame. *Riolan* will have it abound more with fibres than veſſels; and *Hippocrates* calls it ſoft and fibrous, *de principiis*. Sir *George Ent* ſays it abounds with little fibres ariſing in great plenty from its inner tunicle, for which he ſuppoſes the ſpleen was chiefly made. *Highmor* ſays the ſpleen is compos'd of many fibres and ſtrong filaments wonderfully wrought together,

FIBRES.

and many arteries. The fibres of the ſpleen, continues he, by Anatomiſts taken for veins, as if they were twigs of the ſplenic branch, are in reality fine filaments, ſtrong without cavity, neither deriving their original from the ſplenic vein or artery, but like many nets variouſly complicated one into another. They are firmly connected both ways to the ſides of the coat, from whence they ſeem to have their original; moſt wonderfully interwoven, ſo that in this part Nature has effectually diſplay'd her art, and fram'd ſuch an admirable work, on purpoſe to confound the fabulous opinions of thoſe that affirm it an idle and uſeleſs member.

No GLANDS. SECT. VII. Theſe fibres (as they call them) are in truth little muſcles, and have white tendons at their extremities; and in ſhape, bating their magnitude, exactly reſemble the fibrous pillars in the ventricles of the heart, and pretty much in the whole imitate the ſtructure of the *ovaria* of females. Theſe white points probably by very great Authors have been miſtaken for Glands, tho' they confeſs they never could be ting'd with injections even of ink, which certainly would affect them had they been true glands, which are only continuations of the capillary arteries. And 'tis very common in this part to reach the lymphatics by ſuch injections. 'Tis ſtrange *Malpighi* ſhould be confident theſe are true muſcular fibres, and conſequently the inſtruments of contraction, and yet not obſerve theſe white bodies to be their tendons, when at the ſame time he ſays, he could by no means obſerve any cavity in them, and to what purpoſe ſhould they be thought glands, ſince no excretory veſſel is pretended to? How unworthy muſt it ſeem of the dignity of Nature's works, that theſe ſhould be made to ſeparate ſomewhat from the blood on one of their ſides to return it again on the other! *Heiſter Compend. Anat.* peremptorily denies them to be glands, from numerous obſervations and diſſections. He ſays the little ſpheric bodies in diſeas'd ſpleens are only like the tubercles of diſeas'd livers, and have much leſs pretence to be glands, becauſe the liver is really a gland, but that the ſpleen is one wants to be prov'd. *Ruyſk* the ſame in two places, and has particularly demonſtrated them to be ſmall veſſels. I ſuppoſe ſome that have been injur'd by frequent conſtriction, and loſt their tonic power, becauſe only diſcernable in diſeas'd ſubjects. *Morgagni* laughs at *Haver*'s fluid juice ſeparated therefrom. So *Gliſſon* ſays, "Beſide the veſſels juſt "mention'd, that is, the veins, arteries and nerves, there are no other to "be found in this *viſcus*. Some indeed have thought that beſides, a pecu"liar excretory veſſel was given it, and that it empty'd it ſelf into the pan"creatic channel. But I my ſelf, after a moſt careful ſcrutiny upon this "very head (for formerly I favour'd this opinion) could never find the leaſt "of it, and do confidently affirm there is no ſuch thing." Mr. *Behm* in *Phil. Tranſ.* N° 34. p. 651. concludes 'em not nerves turgid of animal ſpirits, as *Highmor* imagins, but the tendons of the fibres, ſerving for dilatation and contraction as in the lungs. And we cannot poſſibly allow them to be other than cortortions of the arterial extremities, reſting upon the muſcular pillars as a ſtay or prop, where there are no *anaſtomoſes* of the veins for them to inoſculate into; and where they reach not ſo far as the ambient membrane: or at leaſt were they real glands, that they ſerve only to lubricate the tendons of the muſcles as is practis'd in other parts; and ſhowing themſelves more particularly when ſwell'd in a morbid *diatheſis*. And *Malpighi* obſerves they are oblong, and that the extremities of the arteries twine about 'em like ivy, as being the only ſtable

part

part. *p.* 108. he ſays the arteries, veins and nerves, end either in them or in the inner coat, which we obſerv'd muſcular, ſometime becoming thick like leather. *Deuſingius de ſucc. nutrit. comment. novo, p.* 225. delivers his opinion, that the uſe of theſe nervous fibres in the ſpleen is to give ſtrength to a looſe and ſpongy bowel. Theſe fibres ſeem to ariſe principally from the inner membrane, which appears chiefly compos'd by the expanſion of their extremities, thrown out upon it like *radii* from a center. They are compos'd of a bundle of filaments clap'd together like other muſcular fibres, whoſe productions faſten themſelves upon the next adjoyning membrane, *capſula*, vein, artery or whatever comes moſt commodiouſly in their way. *Malpighi* has carefully enquir'd whether they were hollow, and pronounces in the negative. That the ſpleen cannot poſſibly be a gland is not only well concluded from its ſtructure ſo different from other glands, but becauſe there is no excretory duct, nor can the great diligence of all anatomiſts in this matter have fail'd of diſcovering it. Where we ſee many ſpleens, which is frequent enough, they are ever accompany'd with veins and arteries, but no ſeparating canal. So that the ſubſtance of the ſpleen is an artful compoſure of caverns and honeycomb-work made by the arteries, veins and fibrous pillars or little muſcles delicately enterlac'd one among another, of various magnitude and figure, without order or regularity, according to the room and ſituation allow'd them by the permeating veſſels and fibres, mutually ſupporting and ſupported. The venular membranes too or *capſula's* which are ſo perforated and compoſe the larger cellular *ſinus's*, are ſtill beſpread with arteries and nerves. All this is as prolixly demonſtrated by the great diligence of *Malpighi* as moſt evident upon *Autopſy* beyond poſſibility of doubt. It ſomewhat imitates the lungs or cavernous bodies of the *penis*, therefore light, like a pumice ſtone, when voided of blood. How juſt then are the ſentiments of the great *Hippocrates* i. *de morb mulier.* where he calls it *Rarum & ſpongioſum velut alter pulmo. Celſ. Gal.* In another place *Hipp.* calls it ἀραχνώδης like a ſpider's web or net, *reticulum*, whence the *French* now call it *la ratte. Martinius. Hipp.* from its fibres, again, calls it ἰνώδες τε καὶ ἑλικοειδές. Inſpection of a prepar'd ſpleen ſhows us ſufficiently 'tis a production of cavernous ramifications firſt longitudinal then lateral diſperſing all around as the leaves of fern march from the ſtem, and ſo meeting with others running parallel to them. Theſe ſpaces and *ſinus's* are ſtrengthned all the way by veſſels and fibres like the beams and rafters of a houſe by the wonderful art of Nature, ſo that a clear paſſage is open thro' one another in the extremities and thro' the holes of the *capſula's* near the principal trunks. And even the very coats, membranes and expanſions of the cells are beſpread with little arteries and nerves, ſo that they are ting'd by injecting color'd liquors or mercury. In Table IV. are drawings of the human and ſome other ſpleens, but it muſt be own'd Nature eludes the utmoſt diligence of the graver. TAB. IV.

SECT. VIII. This contrivance in Nature can ſerve to no other purpoſe than moſt effectually to form a ſponge, which when fill'd by the arterial blood, can at pleaſure upon its contraction throw it all out again into the great channel of the ſplenic vein or back into the artery if it be not too full. Becauſe thro' theſe interſtices and perforations there is the freeſt communication imaginable, between the two ſyſtems of veſſels, without danger of ſtagnation or obſtruction. The reaſon therefore is plain why the muſcular fibres ariſe chiefly from the inward membrane, which too is endow'd PURPOSE.

dow'd with the ſame muſcular force, perfectly adapted to exert their conſtringing faculty, beginning from the outſide and preſſing inwards in action: effectually bringing the whole body of the *viſcus* into a leſs ſpace, as the hand does a ſponge by embracing it on all ſides: ſo that its ſuperficial dimenſions are reduc'd without wrinkling. This is the evident conſequence of its ſtructure, and no other. No poſſible pretence for any excretory veſſels after the nature of a gland, nor any fluid that can paſs or repaſs into theſe interſtices but blood, beſide that of the animal ſpirits into its little muſcles, whereby they perform this action as other muſcles, and for the ſake of which ſo large branches of nerves are beſtow'd on the part. For it's not ſufficient that the ſpleen ſhould barely ſuck up any fluid, or that the blood ſhould only run out and in thro' it, which too would not have been without its uſe, and muſt have been the caſe was its compoſition blood-veſſels alone; or as *Malpighi* compares it, that theſe fibres ſhould only like iron cramps in a building, ſuſtain and connect this ſoft and vaſcular bag of the ſpleen: But further it's neceſſary that it be maſter of a power of action, of giving an *impetus* to the blood, of receiving one from it again, by the complicated contractions and relaxations of its muſcular fibres. Like the *ſyſtole* and *diaſtole* of the heart, to which *Malpighi* compares it, *Phil. tranſ.* numb. 71. p. 2150. where he firmly demonſtrates, the little pillars in the ſpleen, that form the network and cells thereof, to be really carnous and muſcular fibres, contracting the ſides and body of the ſpleen, exactly after a ſimilar manner with the ventricles and auricles of the heart. And ſcarce any author that has wrote upon the part but ſpeaks of them, ſo obvious they be. As *Blaſius* in a dog, *Borrichius* in the civet-cat, *&c.* And hence the Ancients deriv'd their famous *vis expultrix* which enables it to ſqueeze out the *atra bilis*. *Malpighi* takes particular notice of a membrane in the ſpleen diſtinct from the propagations of the venular *capſula*. This is deriv'd from the proper or inward coat of the ſpleen, and doubles it ſelf upon the entring veins and arteries, and accompanies all their ramifications on one hand, on the other it perpetually ſends its fine films and expanſions from all the concavity of its inward ſurface upon the fibrous pillars and cells and cavities, and ſo probably meets the expiring extremities of the arterial pipes. And all this ſeems of vaſt uſe in defending the veins, arteries, nerves and fibrous pillars from abraſions and injuries, reſulting from its frequent acts of contracting and ſqueezing the blood backwards and forwards. This likewiſe as was obſerved of the venular *capſula* is cut thro' and thro' with many holes, ſometime forms pipes like the other veſſels, and ſometime caverns and cells. And in this, many of the fibrous columns are implanted, from this many of them ariſe, as they traverſe all manner of ways the body of the *viſcus*. " *Gliſſon*, p 521. makes it a great queſtion to what purpoſe are its muſcu- " lar fibres, ſo peculiar to the part, every thing elſe of its contents be- " ing common. And concludes that it muſt be of ſome publick uſe " to the body, and that uſe muſt be deduc'd from what is peculiar to " it, as the gall-badder ſhows at once the intent of the liver, the ureters " of the kidneys, the *aſpera arteria* of the Lungs, *&c.* But we may go a little further than *Gliſſon*, and enforce the argument with double ſtrength. For if the muſcular fibres in the *penis*, in the lungs, in the ventricles and auricles of the heart, in the *ovaria* of *females* are moſt evidently deſign'd for contraction and relaxation in their reſpective organs, we may reaſonably conclude the ſplenic fibres, which are perfectly the ſame, are deſign'd for the

the ſame purpoſe. And as Sir *Geo. Ent* ſaid before, for the ſake of theſe muſcles was the ſpleen made. Hence therefore we affirm the ſpleen to be an animal ſponge, that its action and buſineſs is by unbending or ſhortning its muſcles to draw in the blood and force it out again into the venal or arterial ſyſtems or both, and to the adjacent parts. This power is under the conduct of the ſoul by means of the influx of the animal ſpirits, as in other parts, ſubject to what we call involuntary motion, perform'd without our conſciouſneſs, which is the caſe of the whole contents of the *abdomen*. The nerves therefore, which are the conduits of theſe animal ſpirits, of whoſe exiſtence in the vulgar acceptation I make no doubt; thoſe great principles of action claim our next regard.

SECT. IX. To give us a true notion of this affair, and without unneceſſary excurſionsor tediouſneſs, obſerve we that the whole ſyſtem of the entrails, that is, the contents of the two cavities the *thorax* and *abdomen*, are ſerv'd by two nerves, the *par vagum* or eighth *pair* and the *intercoſtalis*, being the two principal ones which chiefly attend upon what we call involuntary action. Which with a conſtant and equable tenor of ſpiritual influx maintain the firſt, great, and uninterrupted natural functions of life: the digeſtion, diſtribution of the aliment into the blood, and circulation of it thro' the whole body, from whoſe ocean all other ſtreams are deriv'd and maintain'd. Theſe two, among others, ariſe from the *cerebel*, that they may not be diſturb'd with the tumult of ſuch as are ſubſervient to our ſpontaneous actions and paſſions. The firſt or *par vagum* is diſtributed to all the parts within the *thorax*, the lungs and heart, and by what they call the recurrent branch, to the wind-pipe and gullet. Beſides it deſcends thro' the diaphragm and wholly furniſhes the ſtomach, and there properly ſpeaking it ends. The *intercoſtalis* ariſes from the fifth and ſixth pair, and is deſtin'd to the reſt of the *viſcera abdominis*. Nevertheleſs theſe two may well be reckon'd as ſiſters or twins, not only becauſe in brutes they are perfectly united, or but one trunk at leaſt incloſ'd in one membranous *capſula*, till they arrive near the heart: but becauſe in human, tho' they be all the way diſtinct branches, yet concomitant and frequently communicate by intermediate nerves. Beſides that the intercoſtal ſends ſeveral ſprigs into the ſame parts originally furniſh'd by the *par vagum*. As is obſervable upon inſpection of the ſchemes publiſh'd by *Willis*, *Vieuſſens* and the great *Euſtachius*, and from which chiefly we have drawn Plate V. that nothing might be wanting to give us an exact intelligence of the part we are particularly deſcribing. NERVES. TAB. V.

The left intercoſtal nerve, which only is to our purpoſe, has a ſuperior excellency to any other, in that it claims ſo numerous origins; for it not only primarily ariſes from the body of the fifth and ſixth pairs, wholly beſtow'd upon the muſcles of the face: but likewiſe it receives a new additional twig thro' every joynt of the *vertebræ* directly from the ſpinal marrow, as it paſſes the whole length of the ſpine, even to the extremity of the *Os ſacrum*. So Nature has moſt eminently provided againſt any poſſibility of failure of the nervous juice in this channel, from obſtruction or luxation, ſeeing here are ſo many branches all running into one. The reaſon of this procedure ſeems to be, that it ſerves the guts, bladder, *&c.* parts membranous, glandular, and cold, which needed plenty of the vital flame deriv'd from the brain to aſſiſt their functions, but more eminently becauſe it pertains to the ſpleen. This intercoſtal immediately at its emerſion out of the ſcull forms a great *plexus* or knot call'd *ganglioformis*, which ſends a communicating branch into the other like *plexus* of its neighbor the *par vagum*, and likewiſe

wiſe a ſprig to the ſphincter of the gullet. I need not mention, that at the ſame time it receives into the ſaid *plexus* a branch from the ſpine thro' the firſt *vertebra*. Then in its deſcent at the middle of the neck it forms another and larger *plexus* peculiar to human kind, which ſends many twigs to the *gula*, *trachea* and arteries thereabouts, particularly joining with the *nervus recurrens* of the *par vagum*. Beſides, it ſends one communicating branch at leaſt to the *par vagum* directly. Further it ſends many to the main province thereof, the heart, and all the great arteries that ariſe from it. It has an eſpecial ſhare in conſtituting the great *plexus cardiacus*. Further it lends aſſiſtance to the diaphragmatic nerve, and ſtill a little lower than the *plexus*, detaches a ſolitary branch from its trunk towards the ſaid *plexus cardiacus*. So large and noble is the province of the intercoſtal nerve, and ſo wiſely has Nature caution'd for the great motion of the heart, in caſe its proper nerve the *par vagum* ſhould receive any injury. It muſt be noted, that hitherto the intercoſtal and *par vagum* in brutes are wrapped up in one coat, as tho' they were one nerve, and go not ſeparately as in Men.

Now our nerve having run the length of the neck, enters the *thorax* under the clavicle, where falling directly upon the axillary artery it ties a rope round it, and immediately forms another great *plexus*, receiving many nerves thro' the *vertebræ* from the ſpine. This *plexus* is call'd *intercoſtalis*. After this it deſcends thro' the length of the *thorax* upon the origin of the ribs, receiving a vertebral nerve at every joint of the ſpine, but ſending none away till it is arriv'd into the *abdomen*. Then it becomes bipartite, diſpatching a great branch call'd the meſenteric, which preſently too becoming bipartite, with one it forms the *plexus meſentericus ſiniſter*, call'd likewiſe *ſtomachicus*, and *lienaris ſuperior*, with the other the *lienaris proprius*, and likewiſe the *renalis*. 'Tis far beyond my purpoſe to trace in this diſcourſe (which is but too tedious already with mere deſcription) all the progreſs of theſe nerves to other *plexus's* and parts of the lower belly, their various combinations and divarications: ſeeing there are no leſs than ſeven of theſe *plexus's* ſerving to the multiform contents thereof, and inoſculating one with another a thouſand ways: we need remark no more, than that the lienal *plexus's* communicate by great variety of nerves with all the parts near the ſpleen, or rather with all the bowels in general; as particularly the ſtomach, the *pancreas*, the liver, the kidnies, the ovaries and parts of generation in both ſexes, the *colon*, and by means of the great meſenteric *plexus* with all the guts. It muſt be obſerv'd too, that Nature very bountifully upon this favourite branch carries many of the vertebral nerves as they have paſs'd the main intercoſtal, and likewiſe by means of the hepatic *plexus* it communicates with the intercoſtal of the right ſide. Nevertheleſs if there be any part to which we may gueſs the ſpleen is nearer ally'd upon account of its nerves, 'tis certainly the ſtomach, whether apparently they go in much greater number from the lienal *plexus*. *Vide* Plate V.

Our buſineſs is, after having conducted the meſenteric nerve to the ſpleen, to give a clear *idea*, if poſſible, of its introduction and diſperſion thro' its fabric, as afore of its veins, arteries and muſcular columns: ſo that its whole compoſition being taken in one view, we may with greater boldneſs begin to explore its uſe. The meſenteric nerve from the intercoſtal, ſtrengthned with ſeveral derivative branches from the ſpinal marrow, with its firſt diviſion juſt under the ſpleen, forms the *plexus lienaris*, the largeſt of any except the great meſenteric. This ſends forth many

nerves

nerves upon the cœliac artery marching directly to the ſpleen, they are generally in number 4 or 5, but preſently branch out into many more; ſome of theſe, as ſoon as they arrive at the body of the ſpleen, turn off to the ſtomach, going backwards and upwards by the *vas a brevia*, and uniting with the *nervus ſtomachicus inferior* in the left ſide of the bottom of the ventricle, where likewiſe they meet with a vaſt number of twigs coming from the ſaid *plexus lienalis* directly. Theſe 4 or 5 nerves going to the ſpleen, before they enter the ſubſtance thereof, in conjunction with and enwrapped in one common ſheath with the other veſſels, unite frequently one into the other, diverging and converging by way of communication, almoſt as the vertebral nerves with the intercoſtal, or as ſeveral vertebrals unite to form one great trunk, to go to the legs and arms, as may be ſeen in *Willis*'s and *Vieuſens* ſchemes, or as we find the conſtruction of the thoracic duct, where collateral branches unite and divide again. This artifice confirms our deliver'd opinion of the ſpleen's action as a ſponge, of its power of dilatation and contraction; for why are many nerves united into one, or whence the inoſculations of the chyle ducts, but for fear of a compreſſion from the *vertebræ* or other obſtruction, which happening to one branch is remedied by the freedom of another? but here ſeems no danger, that theſe delicate tubes of the lienal nerves ſhould ſuffer from any thing but the great plenitude of the contiguous veſſels of blood, whoſe ſudden ſwelling from the contractive force of the ſpleen, might give a check to, or rather totally ſtop the current of the animal ſpirits or ſubtle fluid running in them, which would effectually prevent the ſpleen's muſcular fibres from executing their aſſigned office upon neceſſary occaſion. This is more obvious by conſidering that in their farther progreſs, when theſe wandring threads unite again into one or more chords, and are paſs'd nearly into the ſpleen, they ſometime run along the artery and ſometime the vein, by which wonderful and moſt ſagacious *apparatus* of Nature, unleſs both veſſels and at one inſtant ſhould ſuffer from too large an extenſion of their contained blood, the nerves will be free, and their canals open, at leaſt in a ſufficient number. This inforces our conjecture, and intimates the extraordinary proviſion made, that the action of this ſponge ſhould not invalidate its own office, which would be a vain and abſurd work: that the contraction of its muſcles ſhould not hinder the paſſage of the ſpirits, by extending the cavity of the veſſels, which cauſes its muſcular contraction. We ſee the ſame purpoſe in Nature's view, in that two nerves always accompany an artery, one on one ſide the other on the other ſide, and frequently meeting, as *Willis* ſays, tye the artery about as with a chord. Likewiſe that the veins and arteries enter the ſpleen in many channels, and diſtant, not in one or few, or near together, as in moſt brutes; that in contraction, and perhaps occaſionally unequal compreſſion of the body thereof, ſome at leaſt of the paſſages ſhould be open for the fluid forc'd out of it. Add to this that the *Raphè* is hardiſh, and favors the veſſels running for a ſhort ſpace along it between its ſides as in a furrow. Thus the blood-veſſels, more particularly the arteries, accompany'd with two or more nerves of different bulk thro' all their diviſions, and enclos'd in a membranous *involucrum* like a ſword in a ſheath, and to which likewiſe they impart net-works of their twigs as they go along; all together, but as to different branches at different ports, enter the *Dædalian penetralia* of the ſpleen. After this the nerves are diſpers'd thro'out the whole texture thereof, till they plainly become imperceptible, and this chiefly upon the

the arteries: not only becauſe the nerves thro'out the whole body take all opportunities of accompanying the arteries, whence they receive ſo conſiderable a warmth; but likewiſe becauſe the main ſubſtance of the ſpleen is arterial. For as *Malpighi* ſays, the larger trunks of the arteries do not communicate with the veins by *anaſtomoſes*, or one continu'd trunk as in other places, but open into the caverns and irregular cells form'd by the protracted and expanded extremities of the venous membranes, as far as they reach. So he affirms the nerves enter and unite and divide with every and the utmoſt ramifications of the arteries, included in the ſame *capſula*, and the very *capſula* is o'erſpread with arteries and twigs of nerves all the way, as is uſual with others. The ſame acute obſerver adds, that the nerves are not only cover'd with a membrane, but likewiſe impart a membrane or ſheath to all the muſcular fibres or network of columns, which we have before ſhewn to compoſe ſo great a ſhare of the ſpleen it ſelf, and which, no one can doubt, are the inſtruments of its action; and this adds to their common ſecurity againſt the preſſure of the circumjacent parts, and communicates more readily the ſpirits from the nerves to the muſcles. In ſhort, it's certain enough that every muſcular fibril muſt have a nerve and artery proper to it ſelf, both which are equally requiſites of muſcular motion. And are not the little white globules, ſuppos'd glands, in reality little *plexus's* of the nerves, like thoſe we have already ſpoke of, and of larger bulk: for it's not to be doubted but the nerves may be trac'd into them? they may be therefore the *ſtationes*, the *diverticula* of the ſpirits, as *Willis* ſays of thoſe larger.

SPLEEN very NERVOSE. The accurate *Gliſſon* aſſures us, the extremities of many nerves manifeſtly terminate in the muſcular fibres. And tho' the fibres do not ſeem continuations of the nerves, yet plainly they have an intimate commerce therewith, *i. e.* receive the animal ſpirits thence for their contraction, ſeeing they have no relation to the other veſſels. We have ſhewn before, that the muſcular fibres ariſe chiefly from the coats of the ſpleen. So Sir *George Ent* obſerves in an horſe, that the nerves chiefly are inſerted into the coat, and thence by innumerable ſub-diviſions into its ſubſtance, by that means beſt providing for its action. He tells us in the ſpleen of an ox, four nerves, two greater and two leſs, encompaſs the entring artery as with a ſcabbard; upon their introduction they diſperſe themſelves to the infinite fibrils coming from its coat. *Gliſſon* and *Wharton* pronounce right of the nerves being individual companions of the arteries: in which point *Veſalius* and *Veſlingius* err, in ſpreading them only externally. And in general it's obſerv'd by all Anatomiſts, that the nearer the nerves approach the ſpleen, the more they increaſe in bulk as well as number, even as after they are conducted into the ſubſtance. And further that its coats are more than ordinarily o'erſpread with nerves to that degree, that ſometime they have been miſtaken for chyle-ducts, as *Bartholin* notes out of *Sperlingius*. *Gliſſon* and moſt Authors obſerve, that this part abounds rather more in nerves proportionally than any other, which would engage us to think 'tis no uſeleſs one or ſupervacaneous.

NOT USELESS. SECT. X. The conſideration of the intimate commerce between the ſtomach and ſpleen by means of theſe nerves, and of both with the brain thereby, has induc'd ſome to make our ſpleen the ſeat of the vital flame, or as a lamp plac'd under the ſtomach to warm it by its ſparkles, like a culinary fire under the pot. *Mayow* aſſigns it an office of volatiliſing the nitrous

trous ſalts of vegetables into animal. *Helmont* ſcrupled not to place the throne of the ſoul here, the *ſedes archei*, *veneris nidus*, *hoſpitium animæ*; whence ſharpneſs of wit and ſagacity is generally ſaid to ariſe from the ſpleen, and *Lienoſi pro ingenioſis habentur*. *Hipp. de princip.* pronounces the temperature of the ſpleen hot. We know 'tis a common obſervation in our practice, that the modiſh diſeaſe call'd the vapors, and from its ſuppos'd ſeat, the SPLEEN, does moſt frequently attack ſcholars and perſons of the ſoft ſex moſt eminent for wit and good ſenſe. Therefore it highly behoves our profeſſion, not from the difficulty to reject the diſquiſition, which can only be the *aſylum* of ignorance and idleneſs, but aſſiduouſly to purſue Nature's footſteps thro' her moſt intricate meanders, and by invincible perſeverance urge her at length to reveal her purpoſes. No one certainly that has but juſt dip'd into the anatomy of an animal body, and ſeen the amazing appearance of inimitable beauty, deſign and contrivance, thro' every minuteſt piece and member thereof, would imagine that the ſpleen, boaſting of a preheminence of ſtructure, at leaſt that it is inferior to none in the curioſity thereof, ſhould be as it were a caſual ſtroke and fortuitous job of almighty workmanſhip; but that it has its great uſes equal in dignity and neceſſity with any other. And yet how many good Anatomiſts, after much pains and uſeleſs toil in its conſideration, have as in a paſſion, at laſt concluded, it had no uſe or intention at all, and might as well have been omitted in the animal frame. Whence we meet with the odd fictions and conceipts in Authors about it. Such as *Ariſtotle*'s, who fancy'd the ſpleen was made only for a kind of ſtay or prop to the veſſels, as an anchor holds a ſhip faſt, or as the poles that ſupport the plantations of a vineyard. At other times he makes it a kind of *pſeudo-hepar* or mock-liver, and that it diverts the wandring vapors from their fancy'd aſcent to the head, iii. 7. *de part. animal.* Such *Spigelius* declares his ſentiment. *Plato in Timæo*, and *Galen* v. 7. *de uſu part.* nominate it Ηπατος εκμαγειον, *hepatis expreſſam imaginem*, a counterpart, others more rightly render it *mantile* a wiper or cleanſer of the liver. *Jul. Pollux* ii. 4. *Oribaſius.* When 'tis apparent to any one that examins it with but moderate exactneſs, and from our foregoing diſcourſe, that there is in reality no ſimilitude, analogy or conformity between the ſpleen and the liver. Wiſe Nature will abhor ſo mean an artifice as to throw it in only as a make-weight, to keep up an *æquilibrium* between one ſide of the body and the other, as *Iſidore* thinks; deſervedly reprehended by *Voſſius Etymolog.* But I rather ſuſpect they mean by this term, the ſame ſponge-like quality as I here aſſert.

Cutting out the SPLEEN.

SECT. XI. It does not obſcurely appear, that theſe contemptible notions of this noble part have gain'd ground, if not their original, from many ſtories of the ſpeen being cut out from creatures, without any or much viſible detriment to the œconomy of Life. Which affair we come next to conſider and repreſent in its true light, and what experience has gather'd thence as conſequence; and how animals have far'd after ſuch an exciſion, and how it may be accounted for, without impeachment of the dignity of the ſpleen.

Several experiments have been made from time to time, of cutting the ſpleen entirely away from dogs and other creatures. And ſome Authors contend it has been ſo far from proving detrimental to them, that ſeveral benefits have ariſen therefrom, as particularly that they ſhall be more briſk and gay than before. *Pliny* xi. 37. *Hiſt. Nat.* ſays it was a practice with

ſome to cut out the ſpleen from dogs to make 'em ſwifter in running. *Roſſetus* ſays the *Turks* cut it away from greyhounds, or burn it, for the ſame purpoſe. *Morgagni adverſ. anatom.* ii. p. 54. affirms, that *Zambeccarius* in many dogs made the experiment, and always found them briſker; he himſelf obſerv'd the ſame. As likewiſe *Malphigi. Apſyrtus* 1. 40. *Veterinariæ* mentions ſome burning it in horſes for the race, but diſapproves it. Sir *George Ent* in his apology ſays, he knew a dog lived ſome years perfectly well without it. Doubtleſs the firſt intention of this experiment was founded upon the ſuppoſition of the ſpleen's being an uſeleſs weight. Becauſe they could not find out its uſe, by a general vote they concluded it had none. And this conceipt is as old as *Ariſtotle*, as we hinted before. But he ſpeaks plainer in one place, and ſays directly that it is an uſeleſs member: III. *de part anim.* And after him, his grandſon *Eriſiſtratus* in *Galen* idly fancy'd, Nature created it to no purpoſe, or only for regularity ſake, and to anſwer the liver. Touch'd upon by *Plautus* in *Mercatore*, commented in *Vander Linden*'s *Cappadox lienoſus*. *Ruffus Epheſius* calls it an idle member, doing no manner of work. *Democritus* in his epiſtles to *Hipp. de Nat. human.* had ſaid ſo before.

Theſe reports have emboldned people to that degree, as not to ſcruple the cutting it out of living perſons. *Franc. Rouſetus de partu cæſar.* c. 5. knew it cut out from a human body without harm; he ſays, *p.* 154. that at leaſt ſome parts or pieces of it have been taken away ſeveral times. *Viardus* a Surgeon ſwore, that he had done it twice, and cur'd the people. *Ballonius* did cut it away when it ſtuck beyond the ribs. *Leonardus Fiorovantus* a famous emperic, and the firſt mountebank in *Europe*, affirms confidently, that at *Palermo* the metropolis of *Sicily* he open'd the belly of a certain ſplenetic Woman, and took out her ſpleen weighing 32 pound, whence ſhe was cured; but the truth of this ſtory, ſays *Fonſeca*, I ſuſpect. Indeed *Aretæus* iii. 14. ſays, he has known parts of it come away. See innumerable inſtances quoted by the induſtrious *Drelincourt*, p. 137. *de lienoſis.* But after all, *Bartholin Cent.* iv. *hiſt.* 51. ſays, *Lienem tuto eximi poſſe nobiles ejus uſus diſſuadent.* He thinks what *Pliny* has reported fabulous, and I imagine much of a piece with that ſtory in *Vitruvius*, i. 4. where he reports, that the ſheep in *Crete* live without livers, becauſe they eat much *Scolopendrium*, which our old ſimplers call milt-waſt, *Aſplenium*. *Pliny* is ſo weak as to believe it. With *Riolan* I judge this dangerous operation, if it can be perform'd, is far from rendring the body more active and briſk, at leaſt for any conſiderable time, and ought juſtly to be ſuſpected, becauſe of its vaſt veſſels, as *Tobias Knoblochius* is of opinion, *Inſtit. Anatom. diſp.* 7. as likewiſe *Levinus Lemnius* ii. *de complex. c. ult. in princip. Tagaultius* and *Hieronymus Fabricius* write that all wounds of the ſpleen are mortal. Indeed a piece of it may perchance be extirpated without much harm, or poſſibly it may be ſome ſupernumerary ſpleen, whereof there are many inſtances: ſome we have recited in the deſcription of the part. But if we conſider the number, connexion and largeneſs of its blood-veſſels, and the great *plexus's* of the nerves: none but a madman would pretend to cut it out by choice. The experiment is highly to be doubted, cannot promiſe a long life, if immediate death enſues not. *Cæl. Aurel.* iii. 5. *tardar. paſs.* denies the poſſibility of it. "*Decidi aut auferri lie-*" *nem, voce quidem dictum non officio completum accipimus*, ſays he. *Highmor* denies this exſection with a great deal of argumentation, and *Havers* too.

too. *Vidus Vidius de curat. Membr.* x. 10. thinks this operation impoſſible, and the life of the animal fav'd. *Lindanus* in his *Phyſiolog.* c. 6. p. 67. L. vi. c. 9. ſays, " they who think the ſpleen can be extirpated by cut-" ting out or burning, to me truly ſeem never to have ſeen one in the bo-" dy, or if they have, to be as wiſe as the perſon in *Ætius*, who thought " it poſſible for a man to live without a head." May it not be accounted an extraordinary chance; as *Foreſtus* has taken away all the *omentum* in a young man, and *Riolan* in others, without any inconvenience? *Roſſetus Tract.* ii. *p.* 154. *Ed. Paris.* 1590. ſays, pieces of the *omentum* are daily cut off. Even the womb it ſelf has been ſafely taken away, as *Bartholin* ſhews in his Epiſtles. Vid. *Plaut. in Mercatore. Geo. Bettinus Medicina* xviii. and *Roſſetus* produce many inſtances of it, p. 334. The kidney has been cut out by ſome bold inquiſitors.

Its HISTORY.

SECT. XI. 2. Nevertheleſs, 'tis certain this experiment has been try'd frequently upon dogs, cats, *&c.* and firſt in *England*, as *Bartholin* confeſſes; and it's become a neceſſary piece of diverſion among young Anatomiſts in the univerſities. But it's a great misfortune that there are very few accounts of the conſequence, from obſervation of ſome years time after, what conveniences or inconveniences enſu'd, and how long the creature would live in a good ſtate of health and the like, from whence we might deduce any doctrine with certainty. *Brunner* made ſome odd and deſperate tryals of this ſort, but had not time to conclude any thing from them. It's obvious to any that are acquainted with experiments to how much fallacy this is liable, how great care and judgment is neceſſary, beſide patience, to make any obſervations of this kind, ſo as that they may be uſeful, and ſerve for a rational theory of the part; for I can never be perſuaded but that it muſt make a huge alteration ſomeway or other in the animal œconomy. *vide Mebium*, and *Diemerbr.* As to the experiment it ſelf, the honor of reviving which *Bartholin* ſo clearly reſerves to the *Engliſh*, Mr. *William Becket* Surgeon out of his curious reſearches has inform'd me, that upon enquiry about what time and by whom it was firſt done, he finds that Mr. *Gillam* and Mr. *Alexander Read*, two *London* Surgeons, firſt ſucceeded in this operation upon a dog in the houſe, and in the preſence of Dr. *Bonham* an eminent Phyſician. They firſt made an inciſion four inches long, thro' the integuments of the *abdomen* on the left ſide of the dog, cloſe under the ſhort ribs, then drew out the ſpleen, tied the blood-veſſels, and cut it off near the ligature; then they ſtich'd up the wound, and left it for Nature to heal, which was done in a ſhort time, but that about ſix weeks after the cure was compleated the cur grew mangy. We are to obſerve that theſe two Surgeons were very eminent for their practice in the beginning of King *James* the firſt's reign, and that Dr. *Bonham* dy'd in or about the year 1624. But in the year 1671, one Dr. *George Thompſon* a boaſting chymical Phyſician, in a pamphlet he publiſhed, poſitively aſſerts that he was the firſt who perform'd the operation compleatly, and that the dog lived about two years after, and was loſt by accident. That Dr. *Currer* told him the honorable Mr. *Boyl* offer'd to give five pound for the dog: that the ſucceſs of this operation was well known to the Marquiſs of *Dorcheſter* the founder of our library, Dr. *Harvey*, Dr. *Tern*, and divers others. That after this ſome Surgeons in *London* perform'd the ſplenotomy upon another dog which lived long after. But all this ſeems to have been done a great many years after the firſt experiment. Dr. *Flud* has ſeen the experiment try'd.

All

All that can be done therefore, is to enumerate what has been obſerv'd upon cutting the ſpleen away from animals, that we may reaſonably believe. My reflections thereon will be caſually interſpers'd, in what I afterwards propoſe, *viz.* to deliver my preſent thoughts of the uſe or uſes of the part: and then to execute the intent of the worthy founder of this exercitation, Dr. *Gulſton*, I ſhall recapitulate what diſcoveries and appearances the anatomic knife has afforded in opening morbid bodies, and eſpecially ſuch as have dy'd of any diſtemper relative to the ſpleen; from all which I will preſume to sketch out ſome hiſtory of its indiſpoſitions, and their method of cure. The alacrity with which I do it, is owing to the opportunity afforded me before this ſpecious and learned Auditory, of reviving ſome old notions of our predeceſſors which were neareſt the truth, tho' their reaſons, as commonly underſtood, were not ſo adequate to the genuine principles of Nature, which after-reſearches and improv'd philoſophy will dictate to us. Let us notwithſtanding admire the penetration of the venerable ſages of our faculty, who certainly had excellent courſes of remedies in diſtempers they could not ſo well account for as we; and let it be our ambition and glory to purſue their track, and improve upon them for the benefit of mankind, and honor of the healing art. *Drelincourt* in his *Epimetra* gives good reaſon to believe the Ancients really knew many ſecrets in anatomy and phyſic which after-ages have claim'd as their invention; however let us endeavor to advance the ſtock and ſacred *depoſitum* they have left in our hands, and reſcue the human fabric, that miracle of bold nature as *Zoroaſter* calls it, from its concomitant infirmities and diſeaſes.

CONSEQUENCE. SECT. XI. 3. What has been obſerv'd upon cutting away the ſpleen from dogs is, I. That they become more gay and brisk than before, and ſwifter in running, as they fancy, tho' others affirm quite the contrary. II. That they become more voracious, but frequently vomit up their food before digeſted. III. That they become more ſalacious. IV. That they make water more frequently; *aliaque patiuntur incommoda*, *Waldſmidt* adds, but tells us not what they be. V. That they become ſcorbutic or mangy. VI. That after their Death the liver is found thicker and larger than uſual, and ſo dry'd that it may eaſily be broke to pieces. As to the appearance of the circumjacent parts: In that experiment of *Malpighi*'s where he only ty'd the veſſels going to the ſpleen, which is the ſame thing in effect as cutting it off, and certainly a much ſafer way: the blood-veſſels about the ſtomach, *omentum* and liver were extraordinarily extended and full; their ſmaller ramifications enlarg'd to a huge degree. The ſplenic vein in particular was ſtrangely tumid, tho' the ſpleen it ſelf was waſted away; beſide the liver was increaſed very much in bulk, reaching farther than ordinary toward the left ſide, and was ſenſibly protuberant on the right ſide under the ribs, even before the dog was diſſected. In all other reſpects there was no difference, the blood being freſh and lively. VII. I have been told that this experiment has made dogs fatter, others have ſaid, that it takes away their churliſhneſs and fierceneſs, others that the color of their water is alter'd thereby. VIII. *Waldſmidt Diſp.* 27. ſays, that by experience they ſeldom live above 3 years after it.

From this and all the large fund of the hiſtory and deſcription of the ſpleen laid down before us, I ſee nothing but what ſeems to confirm my poſition of the ſpleen being an animal ſponge, not a gland to ſeparate any juice, but a receptacle of pure and good blood for great and wiſe ends in Nature.

Nature. That by the mode of its conſtruction it muſt have a power of admitting this blood and returning it again with an arterial force, but that it differs from arteries in this, that it forces it not forwards towards the extremities, but back again by the ſame conveyances it receiv'd it. That the eminence and dignity of the ſpleen appears not a little from its fine ſtructure, the ſafety of its reſidence, and Nature's great care in its poſiture under the ribs and towards the back, whence notoriouſly guarded from external injuries. The extenſiveneſs of its communication with other parts, the great command it has of the current blood in the abdominal arteries and *vena porta*, the near intercourſe it has with the ſtomach, the copiouſneſs of its blood-veſſels, nerves, lympheducts above other *viſcera*, all proclaim its excellence. Add to this that it is given to all creatures having blood, that its form and bulk is more conſiderable in more perfect animals and moſt in men. That therefore it's highly expedient to vindicate the honor of anatomy, in endeavoring at leaſt to diſcover its uſe.

That I may not be wanting in my part toward this great purpoſe, I ſhall offer ſome notions that have occurr'd to me thereon. I only propoſe them to the world to be further conſider'd, if they chance to merit it; eſpecially in this place where a perpetual ſucceſſion of Anatomiſts will certainly keep up the dignity of that ſcience, which from *Harvey*'s theatre and *Harvey*'s doctrine has receiv'd ſo vaſt improvements. And I ſhall rather chuſe to abound in heaping up ſeveral hints, ſome of which, in my own opinion, deſerve no great ſtreſs or enforcement, than omit any thing that may poſſibly tend to the incitement of others, to exert ſome new pains in this curious enquiry. For we muſt not think anatomy is arriv'd to a tolerable degree of perfection, whilſt we heſitate ſo much upon this elegant *viſcus*; which (I hope to make a little probable) has ſo much weight in the animal œconomy.

USE I. LYMPHÆDUCTS.

SECT. XII. Becauſe we find the ſpleen full of nothing but blood; and becauſe all or moſt ſuch like bodies are glandular, Anatomiſts have wearied themſelves in an eternal ſearch for the glands here, and for the conveyances of the ſecreted juices. Some have fancy'd or invented one going to the ſtomach, to the kidneys, or this and that part, which Nature has not acknowledg'd; eſpecially the exceſſive number of lymphatics ſo conſpicuous on its ſurface, has prompted them to favor this qualification. But in truth the moſt keen-ſighted enquirer could never diſcover any other excretory veſſels from the part, nor any glands within its cavities to furniſh them, as the accurate *Gliſſon* after a moſt diligent ſearch confidently affirms. And upon a due conſideration of its ſtructure it plainly appears impoſſible there ſhould be any, or which is the ſame thing, that they muſt be uſeleſs and ſupervacaneous or morbid figurations: therefore we may well ſuperſede any further pains in queſt thereof. And as for the lymphatics ſpreading themſelves on its outer membrane, in common with all the other *viſcera* and members, aſſuredly 'tis no primary intention of Nature in formation of the ſpleen, and with Monſ. *Tauvry* we may think there is nothing remarkable in the paſſage of the blood thro' it. That it can receive no other alteration there, than loſing a good deal of its lymph: whence ſometime we find it thick and black, or at leaſt think ſo. But *Gliſſon* is poſitive and with much reaſon, that the lymphatics have no manner of relation or dependance on the ſtructure of the ſpleen: and if by any contraction of its muſcles it ſqueezes the blood again into ſuſion, as do the lungs, 'tis no more than reſtoring

what the other had taken away. Its action therefore being only relaxation and contraction, the one to admit the blood both venal and arterial, the other to force it out again, as is notoriously deducible from all the premised account of its fabric, vessels and situation: whatever of a gland-like office it exercises, is only occasional: Nature wisely laying hold of the opportunity of implanting numerous lymphatics upon a part that is full of blood and well able to bear such an expence, because destin'd to no other secretion. 'Tis only, in all the *viscera*, as it were, a work of supererogation, the whole contents of the *abdomen* and *thorax* contributing indifferently their share of lymph, as they are most able, to promote the motion and fluidity of the chyle in the thoracic duct: No one peculiar gland being form'd purposely and solely for that end. But it's observ'd the lungs, *penis*, womb and all such sponge-like bodies, being much of the same substance with the spleen and abounding with blood, abound more proportionably with lymphatics than any other, and this is the reason of gleets so troublesom to be stopt in those last mention'd parts, after the erosions of a *Gonorrhea*. The spleen therefore of right lends its assistance in this point more largely, having by means of its innate action and of its situation between two great systems of blood-vessels, the ready means of preventing any injuries to it self thereby, by calling in fresh supplies of the purple fluid; and this is but correspondent to the constant practice of Nature, who serves many ends by one contrivance.

The lymphæducts going from the spleen are very many and very large. For it must be noted many of the capillary arteries in the body thereof, branch'd out as we before observ'd *ad infinitum*, are inserted into the outer membrane deriv'd from the *peritonæum*. So that when we separate it, which is done without force, we see an innumerable appearance of small red points on its inward coat, being so many drops of blood spouting from the torn mouths of the arteries. From hence doubtless these lymphatic juices are deriv'd and separated, by small glands in the said outer coat, without any necessary assistance from its internal cells, and fibrous columns, or membranous expansions. They creep along between the two membranes investing it, and breaking thro', encompass the whole body of the spleen like a net. Afterwards as they pass along the cawl, unite into one, and go to the *receptaculum chyli*, having turned round the veins and arteries like ivy branches. *Heister* says a lymphatic gland about the bigness of a bean or nut is oft found without the spleen, upon the entring vessels. This lymph is yellow and sometime reddish as carrying a stronger tincture of the pure blood it's immediately separated from, than from most other parts. *Consule Rubeckii tabulas, Siboldi Hemsterhuysii Messem auream. Lamy, Nuck*, &c. May not this be one reason of the dog's becoming scorbutic or mangy, upon extirpation of this part, the chyle being thus defrauded of so considerable a portion of its diluting lymph? Life to me appears a curious circulation of the same principles. Certainly salts by their solidity and strength of attraction, arising from the plainness of their surfaces and by their activity withal, claim a vast share in the composition and vitality of animals. All our food, every thing in nature abounds with salts, which the noble laboratory of animal organs sublimes and volatilises for its own use and purpose. It raises, precipitates, exalts and pours 'em backwards and forwards, or cohobates 'em, if we may speak in chymical terms, till they fly quite away. This is converting fixt nitrous salts of vegetables into volatil, which is only done

by

by living creatures, and imitated in ſome manner by our *Sal volatile oleoſum*. For every thing (and only) what has paſs'd thro' an animal, produces a volatil ſalt. As Life is motion, and it ſubſiſts upon continual taking and expending as the great *Hippocrates* ſays, therefore is the lymph drawn from the blood in order to be return'd into it again, by the way of the chyliferous ducts, as is the bile, the *ſaliva*, the juices of the *pancreas*, ſtomach, guts, *&c.* and all ſalutary ſecretions; therefore are ſalts thrown into the blood in order to be thrown out again. Of the extraordinary uſe and neceſſity of this lymph *Brunner* has treated very largely, *Exp. nov. c. Pancreas*. And ſince ſcurvy and ſuch like caſes ariſe from a ſaline and earthy conſtitution of the blood, from want of ſufficient diluents and convenient exerciſe and action, ſalt, dry food, and the like: this among other cauſes which will be mentioned, ſeems one that gives riſe to the diſtemper in this circumſtance; the blood of the dog running into concretions and ſtagnations in the capillaries, and producing all the other ſymptoms of that Diſeaſe, which here need not be particularly related.

SECT. XIII. But let us proceed to what I imagine one of Nature's primary purpoſes in formation of this curious organ: That is, for an aſſiſtant of the great buſineſs of digeſtion, or concoction of the aliment in the ſtomach: the firſt and of higheſt importance of all others, for preſervation and ſupport of the *individuum*, the main ſpring of the wonderful machine, rightly by *Plato* from *Hippocrates* call'd the *primum mobile*, alluding to the imagin'd firſt agent of the rotation of the huge celeſtial orbs. This is no new opinion, but rather an old one well ſtarted by the Ancients, but neglected by their ſucceſſors, eſpecially the Moderns. The divine *Hippocrates*, to whom ſcarce any truth was unknown, thought the office of the ſpleen was to help concoction, by drawing off the ſuperfluous humidity from the ſtomach, whom *Ariſtotle* copies after. Others ſuppos'd this aſſiſtance was perform'd by furniſhing the ſtomach with its acid ferment, whence it excited hunger, ſtirring up the *vis appetitrix*. *Ariſtotle* made it, being a ſanguineous organ, the concocter of the crudities that otherwiſe would offend the ſtomach. Some have thought the ſpleen's fancied melancholly uſeful to the ſtomach, by its acid, auſtere, ſtyptic and aſtringent quality, which contracted and ſtrengthned the fibres thereof and enabled it the better to concoct and retain the aliment whilſt digeſted and expel it afterwards, as *Galen* ſays in the lion, leopard, bear, wolf, pard, *&c.* and the *Arabians* fell pretty much into this notion, for they always thought it ſtrengthned the ſtomach. *Avicen.* L. i. *Fen.* 1. *doctr.* 4. c. 1. *Averroes colliget.* 2. c. 8. *Tom.* 9. This was ſaid before by *Galen*, by *Theophilus* ii. *de hom. fabr.* *Nemeſius de natur. hom.* *Meletius de hom. natur.* Others ſpeak plainly that it is done by good blood and warm: whence the Ancients entertain'd a fancy, that creatures which drink much have larger ſpleens, whoſe buſineſs is to warm the ſtomach againſt ſuch a quantity of cold fluid. *Pecquet*, *Veſalius*, *Riolan* and ſome more have hit upon this, as we ſhall ſee by and by.

USE II. DIGESTION.

The Ancients, we ſaid in the beginning, in all theſe notions thought not amiſs. I ſhall propoſe to my ſelf to explicate this doctrine in a fuller manner. And truly that the ſpleen has ſome great relation to the ſtomach, ſeems obvious to the firſt view, and one would think that a common obſerver in anatomy ſhould be naturally tempted to conclude ſo much, when he finds that it is plac'd directly under it, that it has the moſt large and moſt intimate communication with it, by means of their common veins, arteries, nerves

nerves and connexions, and this invariable in all creatures: as we ſaw by the comparative anatomy we purſu'd ſo largely in the beginning of this lecture. So that if the ſtomach in the opinion of *Q. Serenus* deſerves to be call'd *Rex totius corporis*, the ſpleen deſerves to be call'd its viceroy. Do we not ſee the great ſplenic vein and artery drawn in an horizontal line from right to left, under the whole length of the ſtomach, and ſending forth the *Coronaria ſeu gaſtrica major*, the *Gaſtricæ minores ſiniſtræ* three or four in number, the *Gaſtro epiploois ſiniſtra* and the *vas breve* to the ſtomach? all theſe ariſing either from the ſplenic or ſpleen it ſelf, both veins and arteries, and inoſculating one into the other encompaſs the whole body of the left and largeſt ſide of the ſtomach, where (doubtleſs) chiefly is perform'd the buſineſs of digeſtion. Whence *Riolan* ſays he has obſerv'd the left ſide of the inward ſide of the ſtomach of a darker color than the right, as if more torrify'd in that moſt frequent action. Theſe march off in their direct way to the ſpleen. All the reſt of the veſſels that go to the right ſide of the ſtomach, ariſe upon account of convenience of ſituation, only from the oppoſite ſide of the body thereof: in the arteries from the hepatic, in the veins from the *Gaſtro epiplois dextra*, which are but continuations of the ſplenic at their origins, and terminate in thoſe coming from the ſplenic, inoſculating at their extremities in the middle part of the ſtomach. Does not hence appear the reaſon why the ſpleen is plac'd on the left ſide? not to make a balance to the liver. And why ſhould not the ſtomach have its proper veſſels directly from the main trunks of the great vein and artery, not reflectedly from the ſplenics, if the ſpleen had not ſome extraordinary aſſociation therewith? Add, that this conformation is equally reſpected in all ſorts of animals, as well as conſtant in human. Tho' in a man it is more ſtrictly ty'd to the circumjacent parts than in a brute, as particularly to the diaphragm, and ſometime to one part more than another, yet ever annexed to the ſtomach in both, not by veſſels only, but by ſtrong membranes too. *Lienem pertinaciter ventriculo colligantia vaſa*, *Veſalius* calls them. As were it neceſſary to give particular quotations, I might ſpecify the ox, ſheep, deer, *&c.* where the head of the ſpleen is join'd to the ſtomach. So in the wild *African* goat, whoſe ſpleen is ſhown
TAB. IV. in Plate IV. Fig. II. from a preparation of Mr. *Nat. Smith*. So hedghogs are ſtrongly knit to the ſtomach by a membrane and many veins and arteries. That of a mole immediately adheres to the ſtomach as a dog's: as in the *cuculus*, the *turſio*, the *torpedo*, *&c.* juſt by its upper orifice. In a ſea-calf the ſplenic is beſet on each ſide with many branches like ribs running from it to the ſtomach. In the *raja*, ſays *Steno*, becauſe the liver divided into three lobes fills all the upper part of the *abdomen*, the ſpleen lies in the middle under the liver and between both orifices of the ventricle, join'd to it by blood-veſſels. *Blaſius* ſays the monkey's is ſmall but ſending many branches to the ſtomach. *Riolan* ſays there are as many different figures of the ſpleen as men, and he has ſeen one divided all along into five, ſix or ſeven digitations or fiſſures, yet ſtrictly embracing the ſtomach with every one. And of the great connexion between the nerves of the ſtomachic and lienal *plexus* what otherwiſe can be concluded, than that they are kindred parts and execute ſome common office?

Now let us ask our ſelves the queſtion, why do the principal blood-veſſels of the ſtomach ariſe from the ſplenic in its direct road to the ſpleen, which is as we have ſufficiently ſhown an arterial *ciſta* or repoſitory of blood? and

why

why do veſſels go immediately from the ſpleen to the ſtomach, as ordinarily the *vaſa brevia*, and in other creatures as particularly a dog, four or five more from the body of one to the other? Certainly we muſt anſwer, that the ſpleen ſhould be a magazine, *diverticulum* or neceſſary receptacle of the blood for the uſe of the ſtomach, ready as all occaſions and emergencies require, to run plentifully into the gaſtric veſſels and return as ſoon, in a part that muſt ſo ſuddenly alter its dimenſions, extend its bulk, and contract it ſelf in its great buſineſs of digeſtion. *Gliſſon* obſerves the veins and arteries in the ſtomach are exactly proportionate to one another, *i.e.* of the ſame bulk, whereas in other parts the arteries are rather ſmaller than the veins, ſo that the arteries in the ſtomach by conſequence are bigger proportionally than thoſe of other parts of the body. But this is not ſufficient for our purpoſe, becauſe we may conclude that Nature having provided a proportionate quantity of blood only in the ordinary way of life for the ſtomach, which for the moſt part muſt be ſuppos'd empty; how would this common diſtribution anſwer her intent at the extraordinary times of concoction? From whence muſt this new reſourſe be produc'd when there are no new veſſels over and above? Is not then the ſpleen at hand to ſolve the *quære*, or can any thing in nature be imagin'd more adequate or better poſited and contriv'd, were it our buſineſs to invent and aſſign any thing for the purpoſe?

The ſpleen then muſt be ſaid to officiate to the ſtomach by pouring in upon it as it ſwells in eating, a new quantity of blood, beſides that deriv'd in the ordinary courſe of circulation, which is to procure the required heat and neceſſary juices in concoction. And that this is not only neceſſary, but likewiſe in a very high degree, a little conſideration will perſuade us.

HEAT. The ſtomach, we know, is a bag made up of ſeveral muſcular membranes of contrary directions, thereby admirably calculated not only to enlarge and contract it ſelf, in proportion to the admitted and diſcharg'd aliment, but to ſqueeſe and agitate it with a various and complex manner of motion, like that periſtaltic one of the guts (as I have frequently ſeen) ſo as to comminute or digeſt the food we eat, to the greateſt fineneſs, ſmoothneſs and delicacy, and the extremeſt ſeparation of its parts. This is what we call making the chyle, or reduction of the diſcordant nutritious ſubſtances into a white homogoneal fluid like milk. An operation ſo wonderful that it has exercis'd the wits of all ages to account for it, conſidering the ſeeming diſproportionableneſs of the inſtrument to the work; therefore is it neceſſary we ſhould allow it all the aſſiſtance we can find. *Tantillam autem partem toti obſonare ut ſufficiat, mireris*, ſays *Gliſſon*. And he takes notice the ſtomachs of men are leſs in proportion to their bodies than other animals. *Ariſtot.* i. 16. *hiſtor. animal.* ſays the ſtomach is not much bigger than a gut. *Lozelius* ſays the ſtomach and gullet when dry'd do not weigh above ℥ij. ℥ij. *Brunner* found the ſtomachs of owls and ſerpents no thicker than paper. We ſhall not here take occaſion to be tedious in handling the queſtion of digeſtion, and reciting the opinions of authors about it, which would be wholly needleſs to this auditory; obſerve we that it is promoted by the liquors we drink at meals, and the curious diſſolvent the *ſaliva* we ſwallow down in maſtication, and the juices thrown in by the glands of the inner lining, the *tunica villoſa* of the ſtomach, and the acid ferment always found therein. Likewiſe by the heat of that and circumjacent parts, by that natural and that acquir'd. All which together muſt be very conſiderable, or we have rea-

ſon enough to conclude, nature's fundamental purpoſe of digeſtion would be fruſtrate or imperfect. Heat, it's notorious, is the chief and moſt powerful agent in all alteration of bodies, in productions and diſſolutions, every renovation of forms. This in an animal body can only, in an equable and ſuitable manner, be deriv'd from the blood, kindled in the vital flame from the mother, and conſerv'd during life in the circulatory maſs, by its amazing continuation of motion and addition of freſh food, or fewel as we may properly call it.

Ariſtotle had ſuch an opinion of heat neceſſary in concoction that he thought it the only requiſite. *ad init.* ii. *de anim.* he ſays heat is the inſtrument of every coction in an animal body. *Hippocrates de priſc. medicin.* rightly adds a fermentative juice, doubtleſs from obſervation of ſuch being conſtantly found in the ſtomachs of animals: which the good women call cheeſe renate in calves, and may be imitated by the juice of *gallium*, lady's bedſtraw. *Ariſtotle*, *Anonymus Græcus* and *Galen* affirmed the ſpleen aſſiſted in warming the ſtomach: the latter adds, that not only the ſpleen but the reſt of the *viſcera* encompaſſing the ſtomach, were as ſo many firebrands under a boiling cauldron. The ſame is the mind of *Fabr. Bartoletus*, *Encycloped.* 'Tis needleſs to mention the practice of roaſting, boiling and preparing meat for the ſtomach, to make its work leſs: of likening it to an oven; of ſhowing the way to make gellies, extract tinctures by fire, or of *Papin*'s famous digeſter; of ſtrong liquors and hot ſpices aſſiſting, and the like illuſtrations of this work, whereof there are many and long diſcourſes in authors: but we cannot help taking notice that nature has not fail'd to uſe all poſſible advantages of giving the ſtomach an extraordinary warmth even from its ſituation. The obliquity of the poſition of the heart and the reaſon thereof, as it ſeems to me, is not commonly remark'd. 'Tis certain that the major part of the heart is inclin'd on the left ſide the *mediaſtinum* or vertical partition of the *thorax*. Beſides, the flatteſt ſide of the heart or that of the right ventricle lies intirely upon the diaphragm over the top of the ſtomach, ſo that the heart and ſtomach are ſeparated only by the diaphragm. The heart then being the *focus* of the blood muſt needs impart a mighty heat to the ſtomach, eſpecially when it is fill'd with food and moſt needs it. The ſtomach likewiſe from this vicinity muſt doubtleſs reciprocally return its new acquir'd warmth to the heart. Here then ſeems to be a reaſon why the heart is turn'd ſo much toward the left ſide, in order to favor the ſtomach, and why immediately after dinner we find an encreaſed ſtrength and frequency of the pulſe. Thus does nature produce a circulation of cauſes and effects in all her grand purpoſes: for digeſtion ought to be look'd upon as a ſort of war and ſtrife, therefore the ſtomach procures this new *impetus* to the heart, in order to reap the benefit of its encreaſed heat and pulſation, in ſubduing the food. Proceed we to examin into this affair and we ſhall find this deſign ſtill further executed by the huge *viſcus* the liver and gall bladder, almoſt covering the ſtomach on its upper and right ſide, turgid with its hot and fiery bilious juices. Before, is ſpread the oily woof of the forepart of the *omentum*, behind the under *lamina* thereof, like a doubled blanket to warm and cheriſh the part. Underneath lie the guts, particularly the *duodenum*, the *pancreas*, the large gut call'd *colon*, generally full of *fæces* like a gardiner's hot bed, together with the ſplenic artery, and on its back part too the great artery, juſt as it receives the new blood from the left ventricle of the heart, but on its left ſide and outſide where

From SITUATION.

moſt

moſt expos'd, lies the ſpleen full of arterial blood. *Lien enim* (ſays *Plutarch, Sympoſ. dec. 5. prob. 2.) ſpirituum vitalium calore & arteriarum perpetuo motu pollet:* and this is expreſly the opinion of *Drelincourt* ſen. *de lienoſis*, p. 33. In this view only then, can the ſpleen be ſaid to be uſeleſs, or not rather abſolutely neceſſary to the ſtomach? does not nature proclaim its great eminence by its ſituation, being plac'd on the left ſide of the ſtomach where digeſtion is chiefly perform'd, and cloſing it up as it were like the door of a furnace, that it may have an equable warmth quite around? ſo that the ſpleen alone in this ſingle requiſite of heat, is oppos'd to all the reſt of the bowels put together that encompaſs the ſtomach.

Thus poſited great muſt be the heat of the ſtomach; which was one thing *From* BLOOD
ſought for: add to this account the infinity of blood-veſſels pertaining thereto, which to me ſeems more in proportional quantity than is allotted to any other part. *Gliſſon* obſerves ſome capillaries of the blood-veſſels go to every minuteſt parcel of the tunicles of the ſtomach, for tho' they look white they are every where water'd with blood, nor can you prick with the point of a needle into any place but blood drops out. Every one ſees how prodigious a quantity of the larger branches on the outſide o'erſpread and embrace it every way, inoſculating one into another, and *velut coma fruticoſa obducunt*, as *Willis* has it. Theſe paſſing inwards, and ſtill infinitely ſubdivided, terminate in the interior nervous coat of the ſtomach, ſo thick, that the points of them when you take off the *tunica villoſa* appear like a bloody net, as the laſt-mention'd Author expreſſes it. Therefore with him, may we aſſimilate the ſtomach thus boyling with hotteſt blood, on all ſides around it, to a kettle hung over a fire. And probably its heat is not much leſs. The ſpleen in this work, doubtleſs claims an equal ſhare with the other circumjacent parts, but may we not ſurmiſe its task is much larger than any others, becauſe it only abounds with blood, not for its ſelf whoſe whole bulk exceeds not the weight of a drachm, but that it may be a helpmate to the ſtomach, and freely impart what it wants not. The opinions of former Anatomiſts, ſays *Veſalius* v. 9. *Anatom.* was, that the ſpleen threw out that blood which was more than it wanted for its own nouriſhment, upon the ſtomach; *magni cujuſdam uſus gratia revomi.* Now for what purpoſe ſhould this be but digeſtion, which is the office of the ſtomach? Therefore muſt the ſpleen be aſſiſtant therein, ſeeing it has in the account of ſome nothing elſe to do; and can it perform a nobler duty?

In general, I cannot but think this is one of the ſought-for uſes of the ſpleen, and what any one would be apt to ſurmiſe upon the firſt diſſection, and having an *Idea* of the ſyſtem of the parts hereabouts; but after the texture of the ſpleen is found out to be what we have above deſcrib'd, our notions and eſteem thereof riſe higher, and we muſt ſuſpect that ſuch curioſity as nature has there ſhewn, and ſuch powers as ſhe has given it, will deſerve our pains in examining thoroughly the mode and meaſure thereof, and other collateral conſiderations that will offer themſelves, if we be but fortunate enough to get into one of her own paths, and eſcape the mazy tracks of errror and imaginary fictions.

In the act of digeſtion, when the ſurface of the ventricule ſo vaſtly and ſo ſuddenly encreaſes, its coats muſt neceſſarily become thinner, as more ſtretch'd out, like the blowing up of a bladder. The veins and arteries

likewiſe which ſo plentifully o'erſpread it, and permeate its various folds with innumerable weavings, muſt equally be extended, and their coats become thinner. From both which conſiderations it is neceſſary to conclude, that in this ſtate the ſtomach is become weaker than before, when there is occaſion for more ſtrength. But if ſtrength, *cæteris paribus*, be in proportion to the quantity of blood, the ſtomach muſt neceſſarily want a vaſt acceſs of blood, if we only ſuppoſe its dimenſions enlarg'd without regard to the food admitted, for if only the ſame quantity contained in its blood-veſſels during its contracted ſtate, was allow'd it when it's ſtretch'd to ten times its former bulk, it would, I fear, ſcarce ſuffice for preſerving it from mortification; becauſe it would be the ſame thing as letting off nine parts in ten of a man's blood in veneſection: then if we take in the conſideration of the work of digeſtion to be carry'd on, we encreaſe our demand to a prodigious degree, without proviſion for anſwering it, and the conſequence of that requires no great *calculus* to diſcover. Whence then muſt the ſtomach borrow ſo large and momentaneous a ſupply without robbing other parts, but from its neighbor the ſpleen? with which all its veſſels are ſo freely annex'd, which is ever full, which by contraction of its muſcles can ſqueeze it out in any requiſite proportion, which by its veins and arteries, *viz.* the ſplenic, can temper it to any deſired heat, and which can admit it back again, and all this without any the leaſt diſturbance or interruption, of the œconomy of the other parts, of the circulation of the maſs in the whole. I do not think it ſufficient to ſay that the great artery is ready to ſupply it, and whence ſhould it have its blood but from whence all the reſt of the body? for if you ſtop the chief current that ſupplies the lower part of the body, you deſtroy the *major* part whilſt you are providing for the whole, and all the time a man is at his dinner, his legs and thighs beſide all the lower *viſcera* would be benumb'd, or in a dead palſy; or if not quite ſo bad, yet we certainly ſhould frequently find ſome inconvenience of that ſort, which is quite contrary to all experience. Nor can I imagine any other fund for the ſtomach but the ſpleen, and without it, would it not at leaſt plunder from the *pancreas*, from the liver, from the *omentum*, from the guts, even the whole tract of them, from the *pylorus* to the *colon*? which would be ill able to bear ſuch a loſs, when it's their buſineſs next, and their no mean function, to receive the ſubtilis'd current of the chyle, ſeparate its ſtill purer parts, tranſmit it into the blood by their periſtaltic motion, furniſh the expence and juſt tribute of lymphatic juices, neceſſary to carry on the whole *apparatus*, for which the contents of the *abdomen* are chiefly deſtin'd? It would not have been an adequate method to anſwer the aſſigned duty of this concocting organ, had the blood been thrown in upon it directly by proper arteries as in other parts, whereby it would have been oblig'd to take in juſt ſo much, neither more or leſs: or granting it were ſo, upon depletion thereof, that quantity would be too much and prove offenſive to it; or at leaſt ſuch a procedure would have created a tumult in the circulation, or in the adjacent parts, which muſt have been of ill conſequence frequently, if not always, and incommode the diſtribution of the chyle. But wiſely has our Author contriv'd that by the ſplenics drawn acroſs the belly under the ſtomach, to the open caverns of the ſpleen there is a wide channel with many ſubordinate cuts, to ſupply it in needful proportion only, and according to its exigences. Juſt as the countrymen practiſe in deriving water from a river

river into the neighbouring paſtures or medows, by ſeveral little trenches or rivulets, whilſt the grand ſtream glides by, without danger of want or overflowing. And in this reſpect it will appear to any one that intimately conſiders the thing, that the ſpleen may be call'd a meſentery to the ſtomach, and nature's manner in both, in deriving the blood-veſſels to the ſtomach, and to the guts, moſtly by channels falling perpendicularly thereon, and by ſhort intervals, is manifeſtly aiming at the ſame purpoſe, and to favour the periſtaltic motion in each. The ſplenic artery then is plainly meſenteric to the ſtomach, but by how much more excellent is the ſtomach beyond the reſt of the inteſtines, by ſo much more careful has the Divine Artificer been, in placing at the end of this canal the noble compoſure of the ſpleen, to conduct that blood by a new direction, and different from the pulſe of the heart, ſo that it may be only and moſt effectually uſeful to the concocting part it is deſign'd for. Nature's care likewiſe is not unworthy of remark, in preſerving theſe ſplenic veſſels from any danger of accidental obſtructions. For they are not only ſingular in their horizontal ſituation, but by the ſupport they receive from all the circumjacent parts; being carry'd their whole length upon the *duodenum*, the *pancreas*, the *colon*, and both membranes of the *omentum*, no otherwiſe nor leſs magnificently than is the *alveus* of a *Roman* aqueduct upon arches of ſtone in a level current, over all inequalities of ground.

One other conſideration we muſt not forget; that whereas upon the extraordinary encreaſe of bulk in the ſtomach, its fibres and the coats of its veſſels, as we ſaid, muſt become weaker and not ſo able even to protrude the blood contain'd in their cavities for want of due elaſticity, therefore as the ſpleen ſupplies 'em with blood, is it not likely that its arterial cells and fibrous columns, which apparently have no uſe as to its ſelf, obſtetricate as it were to the ſtomach, by throwing the blood in, and deriving it back again by its proper power and mechaniſm, as a ſort of deputy to the heart it ſelf? ſo that it may with ſome reaſon be eſteem'd as a heart to the ſtomach: which conception is not unworthy of examination.

I will add one particular more, of which a hint is already given, ariſing from the great heat neceſſary, and as we ſee provided for concoction in the ſtomach, and from the different ſtate of dimenſion this part is oblig'd by ſudden alterations to ſuſtain, which is this: That it highly became the providence of wiſe nature, in an affair of ſo great and daily conſequence, that the powerful agent of heat, ſo uſeful when well conducted, and confin'd within due limits, and of ſo ruinous conſequence when become tyrannical, ſhould by ſome contrivance or other be regulated, that is, encreas'd or diminiſh'd, or retain'd in an uniform force, in the height and proportion this great animal function requires. Like as the chymical regiſters, which advance or depreſs the fury of their furnaces at pleaſure, from the mild *tepor* of a ſimple digeſtion, or the briſker heat of a diſtillation, to the elevation of volatile ſalts, or the exceſſive violence of forcing out acid ſpirits. Now this I conceive moſt adequately executed by the ſpleen two ways, firſt as we obſerv'd before in the natural and conſtant heat, ariſing from the warmth of all the circumjacent parts, that encloſe the ſtomach, as a fire does the bottom of a kettle, or any thing boyling in *balneo Mariæ*; the ſpleen cloſes up the outſide of the left and moſt buſy part of the ſtomach, as the iron door of the hearth in a Still, which by its cloſeneſs or remiſſneſs can encreaſe or diminiſh the heat, that is, by taking in or emptying it ſelf of

REGULATION.

the circulating blood, with which it cheriſhes that ſide of the ſtomach, as by a warm cuſhion or bag of heated ſand apply'd to the part; as likewiſe by its more or leſs frequent action of forcing this warm blood into the veſſels of the ſtomach. In the ſecond place, if we reflect upon the quality of the veſſels coming to it, that its arteries ſpring from the *aorta* immediately at its origin from the heart, where the blood is of utmoſt warmth, and that its vein comes in a very wide ſtream from the *porta* where the blood is certainly of the leaſt, being at the very laſt declenſion of the circulation, even much inferior to that of the *vena cava*, as having been tranſcolated thro' the whole ſyſtem of the inteſtines; here it becomes perfectly poſſeſſor of a ſtore of quite oppoſite degrees of richneſs and vitality, and therefore becomes capable of mixing, compounding, or tempering this blood for the uſe of the ſtomach, to as nice a proportion, as the inſcrutable inſtinct of every part of an animal, which moſt exactly knows its office, can dictate. Which notion in my opinion lets us into ſo wonderful a ſcene of the ſuperior dignity of this part, that we need no longer to ſuſpect the pains and elegancy of compoſition which nature has beſtow'd upon it, or throw it away as redundant and impertinent.

BLADDER. There are only two other parts of the body ſubject naturally to ſuch extremity of dimenſions as the ſtomach, and thoſe are the bladder and womb: and was the firſt exactly under the ſame circumſtances as the ſtomach, it would without peradventure equally require ſuch a coadjutor as the ſpleen. Tho' the ſtomach may be filled with victuals perhaps in a quarter of an hour, with drink much ſooner, yet it can ſcarce be ſuppos'd that the bladder can be fill'd in equal time, to any exceſſive degree. Doubtleſs it takes up hours, ſo as to produce great uneaſineſs. Next, the ſtomach is liable to be, and frequently is gorg'd with cold water; but the water of the bladder is ſeparated from the blood, and of equal warmth, and therefore of it ſelf will ſollicite the blood into the enlarging veins and arteries of the bladder as it gradually ſtretches out, whilſt the cold fluid admitted into the ſtomach will rather repell it. Laſtly, there is a great difference between their capacities: the ſtomach will certainly hold three times as much as the bladder, its coats are vaſtly thicker, the number of its veſſels exceed it beyond compariſon, and conſequently demand as much more blood; but above all the great force and muſcular action thereof of many hours time, the huge flood of juices requir'd in concoction, ſet it quite upon a different level, and more illuſtrate the neceſſity of ſuch an organ as the ſpleen for the ſtomach, whilſt the ſmall redundancy of blood wanted in the bladder either for retention or expulſion, may without any manner of ill conſequence be drawn from, or return'd into the circumjacent parts. And 'tis plain that the warmth of the urin in the bladder, anſwers every difficulty that may be ſuſpected in the caſe, from the horror we frequently find after making water, which ſhows there is a diminution of heat in the parts thereabouts upon that evacuation.

WOMB. Now as to the matter of the womb in females, it ſerves very much to confirm the doctrine we have advanc'd, and there is a good deal of ſimilarity in the caſe, and parallel mechaniſm, tho' with the ſame beautiful variety, that different parts and uſes require, and that nature every where obſerves. The womb is a hollow part, deſign'd for the reception of the impregnated egg and its contents, which is to encreaſe in bulk, in proportion to the growing *fœtus*, till the time of birth. It's compos'd of fibrous

expanſions and complications of blood-veſſels, very like the ſpleen. *De le Boe Sylvius* compares the ſubſtance of the ſpleen to the *placenta uterina*, whoſe compoſition is the very ſame as that of the womb. *Wepfer* in his epiſtle to *Tho. Bartholin*, *Cent.* iv. *Epiſt.* 14. compares it to the *placenta*, and to the womb of a woman when near delivery. He ſays when the juices are ſqueez'd out of it, it contracts: and that I experimented moſt evidently my ſelf, in the man's ſpleen laſt diſſected in this place. He adds, that when put into water it ſwells exactly like a ſponge, purſuant to thoſe notions I endeavor'd to eſtabliſh in the beginning. *Malpighi* ſays, by blowing you may ſtretch it out *in excedentem magnitudinem*: ſo *De Graaf* declares the womb in time of geſtation to be of a ſpongy ſubſtance. *Malpighi* deſcribes its carnous fibres gather'd into bundles, and ſtretch'd out netwiſe outwardly, and that its inward ſubſtance is a *congeries* and complication of columns, ſo that taking away the *chorion* and *placenta* it appears plainly muſcular, which changing the ſcene will paſs for a deſcription of the ſpleen. *Morgagni* confirms it from his own obſervations, *Adverſar. Anat.* iv. p. 47. *Roſſet.* c. 1. ſays it is full of cells after the manner of a ſponge or pumice ſtone, and that nature has given this ſort of ſubſtance to the womb, that it may contain a ſtore of blood and ſpirits for the aliment and life of the *fætus*, and adminiſter to the fungous fleſh of the ſecundine, ſticking upon the womb as plants imbibe the dew. Now it appears how neceſſarily this body the womb as it increaſes in magnitude, muſt encreaſe likewiſe in thickneſs and ſtrength, not only to reſiſt the ſtruglings of the child, which grow more and more violent with its age, but likewiſe that it may enjoy a greater warmth to ripen the conception: and this can only be done by admitting a larger quantity of blood. And we ſee in effect it grows thicker as more extended, and from the innumerable *plexus's* of veins and arteries twiſted all over its outer ſurface, and pervading intirely its inner ſubſtance, by degrees imbibes a very large portion of blood for the purpoſe aforeſaid, and for the nutrition of the young one in its cavity. So that the ordinary quantity afore voided at proper intervals by the ſex, is now retain'd. But when the end of all this preparation is accompliſh'd upon delivery, and excluſion of the *fætus*, the *uterus* diſcharges its ſubſtance of this accumulated blood, by what we call the *lochia*, and returns with ſurprizing expedition to its priſtin craſſitude, which *Riolan Anthropogr.* vi. 2. ſays he has known done in twenty four hours, tho' at this time *Roſſetus* ſays it is two fingers breadth thick in ſubſtance. So that we ſee the womb has the ſelf-ſame power of receiving into its body a great ſuperfluity of blood, and to encreaſe its own bulk, not for its ſelf, but for the ſake of the little gueſt it has taken in, juſt as the ſpleen, not for it ſelf but for its neighbor the ſtomach: then when the womb has parted with the offspring, it voids all the unneceſſary quantity, not into the maſs of blood, for that would bring immediate ruin, but throws it out, and no doubt by the very ſame mechanic faculty, as the ſpleen throws the blood upon the ſtomach, and receives it back again, that it ſhould not offend the whole œconomy. So that the womb is a ſpleen to it ſelf, and by its texture provides the matter of nutriment to the *fætus* and ſecundine, of diſcharge to the *lochia* and ordinary *menſtrua*, as the ſpleen does to the ſtomach. And this whole compariſon if thoroughly weighed has ſo ſurprizing an analogy, that we can ſcarce forbear a hymn to ſagacious nature, who thus, by what intimations we know not, inſtructs every member of a living creature in its reſpective function;

function; but more especially those that serve involuntary actions, which in my opinion are much the same as what we call Instinct in other creatures or brutes. Nor need we wonder more at the nest of a swallow, the honeycomb of a bee, the providence of an ant, or the sagacity of a hound, than at this present business of digestion, or propagation and preservation of the species, at the power of action in the stomach, in the spleen or womb. Every part knows its duty, when to receive, when to give: and it would be to our honor could we say, the actions that depend on our own free will and voluntary determination, are perform'd with as great regularity, as these perpetually done, our selves inscious and unconsenting.

The spleen then, in my thoughts, and womb perform a like task in two great operations of human life, the preservation of the *individuum*, and propagation of our like. The only material difference between the parts compar'd, is in the time and the out-lets whence the blood retires. In the one the encrease of strength and additional access of blood is by very gentle degrees, as the *plethora* of the menstrual blood is heap'd up during the space of some months: but in the business of digestion, it must be almost instantaneous. We may well suppose a voracious man in a quarter of an hour shall stretch out his stomach to ten times or more the space it took up before, and consequently requires as much more blood in the same, or a much larger *ratio*, for the necessary nutrition of the part, and conservation of its natural warmth and life. But cast into the account, the important action it is going upon, and the great strength necessary thereto, we may reasonably conclude, nature had not acted up to her wonted wisdom, had she been forgetful of providing a large resourse of blood upon so notorious an occasion, which we suppose and require to be no other than the spleen.

BEASTS *of* PREY. This method of reasoning appears confirm'd from the consideration of ravenous creatures and beasts of prey. These are endow'd with a capacity of bearing hunger for a great while, because their food is not always at hand, in which circumstance their stomachs are exceedingly contracted, and the vessels thereof empty of blood. When they meet with a spoil, they gorge themselves to a prodigious degree, laying up as it were a portable magazine for the exigences of life, during several days to come. Such are dogs, wolves, foxes, lyons, *&c.* and great fishes, as pikes, sharks, whales and the like, which ordinarily will devour another fish, nearly as big as themselves, which they digest by degrees like the melting down a long piece of metal, by approaching it nearer and nearer the furnace. Now we find in fact they are accordingly provided with large spleens, and with extraordinary communications therefrom, to enable them during the long time of digestion, to receive all necessary supplys of blood from thence, for this extraordinary occasion, which lasts several days before the stomach is quite empty'd again. Thus in the creatures dissected by the royal academy at *Paris*, the lyon's spleen was pronounc'd large, and in the lyoness they take notice, that the communicating vessels between the stomach and spleen were large, and no less than eight in number. So they tell us the spleen of the castor or beaver was fastned to the stomach by eight short veins, and as many arteries: So the spleen of a civet cat was extraordinary long; *Blasius* adds, very large and totally involv'd by the *omentum*. In the porcupine it's generally very large, and sometime double. In a hedghog there are no less than twelve vessels, which fasten it to the stomach,

ſtomach, and *Blaſius* himſelf obſerves it very large. In the eagle theſe veins and arteries are remark'd to be very large and wide. And I ſuppoſe comparative anatomiſts will find multitudes of like inſtances in ſuch creatures, when they ſhall make it a head of their enquiry. In the dogs I have diſſected, and as drawn in Scheme VI. five or ſix veſſels go directly from the ſpleen to the ſtomach, veins and arteries, which are ſo many *vaſa brevia*. What is the purpoſe of all this, but for a more free derivation of heat and blood, during digeſtion, from the ſpleen which wants it not, to the ſtomach where it's ſo evidently requiſite? Again, that no ſort of proof even negative may be wanting, it ſeems that vipers and ſuch ſort of animals as have none or rather very ſmall ſpleens digeſt very ſlowly for that reaſon, and will bear hunger extremely, for *Redi* has kept 'em ten months without eating. In this view probably nature gave them the poiſon that kills their prey inſtantly, which otherwiſe would be very troubleſom when ſwallow'd alive.

It ſeems to me a neceſſary ſuppoſition, that unleſs nature had contriv'd the fibrous and muſcular fabric of the ſpleen, to aſſiſt the ſtomach in the above deliver'd method, ſhe muſt not have form'd the ſtomach of a plain parcel of membranous coats, but of innumerable muſcular weavings and tendinous expanſions, like the ſpleen, or like the body of the womb in females, or wholly like the gizzard of fowls. But then what inconveniencies would have enſu'd from its daily uſe and ſudden alteration of its figure, (if it could have anſwer'd the uſe at all) are obvious enough. Its neceſſary enlargements and contractions would have taken up ſome days ſpace. A meal would have been a week's work at leaſt. Many other purpoſes which we ſhall mention, it would have been utterly incapable of performing, at all; many other not without as great inconvenience as we find in the miſcarriages of women. And how often ſhould we be troubled with all their ſwoonings, fainting fits and ſickneſs, which they undergo upon a firſt impregnation? This notion would open to me a new ſcene to be tedious, but if conſider'd by thoſe that underſtand the reaſons of theſe things, from the mechaniſm of parts and knowledge of the animal œconomy, will of it ſelf ſpare the audience and me. And we may ſafely affirm the fabric of the ſtomach at preſent, is the effect of infinite wiſdom; and that where the blood is to be convey'd to it, not in the common tenor of circulation, but with certain regulation, the ſpleen is with equal art provided, and nothing elſe of whatever compoſition can poſſibly ſo well execute its office.

But we muſt not forget another difference in relation to the compariſon we made between the ſpleen and womb, that is, in the outlets whence the blood retires from each, upon their reſpective occaſions, well adapted to the times requir'd therein. The womb diſcharges it ſelf of its redundant blood in the *menſtrua* and the *lochia*, thro' the innumerable gapings of its *arteriolæ* in its inward tunicle, by the natural contraction of its component fibrous texture: but the ſpleen pours forth its blood not with an intent utterly to exclude it, but receive it again when equal neceſſity requires it, therefore it ſends it out by the ſame way it enter'd, *viz.* by the arteries or the veins, as is moſt requiſite, the one going chiefly to the ſtomach, the other to the liver, and both forwarding digeſtion and extruſion of the aliment, according to our general aſſumption.

FLUID SECRETION.

The continuance of the action of the ſtomach in digeſtion, which generally and ordinarily in men laſts four or five hours at leaſt, muſt require a continuation of all the advantages of blood, heat and ſpirits, as all other

muſcular motions do, and to perfect it we muſt admit of a copious flux of juices, ſecerned from the inner coat, from the pureſt blood, before it has parted with any other ſecretion. For we know the moſt fluid ſecretions are perform'd neareſt the heart, where the tide runs ſtrongeſt. This is both to help the diſſolution of the aliment and to lubricate the ſides of the ventricle it ſelf, to prevent its fretting and wearing away, by continual rubbing, as we ſee is the practice of artificers, in oyling their hones and whetſtones. This can never be done without a perpetual acceſs and receſs of a large quantity of freſh blood, warm ſtreaming from the heart, by a ſhort journey, in the manner we have been contending for. This is confirm'd and illuſtrated by the reaſons and experiments made by *Drelincourt ſen.* as we are told by his ſon, p. 31. *de lienoſis*; where he proved, that the arteries contain'd ten times more lymph than the veins, that the blood being deriv'd to the ſpleen in a tenfold greater proportion than into the liver, becauſe the ſplenic artery is ten times larger than the epatic, muſt have in it ten times more lymph than the liver. All this is perfectly conſonant to nature, ſeeing ſhe has inſerted ten times more lymphatics, at leaſt conſiderably more, into the ſpleen, than into any other *viſcus* in proportion to its bulk. If then only the ordinary method of circulation was here obſerved, and that the blood injected by the arteries to the coats of the ſtomach, was to paſs away by the veins as commonly in other parts: beſide the many inconveniences before mention'd, of the times of its return being too long, to give any tolerable warmth to the part; of the obſtruction of all its channels by the ſudden riſing of the dimenſions of the ſtomach, and the like; we may well affirm, that its glandular ſecretions would preſently be exhauſted and depauperate, and in ſhort the mighty *focus* neceſſary would languiſh and be extinct, and the whole cookery come to nothing: without the diſpenſation of the ſpleen, which is, as we hinted, a ſecond heart, or more properly a heart to the ſtomach. From its ſimilar fabric muſt we not conclude its uſe ſimilar? if the fibrous columns in the ventricles of the heart, contract and dilate to force the whole maſs of blood thro' the whole body, why may not the like fibrous columns in the ſpleen poſſeſs the ſame action, to throw the blood upon the digeſtive organs, whoſe work is as neceſſary to the *individuum* as the other?

It ſeems plain to me in the ſenſe I have been endeavoring to elucidate even to tautology, that the ſpleen operates againſt the force of the heart, and the oſcillation of the arteries. 'Tis as it were a pump or ſyringe, which thus oppoſing it ſelf, cauſes a double quantity of blood to be thrown into the ſtomach. We may ſuppoſe it like a ſecondary engine, at one pulſe borrowing its *quantum* of blood and at the next returning it: which muſt certainly produce upon all the parts bordering on the ſplenic veins and arteries the manifold benefits deſir'd. Muſt not the blood be ſqueez'd with great violence into the veſſels of the ſtomach, and forc'd to depoſit its fluid part like preſſing any thing thro' a ſieve? beſide, muſt not this frequent appulſe of new blood accelerate the ſeparation of lymph, whoſe ducts we obſerv'd to be ſo very plentiful in the ſpleen, more than in other parts, and this muſt be ready to attend the chyle, when perfected in the ſtomach, and conduct it into the blood, which office the ſpleen claims in a more eminent degree than any other *viſcus*? Further, upon every natural contraction of the ſpleen, as the blood in the ſplenic artery is protruded upon the ſtomach; ſo that in the vein is forc'd towards the liver, and this latter is equally neceſſary with the former: for whilſt the ſtomach is concocting the food,

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the liver is to prepare its contribution of the bile, ready to accompany its passage thro' the *pylorus*, to stimulate the guts, to volatilise and embalm the chyle, to do what nature has design'd as its business and purpose, which at present is not ours to enquire, seeing on all hands anatomists agree upon its necessary admission into the chyle passing into the blood thro' the lacteals. What is said of the lymph and bile is equally applicable to the fluid secretion of the *pancreas*, and the whole furniture of lymph in the mesenteric glands, and upon all these accounts then the spleen is useful in digestion. BILE.

This new power attributed to the spleen in so extensive a manner, as I have ventur'd to assert, ought not to seem strange, from a consideration of its make, as largely describ'd above, and from the magnitude of the splenic artery. I would ask why has Nature given a bigger artery to the spleen than the liver, which in weight and bulk so prodigiously exceeds it? and that the spleen seems to have a pulse of its own, separately from the heart, is not improbable, from the prodigious palpitation of the cœliac artery in hypocondriacs, no doubt most frequently taken for a palpitation of the heart, and which as is observ'd by *Fernelius* and *Mercatus* does not seem to depend upon the pulse at all, but will in time oblige the heart to sympathize with it. Of which *Tulpius* gives us an example. That the action of the spleen is muscular, is confirm'd from its coats becoming cartilaginous: thus the heart in some has been so tough that fire would not consume it, as that of *Germanicus* found after the funeral pile. And thus *Riolan* has observ'd it. For what purpose are the *ovaria* of females of a like structure with the spleen, as we hinted §. VIII. but to thrust out and expell the egg when impregnated? *Malpighi* himself in the *phil. transf.* n° 71. p. 2150. calls the spleen in expres terms a muscle, which I will repeat in his own words to strengthen my notions by so great an authority. " *Lienis* " *fibras quæ tot ingenia torsere, nequaquam nerveas sed carneas esse depre-* " *hendi, ita ut ex carneo exteriori involucro & productis transversaliter fi-* " *bris mirabilis fiat musculus, Lienis cellulas comprimens, quo sanguis per* " *splenicum ramum propellatur, non absimili structura & ritu, qualis in* " *grandioribus cordis auriculis observatur. Carnei enim lacerti per transv.* " *versum ducti suarum fibrarum implicatione rete efformant, membraneas cel-* " *lulas comprimens suisque extremis finibus mirabiliter productis, car-* " *neum involucrum constituunt.* After so expres an account of its being a muscle as it were to squeeze the blood out, is it to be doubted that during its state of relaxation it must admit it into its cavity, and where must it squeeze it to but to the stomach and the liver, as above recited? Then where is the difficulty of finding out its use? must we not proceed the same way in this and in other parts, and determin the reason of their action and purport, by the manner of their fabric, and the result of its natural consequences? POWER. MUSCULAR.

Has not nature, in as fair characters as possible, pointed out this use, by the nerves of the splenic *plexus* retorted upon the stomach, furnish'd from a quite different nerve, and this in a much larger share, than she has allow'd any where else? why this contrivance, but that immediately upon the action of the stomach, the spleen is rous'd up to its office? The kindred spirits, like *præcursores* or spies and intelligences, excite its mechanism of contraction and relaxation, in order to assist in digestion: by its warmth and by its quantity of new blood, by its plenty of fluid secretion into the cavity of the stomach, by its exciting the liver and *pancreas* to action and perhaps all the guts, by its plenty of lymph to mingle with the chyle. And when digestion is over by receiving the superabundant blood retiring from the stomach

mach with equal pace as its *ſuperficies* contracts, or by gradually protruding more than it can contain, into the numerous veſſels of the *porta*, or into the cœliac artery, where it's taken in with the current of the circulation: where it is wanted, or where there is leaſt oppoſition, that there may be no apprehenſion of burſting any veſſels, or that any member or *viſcus* ſhould be oppreſs'd, the ſpleen executing the office of diſpenſer, the *viſcerum œconomus* of *Hipp.* to the animal family, thro'out this whole operation.

AUTHORS. As *Malpighi* in the before recited quotation ſo expreſsly eſtabliſhes the muſcular faculty of the ſpleen, ſo many Anatomiſts could not but give a glance towards its uſes contended for. The great *Veſalius*, from inſpection of its veſſels and their connexions, was aware of the ſervice it performs to the ſtomach, by imparting a conſiderable heat thereto. " *Lienem*, ſays he, *ſuo* " *calore innato ac frequentibus quæ illum intertexunt arteriis ventriculi* " *concoctionem favere.* *Highmore* perfectly agrees to it. And *Pecquet*, who adds, that it is a ſort of æſtuary to the blood about the ſtomach and liver, a retiring place. *Riolan* thus delivers himſelf, " *Ventriculus enim* " *membranoſus calido ſanguine irrigandus erat, ad conſervandum illius tem-* " *peramentum, quod frigidiore cibo & potu infringi ac debilitari poterat.* And the terrible effects produc'd herein by eating ice and ſnow-liquors are notorious in hot countries. *Hildanus cent.* iv. *obſ.* 38. gives a caſe of ſudden drinking a large quantity of cold water, which brought the utmoſt torment upon the ſtomach, by ſwelling it out immoderately on a ſudden, and from the cold impreſſion upon its coats repelling the acceſs of blood, as we may with much probability imagine, ſo that the patient became phrenitic for a while with violence of the pain. *Bartholin* ſays that in ſome the *vas breve* is wanting, and theſe ſubjects probably concoct worſe, or this defect is compenſated by other arteries. *Carolus Piſo*, well adviſed of this intercourſe between the ſtomach and ſpleen, thought the gaſtric veſſels, the *epiploic* and *vas breve* carry'd the chyle to the ſpleen. *Rondeletius* and his followers, *Ulmus*, *Piſo*, *Pariſanus*, fancy the ſpleen ſeparates the flower and fineſt part of the blood as a ſieve. Many others have a conceit ſomewhat like it, as to make a fine tincture by mixing with the animal ſpirits, ſuch as *Hogeland*, *Lambert Velthus. Corn. Conſentin. Hyper. Fr. Sylvius* and *Burnet.* In a larger ſenſe taking in the whole diſtribution of the aliment, we may underſtand Monſ. *de la Chambre* in his tractate of digeſtion, who delivers it as his opinion, that the ſpleen makes the ſpirits for the uſe of the *abdomen.* *Dionis* ſays, the continual beating of the fibres of the ſpleen ſupplies the want of the impulſe of the heart and the ſpring of the arteries, which alters and prepares the blood, and that the nerves put in motion the fibres to grind the blood, like ſo many milſtones, ſo that it attenuates and refines it. And this ſeems to be the reaſon why the ſpleen in moſt birds is very ſmall, §. iii. 2. and an argument that it relates to the ſtomach, becauſe their muſcular gizzard in great meaſure ſupplies its uſe. *Mayow*'s opinion quadrates with ours, only putting blood inſtead of his favorite nitro-aereous particles, " which in due plenty and with a certain *regimen* are carry'd to the bow- " els dedicate to the concoction of the aliment. So *Deſcartes* demands a great heat in concoction, and ſuppoſes it deriv'd from the arterial blood, which no one can deny to be the fountain of all animal heat. Appoſite to the mind of *Plato*, " the warmth of the bowels ariſes from the blood as " from a living fountain of fire: (taken from *Hipp.*) which is the univerſal " mover and only workman of all the functions. As among the chymiſts *Vulcan* is the only cauſe of all their operations. *Ariſtot. de part. animal.* iii. 7.

iii. 7. ſays ſanguineous creatures have a liver, but not all a ſpleen, but thoſe which have it doubtleſs for an aſſiſtant of concoction.

It would be very unintelligible to me, how it's poſſible even in mankind, in the ordinary ſtate of life and health, and where we have our regular meals provided, that the ſtomach ſhould be able to perform ſo mighty a task, without a vaſt addition of blood; but much more ſo in diſeaſes and accidents, eſpecially in the creatures of prey abovementioned. But in reflecting upon what has been ſaid, we may imagine how the ſpleen forwards digeſtion, without any fancy'd acid juice, convey'd thence into the ſtomach. This opinion had gain'd great ground, and as in other caſes, when prepoſſeſs'd many have conceipted ſuch a taſte in the blood of the part, but rightly rejected by *Highmore*; and *Drelincourt* p. 28. *de lienoſis*. The curious *Gliſſon* denies this fact, and aſſerts that the blood in it, (both human and of brutes) is of the ſame taſte and ſweetneſs as in any other part; ſo that thoſe preſcriptions muſt be vain, where an ox's ſpleen is order'd to be eaten to leſſen the ſpleen, and attenuate its *atra bilis* by its acidity, as *Quercetan* ſays, for which reaſon they have given it to women to force the *menſtrua*. *Fonſeca* p. 190. Hence likewiſe we may be able to ſolve ſeveral appearances; as firſt, what is the reaſon that after long faſting, if we eat plentifully, the ſtomach will certainly throw the food up again, if no worſe ſymptoms enſue? becauſe the maſs of blood depauperated with nutrition of the parts, can't afford quantity enough to aſſiſt the action of the ſtomach, and becauſe the magazine of the ſpleen is exhauſted. Why ſuch animals as have their ſpleens cut out, are more voracious than others? becauſe the quantity of their circulating blood is larger in proportion than uſual, by all that ſhould be contain'd in the ſpleen. For this receptacle being abſent, the blood lies upon all the neighboring veſſels of the ſtomach in vaſt plenty, in order to ſupply the want of the part; ſo that they are exceedingly dilated and oppreſs'd, (which we ſhall touch upon hereafter) therefore by their weight on the ſtomach the blood will be forc'd to part with a great deal of its fluid parts, thro' the glands of the inner tunicle, which become the ſtimulating juices for appetite; theſe ſaline, poignant, and active ſecretions, as we ſaid before, being more profuſely deriv'd in this part ſo near the heart and fountain of its circulation; tho' languiſhing in digeſtion, the force and ſtore of the ſpleen not concurring. The muſcular membranes too of the ſtomach will in faſting be made ſtronger and deſirous of action, but then the ſtomach being fill'd, is not able to perform the work it has provided for its ſelf, being depriv'd of its aſſiſtant. *Hildan Cent.* vi. *obſ.* 74. obſerves in a diſſection (the ſpleen being very ſound) the ſplenic vein exceſſively large, whence he ſolves the unreaſonable appetite of the patient, yet her food did not digeſt, and ſhe dy'd of a conſumption. Hence likewiſe dogs that have undergone this experiment are obſerv'd frequently to vomit up their food, and more eſpecially for ſeveral days immediately after, the creatures are wonderfully troubled with belchings, and four diſcharges of water, the unneceſſary ferments of the ſtomach, which ſhows how quickly the want of it is felt in digeſtion; and becauſe it is incompleat, and the chyle not to be paſs'd into the guts, nor carry'd downwards by way of a lientery, nature diſburthens herſelf of the ſuperfluous load upwards; and when the ſtomach is again empty, the former appetite preſently returns from the aſſigned cauſe.

No Acid Juice.

Queries.

Pertinent to this I have heard Dr. *Mead* relate a ſtory, that when he was a ſtudent at *Leyden*, he decoy'd a dog, by offering him victuals in order to diſſect him, and found his ſtomach ſo prodigiouſly full of indigeſted and ſtinking food,

that he could ſcarce open him without cutting into it unawares, and never met with the like appearance before, whence he wonder'd the dog ſhould be tempted with food. When he more curiouſly examined into the matter he found the dog had undergone an operation before, and loſt his ſpleen by the hands of ſome of the academics. All this appears neceſſary and accountable from what is rehears'd. Hence we muſt conclude, that in the natural order of things, the ſtomach is neither overpower'd with ſtreams of blood to ſuffocate its action, or cauſe inflammation; nor yet in any ſtate contracted or relaxed, acting or at reſt, full or empty, is deſtitute of its due quantity, the ſpleen by the poize of its muſcular fibres conforming it ſelf exactly to exigencies. And if it ſhould chance that from the action and friction of digeſtion any detriment ſhould acrue to the ſtomach, as that any artery ſhould be obſtructed, the ſpleen alone ſeems capable of remedying it, both by its natural force in opening it directly, or by collateral branches carrying on the common work, till it is remov'd, and the free communication reſtor'd.

SECT. XIV. From what has been deliver'd, we muſt by this time underſtand one principal purport of the ſpleen, at leaſt what I have imagin'd as ſuch, and humbly ſubmit to the conſideration of the learned. But if the functions of this *viſcus* be rightly ſtated above, or but nearly ſo, there are many other collateral uſes that may be ſuggeſted, for nature ſeldom fails of ſolving many intentions by one act. I cannot excuſe my ſelf from pointing out ſome more conſiderations of this ſort, in the ſame looſe way as the preceding, and they ſeem to confirm what is advanc'd, however will furniſh us with new matter of contemplation; and even tautology muſt be excus'd in a new ſubject, where we are not aware of the doctrine deſign'd to be inculcated.

CONTORTED ARTERY. The excellence of the ſpleen ariſing from its fabric, will admit of further dilucidation. We obſerved in our deſcription of the ſplenic artery, that all writers in anatomy wonder much at its vaſt bulk, beyond any apparent neceſſity in proportion to the part it goes to. The ſplenic artery is as big as one of the iliacs, therefore it can receive as much blood upon calculation, as a ſixth part of the whole body. *Wedel. machin. vit.* c. 2. and *mæbius fundam. Med.* ſay it is five or ſix times bigger: *Drelincourt ſen.* meaſur'd the ſplenic artery ten times bigger than that of the liver, *de lienoſ.* p. 10. *Hipp.* calls it *ampliſſima:* and *Avicen.* iii. *fen.* 15. *tract.* 1. c. 2. and *Aponeus. differ.* 31. Nor is it moſt capacious only but moſt long. *Riolan* ſays, *multis ſinibus tanquam nodis turgidulis intercepta, mole ſua venam ſplenicam æquare videtur ſed propter viarum ambages longior exiſtit.* Moreover this artery and its ſubdiviſions near the ſpleen, are contorted much, like the arteries upon the body of the *uterus.* We know well the reaſon of the one, that they may be capable of extending themſelves upon the riſe of the womb, otherwiſe they would be broke, and they contract with it again proportionally by ſhortning their lengths. By parity of argument we conclude the ſame of the ſplenic artery, and that it is to be relax'd and contracted, that it may conform it ſelf to the intumeſcences of the ſtomach, and of the ſpleen. The ſplenic artery ending immediately in the ſpleen, and by its network of ramifications compoſing intirely the ſubſtance thereof, except its muſcular fibres; the whole body of the ſpleen by this means becomes as it were a great artery, or arterial ciſtern. Conſidering its muſcles too, it has a muſcular as well as arterial force. Whence I ſuſpect ſome late and very learned authors have conſidered one uſe of the ſpleen generally agreed to, but by halves, *viz.* that becauſe the ſum of the

cells

cells in the ſpleen muſt vaſtly exceed the diameter of the ſplenic veſſels; the blood muſt fall as it were into a dead pool in the ſpleen, and conſequently move I know not how many thouſand times ſlower here, than in common circulation: and this is in order for the ſeparation of the bile in the liver. It ſeems to me hard to conceive, that ever blood brought into this condition ſhould recover any commerce with the maſs again, any more than that which has ſtood an hour in a poringer after venæſection; and was it true, we ſhould call it a bungling procedure in nature. This would have ſome foundation indeed, were the ſpleen a *parenchyma* only, as fancy'd by *Eraſiſtratus*, *Aphrodiſeus*, *Lactantius*, *Oribaſius*, *Septalius*, &c. But is not this concluſion of theirs without foundation? the whole body of the ſpleen is no other than a real artery, has all the ways and properties of acting as the arteries, relaxes its fibrous coats upon impulſe of the circulating blood to receive it, and by its innate power of contraction, to expel it again *qua data porta*. Is it not the property of arteries to force and conduct the blood from a larger diameter to a leſs, becauſe their tubes are conical? does not the ſpleen the ſame, from their own ſuppoſition? But they did not conſider this power of the ſpleen; and certainly had it no reality, the blood once admitted into it muſt eternally there remain. Moſt of our authors ſince the ancients, ſurpriz'd at the bulk of the ſplenic veſſels, agree nature's purpoſe thereby is with a deluge of pure and warm blood to concoct the crudities and ſuperfluous moiſture the ſpleen ſucks from the ſtomach, which moſt evidently is no other in proper words, than the opinion I have been eſtabliſhing. And it's plain the *vas breve arterioſum* can have no other arterial power than what it derives from the ſpleen as its heart. Therefore becauſe the cavities and cells of the ſpleen are very great, and exceed the diameter of the veſſels by which the blood enters, nature has wiſely compenſated this defect, which would neceſſarily reſult therefrom, in the extraordinary gift of muſcles. But then it will be ask'd to what purpoſe did ſhe create a blot or defect, in order to heal it again: this we will conſider.

MOTION LEISURELY.

We have already been endeavoring to eſtabliſh an extenſive *idea* of the power of the ſpleen, we have reſembled it even to the heart it ſelf; there is no more reaſon the blood's motion ſhould be rebated in the ſpleen, than in its paſſage thro' the heart, whoſe ventricles are equally more in diameter than the auricle, than the *vena cava*. Has not the ſpleen the ſame *carnei lacerti* as the heart, and why may it not uſe them? But ſome will ſay, how comes it about, that this fine action of the ſpleen has not been ſeen all this time? in innumerable diſſections, ſome lucky moment would have preſented this noble *viſcus* at work, and no longer left us to doubt of its prehemineence, and the manner of its claiming ſuch a ſtyle. I anſwer, that this action of the ſpleen is not ſuppos'd a regular and uniform ſucceſſion of relaxation and contraction, like the pulſation of the heart, ſuch a one is not at all neceſſary in the ſpleen. And tho' it may by chance of a ſudden either contract, or dilate it ſelf, as in accidents (which we ſhall ſpeak of by and by); yet was it to be common, it's plain it would deviate far from the office I have aſſign'd it, of preventing miſchiefs in the œconomy, and adminiſtring relief upon occaſion in divers circumſtances. Inſtead of this good character, it would become a terrible tyrant within us, and have it in its power at any time to deſtroy us. For ſo great a quantity of blood as is under its command, either ſuddenly drawn in, would empty the great

great artery, and drink up its whole channel as *Xerxes* his army, or ſuddenly guſh'd forth, would overwhelm the whole machine, or break its pipes and canals. But no ordinary and common exigences which I ſuppoſe the ſpleen adminiſters to, require this, they are all gradual, not an *impetus*, but like the preſſure of a weight, upon which depends the movement of clocks, of a neceſſary quantity and tenor, tho' their motion inviſible. For notwithſtanding nature has contriv'd our muſcles, as ſuppoſe the *biceps* of the arm, to contract it ſelf, or lift up a weight on a ſudden, in the twinkling of an eye, upon the impulſe of the mind; yet if we pleaſe, we can perform that action with any requir'd degree of ſlowneſs, ſo as that its motion ſhall become plainly imperceptible, and ſuch ordinarily is that of the ſpleen. And in this very point, the ſpleen ſeems juſtly to be grac'd with an excellence above the heart it ſelf. Certainly the motion of the heart, tho' of the firſt concernment to us, yet is purely ſervile and mechanical. It can no more ſtop or accelerate it of its ſelf, than the globe of the earth in its annual orbit. Such a one as this would not have anſwer'd the primary intent of the ſpleen, as is evident above all things. The motion of the heart being perpetually and indiſpenſably neceſſary without any regards whatſoever; that of the ſpleen but occaſionally, or to be intended or remitted as requiſite; and it ought to know when to intend, when to remit, when to contract, when to relax, and in juſt proportion. Hence therefore may we not anſwer *Gliſſon*, who makes it a great queſtion, to what purpoſe ſo many nerves ſent to the ſpleen? for as it's obſervable that the *viſcera*, ſuch as the lungs, liver, ſpleen, ſtomach, reins and guts, parts vaſcular or glandular or membranous, have a much larger quantity of nerves beſtow'd on them, than even the heart it ſelf, which is purely a fleſhy muſcle, becauſe their action tho' inſtinctive, yet is occaſional, and not oblig'd by as ſtrict a neceſſity as the other: So muſt it be ſaid more eminently of the ſpleen, than of all the reſt, becauſe it has more nerves than any other, even more than the great *viſcus* of the liver, ſo vaſtly more bulky. The *viſcera* are the chief offices of life, therefore moſt copiouſly ſupply'd with nerves; in vain are the muſcles and fibres ſtrong, in vain does the heart exerciſe its ceaſeleſs vibrations, if the cookery of the bowels did not ſupply 'em with original powers, and means of action. Therefore by thisextraordinary commerce between the brain and ſpleen, are its muſcles under a more intimate conduct of the animal ſpirits, by which it performs the great and beneficent offices I have aſſign'd it, as the various parts in the animal œconomy under its empire require it. And therefore can it accelerate the blood, as well as retard its motion, when there is occaſion. *Heiſter* expreſly ſays, he has often found the blood in the ſplenic vein thinner and more fluid, never thicker than other venous blood: and that its arterial is ſimilar with other, no one has queſtion'd. So that tho' I own the blood deriv'd into the caverns of the ſpleen muſt loſe much of its motion, were there not theſe muſcular fibres, and that it may upon the remiſſion of their action when occaſion requires, actually be retarded; yet without the fabric it enjoys, and the manner of action we contend for, it would really have been an uſeleſs member, and could not have either aſſiſted the liver in making the bile, or to any other uſe we or others have or may aſſign it. If it be neceſſary a quantity of blood ſhould hereabouts be collected occaſionally, it cannot be done any otherwiſe apparently, but by the preſent contrivance. For if there had been only a circuit of arteries, as

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long as we pleaſe, the blood contained therein muſt only have gone forwards, and paſs'd away by veins, and this but by the common power of the arteries, without any choice, any deſired degree of acceleration or retardation, or any determination to particular parts. So that in ſhort we conclude, had not the ſpleen been juſt what it is, it had been no ſpleen at all, and might as well have been abſent. But we may ſay of it as *Roſſetus* does of its arteries, "*quas arterias ibi a natura inutiliter repoſitas qui dicit, "medicæ majeſtatis læſæ reus eſto, tract.* II." Therefore ſeeing the ſtomach could not well have acted without the ſpleen, and that the ſpleen's action had been well nigh uſeleſs without the ſtomach, we think it prov'd, that the ſpleen helps concoction in the moſt eminent degree.

USE III. ÆQUILIBRIUM.

SECT. XV. That theſe muſcles and veſſels of the ſpleen, or properly the ſpleen it ſelf, in a good ſtate of health, is of an equal and proper tenſion with thoſe of the reſt of the body, is a ſuppoſition, which, I think, will readily enough be granted. And as its action of contraction and relaxation is temperate and gradual, it eludes any poſſible opportunity of ſeeing it, even in viviſection. But from its deſcribed abilities, beſides the uſes already mention'd, we may ſuppoſe it to be a true counterpoiſe to the whole vaſcular ſyſtem, or *compages* of an animal body, an adequate inſtrument to preſerve an *æquilibrium* between the veins and arteries, between all the parts of the lower belly, deſign'd to ſupply the animal with new food and vigor, and in general between the ſolids and fluids. This great conſideration I ſhall sketch out in ſeveral particulars, not yet or but faintly taken notice of in authors. And for more ready apprehenſion thereof, compare it to the great reſervoirs or baſons, which the maſters in hydroſtatics cauſe to be made upon a hill, or top of a tower, when they propoſe to furniſh a town, with a conſtant, equal and regular flux of water. *vide* fig. V. Tab. IV. The reaſon of it is this: the engin work'd by the power of wind, or horſes, or the ſtream of a river, forcing the water into the pipes, muſt of neceſſity break them, when they are full, unleſs the ends thereof in the city were open, and that it ran out as faſt as forc'd in. But this will not anſwer the uſe and neceſſities of the machine. The turncocks in the city are open'd as the occaſion of families require, and it's the buſineſs of the engine to work without any regard to them; therefore the other end of the pipes is carried up to a place of eminence, into a great ciſtern or pond, into which the ſuperfluity of water aſcends. Hence there can be no danger of burſting the pipes, and likewiſe when the engin ceaſes to work, as at night is uſual, there can be no failure of ſupply, for the natural gravity of the water brings it down from the ciſtern, as well as if actually forc'd by the engin. This is juſt the method of our new-river water-works and other: and that the ſame contrivance is needful in an animal body, I can ſcarce think will be deny'd by any perſon that reflects a little, how neceſſary it is that a certain proportion muſt be obſerv'd, between the canals of the body and the liquids pervading them; between the power of the heart that forces them around, and the reſiſtances every where found in conical tubes, glands, the compoſition of an animal body; between the progreſſion of the blood, and its return; between the quantity of motion, and the quantity and fluidity of blood, and the like. Therefore to anſwer all this purpoſe, wherein chiefly conſiſts what we call a natural conſtitution or temperature; the heart I conceive repreſented by the forcing machine, the ſpleen by the reſervoir, and its occaſional action is analogous

to the gravity of the liquid element. As the heart muſt never ceaſe its action, if we ſuppoſe a great ſtream of chyle encreaſing the maſs of blood, and at the ſame time that inſenſible perſpiration, or other ſecretions be ſtopt, or that there be any obſtructions in the veſſels, where will you find a reſervoir but the ſpleen, to prevent a rupture of them, that dilates its cavities for reception of the over ballance?

NUTRITION. This matter may be explain'd in ſeveral particulars. I take it for granted that in common way of living, we make more blood than is juſt neceſſary for the occaſions of life; and without this proviſion, we ſhould be ſubject to a thouſand inconveniences. The body of an animal, by the curious inquiſitions of later anatomiſts, is found to be a vaſcular ſyſtem form'd of admirable contexture, of innumerable complications of fibrous and elaſtic canals, which was obſerv'd long ſince by the philoſophic emperor *Antoninus*. Theſe are fill'd and permeated by the maſs of blood, and the liquors ſecern'd therefrom: and life and health conſiſts in a well adjuſted *æquilibrium* and action, between theſe ſolids and fluids. The latter being in a continual flux, broken in pieces, forc'd thro' a thouſand meanders and ſecretory veſſels, act upon the former, and the action is return'd again, according to one great principle and law of nature. Little parts are perpetually abraded from the ſides of the fleſhy tubes and ſolids, which muſt be repair'd by the addition and appoſition of freſh nutricious parts, from the balſam of the blood, the ocean or fountain of the microcoſm. Likewiſe the texture of the blood it ſelf by this expence, as well as conſtant rotation, equally wants repair, and muſt be always full and ready to adminiſter to the endleſs neceſſities of nature. She would be a very imprudent and improvident mother, or rather ſtepmother, that was ſo niggardly, as only to take care of ſupplies the minute we want it. So complicated a machine, liable to external injuries and internal diſorders, muſt have a reaſonable *overplus*, a ſtock in hand, to be employ'd whenever there is occaſion, and for fear a regular ſupply ſhould be procraſtinated. Even ordinary exerciſe and muſcular motion, the great expence of ſpirits, to vulgarly thinking mortals, much more to men of buſineſs and ſtudy, the prodigious variety of matter ordain'd for ſecretions, the large diſburſements of inſenſible perſpiration and common breathing, demand a conſiderable plenitude of juices: and if there was not more than enough, we ſhould be continually fainting. But a violent exerciſe, or faſting beyond the accuſtomed time, a *nauſea* or want of appetite, a *diarrhea* or exceſſive ſweat, a fit of ſickneſs, tho' but ſlight, would quite deſtroy us, and the ſides of the veſſels would cloſe up: there being no fund to ſupport life under ſuch wants and accidents. And beſide, the ſtrength would be ſo far diminiſh'd, as that we ſhould never be able to recover upon removing the inconvenience. When a fever was abated, the blood would be wholly impotent, to furniſh poor remains for the juices of digeſtion, the promptuary of the ſpleen it ſelf would be drain'd. If a bone chanc'd to be broke, or upon an amputation, the fever caus'd by the pain, would have drunk up even the very liquor that ſupplies the *callus*, or the digeſting and healing fluids of a wound. Upon occaſion of an hæmorrhage, the main ſtream would be ſo exhauſted, as to become unable to aſſimilate new currents of chyle into it ſelf. We way gueſs at this from the prodigious weakneſs and ſudden dejection that follows an enormous looſeneſs, or the common alvine excretions of hypochondriacs, whoſe ſpirits are naturally poor and weak. Therefore this ſo neceſſary a ſurcharge

of blood, I ſuppoſe ſo regulated by the ſpleen, as that no inconveniences ariſe from it in the whole maſs and its circulation, as the ſuperfluity of water in the before-mention'd hydraulic contrivances. And as it is waſted continually and diminiſhes in quantity, from the expence of life or accidents, the poize and proportional compreſſion of the ſpleen, like the gravity of water from the ciſtern, by pouring from its own cavities, keeps the veſſels always full, adapting its force to the exigency of affairs in the animal police.

A great inſtance of this foreſight and proviſion in nature, we find in the *menſtrua* of women. That ſex being ordain'd to continue the world, by producing new individuals from their own ſubſtance, are ſo form'd, as that in ſuch a time they ſhall have conſtantly ſtor'd up more blood than is conſum'd in their own nouriſhment, towards that of the child within them; and conſequently when not impregnated, muſt be thrown out by the uterine veſſels. According to the true doctrine of one who is now the ornament of our faculty, and this college, in his admirable treatiſe upon that head. *Emmenolog.* Were it otherwiſe, they muſt either eat a very indecent quantity of food, when pregnant, as well as inconvenient to them in that weak ſtate which they generally find themſelves in at ſuch times; or muſt in few months be reduc'd to a perfect *maraſmus*, ill calculated for the work then to be done; or elſe they muſt perpetually be under as ſtrict a regulation of diet in common life, as if ſubject to a phyſical *regimen*. But it may be objected, that this inſtance is wholly contradicted by the females of other creatures, that have no evacuation of this ſort. Nevertheleſs my corollary from hence is not weakned but confirm'd, by conſidering the reaſon of this remarkable difference, and in which above all others, the beautiful order and conſummate wiſdom of their common and great architect appears. The end of providence, and the ſocial nature of reaſonable creatures, that have a freedom of action beyond the impulſe of appetites, make it neceſſary that the ſex ſhould, after mature years, be always capable of impregnation, therefore always provided with this redundancy of blood. When they are not impregnate, or in a ſingle ſtate when that purpoſe is not to be admitted, it muſt be evacuated, or health is endanger'd. But in the brute part of the creation, where continuation of the kind is only provided for, without any regard to the endearments particular to the human race, it is ſufficient that they ſhould admit of the male only in certain intervals of time, when there is this turgeſcency in the maſs of blood heaped up even in them too; So that it is common to both, but not neceſſarily evacuated in brutes for that reaſon. This *plethora* then ſo requiſite, preſſing upon the uterine veſſels, and ſwelling them to an immoderate degree, rouſes up the ſpring and elaſticity of their arterial coats, and the muſcular fabric of the womb, which is permeated by them; ſo that the ſuperfluity is voided, till there becomes a reaſonable *æquilibrium* again, between the containing veſſels and contained blood. This, as we ſaid before, is done by ſome ſuch like method as the ſpleen acts by. We find then the neceſſity of this redundancy, both for the ſake of our own life, and of that we give to others. And truly I am not without juſt ſuſpicions, that the ſpleen it ſelf is very uſeful too in the *menſtrua* of women; why otherwiſe ſhould we commonly obſerve this *viſcus* in a woman exceeds in magnitude a man's, and conſequently proportionally biggeſt of any creature whatever. §. iii. 3. May it not in ſome meaſure perform theſame office to the

MENSTRUA.

womb,

womb, as before we ſuppos'd it does to the ſtomach? or at leaſt aſſiſt it, which is as it were mainly a ſpleen to it ſelf by ſimular texture; or as we ſaid of people laboring under an *elephantiaſis* §. iii. 3, 4. ſeeming to be wholly made up of ſpleens. And I doubt not but the ſpleen, was it never to exerciſe its office, would be of a ſubſtance exactly reſembling the *uterus* in a virgin. I ſee no reaſon why it may not be a receptacle for part at leaſt of the extravagant quantity of blood, and ſo help to regulate its diſcharges, as that it may be leaſt obnoxious or inconvenient; that the ſuddenneſs thereof or flowneſs, ſhall not incommode the œconomy of the parts and veſſels, and their mutual actions and relationſhip. If it was equally diſpers'd in the ſyſtem of the ſanguinary tubes, the women would labor for a long ſpace under the terrible ſymptoms, which are the diagnoſtics of a ſuppreſſion of the *menſtrua*. The load would weary the elaſtic veſſels to force round ſo much more than is neceſſary, and upon quick depletion, ſo different a ſtate would ſpoil their tonic powers. *Vaſa nimium vacua aut nimium plena ſanitati obeſſe, Hipp. de vict. acut. n.* 21. *& n.* 58. *In humano corpore conſluxus eſt unus, conſpiratio una & omnia conſentientia. Id. de alim.* Certainly in virgins the hypogaſtrics are very ſmall, and the ſpleen, as it aſſiſts in other caſes to preſerve the *æquilibria*, ſo may it probably in this, by taking off part of the burthen from the circulation, and waiting for the critical aperture of thoſe veſſels, when it knows how to diſcharge it ſelf, and perfect the work the others have begun, to its due ſize and quantity, ſo as to give time for the mouths of the veſſels to cloſe, in the inner tunic of the womb, whence doubtleſs the iſſue is made, as *Morgagni* well obſerves *adverſ. anat.* i. p. 39. Tho' without queſtion a *plethora* is the material cauſe of the *catamenia*, yet there ſeems to be ſomewhat more, a *divinum quid* in nature as an efficient cauſe, which we may conclude from the exactneſs of their returns, as in many diſeaſes; and that in violent feavers, or hæmorrhages, or conſumptions, this diſcharge ſhall not forget its ſeaſons; and poſſibly there may likewiſe be ſomething like a habit in time, ſuch as we get in many external actions. Whence the ſpleen probably is ready in common and ordinary courſe of life, regularly to throw its *quantum* of blood upon the ſtomach, at a certain time of the day it has been accuſtom'd to, whether a meal be prepar'd or no. And is not this the cauſe of hunger, which has been matter of ſo much diſpute? *v. Hipp. de rat. vict. in acut. n.* 15.

HUNGER.

IMPREGNATION.

If this intercourſe between the womb and ſpleen be admitted, we may eaſily gueſs at the ſervices the latter is able to perform upon impregnation, when the *menſtrua* muſt be retain'd. The vaſt ſickneſſes and diſorders the ſex feels upon that account, the vomits, cholics, *&c.* as they may in great meaſure be attributed to this retention; ſo probably they would be much worſe but for the cavity in the ſpleen, which receives a great ſhare of the ſuperfluity, and adminiſters it regularly and calmly to the womb, as its bulk encreaſing demands it. Upon ſuch occaſions we are forc'd to take away ſome blood, which only and effectually relieves the patient, and prevents many miſcarriages where the uterine veſſels are overpower'd. It's great pity women ſhould deny themſelves the benefit accruing from venæſection, out of a miſtaken notion and fear of loſing blood in times of geſtation, when it's always ſafe and neceſſary in the beginning, becauſe there is commonly a greater quantity provided than expended, till the conception is conſiderably ripened.

By

By a ſimilar method it's obſervable, nature purges her ſelf in men of a very full habit and lax conſtitution, of her *plethora* by the hæmorrhoids, bleeding at noſe, bloody urine, and other irregular ways, and that often by as conſtant returns as the periods of women. Whence many gouts, rheumatiſms, pleuriſies, and other rich inflammatory diſeaſes have been critically diſcharg'd, when a ſtoppage of inſenſible perſpiration, or other ſolemn ſecretions, or too high feeding and intemperance, has enlarg'd the quantity of blood to ſuch a degree, that the ſpleen finds it neceſſary to diminiſh it, eſpecially by theſe dependent veſſels of the *rectum* beſt anſwering thoſe of the *uterus*. Juſt as thoſe that have a member amputated, are obliged much to ſhorten their diet, or they become obnoxious to hæmorrhages, dyſenteries and the like from an improportionate quantity of blood. I cannot ſuppoſe but that this *viſcus* is of conſequence to females, in the terrible efforts of parturition, in adminiſtring ſtrength by new blood, in receiving it during thoſe convulſions and ſtruggles, and other means of like nature, where there is ſo great hazard of burſting the veſſels. This will offer an opportunity to ſtart a queſtion, whether or no it bears a part in the organs and actions dedicated to *Venus*, in favor of the opinion of the ancients, in furniſhing blood upon thoſe occaſions to warm and inflate the parts, or ſupplying its want in the adjacent veſſels.

PENIS. By all the bodies that I have had opportunity to examin, I judge the *corpora cavernoſa* of the *penis* exactly of the ſame manner of fabric with the ſpleen, and the actions of both, their inflations and depletions ſeem perfectly analogous; and that of the internal part cannot be better and more ſenſibly explain'd than by the external. Whoſe power and mode of deriving and retaining ſo ſuddenly and ſo long a quantity of blood and heat to it ſelf, appears as little accounted for, as that which adminiſters the occaſion of this diſcourſe. As for the vulgarly received opinion of the *erectores* or *tranſverſales* muſcles doing the feat, by hindring the return of the blood, I much ſuſpect it. The contraction of muſcles is voluntary, involuntary or mixt, and I do not apprehend thence, how by any means the blood is forc'd in an extraordinary quantity into the part, ſo as to cauſe erection, nor how they act by compreſſing the outlets thereof as commonly thought. The firſt can do no more than pull the *penis* a little to one ſide, and when acting together, ſhorten it a little to give it a greater tenſion: the latter (diſcover'd by Mr. *Cooper*) by thoſe that have examin'd the matter throughly are ſaid to pull quite the contrary way, and rather open than obſtruct the blood-veſſels; as for the *acceleratores*, they relate only to the *urethra*, in giving an *impetus* to the contents of the bladder, and *veſiculæ ſeminales*. A *plethora* either total or partial is equally the material cauſe of action in both; as in the *penis* is evident when it ſwells after death, particularly in the common execution, hanging, where the weight of the blood preſſes into the part: And after a battle, when the blood has been inflam'd with action, ſo that it takes up more ſpace than before, and produces the ſame conſequence as a *plethora*. This is more eſpecially remark'd in the *Turks*, who upon thoſe occaſions take ſome fine crude *opium*, whoſe genuine effect is to warm and inſpirit the blood, as in drunkenneſs, which is attended with the ſame *phænomenon*. This has been caus'd by encloſing a dead corpſe in plaiſter of *paris*, the cold conſtringing the veſſels, and protruding the blood where leaſt reſiſtance; and I believe any of theſe cauſes as frequently affect the ſpleen as the other part, which

may be the reaſon we ſo often find it much ſwell'd and hard after death, when the perſon labor'd under no diſeaſe thereof. All theſe ſhow the great conformity between the ſpleen and *penis*, and the compariſon illuſtrates each other. Nor can we account for the like ſollicitation of blood any otherways, into many other parts which renders them turgid and tenſe alike, ſuch as the nipples of the breaſt, the excreſcencies on the necks, throats and heads of turkeys, cocks and the like, when they exert themſelves, and ſhow their pride as we vulgarly ſpeak. And if the reaſon of the ſtructure of the *penis* and ſuch parts be, that they ſhould ſwell and relax, upon this adventitious heat and unaccountable ſally of the blood, we muſt conclude the ſame of the ſpleen; and ſeeing there is a ſecret and ſurprizing ſympathy between divers parts of the body, eſpecially thoſe of like texture, (as *Baglivi* largely demonſtrates, *de fibr. motr.* i. 10. *Morbi partium in ſubſtantia & compage ſimilium mutantur ad invicem*, *Baglivi*, p. 306.) we may juſtly believe the ſame heat, *plethora* or mantling (to borrow an expreſſion from fermented liquors) in the blood, will cauſe a ſimilar effect in both theſe bodies. And as far as we may gueſs from a thing that has never been conſider'd, we find it ſo by experience, both the parts after a full meal prone to admit the blood; whence a preternatural extenſion of the ſpleen becomes a diſeaſe as much as a priapiſm: and that lienoſe are obſerv'd to be very ſalacious, about which *Drelincourt* makes merry, p. 54. *de lienoſis*. Sufficient it is at this time, that I only give the hint in theſe nice matters, and that what is ſaid of the *penis* is as applicable to all the uterine parts in a woman. To examine this matter thro'ly would cut out entirely a new work; for there are yet immenſe regions in the province of nature uncultivated, and we contentedly run away with vulgar notions and ſolutions, neglecting to examine into their truth. It ſeems eaſy to imagine, that if the ſpleen be the *moderatrix* of the *equilibrium* between the blood and the ſolids, it may at any time lend a due portion to the organs of generation, and receive it again. We need not ſcruple the diſtance in this or the like caſes between the parts, for adding a quantity of fluid into any point of the containing veſſels, affects the whole liqor, and preſſes alike upon every part of the veſſel, without immediate contact of one part, as the pulſe at the heart is felt in every extremity of the arteries. And this I conceive to be what is meant by the ancients. But one may be naturally in-

MIRTH. duc'd to believe that in mirth, joy, exultation, laughter and the like paſſions, where *in mente ſana & corpore ſano*, there is a grateful ſenſation within one, ariſing from the brisk emotions of the blood, and vibrations of the ſolids, like the melodious thrill of a ſharp muſical ſtring, beyond the calm degree and gentle indolence of health only: In this caſe I ſay the ſpleen muſt be more affected than any other part, becauſe more largely ſupply'd with nerves, and therefore adminiſters to all the various and pleaſant tumults of the blood, and counterſtruggles between it and the fibrils, and the ſallies of the ſpirits. And the ſame cauſes ſhould naturally have their influence on this part hid within the receſſes of the *abdomen*, as well as on that outwardly poſited, and likewiſe abounding with a large quantity of nerves. *Plato*, *Pliny*, *Galen*, *Aphrodiſeus*, *Aurelianus*, and innumerable moderns, make the ſpleen the organ of laughter. *Splen ridere facit*, ſays *Iſidor.* in *orat.* and *Perſeus ſat.* 1. *ſum petulanti ſplene cachinno*; and the teutonic word **milt**, whence our *engliſh* name is deriv'd, implies mirth and munificence ſays *Beverwic.* But of this again hereafter.

We proceed to intimate ſome more incidental purpoſes of the ſpleen. VOMITING. We have ſhown largely before, the ſingular aid it is ſuppos'd to exhibit to the ſtomach in digeſtion, does it not hold equally true in that violent action, vomiting, whether caſual or with deſign? In ſuch a ſudden convulſion of that part, where it changes its dimenſions ſo exceedingly and momentaneouſly, there muſt be a voydance of blood in its encompaſſing veſſels prodigiouſly quick and impetuous. The ſame will be repeated upon every fit. And how this admiſſion and return of the blood, and the whole action can be done, and without infinitely more ill accidents than commonly, but by the help of the ſpleen, I ſee not. *Horſtius* has ſeen a ſpleen with three blood-veſſels going from the meſentery to it, one in the middle, and one at each end. The like may be affirmed of all convulſions of the bowels, hyſteric fits, iliac paſſion, windy, humorous or nervous cholics; and the gut *colon* ſeems reflected up to the ſpleen with that view in COLON. nature; and to have ſo free a communication with it by blood-veſſels and nerves, to be near its ſovereign influence, as well as that by its heat it may warm the ſtomach. For this inteſtin in retaining and excerning the excrements, is much in a caſe with the ſtomach and the food, and ſeems as much to require the benefit of the ſpleen in its common function, as upon extraordinary occaſions; when pain, or the *ſtimulus* of a clyſter or acrid humors occaſion its diſorder. Were not its blood-veſſels large, and immediately communicating with the ſplenic, we ſhould be liable to aneuriſms, *varices*, *hydatides* in the part: or other diſturbances would accrue to the animal œconomy, every time we went to ſtool. Therefore is the ſpleen ty'd to the *colon* by membranes, the nerves of the *colon* are deriv'd from the ſplenic, and its veſſels too. Further, *Riolan* thinks the ſpleen beneficial to the *colon*, in furniſhing it with blood and warmth, as it does to the ſtomach, if it ſhould chance to want it, eſpecially in ſuch diſeaſes as we have juſt mention'd, his opinion with a little alteration very much quadrates with ours. Toward the end of his ii. and 23. he ſays, " *Lien naturale eſt* " *reconditorium ſive promus condus ſanguinis (elaborati in hepate, ſed po-* " *tiſſimum craſſi terreſtris & melancholici) qui ibi aſſervatur ad uſus ne-* " *ceſſarios, vel ut attenuatus ex permixtione arterioſi nutriat partes alvi-* " *næ regionis cum altero ſanguine venæ portæ, vel ut refluat in jecur ſi eo* " *indigerit, atque lien id agit quamdiu iſthæc viſcera ſunt integra & ſana,* " *non debet autem ingurgitari & nimium repleri ſanguine, alioquin depau-* " *perantur & contabeſcunt partes alvinæ regionis, totiuſque corporis, ut* " *ſcriptum eſt ab Hippocrate.*" We may conſider here is a direct paſſage, and neareſt communication between the ſpleen and all the meſenteric veſſels, whereby it's allied to the *omentum*, *pancreas*, liver, guts, womb, bladder, &c. ſo that it ſeems to regard in this view, and in all the beneficial purpoſes we before-mention'd in reſpect of the ſtomach, all theſe *viſcera* of the *abdomen*. So general is its commerce with the appendages of the meſentery, liver, kidnies, ſtomach, that *Willis anat. cerebr.* c. 27. rightly obſerves, the ſpleen ſuffers for their indiſpoſitions; and it ſeems truth, that upon a too plentiful ingurgitation of liquor, as in common drunkenneſs, as well as in exceſs of eating, the *viſcus* we are treating of muſt charge it ſelf with a very conſiderable ſhare of the ſuperfluity, for we can ſcarce otherwiſe think it poſſible for ſuch a quantity as ſome will ſwallow down at a ſitting, to be admitted into the circuit of the ſanguineous tubes: and there are, ſays *Bartholin*, that will indulge their cups for a whole day together, without making water.

Further,

Communication between the PORTA *and* AORTA.

Further, as the meſenteric veſſels, eſpecially the veins running into the *porta*, are a ſyſtem of themſelves, and independent of the great artery and *cava*, having no ready paſſage into the common maſs, but thro' the body of the liver; the ſpleen is its communication by which in caſe of an obſtruction it may, and does queſtionleſs ordinarily make its retreat. So that as before we obſerv'd, the ſpleen claims the *ſpecies* of a ſubordinate heart, or a heart to the lower cavity the *abdomen*, as the *meninges* are by very great authors (*Baglivi* and others) thought to be a heart to the ſupreme cavity the brain.

ACCIDENTS. If theſe notions are not entirely chimerical, the general uſes of the ſpleen are ſo extenſive, as it ſeems obvious to me that life, without it, muſt be ſubject to infinite inconveniences, not regarded becauſe thereby prevented. Therefore had we no ſuch organ, nature would have done wiſely to have made one, where the foundation of our being depends upon a circulation of liquids in pipes, and a certain harmony in their mutual action upon each other. Suppoſe we in violent exerciſe, running, leaping, fighting or the like, unforeſeen accidents, a ſudden fright, fall or terrible ſhock, an extraordinary paſſion of anger or other, the running againſt a poſt in the dark, any thing of fear, that neceſſarily produces a moſt vehement and univerſal contraction of the ſolids; theſe muſt throw the whole machine into prodigious jeopardy, and it would be impoſſible to avoid a rupture of ſome of the blood-veſſels, if there be an exact plenitude, or as we ſuppoſe ſomewhat more, and an hæmorrhage internal or external muſt enſue. Do not theſe make fire flaſh in our eyes as we expreſs it, does not the ſurprize of falling into the water, or the ordinary going into the cold bath, where the terror is loſt, often force the blood thro' the tender veſſels of the lungs, cauſe head-achs from its being more than ordinarily preſs'd toward the irreſiſting ſubſtance of the brain? *Gaudium & ira menſes promovent*, ſays *Baglivi, de fibra mot.* i. 10. *Uteri laxitas ſolo terrore ſanata fuit : Id. eod.* both depending on the tenſity and oſcillation of the fibres in the part, deriv'd from the paſſion. Nothing appears capable in theſe extremities of warding the impending ruin but the ſpleen. This ſeems to be the caſe mention'd in *Kerkringius ſpicileg. anat.* of a man that dy'd, fifteen months languiſhing after a fall from a houſe. When open'd, his ſpleen was found exceſſively big and hard, and the author of all the calamities we ſhall recite when we come to conſider its diſeaſes, for here nothing appear'd of any bruiſe, but probably the too great afflux of blood to the part upon that accident, debilitated its tone to that degree, that it could never recover it. And ordinarily do we not find that in violent paſſions the left hypochondre will be ſenſibly inflated, and a ſtrong pulſation felt externally, beſide the tenſive pain we perceive inwardly? becauſe in ſuch caſualties the ſpleen is as it were a place of arms in open trenches, whereto upon a ſally the diſorder'd troops repair, unite and return in proper time to their ſtations and duty with freſh vigor. Its great veſſels are ready from all parts to receive a ſhare of the tumultuous maſs into its caverns, and prevent dire conſequences of extravaſations, and when the diſorder is over, to remand it back to the veſſels. Were there not this proviſion, ſcarce any paſſion of the ſoul, even laughter it ſelf, but might prove fatal. Commendable therefore is the practice ſo frequently us'd of venæſection upon ſudden and extraordinary joy, as the unexpected reprieve of a criminal from death, good or bad news, and the like. Now in this caſe too, there is a general contraction of the ſolids,

as

as is evident from the ruſhing of the blood to the heart and almoſt oppreſſing it, which we ſenſibly feel, and the violence is exerted chiefly by forcing the blood from a leſs into a greater ſpace, ſo that acting upon the capillaries of the arteries, the blood is driven into the wid'ning veins, whence paleneſs immediately enſues; and upon their wider trunks by conſequence it retires into the ſpleen as their proper *diverticulum*, whoſe wideſt arterial capacity abſorbs it, and thereby the danger of rupture is prevented, till the laboring heart by degrees recovers its regular motion, and by both the œconomy is reſtor'd: the heart being a muſcular pump, the ſpleen an arterial one. Under this ſame predicament in right reaſon ought a fever in all its degrees to be included. For where the blood is FEVER. heated, rarify'd and inflam'd to a prodigious degree, 'tis the ſame thing as if its quantity was extravagantly encreas'd, and the veſſels were incapable of containing the whole maſs. So in ligatures of any part or obſtructions, where the veſſels of one member are turgid, in another flaccid, the ſpleen is the only inſtrument that can reſtore or keep up a tolerable *æquilibrium*, taking where redundant, giving where deficient, and procraſtinating a fatal interruption of the circulation. It's well worth while to conſult the learned *Baglivi*, largely diſcourſing on the neceſſity of this *æquilibrium* between the ſolids and fluids, and of the diſeaſes and inconveniencies ariſing from the errors thereof, *de fibr. mot.* i. 6. *corollar.* 2. This whole doctrine of ours appears to me highly confirm'd, and to ſight demonſtrated from the odd ſtructure of a hedghog, a creature which has ſo wonderful a faculty of coiling it ſelf into an orb, and repelling an enemy with its paliſado'd skin. Here nature has beſtow'd a remarkably large ſpleen, with very numerous veſſels, as we mention'd before, to favor this purpoſe, that the blood being preſs'd out of the other ſanguinary tubes in the limbs, might withdraw it ſelf thither. Thus do the *millipedes* form themſelves into the ſhape of a pill, in hopes to elude the appearance of an animal, and by the eye of reaſon we may imagine has the ſame inward conformation of parts. From all which reaſons, and above all becauſe of paſſions, is the human ſpleen bigger, and more furniſh'd with veſſels and artifice than beſtial, not ſubject to ſuch ſudden inundations and rarefactions. *Riolanus* ſays, the ape's ſpleen is exceeding ſmall. It's well nature has ſo juſtly and eſſentially diſtinguiſh'd the ape's from ours in ſhape, bulk and want of connexion to the diaphragm. [§. iii. 3.] *Blaſius* p. 109.

It cannot be very abſurd, if from likeneſs of conformation, we ſhould HEART. think the ſpleen and heart have no mean relation, not only as the ſpleen muſt receive the vital current from the heart in common with other parts, but as it has the like muſcular columns and mode of contraction, whereby it adminiſters great aſſiſtance to it in quality of ſuperintendant of the *æquilibrium*. For as we ſaid, it's as neceſſary that the blood ſhould be proportion'd to the heart, as that the heart ſhould circulate it, and they are reciprocally ſo. Nature could not be too ſollicitous to render the work of that great pump of the microcoſm as eaſy as poſſible and uninterrupted. For which reaſon ſhe has contriv'd the auricles as a ſtandard meaſure, to pour in by ſize a due quantity of blood and no more, at one time into the ventricles. And beſides, the ſpleen with its poize takes care to keep up an exact plenitude in the veſſels to further the buſineſs of the auricles, and the beating of the heart, and its office muſt be as inceſſant. Therefore the ſpleen may juſtly claim a title above that of being ſervant to

the heart, ſeeing it has a ſovereign influence over it, for if it forces much blood from its cavities, it muſt make the heart beat oftner, to overcome the additional weight. If it uſurps more to its ſelf, the labor of that principal muſcle becomes leſs. And in this ſenſe, if any, we may underſtand *Veſalius* v. 9. *anat.* " *lienis beneficio cor præcipuo quodam uſu refrigerari* " *(quod arabum præcipuis affirmatur;)*" and if we pleaſe we may interpret this to be the meaning of younger *Helmont* making it the ſeat of his *archeus* or ſenſitive ſoul. Under the notion of a *diverticulum*, the ſpleen is taken by Dr. *Liſter de humor*, and Dr. *Purcel* on the cholic, to prevent a ſuffocation of the heart upon a too copious acceſs of blood towards it, agreeable too to the ſentiments of a gentleman in the *philoſ. tranſ.* n°. 34. p. 651. " for when (ſays he) from vehement motion or paſſion the blood " boils too much, leſt it ſhould oppreſs the heart, and injure the brain by " too furious a ſally, the ſpleen receives a good part thereof, ſo that its " ſwelling thereupon with a pulſe and intenſe heat like that of the heart " may outwardly be felt by any one." *Laurent* vi. *queſt.* 27. ſays there are *anaſtomoſes* between the *porta* and hepatic vein going into the *cava*, and thence ſolves the voydance of his imaginary melancholic blood of the ſpleen by the emulgents, and ſo by urine; but he thinks it a nearer way by the arteries. He repeats it again, iv. *queſt.* 8. I need not intimate how by this means the purpoſe we are inſiſting on, becomes ſtill of a much larger extent and benefit; for if any tumultuous return of the blood in the *cava* ſhould offend the right auricle, the ſurplus finds a paſſage into the ſpleen by the ſplenic vein, or if an obſtruction happens in the great artery near the heart, the ſplenic artery brings relief. Theſe circumſtances may further
COLD. take place upon great external cold, where the blood cannot return from the extremities, ſo faſt perhaps as wanted at the heart; therefore the uppermoſt part of the *cava* near the right auricle can borrow (by inverting the propoſition) from the ſpleen thro' the ſplenic vein, to ſupply the heart, and likewiſe produce a narrower circuit or epicycle thro' the ſplenics, till the blood thus more than ordinarily warm'd by ſo quick a repetition of its paſſage thro' the heart, lungs and ſpleen, will be fitter to expedite the tranſit of that, near ſtagnating in the external parts and *anaſtomoſes* of the limbs.

Perhaps I may have been too large and too particular in theſe indigeſted hints, but I was willing to offer every conſideration, that might occaſion theſe matters to be more enquired into. I ſhall not regret my labor, if any one of the notions produc'd may be of the leaſt advantage to medicine. What remains of this ſort will be but brief, and therefore favors your patience.

USE IV. LIVER. SECT. XVI. *Boerhave*, *Keil*, and moſt of our moderns acquieſce in this opinion, that the ſpleen has great regard to the liver, and ſeems made on purpoſe to aſſiſt it, in its work of ſeparating the bile from the blood. *Alexand. Aphrodiſeus* §. ii. *probl. Aretæus* i. *chron.* the author of a little book *de reſpiratione*, and moſt of the antients made the ſpleen an helpmate to the liver, wherefore they call'd it νοθον ηπαρ και ωσπερ αντιζυγον. *Ariſtot.* t. i. p. 1005, 1009, 1010. *ed. Paris.* v. *Hoffman's apolog.* ii. 35. *Hipp.* iv. *de morbis*, thinks when the liver is out of order, the ſpleen is its ſubſtitute. I take all theſe to be true, but with ſome qualification. The ancients muſt be underſtood to mean the ſecretion of bile inſtead of ſanguification. The moderns obſerve, that the ſplenic vein paſſing directly to the *porta* in

conjunction with the meſenteric, omental, &c. terminates in the liver, and carries that blood whence the bile is taken by the glands therein. That blood deriv'd from the veins of the guts, call'd meſariac, muſt be look'd upon as next to ſtagnant, having the leaſt degree of ſpirituoſity and fluidity, by loſs of its liquid parts in the lymphatics, in the common nutriment of the contents of the *abdomen*, and its motion very much rebated in thoſe membranous *viſcera*: therefore according to the doctrine of ſecretion well eſtabliſh'd by Dr. *Keil*, extremely favors the ſeparation of ſo craſs a fluid as the bile, which muſt be ſlow and leiſurely, the union of its viſcid particles requiring time to coaleſce, and doubtleſs oyly globules of fat from the *omentum* make part of that ſaponaceous juice. They add further, what we mention'd before, that for fear this ſhould not prove ſufficient, here is the blood in the ſpleen carry'd by the ſplenic vein, from whoſe dilated caverns it moves with a yet more ſluggiſh pace, and more deſpoil'd by its numerous lymphatics. And this uſe of the ſpleen we may grant in caſe it be wanted, and from the theory of the part all along by us advanced, it has it in its power to retard, as well as to accelerate the motion of its contained blood. But ſtill we muſt beg leave to ſuſpect this is an exigence much ſeldomer occurring than ſeems demanded by thoſe gentlemen, and upon which they probably lay too great a ſtreſs. For tho' we allow the ſpleen to be an arterial *ciſta*, as it were, incloſ'd in a venal one, and that from its vaſt ramifications and cells in its body, the blood contain'd in it would, *ceteris paribus*, find but a difficult paſſage out; yet if we throw in to the account a conſideration of its muſcular fibres, the ſame effect is ordinarily produc'd therein, as if the *anaſtomoſes* of the veins immediately received the blood from every extremity of a capillary artery, therefore is the circulation therein faſter or ſlower in proportion to that of other parts, as uſe and neceſſity dictates and requires: and I believe more frequently in life the former, rather than the latter. And in the main may conclude no part of the body has an equal privilege with it, that can with choice take the thin arterial blood, if too much drain'd by the lymphatics, or the thick of the venal, and this in what proportion it pleaſes, to any required temper; and be that as it will does not impeach our general doctrine, but much confirms and illuſtrates it, and fully in our opinion exalts the *idea* we have conceiv'd of it. And if we reflect upon this matter ſeriouſly, we may well imagine that nature has contriv'd this organ as a heart or pump to the ſluggiſh veſſels of the *porta*, which has no other active power belonging to it, and that as the long rope of the *par vagum* nerve is let down thro' the *cranium* for the uſe of the heart, ſo the longer of the intercoſtal is deſtin'd with ſtill greater ſtrength to the ſpleen, whoſe buſineſs, tho' not ſo conſtant, is as neceſſary and more various.

I think I have given ſufficient teſtimony, that the blood in the ſpleen ordinarily is not in ſo effete a condition, as to be worſe than that of the meſariacs, but equal to the moſt rutilant in the arteries of the body, contrary to the aſſumption of their *hypotheſis*, tho' accidentally and in diſeaſes it's to be thought ſuch is the caſe. It appears no mean argument againſt them, that in all epatic obſtructions which cauſe the jaundice, the ſpleen generally is a fellow-ſufferer. In the mean time I am fully perſuaded, that it is of utmoſt concernment to the work of the liver thus. The action of the liver is occaſional, as well as that of the ſtomach, but becauſe it is ſlow, there is a reſervoir provided for it with the very ſame mechaniſm as we before

aſſerted

aſſerted was the caſe of the ſpleen, in relation to its becoming the inſtrument of *æquilibrium* between the ſolids and fluids. This is the gall-bladder which appears a true ciſtern plac'd at the end of the cyſtic duct, into which runs the overplus of the bile falling down the hepatic duct or *porus bilarius*, and not immediately admitted into the guts, where there is no occaſion for it but after digeſtion finiſh'd. Moreover if by any chance the liver is too ſlow, or is hinder'd in its action, the plenitude of the gall-bladder ſupplies the neceſſity, for a meal or two, in which time it's to be hoped nature will be ſtrengthned to ſubdue the inconvenience. The voidance of the gall-bladder is perfectly analogous to the water flowing by its own gravity into the aqueducts of a city, whilſt the forcing engine ceaſes to work, according to our former compariſon. Now all the inconvenience the liver can be liable to, ſuppoſing it of good conformation, is the obſtruction of the biliary glands, and indeed from the ſlowneſs of the blood moving to it, and that of the ſeparation in it, it's not to be wonder'd at, if it happens ſo often, and cauſes a jaundice, or retention of bilioſe particles in the maſs of blood. But I gueſs this would be infinitely more frequent were it not for the ſpleen, which is regularly an inſtrument of volatilization to the blood, as in a partial ſenſe has been the opinion of many Authors of good note. *Waldſmidt, Velthuſius tract. de liene. Drelincourt de lienoſis*, &c. So *Roſſetus* ſays *Lien ſanguinis vitalis eſt non fons & origo ſed vel penuarium vel officina quædam.* v. *Ulmaus de ſplene. Hipp. de intern. affect.* ſays, the ſpleen is always of a hot temperament. Why ſhould young *Helmont* make it the ſeat of the ſoul, if he had not obſerv'd it full of rutilant blood? therefore is it not reaſonable to aſſert, that the ſpleen is an arterial lake or ſluice of brisk and pure blood, to oppoſe againſt the poverty and extreme inactivity of that in the meſariac branches of the *porta* going to the liver? for which there ſeems a ſpur wanting rather than a curb. And in this ſenſe with *Galen* we may ſay the ſpleen is a purger of the liver, with whom *Oribaſius* agrees. Nor can I doubt but a little freſh blood added, will promote rather than retard the union of the bilioſe particles in moſt conſtitutions, and for this great purpoſe nothing could have been better contriv'd than the ſpleen, its veſſels and action as above deliver'd. And doubtleſs the guts would frequently mortify were it not for the ſpleen, from whoſe ſovereign office upon occaſion it can borrow new vitality, without commonly injuring the ſlackneſs of the circulation in themſelves ſo neceſſary for the liver. Conſider further, that the liver keeps holyday ſometime, as particularly upon faſting, when nature knows how injurious it would be to pour into the empty guts that terrible *ſtimulus* of the bile, tho' from the common *plethora* there is no deficiency of blood for ſuch a ſecretion. I ask then what muſt become of the ſtagnant blood in the meſariacs, and how muſt its motion be quickned to enable it to retire into the maſs again, unleſs the ſpleen lends its friendly aid? either pours a warm deluge upon it, whence it paſſes thro' the liver without loſing its bile by accelerating its motion beyond that degree neceſſary thereto, or expedites it thro' the communications between the *cava* and *porta* mention'd by *Laurentius*, or abſorbs it into its own capacity and reſtores it into the arteries; ſo that in this it becomes mediator between the two diſtinct ſyſtems of blood-veſſels, that of the *porta*, and that of the whole maſs in the veins and arteries. All this ſeems very particularly confirm'd by the experiments of *Morgagni*, *Bohnius*, *Ortlobius*, and *Malpighi*, that when the ſpleen is cut out, the bile is obſerv'd to be

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of a more obſcure color than otherwiſe, as wanting ſome briskneſs and fire from the lienal fund. Indeed, this laſt method of nature is the very ſame as is practis'd every day in works of ſewers in level countries bordering on the ſea, by what they call the back-water, that is, when one of their drains or outfalls wants ſcouring, they take in a great quantity of the ſea-water at a high tide, which upon the receſs of the tide, adding a new weight and *impetus* to the freſh water removes the obſtacle. This notion of ours in a great meaſure coincides with that of *Drelincourt ſen.* for he, as we before ſaid, obſerving that the blood in the veins is ten times thicker than in the arteries, and more eſpecially in the *porta* than *cava*, concludes that the fluidity of the arterial blood in the ſpleen muſt neceſſarily promote, by its abundant lymph, the paſſage of the meſariac blood again to the heart, ſeeing it has no aſſiſtance againſt its *lentor* by lymphatics deriv'd to the *porta* for that purpoſe. And thus, according to my apprehenſion, do we ſolve this *quære*; why is an hyſteric fit or a fever judg'd by a ſudden jaundice thrown all over the skin? the ſpleen forcing the attenuated blood in the meſariac veſſels thro' the liver, and hindring its common office.

There are many other collateral uſes of the ſpleen I might inſiſt on, and enquire whether it is not ſubſervient to thoſe that give ſuck, where a large quantity of blood is neceſſary, as appears from the retention of the *menſes* at that time, and the brisk appetite of the mother? what relation it has to accidents of reſpiration, by means of the phrenic branches? what is its intercourſe with the *pancreas?* If the office of the *pancreas* be reaſonably ſuppos'd to furniſh a ſmooth juice that may temper the bile, and hinder its too violent bite upon the immediate part of the inteſtin it falls into, which would become painful; then the *pancreas* rightly receives its blood for ſo fluid a ſecretion from the ſplenic artery or ſpleen it ſelf. I obſerv'd in the body here diſſected, whoſe ſpleen is preſented plate vii. ſome arteries going to the *pancreas* juſt at their entrance into the ſpleen, and hence the reaſon why the meſariac blood comes not to that *viſcus*. I might examin whether the *glandulæ renales* or ſeparation of urine in the kidnies has reſpect to the ſpleen, ſeeing there have been found communicating branches between it and the emulgents. The ancients ever had a notion of the ſpleen evacuating it ſelf by the bladder. The *Chameleon* wants a ſpleen, and equally all its urinary organs, neither drinks nor makes water, digeſts not its food but voids it unchang'd, having a natural lientery ſays *Blaſius* from *Panarol.* No wonder then if aſſerted uſeful in digeſtion. Theſe and other enquiries of this nature, I leave to further *examen* by my ſucceſſors in this chair.

Leſt the force of the reaſoning all this while deliver'd ſhould be thought leſſen'd by an objection which will readily occur, ſomewhat remains to be ſaid upon it. If ſuch be the great uſe and offices of the ſpleen, not only *ex eventu neceſſarium*, as *Ariſtotle* ſays iii. *de partibus animalium*; but that it appears in our own account thro' ſo long a ſeries of particulars, highly and indiſpenſably neceſſary to the animal œconomy, and even to the very being of creatures; how comes it to paſs, that when it's totally extirpated, they live perfectly well, or if they ſuffer ſome little inconveniences, yet do not ſome other advantages accrue, that render its loſs leſs ſenſible, and perhaps in the main no real detriment? To which I anſwer: *Roſſetus* ii. *de partu cæſareo* p. 154. delivers it as his opinion, that in theſe caſes they cut away but part of the ſpleen, and that even part of the lungs have been ſe- OBJECTION.

veral times cut off and heal'd. And indeed in dogs, wherein the experiment has been chiefly eſtabliſh'd, it ſeems next to impoſſibility that the whole ſhould be taken away, from conſideration of the blood-veſſels that muſt neceſſarily periſh, to ſay nothing of the great collection of the nerves there: Its ſituation appears quite the reverſe with a man's, (certainly a much more proper ſubject in the caſe,) for the head is poſited where the tail of a man's, and the whole more inward, and under the length of the ſtomach. It's evident from the cut exhibited Tab. vi. that of ſeven veſſels going to the ſtomach, five at leaſt muſt be cut away, ſo that in all reaſon we ſhould judge the ſtomach muſt be ſtrangely defrauded of its nutriment: Nevertheleſs admitting the experiment in its full force to be matter of fact, (which I fear has wanted due examination) there as yet has been no other benefit pretended to, than rendering the creature more gay, more ſwift, more voracious, more ſalacious. All which may without difficulty be ſolv'd by what we have already ſhown, *viz.* that the quantity of blood is thereby increas'd in the whole maſs, by the ſurpluſage of that which ſhould ordinarily reſide in the cavity of the ſpleen, or the ballance of the *æquilibrium*. But this pretended benefit is wholly deny'd by ſeveral antient and modern phyſicians, whoſe authority in this point ſhould weigh more than that of *Pliny*, or ſome empirics and turkiſh horſe-jockies. And is not want of digeſtion, ſcurvy, and other diſeaſes and inconveniences mention'd, more than a ſufficient counter-charge againſt theſe precarious perquiſites? which in the whole can never avail to overthrow ſo many manifeſt occaſions where its preſence and action as eſtabliſh'd, is highly neceſſary and commodious at leaſt: much leſs to prove nature a bungler, and guilty of ſupererogation, who has diſplay'd all poſſible marks of profoundeſt wiſdom and deſign, and yet magnificent parſimony in all her other formations. May we not more reaſonably ſuppoſe, that where the animal is depriv'd of this *viſcus*, after her wonted manner, ſhe contrives a thouſand ways to remedy the detriment as well as poſſible, and tenacious of life forms new veſſels, or enlarges others, finds new modes of action for her relief, and delegates the task of the loſt part upon others? as *Bartholin* ſuppoſes, *cent.* iv. *hiſt.* 51. that when the ſpleen is reſcinded, the *pancreas*, liver, or ſomewhat elſe becomes its deputy. Thus we ſee upon cutting a great artery, ſhe expands other collateral ones to ſupply the circulation, as Mr. *Cooper* tells us in the *phil. tranſ.* A moſt eminent inſtance of this nature in *Brunner*'s *exp. nov. c. pancr. exp.* vii. and in another dog p. 118. and in general he ſuppoſes his uſes of the *pancreas* transfer'd upon other parts which muſt act for it when cut out. And in the experiment of *Malpighi* §. xi. 3. and in that before-quoted paſſage from *Laurentius*, where it was deficient originally §. iii. 2. it ſeems manifeſt, the veſſels were oblig'd to become ſuccedaneous to the ſpleen, and being more ſwell'd out, particularly the artery and its coats thickned, it might well undertake in ſuch emergency the whole buſineſs thereof upon its ſelf, and very adequately, ſince there is ſo great conformity between them, and their power of contraction and relaxation equal; ſince as we demonſtrated, the ſpleen ſeems only a multiply'd or protracted artery with muſcular fibres over and above, beſtow'd on it for greater ſtrength in imitation of the heart. Here likewiſe were all the leſſer ramifications of the blood-veſſels of the ſtomach more enlarg'd, the better to enable it by heat and blood to perform its digeſtion, and become its own promptuary or a ſpleen to it ſelf. That redundant

dundant blood thrown thither for that moſt evident purpoſe, forceably diſtending their coats which ſhould retire into the neighboring ciſtern. So the huge encreaſe of the liver ſhows, it's oblig'd to extend its own province, to contain ſomeway or other that ſtore of blood in its ſelf, which aforetime was treaſur'd up in its magazine the ſpleen. Thus the appearance of the dog diſſected by Dr. *Mead*, the vomiting and all other ſymptoms enumerated on ſuch experiments, confirm not weaken the produced doctrine. The reaſon of ſour belchings and *flatus's* in theſe mutilated animals, ſeem perfectly like that of hypochondriacs, owing to irregular and too haſty fermentations in deprav'd digeſtion, like water boiling over with too much fire, becauſe the tone of the ſpleen is ſpoil'd. Whereby it either pours the blood and digeſtive juices into the ſtomach too much, too ſuddenly and in convulſions as it were, much as is the caſe where the veſſels only officiate when it's cut out; or elſe not enough, ſo that it anſwers well a furnace without a *regulator*. And in our ſubſequent account of the diſeaſed ſpleen (much the ſame thing as where it is abſent) many occaſions of remark will occur both theoric and practical, that ſerve to ſet aſide this objection. Since then, if what nature does in the ordinary courſe of life, and what ſhe is forc'd to do when put out of her biaſs and reduc'd to extremities, concur to eſtabliſh our aſſertions, we think our ſelves ſecure.

We have accounted already for moſt of the *phænomena* upon thoſe experiments. What remain are not difficult, and equally concluſive of our purpoſe. That ſuch creatures make water more frequently, depends upon the ſuppoſition of their having more blood in proportion than otherwiſe, as before reſtrain'd, where the circulation muſt be encreas'd, which promotes the urine as all other fluid ſecretions. Thus *Brunner* obſerv'd when the *pancreas* was taken away that appetite was increas'd, for no other reaſon that I can imagin: hence the water of hyſterics is much, white, unconcocted and thin; ſo *Brunner*'s dog that loſt his ſpleen, made water frequently, and drank much. Juſt as we obſerv'd in the acuating juices of the ſtomach, rendring them more voracious, tho' after they had ſtuffed their ſtomachs, digeſtion ſlacken'd for want of the ſplenic auxiliaries. 'Tis a common obſervation among drunkards, that during the fit of a debauch, he is firſt fudled that goes oftenеſt to the urinal; that being an indication of a more accelerated motion of the blood, which by paſſing ſo much quicker thro' every part muſt needs encreaſe the heat, ſooner affect the head, and cauſe drunkenneſs with its concomitant ſymptoms. Their being more ſalacious ariſes from the ſame cauſe, and which we find one of their drunken ſymptoms, the quicker circulation ſpiritualiſing the blood, and provoking all the ſtimulating fluids of venereal appetite. For tho' immediately more viſcid ſecretions are perform'd where the current is ſlack, yet it's not doubted but all ſecretions in general are more expeditiouſly promoted, by frequent circulation and briſk pulſe, which conſequently muſt pour the blood more impetuouſly into the ſeminal veſſels, as well as others. Laſtly, that we may be able to give a gueſs at the importance of ſuch a quantity of blood as the ſpleen will contain, and of what conſequence it is to the animal œconomy under the conduct of an organ endow'd with the above ſpecify'd powers: we need only conſider the ordinary complement of the menſtrual *plethora*, which is the reſult of many days retention, and which amounts to about ℥xx. Whereas we may well judge that a moderate and healthful ſpleen will contain at leaſt lbj, and which is conſtantly under its power and direction.

SECT.

DISEASES. SECT. XVII. The reſidue of our time, as order requires, muſt be allotted to conſideration of the diſeaſes of the ſpleen, and what are properly ſo called, the VAPORS, whither that which goes under the title of hypochondriaciſm, peculiarly aſcrib'd to men, or the more frequent torment of the fair ſex, hyſteric diſorders. It's obvious the execution of this multifarious task would require a volume, and vaſtly exceed the boundaries of this lecture (which we have tranſgreſs'd already) ſhould we purſue it thro' its utmoſt labyrinths. But preſuming upon the great candor, as well as patience of the moſt learned auditory in the world, I ſhall at preſent obſerve, that in caſe the doctrine we have advanc'd be founded upon truth, the whole hyſteric theory muſt be fetch'd from a ſomewhat different ſourſe than has hitherto generally obtain'd. Therefore I may perhaps more eaſily beſpeak your curioſity whilſt as conciſely as poſſible I only pretend to trace out a general ſcheme of what may be ſaid upon this diſeaſe, which both antients and moderns have attributed to the part, but, as far as I gueſs, not perfectly apprehended the reaſon. Whence probably the diſtemper has been found ſo difficult and ſtubborn, and as well as ſome others ſtil'd *opprobrium*, and *flagellum medicorum*. *Laurentius*, *Beſſardus*, &c.

We ſaid before, life, at leaſt health, when the original *ſtamina* are ſound, depends upon a libration or *æquipondium* of the ſolids and fluids mutually oppoſing each other, much as motion and attraction conſerve the volubility of the celeſtial orbs by a contrary *niſus*. And this is what properly is meant by the conſtitution of a perſon, which varies one from another, or in different ſtages of life in the ſame, as theſe fundamental cauſes cooperate, or prevail one above the other. And the ſpleen is by us ſuppos'd the great *regulator* or watergage to the heart, and *conſervator* of this *æquilibrium*, like a court of admiralty within us; as the moon to our globe is ſovereign of the ſeas, giving a motion ſalutary, regular and conſtant to the fluid element. I hope I may be excus'd for uſing ſuch ſort of compariſons, ſince nothing perfects our *idea's* ſo well as analogy from things evident to thoſe we endeavor to make ſo, where the reſemblance is tolerably juſt. How eminent then is the ſtation of the ſpleen? for it is as neceſſary that the heart ſhould move, as we may ſay, by rythm and concord, as that it move at all. There muſt be a nice adjuſted plenitude in the veſſels, or the animal pump will languiſh, be diſturb'd, hurry'd or ſuffocated, as we have already and ſufficiently inculcated. And if there be a deviation from this meaſure on one ſide or other for ſome continuance of time, thro' failure of this ballance of the ſpleen, (tho' we ſuppoſe all the other *viſcera* and ſolids in good condition) great diſorders muſt enſue thro'out the whole œconomy. All ſecretions muſt be vitiated of courſe, the whole maſs being of an undue compoſure. Digeſtion is deprav'd, evacuations irregular; nature put upon a million of unguided ſallies, convulſions, tumults, and the human machine become a ſeat of rebellion and miſrule, and muſt ſuffer in a moſt unaccountable manner, ſuch we call the vapors. A diſtemper of ſo diſſimilar a complexion, that it is never alike in any two perſons or ſcarce in two fits of the ſame perſon. *Sydenham* calls it *farrago quædam phænomenôn incompoſita atque inordinata*. Other diſeaſes by many learned writers are well ſolv'd by particularities of the afore-mention'd deviations: but this is a complication of them all, and may appoſitely deſerve the definition of a *morbus morborum*. Then, if we conſider the conſequences of it, when run to ſome length, and the whole frame drawn into

conſent and defection, we need not wonder that without regard to the neceſſary varieties of age, ſex, climate, conſtitution, diet and other nonnaturals, different paſſions, and a thouſand variable incidents, the concomitant ſymptoms muſt be as proteiform as can poſſibly be imagin'd. That where a part is concern'd that has ſo diſtant and various a communication with others, where the accumulated depravation of ſo many noble uſes as we above aſſign'd, falls on us with full weight, an hyſteric *hydra* ſhould be produc'd.

In a word, we may venture to call the vapors a relaxation of the tonic action of the ſpleen, whether from any proper diſorder or defect in it ſelf, or whether join'd with an univerſal relaxation of the vaſcular *compages* or ſolids in general, whether cauſing or cauſed. But rather beginning the prelude, which muſt ſoon be follow'd by the whole; whence it is but a ſort of half life, and accompany'd with the utmoſt deſpondence and deſpair of relief. When we fix the riſe and lay the ſcene thereof in the ſpirits, or to ſpeak in more intelligible terms, the nervous ſyſtem, we miſtake the conſequence and effect for the primary cauſe. But from hence the name of vapors ſeems to ariſe, pointing to thoſe nimble agents in all animal actions, to which we fancy the quick tranſitions and volatile nature of the ſymptoms here are moſt like. As *Baglivi* makes the *meninges*, as it were, the heart of the brain; and I think all his doctrin *de fibra motrice* very much confirm'd by our modern practice of ſnuff-taking; ſo we make the ſpleen the heart of the *abdomen*. That each of the three cavities may have its great auxiliary and ſuperintendant, which in their due ſubordination and harmonic co-operation, conſtitute the animal œconomy. The true heart indeed throws the blood to both the other, the *meninges* regulate the ſecretion of the animal ſpirits which is the cauſe of the motion to all: But the ſpleen preſides o'er the fountain head, the organs of concoction and its dependent inſtruments of diſtribution of the chyle, which is to make the blood, the ocean whence all ſtreams are deriv'd and all vitality; not only ſo, but regulates it, that it may be really uſeful to the other two, and to the whole. So that for the true cauſe of this diſeaſe, we muſt ſearch for the foundation, which if weak and defective, no wonder that the higheſt pinacles nod, and whoſe fall will only help to make the ruin greater. Such I take to be the caſe of the ſpleen in this complex malady, by the ancients call'd melancholy or black bile, which they ſuppos'd heaped up in the part, and wanted evacuation or volatiliſation, ſo as to become good blood again, and fit for nutrition and other functions of the body. This notion they deriv'd from inſpection, finding generally the ſpleen in this caſe much ſwell'd and ſtuffed with thick unactive blood. The yellow or true bile they thought of a dry and hot temper, this black bile or melancholic juice was cold or moiſt; meaning that in this circumſtance the blood was of an undue craſſitude, poverty and humidity, and wanted much of the fire which ripens all things. They obſerv'd too, that melancholics often vomited black matter like ſoot, and made black urine with black ſediment, all pronounc'd ſigns of the ſpleen affected, *Gal. Avicen.* l. 1. *fen.* 2. *doct.* 3. c. 2. *Actuar.* i. *de urin. judic.* 20. *Averrho. colliget.* iv. 22. *Piſo* §. 1. That they had a *tremor*, when they awak'd, of all the parts of the left ſide; ſo that they ſaw the truth plainly, tho' by their term of refrigeration is meant relaxation, in our later way of ſpeaking, an inactivity of the circulation, and *lentor* of the blood.

DEFINITION

CAUSE. *Galen* defines the hysteric passion an *intemperies frigida*, which neither arises soon, nor ceases soon, which is no more than a lax and moist constitution, degenerated into an habitual indolence and remissness of action, between the solids and fluids, in which the spleen has so mighty an interest. *Gal.* ii. and 5. *de art. cur. ad Glauc.* calls it the distention of the spleen by *flatus's*. *Hipp.* says, *pituita* is always join'd with melancholy, and that the blood of such is full of *ichor* and crudities. So that splenetics have no great thirst tho' they make much water, they likewise sweat much, and spit for weeks together as if salivated. Any ulcerated part will run much. Old authors complain in these cases of the patients having drank much water. Now this moisture abounding, drowns the volatile salts in the blood, whence the spirits and principles of action in the body; and leaves it thick, black, sluggish, earthy and unqualify'd for its office. The vascular system, which it permeates and nourishes, is become consequently languid and unactive, and both go to wreck from the reciprocal dependance on each other. No marvail the symptoms of this malady are so infinitely various, that they suffer in every limb and member and *viscus*, even in the whole body to such a degree, that it appears like witchcraft, when it arises from a temper and constitution quite opposite. Most frequently indeed from that which is humid and remiss, yet sometimes from the dry, the hot and fiery, which by an extravagant evaporation and wasting of the fluid and spirituous parts of the sanguinary mass, leaves the blood in just the fore-mention'd condition, or creates this *atra bilis*, or stagnant state thereof, where it was not before; and this seems more peculiarly that melancholy which terminates in madness. So that to point out in few words the causes of the vapors, 'tis want of action or too much passion, the mind and body join hands in their own overthrow; any thing that depauperates the blood, wastes the spirits, that for some time together defeats the true proportion and harmony between the solids and fluids, which is maintain'd by the spleen. Such are a lazy indolent life, lying too long in bed, a stagnating, marshy, saline air, tedious fevers or other diseases, hæmorrhages, drinking too much water especially in winter, middle age and peircing wit, for a slow and temperate *genius* seldom runs into this excess. Too much study, especially upon one topic, variety being as much a relaxation, as total abstinence from books. Nocturnal lucubrations, excessive grief, care, solitude, watchings, solicitude, too much indulgence of one passion, especially that predominant one of love. We may add too much labor and fatigue in a hot, dry air or season, salt food, an abuse of spirituous liquors, which in reality drink up the vital flame. And sometime 'tis hereditary, as *Hipp.* says. Nor does any thing hinder but that there may be an original and natural debility in the part as well as acquir'd, particularly where the solids in general appear to be soft and lax. Therefore this being a distemper that scholars and ingenious people are more addicted to than others, the consideration of it must needs be very inviting, but above all in compassion to the tender sex, without whom the world it self would incur the disease, they being one main spring of all action in the wondrous machine.

MELANCHOLY. *Aristotle probl.* §. 30. enquires why this melancholy should prove so obnoxious to men that have been most famous for war, for wit, philosophy, legislature, poetry, arts, &c. such as *Hercules*, *Ajax*, *Bellerophon*, *Empedocles*, *Socrates*, *Plato*, *Heraclitus*, *Timon* and the like, who all dy'd of this distemper; v. *Drelincourt. de lienosis* p. 44. *Hercules* burnt himself

on

on his own funeral pile, *Ajax* ſlew himſelf with *Hector*'s ſword, *Bellerophon* wander'd in the *Aleian* fields,

Is miſer Elæis ſolus errabat in agris,
Ipſe ſuum cor edens, hominum veſtigia vitans. *Hom.* Il. iii. v. 202.

Lucian in his comment on aſtrology ſuppoſes *Bellerophon* a great ſtudent in that ſcience, which made him vapor'd and melancholy, and a lover of ſolitude. Thence the fable of his being thrown off *Pegaſus* into theſe famous fields, where I ſuppoſe he walk'd to contemplate the heavenly motions. This is *Tully*'s opinion *Tuſc. qu.* iii. n. 26. *Euſtach.* t. i. p. 494. 13.

Sic nimiæ bilis morbum aſſignavit Homerus
Bellerophonteis ſollicitudinibus.
Nam juveni offenſo ſævi poſt tela doloris
Dicitur humanum diſplicuiſſe genus. Rutil.

No more is meant by the eating of the heart or liver of *Tityus*, *Prometheus*. So *Empedocles* threw his life away in a fit, and little did *Ariſtotle* think it would be his own caſe. And thus was the fate of many other of the famous ancients, as *Sappho*, which gave riſe to the ſeveral fables and invention of the *greek* poets. What can we think otherways of *Orpheus?* thus *Virgil* deſcribes his ſymptoms for loſs of his wife, *Georg.* iv.

Septem illum totos perhibent ex ordine menſes
Rupe ſub aeria deſerti ad Strymonis undam
Fleviſſe, & gelidis hæc evoluiſſe ſub antris.
Solus hyperboreas glacies Tanaimque nivalem,
Arvaque Riphæis nunquam viduata pruinis
Luſtrabat, raptam Eurydicen atque irrita Ditis
Dona querens.——

Ovid thus,

——*Septem tamen ille diebus*
Squallidus in ripa Cereris ſine munere ſedit,
Cura dolorque animi lacrymæque alimenta fuere. Met. x.

I imagine the ſame of the Sybils and Propheteſſes, of the dancing *Corybantes*, the revelling Bacchinalians, *&c.* and Prieſts in general, who from their ſecret and ſilent way of life fell into this calamity, as our modern Carthuſians, Hermits, Monks, Dervis, *&c.* So that when they came to exerciſe their offices, they were forc'd to make themſelves drunk and mad, and all their extravagant actions and ſpeeches were taken for ſacred fury and inſpiration. Then was the time they gave oracles, then they fancy'd themſelves, or were vulgarly thought to be, poſſeſt with a ſupernatural ſpirit of wiſdom and foreſight. And not long ſince have we ſeen ſomewhat very like this in *England.*

The SPLEEN *ſwell'd.*

The ſpring and elaſticity of the ſpleen thus debilitated, and render'd torpid, liſtleſs, we muſt expect it ſhould be loaded and crouded full of blood, and ſwell'd to a preternatural bulk, conſequently obſtructed and idle in all its great offices, and more and more unable to reſiſt the common impulſe of the arteries; ſo that it becomes heavy according to the mind of the ancients, in reality as well as feeling, v. *Friend*'s *Emmenolog.* p. 80. and a ſaturnine bowel as *Helmont* calls it, which ſignifies no more than diſeaſed; for ſound parts have or create no ſenſe of weight. In ſome from their infancy the ſpleen is exceſſive in bulk, or impotent. *Hipp.* obſerves that people born or living in moiſt fenny countries have larger ſpleens than uſual, where they make uſe of ſtagnant water. Splenetics are generally

generally of a full, large, lax, ſanguine habit, *laxiore crudoque* ſays *Sydenham*, fair of complexion and inclineable to fat, and naturally ſubject to gouts, rheumatiſm. And people that have large veins tho' lean, have larger ſpleens. *Hipp.* ii. *prorhet. t.* 42. gives us a way to know thoſe under ſuch circumſtances, that the skin appears very full and prominent under the eyes. I ſuppoſe he means the lower part of the *orbicularis* muſcle lying on the cheek-bone. Let me add another diagnoſtic from my own obſervation, ſuch as have large legs, rather thicker and more muſcular than ſhould be the proportion to their body, and commonly have narrow ſhoulders, pale and thin viſage. They that are ſubject to bleed much at noſe have large ſpleens, and thoſe that indulge drinking too much when young, which lays a foundation for this diſeaſe. *Lindanus* ſays, the common people of *Friſia* who drink much buttermilk have large ſpleens. All great authors confirm its growing large in an unhealthy ſtate and evil digeſtion. *Hipp. de loc. in hom. Plato* in *Timeo. Gal.* ii. *de nat. fac.* 9. *Veſalius* ſaw it ſo in an *elephantiaſis. Ballonius* obſerv'd it putrid in melancholics. *Car. Piſo* oft found it turgid, and of a pitchy color in quartans. *Fernelius*, who dy'd of a melancholic quartan, had his ſpleen inflam'd, ſwol'n full of clotted blood like black pitch, ſays *Plautius* in his life. *Veſalius* ſaw one ſo large that it cover'd the ſtomach, and grew to the liver, in ſubſtance like that of ſound people, v. 9. one nearly as big in the next page. *Ætius* x. 7. 16. ſays, it ſometime grows ſo large that it will reach down to the *pelvis* in length, and approach to the liver in bredth; obſerv'd too by *Aretæus* i. *chron.* 14. and in *Plaut. Curculio act.* 2. In a woman from whom I made a vertical ſection in the houſe of the royal ſociety *feb.* 1720, the ſpleen was very large, reaching to the *pelvis*, it was nine inches long, and weighed ℔iij ſs. *Hipp.* ſays, ulcers in the legs of ſuch are difficultly heal'd. This woman dy'd with an ulcer in her knee. In an infirm man diſſected in this theater,
PLATE VII. the ſpleen was ten inches and a half long, ſix broad. Mr. *Becket* from his caſes obſerv'd in St. *Thomas*'s hoſpital, told me of a young man that contracted an ill habit of body, and had an ulcer in his leg, which puzled the utmoſt efforts of the ſurgeons to heal. After it had for a long while been kept to the compaſs of a ſixpence, on a ſudden irritated by their incarners, it broke out into freſh ulcers all around, and enlarg'd it ſelf to a hand's bredth; then a looſeneſs ſeiz'd the man, he became of an ill countenance, loſt his appetite and dy'd: nothing remarkable when open'd but the exceſſive bulk of the ſpleen, weighing five pounds four ounces. He has another dying of an *aſcites*, who had a ſordid ulcer in each leg, hardly to be kept from mortifying, with abundance of cuticular eruptions diſcharging much ſerocity. The man's countenance like the former, his liver and ſpleen very large and ſchirrous: which inſtances confirm the great ſagacity and careful obſervation of *Hipp. Horſtius* mentions two or three vaſt ſpleens, and of unuſual ſhapes, one weighed above two pounds, and had three veſſels inſerted into it from the meſentery, one in the middle, and one at each end. Mr. *Cheſelden* in a boy found a diſeaſed one of three pound: in a man, five pound two ounces. *Hildan. cent.* ii. *obſ.* 45. and *epiſt.* 55. the ſpleen and liver of an exceſſive bulk in a woman, ſo that ſhe thought herſelf with child; great hardneſs and ſwelling on the left ſide, the ſpleen grew to one ſide of the liver, which ſhows there had been an inflammation withal, the *vas breve* ſmall and obſtructed. *Cheſneau* gives an account of a woman at *Tholouſe* having a great tumor in her left hypochondre

chondre reaching down very low, ſo that they took it for a riſing of the womb: upon opening her body they found the ſpleen ſwell'd to that degree. *Bartholin. cent.* i. *hiſt.* 80. ſaw one two ſpans long, four pound weight, the *vas breve* very large and divided into four branches. *Flammerding* ſaw a ſpleen of forty three pound; *de tum. lien. Colum.* l. xv. *anat.* has found them of twenty pound, cartilaginous externally: One of ſix pound in *Bonet. anat. pract.* p. 958. *Diemerbroek* found one as large as a man's head, *anat.* i. 15. and cites from *Wepfer* one in a woman weighing ſix pound. *Cabrolius* one of five pound. *obſ.* 6. *Skenkius* one of twenty three pound. iii. *obſ.* 9. There have been vaſtly larger, as that which cover'd the whole contents of the *abdomen* in a woman, yet ſhe had children and lived very well. Others of like enormity in *Aretæus* i. *chron.* 14. *Ætius tetrab.* 3. *ſerm.* 2. c. 7. *Trallian.* viii. 12. and many more authors. *Drelincourt.* p. 101. *de lienoſis.* The ſpleen encreas'd to a monſtrous degree in a melancholic unactive young woman, whence ſuppreſſion of the *menſes. phil. tranſ.* n° 194. p. 543. *Fernelius* ſays he has ſeen it bigger than the liver. *phyſiolog.* c. 7. *Blaſius* has an inſtance of the ſpleen very hard of three pound weight, found in a melancholic. *obſ. med.* 22. Theſe extravagant inſtances are ſufficient to ſhow how much the welfare of our body depends upon this *viſcus*, and how neceſſary it is to keep the blood in due fluidity and diſtribution, from its rightly diſpos'd tonic action. *Hipp.* iv. *de morbis* ſays the head and ſpleen are moſtly obnoxious to diſeaſes, being parts of capacity. And *Galen* well compar'd it to a bank or treaſury, ii. 9. *de natural. fac. Plato in Timæo.* So *Trajan* the emperor us'd the ſame ſimilitude; ſaying as the coffers of the prince were inrich'd, the common people were impoveriſh'd. *Aur. Vict. epit. Rhodigin.* iv. 18. meaning as the ſpleen encreaſes in bulk, the body grows lean.

This ſtagnation of the blood will certainly firſt beign its tragedy in the lower belly or hypochondres, whence the name of the diſeaſe, and where the ſeat of the ſpleen, where the blood-veſſels largeſt, moſt numerous, eſpecially the veins going to the *porta*, which we obſerv'd by the deſign of nature are to ſlacken its courſe for the purpoſe of the liver. If the circulation in general be ſlow, here it conſequently muſt be much ſlower, as receiving no help by ordinary muſcular action and exerciſe of the limbs, and eſpecially from the arterial force of the neighboring ſpleen. Here can be ſuppos'd no want of rebatement in the caverns of the ſpleen which is become the diſeaſe. Patients of this ſort therefore are of a ſallow complexion, the lively and florid color of the face vaniſhes, whence the jeſt of *lienoſi omnes mortui, Strab.* xiv. *Stratonicus* the harper a witty fellow found all the inhabitants of *Caunia* lienoſe and pale; when they reprehended him for jeſting upon them and accuſing their city as unhealthful: God forbid, ſays he, that I ſhould think ſo, when I ſee even dead men walk in it. *Cælius* iv. 18. So a wan or dark color ſucceeds, as in *Anaxenor*, in *Antilocus*, and *Alevas* in *Hipp.* they have a ſlow pulſe and reſpiration, they feel a perpetual weight and heavineſs, eſpecially after meals, with a head-ach, difficulty of breathing, have faint ſweats, a frequent coldneſs all over the body; bilious vomitings, *nauſea*, ſower, fetid belchings, *Aretæ. diuturn.* i. 5. crudities, flatus, rumbling in the guts, whence the diſeaſe has got the name of flatulency in *Gal. Hipp.* &c. dejections of ſlimy, acrimonious, bilious matter; gripes, conſtipated belly, loſs of appetite, all depravations of our afore-aſſigned uſes of the ſpleen, with utmoſt dejection of ſpirit. They make Symptoms.

much water, but without relief, as if ſeiz'd with a *diabetes*; *Aretæ. diuturn.* ii. c. 2. the fluidity of the blood being more leſſen'd, by a clear and unconcocted effuſion. Stoppages of the *menſtrua*, inflations, pains of the *hypochondria*, loyns, back, ſwellings of the leggs. *Syncope*, dulneſs of the eyes, unquiet ſleep, *clavus hyſtericus* from obſtruction of ſome veſſels in the *meninges*, and too frequently that horrid peſt of mankind the *polypus* in the heart. Fantaſtic, whimſical notions, peeviſhneſs, paſſion and the like. Spontaneous laſſitude, and many ſcorbutic ſymptoms, as ſpots, livid ſuffuſions, which in time itch and grow ulcerous; but generally above all, a ſharp and wandring pain in the left hypochondre the fountain of all the reſt, and which even the horſe-doctors remark in their cattle; *Apſyrtus veter.* 40. the tumor of the left *hypochondrium* will increaſe after dinner, upon motion or anger that inflames the blood, or by a contrary reaſon upon ſadneſs, the blood falling into it as a ſink, as *Lælius a fonte* calls it. Frequently they have a ſymptomatic greedineſs and unreaſonable appetite, as was obſerv'd in dogs without ſpleen, and thirſt too, and all the ſymptoms of epileptic fits. *Ilias quartanarum lienis imbecillitatem ſuccedit*, ſays *Ballonius* i. *de morb. mul. f.* 70. They ſpit much, which *Galen ex Diocle.* 3. *de loc. affect.* mentions moſt common among hyochondriacs. And in a word, what remarkably proves our doctrine juſt, *Booerhave* affirms, have all the ſymptoms that attend creatures from whom the ſpleen is cut out. *Inſtitution.* p. 77. It's obſerv'd the ſymptomical vomiting laſting, the ſwelling of the ſpleen abates, and *vice verſa*. The reaſon is, becauſe that convulſion draws the ſpleen by conſent to exert it ſelf, and diſcharge its blood; when the vomiting ceaſes the left hypochondre ſwells, and yellow ſuffuſions of the skin ſucceed, the liver ſuffering in its office at the ſame time for want of the power of the ſpleen. Well may *Hippocrates* call thoſe ſplenetic whoſe ſpleen is hard, and ſpeak ſo much of the riſing of the ſpleen, vi. *de morb. popul.* §. 2. *& alibi.* and hence the whole pathology of the hyſteric colic. The vaſt quantity of bilioſe matter thrown up by vomiting, or downards by *diarrhea*, and ſtill tinging the skin, ſhows this overmuch ſizineſs of the blood deſtin'd for that ſecretion, generally in the whole maſs, particularly in the abdominal veſſels. From which, and its ſtimulating quality, when the head is attack'd, *coma's*, epilepſy, apoplexy, or the numbneſs of a part enſue, or talkativeneſs, tremors, ſpaſms, head-ach; when the heart, palpitations, ſwooning, anxiety; when the breaſt, ſighing, ſhort-breath, cough; when the diaphragm, laughing; when the belly (and more frequently being the ſeat of the morbid *minera*) *rugitus*, *cardialgia*, colic, iliac paſſion, *&c.* when the reins, nephritic ſymptoms, and the like, and ſometime all together; the reaſon of which is eaſily apprehended without deſcending to particular ſolutions, not at this time to be indulg'd.

When nature has ſuffer'd for ſome time under theſe preſſures, and you may very plainly feel the tumify'd ſpleen in the left hypochondre, ſhe begins then to rouſe her ſelf, and look out for relief. The heart, in this caſe the *dernier reſſort*, and the ſplenic artery begin a prodigious pulſation in the part, in order to remove this accumulated exceſs of blood, which ſometime ariſes to convulſion and inflammation. We have divers accounts from phyſicians how the ſpleen or its arteries ſhall ſtrike ſo ſtrongly againſt the ribs, that it may be ſeen, and even heard to make a noiſe as of ſtrokes inflicted, at the diſtance of thirty foot, v. *Bonet. ſepulchret.* p. 979. *Tul-*

pius ii. *obſ.* 28. The patients can feel it rowl within them as in anguiſh, and the whole belly ſhall be ſtretch'd out like a drum, all the membranous parts conſenting therewith. Sometime they fancy that they feel a bird or ſome live thing jumping or fluttering within. V. *Arculanus in non. Rhaſ.* c. 100. *Eraſtus in Hipp. progn. Claudin. conſ.* 46. 62, and 74. *Bontius obſ. indic.* 8. and all obſerv'd before by *Hipp.* Some have fancy'd themſelves poſſeſs'd with an internal devil; others a frog leaping, and that they can hear it croak. *Drelincourt* p. 117. *de lienos.* ſays, the lienal artery ſhall beat ſo powerfully that the whole left *hypochondrium* will be ſhaken as far as the navel. As *Riolan* ſays, *ægerque percipit inter ſe volitantis aviculæ ſpeciem. Hipp.* in the caſe of *Lycia* who was ſplenetic, obſerv'd the left baſilical artery to have a far ſtronger pulſe than the right. 'Tis at this *ſtadium* of the diſtemper that lienoſe have a red face and fluſhings of blood after dinner, the palms of the hands are hot, ſtrange ſtruggles and variations in the pulſe, throbbings of the heart, wandring pains and prickings all over the body, which demoſtrate the efforts of nature. Fevers, *menſes*, bleeding at noſe, *anus*, and other ſalutary exertions ſhow themſelves, which if prudently improv'd by the phyſician co-operating, reſtore the patient, as the wife of *Hippoſtratus* in *Hippocrates*.

MINUTE SPLEEN.

As the exceſſive bulk and weakneſs of the ſpleen is chargeable with theſe ruinous conſequences: ſo ſometime it offends as much on the other hand by its unreaſonable minuteneſs, equally uncapable of executing its aſſigned purpoſes. Sometimes it happens that other accidents diſqualify it, as ſtones bred in its cavities, or its coats growing coriaceous. Many inſtances of both kinds in *Drelincourt*, p. 109. and he gives us a good hint at a ſolution of the ancient fabulous *cataſtrophe* of *Niobe*, *Atlas*, &c. who probably dy'd of melancholy.

In vultu color eſt ſine ſanguine lumina mœſtis,
Stant immota genis nihil eſt in imagine vivum.
Ipſa quoque interius cum duro lingua palato
Congelat, & venæ deſiſtunt poſſe moveri. Ovid Met.

Tully 3. *Tuſc. quæſt.* ſays, *Niobe fingitur lapidea propter æternum, credo, in luctu ſilentium. Thoner epiſt.* 2. l. vi. mentions one dying melancholic, that had an extraordinary ſmall ſpleen not weighing above an ounce. *Laurentius* mentions another ſuch. *Veſalius* v. 9. obſerv'd in one that dy'd of the jaundice the liver large, hard and green of color, the ſpleen large and ſoft. He mentions two who dy'd of the dropſy, the ſpleen white and ſmall. Theſe two diſeaſes are moſt frequently conjoin'd with or conſequent to the affection of the ſpleen, as it proves deficient in adminiſtring to the liver in the manner above propos'd; and as the extraordinary quantity of the fluid part of the blood is voided thro' the broken lymphatics inſtead of the other by urine, ſweat, or ſpitting. *Morgagni anatom. adverſar.* iii. p. 46. in a prieſt and a virgin found it waſted away after a long ſickneſs. *Bontius obſ.* 7. ſaw it like a little ball. *Vidus Vidius* x. 10. *de cur. membr.* of the bulk of a pigeon's egg. *Salmuth cent.* i. *obſ.* 21. as big only as ones thumb. *Thuanus*'s in *Riolan* weighed not an ounce. *Peyerus hiſt. anatom.* as big as a bean. *Couringius* 6. *de ſang.* leſs than the bredth of a nail of ones finger. *Litrius* in a ſickly man waſted away, in another he found it petrify'd, or rather oſſify'd. *hiſt. del' acad. R. de ſcience. Hildanus cent.* 2. *obſ.* 44. the ſpleen with other *viſcera* and the veſſels full of limy matter. *Drelincourt* has ſeen ſome ſmall ſpleens, but as heavy as ſtones,

ſtones, and many perfectly ſhrivel'd up and contracted. *Hipp. de intern. affect.* ſays the ſpleen will ſometime be as hard as a ſtone. Sometime it will become hard, and when cut thro' make a noiſe like a cork, an inſtance in *Bartholin cent.* 4. *obſ.* 60. *Turnehiſerus in exam. urin.* ſaw a ſtone as big as a cheſnut, whitiſh and ſoft as alabaſter in the ſpleen, compos'd of layers which weighed ℥ijſs. ʒj. at full-moon this girl always felt a pain in that ſide. *Nichol. Fontana* found a large ſpleen fill'd full of white ſtones in two inſtances. One in *Veſalius* dy'd after three years impriſonment, of the black jaundice, his ſpleen waſted away, dry and hard; another dy'd of a dropſy where it was white and ſmall. It's frequently ſeen in a ſheep eſpecially, that the inner tunicle has chalky ſtuff fix'd to it, *melicerides* and other ſort of tumors, from extraneous matter forc'd out of the extremities of its veſſels and cells; doubtleſs upon its frequent act of conſtriction. Sometime in this diſeaſe the ſpleen has been corrupted and turn'd into a maſh, by the corroſive fermentations of its ſtagnating blood, as *Drelincourt* obſerves p. 87. *de lienoſis.* So that from theſe exceſſes and defects we may ſafely gather that the moderate ſpleen is moſt healthy; as *Ariſtotle* concludes iii. *hiſt. anim.* 16. So the butchers uſe that and the liver as a teſt of the health of the cattle they kill. So the ſpleen of the famous old *Parr* upon his diſſection by the great *Harvey* appear'd but ſmall, about the bulk of a kidney.

All the inſtances of the coats of the ſpleen becoming coriaceous (§. iii. 5.) produce the ſame evil diſpoſition and incapacity of its duty, they ſeem owing to the ſame cauſe that creates oſſifications at the mouth of the great artery at the heart, and in other parts of the arteries; to wit, the continual impulſe of the warm blood, ſo near the ſpring of its heat, to which the ſpleen claims the neareſt vicinity, as moſt ſuitable to the dignity of its office. Such an opinion had *Hippocrates* of this vivific faculty thereof, that he thought even its inclination one way or other from its moſt uſual and natural ſituation carry'd a larger quantity of blood and ſpirits that way. In his vi. *Epid.* §. 2. he pronounces, *quibus deorſum vergit lien, his pedes & genua calent, naſus & aures frigent*, the extreme upper parts ſuffering thereby. Pertinent to which *Sydenham* has obſerv'd in hyſterics a ſtrange coldneſs in ſome external parts like to a dead corpſe. Nay even the venal blood of the ſpleen is more freſh and diluted than any other thro'out the body, as *Boerhaave* takes notice p. 77. *inſtitut.*

LAUGHTER. If ſuch then be the benefits, ſuch the ills depending on the diſpoſition of the ſpleen, the ancients had a more than metaphorical reaſon to aſſign this part the honor of mirth and jollity, health and love, &c.

Splen tumidus nocet, & riſum reddit ineptum.
Dicitur exſectus faciles auferre cachinnos,
Perpetuoque ævo frontem præſtare ſeveram. Seren. c. 22.

V. *Euſtath.* in α *Iliad.* . v. 559. *Rhodigin.* iii. 12. and 22. *Pliny* ii. 37. Laughter was counted a God by *Apuleius met.* ii. and iii. *Scholiaſt. in Ariſtoph. cereal. Porta phyſiogn.* xxi. A fit of laughter has often cur'd a fit of the ſpleen. Laughter is a paſſion proper to the human race, and certainly is aſſiſted by the ſpleen; as in that convulſion, the diaphragmatic and phrenic branches give and receive blood readily to it. The ſpleen only in human bodies is faſtned to the diaphragm, and its concuſſions reciprocally aſſiſt the ſpleen, whence mirth at meals muſt be very uſeful towards a good digeſtion, by forwarding its help to the ſtomach in the manner we deſcrib'd.

Tho'

Tho' not from laughing, yet in common reſpiration, nature has indulg'd this ſervice to brutes, by placing the ſpleen in a length parallel to the diaphragm, between which, the ſtomach and inteſtines, it is ſo ſqueez'd in breathing, as that the blood muſt be forc'd up to the ſtomach from it alternately as from a ciſtern. From whence, and by promoting its fluidity, we may underſtand *Plato*, *Jul. Pollux.* ii. 4. and others, who thought this jollity was procur'd by defecating the blood, and concocting the *atra bilis*, which made folks peeviſh. *Serv. in æn.* xii. *ſplene ridemus.* The concernment between the ſpleen and laughter ſeems further inculcated from the two very large communicating nerves, between (only) the left intercoſtal, whence the ſplenic nerves and diaphragmatic, with the muſcles of the face, which is not found in brutes. Wiſely therefore did our anceſtors keep their jeſters to entertain them at dinner, to make 'em laugh and digeſt well, the firſt topick of health, whence they begat an athletic and hardy race, that did ſuch wonders in arms. Quite contrary to the practice in religious houſes, colleges, where the ſcripture is prepoſterouſly read at meal-times, and a ſuperfluous demureneſs of countenance prepares them for all the diſeaſes of an unactive ſpleen. Indeed it's notorious enough how the hyſteric train of ills has gain'd ground, ſince action in both ſexes is diſus'd, which with chearfulneſs is one great method of preventing and curing the vapors. The wheels of life grow ruſty without continual motion, and death is no other than a ceſſation of motion. 'Tis not above a hundred years ago ſince all excellence was chiefly plac'd in exerciſe, feats of arms and tryals of ſtrength, and moſt of our diverſions were of that ſort; but now we have no appearance thereof but hunting and horſe-races. Our leaving the country for cities and great towns, coffeehouſes and domeſtic track of buſineſs, our ſedate life and exceſſes together, have prepar'd a plentiful harveſt for theſe diſorders. The remedy therefore is obvious; and without the concurrence of chearfulneſs, exerciſe, open air and converſation, all medicine is impotent. The hyſteric malady, ſays the accurate *Sydenham*, makes up one half of chronical diſeaſes, few women eſcape without ſomewhat of this ſort, except ſuch as work hard, and moſt men that live a ſedentary ſtudious life are obnoxious. That women have it more frequently than men, is accountable from the ſpecific delicacy and ſoftneſs of their compoſure, their more tender frame, and the leſs elaſtic *compages* of their ſolids. Moreover becauſe they generally uſe leſs exerciſe than the men in all civil countries, and that the womb is in ſome meaſure analogous to the ſpleen as we have ſhown above; conſequently furniſhes one more occaſion of the diſtemper, which does not a little corroborate our reaſoning, not unjuſtly did the ancients charge the ſpleen and womb with this malady. Hence the ſymptoms of menſtrual ſuppreſſion and ſpleen are alike, and the cure too, being both plethora's, accompany'd with a *lentor* of the blood, and this has given it the name of hyſteric. In one the tonic action of the *uterus* is vitiated, as that of the ſpleen in the other caſe. Steel and ſulphurated medicines good in both, to which with *Fonſeca* we may join the Piles, who ſays that theſe are endemical at *Venice*, *Padua*, and thereabouts in that watery ſituation, whence the melancholic ſullen habit of thoſe people. They drink much water too with their wine, and that bad, which relaxes the natural ſtrength of the ſolids. *Hipp. de aere aquis & loc.* makes *lienes* and *hæmorroides* akin, both ariſing from a redundant humidity. *Cheſneau* ſays, the people of *Marſeilles* are ſubject to the ſpleen from their marine

ſcite. One great diagnoſtic of the ſpleen's being affected, is the face diſcolored and wan. *Gal.* v. 6. *de loc. affect.* and l. *de atra bile*, *Hipp. de affect. & de intern. effect. & de loc. in hom. Gal.* ii. *de natural. facultat.* So the natural color of the face changes in women with child, and in diſorders of the *menſes* as in ſplenetics. A nice and delicate woman tho' perfectly in health, upon a vomit or a purge given that works ſmartly, ſhall immediately, ſays *Sydenham*, be attack'd with ſome hyſteric ſymptom; whence he infers this diſtemper lies not in the humors evacuated, and only ſeems owing to the *æquilibrium* between the ſolids and fluids injur'd; the debilitated ſpleen being not able to perform its office quick enough, in reſtoring a due quantity of blood into the convulſed parts, and keeping up the tenor of the circulation. This is further confirm'd, becauſe the like diſorders oftner and more certainly enſue upon a ſudden loſs of blood by art, nature, or accident, as v. ſ. childbed, faſting, hæmorrhoids, *&c.* which ſhows that the arterial and venal ſyſtem has but a juſt quantity of fluid ordinarily, and wants to be ſupply'd out of the ſuperfluity in the *diverticulum* of the ſpleen, in this caſe not readily affording it thro' its contracted weakneſs. Women likewiſe addicted to *menſium profluvium nimium* are moſt frequently hyſterical. Nor is it to be wonder'd at, that quite oppoſite caſes produce the ſame malady. *Riverius cent.* i. *obſ.* 94. gives us an inſtance. This proves that the animal conſtitution, as *Gliſſon* words it, is chiefly affected in this diſeaſe; that is, the *æquilibrium* of the blood is deſtroy'd one way or other, either by too great or too ſmall a quantity. For where there is a paucity of blood, and the ſolids overcome the fluids for want of the ſplenic ballance, 'tis the ſame thing as if the tone of the ſpleen was quite relax'd, and not able to co-operate againſt the heart. So in women after a long fit of illneſs, the *menſes* return but ſlowly, an argument that nature requires ſome time to raiſe the *plethora* again, which is always neceſſary. Often likewiſe after lying-in, they intermit two or three returns for the ſame reaſon. *Veſalius* v. 9. tells us of a man who by the ill look of his face was judg'd lienoſe, accordingly his ſpleen was found ſoft, very large, and in color like a healthful liver. There is an account in *phil. tranſ.* n° 194. p. 543. by Dr. *Grew*, of the ſpleen in an unactive girl ſwolen to an immenſe degree, all the other parts ſound, the blood in it was very good, but from a relaxation of its fibres, was only able to receive, not expel it again proportionate to expence: which diſtemper ſhe acquir'd by indolence and want of action. Whence we may learn a caution, how neceſſary it is in young people eſpecially, and dictated to us by nature, in the ludicrous ſports which ought to be indulg'd in all children.

EXERCISE. Sufficient exerciſe, as it muſt be accounted a prevention, ſo a main remedy of the vapors. 'Tis the principal weight of our machine, that conſerves the motion of its numerous wheels and pullies. 'Tis the grand agent of the greater and leſſer world. External voluntary action promotes and aſſiſts the involuntary ones, gives a ſmartneſs and brisk tenſion to all the fibers, in a true ſenſe corroborates the *viſcera*, and furthers their ſecretions. The blood is puſh'd on with celerity, acquires a due *fluor* and heat thereby, ſo that it is ripe for its manifold uſes. Hence the *ſaliva* ſtarts from the glands of the mouth upon ſight of food, the ſpleen is ready to pour its *alcohol* upon the matraſs of the ſtomach, the pancreatic, hepatic, lacteal ſluices are open, the ſtrutting lymphatics are eager to evacuate, and the thoracic chanel to receive the lucid chyle, and convey it into the blood;

there to obtain a new character and be fitted for the noble uſe of nutrition, and at length exalted into the ſublimeſt material form, that of animal ſpirits; which thro' a circulation of motions become the inſtruments of repeating the ſame work again. Thus the ſpring of a watch by a conſtant *niſus* and reaſonable uſe retains its tone, but if thrown by for ſome time, it grows ruſty, brittle and uſeleſs: juſt as idleneſs of the diſtractile fibres ſlackens the blood's motion, vitiates all the *apparatus* of digeſtion now mention'd, and all ſecretions in general. The ſpirits become poor and impotent, the blood cold, effete, viſcid, and unfit to paſs thro' the minute arteries, apt to coagulate, eſpecially in the meſenteric veſſels and neighboring ſpleen, which now becomes the lazy ſink of the body, inſted of the ſeat of mirth and laughter.

Many inſtances experience and authors afford of ſplenetics cur'd by a pertinacious courſe of labor; ſuch as that of *Orchemenes* the *Lacedemonian* mention'd in *Plutarch*, who was recover'd by a gradual and continual exerciſe of running: the ſame of *Laomedon*. *Ælian* relates the ſame of *Straton* in the olympic courſes. Labor is often inculcated by *Hipp. de intern. affect.* in cure of this diſtemper. Nay he even orders his patients to hew timber for thirty days; a good hint to our nice gentry, that think it beneath them to uſe even their own legs. In this title we may include dancing, ſinging, and every thing that procures muſcular motion, and quickens reſpiration. But above all things riding is eſpecially beneficial in hypochondriaciſm, as acting more adequately upon the veſſels of the *abdomen* by uninterrupted concuſſions, and the new oſcillation it excites in the univerſal ſolids. And in this great advantage it exceeds all exerciſes and diverſions, that as they tire, fatigue and waſte the ſpirits, this relieves, invigorates and briskens them, by this we reap all the deſired benefits without the expence. Next to exerciſe temperance, and which in ſome meaſure ſupplies it. Few people ſuffer for want, whilſt millions are conducted to untimely ſhades by the trencher and bottle. *Eudemus* in *Hipp.* was cured thus by v. f. ſpare diet and drink, which was ſmall red wine. By faſting, *Theſſalus* in *Gal.* It's mention'd in authors, that ſometime this melancholy has been caus'd by abſtinence from *Venus*, which is a ſort of reſuſcitation of the ſpirits and circulation. For *Hippocrates*, *diæt.* ii. 36. ſays it attenuates and heats the blood. Hence *Gal.* ſpeaks of one who became ſplenetic after the death of his wife. *Fonſeca* is very particular in his advice upon this caſe, *Conſultat.* lxxxv. Nevertheleſs without the golden mean neceſſary in every thing, the unwary may incur the caſe of *Damnagoras* in *Hipp.* who fell into the diſtemper by venery inflaming the blood.

We have obſerv'd, that one of the appearances exhibited to us by dogs mutilated of the ſpleen, was that they are apt to become mangy or ſcorbutic, which is no other than a ſymptom of our diſeaſe. Having no ſpleen is the ſame thing as having one obſtructed, or impotent in its duty. The pains we mention'd before all over the body are owing to the corroſions of theſe acrid ſcorbutic ſalts. The earthy and unactive ſtate of the blood renders it unfit to paſs thro' the minute arteries in the outward habit, where portions of it ſtagnate, and at laſt make their way thro' the skin by ſcabs, ſpots, *&c.* not only the *polypus's* but extravaſations of all ſorts, together with aneuriſms, *varices*, *hydatides*, and the *ſchirrus's* upon the bowels, come into this predicament. *Polypus's* have been found even in the lienal artery as well as others. *Drelincourt* p. 79. *Ulmus Junior* affirms, that out of the arm of a melancholic, in ordinary venæſection, a

grume

grume of black aduſt blood of a finger's length has been extracted. Such mention'd in *Baglivi* p. 304. 339. *Bartholin cent.* i. *hiſt.* 38. the *ſcelotyrbe* and *ſtomacace* commonly the ſcurvy deſcrib'd by *Hipp.* ii. *prorhet.* is this largeneſs of the ſpleen with rotten gums and ſtinking breath. *Quibus lienes magni ſunt iis gingivæ vitiantur & os græve olet*, again *quibus lienes magni ſunt, & neque ſanguinis eruptiones contingunt neque os græve olet, ii in tibiis mala ulcera habent & nigras cicatrices.* Hence the great aneuriſms of the lienal artery taken notice of by *Drelincourt*, and *Arantius obſ.* 35. *Coiterus obſ. anatom. anni* 1565. *Ephemer. Germ. obſ.* 30. *anni* 1673. and the ſwelling of it to ſuch a degree, that it crouds it ſelf up to the *thorax*, and diſturbs the province of its neighboring cavity. *Vid. Reuſner* and *Sennertus. Gliſſon* obſerves the *vas breve* ſometime will become varicoſe, and ſometime broke, throws blood into the ſtomach. As in the caſe Dr. *Tancred Robinſon* informs me of in a patient of his, who after a violent vomiting of blood for three days continuance expir'd. His body was open'd by Mr. *Cooper*, they found the ſpleen very turgid, and reaſonably conjectur'd the evacuation was deriv'd thence. *Bartholin* mentions a ſplenetic perſon, wherein nature emptied her ſelf of a ſuperfluous *plethora* by the ſpleen; for he vomited up 16lb of blood without harm. And this proves the neceſſity of having ſuch a *diverticulum* of the ſpleen to lodge the overplus: how otherwiſe can we account for that caſe in *Baglivi* p. 341. where an inflammation of the ſpleen happen'd from ſuppreſſion of an hæmorrhage by cupping, the redundance of blood naturally running and oppreſſing its accuſtom'd receptacle. Whence he adds vomiting blood becomes ſo familiar to ſplenetics, it being ſo ready a way for the ſpleen to evacuate it ſelf.

The neurology of the ſpleen furniſhes us with another pregnant proof of our theory, particularly in that ſolemn riſing of the throat in hyſterics, deducible from the communication between the *par vagum* and intercoſtal nerve, for there is an eminent branch from the middle *plexus* or *cervicalis* of the left intercoſtal nerve, and proper to human kind, which goes to the recurrent nerve on the left ſide only, which is plac'd on the *trachea* and *gula* on its whole length, beſides ſix ſmaller twigs common on both ſides. This being the proper nerve of the ſpleen, when it is painfully affected muſt needs cauſe a convulſive corrugation on thoſe parts, and difficulty of breath. And this motion is felt to begin from the bottom and go upward, as the recurrent nerve does, juſt as tickling about the hypochondres cauſes laughter, becauſe the diaphragmatic nerve ariſes from that which goes to the muſcles of the face. It's no wonder that the diſeaſes of the bowels, particularly the ſpleen, ſhould be ſo cognoſcible in the face, as is commonly obſerv'd, when the intercoſtal nerve ariſes directly from the *par quintum*, which is diſtributed to the whole face, and *ſextum* which goes to the eyes, which is a remarkable providence in nature, to diſcover the affairs relative to the diſtribution of the aliment in the moſt conſpicuous part. Hence the ſymptoms of immoderate laughings and weepings in ſplenetics. And after all that I have been able to gather, from the great deal that has been wrote on the uſe and deſign of nature, in forming what we call the *ganglia* or *plexus's* of the nerves, I can aſſign them no better, than that they ſhould be a ſort of ſpleen to the nerves, and act upon thoſe canals and the ſubtle fluid contain'd in them, after a like manner as the ſpleen does upon the circulatory veſſels of the blood. " The ſplenic *plexus*, ſays *Vieuſſens* in " his neurography, communicating with the ſtomachic, epatic, renal, and

" upper

" upper meſenteric, fully ſhows the reaſon why vomiting generally at-
" tends inflations of the ſpleen, together with nephritic and colic pains.
" Again he ſays, 'tis plain the ſplenic nerve has its motions from the great
" perturbations that are wont to happen in the left ſide of hypochon-
" driacs; and the conſtrictions of the bowels with violent ſhakings as it
" were, accompany'd with wandring pains, ariſe from the corrugations of
" the ſplenic nerves, which not only excite tumults in its own neighbour-
" hood, but likewiſe in the heart, and ſometime the whole body. For in
" hypochondriacs we find as ſoon as the ſpleen ſuffers, the parts about the
" heart are drawn downwards and moſt violently compreſs'd, ſo that they
" become ſad and dejected, complain of the utmoſt ſtraitneſs of breathing and
" the like, and give themſelves up for expiring people." *Willis* makes the intercoſtal nerve chiefly concern'd in hyſteric affections, for he gives it as a reaſon why vomitings then ſo frequently happen, becauſe the nerves go from the intercoſtal to the ſtomach, c. ii. §. 1. And what they call the riſing of the mother, is only the like conſent and convulſion of the meſentery, the womb and parts adjacent; and this is in both ſexes, frequently in our bills of mortality call'd the riſing of the lights. 'Tis in general the appendages of the ſpleen, the whole meſentery with what belongs to it. For 'tis not to be imagin'd that the womb it ſelf riſes in that manner, as the parties fancy, thinking that they feel ſomewhat as big as a cannon bullet: becauſe 'tis plain the womb is immoveably fixt and cannot riſe up. And that in women with child, when the womb preſſes upon the very ſtomach, or where there is a dropſy of the womb, that part being more extended, yet hyſteric ſymptoms do not enſue.

The ſenſes of ſmelling and taſting are much akin, what pleaſes or diſ- SMELLS.
pleaſes one, alike affects the other. Smelling of food immediately excites the appetite, and moſt frequently if one of theſe be loſt, the other periſhes by ſympathy. Now the intercoſtal nerve furniſhing the ſpleen and hypochondres with ſpirits, is deriv'd from the fifth pair, which in great meaſure ſerves the olfactory organs, and principally thoſe of taſting. Whence we may eaſily deduce the reaſon, why ſtrong fetid ſmells, ſuch as caſtor, *aſa fœtida*, burnt feathers, leather, and the like, ſo generally relieve hyſterics. It ſeems juſt to ſuppoſe, that the nerves in this diſtemper are relax'd as well as the reſt of the ſolids, therefore the motion of the ſpirits within them muſt be inordinate; and that theſe viroſe ſmells contract and new brace them up, and give them a more proportionate oſcillation, and the ſpirits conſequently a more compoſed motion. Therefore they recreate the whole nervous ſyſtem in general by the olfactory nerves, and the *viſcera* in particular by the intercoſtal, juſt as the ſmelling of volatile ſalts and ſpirits, or drinking a glaſs of ſtrong liquor after fainting, immediately relieves without entring into the blood: or as brisk or chromatic muſic produces a new ſpring in the nerves, a fire in the blood, and raiſes a paſſion; whilſt the *lydian* ſoft mood quells it, and relaxes the nerves, as we may gueſs ſweet ſmells do by their complacency; the one cauſing a violent vibration, the other a gentle one.

The great *Hippocrates* iv. *de morbis*, tells us the ſpleen evacuates it ſelf EMETICS.
four ways; by the mouth, noſe, urine and *anus*, which in few words is an univerſal direction for the cure of this diſtemper, and ſhows the extenſiveneſs of the ſpleen's communication and operation. Here are the two great intentions hinted at, of agitating and ſpiritualiſing the blood, together with defecating and leſſning the quantity; and ſtrengthning the ſolids, whereby

nature is reſtor'd to her priſtin *æquilibrium*. Emetics therefore are extremely uſeful and neceſſary in the beginning, and to be repeated at proper intervals, eſpecially as icteric ſymptoms moſt frequently accompany. *Fonſeca* ſays twice in a month; but if it be doubled, not amiſs. Theſe are powerful above all things in giving motion to the ſpleen, and all the veſſels of the *abdomen*, drawn into conſent by that ſalutary convulſion of the ſtomach. This muſt needs evacuate the ſpleen, and recover its tonic power, muſt accelerate the tranſition of the bile thro' the liver, ſcour all the abdominal glands, and rouſe up its whole contents to their reſpective offices, whereby the firſt buſineſs of the œconomy, digeſtion is reſpected. Nevertheleſs this is to be done with caution and good advice, with regard to the ſtrength of the party, the *ſtadium* of the diſtemper, and its moſt prevailing ſymptoms. For the hyſteric colic in particular is not to be cured by evacuating the redundant bile altogether by emetics, but by ſending it the right way thro' its proper gland the liver. Hence opiates are the chief remedy which volatiliſe the blood, and obtund the painful ſtimulations of the bile upon the parts. Then warm bitters which concoct and thin the humors, ſtrengthen the ſtomach, and aſſiſt the ſpleen to promote its natural paſſage thro' the hepatic glands. Certainly the vi. conſequence of exſection of the ſpleen which I ennumerated p. 28. fully proves my ſuppoſition, that the ſpleen aſſiſts the action of bile-making in the liver, not by ſlackning, but accelerating the motion of the blood in the *porta*. For if in animals where the ſpleen is loſt, the liver is found thicker and larger than uſual, and that it becomes perfectly dry like cork, and may be crumbled in pieces: 'tis a moſt undoubted argument, that it wanted the arterial fluice of the ſplenic blood, to ſcour out the bilioſe glands and canals, and dilute its hot and violent ſalts ſtagnating therein. The lack of this ſalutary exertion no doubt is moſt frequently the cauſe of jaundice, and many other maladies akin to that we are treating of; but this theory may be ſo copiouſly extended, that I fear even to touch upon it again.

VENÆSECTION. As it's neceſſary to leſſen the quantity of the blood, to give room for the tenſion of the fibres to recover it ſelf: ſo we find nature frequently by a critical diſcharge thereof in this caſe eaſes her ſelf of the ſuperfluous load, ſometime by the noſe, ſometime by vomiting blood, pour'd into the ſtomach by the *vaſa brevia*, ſometime by a bloody flux, but oftner and beſt by the hæmorrhoidals, always moſt natural, and the ſalutary outlet from the ſpleen. The great *genius* of medicin *in coacis*, pronounces thus; they which have pains about the *præcordia* and mouth of the ſtomach, the liver and parts about the navel, are preſerv'd by diſcharge of blood by the *anus*, not diſcharg'd they dye. Thus the kinſman of *Ariſtæus* in *Hipp.* and *Pericles* of *Abdera*, and *Antigenes* the *Perinthian*, were cur'd by a flux of blood from the left noſtril, by a large ſweating and thick urine. The like hæmorrhage freed *Bion*, *Scopus*, *Lycinus*, and the ſtranger in the garden of *Dealcis*. *Hechſteter* has frequently cur'd hyſterics by letting blood even tho' the *menſes* were flowing. *Highmore* the ſame. Hence the common opinion among the ancients, and founded upon nature, (as apparent enough upon our premiſed communication between the hæmorrhoidal and ſplenic veſſels) that the hæmorrhoidal veins purg'd the ſpleen, and leeches are apply'd to open them for that purpoſe, there being no more direct derivation from the ſpleen than this way, of great emolument to all melancholics, and in general to plethoric habits, and in

great diſtempers, eſpecially the critical one of the internal hæmorrhoids. This is to be ſupply'd by blood-letting where it's not ſpontaneous, and rather to avoid the trouble and inconvenience that attends the other. *Hipp. Aphor.* vi. 11. ſays the hæmorrhoids coming upon thoſe troubled with melancholic or nephritic ills, is good. *Aphor.* vi. and 21. he ſays *varices* or hæmorrhoids coming upon mad people ſolves the madneſs. *Gal. de v. ſ. adverſ. Eraſiſtrat.* ſays, they live the moſt healthy who have the hæmorrhoids open. *Hipp. de humoribus* and vi. *de morb. popular.* declares, they which have the hæmorrhoids are in no danger of a pleuriſy, peripneumony, *phagedena*, *furunculi* or tubercles. *Hildanus* adds leproſy, *vitiligo*, apoplexy, epilepſy, *vertigo*, or inflammation of the eyes. He gives many caſes of the ſpleen cur'd this way. *Gal.* in 11. *aphor.* §. vi. affirms 'tis only on account of the evacuation. From every author we may learn, that melancholy and madneſs, affections of the ſpleen, reins, liver, meſentery, quartans, malignant ulcers, cancers, and all cutaneous diſtempers, almoſt all ills of the lungs, head, and in ſhort of the whole body, ariſe from a redundancy of blood; and eſpecially in mankind, according to an aſſumption we treated of before. For which reaſon provident nature has contriv'd to obviate this inconvenience, by making the ſpleen more large and curious in mankind than animals, and in the hæmorrhoids. Hence ſhe is much more frequently redundant in many ſpleens than deficient in one, and hence the graduation thereof, for it is more conſiderable in more perfect animals. So *Ariſtot. de part animal.* iii. 7. ſays, only moſt perfect animals have the ſpleen. *Riolan* iv. ſays, thoſe animals which have blood and have but little or no lungs want the ſpleen, or have a very ſmall one, which moſt evidently points out to us, that this part regards the *regimen* of the maſs of blood. Hence hæmorrhages of the noſe a ſymptom of lienal obſtructions, the blood regurgitating for want of room to retire into. *Hipp.* ii. *prædict. n.* 41. *Hipp.* and *Celſus* ſay, they that have great ſpleens are ſubject to hæmorrhages. Now as to the hæmorrhoids, the misfortune is that it's difficult to regulate their flux, being in ſo dependant a part, for they rarely are open, and when ſo, not eaſily cloſ'd again, and then they depauperate the whole maſs by the exceſs: beſide the great pain accompanying, which frequently produces other ills; as oedomatous ſwellings of the legs obſerv'd by *Hipp.* and other tabid ſymptoms. Whence *Hipp.* vi. *aphor.* 12. recommends one to be left running if the reſt be ſtopt. Here is likewiſe ſome difference between the internal and external, the former chiefly emptying the *plethora* of the *abdomen* or veſſels of the *porta*, the other being deriv'd from the *cava* and great artery relate to the univerſal habit. The firſt by authors is ſaid to have a more particular relation, and rightly, to what they call the *cacochymia*, or ill ſtate of digeſtion according to our theory; the other to the common plenitude of the whole maſs. Therefore a ſuppreſſion of the internals is more dangerous, and their flux more beneficial, eſpecially in our caſe, as more immediately derivative from the ſuffering parts, and it's rare for the external to flow, unleſs open'd by art. Now to procure this aloes is obſerv'd by all to have a moſt ſpecific quality, and given in ſmall quantities as an alterative; and *laudanum* too, which diſſolves the blood exceſſively, and from its divine relief is ſo coveted by melancholics.

Vrunt letheo perfuſa papavera ſomno. Virg.

Diuretics

DIURETICS. Diuretics are entitled to an eminent regard in hypochondriaciſm, being moſt powerful in fuſing the blood and diſſolving its concretions. *Hipp.* in the little book *de intern. affect.* ſays ſuch medicines ought to be preſcrib'd to lienoſe as purge by the bladder. In *extern. affect.* he orders diuretics to bilioſe who have a great ſpleen, and therefore of a bad color and contract malignant ulcers. *In coacis*, he tells us that in long wandring fevers, thin urine ſhows the ſpleen affected, and that tho' they ſpit much and make ſo much water, ſtill he adviſes hydragogues, and a critical flux of urine proves ſalutary to them, as he ſeveral times inculcates. So *Bion* being ſplenetic was judg'd when he made much water, very clear, and bled at the left noſtril, for his ſpleen was hard and ſwolen. He thinks the left veſſels more particularly prove ſerviceable, as being on the ſame ſide with the ſpleen, and *Drelincourt* ſtrenuouſly defends this ſentiment. The left ſide of the body no doubt is moſt excellent, and an argument of the excellence of the ſpleen may thence be drawn, for on that ſide is the major part of the heart and more excellent part, the left auricle and ventricle, on that ſide is the gullet, *aorta*, ſpleen, thoracic duct, ſtomach, *pancreas*, *colon*, and a larger quantity of nerves, and it's obſerv'd the *epiploon* deſcends lower on that ſide. *Galen* ſhows numerous inſtances of the good effect of this evacuation by the bladder in this diſeaſe, as in *Herophon*, *Nicodemus*, *Meto*, *Heropythus*, in the wife of *Epicrates*, &c. He ſays eſpecially the kindred malady of a ſtoppage of the *menſes* was freed by a large profuſion of black urine. This he had from *Eraſiſtratus*. In his comments on vi. *Epidem.* he has ſhown this is a ſign of a colliquated ſpleen as he calls it. *Avicen.* xv. 3. ſays when lienoſe exerciſe themſelves much, the melancholic humor is deriv'd to the urinary paſſages, and black water is made. *Laurentius* vi. *quæſtion.* 26. obſerv'd many lienoſe cur'd by a large quantity of ſuch. *Valetius in exercitat. ad* c. 40. *Hollerii*, ſpeaks of a religious who three or four times in the year, eſpecially ſpring and autumn, had his ſpleen ſwell'd with pain in the left hypochondre, and all over his body became ſublivid like black jaundice, at length for five or ſeven days making much blackiſh water he recover'd, and this happen'd conſtantly for fifteen years together. 'Tis an undoubted proof that men raiſe a *plethora* within the ſpace of a month as well as women, becauſe *Sanctorius* has obſerv'd they conſtantly weigh heavier once in that ſpace, and by ſome critical evacuation of urine or the like return to their former ſtate. The more volatile theſe and all other ſplenic remedies the better, as the more attenuating and brisk about their work. And in this ſenſe is it beſt underſtood why acid things are ſaid by authors to be friendly to the ſpleen, ſuch as pickles in particular, becauſe they diſſolve and thin the conſiſtence of the blood in ſplenetics and promote urine, *Hippocrates* gives even vineager. And *Celſus* orders a *malagma* for the ſpleen temper'd with the ſharpeſt vineager.

STOOL. As to the fourth way of cure directed by *Hipp.* we muſt obſerve there are two *ſtadia* in this diſtemper; the firſt a ſuperabundant moiſture, which is the beginning and progreſs thereof; the other a dry, earthy, ſaline and fix'd ſtate of the blood, which is approaching to that of madneſs. In the firſt brisk purgers muſt be us'd that fetch out the *ſerum*, ſuch as jalap. Now the advice of *Hipp. Aph.* iv. is applicable, where he orders melancholics to be purg'd violently with ſuch things as being ſmall in quantity work much. Nor need we be afraid, when even a ſhort dyſentery has cur'd the ſpleen in *Hipp. Celſus* ii. 8. *Aponenſ. diff.* 101. *M. de gradibus*, *Heurnius*

nius t. ii. In the latter caſe as to laxatives they muſt be of a much gentler claſs, and much preparation made for them by a diluting courſe of diet. Cyder is very good, and Spaw waters now claim their place, eſpecially the chalybeate, which open the urinary paſſages, diſunite the feculent accretions of the blood, and by their ſtypticity conſtringe and ſtrengthen the tonic diſpoſition of the fibres, beſide the great heat procur'd therefrom and many other advantages, when they are judicially adminiſtred, by ſuch as underſtand their *rationale*. Moreover by frequenting theſe places not a little benefit is to be expected from the company, variety of life, converſation, exerciſe, air, and mind diſembaraſs'd from cares and buſineſs, the muſic, balls, and other entertainments. The ladies tea-table now is ſeaſonable. And in food all moiſtning *regimen*, ſuch as cichory, parſnips, *aſparagus*, carrots, figs, almonds, raiſins, and your horary fruits. *Hipp.* and *Meſue* adviſe aſſes milk.

The theory of all this, which is eaſily apprehended by a *tyro* in medicin, ſhows that ſudorifics are very uſeful at firſt, eſpecially after exerciſe, or upon rubbing the skin with a fleſh-bruſh. Iſſues likewiſe are commendable. Bath-waters muſt neceſſarily ſpirit up the blood, but care muſt be taken not to increaſe or produce an inflammation. I judge pumping upon the ſpleen an improvement and good *ſuccedaneum* to the methods of the antients, ſuch as burning it, or fomenting it with hot decoctions of *aqua calcis* and herbs, or beating it with ſticks in order to reduce it and oblige it to contract its ſelf. The *cortex peruvianus* is recommended with great reaſon by *Sydenham*. If it cures fevers by thinning the blood, by new bracing up the fibrous ſyſtem with its aſtringency, and by opening inſenſible perſpiration; it anſwers every intention in the caſe before us, eſpecially if the fits return, as frequently, at ſtated periods. Steel and ſulphur had better be repeated than not inculcated as a ſacred anchor. I have only one hint to add, whence an eaſy calculation may be gueſs'd at, of the extent of the power of the ſpleen. And that is deducible from the analogy I have ſeveral times mention'd between it and an external part of the body ſubject to like variety of extenſion, which ordinarily and generally at a *medium* in its different ſtates admits of this difference in its bulk or quantity of blood introduc'd into its cells, *viz.* 17, 86: 2, 55. this if transferr'd to the ſpleen, which I think may very reaſonably be ſuppos'd, is ſufficient to anſwer fully the utmoſt powers and faculties I have any where aſſign'd it.

Having chalk'd out ſome general methods and moſt powerful remedies, I ſhall detain you no longer. As for particular and innumerable applications and adminiſtrations, with their reaſons and deductions and the like, I refer to authors who have wrote largely upon the ſubject, ſuch as *Highmore*, *Sydenham*, *Purcel* and others, whoſe practice, whether deſignedly or no, manifeſtly glances towards the theory we have been explaining. As I ſpeak to the experienced in the faculty, there is no occaſion in the curative part at this time for the length and exactneſs of a regular treatiſe. I have endevor'd to mention what ſeems ſufficient to open and confirm my opinion. which I entirely ſubmit to the moſt acute judgment and equal candor of this learned auditory, with all the poſſible reſignation that becomes a free phyſical enquiry.

RESTAT adhuc, Auditores humaniſſimi, ut veniam mihi indulgeat patientia veſtra tamdiu ſuſpenſa. & quidnam dubitemus a viris doctis &

omni ſcientiarum genere imbutis; quorum proprium eſt tam candore & benevolentia omnes antecellere, quam præceptis inſtitutiſque philoſophiæ abundare? Arduum ſane opus & ſiquid aliud difficilimum tentaſſe non pœnituit, cui aures præbere faciles & amicas dignentur Machaoniæ artis Principes. Non deſperandum eſt etſi in hac palæſtra tot egregii & magni nominis viri, oleum & laborem, ne dum nudam veritatem adepti inſumpſerunt. In cauſa veritatis omnibus perorare licet & in convivio philoſophico non omnino aſymbolos eſſe. In problemate maxime nodoſo certaſſe tantum ſat gloriæ æſtimandum eſt. Vobis quidem viri ornatiſſimi, ex jure deferunt Apollinei cætus aſſeclæ tentamina ſua, ad extendendos medicæ ſcientiæ terminos, ad ornandas naturæ ſapientis provincias, unde morborum theoria & curationes luminis aliquid mutuantur. Auſpiciis veſtris excitatum, quem non capiat æmulus benemerendi ardor? qui tam præclara ingenii & eruditionis ſpecimina ex hoc ſubſellio edidiſtis, qui artem propriam ad celſiſſimum dignitatis gradum adeo longe reipublicæ utilem evexiſtis. Domus hujuſce columnæ ſtantes & lumina ingentia! Nec dubitandum eſt quin ſodalitium veſtrum mereri pergat maximorum principum favorem, qui nunc & olim maximos honores & privilegia in idem contulerunt. Cui ſe non dedignatus eſt adſcribere Britannicæ nobilitatis flos: cui nec inter minimos aut laudis aut honoris titulos viſum eſt ſe collegio regali medicorum ſocium adjunxiſſe. Expergiſci profecto videtur & in lucem redire antiquus hujus loci genius. An Harvæi manes ingentes, an Caji an Linacri ſpiritus immortales, relicta ſede beatorum, ædes dilectas iterum reviſunt? Me fallit amabilis inſania, ni priſcam virtutem & energiam reſumpſimus, atque ſæcla denuo Saturnia expectamus. præſertim ſub illuſtriſſimo & ſpectatiſſimo præſide, qui ad omnes avorum noſtrorum dotes præclariſſimas, etiam addidit ſuas. Cui ſummus ni pectoribus naturalis ſcientiæ promovendæ incoctus amor, cui nec mens nec vires deſunt, artem divinam ad priſtinum nitorem reſtituendi. virum equidem noſtri encomii haud indigum ſuſpicit orbis eruditus, & laudes ejus abſentis prædicantur, quas coram innuere rudis eſt & injurioſi.

Taceo indefeſſam ejus diligentiam & acumen in libris undique conquirendis, qui ad claſſem Hippocraticam pertinent: quoniam ipſe omnibus bibliothecis longe & inſtructior & vivens Palatina. Taceo pinaco thecam hiſtoriæ naturalis tam varietate & copia quam ordine & methodo admirabilem omnino; niſi ipſe Plinius alter & alter Hippocrates, & totam naturam perlegit & in uſum ſalutemque humani generis adminiſtret; aut veluti ſol oculus mundi divitias ſuas, ſc. quicquid habet uterque polus, largitur, intelligit, illuſtrat.

Nec minus collegis univerſis gratulor tanti præſidis ſequacibus, qui ſymbolis collatis tam lubenter ædes haſce & medicæam reſtituerunt rem. per quorum induſtriam & aſſiduas curas, exploratis medicamentorum genuinis viribus & præparatione caveatur: ut nebulones larvatici civium ſanguinem & crumenam ſitientes foris ablegentur. Vos quidem curru triumphali cernimus quotidie velut Capitolium aſcendentes, morborum acies hoſtiles proculcare. Vos Pythonis domitores, mortiſque profligatores. Quam jucundo ore omnes vos aſpiciunt, vitam pretioſiſſimum omnium bonorum divina manu largientes. Vos poſteri laude immortali remunerent, quibus in progenitorum ſalute, ſua debetur, & ad cœlum uſque prædicabunt, humani generis præſidium & dulce decus.

EXPLICA-

Explication of TABLE I. *of the* SPLEEN.

AA. *Arteriæ hepaticæ.* a. *umbilicalis.* BB. *phrenicæ.* b. *ſolitaria.* CC. *cyſticæ gemellæ.* D. *pylorica.* dd. *epiploici rami anteriores dextri.* E. *gaſtro epiplois dextra.* ee. *gaſtrici rami anteriores dextri.* F. *inteſtinalis ad duodenum & jejuni principium.* f. *ramulus ad pancreas.* G. *arteria cœliaca.* g. *ſplenica.* H. *ad dextram inferioris omenti & colon, epiploo-colica dextra poſterior.* I. *gaſtrica dextra poſterior.* K. *pancreatica.* L. *ad mediam inferioris omenti & colon, epiploo-colica media.* M. *epiploo-colica ſiniſtra.* N. *gaſtro epiplois ſiniſtra.* nn. *rami gaſtrici ſiniſtri anteriores.* O. *gaſtrica poſterior.* oo. *rami epiploici ſiniſtri anteriores.* P. *gaſtrica major.* pp. *ad dorſum ventriculi.* QQ. *gaſtricæ poſteriores minores ſiniſtræ.* q. *Coronaria.* R. *ſplenicæ rami ſuperior & inferior lienem intrantes.* r. *anaſtomoſis cum vena ſplenica.* S. *vas breve.* T. *hæmorrhoidalis ſplenicæ, externa.* tt. *renales ſive emulgentes abſciſſæ.* V. *hæmorrhoidalis aortæ interna.* W. *meſenterica ſuperior.* X. *meſentericæ ramus ad ileum.* Y. *ſacra.* ZZ. *vertebrales.* &. *ſpermatica ſiniſtra.*

TABLE II.

AAA. *Venæ portæ origo in hepate.* a. *umbilicalis.* BB. *phrenicæ.* CC. *cyſticæ gemellæ.* D. *pylorica poſterior.* dd. *epiploici rami anteriores dextri.* E. *gaſtro epiplois dextra.* ee. *gaſtrici rami anteriores dextri.* F. *a duodeno & jejuni principio, inteſtinalis.* f. *ramuli a pancreate.* G. *ſplenica.* H. *a dextra inferioris omenti & colo epiploo-colica poſterior dextra.* I. *a poſteriori & dextro ventriculi fundo abſque arteria, gaſtrica poſterior dextra.* K. *pancreaticæ.* L. *a media inferioris omento & colo, epiploo-colica inferior media.* M. *a ſiniſtra inferioris omenti epiploo-colica ſiniſtra.* N. *gaſtro-epiplois ſiniſtra.* nn. *gaſtricæ ſiniſtræ anteriores ramuli.* O. *gaſtrica poſterior.* oo. *gaſtrici dextri anteriores ramuli.* P. *gaſtrica major.* pp. *a dorſo ventriculi.* Q. *gaſtricæ poſteriores, minores, ſiniſtræ.* q. *coronaria.* R. *ſplenicæ rami lienem intrantes inferior & ſuperior.* r. *anaſtomoſis cum arteria ſplenica.* S. *vas breve.* T. *hæmorrhoidalis a ſplenica, externa.* V. *hæmorrhoidalis portæ ſ. interna.* W. *meſentericæ ſ. meſaraicæ.* X. *meſentericæ ramus ab ileo.*

TABLE III.

An ox's ſpleen prepar'd, the arteries injected with wax by Mr. *Symonds*. Here the upper coat is intirely cut off to ſhow its internal texture, and a ſection of the ſplenic vein taken away.

A. the larger ſplenic artery penetrating thro' the ſide of the ſplenic vein, and running along the middle of its main channel in the ſubſtance of the ſpleen, like one pipe within another. Its ramifications are obvious, percing every where thro' the vein and diſperſing themſelves thro'out the whole, to the verge of the ſpleen.

a. is the leſſer ſplenic artery, alike piercing thro' the vein but a little lower. This runs acroſs the main trunk of the ſplenic vein, and enters, after a divarica-

divarication into two, a like branch of the vein, and then diſperſes it ſelf at the bottom of the ſpleen as the former, thro' the main of its ſubſtance.

B. the ſplenic vein, which becomes a large *capſula* to the arteries. Its punctures and perforations are conſpicuous all along which open into the circumjacent cells. Sometime it's obſervable the artery dips thro' it, and emerges again, as at the letter b, and other places.

The reſt of the ſubſtance of the ſpleen is made of arteries and fibres, which leave the infinity of cells between them all opening one into another.

c. ſhows a bit of the external ſmooth ſurface of the ſpleen.

TAB. IV.

Fig. I. the human ſpleen.

Fig. II. the ſpleen of a wild goat. both prepar'd by Mr. *Nat. Smith* lately deceas'd.

Fig. III. the ſpleen of a child.

Fig. IV. the ſpleen of a ſheep. both prepar'd by Mr. *Joſhua Symonds*.

In all theſe figures a. ſignifies the ſplenic artery, b. the vein upon which the nerves run, and muſt be ſupply'd by imagination, rather than preparation or figures; the reſt are the fibrous columns and cells.

Fig. V. is a diagram to explain the manner of water-works thus, A. is the place where the power of the forcing engine is apply'd, continually driving the water into the pipes, repreſented by the canal A B. B. is the end of the pipes in the city or place to be ſupply'd with water. C. is the ciſtern or pond, or reſervoir upon an elevated place, that continually receives what is not evacuated at B.

TAB. V.

Repreſents a vertical ſection of the human body thro' the middle of the ſcull and whole length of the ſpine, in order to ſhow the propagation of the nerves, particularly the *par vagum* and left intercoſtal.

a. The skin of the *cranium*. b. the *cranium*. c. the *falx*. dd. the *ſinus's* or veins thereof. ee. the veſſels ſpread upon the *meninx*, lining the inſide of the ſcull. f. the ſpongious bones of the noſe. g. the place of the *cerebrum*. h. the place of the *cerebellum*. 1. the origin of the *par primum* or olfactory nerves. 2. the optics or ſecond pair. 3. the mover of the eyes or third pair. 4. the pathetic of the eyes or fourth pair. 5. the fifth pair going to the eyes, face, noſe, palate, forehead, upper and lower jaws. From it ariſes one branch of the intercoſtal nerve. 6. the ſixth pair going to the eyes; from whence another branch of the intercoſtal ariſes. 7. 8. 9. 10. denote the other pairs.

i. is the eighth pair or *par vagum*, tranſmitted thro' the lower part of the ſcull, and making immediately the *plexus ganglioformis ſuperior*. Thence we trace its diſperſion upon the heart, lungs, gullet, ſtomach, *pleura*, *mediaſtinum* or whole contents of the *thorax*; paſſing thro' the diaphragm, it encompaſſes the body of the ſtomach with numerous branches, and from thence ſends many twigs to the lienar *plexus's*.

k. is the ſpinal marrow cut off from the *cerebellum*, and paſſing down the whole length of the ſpine.

I. is

I. is the left intercoſtal nerve let thro' the lower part of the ſcull, and making immediately the *plexus ganglioformis ſuperior intercoſtalis*, from whence goes a communicating branch to the ganglioform *plexus* of the *par vagum*; others to the *ſphincter* of the throat; another to the heart. Going downwards it forms the middle or cervical *plexus* m. ſending by the way ſeveral communicating branches to the *par vagum*. Then it ties a rope about the axillary artery n. and immediately forms the inferior intercoſtal thoracic *plexus* o. it receives all this way a branch from the ſpinal marrow at every joint of the ſpine mark'd pp. and ſends out likewiſe branches mark'd qq. to the arms. It muſt likewiſe be noted that from the middle *plexus* it ſends an eminent branch into the recurrent of the *par vagum* upon the *gula* and windpipe mark'd rr.

After this the intercoſtal deſcends the *thorax*, but dividing it ſelf into two bodies; and paſſes the diaphragm directly to the ſpleen, where it forms the great lienar *plexus*, whence many communicating branches to the ſtomach. Its various communications from hence with all the meſenteric and other *plexus's* of the whole *abdomen*, and its entry into the ſpleen, and what is further neceſſary on this head, is explain'd in the diſcourſe and delineated in the ſcheme, as much as the nature of the thing will bear, but is more largely illuſtrated in writers upon the parts.

f. ſhows the tongue. s. the *cartilago ſcutiformis*. t. the windpipe. u. the heart. w. the paſſage of the windpipe into the left lobe of the lungs cut off. x. the origin of the great artery from the left ventricle of the heart. y. the deſcending trunk of the great artery. z. the carotid artery going up to the head, cut off. &. the gullet.

A. the aſcending trunk of the *vena cava* going to the right auricle of the heart. B. the left auricle of the heart. C. the *mediaſtinum*. D. the diaphragm. E. the ſtomach. F. the *pancreas*. G. the *inteſtinum duodenum*. H. the ſpleen. I. the ſmall guts. K. the left kidney. L. the *colon*. M. the great artery and vein branching out to the iliacs. N. the bladder. O. the *inteſtinum rectum*. P. the ſpermatic veſſels. Q. the *ureter*. R. the *os pubis*. S. the teſticle. TT. the nerves that go to the leg.

TAB. VI.

Shows the *viſcera* in the *abdomen* of a dog, diſpoſed chiefly with an intent, that the communication of the ſpleen therewith may be more evident. The veſſels are eaſily underſtood from the firſt and ſecond ſchemes; what references are neceſſary follow. A. the upper fold of the *omentum* elevated. B. the ſtomach turn'd upwards. C. the *pylorus*. D. the *duodenum*. E. the gall-bladder. F. the liver. GG. the *pancreas*. H. the ſpleen. iiiii. its numerous *vaſa brevia* to the ſtomach. K. the ſplenic artery. L. the ſplenic vein. M. the greater gaſtric veins and arteries. N. the veins and arteries call'd *gaſtro-epiploicæ ſiniſtræ*. O. the *gaſtro-epiploicæ dextræ*. P. the *vena porta*. Q. the aſcending trunk of the great vein. R. the deſcending trunk of the great artery. SS. the kidnies. T. the *inteſtinum cæcum*. VV. the *ilia* or ſmall guts. W. the *colon*. X. the *rectum*. Y. the veins and arteries thereof. ZZ. the *ureters* cut off.

TAB. VII.

Shows the abdominal *viſcera* in a man, ſo diſpos'd as to illuſtrate the communication between them and the ſpleen; the names of the veſſels are eaſily known from the firſt and ſecond tables.

A. the gullet. B. the upper fold of the *omentum* turn'd up. C. the ſtomach turn'd upwards. DD. the liver. E. the gall-bladder. F. the great artery. G. the great vein. H. the *vena porta.* I. the ſplenic artery. K. the ſplenic vein. L. the ſpleen. M. the *pancreas.* N. the *pylorus.* O. the *cæcum.* PP. the ſmall guts. Q. the *colon.* R. the lower fold of the *omentum.* S. the *rectum.* T. the *ſphincter ani.* V. the external hæmorrhoidal veſſels. W. the internal. XX. the *iliac* veins and arteries. Y. the meſenteric veſſels. Z. the emulgent. &&. the ſpermatics.

TAB. VIII.

Shows a large ſpleen human, found in a man laſt diſſected at the college, drawn in its exact bulk. A. the ſplenic artery. B. the ſplenic vein. CC. veſſels going to the hæmorrhoidals. D. veſſels going to the *pancreas.* E. the *vaſa brevia.* F. the nerves.

ELENCHUS SPLENIS.

USE I.

USE II.

USE III.

USE IV.

AN

January 1722.

AN ESSAY TOWARDS THE ANATOMY of the ELEPHANT,

From one DISSECTED at

Fort St. George Oct. 1715, *and another at* London Oct. 1720.

THE great uſes of comparative anatomy are ſo glaring and manifeſt, that nothing need be ſaid to recommend it. This conſiſts in obſerving the admirable and various methods of nature, in the ſtructure of different animals, correſpondent to their bulk, figure, place, manner of ſubſiſtance and the like. And we may be aſſur'd the pleaſure that attends the curioſity of ſuch as love theſe enquiries, will be a perpetual incentive to the induſtry of all ages, in ſearching out the inexhauſtible fund of wonders in a living creature. We need not inſiſt upon the great light ariſing therefrom, towards explaining difficult points in our own œconomy, as well by inſpection, as plain reaſoning and inferences from one to the other: ſuch diſſections mutually illuſtrating one another, as will in ſome inſtances be clear from the enſuing diſcourſe. The common and all-wiſe founder chuſes in different manners to compaſs the ſame ends, ſometime as it were by neceſſity, ſometime by choice, the more to demonſtrate the magnificence of his power, and captivate our attention to the harmony of his works, which like muſick conſiſts in a moſt beautiful and concordant variety. Comparative anatomy is the metaphorical oratory of nature, a divine ſermon, where ſhe explains her purpoſes by pleaſing circumlocutions, and a redundancy of invention, that ſtrikes us with inconceivable raviſhment.

But more eſpecially may we expect improvement in our art, by ſearching into the entrails of ſo prodigious a creature as the elephant, the hugeſt of all that tread the ground, a mountain of animated matter. Where little and neceſſary particularities, eſcaping our ſight in moſt others, are ſpread out in *folio* and preſent themſelves to our naked eye in full view; which often in others we are apt to paſs over without ſo ſtrict a ſcrutiny, or at leaſt by common viſion cannot poſſibly come at: where the ſprings and wheels of life, as we may not improperly call them, are expanded and enlarged,

which adds much to the delight as well as profit of the work, ſo vaſt a machine requiring a more extraordinary workmanſhip in its compoſition, than other minute, and for that reaſon call'd, imperfect animals. For if there be a certain *terminus* in the atoms or firſt particles of ſubſtance, as we may gather from Sir *Iſaac Newton*'s optics, ſo that its powers have an extent beyond which they cannot well go; then is it reaſonably to be ſuppos'd, that their combinations and effects have ſomewhat different turns, as to the action and compoſition of animalcules, in reſpect of the larger loco-motive productions of the creation. Even as the laſt-mention'd great man has juſt ſuſpicions, and very far demonſtrated that the laws to which matter is ſubjected, exert themſelves in parts extremely ſmall and near to one another, not in the ſame manner, as in the immenſe and diſtant collections of the planetary bodies.

The rarity of this creature and opportunities of diſſecting it, as well as the ſcantineſs of what has hitherto been printed upon its anatomy, will ſufficiently apologize for the preſent editor, if he pretend; to no more than adding ſomewhat material to the account, in a ſhort reherſal of the parts, eſpecially ſuch as moſt conſiderably vary from others. For it is not to be expected that a compleat natural hiſtory of it, can poſſibly be gather'd from one or two inſtances. They that are converſant in theſe affairs will readily own, how far diſtant we are from ſuch a pretence, even in the human body, after the labors of ſo many ages, and infinite ſubjects employ'd in that purpoſe. How great are the improvements we boaſt of ſince *Galen*'s time, yet how rich a harveſt remains for the glory of future times?

But we thought our ſelves indiſpenſably oblig'd to communicate what is here obſerv'd, by which means only, there is hope in time, to have a compleat deſcription thereof, from the ſum of what has been and may be publiſh'd. The only excuſe we can make to thoſe, who poſſibly may expect a larger volume, is founded on the wetneſs of the ſeaſon which then happen'd, whereby it was impracticable to dwell on the parts and examine them with due accuracy and attention in the open air. For which reaſon it's very much to be wiſh'd, ſome public place was provided, convenient for ſuch diſſections and other extraordinary occaſions of this nature. However if the gentlemen that have already publiſhed the reſult of their diſquiſitions in this ſort, under the ſame or like diſadvantages, merit the thanks of the public; it is hoped this imperfect addition to their ſtore, will not be blameable or impertinent. Yet the learned world ought to be acquainted that whatever is found worth peruſal in theſe papers, is entirely owing to the care and coſt of Sir *Hans Sloan*, whoſe unweary'd application in promoting uſeful knowledge is as extenſive as the field of nature. He furniſhed us with the opportunity of the preſent adminiſtration, and moreover obtain'd an account of another diſſection of this creature, made at fort *St. George* in the month of *october* 1715, (which was much larger than ours, *viz.* in height 7 or 8 cubits, *i. e.* a foot and half *French* meaſure, which is ſomewhat more than ours) open'd and deſcrib'd by *monſieur Suply* ſurgeon there, in a letter written to the chief ſurgeon of fort *St. David* in the eaſt *Indies*. The method therefore we ſhall take in the following pages, will be to incorporate both hiſtories, as far as is conſiſtent, and except where they differ in any particulars worth mentioning; but the general meaſures of the parts are given from the biggeſt.

The

The elephant we diſſected was lately brought into *England* from *Bencolen*, our eaſt *India* company's factory, and exhibited for a public ſpectacle. Somewhat leſs than three years old, and about ſix or ſeven foot high. It dy'd, as we may reaſonably ſuppoſe, for want of a ſuitable and proportionate method of food, and from the ignorance of the keepers, who expos'd it to cold and moiſture, by ſtabling it in a damp booth and wet floor, not agreeable to its nature and the hot country it came from. Beſide, it was upon cutting its great teeth or tusks, one being obſerv'd juſt broke forth. It's likely this pain, which was diſcernible from the creature's continual rubbing of the part, brought on a fever as is uſual on ſuch occaſion. Its perſpiration no doubt was ſtopt from the cold taken, and it had no ſtools for ſeveral days, which is a diſtemper theſe creatures are naturally ſubject to. All theſe diſorders we may well ſuppoſe heightned by the great quantity of ale the ſpectators continually gave it. After it had languiſh'd for ſome time, by the advice of a farrier ſeveral very ſtrong purges and gliſters were uſed; they not paſſing, it dy'd on the 4th of *October* 1720.

As to its external ſhape, it cannot be deſcrib'd with greater accuracy and ſimplicity, than in that famous old author and *greek* phyſician *Aretæus Cappadox* lib. ii. *de cauſis morb.* cap. 13. a tranſlation of which we judge not unacceptable to the reader. " The head and face of the creature is " ugly, and indiſtinctly join'd to its ſhort neck, ſo that it ſeems as if fix'd " upon its ſhoulders. The ears are very large and broad like wings, reach- " ing down to its throat and *ſternum*, whereby its neck and ſhoulders are " cover'd, like a ſhip with its ſails. Its horns, otherwiſe called teeth, are " extremely white, exceeding every thing of that color in any other crea- " ture. Theſe are plac'd not on the forehead and temples, as is uſual in " cornigerous animals, but in the mouth and upper jaws; looking upwards, " not ſtrait but turn'd a little forwards, upon whoſe convexity they are a- " ble to carry a weight. They are very large, of the length of a cubit or- " dinarily, ſome much longer. From the upper jaw goes a large promi- " nence, ariſing at the upper lip, 'tis long, without bone, flexible like a " ſerpent. At the end of this are two openings, which nature has bored " quite thro' to its lungs like a double pipe. The creature uſes this canal " as a noſe to breath withal, and likewiſe as a hand, for it can take up a cup " at pleaſure with this proceſs, and hold it faſt very ſtrongly, nor can any " thing elſe but a ſtronger elephant take it away. Graſs is its food, for it " can't eat fleſh. Its long feet bearing the creature a good height from the " ground, and its neck, as we ſaid, being ſhort, it cannot eat from the " earth with its mouth. Nor can it drink out of a river therewith for the " ſame reaſon; and in ſome meaſure its trunk hinders thoſe purpoſes. " With this it takes its food, and can lift up a great weight. Rightly " therefore the ancients call'd it *proboſcis*, becauſe it ſeems to eat with it " before its mouth. When it thirſts it immerges the end of the trunk, " then breathing, inſtead of air draws up water in large quantity. When " he has fill'd his noſe as a cup, he pours it into his mouth with a ſtream " like a river; afterwards draws again and pours it out again, till he has " fill'd his belly like a ſhip. His skin is rough and very thick, rais'd un- " equally with long tracks of deep fiſſures, ſome in ſtrait lines, ſome croſ- " ſing one another, like the furrows of a plow'd field. As other creatures " have hairs or briſtles, the elephant has only a ſort of down. There are " infinite other differences between this and other animals; as that he

" bends

" bends the knee of his hinder leg like a man, and has breaſts near the " arms like women."

Thus far this moſt accurate author, to whoſe deſcription little need be added. It's generally allow'd to be ſomewhat of the hog kind, its ſnout being wonderfully extended into what they commonly call the trunk, or trumpet more properly, which ſo remarkably diſtinguiſhes it from others, and where nature's contrivance is ſo admirable, in this bulky, unwieldy, and otherwiſe helpleſs creature, which perfectly ſupplies the uſe of hands given to the human *ſpecies*, and its ſimilar repreſentatives of the monkey kind. The end of the trunk, tho' apparently like a hog's, is of an exquiſite ſenſe and action; there is a little protuberance in its upper part, which it can uſe as a man does his fingers, and take up the ſmalleſt piece of money or the like, and do a thouſand feats learnt it by the keepers; as firing of a gun, beating a drum, throwing a javelin, *&c.* to entertain the ſpectators. It can bend this inſtrument upwards, downwards, backwards or ſideways, to any part of its body. Whence very aptly by *Lucretius* l. 2. are they call'd *anguimanos*. *Pliny* ſometime terms it the hand. *Spirant & bibunt, odoranturque haud improprie appellata manu.* viii. 10. By *Schotto, manus naſuta.* l. 8. *mirab. animal. terreſtr.* 'Tis ordinarily ſeven foot long or more, proportionable to its height, ſeeing it muſt of neceſſity nearly reach the ground. With this it takes up its food, which is generally graſs, or roots of herbs or boughs of trees, which its height and ſtrength enables it to pull and break off, hanging with its whole weight thereon if need be; ſo that this way they will depopulate whole woods, as far as they can reach. It is very diverting to ſee the creature eat, and obſerve how well it knows to uſe theſe peculiar members; how dexterous it is in the management of them. The leaves and herbs it rouls up into a bundle, after it has ſhak'd them from duſt and inſects, as a man does a ſallad, wherein it is very nice and delicate: then bending the trunk into a circular form, lodges them in his mouth. It's ſaid, if you mix ſand or dirt with barley, which it loves very well, it will ſeparate the grain very notably from the impurities before it eats. They love melons and the like fruits exceedingly, and can ſmell them at a vaſt diſtance, as the learned *Hermolaus* ſays in his commentaries on *Dioſcorides*. When it has no other food, it digs up roots, either with its trunk or teeth, and uſes both too in cutting down and deſtroying trees. *Strabo* reports it will raiſe it ſelf on its hinder legs to pluck down the arm of a tree, or to demoliſh fences or whatever ſtands in its way; and in ſuch kind of work it has more than the ſtrength of twenty four men. It pulls up palm-trees whole, and eats the fruit. 'Tis known they can carry twenty men in a tower upon their backs in time of war. When they go thro' deep water and in danger of ſinking they ſtretch out their trunk above water to breath thro'; ſo provident is the Creator, who not only has given the creatures wonderful organs, but likewiſe taught them all their uſes. The largeſt of theſe (as by the *Indians* accounted) royal animals, are in the eaſt *Indies*, and generally of a whitiſh color or ruſſet. Thoſe in *Africa* are leſs and of a darker complexion. The utmoſt height we read of is about nine cubits or fourteen foot. It's remarkable that the proportional length of the elephant is leſs than that of others, for 'tis generally equal to its height. How well is the cube apply'd for ſtrength! They are gregarious and never found but in herds, and are ſaid to live to two hundred years. Dr. *Strachan, phil. tranſ.* n° 277. ſays, one ſort of the elephants are

much higher before than behind. It's obſervable the fore legs are longer and larger than the hinder, contrary to other quadrupeds. The legs for a good height are much of an equal thickneſs and cylindric like the ſhaft of a pillar. The bottom of the foot is as round as a horſe's hoof, and ſeems a compoſition of nature's, between that and the divided toes of other creatures: and each nail of the toes is like a ſmall hoof. Its legs and feet have as many joints as other animals as to the *ſceleton*, but towards the bottom outwardly end like the baſis of a column in a flat, circular, horny ſole, where in the fore part four flat nails come from the toes, with but very obſcure diviſions. A multiplicity of ſtrong muſcles implanted into every bone of the *tarſus* and *metatarſus*, which are nearer the ground than in other creatures, form it into a round, thick ſhape, like a jack-boot with the fore part of the foot cut off. The ſole is not ſo hard but that it adapts its ſelf to the plain it treads on, which no doubt is facilitated by thoſe muſcles. It's ſurprizing in the *ſceleton* to obſerve, according to *monſieur Suply*, the bone of the *tibia* in the leg outward and the *fibula* inward, contrary to the manner of other creatures: the meaning of which can be only for greater ſtrength like buttreſſes to a building. It lies down upon the ground to ſleep, and raiſes it ſelf again upon its knees, tho' not without ſome labor. This the keepers affirm'd of our young one, but the full-grown probably ſeldom lie down. It can walk three or four miles an hour with eaſe. The toes in our judgment are like thoſe of a tortoiſe, having 5 nails on its fore feet and but four on the hinder. Ours being a female had two nipples upon the *ſternum*, nearly between its forelegs, which are common to both ſexes, if *Ariſtotle* be not miſinform'd. The *pudendum* was placed more than ordinarily forward, between its hinder legs, upon the *abdomen* towards the navel. Its tail long and ſlender like a pig's, but hanging downright with a few hairs on the end. Its eyes are of a red color and very ſmall, like a pig's, as *Vartoman* compares 'em. Ears large and flat lying cloſe to the neck, like great pieces of leather, or bat's wings. Its mouth very ſmall, tongue ſharp towards the end, and flattiſh in a plane perpendicular to the horizon. All its teeth are grinders, eight in number, four in each jaw, two on a ſide, but large and ariſing from many roots; for cutting teeth are uſeleſs, ſeeing it breaks off the herbs with its trunk as a man with his hand. It has a bluſtering kind of voice with its mouth, call'd *barrus* in *latin*, a roaring, but the ſound of its trunk imitates a trumpet of a deep note.

The skin of this creature is thick, wrinkled and furrow'd into ridges and cavities, ſome proceeding ſide by ſide, others interſecting them at right angles or obliquely, very much like the corrected compariſon of *Aretæus* his plow'd field; it has but few ſcatter'd hairs on it, and of a ruſſet color. We have obſerved that the skin of whales is channel'd, much after the ſame manner, nature uſing a like method in creatures of like enormity. It has a power of vellicating or contracting it, whereby it kills the flies and other troubleſome animalcules by intercepting them between its wrinkles, or at leaſt ſhakes them off. By feeling upon the *abdomen* we diſcern'd a large *ſcutum* as if it had been of bone, which guarded the whole compaſs of the belly. This upon diſſection we found to be only a broad and thick body of hard fat. It's probable, 'twas part of that tough and thick membrane Dr. *Moulins* ſpeaks of, conſiſting of fibres which deſcended obliquely, from the *ſpina dorſi* to the *linea alba*, and doubtleſs deſign'd to ſupport the great

weight of the *viſcera* in the *abdomen*; and not without reaſon, for we found all the abdominal muſcles very thin in reſpect to what we might well hope to have ſeen, and in proportion to the contents to be ſuſpended thereby, and to the uſe of them; wanting in the extruſion of the excrements, out of guts of ſo prodigious a ſize. After theſe with the *peritoneum* were remov'd, which was not without a good deal of labor, we had the appearance delineated in Tab. II. Fig. II. where it's to be obſerv'd the *omentum* did not cover all the guts as uſual, nor was it cover'd with fat as others, but ſo exceedingly fine and thin that we might well compare it to gawſe or a ſpider's webb, and that twelve foot long and almoſt as broad. A contexture ſo amazingly delicate that it highly deſerves the name of *rete mirabile*. And certainly nothing in the world can be imagin'd ſo curious and ſurprizing. Sprinkled all over with an infinite number of veins and arteries, which with perpetual *anaſtomoſes* and minuteſt ramifications communicate one into another, and all ſeeming to float in the air by reaſon of the extreme delicacy of the membrane that holds them together. Some of their principal trunks were as big as one's finger. Theſe are all along, thro'out the whole ſurface, encompaſs'd and accompany'd with the branchings of the adipoſe veſſels, every where ariſing in this thin, lace-like membrane, and uniting by degrees into larger canals, as other veſſels, till they convey their juices either into the veins or arteries. One of theſe intire was ſhown before the royal ſociety, ſent by *monſieur Suply* perfectly devoid of fat. That which Dr. *Blair* diſſected in *Scoland* had no *omentum* at all, and was very lean thro'out his whole body, laboring as I ſuppoſe under a *pthiſis*, the ſame was true of both ours, which ſeem'd therefore going into the ſame diſtemper. For we ought not to imagine them in a natural ſtate, tho' the *ſcutum* of fat before mention'd would in a great meaſure execute one of the offices of the *omentum*, in keeping the guts warm and ſlippery, and defending them from immediate injuries of the cold, to which ſuch membranous and exſanguious parts are ever liable.

One may wonder how ſo thick a fluid as the fat can circulate in ſuch curious pipes, as doubtleſs it does, we imagine ſomewhat like the juice or ſap in the leaves of plants. Certainly this muſt be aſſiſted by the continual motion of the abdominal muſcles, *diaphragm* and periſtaltic oſcillation of the guts themſelves. But could the blood-veſſels here be injected with wax of two colors different from the adipoſe, it would beyond diſpute be the fineſt preparation in the world. A piece of this *omentum* is delineated Tab. IV. Fig. I. as well as graving can imitate ſo extraordinary an expanſion, from the original pieces, prepar'd by *monſieur Suply*, and ſtretched upon paper, which are beautiful beyond imagination. It cannot ſeem improbable that there are ſmall glands, which ſeparate this oily matter from the blood, to be repoſited in theſe membranous ſacks, as in a ſtore-houſe, and return'd into the maſs again upon occaſion. It is worth the while of the curious in anatomy, to ſearch for the manner and conveyances. Till when, give us leave to hint at ſome of its uſes. We mention'd its guarding the guts from cold, pertinent to which are hiſtories in phyſical writers of this part, when waſted away or cut off being ſupply'd well enough by flannel continually worn upon the belly, as that particularly in the *gladiator* from whom *Galen* took away the *omentum*. This is a benefit which appears highly neceſſary in winter, as that before ſpoken of in facilitating by its ſlipperineſs the motion of the guts, which ſeems peculiarly uſeful in ſummer, when exceſſive heat

dries

dries up neceſſary fluidities. Beſide, we may juſtly pronounce its fat a principal ingredient of the blood and nouriſhment of the ſolids. For as life conſiſts in action and motion, a conſtant ſupply will be neceſſary for the abraded particles thereof: to ſupple the muſcular fibres after long and painful contractions of labor, to moiſten and lubricate the heads of the joints and tendons upon the ſame occaſion, all which is beſt done by the ſmooth and oily balm from this reſervoir. Likewiſe will it not be uſeful to envellop acrid juices and ſalts in the maſs of the blood and prevent ſtimulations injurious to nature? will it not keep up the conſiſtence of the vital fluid, in danger of diſſolution in weather exceſſively hot? will it not guard the kidneys in their ſaline ſecretions? Another uſe of the fat is to render the skin ſoft and plump, and to anoint it as it were, in defence of the injuries of the air, which in ſome countreys they are forc'd to ſupply with vegetable oil. So nature has wiſely contriv'd ſweat of that unctuous quality, or otherwiſe our skin would have been perpetually defac'd and ſore, with chops and chinks. Upon the ſame account it hinders the too great diſſipation of the ſpirits, as we call them, or volatile parts of the blood, perpetually ſteeming from us by inſenſible perſpiration. Has it not ſome ſhare in the ſublime compoſition of the animal ſpirits, the veſtal *focus* or lamp of life, in many of which reſpects it may not improperly be call'd the *humidum radicale* of the ancients? Another great uſe of this adipoſe membrane we conceive to be the furniſhing matter for the bile; for 'tis certain all the veins of the *omentum* enter the ſplenic and *porta* which lead directly into the liver, and the bile is a true ſaponaceous liquor, compos'd of oil divided and fix'd by ſalts, much after the ſame manner as our ſoap-makers practiſe in their art. Many more without queſtion are the purpoſes aſſignable to this fluid by thoſe who conſider it *ex profeſſo*. We ſhall only add that the greaſe of the *omentum* was well imitated by Dr. *Grew* in boiling ſpirit of nitre with oil of olives.

Next to this beautiful woof of the *omentum*, the prodigious view of the guts arreſted our attention. The *colon* is thicker than a man's body, which as well as the reſt, are full of large glands in the inward membrane like bottles, as big as the end of one's little finger. They appear, at leaſt their ſecretory duct, like a bag with one ſmall opening, ſo that upon any preſſure either from the chyle or excrements paſſing thro' them, the liquor contain'd is ſqueez'd out, as when we ſqueeze a bladder or ſpunge. Theſe bags therefore are reſervoirs of that liquor to be us'd upon occaſion, as the gall or urine-bladder: and hence appears the uſe of diſſections of theſe large animals, for other creatures have the ſame glands, of the ſame artifice, but not eaſily obſerv'd becauſe of their ſmallneſs. The meſentery too was very thick, ſpread over with large lumbal glands, the receptacles of the chyle and lymph. *Monſieur Suply* ty'd the two ends of a large peice of the inteſtines, after he had fill'd it with water. By preſſure and an undulatory motion in imitation of the periſtaltic, he endeavor'd to force the liquid into the chyliferous or lacteal veſſels, but to no purpoſe: tho' he flatter'd himſelf theſe pipes would have been proportional in ſo large a creature. Great cluſters of glands within the inteſtines of divers figures, the fabric and vaſtneſs of the connivent valves and the veins interſpers'd thereon afforded the nobleſt ſpectacle imaginable, every thing appearing as thro' a microſcope. The ſtrength and thickneſs of the coats of the guts was remarkable, and the methods by which nature guarded itſelf againſt the inconveniences of ſo large a load of excrements.

The

The *plicæ*, *rugæ* and little openings of the excretory ducts of the glands in the *ſphincter* of the *anus* are exceedingly curious. The bulk and ramifications of the meſenteric artery and meſariac veins upon the meſentery was very entertaining to behold.

It's obſervable this creature has no gall-bladder, even as horſes and others; but the *porus bilarius* is manifold, ſeveral large pipes from the liver uniting into one cholidoc duct. This is of the thickneſs of a gooſe-quill, which paſſing about three or four inches, between the three tunics of the *duodenum*, like the *ureters* in thoſe of the bladder, at laſt opens in its interior ſurface after a very curious manner. For there is a fleſhy protuberance like the *anus* of a fowl, or the *os tincæ* and aperture of the *uterus* in the *vagina* of a woman, but much larger, and this ſerves admirably well the uſe of a valve. Beſide the inſide of this cholidoc pipe in its paſſage thro' the membranes aforeſaid, has ſeveral carneous fibres or tendinous columns, like thoſe of the auricles or ventricles of the heart; the reaſon of which extraordinary fabric is apparently to force the bile into the guts when there is need, and hinder its efflux at other times, (as we have lately aſſerted in the office of the ſpleen, whoſe texture it imitates.)

The inward ſubſtance of the liver in both our ſubjects was intirely putrid, reſembling a flabby bag full of corrupt matter, which being thus waſted away, muſt needs bring on their death. Hence it is no wonder the creatures ſhould be coſtive for want of the *ſtimulus* of the bile; and it ſeems this is the common diſeaſe of the inhabitants of thoſe eaſtern countries about *Coromandel*, who ſo frequently dye of abſceſſes of the liver. The occaſion of which may naturally be attributed to the heat of the climate, which exhaling the fluids too abundantly, leaves the active and corroding ſalts of the bile without ſufficient diluents. To us it ſeems, that the common appearance of tanning in the ſun-beams, and the gradation of complexions between the northern whiteneſs and the *æthiopic* dye, will eaſily account for the perplex'd queſtion about the *indian* blacks upon the ſame principle. The liver was very ſmall as to its proportion. The keepers of the elephants obſerve them naturally ſubject to coſtiveneſs, which is not to be wonder'd at, if we only conſider the exceſſive bulk of the inteſtins; ſo that the immenſe quantity of excrements lodg'd therein muſt require extraordinary ſtrength to expel them. Theſe inconveniences muſt ſtill in a larger degree affect ſuch as are kept tame, and without ſufficient action and exerciſe. Therefore are the maſters of them frequently oblig'd to give them ſtrong purges, as this following, *vizt.* ℞ *aloes caballin. gambog. & colocynth. ana* ℥*vi. ſem. palm. Chriſti, piperis longi Bengalenſ. zinzib. ana* ℥*iiij. ſacch. ſeu Moloſs. q. ſ. f. pilulæ* n° *xxiiij. per una vice.* Afterwards are adminiſter'd the following corroborants of the ſtomach and expellers of wind.

℞ *Calam. aromat. zinzib. galang. ana* ℥*iiij. piper. rotund. aſæ fetid. curcum. ana* ℥*ij. ſem. lactuc. &* 4. *calid. major. ana* ℥*iſs. ſacchar. commun. ſive moloſs. q. ſ. ad formand. pilul. mediocr. per una doſi.*

Monſieur *Suply* ſpeaks of the manner of treating the elephant in the ſtrangury or retention of urine, 'tis this. If other things they adminiſter fail of ſucceſs: they tye him down very faſt with great cords, ſo that he cannot poſſibly ſtir, and apply a broad fire-pan of iron, or ſuch like thing heated red hot, to the region of the bladder, which preſently produces the deſired effect, as an extraordinary *ſtimulus*, from the prodigious contraction it cauſes in the muſcles of the *abdomen* and circumjacent parts.

It

It is moreover cuſtomary in that country to apply a hot iron under the heel, in a *cholera morbus* with good ſucceſs. Whoever is acquainted with the medicin of the eaſterns, will not wonder at theſe kind of practices which they uſe in almoſt every caſe. The reaſon and good effects whereof would doubtleſs bring them more in vogue among us, was it not for the terror which accompanies them. *Ariſtotle* ſays, the elephant is obnoxious to colical inflations of the bowels; which by dolorific contractions muſt needs hinder their natural evacuation by the *anus* and bladder.

The *pancreas* and ſtomach were ſmaller than one would imagin in ſo prodigious a creature; the ſpleen was four foot long, and near a foot in bredth about the middle, where the ſplenic veins and arteries enter. 'Tis of the ſame ſubſtance and contexture as the human, but of a darker red color and ſemicircular figure, broader and flatter towards the middle, as may be ſeen in Plate VII. Fig. II. *Galen* and *Ariſtotle* both take notice of the ſmallneſs of this *viſcus*, as they think in proportion to the whole.

The kidnies were half a yard in length, of an ill ſhape, very flat, flabby, of a lurid complexion. The *pelvis* and its baſinets when open ſeem very ſmall. The renal glands or *ſuccenturiati* were as big as a child's head, of a very irregular figure, compos'd of a many other gland-like bodies, packt together into a ſtrange form. When any of theſe were cut open, we found a cavity within, and they all ſeem'd to open into one cell, but yet no common or particular excretory duct diſcernable. One of their ends was lengthned out like the teſticle of a cock, of a blackiſh color, which cut acroſs had a cavity in it full of a brown and viſcous humor. There are numerous arteries go to theſe glandules from the emulgent; one from the kidney it ſelf, and as many veins from theſe myſterious bodies to the emulgent vein. So that their uſe ſeems to be only that they ſhould ſerve as a bye path or communication between the emulgent vein and artery, that the circulation may not entirely be at a ſtand, whilſt the kidnies are performing their office of ſecerning the urine. That lympheducts ariſe from them, is only a part they bear in common with all the other *viſcera*.

Paſs we next to the cavity of the breaſt or *thorax*, which we obſerv'd very acute upwards toward the neck, contracting it ſelf into a narrow ſpace, and without clavicles as in horſes, *&c.* The lungs of the elephant are not large, and adhere in both ours on all ſides to the *pleura* and diaphragm as in fowls, which monſieur *Suply* thinks commodious enough in this *coloſſus* of a creature: the muſcles of the *thorax* and preſſure of the air being ſufficient to expand them, and forward the circulation of the blood, perhaps better than if they had hung free in the cavity, where their bulk might poſſibly have been an impediment to their reſpiration: but in Dr. *Blair*'s ſubject they did not adhere. The *trachea* had ſomewhat peculiar in its ſtructure, the inward or poſterior ends of the cartilaginous rings that compoſe it, lapping over one another. The bellowing of this creature is extraordinary great and terrible, partly owing to the length of his trunk, for which reaſon ſome of the ancients call'd it *tuba*, and now the *french trompe* upon account of its noiſe. The gland *thymus* was large and double. The heart is no leſs than two foot long from the tip to its baſe. 'Tis of a broad flat figure, and very flabby, wanting much of that firmneſs we might expect in this principal engin of ſo portentous an animal. The *ſeptum* which parts its ventricles is very diſcernible externally, ſo that the whole *viſcus* appears as it were double, and with two tips or points of the cavities;

which is the reaſon that *Ælian* and other authors thought it had a double heart. The whole view of this cavity is ſhown in Plate II. Fig. I. There were ſeveral lumps of hard fat upon the heart. The *pericardium* was very thin, and the water enclos'd in it of the uſual dark bloody color. The auricles likewiſe and ſides of the ventricles were very thin, but the coronary veins on the body thereof, interlacing one among another, form'd a curious appearance: the opening of the coronary artery at the *aorta* is big enough to admit ones thumb.

Opening the right ventricle, the tricuſpid valves appear as drawn out Tab. III. Fig. IV. in their natural bigneſs, the tendinous fibres and fleſhy columns of muſcles mark'd AA and their uſe are well enough known. And Dr. *Blair* obſerves with us, each fleſhy column is a true muſcle with round bellies and tendons; nor is the number of the tendons in this valve ſo preciſe and invariable as to merit a denomination in the ſingular; for it's plain here are four tendons. There was likewiſe a tranſverſe column or tendon which might with propriety be call'd *muſculus cordis biceps:* as in Tab. III. Fig. III. attach'd by two muſcular eminences to the *ſeptum* and ſide of the ventricule, which no doubt very much aſſiſted in the contraction thereof, and likewiſe hinder'd its too great dilatation upon the influx of the blood in the *diaſtole*. The ſame is obſerv'd in oxen. This may be look'd upon as a ſort of gauge aſſizing the quantity of the tranſient fluid it ought to receive and throw out at one *impetus*. The auricles had nothing particular. Fig. I. in the ſame table ſhows one of the ſigmoid valves of the pulmonary artery in its natural bulk.

The mitral valve of the left ventricule we have delineated in its juſt magnitude in Tab. IV. Fig. II. its prodigious bulk and ſtrength is obvious, its numerous tendons and their various directions are remarkable. The two uppermoſt mark'd AA being long were inſerted into the left auricle, the two inferior ones mark'd BB oppoſite to them were attach'd to the carnous columns within the ventricule, which were many and prodigiouſly ſtrong. The two firſt antagoniſe the two ſecond. Many other tendons there are, we ſee, of oblique directions to them, which all unite in one common office, both as valves and muſcles, of hindring the reflux of the blood into the lungs, and of protruding it thro' the whole arterial ſyſtem. So large is this body in this creature, that many blood-veſſels are conſpicuous upon it, eſpecially in the lower part; and the whole confirms what we before intimated, that anatomiſts have not been ſufficiently exact in the name given thereto, making the mitral valve but bipartite, and the tricuſpid but threefold, ſeeing they are evidently but one valve, and the tendons which have occaſion'd the denomination are of a much greater number in nature than in the name. In Tab. III. Fig. II. is ſeen one of the ſigmoid or ſemilunar valves of the trunk of the great artery in its exit from the heart. What is chiefly notable in this and the former membrane, is the tranſparent tendinous expanſion at each end mark'd C. C. C. C. which are the roots whence the fibres which compoſe them ariſe, and are ſeen to croſs one another in the middle, as they paſs from one ſide to the other. The ſuperior ones at D. going to the inferior ſide of the oppoſite end at E. This is a beautiful contrivance of nature to anſwer her purpoſe in it, that their contraction may be uniform; doubtleſs the human is of the ſame make, tho' we do not know it has been taken notice of before, becauſe not ſo conſpicuous thro' their minuteneſs. In the whole, we cannot but

 contemplate

contemplate with the greateſt pleaſure this marvellous pump of ſo large a beaſt, the great ſpring of the whole machine. And monſieur *Suply* expatiates upon the difficulty even of cutting thro' the arteries and other parts, by reaſon of their ſtrength and thickneſs, in order to take out the heart and lungs, and deſcribes his *indian* aſſiſtants in number no leſs than a ſcore, naked and arm'd with great crooked knives, going in and out from the *thorax* of this creature, like *Jonas* from the whale's belly, and compares them cover'd as they were all over with blood, to infernal furies.

Both ventricules and the beginnings of the great blood-veſſels were well nigh fill'd with a *polypus* of a very tough conſiſtence and color, between white and yellow; which certainly muſt very much retard the circulation, and by rendring it languid, prove one great occaſion of the creature's death, which we may not improperly attribute to the jaundice. For if we conceive all the bilioſe particles of a fiery ſaline nature, reſting and fermenting in the glandular ſubſtance of the liver, not able to expel them thro' a ſtagnation of the blood's motion; it's not difficult to ſuppoſe this muſt at length intirely deſtroy its fabric, and turn it into that purulent ſtuff we obſerv'd. It's not unreaſonable to add, as another cauſe thereof, the tone of the ſpleen debilitated, which ſhould have quicken'd the office of the liver, according to the theory we before advanc'd; and this we may infer from the apparent laxity of the fibres of the heart and all the other *viſcera*. Theſe *polypus's* well enough reſemble calves-foot jelly, but of a more firm and fibrous contexture. Therefore the warm and quick purges before-mention'd are very judiciouſly adminiſter'd by the *Indians*, to the creature lyable to theſe inconveniencies and coagulations, which probably are originally owing to the chyle being depriv'd of the volatilizing quality of the bile, in its paſſage thro' the inteſtines towards the heart. Dr. *Blair*'s too had a very large *polypus*, which ſeem'd to be made of yellow fat. *Galen* ſays, he took a great bone from the heart of an elephant, which I ſuppoſe was at the origin of the *aorta*, as is frequently found in ſtags and other creatures, beſides human. For which reaſon by the ſuperſtitious fancy of ſome, it has been introduc'd into the practice of phyſic, as a thing of great cordial vertue.

Come we next to that ſurprizing inſtrument its *proboſcis*, which is compos'd entirely of a curious *compages* of various *ſtrata* of muſcles, laid upon and running acroſs one another, their fibres being generally at oblique angles mutually interſecting, and inſerted into cartilaginous bodies, ſpred ſeveral ways thro' its whole length, from which complicated mechaniſm it can perform all manner of motions like a ſerpent, as *Aretæus* well expreſſes it; giving the whole or any part, all together or ſucceſſively, what degree of rigidity and tenſion, or limberneſs and mobility it pleaſes, from the influx of the ſpirits in muſcular action. Theſe muſcles may in a general ſenſe be ſaid all to ariſe from a very broad and large inſertion in the *os frontis*, depicted in Tab. V. Fig. 2. mark'd with the letters FFFF. whence the appearance of them in Tab. VII. Fig. I. is ſhown, as when ſeparated therefrom. They may in the ſame general ſenſe be ſuppos'd implanted into the great canal or cartilage, which runs in the center from one end to the other. Theſe *faſcia's* of muſcles diſtinctly conſider'd, conſiſt of fibres, ſome of a longitudinal direction, ſome tranſverſe or annular, ſome running obliquely to the right, ſome to the left. We diſcern the fore or upper part of the *proboſcis* has only longitudinal muſcles, whoſe bundles meet in the tendon on each ſide at one end, going the

whole

whole length of the *proboſcis* with the other extremity. The other *laminæ* generally ariſe from the tendon or cartilage on one ſide, and are inſerted into that on the middle or forepart, ſometimes into one another; for theſe ſide cartilages reach not above a fifth part of the whole length from the head, in its thicker or upper part. On the outſide of the upper muſcle or longitudinal one, in its contracted ſtate, we obſerve the fleſhy bundles of fibres compoſing it, are of a wave-like poſiture, which upon lengthning or bending the part become ſtrait, after the manner as is rudely imitated in Plate V. Fig. III. We muſt imagine the ſame of all the external muſcles of the trunk, without which contrivance it could never bend or twiſt the member as it does at pleaſure, and would have been in a great meaſure uſeleſs, or ſuffer'd much in its action, as the bark of a twig is crack'd and ſplit upon the convex ſide in bending. How the minute *ſtamina* of theſe muſcular fibrils are laid upon one another and implanted into the cartilages; how the veſſels have free paſſage between them, their mutual *nexus's* and implications, and nature's inimitable workmanſhip thro'-out the whole, where ſo many different intentions interfere not, is altogether aſtoniſhing. From a conſideration of Figure I. in Plate V. and the counter-contractions of theſe muſcles, we may eaſily get an *idea* of the manner of action in this wonderful part, whereby it can turn it every way, and becomes ſo very uſeful to the creature, and like an arm without bones. The cartilaginous body in the middle, which is the main ſtrength and firm ſupport of all the muſcles, is divided into two pipes or noſtrils, each bigger than ones thumb, of an oblong ſhape, pointed at one end, ſmooth and glib within. There is an intermediate *ſeptum* all along it, from the head to the extremity, cartilaginous likewiſe. In its upper part only, next the head, and juſt by the *epiglottis*, are two valves which it cloſes at pleaſure, whence are two paſſages into the mouth, and two into the ſpongy bones of the forehead: as is demonſtrated in the afore-mention'd Plate V. Figure II. The muſcles that ſerve theſe valves act, when by inſpiration it draws up the water in this double canal for drink like as in a pump; when they are full by bending its trunk into a bow, it ſpouts it as a torrent into its mouth, or over its whole body, for coolneſs or cleanlineſs, and to drive off flies, by the force of expiration. The ſection of this trunk is ſhown in Plate I. Fig. II. Very large and numerous nerves go to the trunk, which are propagated all along by the ſides of the arteries, as is uſual thro' its whole length, all which are drawn in the before-mention'd Plate VII. Fig. I. They ſerve for the admirable motions of the part.

The view of the mouth is ſet forth in Plate VI. DD. The two great teeth whence our ivory, grow in the upper jaw: they have been found ten foot long. It's allow'd that the teeth of the males are longer than the females, but that the latter is of the fineſt grain, and the age of them is judg'd by the whiteneſs. Dr. *Strachan phil. tranſ.* n° 277. ſays, ſome of them never have the long tusks. Authors are mightily divided, whether they ſhould be reckon'd horns or teeth, as likewiſe about the caſting them; ſome think it happens in about the ſpace of ten years, not annually. They form themſelves into a curve, the concave being forwards, quite contrary to the tusks of a boar, and which ariſe from the under jaw. Yet there ſeems no other difference between theſe two when compar'd together, than what ariſes from the beautiful contraſt of nature obſervable in all her works. You may find the diſpute whether they be horns or teeth ma-

nag'd

nag'd in *Pauſanias*, *Heliacis:* in *Oppian de venat.* ii. The antidiluvian elephants have been frequently found in the earth, even here in *England*, and impos'd upon the vulgar, who imagin'd 'em *exuviæ* of giants. A tooth was brought to me this year, in poſſeſſion of *George More*, Eſq; of *Newark*, weighing between three and four lb. the whole *ſceleton* was found in the cavity of lead-mines at *Wirkſworth* in *Derbyſhire*. Sir *Hans Sloan* has ſome bigger than this. In the continuation of the abbots of *Peterburgh*'s chronicle by *John de Boſton*, lately publiſh'd by Mr. *Sparkes*, there's an account *anno* MCCCXLIIII that ſuch another was found at *Bardney*, *Lincolnſhire*, and thought a giant, but the deſcription ſufficiently clears the matter. So Mr. *Aubury* in his mſ. collections of antiquities in *Britain* and *Ireland* tells us, elephants bones have been dug up out of a ſpring at a camp on *Mamtor-hill*, near *Caſtleton* in the high-peak of *Derbyſhire*. Mr. *Cambden* in *Eſſex* p. 351. ſpeaks of the like from *Ralf de Coggiſhal* found near the *Neſs* point: and many inſtances there are in foreign authors.

The skull of the elephant is not very large, eſpecially its cavity that contains the brain. But 'tis remarkably thick; for its inward and outward walls are ſeparated to a conſiderable diſtance, by a vaſt number of bony cells, eſpecially in its fore part and ſides. Theſe *ſinus's* of irregular figures and magnitudes generally communicate one with another, and end in the common duct of the noſe. Hence it is that when darts or arrows are ſtruck into its head, and the hunter imagines the creature kill'd: he pulls them out with his trunk without harm, for they cannot penetrate into the receſs of the brain. The reaſon of this ſeems only to ſwell out the external bulk of the head, and make it a little more ſhapely and proportionate to the bulk of the animal, without enlarging the brain more than neceſſary: therefore may be look'd upon as a fine ſtroke in drawing, to give a greater grace to the *contour* of her figure, introduc'd by nature, ſtudious of beauty and ſymmetry as well as convenience. We ſaw'd off the upper part of the *cranium*, which exhibited a moſt noble and delightful view of an horizontal ſection of the brain and cerebel with its branching texture, quite thro' the *ſeptum lucidum*, whereby the *corpus calloſum*, ventricules and *corpora ſtriata* were viſible; as repreſented Tab. I. Fig. I. The whole compoſure of the brain was not inferior to that of the human, and diſcover'd its beauties proportionable to its bulk, eſpecially in all the pairs of nerves, which were large and very diſcernible, particularly the recurrent upon the body of the *medulla ſpinalis*, in the cavity of the *vertebræ colli*, together with its blood-veſſels. The olfactory nerves were very broad, as being the origin of thoſe numerous *propagines* diſſeminated thro' the trunk. We took off a moſt delicate *plexus* of the arteries that ran upon the outward ſurface of the brain under the *dura mater*, and extended it upon fair paper, which was left in the cuſtody of Sir *Hans Sloan*. The whole ſtructure of the contents of the head was ſo fine and perfect, that we need not wonder this creature, according to hiſtory, ſhould be the wiſeſt of all brutes, and even endu'd with human paſſions. *Elephanto belluarum nulla prudentior*, ſays *Cicero* i. *de natur. Omnium quadrupedum ſubtilitas animi præcipua illis perhibetur*, Plin. 'Tis allow'd on all hands, that they are of an incredible docility and ſenſe of things, manſuete and a lover of company. It's needleſs to repeat the many ſtories of its underſtanding muſic, language, gratitude, memory, revenge and the like, which will not come under the denomination of inſtinct as we term it in other animals, and are largely noted in writers of hiſtory and tra-

vels in the eaſtern parts of the world, where they are chiefly bred, and eſteem'd by the emperors of thoſe countries as a kind of deities, on whoſe fate depends that of their kingdoms: on whoſe account ſometimes they have made great and terrible wars upon one another. Much of this nature in *Pliny*'s eighth book and others. Their ſenſe of ſmelling is ſaid to be very acute, and they are exceedingly pleas'd with odoriferous herbs and flowers. They delight much in finery, and to be adorn'd with gawdy trappings. They tell us, they are ſenſible of the beauty of a woman, and upon ſight thereof will remit of their fierceneſs and anger, when provok'd to a paſſion. It's affirm'd they love to be prais'd, careſs'd, and flatter'd with magnificent and pompous titles, ſuch as they beſtow on their emperors; that they are ſenſible of kind promiſes of good paſturages and ſuch fruits as they admire, which they will reſent very much, if not punctually perform'd. *Pliny* and *Ælian* ſay they have been taught to write. Who will be incredulous, when we are aſſur'd ſo bulky a creature has been inſtructed to dance on ropes, for the entertainment of the *Roman* people, in their amphitheaters? *Arrian* and *Martial* ſay, they learnt them to dance to muſick in time and meaſure. Whoever have a mind to divert themſelves with the whole hiſtory of the elephant, may find it in *Aldrovand* and *Geſner*, where every thing is collected together that has been written in any author concerning it.

They are ſaid to be a very chaſt creature, and never accompany with more than one female, and in ſuch obſcurity that no one has ever been able to detect them. *Ælian* affirms too that it is but once in their lives, purely for continuance of their *ſpecies*. *Ariſtotle* adds, not till they are 20 years old. Some authors affirm, the time of their geſtation is about a year and half, others two years, and bring forth ſingle births. *Ælian* ſays, the young elephant is about the bulk of a calf of a year's age, and that it ſucks with its mouth, not its trunk. We know not whether credit ought to be given to him, affirming, that they are not unwilling to have their young ones taken away, as judging the noble and generous nature of mankind will not injure their offſpring, but rather cheriſh it. We are next brought to conſider the parts of generation, whoſe ſtrangeneſs has puzzl'd all anatomic enquiries, even ſo far that they have not been able generally to determin the very difference of the ſex. Monſieur *Suply* ſays, in the *abdomen* of that he diſſected, was found under one of the kidneys, a round body bigger than a man's head, cover'd with a ſtrong and thick membrane of a like contexture and ſubſtance with that of the renal glands, but without any apparent cavity or excretory veſſel: he immediately imagin'd it to be one of the teſticles, but finding none on the other ſide correſpondent thereto, he chang'd his ſentiment, and owns his ignorance of what it ſhould be, or where they are ſituate in this creature, ſeeing nothing appears outwardly either in the male or female as in other quadrupeds, but a kind of little pouch hanging under the belly. He ſays the *penis* meaſur'd in its contracted ſtate 4 foot in length, cut off as cloſe as poſſible from the *corpus nervoſum* and *os pubis*. That the conduit of the *urethra* was very ſmooth and ſhining within, and would admit the introduction of a finger, that it was in the main like the *priapus* of an horſe. The great naturaliſt of *Stagyra* ſays the *penis* is like a horſe's, but ſmall, and that its teſticles are not viſible outwards but plac'd near the kidneys. Upon view of the external *pudendum* which is not large, we pronounc'd ours a male from the reſemblance of

the *clitoris* to a *penis*. It had all the nerves, muſcles, arteries and veins thereof, but was no more than two hands bredth long, and thick proportionably. Upon further *examen* we diſcover'd the *vagina*, which corrected our miſtake; this was wide enough to admit a hand, and extended it ſelf backwards from its orifice upon the belly, till it came to the *os pubis*, then reflecting forwards ended in the opening of the bladder and womb, not far diſtant from each other, under and beyond the *os pubis*, the *clitoris* accompanying it all the way. This conformation could not but ſurprize us, and put us upon reaſoning, what ſhould be the intent of nature, in ſo ſtrange a procedure. The opening into the *uterus* was by two *foramina*, juſt like two noſtrils; after it has gone ſome length diſtinguiſh'd by a *ſeptum* all the way, it becomes one cavity, and at the ſame time divaricates into the two *cornua* as is uſual in other beaſts. A great body of fat on each ſide ſtretched themſelves from the *vagina* round the bladder, all the length of the *cornua*. We obſerv'd theſe collections of hard fat in this creature, to abound in all the cavities, perhaps on account of ſome reaſons we have offer'd above, when mention was made of the *omentum*. The *capſula's* of the ovaries had fibrous columns reaching from one ſide of its inward membrane to another, like the auricles of the heart. There were large *lacunæ* in the coat of the *vagina*. The bladder would contain about five gallons. It ſeems as if this creature voids its urine all at once, like the throwing of water ſuddenly out of a veſſel, which is probably perform'd by the *vagina* receiving it from the bladder into its whole capacity, and then ſpouting it out.

This is what appear'd upon firſt view as to the parts ſubſervient to generation in a female as our creature; but Dr. *Douglas* took them home with him to examin more nicely, and thereupon gives his ſentiments in the ſubſequent account.

AT the opening of the young elephant in Sir *Hans Sloan*'s garden, I chiefly applied my ſelf to the diſſection of the *proboſcis* and uterine parts, having with all the care, the inconveniencies of the place and badneſs of the weather would admit of, ſeparated the firſt from the head, and taken the latter out of the cavity of the *pelvis*, and then had them both carried home to my own houſe: where the remarks I made on the *uterus*, I have drawn up in the following manner.

The parts then to be examined are, 1. the *clitoris*. 2. the *vagina*. 3. the *uterus*. 4. the *cornua*. 5. the *ovaria*. and in the laſt place to conſider the poſture for copulation, which the uncommon ſituation of ſome of theſe parts does occaſion.

1. The *clitoris*, which in all reſpects does very much reſemble the human *penis*, ariſes by two *crura* from the lower part of the *os pubis*, which ſoon uniting make up one body thirteen inches long, and aſcending towards the navel upon the muſcles of the belly behind the *vagina* which firmly adheres to it, terminates (leaving the wider integuments) into a longiſh round part cover'd with a fine skin, which appears very like the *glans* of a negroe's *penis* in color as well as in ſhape, but has not the leaſt appearance of any perforation or hole in it. This *glans* or *balanus* is one inch and an half in length, and about three inches round. The ſubſtance of the *clitoris* is ſpungy and reticular, cover'd with a thick and white nervous caſe or *involucrum*, as the *penis* is in men. The blood-veſſels and nerves

nerves are ramified on its *dorſum* or back, after the ſame manner they run on the *penis*. It has alſo two muſcles, that in their beginning, progreſs and inſertion do reſemble the *erectores penis* in men. Along the back of this part there runs a large round tendon between the two nerves, under a particular membranous covering as in a caſe, and prevents its ſtarting in time of action, which is made up by the union of the ſhort tendons of two muſcles which ariſe from the *pubis* near the beginning of the *crura clitoridis*, and terminates by a thin expanſion at the lower end of the *clitoris*, and alſo into the skin of the belly that comes round the *glans* as a *præputium*. The uſe of this pair of muſcles ſeems to be to unſheath the *glans* by drawing the skin downwards nearer the *pubis*.

2. We come next to examine the *vagina penis*, which for its length and ſituation is particularly remarkable, and very different from any thing I ever met with in any other animal as far as I remember. Its external opening, which is the *orificium pudendi*, is not near the *anus* as in other females, but upon the belly, midway between the *pubis* and navel juſt under the *glans clitoridis*; which was the reaſon why I miſtook the ſex upon a ſlight examination of the external parts; for obſerving no orifice nor opening near the *anus*, and ſeeing a large and well formed *glans* near the navel, I took it for a male, and was not undeceived till I parted the *oſſa pubis* and came into the cavity of the belly: from thence it went down to the bottom of the belly, paſſed over the broad fore part of the united *oſſa pubis*, and where they parted entered between and penetrated further into the cavity of the *pelvis*, between the *rectum* and *veſica*, and ended at the *oſculum uteri inferius*. On the outſide of the belly its connexion is to the body of the *clitoris*, and within to the *rectum inteſtinum* and *veſica urinaria* as in other ſubjects, being in length about twenty inches. As to its capacity, it is narroweſt where it is loſt in the skin of the belly, which here forms a kind of *labia*, the outer skin being thin and of a whitiſh color. It becomes a little wider near the union of the *crura clitoridis*, and from thence it grows ſtill wider till it receives the *meatus urinarius*, and then above that opening it contracts a little juſt before it ends: the wideſt part being ſeven inches round the ſides of the *vagina*, being laid flat upon one another, but when blown up it appears ſo large as to receive one's fiſt; where it adheres to the *clitoris* it's not much above five inches. On the inſide of this paſſage, we obſerve the large orifices of ſeveral glands. Its ſubſtance is half an inch thick, between the place where the *veſica* opens and a little below the union of the *crura* of the *clitoris*, and looks of a reddiſh color when opened: where it adheres to the *clitoris* it's not much thicker than ordinary, excepting its muſcular coat. This *vagina* is provided with one pair of muſcles and one *ſphincter*. The firſt ariſes from the *iſchion*, fleſhy and narrow, and paſſing near the *ſphincter ani*, from which it ſeems to receive ſome part of its origination, it is ſpread over one ſide of the *vagina*, and then is inſerted into the *clitoris* a little below the union of its *crura*. As it paſſes from the *ſphincter* of the *anus* to the *vagina*, it forms a thick bundle or *manipulus* of fleſhy fibres, and there it ſpreads it ſelf on the back of the *vagina*. The ſecond muſcle lies under the inſide of the *oſſa pubis*, ariſing alſo from the *iſchion*, from whence paſſing over a kind of tendinous pulley it covers one ſide of the *vagina*, and then in the middle joins its fellow of the other ſide; and when theſe act the paſſage of the *vagina* muſt be ſtraitned. The *ſphincter* muſcle covers the neck of the

b'adder

bladder as well as the upper part of the *vagina*, and ſo ſerves chiefly to hinder the involuntary excretion of urine.

3. *Uterus.* The part that lies between the ending of the *vagina* and the opening of the two *cornua*, may well be eſteemed to be the *uterus* or *uteri fundus*, being in length nine inches, and laid open upon an eaſie ſtretch it meaſures about eight inches. Its inſide is of a whitiſh color, and pretty full of wrinkles. The lower part is contracted, and opens into the *vagina* by two orifices with an intervening thin *ſeptum* about the bredth of an inch: this part being viewed from the opened *vagina* exactly reſembles the noſtrils. At its upper part, where the *cornua* open, we obſerve two *labia* or lips with a large opening between; one of them is broad and large, but the other is much narrower, and contracted. Theſe *labia* are nothing but a reduplication of the inner coat, which is wrinkly and rugous in ſeveral places and of a white color, but has no muſcular coat on the outſide.

4. *Cornua.* We muſt divide each *cornu* into two parts, to have a diſtinct notion of the whole. The firſt I call the united part, becauſe it appears to be ſo, being both cover'd by the *peritonæum* and entirely freed from any adheſion to the *rectum* or *veſica*: yet they are diſtinguiſh'd in their whole length by a longitudinal *ſeptum*, as you may obſerve in this one that is laid open. The other is entire; yet there's not any appearance of a *ſulcus* or depreſſion in the middle as a note of diſtinction. Each of theſe *cornua* is about nine inches in length. The ſeparated or diſtinct part of the *cornu* is ten inches in length, *i. e.* between the place where it parts from its fellow to its termination in the *ovarium*. Its wideſt part when flatted out is ſomething above two inches, but when blown up by inflation its near ſeven inches round; they both run ſtreight laterally, and not in an undulating manner as they do in moſt quadrupeds. There are no wrinkles, much leſs any cells, in this part of the *cornu*, its inſide being very ſmooth and even, and nothing like any protuberances when blown up. It grows very narrow juſt as it ends at the *ovarium*. Tho' no wind paſſes out at this end, yet there muſt be a communication between it and the ovary. They are made up of two diſtinct membranes, the innermoſt of which is full of glands. One ſide of the *cornua* is fix'd to the *peritonæum*, which is commonly call'd the *ligamenta lata*, and is here looſe and floating, and cover'd with a great deal of fat; but all the reſt is free from any adheſion.

5. *Ovarium.* From the place where the *cornua* terminate in the *peritonæum*, there ſeems to be continued from them a large membranous *capſula* or bag, and probably has the ſame uſe with the *fimbriæ vel ornamentum foliaceum* in the *tuba falloppiana*, which is to claſp about and embrace the ovary in time of impregnation; and as that in women is a continuation of the ſubſtance of the tube it ſelf, ſo this bag is nothing elſe but a production and dilatation of the *cornu*. In figure and ſhape it very much reſembles the right auricle in the human heart; it is made up of two membranes, the innermoſt of which is divided in the middle, and between the duplicature in the lowermoſt half there's a plain canal that leads towards the *cornu*, made, I ſuppoſe, for conveying the fœcundated *ovulum* into that part. The ovary or egg cluſter is connected to the *peritonæum* which is fixed to the *ilia*, having all round the

ſame a great deal of fat inclos'd between two membranes. It is flat and thin in this young animal, and thro' the wrinkled skin there may be ſeen ſeveral white ſpecks which are the *rudimenta ovulorum.* The diſtance between the two ovaries is twenty five inches.

6. The manner and poſture of their copulation comes next to be conſider'd, which is ſomething difficult to determin without ſome notion of the ſtructure and ſituation of the *penis* in the male; but ſuppoſing that his genital parts are like thoſe in a horſe, which was advanced many hundred years ago by *Ariſtotle* himſelf, *genitale equo ſimile habet ſed parvum,* and confirm'd lately by Dr. *Moulins,* in the anatomy of the elephant he diſſected at *Dublin,* where he ſays the *penis* was larger than that of a ſtone-horſe, but hardly ſo long. Now I ſay, ſuppoſing this, the poſture muſt be as follows, and almoſt in the ſame manner as *Ariſtotle* has expreſs'd in *Theodore Gaza*'s tranſlation, *ſubſidit fœmina, clunibuſque ſubmiſſis inſiſtit pedibus ac innititur: mas ſuperveniens, comprimit atque ita munere venereo fungitur.* That is in ſhort, the female muſt be in a ſupine poſture or lying on her back, and that either in a ditch, or as *Tavernier* will have it in a bed of herbs or weeds four or five foot high from the ground, and the male in a prone poſture, and ſo muſt enter *more humano*; and in order to bring the *orificium vaginæ,* which is at a great diſtance from the *anus,* the firſt pair of muſcles we have deſcribed as belonging to that part, together with the influence of the *retractores præputii,* which we have likewiſe ſeen, are provided and contrived by the wiſe architect of all things, to draw down and approximate that part to the *pubis,* being much aſſiſted by the efforts of the *penis* and general contraction of all the parts *vigente venere.* There ſeems to be ſtill another way, could the big unwieldy animal perform it; and that is for the male to get upon the female lying on her back with his head towards her hind legs. If neither of theſe will do, it is certain and demonſtrable from the known ſituation of the female parts, that the *coitus* can never be performed *more brutorum,* i. e. neither by getting up behind as horſes, *&c.* neither breech to breech, as the animals called retrocoient, ſuch as hares, *&c.*

EXPLI-

EXPLICATION *of the* PLATES *of the* ELEPHANT.

Tab. I. Fig. I. A ſection of the upper part of the ſcull of the elephant ſawed quite acroſs. A. denotes the forepart or *os frontis*, where its cellular caverns are remarkable before and on the ſides. B. the medullar. C. the cortical part of the *cerebrum*. D. the *corpus ſtriatum* making the right and left ventricle. E. the *ſeptum lucidum*. F. the *cerebellum* with its foliage-work. G. the back part of the ſcull without caverns. H. the paſſage of two blood-veſſels between the *cranium* and *dura mater*.

Fig. II. a croſs ſection of the trunk of the elephant. A. its fore or upper part. BB. the double cartilaginous pipe or noſtrils. CC. the blood-veſſels and nerves. DD. its muſcular *laminæ*.

Tab. II. Fig. I. ſhows the *thorax* open'd. A. the *œſophagus*. B. the windpipe. CC. the lungs. DD. the cartilaginous ends of the ribs whence the *ſternum* is ſeparated. E. the heart with its coronary veſſels. F. fat lying thereon. G. the right auricle. HH. the carotids from the head. II. the axillaries from the arms. K. the diaphragm. L. the liver. M. *ligamentum umbilicale*. N. the ſtomach. O. the *pylorus*. P. the margin of the *omentum*.

Fig. II. the *abdomen* open'd. A. a piece of the upper limb of the *omentum*. B. the *ligamentum umbilicale*. C. part of the ſtomach. D. part of the ſpleen. E. part of the *duodenum*. F. the *colon*. GG. the *peritonæum*. H. the *omentum*.

Tab. III. Fig. I. one of the ſigmoid valves of the pulmonary artery as big as the life. CC. the tendinous expanſions. D. E. ſhow the decuſſation of its component fibrils.

Fig. II. one of the ſigmoid valves of the great artery equal to nature. CC. the tendinous expanſions. D. E. the decuſſation of the fibrils.

Fig. III. is a fleſhy column going from the *ſeptum* to the ſide of the right ventricle of the heart.

Fig. IV. the tricuſpid valves of the right ventricle of the heart in their natural bulk. AAAA. the roots or tendons thereof, cut off from the ſides of the ventricle. B. the membranous part.

Tab. IV. Fig. I. a piece of the *omentum*, with the veins, arteries, and adipoſe veſſels.

Fig. II. ſhows the mitral valves of the left ventricle of the heart, according to their real magnitude. AA. denote the two tendons implanted in the left auricule. BB. two tendons their antagoniſts, inſerted in the ſides of the left ventricle. CC. are blood-veſſels diſperſed over this part of the valve.

Tab. V. Fig. I. a piece of the *proboſcis* where the ſeveral muſcular *laminæ* of different directions are viſible, and how they are implanted into the cartilaginous lines that run thro' its whole length. A. is a muſcular *ſtratum* ſeparated on one ſide. B. a cartilage running the length of its upper or fore part. C. one of the ſide cartilages running a fifth part of its length.

Fig.

Fig. II. ſhows the fore part of the ſcull or forehead, where is the origin or implantation of all the muſcles and cartilages of the *proboſcis*. A. the *os frontis*. BB. the *ſinus's* of the noſe. C. the *ſeptum naſi* continu'd thro' the whole trunk. DD. the baſes of the valves near the *epiglottis*. EE. paſſages into the mouth. FFFF. the origin of the muſcles of the *proboſcis*. GG. paſſages from the ſpongy cells of the head.

Fig. III. the manner of the appearance of the upper or external muſcle of the *proboſcis*, the fibrils whereof by lengthing become ſtrait, or reduce themſelves into a wave-like figure according to the variety of their action.

Tab. VI. ſhews the mouth of the elephant. A. the trunk. B. the palate or roof of the mouth. CC. the lower jaw divided in the middle. DD. the tusks breaking out. EE. the lips. FF. the four grinders in the upper jaw. G. the glands in the roof of the mouth. H. the tongue thrown back. I. the muſcles of the cheeks. K. the *uvula* and throat. L. the *os hyoides*.

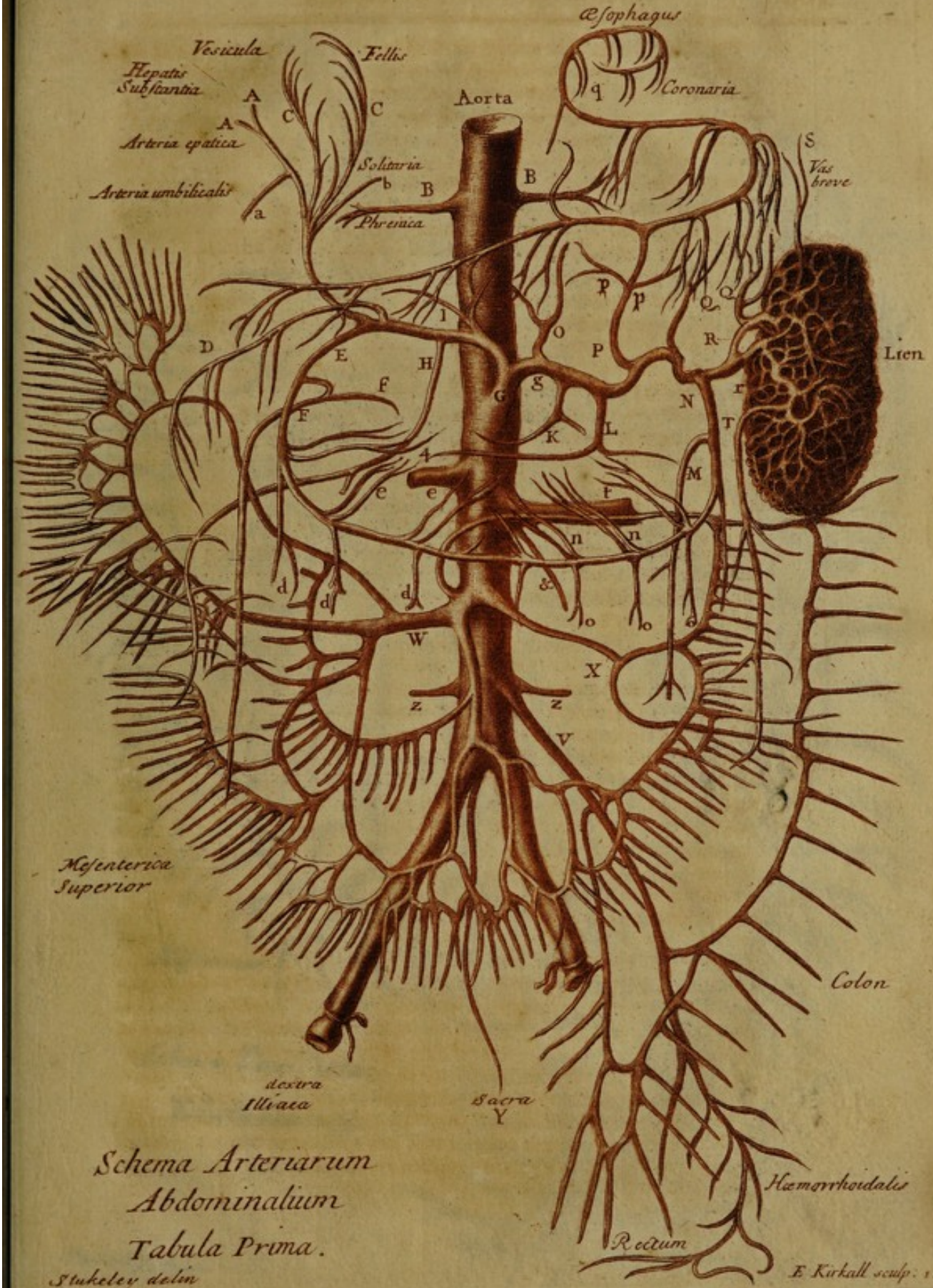
Tab. VII. Fig. I. demonſtrates the root of the *proboſcis* ſeparated from the *cranium*. A. the under ſide of the *proboſcis*. B. *os naſi ſpongioſum*. CC. two valve-like bodies at the opening of the two pipes of the trunk, upon the ſpongy bones of the noſe. D. the cartilaginous *ſeptum* between the two pipes or noſtrils. EE. the origin of all the muſcles of the *proboſcis* cut from the ſcull. FF. nerves going to the body of the *proboſcis*. GH. veins and arteries accompanying them. I. the fore part of its inſertion upon the *os frontis*.

Fig. II. the concave ſide of the ſpleen, where the veins, arteries and nerves enter in a line paſſing thro' its middle.

Fig. III. a ſection of the *medulla ſpinalis* in its natural bulk, of a young elephant.

Tab. VIII. the parts of generation in a female elephant ſeen from the back part. A. *glans clitoridis*. a. *orificium vaginæ*. B. *vaginæ dorſum*. CC. *muſculi retractores præputii*. DD. *crura clitoridis*. dd. *muſculi ejuſdem*. EE. *conſtrictores vaginæ*. F. *ſphincter ani cum glandulis ſuis inter plicas latentibus*. G. *Muſculus elevator ani*. H. *inteſtinum rectum*. I. *vagina aperta & orificium veſicæ*. K. *duplex uteri orificium*. LL. *ligamenta veſicæ ſuſpenſoria*. M. *vaginæ pars ſuperior aperta, ubi orificium uteri & labium ejus*. mm. *ureteres*. N. *cornua ad invicem juncta, alterum clauſum, alterum apertum per longitudinem*. OO. *ovaria, alterum capſula exutum*. P. *veſica*. QQ. *fimbriæ*. RR. *rami venæ hypogaſtricæ*. SS. *ligamenta lata vaſculis interſperſa*.

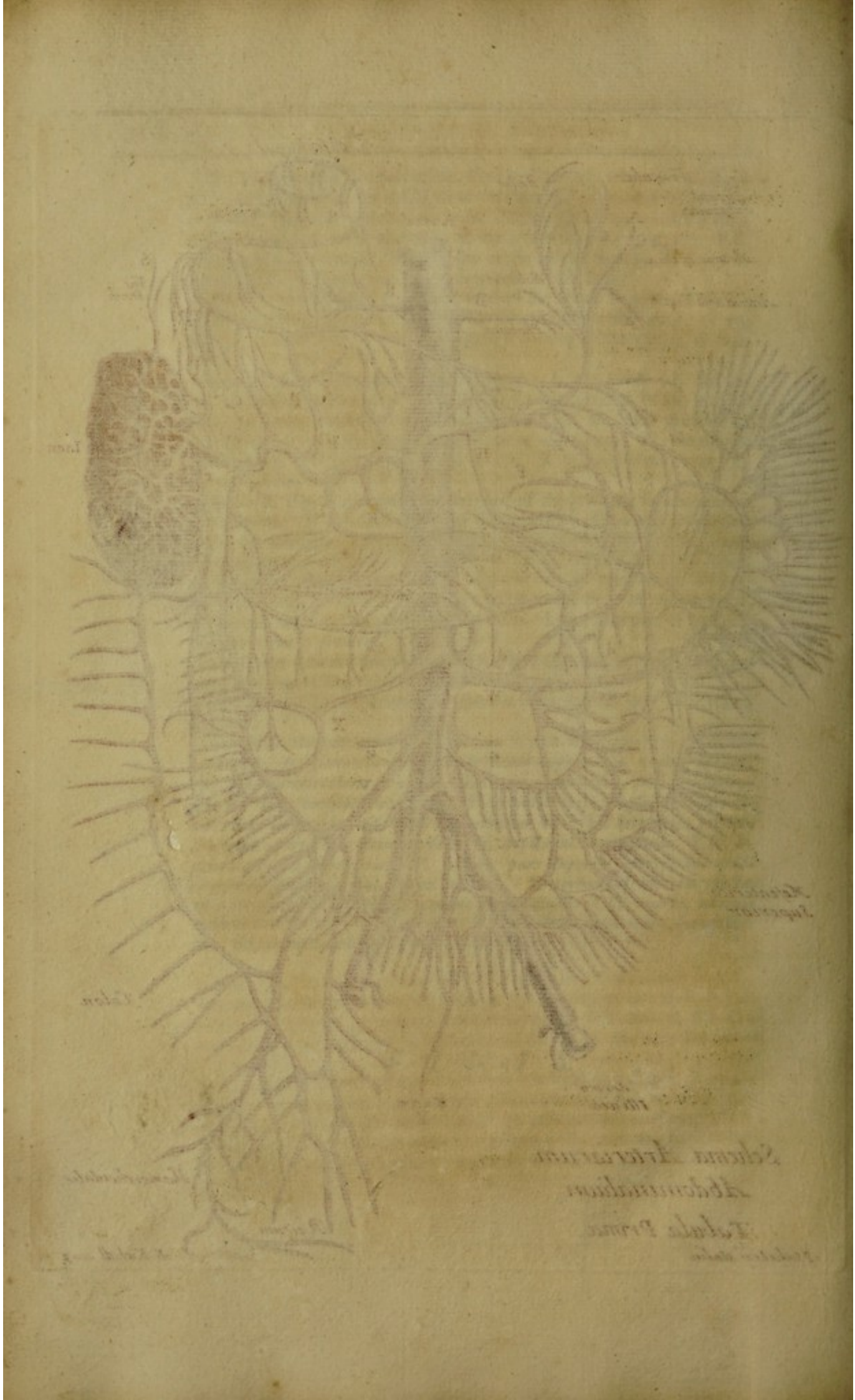
FINIS.

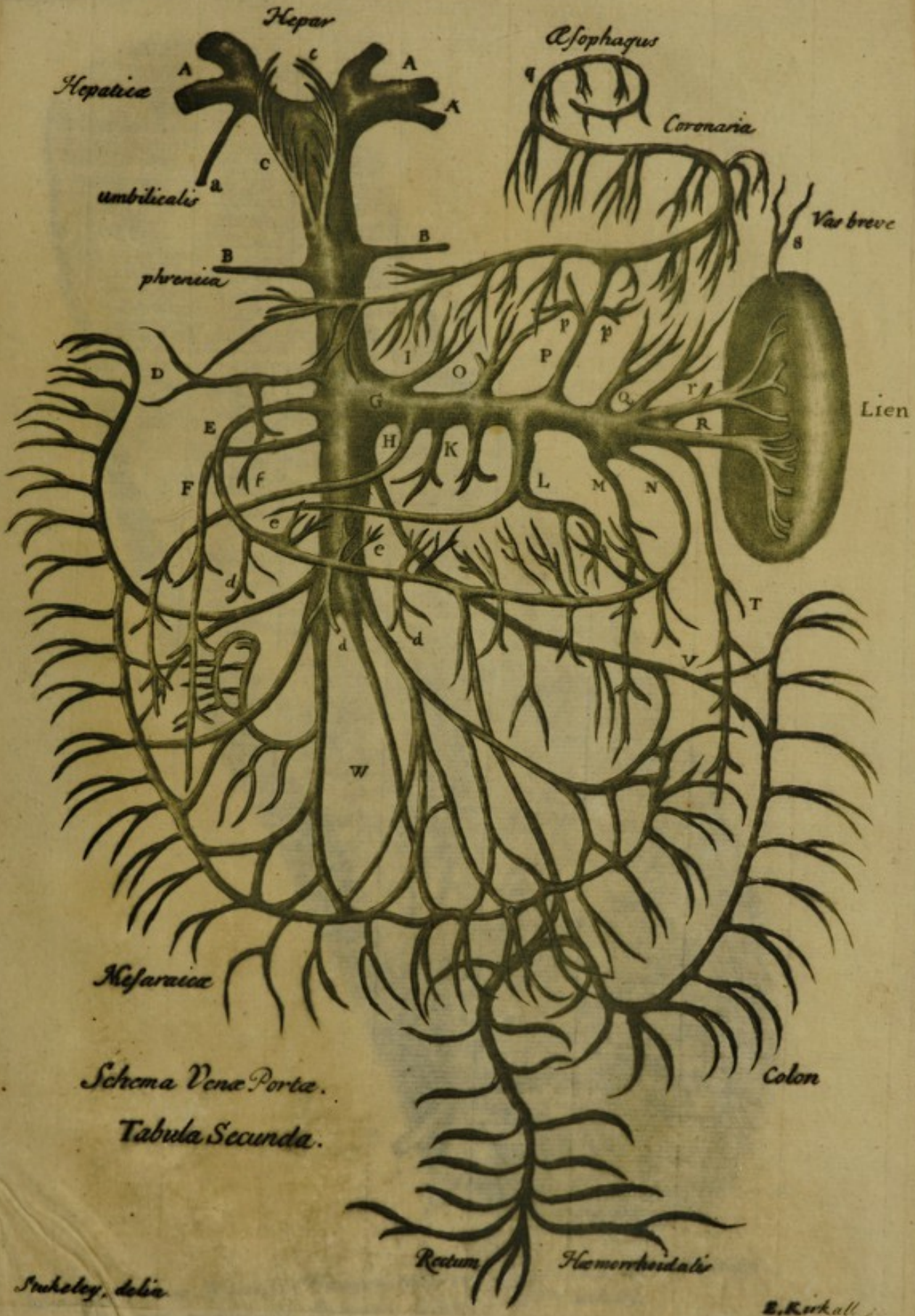


Schema Arteriarum Abdominalium Tabula Prima.

Stukeley delin

E. Kirkall sculp: 1.





Schema Venæ Portæ.

Tabula Secunda.

Stubeley. delin

E. Kirkall sc.

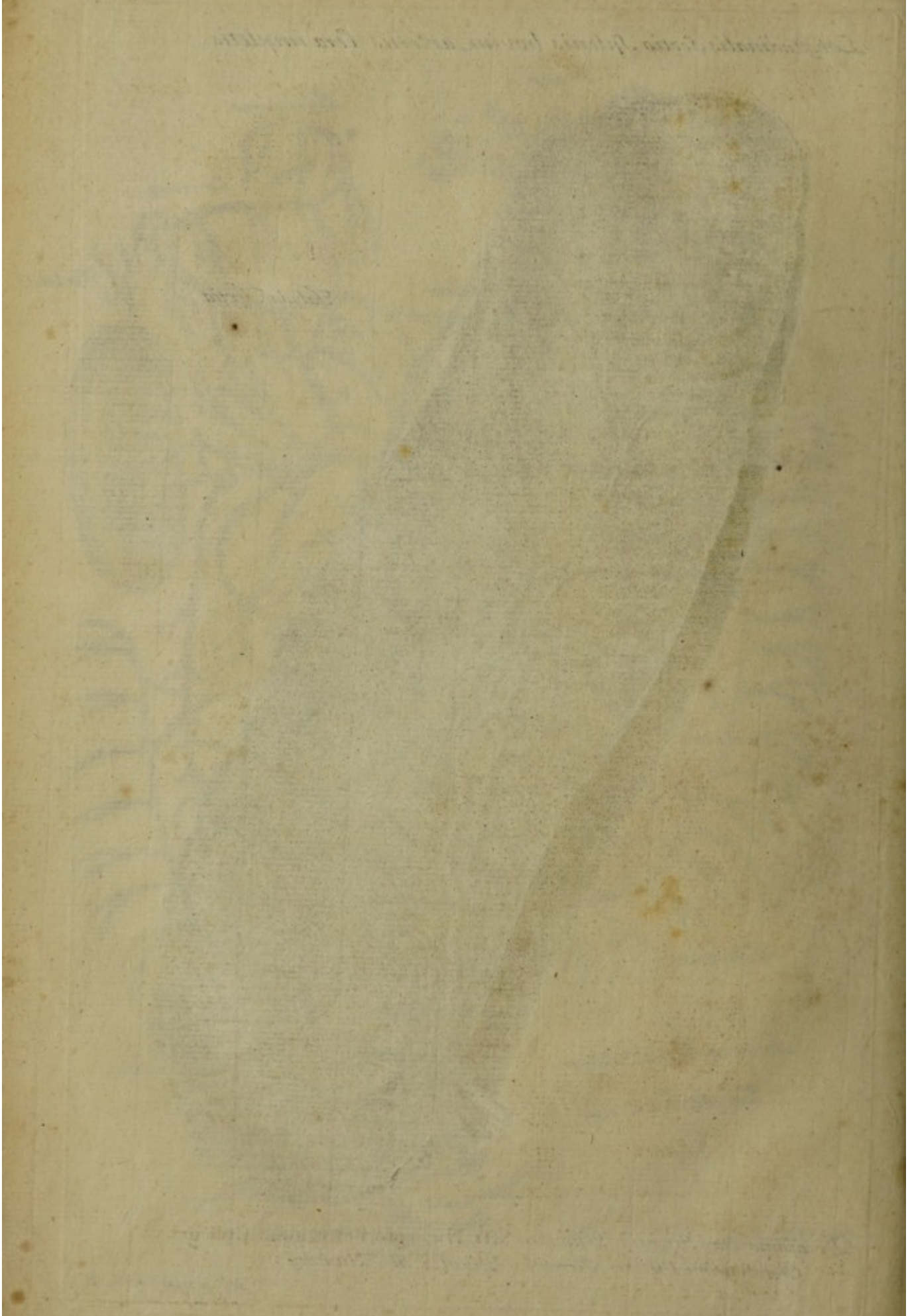
Tabula Secunda.

Longitudinalis Sectio Splenis bovini, arteriis Cera impletis.

Tabula Tertia

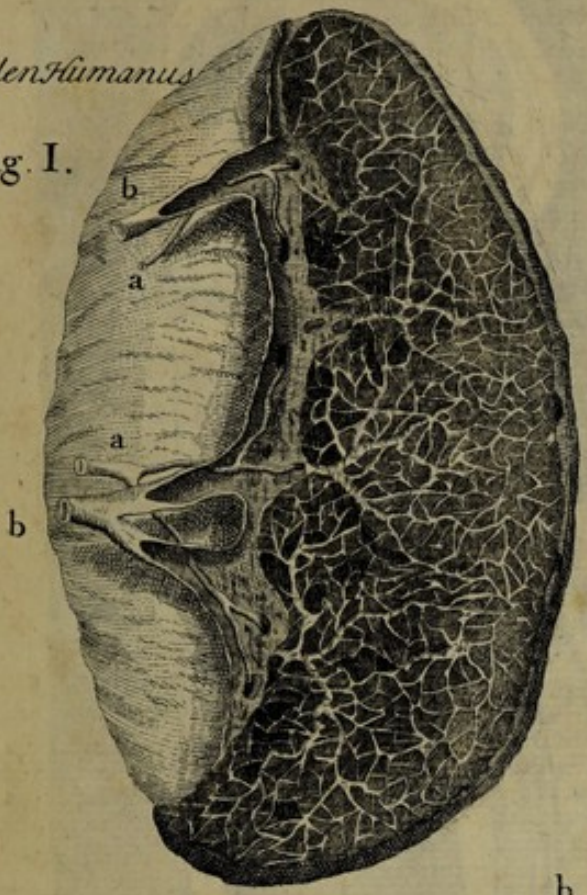
Doctissimo Viro Henrico Plumptre M.D. Præceptori olim, nunc Collegæ,
Elegantissimi Visceris Iconem Dicat W.^m Stukeley.

G V^dr Gucht Sculp^t 3



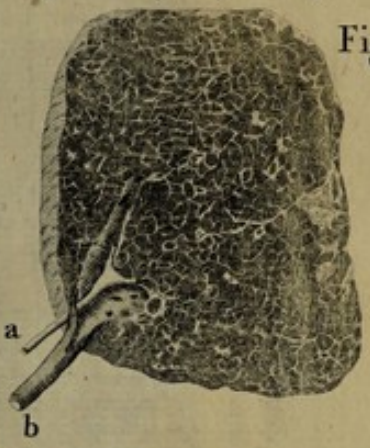
Splen Humanus

Fig. I.



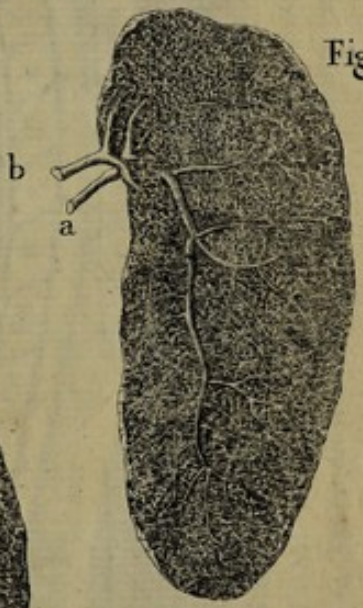
Splen rupicapræ Alpinæ

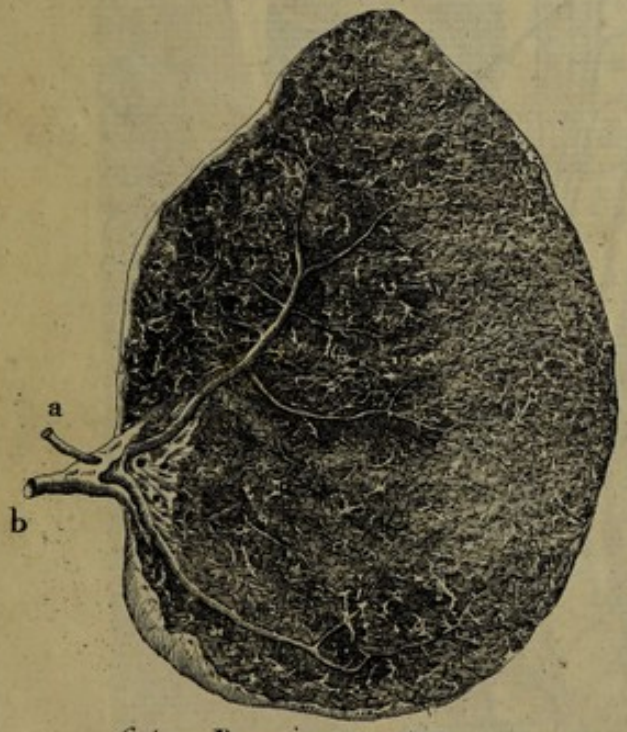
Fig. II.



Splen Ovinus

Fig. IIII





Splen Pueri Fig. III.

Tabula quarta

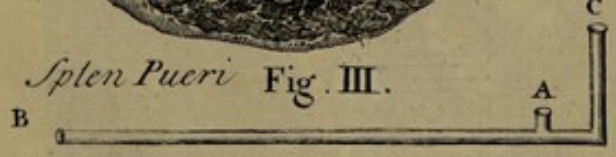
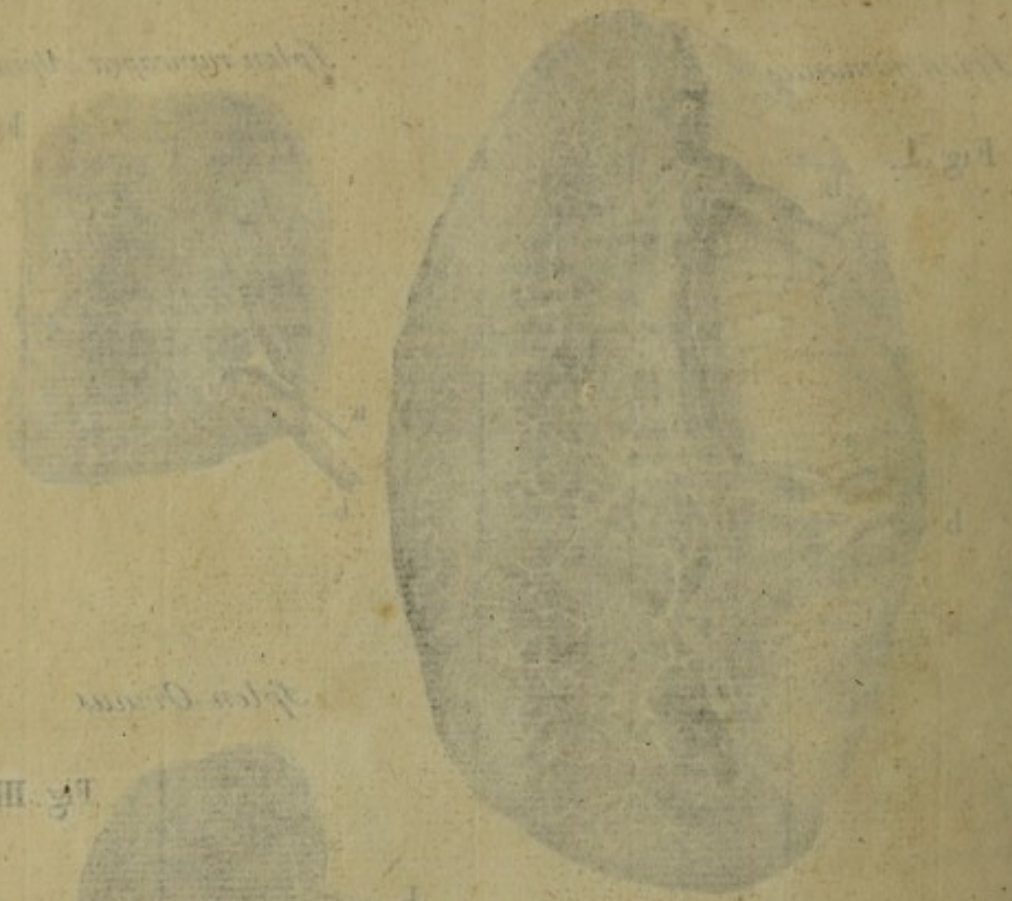


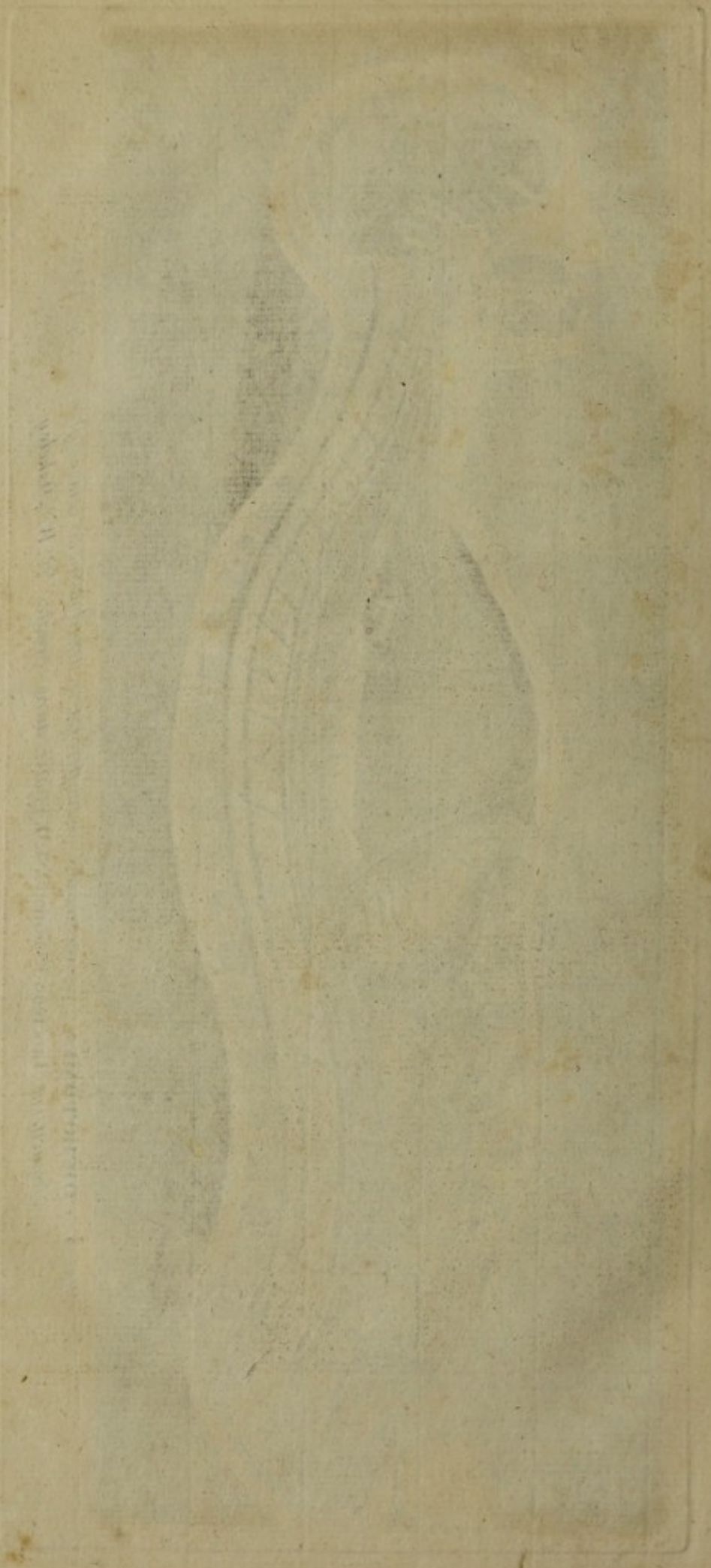
Fig. V.

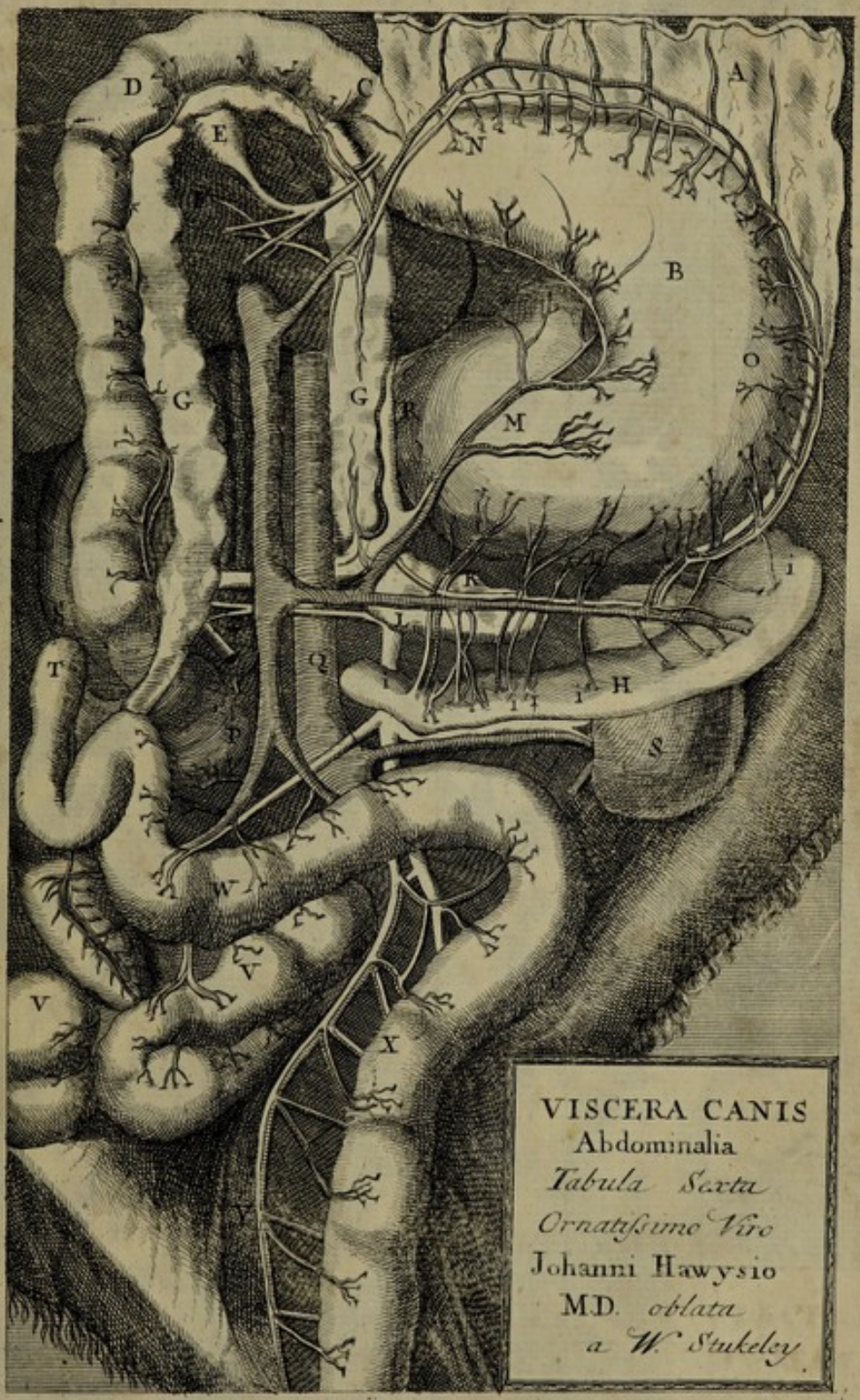
Cl. Richardo Mead M.D. Naturæ opus elaboratum D.L.M.

W.m Pickering . 4.



Humana **DICHOTOMIA** *Nervosi generis in sinistro latere distributionem commonstrans. Apr. 1722*
Sagacissimo Tancredo Robinson M.D. *vitalis aurae canales D: Wm Stukeley*

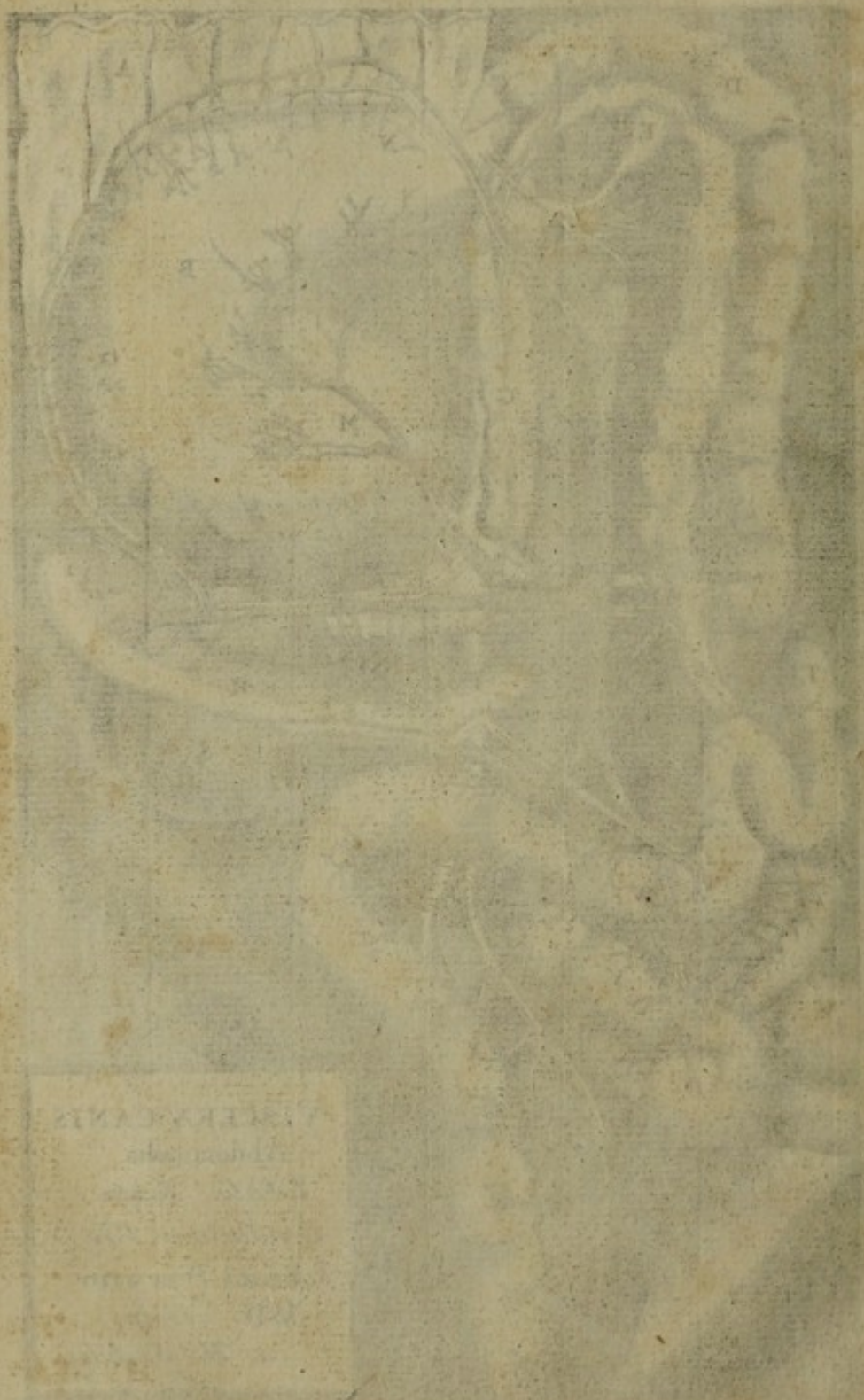


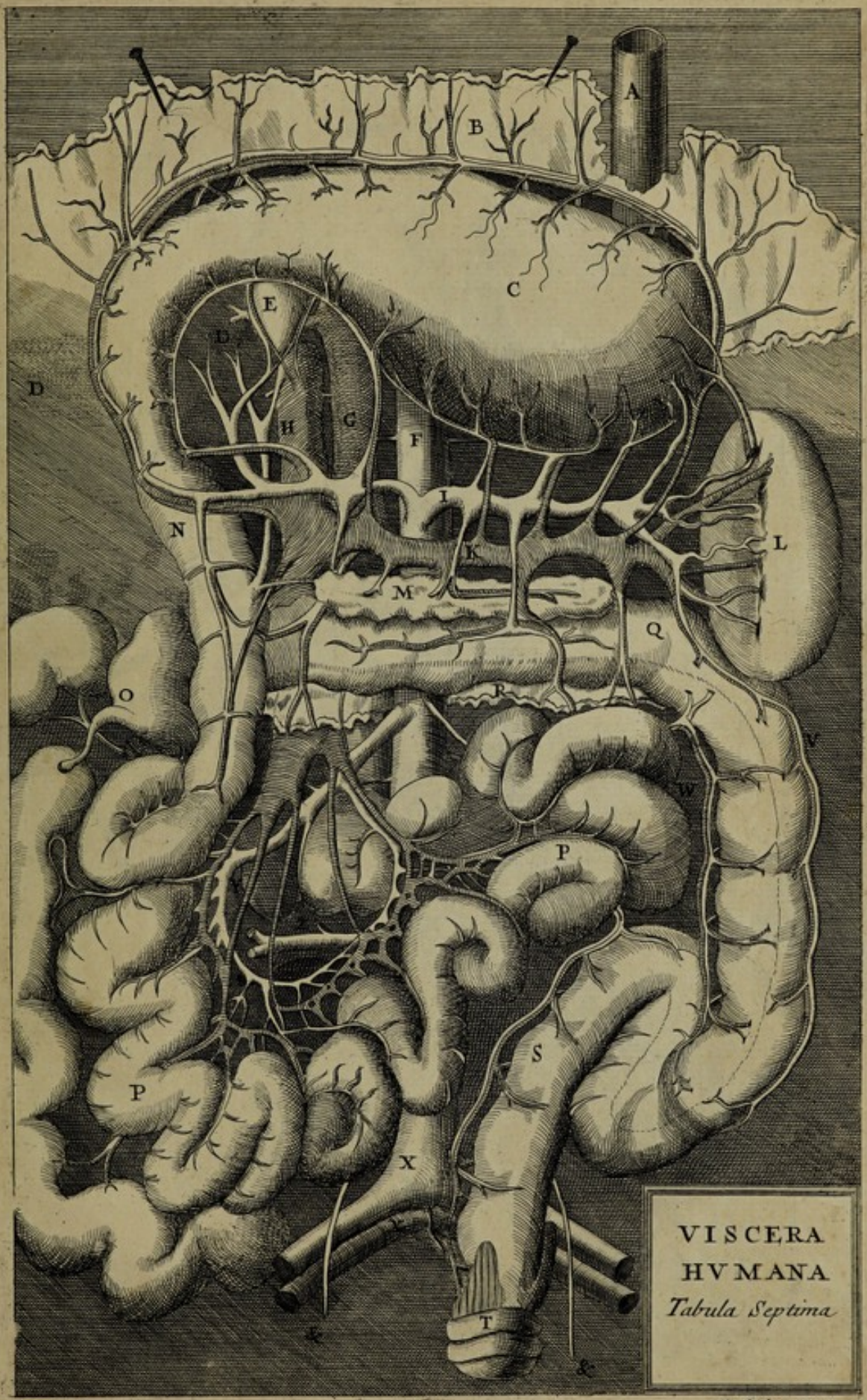


VISCERA CANIS
Abdominalia
Tabula Sexta
Ornatissimo Viro
Johanni Hawysio
M.D. *oblata*
a W. Stukeley

6

Stukeley delin.

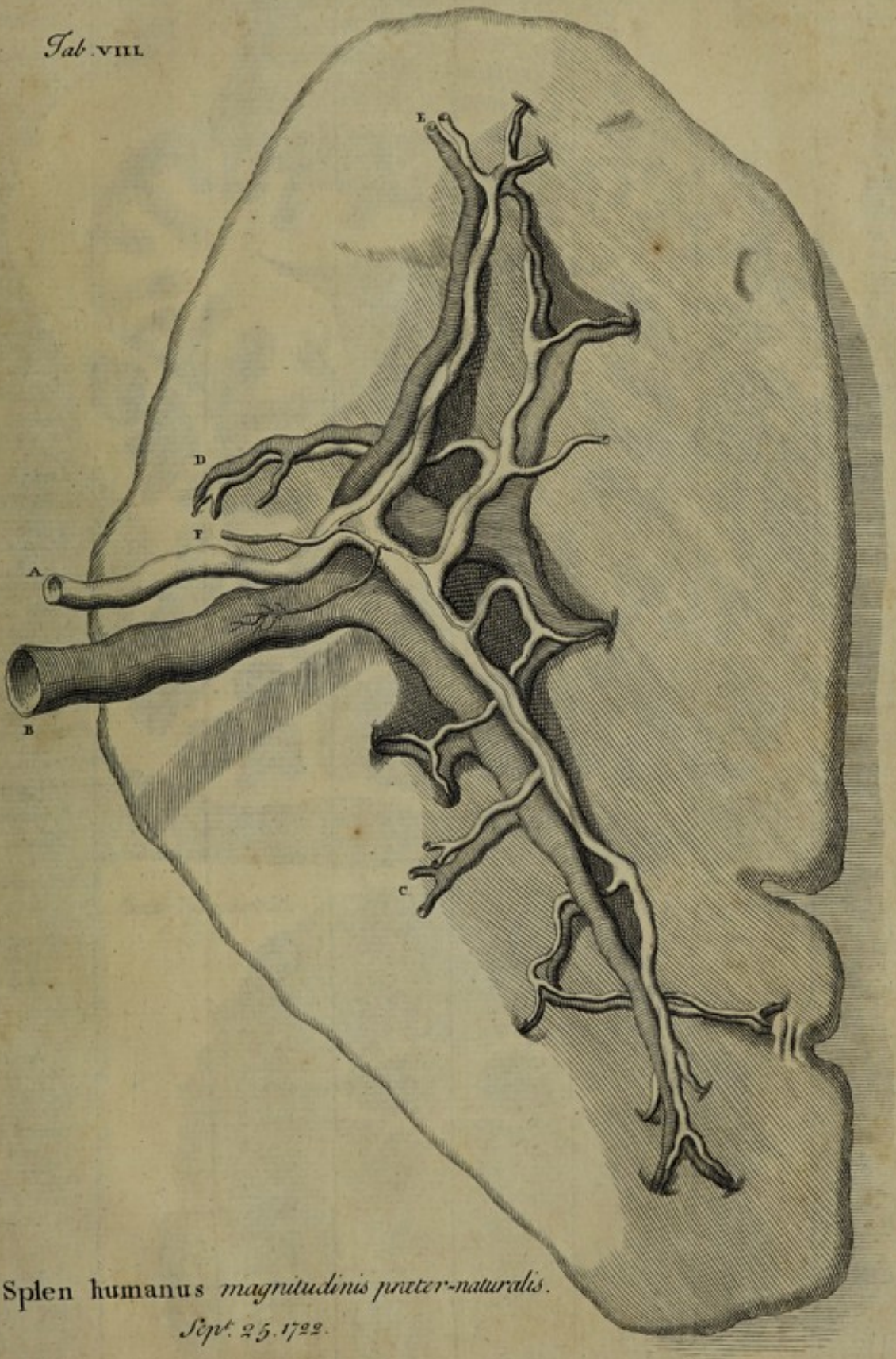




VISCERA
HVMANA
Tabula Septima

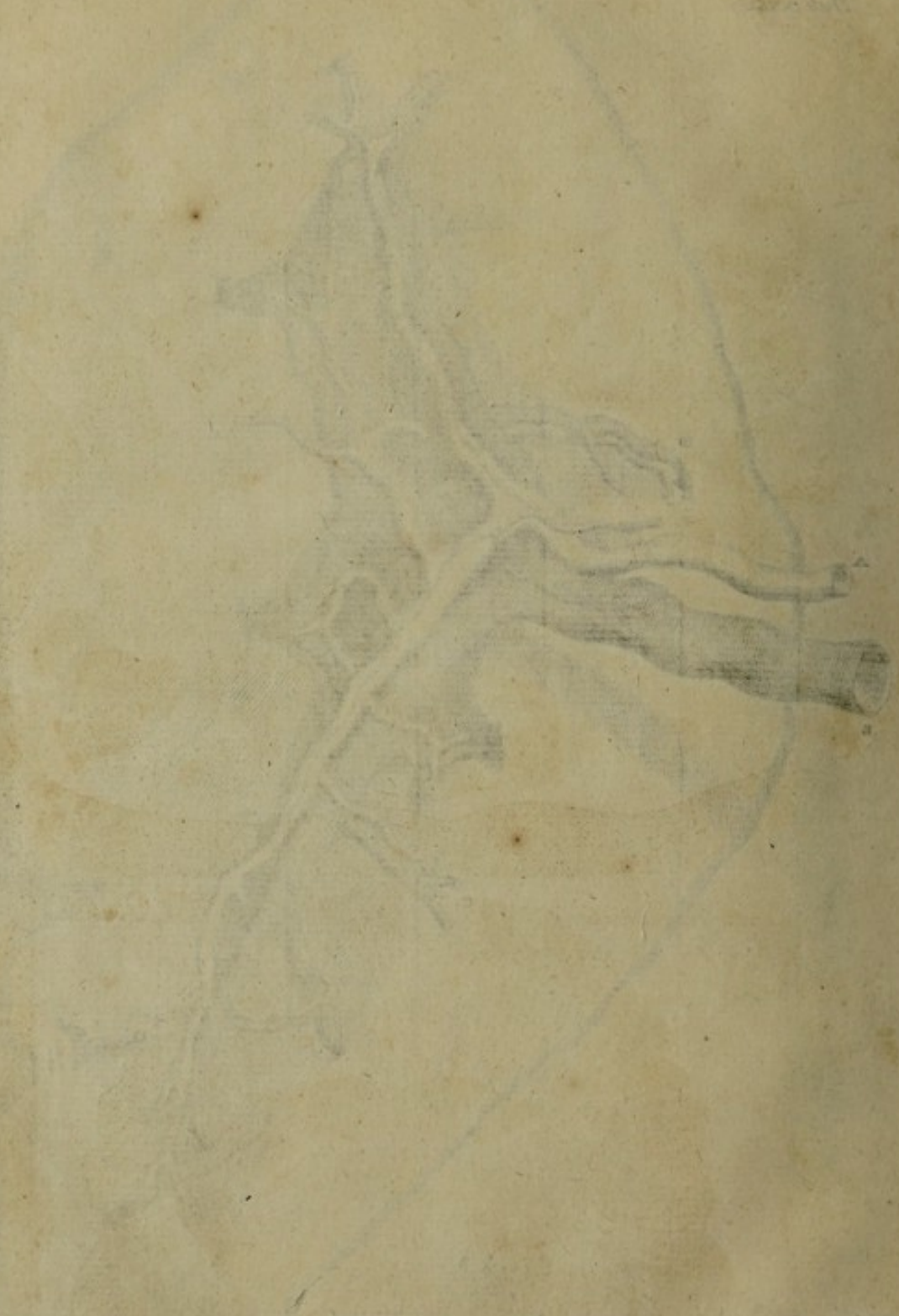
Stukeley des. 7

Tab. VIII.



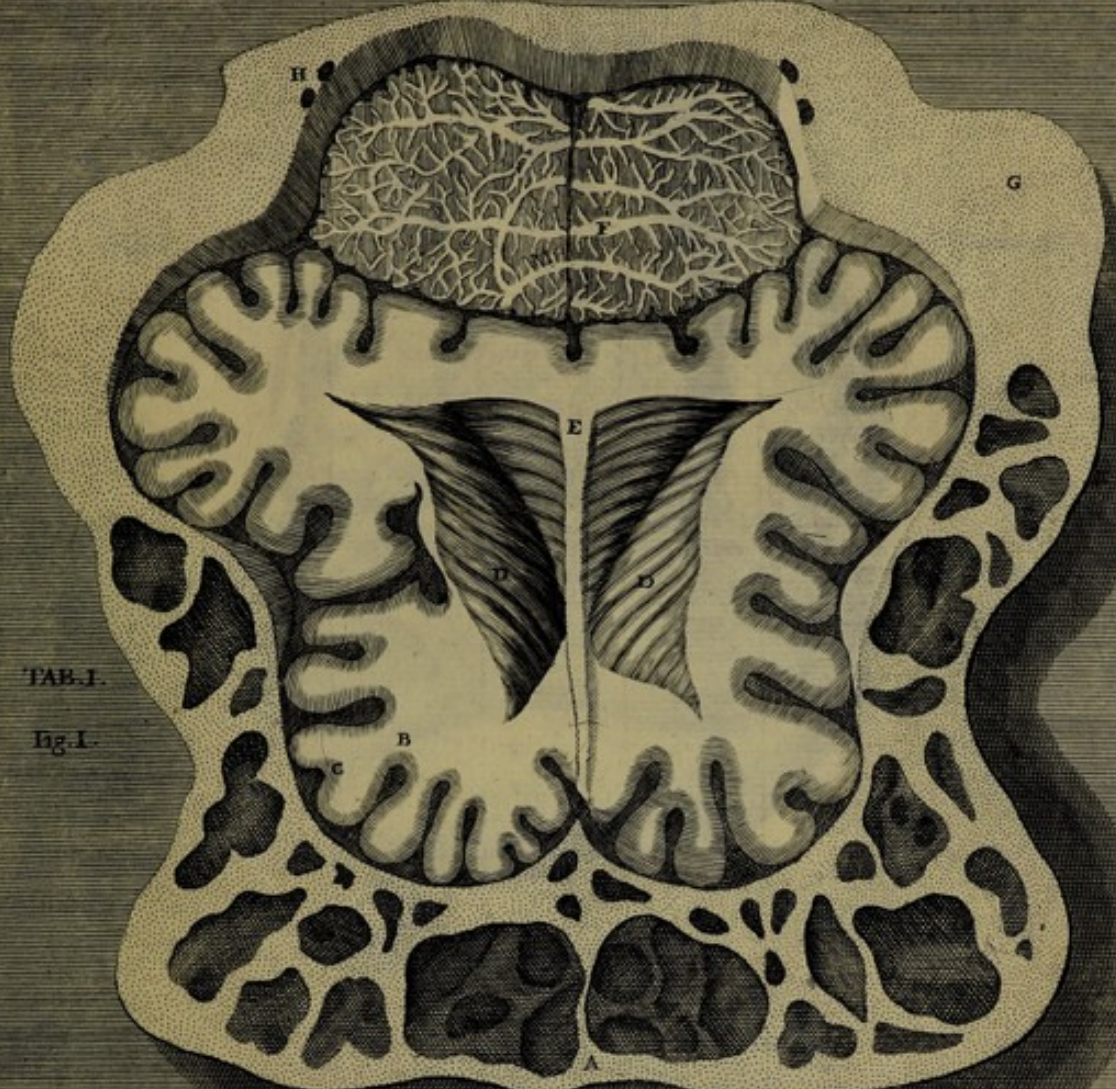
Splen humanus *magnitudinis præter-naturalis.*

Sept. 25. 1722.



These plates are to be bound after the Elephant.

Sectio Cranii Elephanti



TAB. I.

Fig. I.

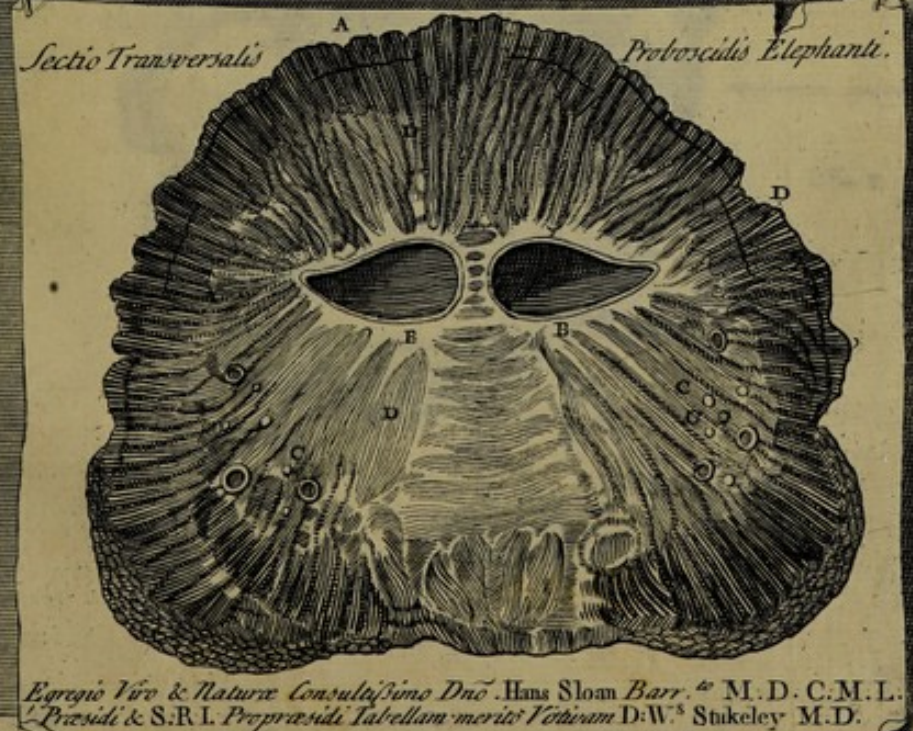
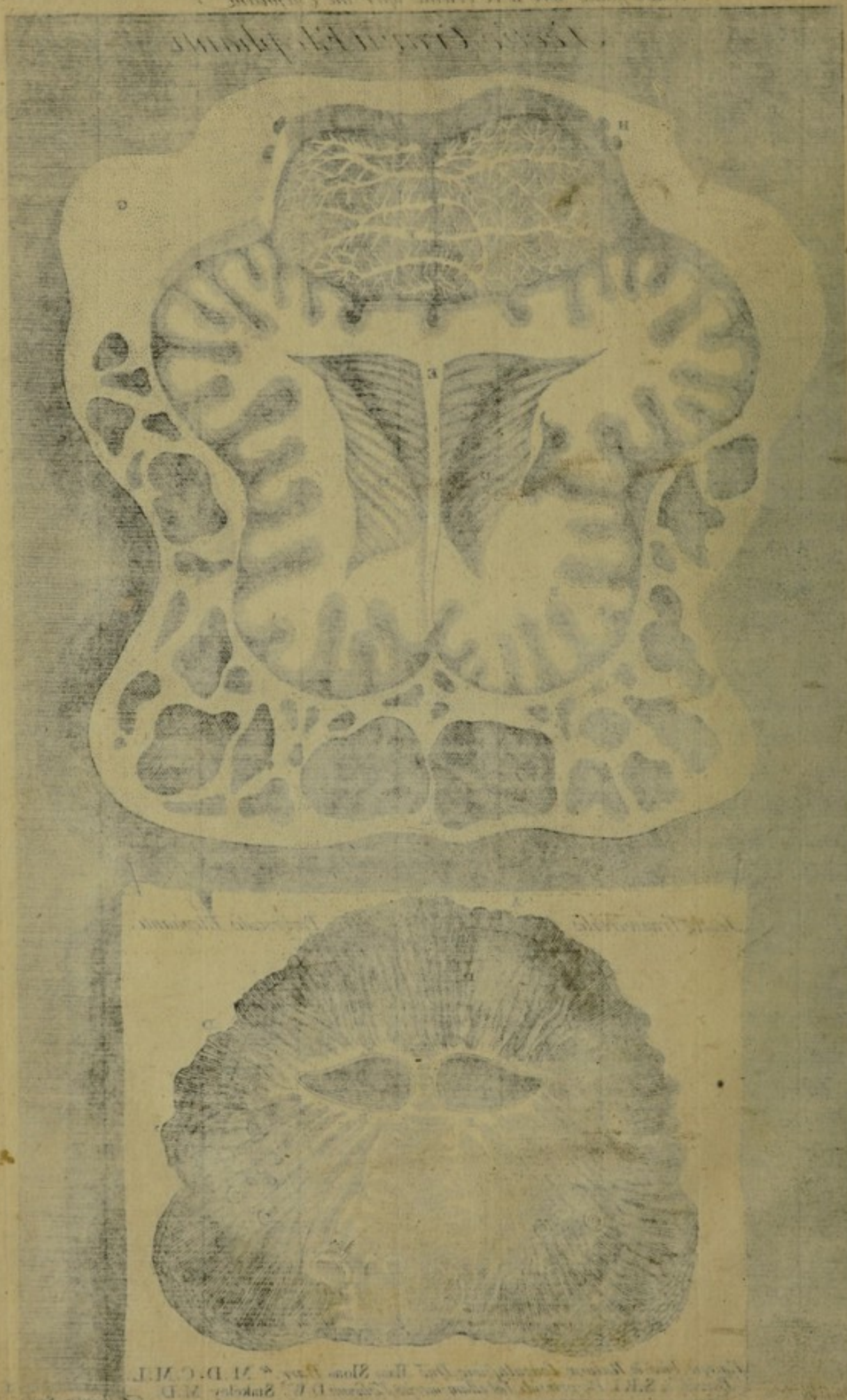


Fig II.

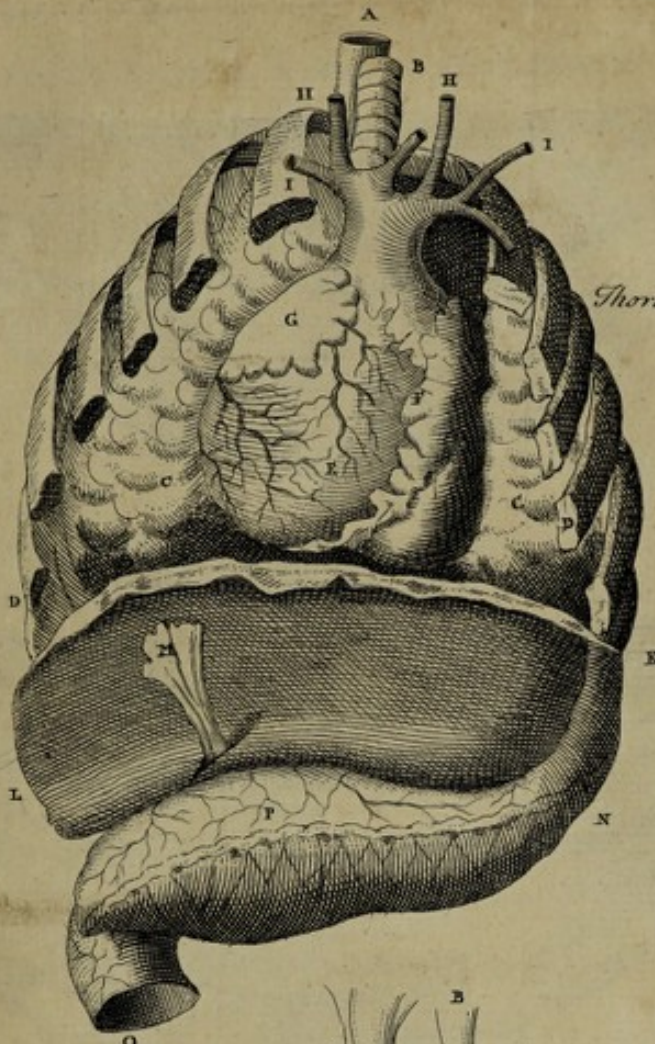
Egregio Viro & Naturæ Consultissimo Dno. Hans Sloan *Barr.*^to M.D.C.M.L.
Præsidi & S.R.L. Propræsidi Tabellam meritis Vtiuram D:W.^s Stukeley M.D.

Stukeley delin. *Thornton Sculp.* I



TAB II.

Fig. I.



Thorax Elephanti apertus

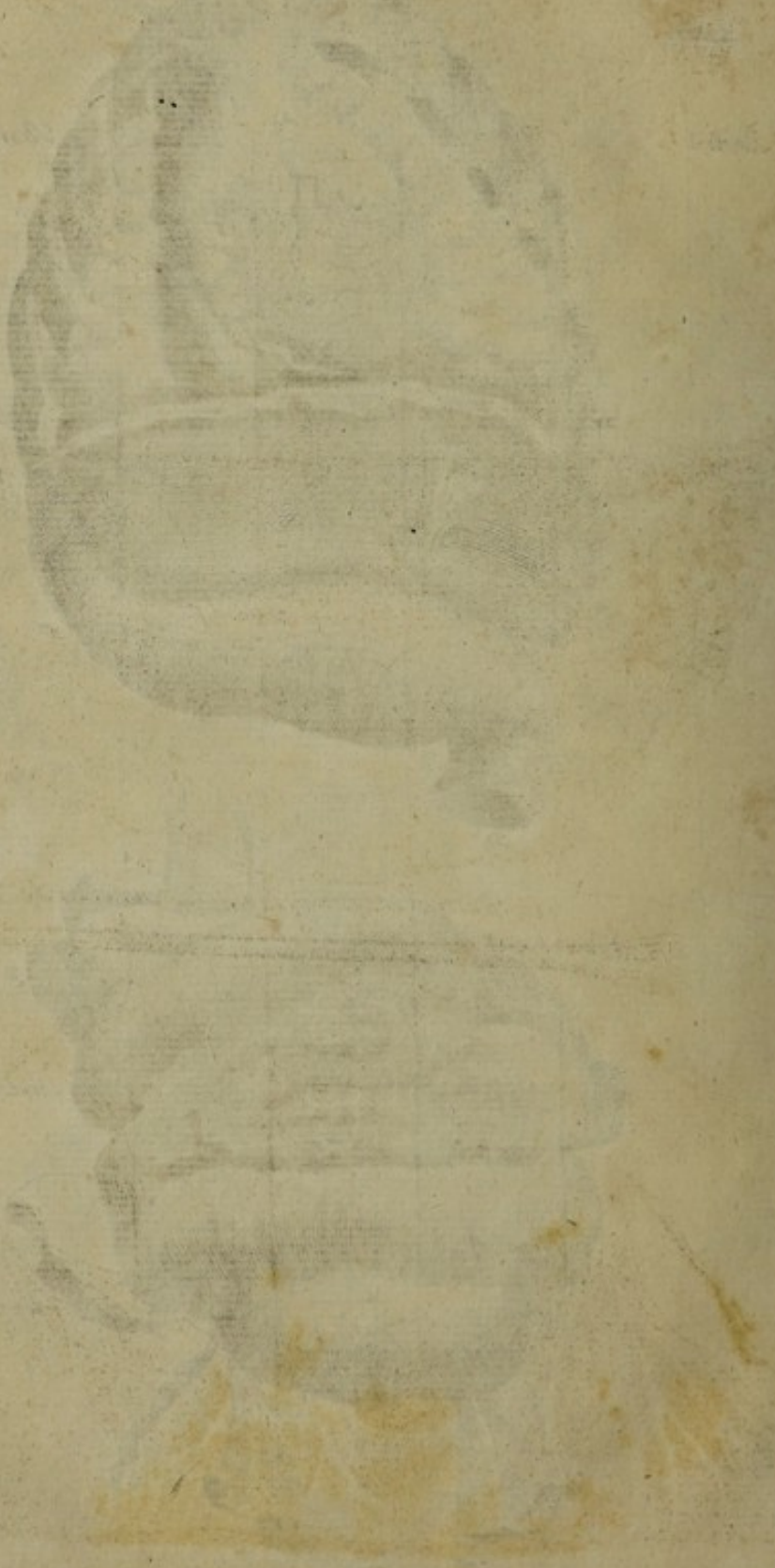
Abdomen apertum.

Fig. II.

Stukeley delin.

II.

Vdr Gucht Sculp.



TAB. III.

Valvula Semilunaris Arteriæ Pulmonalis in Elephanto

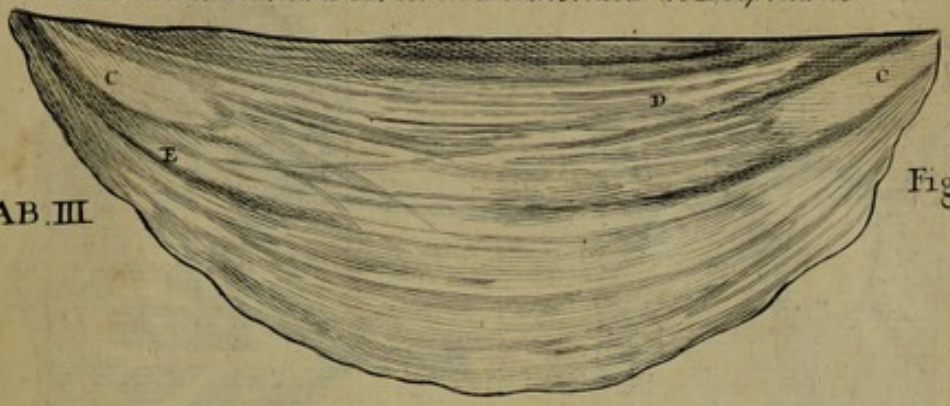


Fig. I

Valvula Semilunaris Aortæ

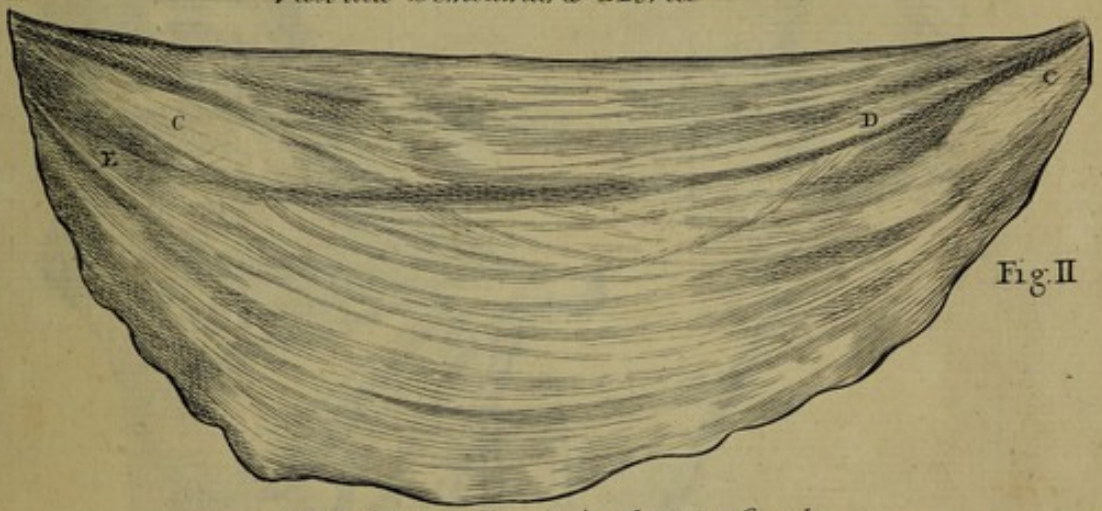


Fig. II

Columna tendinosa in dextro Corde

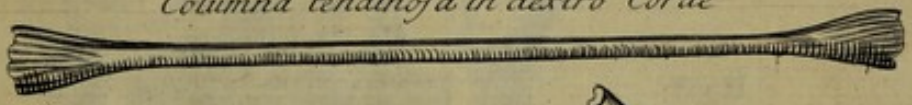


Fig. III

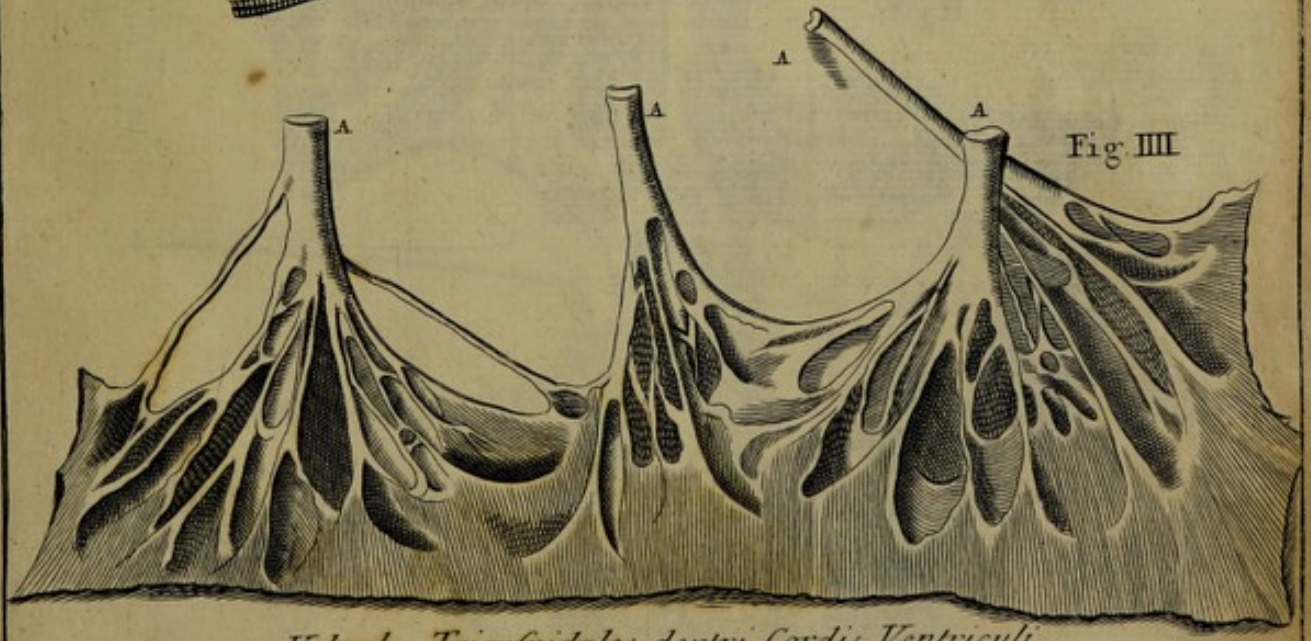
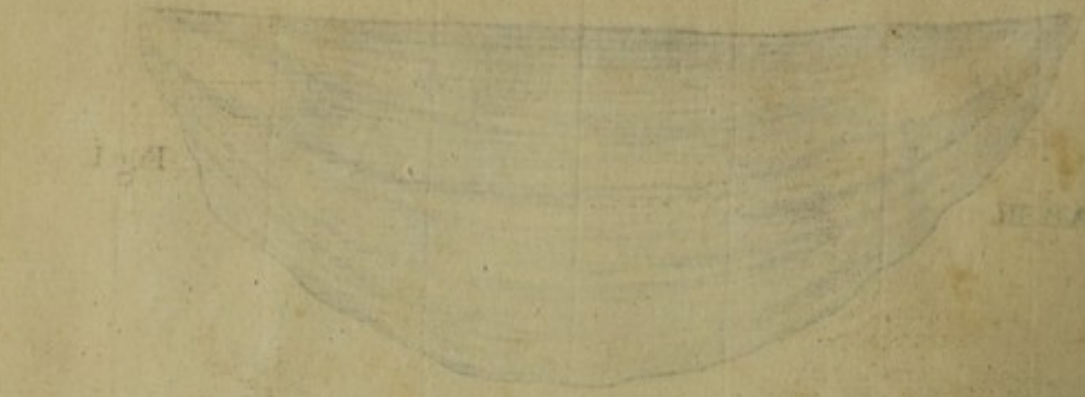


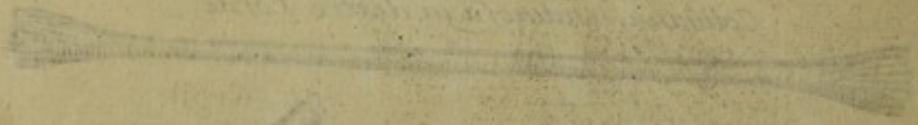
Fig. IIII.

Valvulæ Tricuspidales dextri Cordis Ventriculi

Sayley delin.

Sympson Sculp.





TAB. IIII.

Pars Omenti Elephantini

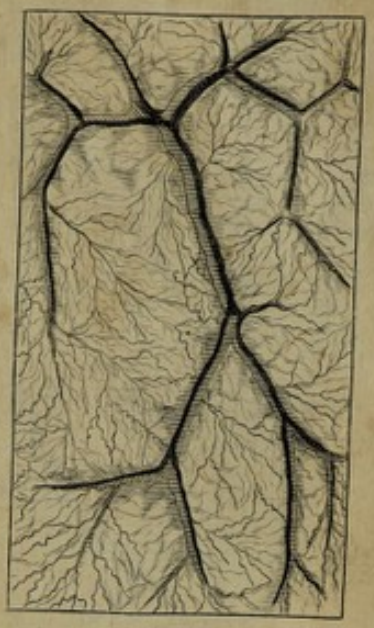


Fig. I.

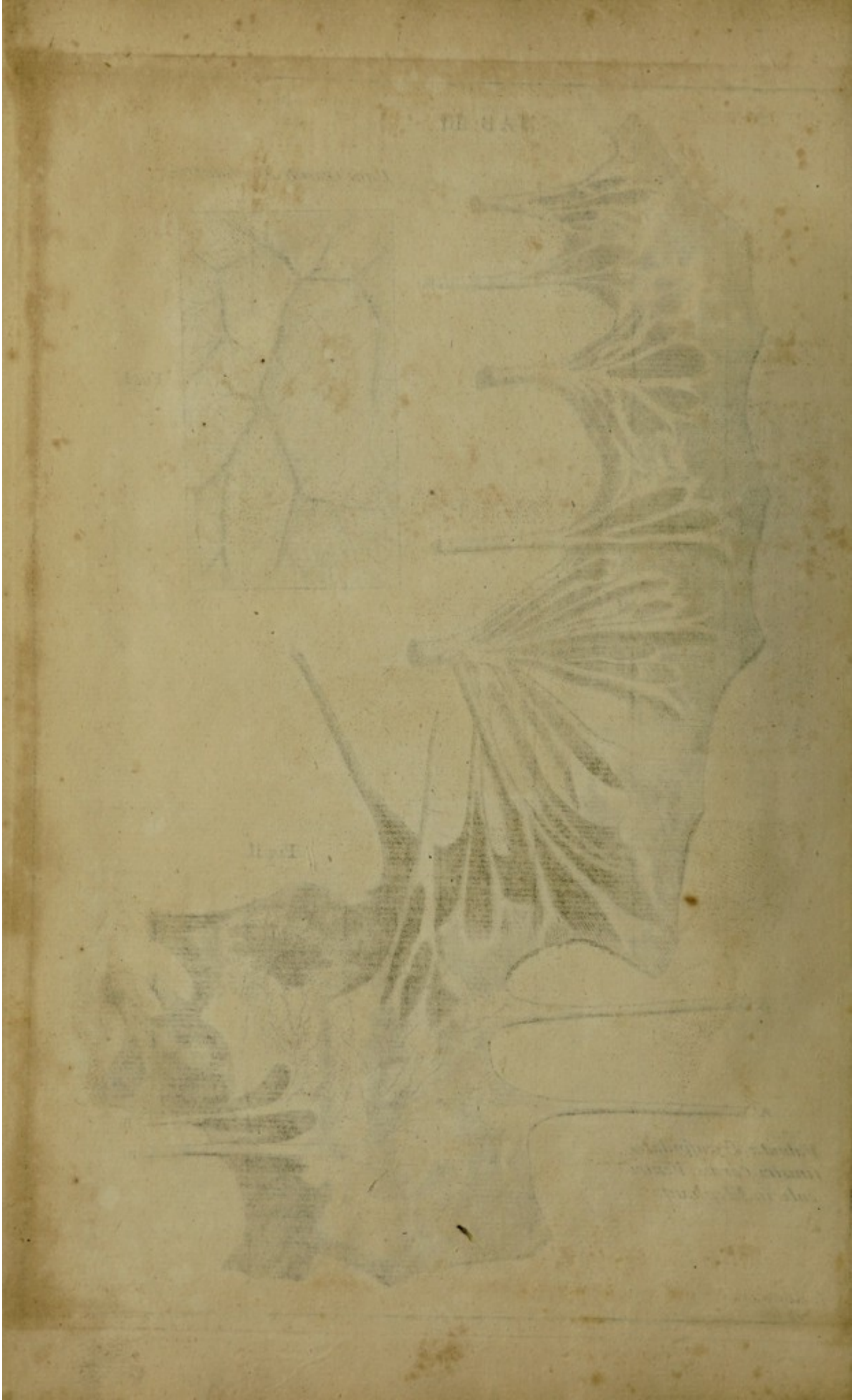
Fig. II.

Valvulæ Tricuſpidales ſinistri Cordis Ventriculi in Elephanto

IV

Sympſon Sculp.t

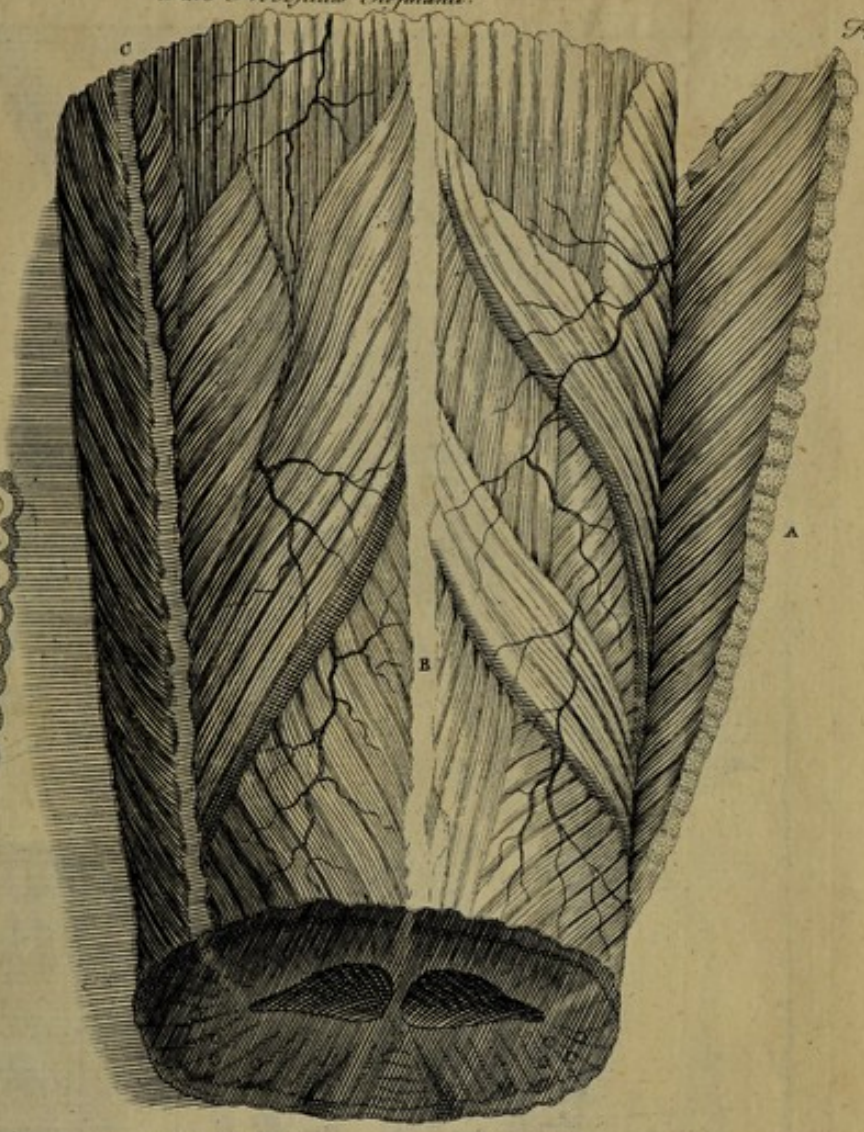
Supſy delin.



TAB. V.

Pars Proboscidis Elephanti.

Fig. I.



Musculus Proboscidis Longitudinalis.
Fig. III.

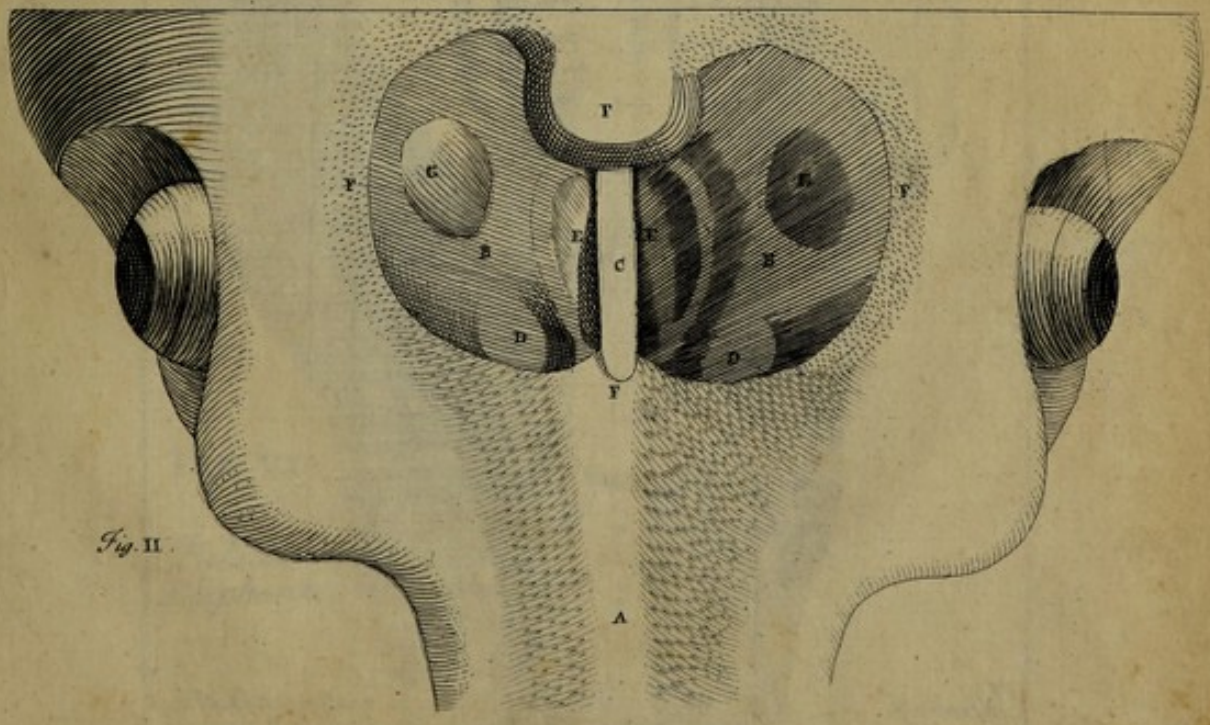
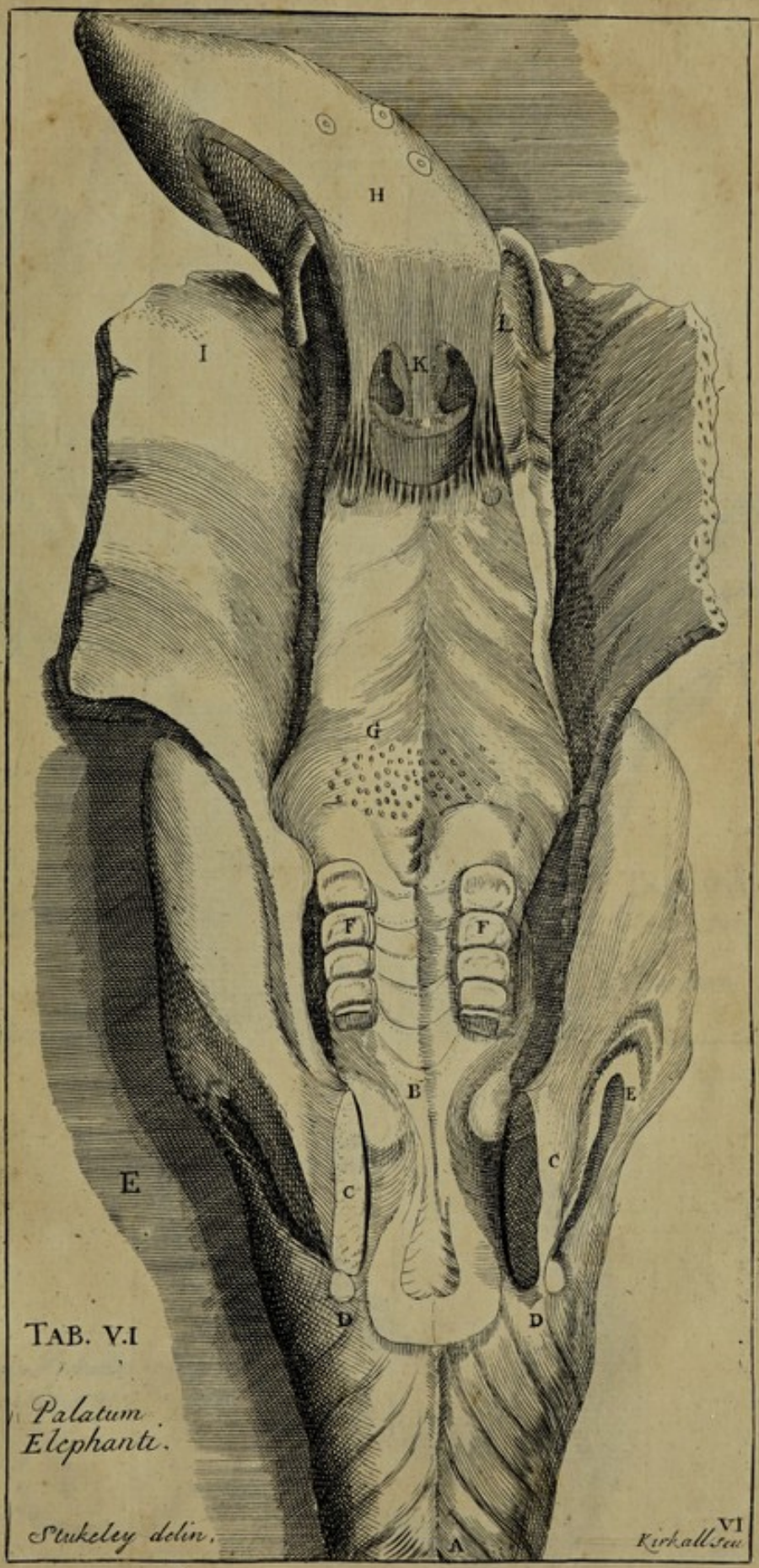


Fig. II.

Os Frontis

Sathelej delin.

Vr Gucht Sculp.



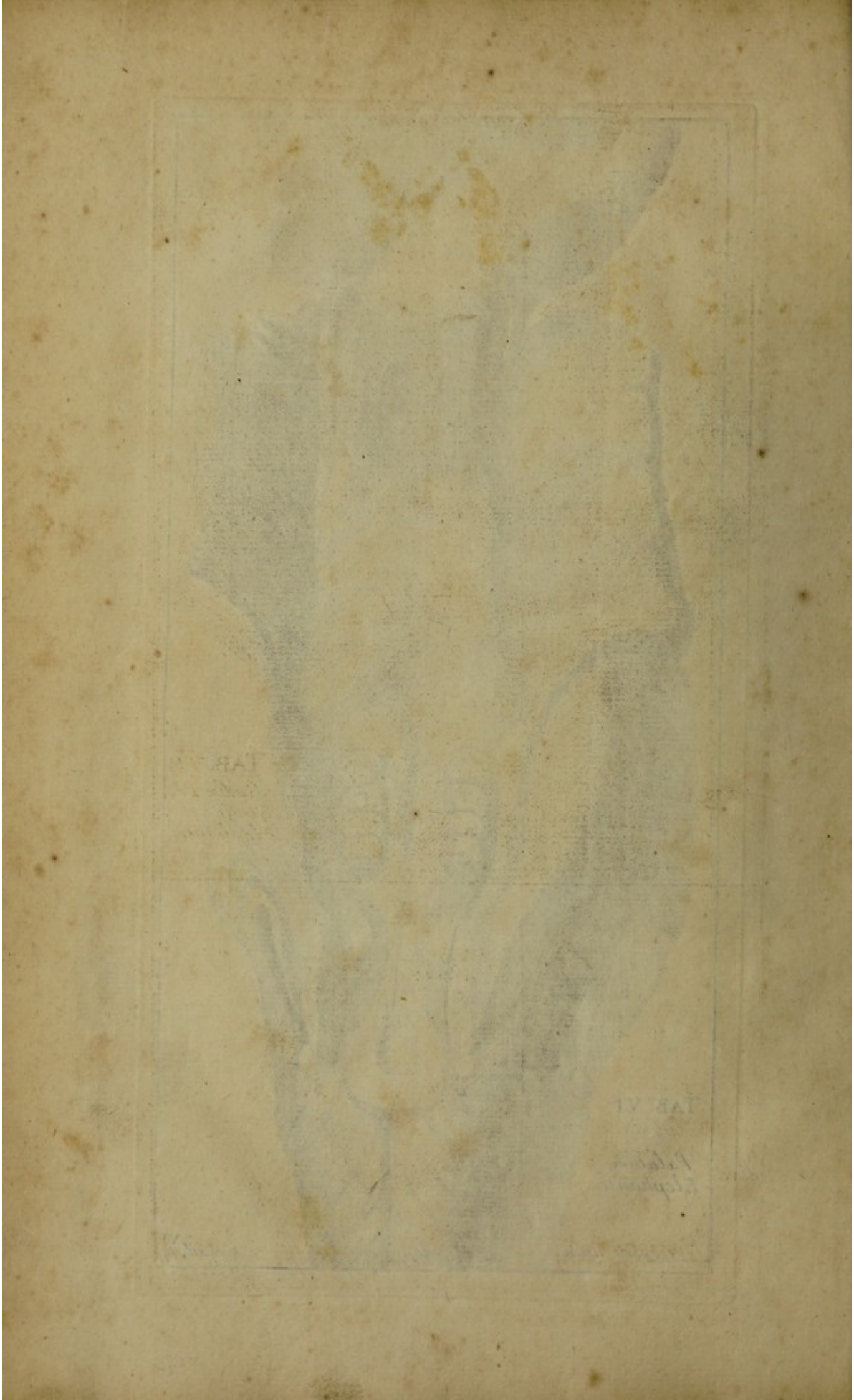
TAB. V.I

Palatum Elephanti.

Stukeley delin.

VI

Kirkall Sculp.



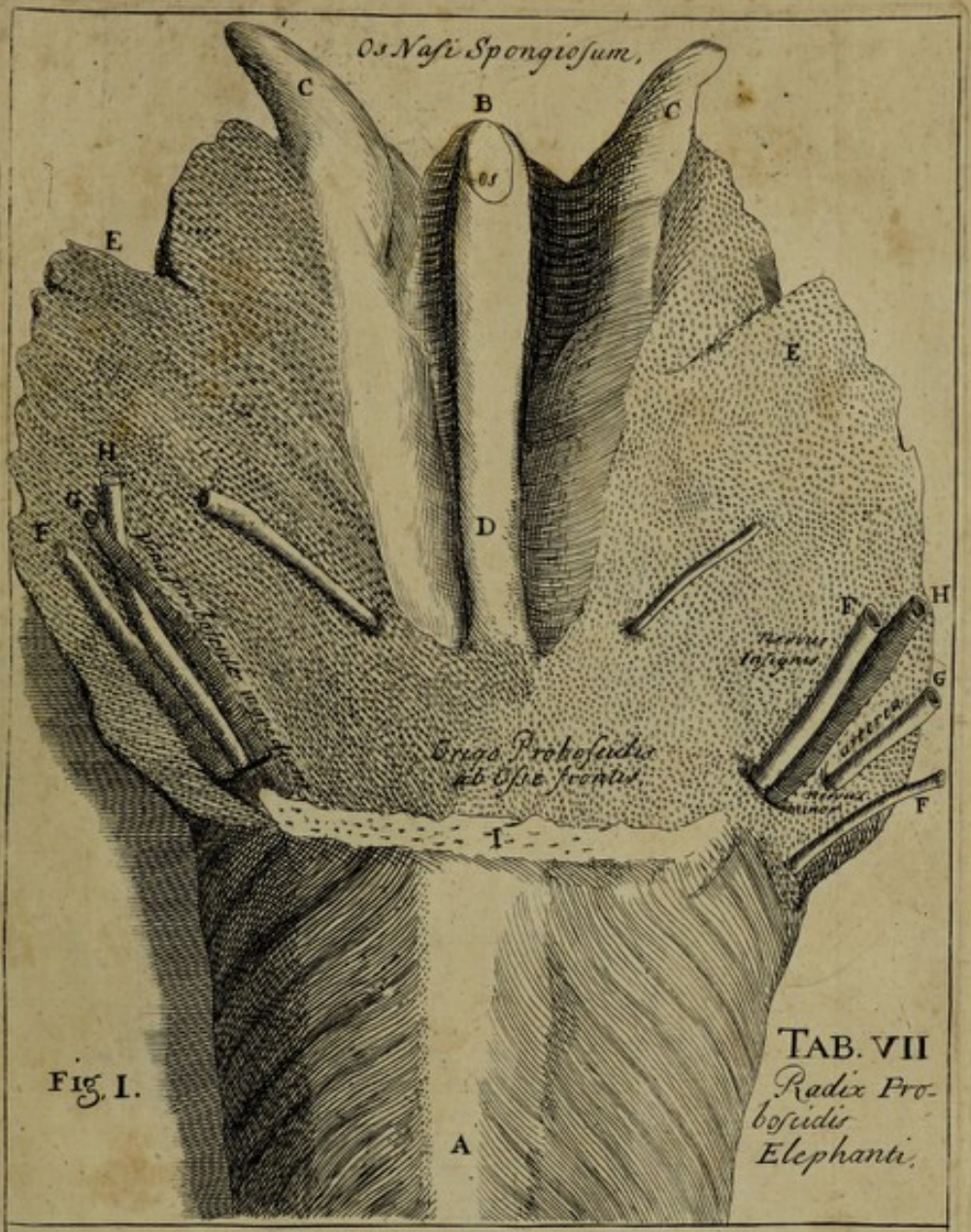


Fig. I.

TAB. VII
Radix Proboscidis Elephanti.

Fig. II.

figura splenis.

Sectio Medullæ spinalis in Naturali Magnitudine.

Fig. III.

Stubelcy delin.

VII
E. Kirkall sculp.

Tab. VIII.

Elephantis Feminæ Partes Generationi
Inservientes, ab aversa parte conspicuæ.
Jacobo Douglas MD.
Summo Anatomico Tabula
Merito voliva.

VIII.

Samuel C. Causten.
Washington D.C.
Dec 1858.